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As some of the arrangements and specialities described in this Journal may be the subjects of Letters Patent the amateur and trader would be well advised to obtain permission of the patentees to use the patents before doing so.

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MODERN WIRELESS

Vol. XX. No. 84.

BRITAIN'S LEADING RADIO MAGAZINE

December, 1933

A Special Supplement—The "Q-B"—A Sign of Progress—1934 Designs.

NINETEEN-THIRTY-THREE has been a very eventful year for radio, and it has been our lot to record a number of important developments in the art during the past twelve months.

In this, the December number, we take once again the welcome opportunity of wishing each of our readers a Happy Christmas and prosperity for the New Year. And in order to assist them with the problem of choosing suitable and satisfying presents for their friends, we are incorporating in this month's issue a special illustrated gift supplement.

In past years we have found that our readers greatly appreciate some assistance in choosing, from the large variety of radio apparatus available, that which is most suitable to their needs and pockets.

This year there is a greater variety than ever, and so our Christmas gift supplement has been prepared with the object of affording the maximum possible aid to the Christmastide shopper.

There is no question nowadays about the permanent pleasure which is procurable from a good wireless receiver. And as the aim of all present-giving is to afford pleasant remembrance, there is no wonder that radio equipment has come to be regarded as the ideal form of gift for Christmas and the New Year. Our supplement will aid you to choose wisely.

The "Modern Wireless" "Q-B"

ANOTHER special feature of this issue is a full description of a magnificent four-valve receiver, the MODERN WIRELESS "Q-B." It is an unusually excellent design, which we can specially recommend to the discriminating set-builder, who wants quality and efficiency combined with the utmost possible economy in running costs.

In the "Q-B" this desirable combination is achieved by the employment of Class B technique, supplemented by an H.T. economiser.

This latter feature is employed in conjunction with the driver valve, resulting in the set's high-tension consumption being remarkably small for a really powerful receiver.

A Sign of Progress

ONLY twelve months ago a powerful output such as is provided by the "Q-B" would have been considered as belonging to a receiver outside the possibilities of economical home-construction. But the advances in 1933 have been such that we can recommend the set with every confidence, for the system on which it is based has been *proved* to be eminently satisfactory in use.

As many of our readers will appreciate, this system (Class B amplification) is fundamentally superior for the battery set. Its outstanding feature is the remarkable economy with which the big and undistorted volume previously associated with mains operation can be obtained from a battery set, employing relatively inexpensive components.

Small Anode Current

It accomplishes this by cutting down the set's anode current almost to vanishing point during silent periods; and consequently the high-tension battery can handle larger volume, when it is called upon to do so, without distress, and still show a substantial over-all economy in its replacement requirements over the period of constant use.

Quite as ingenious, and also fundamentally attractive, is the idea behind the economiser, which is included in the "Q-B" design. It depends for its usefulness upon the recently-introduced Westector, a metal-rectifier which also became a popular adjunct in radio receivers during 1933.

Another fine set design by Mr. G. P. Kendall is also described in this number, under the title, "How to Build the A.C. Mains K4." It makes all the merits of the original K4—including the simplified Step System of construction and Tone Levelling—available to the A.C. mains-equipped household.

1934 Designs

AND now a final word about the future. This is the last number of MODERN WIRELESS to be issued as a separate shilling journal. In 1934 it will be incorporated with its popular sister-journal, "The Wireless Constructor," which will continue to be published mid-monthly, at sixpence.

We should like to call special attention to the fact that it is in "The Wireless Constructor" that Mr. John Scott-Taggart describes his world-famous receivers, such as the "S.T.300" and the "S.T.400."

Probably all our readers will know of the phenomenal success which attended these designs. And they have heard, already, of his latest design, The "S.T. Super," a marvellously selective and powerful set. To make sure that it would succeed under the most difficult conditions, it was designed within 4½ miles of the London stations.

The "S.T. Super" was described in the December number of "The Wireless Constructor," and when that journal incorporates MODERN WIRELESS, in 1934, it will continue to be the vehicle by which exclusive "S.T." designs are made known to the public.



I HAVE done quite a lot of testing since last month, and though the loudspeaker I referred to did not come up to expectations, I have found a couple of new pick-ups that are worth careful consideration by anyone requiring that type of component.

They are cheap, too, and form remarkably good value for money. Made by Cosmocord Ltd., a new firm on the Cambridge Arterial Road, Enfield, the pick-ups go by the name of "Universe," and comprise two models, the Standard and the Super.

The same head is used in each, but the mounting is different, that of the Super being adjustable for pick-up weight by means of a simple lead balancer at one end of the arm.

The Standard model has no such counterpoise, but as in the case of the Super the pick-up head swivels for needle insertion and both models have volume controls incorporated in the bases. These controls, by the way, are particularly neat, being very much smaller than usual.

The pick-up armature is highly damped and the gap is small, resulting in excellent sensitivity and clear-cut reproduction. The response curve is good, the bass being well produced, with adequate compensation for record loss, while the high notes are fully represented. There are peaks in the curve, of course—what pick-up is free from them?—but they are not serious, and at the price of 20s. and 22s. 6d. for the two models I consider they are excellent propositions.

Her Xmas Record

Gracie Fields, our national comedienne, has made another Christmas record. It was hoped to be able to

make it at the Fields' home at Telford, but the advisability of having an orchestral accompaniment made that idea impracticable.

The record is intended to give a faithful portrait in miniature of the annual gathering of the Fields' "clan" each Christmas, when they all sit round the fire and sing songs in harmony.

So we have Gracie, her mother and father, her sister Betty, and her brother Tommy, all joining in a striking

MUSICAL "COLOUR"



The latest novelty in records is the new "Truesound." These records are cheaper than ordinary discs, weigh about an ounce, and bear colourful pictures of the "stars," of the songs they contain, or scenes symbolising the number recorded. Incidentally, they are practically unbreakable. Above is a selection of the first batch of "Truesound" records, showing the artistic design of the discs.

Yuletide record which is vibrant with human appeal. You should look out for it, and especially Gracie's maternal kiss at the commencement, which kiss caused some trouble at the recording end.

Personal Touches

The human side of recording is much more varied than the general public might think. All sorts of little episodes take place at the studios, or have their signals under the recording stylus, and an excellent book could be written on that side alone.

Here is a typical example of how a quite personal incident may result in a recording that will be heard the world over. It concerns John McCormack, the world-famous Irish tenor, and his latest H.M.V. recording, "Love's Roses."

This record was made by Count McCormack when he was in London in the middle of September, the day before the marriage of his daughter Gwendoline to Mr. Edward Pike.

The song, "Love's Roses," was written under unusual circumstances. Miss McCormack met Mr. Martin Broones, the well-known popular song composer (who wrote the music for "Give Me a Ring," now on at the Hippodrome), at a cocktail party in London last February.

She mentioned to Mr. Broones that she was trying to find a novel Easter present to send to her father who was on a concert tour in America. After discussing several ideas with Mr. Broones, he inquired as to whether she could sing at all, and on hearing that she possessed a soprano voice, he suggested he should compose a special song which she should record, and send a copy of the record to her father.

"Love's Roses"

She thought it an excellent idea, and the dance music composer set to work on a tune which he eventually called "Love's Roses." Mr. Broones and Miss McCormack visited the "His Master's Voice" studios, made the record, and despatched it to America.

Count McCormack, besides being gratified by this unusual present, was very interested in the song itself, and when he next saw his daughter said that when he was in England he would record it personally, and show her how it should be sung. DA1341 is the outcome of their friendly competition.

HOW TO BUILD

The A-C MAINS K4



by **G.P. KENDALL, B.Sc.**

All the merits of the wonderful K4 design are now made available for the mains user. The Step System, Tone Levelling, and all the other remarkable features of the original design are here allied to the super efficiency of mains valves in a set which is as up-to-the-minute as the Grid Scheme.

STRANGE as it may seem to cynics who remember how long I have been doing it, I really enjoy designing and making sets! I get lots of pleasure out of it; partly, I suppose, because one always enjoys the use of one's skill at anything; partly because I still get a thrill from seeing an assemblage of inanimate parts come to life and re-enact the scientific miracle of wireless at my bidding, and partly because I always have the hope that the new set will be better than anything which I have done before.

Probably the last is the main reason for the enthusiasm with which the job always inspires me, for I rarely make a set unless it is to contain some features which I am pretty sure will make it a really noteworthy affair.

A Foregone Conclusion

Consequently, I always switch on for the first test with a feeling of pleasurable anticipation, which I hope is shared by those constructors who follow my designs.

I always find it particularly interesting to make a mains version of some set which has proved of exceptional efficiency in battery form, for then one knows that the new instrument is quite certain to be something exciting to handle, as a result of the natural increase in amplification of each of its

stages when the mains valves are brought into the picture.

It was, therefore, a foregone conclusion that I should make a mains version of the K4. Even if I had no intention of publishing the design, I should still have made the set for my own satisfaction. But actually, of course, I knew that many readers would likewise be interested in it, and so, as soon as the battery version was complete, I set to work to produce a fully worked out mains design.

Top-Notch Efficiency

I had a most interesting time over it, and the final result completely delighted me, for it was such a mains set as the enthusiast dreams about, and yet it gave no trouble from the first. As I designed and built it, so it worked and gave top-notch efficiency at once without the slightest adjustment or modification.



All the K4 Features, Plus Mains Working

If it had been designed as a mains set from the first, of course, this would not have been so gratifying, for it should almost always be possible to design such an instrument so that its behaviour can be predicted in advance. Where one proceeds by keeping as close as possible to a battery design, however, there is some difficulty in estimating whether there will be sufficient stability left after the more efficient mains valves are set to work.

Inherently Stable Design

I, naturally, wanted to make the mains K4 as much like the battery one as I could, so that it should be easy for anyone to make a conversion of the one into the other if he should so desire. I might perhaps have hesitated to adopt this plan in the case of so large and highly developed a set if I had not had such complete faith in the virtues of the Step system in promoting an efficient and inherently stable design in the first place.

Events showed that my trust was not misplaced, and it is a striking fact that the mains design, as shown in the photo and wiring diagram, contains no more screening than the battery set, and the only increase in decoupling is that made necessary by the various voltage-adjusting circuits.

I shall explain how a little extra screening of individual leads in the wiring may, in some cases, be desirable, but in all essentials the stabilising arrangements of the mains set are

precisely the same as those of the battery version. Nevertheless, the mains instrument possesses the full standard of stability which I consider desirable in a design for the home constructor.

Let me explain that last remark, lest somebody might think I am trying to hide something! The point is this: in a commercial set it is usually necessary, in the interests of complete ease of operation, to make the H.F. stage entirely stable. Where the operator is prepared to exercise a little skill for the purpose of getting better results, it is definitely an advantage to arrange matters so that when the H.F. "gain" (or "volume") control is turned right up, the circuit just approaches a condition of instability.

This condition is fulfilled in the mains K4. When the volume control is turned right up, you will find that the set begins to show slight signs of being "near the edge." Only a little reaction will then be needed to make it oscillate, and there may even be places on the dial where you can make it oscillate with the reaction condenser at minimum.

Getting the Last Ounce

What this means, of course, is that on those rare occasions when you want the last ounce out of the set, you will be able to get the extra sensitivity of a little controlled feed-back in the H.F. stage, as an automatic result of turning up the volume control. By making only a moderate approach to

this condition, and then applying the reaction at the detector stage, you will find it possible to get some very interesting results.

At all other times you will, naturally, find it necessary to keep well away from the maximum volume setting to avoid excessive strength, and then the effect does not take place. Reaction can, in such circumstances, be applied in just the normal way, if it is desired to eliminate interference, with perhaps a further reduction on the volume control to keep the strength of signals within bounds.

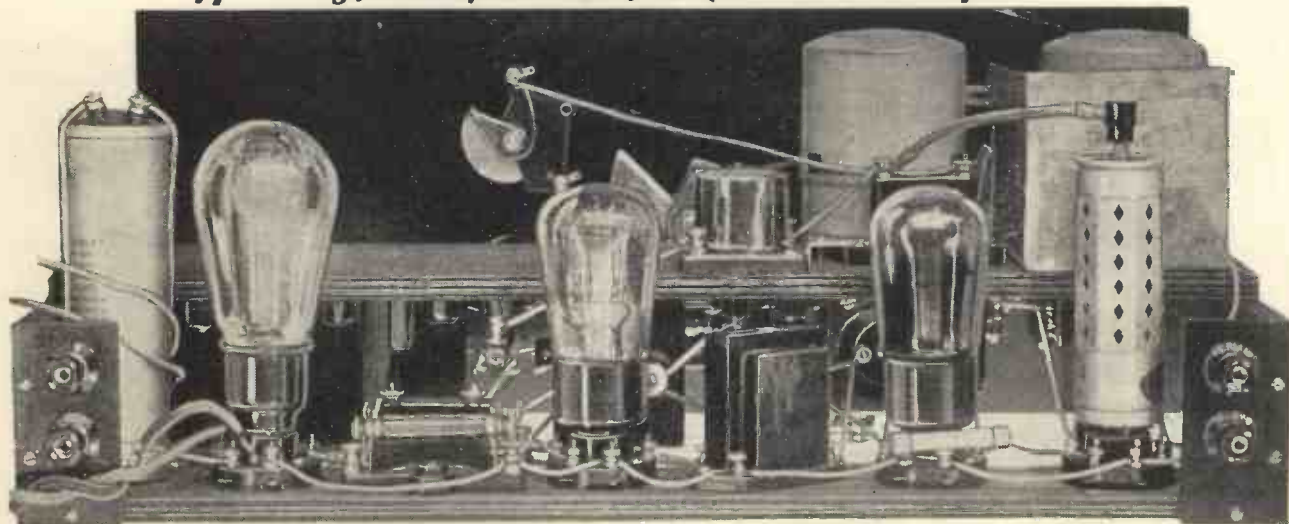
Separate Power Unit

This is a method of using reaction in a powerful set which can only be used to full effect in a receiver incorporating my "tone-levelling" system, as I explained in the original articles describing the K4.

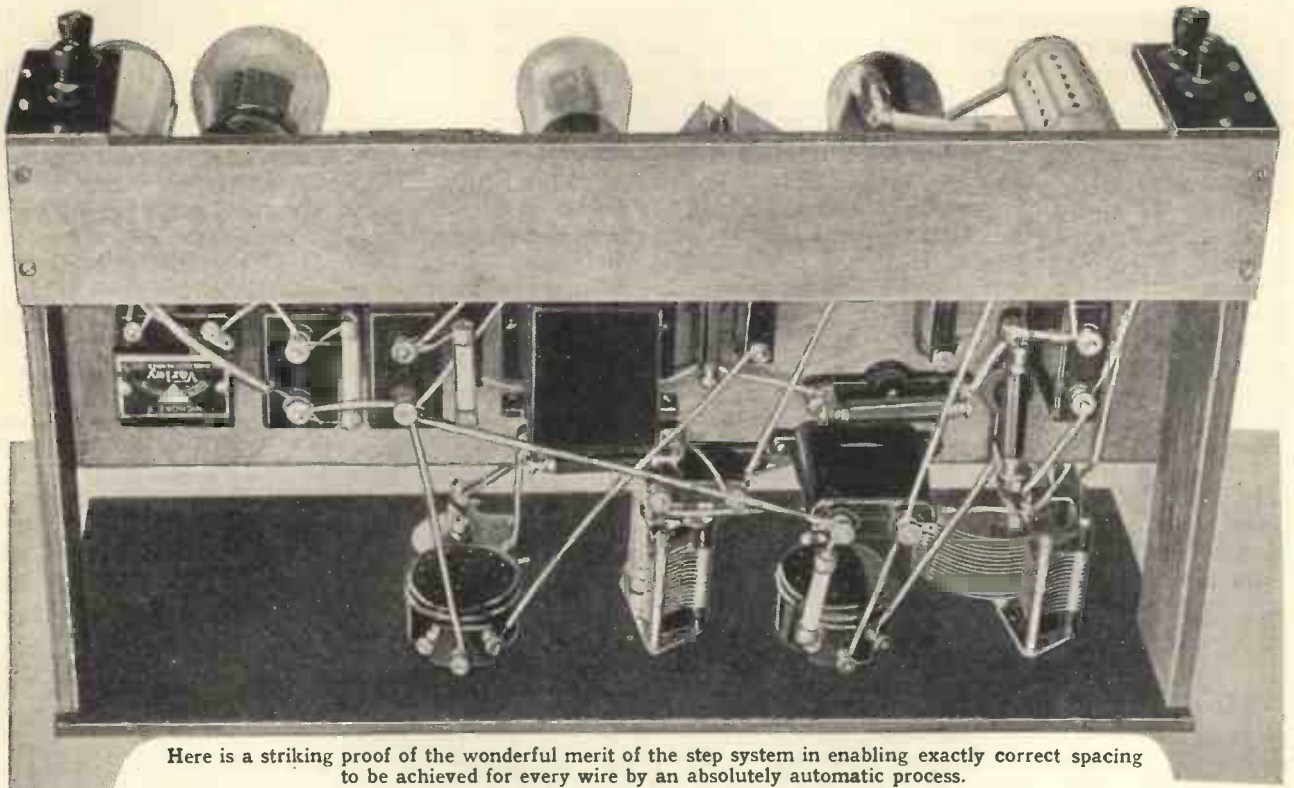
As regards the general plan of design I have used for the mains K4, it will first be noted that I have chosen the scheme of a receiver which incorporates just the voltage-adjusting circuits, the actual mains equipment being located in a separate power unit which the constructor can purchase ready for use.

This system has, to my mind, many important advantages, chief among which is the fact that the power unit is a more or less standard affair, which can be used with future sets. Thus, when at some (very) distant date you decide that your K4 is due for replacement it will only be a matter of building a new set: the old power

Efficiency, Compactness, Superlative Performance



The mains set is assembled on exactly the same principles as the battery model. Great pains have been taken by the designer to make it as easy as possible to convert the original instrument for mains working.



Here is a striking proof of the wonderful merit of the step system in enabling exactly correct spacing to be achieved for every wire by an absolutely automatic process.

unit is pretty sure to serve for the new receiver.

The particular type of power unit which I have chosen gives a supply of H.T. current at a voltage of approximately 200, up to 60 m/a. being available. There is only one voltage tap, of course, all voltage adjustment for the separate valves being done in the set itself, as I mentioned just now.

The unit also provides two separate supplies of alternating current at four volts for the heaters of the valves. Only one of these supplies (the 5-ampere one) is normally used for the K4, but the other would be required if a directly-heated type of output valve were employed.

Easily Converted

The set itself is of the same over-all dimensions as the battery instrument, and can be housed in a similar cabinet if desired. The step framework is exactly the same, and the panel layout is identical except for the obvious omission of the on-off switch, the mains set being controlled in the usual manner by means of the switch governing the mains outlet from which it is run.

I have taken considerable pains to make the two sets as much alike as

possible, so that the task of conversion might be made an easy one. I stress this point, because I foresee that many battery users will come to the conclusion that in the K4 they have found a set which they will be prepared to keep for some years, and they will naturally begin to think about running it from the mains.

A Word of Advice

Many battery users, I find, continue to build battery sets simply because they wish to leave themselves free to scrap and renew with the minimum of expense, thinking to change over to some form of mains working only when they have found a set which is so good that they consider it will satisfy them for some time to come. The original K4 must surely come within this category, and I should like to offer a word of advice to those who may now be thinking about the best way of running it from the mains.

The natural thing to do, I know, is to buy or build a mains H.T. unit, possibly with a trickle charger to take care of the L.T. supply, but I would like to suggest that the alternative method of converting to the actual mains version should be given serious consideration. In this way real all-mains working is obtained, with

complete abolition of all battery worries, and it is to be remembered that the mains version gives even more startling results than the battery instrument.

The actual cost of the conversion is very little more than that of the other method, for a very large number of the components from the battery set can be used again.

The difference in cost then becomes chiefly a matter of the purchase of a set of mains valves, and while it must be confessed that this is something of an item, there is the mitigating fact that such valves have amazingly long lives, and that their cost must be compared with the length of service they give.

Making Comparisons

So much for preliminary matters. I wonder if I need say much about the results the set will give before I go any further? The performance of the battery model is now so well known that I think all I need do is to explain how a mains set compares with it, and leave out all the superlatives.

Selectivity is approximately the same, with perhaps a slight advantage in favour of the mains model. This really results chiefly from the fact that the "mag." of the mains H.F. stage is

Only a Stepped Receiver is Up-to-Date!

slightly higher, and therefore it is possible to work with the series aerial condenser at smaller settings for a given strength of signal.

The over-all mag. of the set is perceptibly higher, although the difference is less than is usual in these cases. The maximum undistorted output of the mains set naturally depends upon the particular output valve chosen, but it is normally of the same order of magnitude as that of the battery model. Theoretically the quality from the mains set should be a trifle the better, but in practice it would take a most exceptionally acute ear to detect the difference.

The quality given by the Class B output stage of the battery set is, of course, well above the average standard of such circuits, so if you have only heard an ordinary Class B set you may

the first set, I should feel obliged to go to great lengths to convince the reader of the amazing merits of the one I am now presenting.

Circuit Details

Just as in the case of the battery set, this really rather wonderful efficiency is based on two distinct lines of development. First, there is the fact that the circuit is properly engineered to take full advantage of the latest modern developments in ultra low-resistance tuning circuits, which is made possible only by my tone-levelling system, which permits it to be done without loss of quality, and, secondly, there is the construction of the set on the step system, which for the first time permits a really efficient lay out to be obtained.

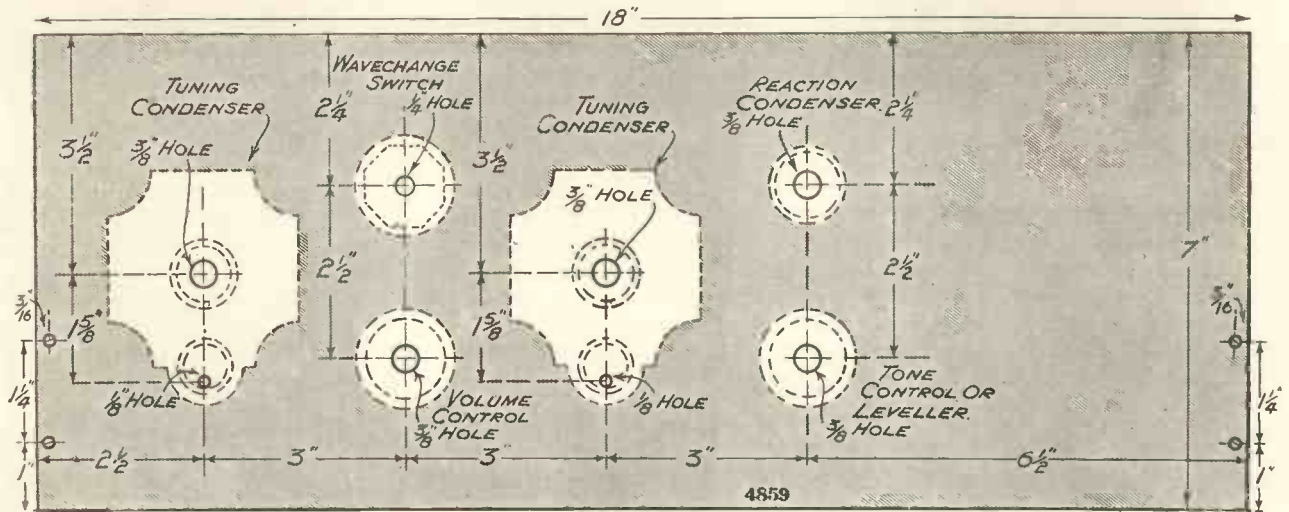
Space will not allow me to go into

that the anode current from the S.G. valve passes through that portion of it between the slider and the end nearest to earth. The potentiometer also carries the "waste current" from the potential divider system which supplies the screening electrode voltage for the valve, with the usual object of maintaining as nearly as possible a constant difference of potential between the cathode and the screening electrode.

Between the lower end of the potentiometer and earth a small resistance is inserted for the purpose of providing a sort of stop on the bias adjustment, so that it is impossible to apply zero volts to the grid of the valve. This resistance is marked R_4 in the diagram, and its actual ohmic value is given elsewhere.

The usual by-pass condensers are provided from cathode to earth and

How to Place the Panel Parts



PANEL DRILLING DIAGRAM.

The panel layout is identical with that of the battery model, except that the L.T. switch is omitted, the mains set being controlled from the mains point which feeds it.

expect the quality from the mains K4 to be decidedly better. I mention this point because I have heard people allege that Class B gives poor quality, and I do not want to give them a wrong impression. Actually, of course, Class B can give really good quality, but it must be confessed that considerable care in design is needed to make it do so.

Startling Performance

To sum up, the mains K4 will rake in a perceptibly better string of stations than even the original battery model could do, and it will give distinctly better volume on the weaker ones. That, naturally, means a pretty startling performance, and if I had not already gone into the matter with some thoroughness in connection with

these points in detail here, so I must ask the reader to refer to those sections of my original article in the October issue which dealt with them. Everything which I said therein applies with equal force to the mains set.

Now I think we might take a look at the circuit diagram of the receiver, and see how it has been modified to make it suitable for mains working. Starting at the usual place, it will be observed that the general arrangement of the tuning circuits is unaltered, but the S.G. valve is provided with a different type of grid-bias voltage adjustment, as befits a variable-mu valve of the mains type.

In the present instance the bias is derived from a potentiometer of 10,000 ohms so placed in the circuit

from screening electrode to earth, and although they are arranged in the simplest possible way, they are so combined with the voltage control resistances as to produce fully adequate decoupling.

Protecting the S.G.

In the anode circuit of the valve will be found a resistance marked R_2 which may look a little unfamiliar, but actually performs quite an ordinary function. Its purpose is to effect a slight reduction in the H.T. voltage applied to the valve, for although the maximum (200) is within the normal rating of a mains S.G., my experience is that to work a little below this point is advantageous. The drop in amplification is so slight as to be imperceptible, and the emission of the valve is safeguarded.

New Principles—New Ideas—New Performance

The absence of a decoupling or bypass condenser will be noted in connection with this resistance. The reason for its omission will probably be known to the reader; parallel-feed

choke-capacity output filter for the speaker and properly arranged auto-bias circuit to economise decoupling components. This is a point which I consider has been neglected very largely in recent set designs.

correct types of components are used, every important wire can be run straight from terminal to terminal, and if each is so treated and pulled tight, correct spacing of every one is automatically assured.

A VITAL COMPONENT



Here you see the compensating L.F. transformer which is an integral part of the tone-leveiling system which plays an important part in making the K4 the outstanding design of the year.

circuits very rarely require any actual decoupling.

At the detector stage the arrangements follow closely upon those of the battery set. The main differences are to be found in the altered values of the grid condenser and leak, and in the presence of an effective decoupling filter in which the resistance also serves as a voltage-dropper.

A Triumphant Success

Following the detector is the compensating transformer with its associated tone-leveiling circuit, and then comes the first L.F. stage. This consists of a valve of the medium impedance type, resistance-coupled to the output stage. It is, of course, unconventional to put the transformer stage first and the resistance second, but I never did take much interest in conventions! In the present case it is definitely the better arrangement, permitting the full benefit to be obtained from the tone-leveiling device.

The output stage is of quite a straightforward triode type, with

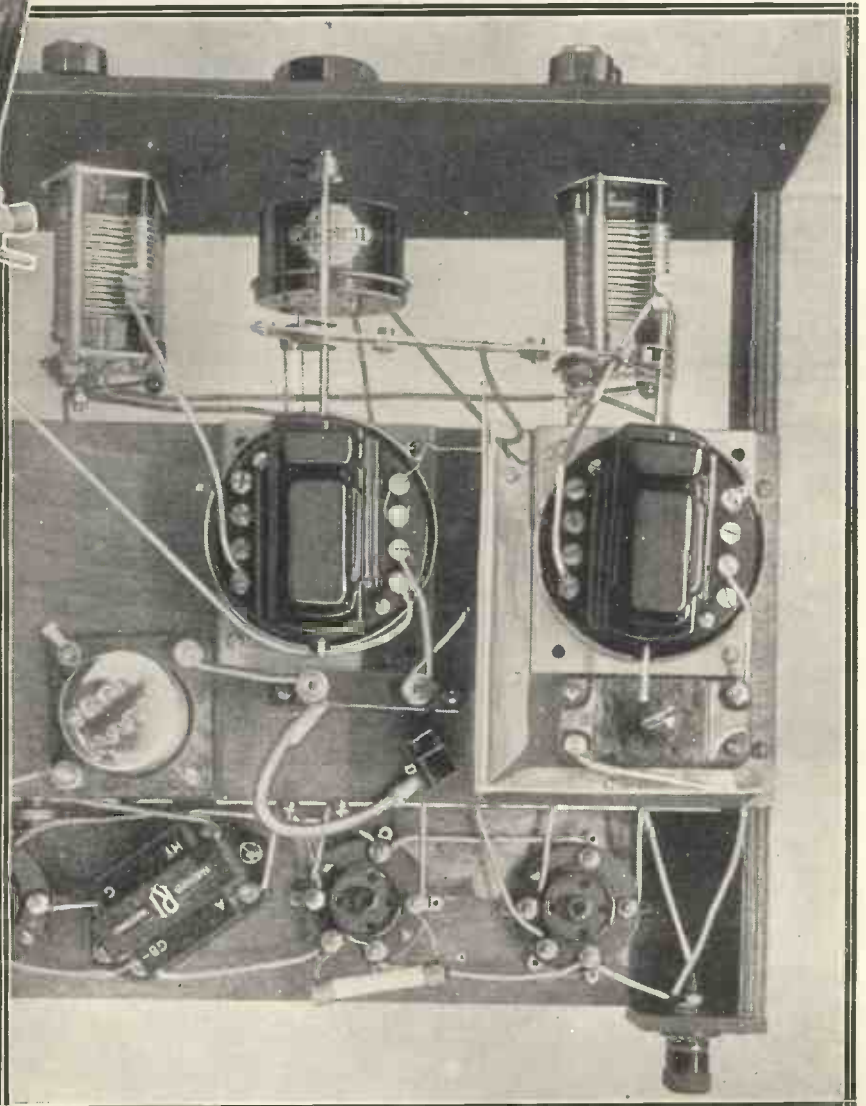
Turning now to the practical side of the design, the first point which appears from an inspection of the photographs is that the step system emerges triumphantly from the severe test of producing a completely successful layout for a mains set in which the position of every wire and its exact run is fixed automatically by the design itself.

Just as in the battery set, if the

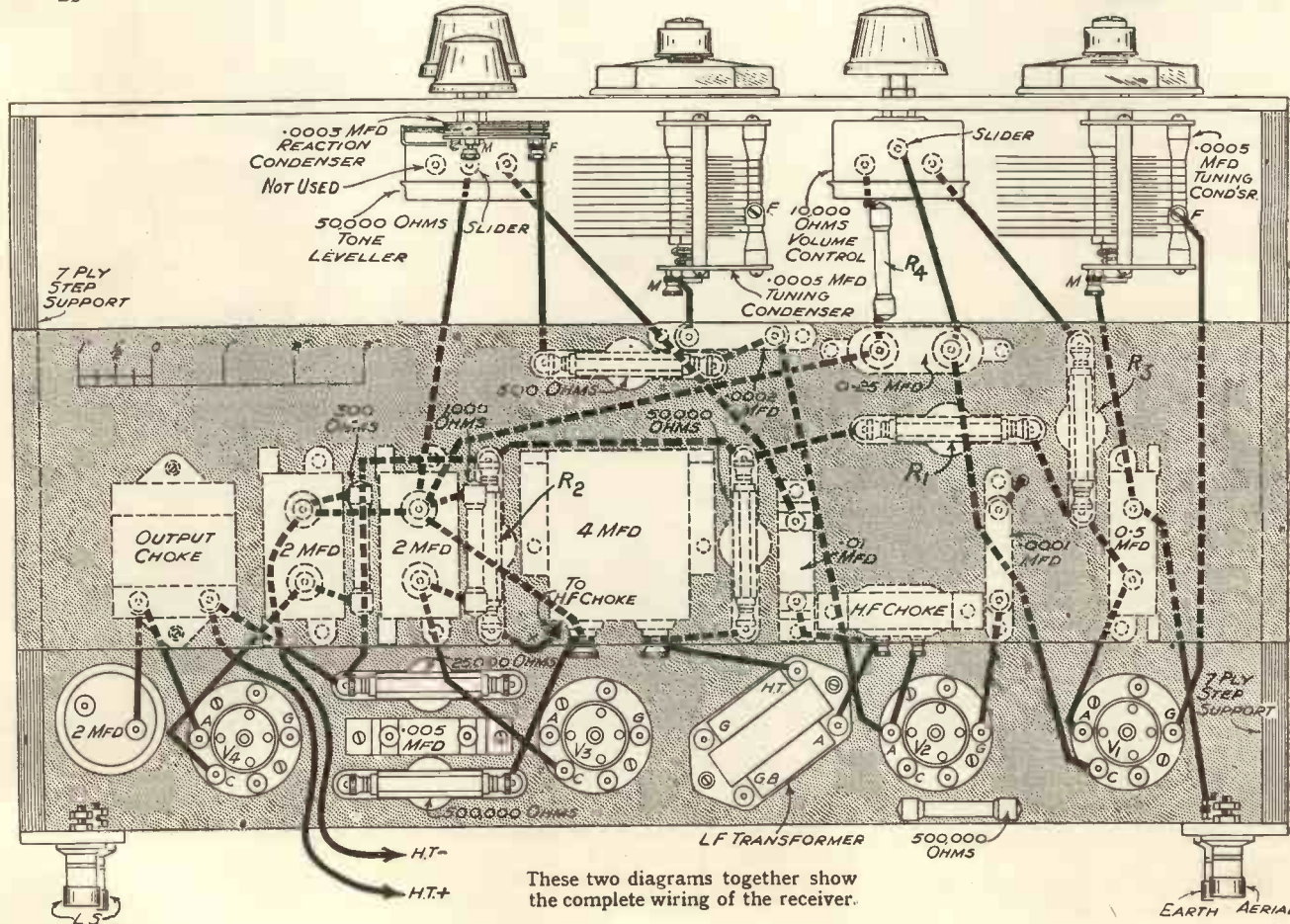
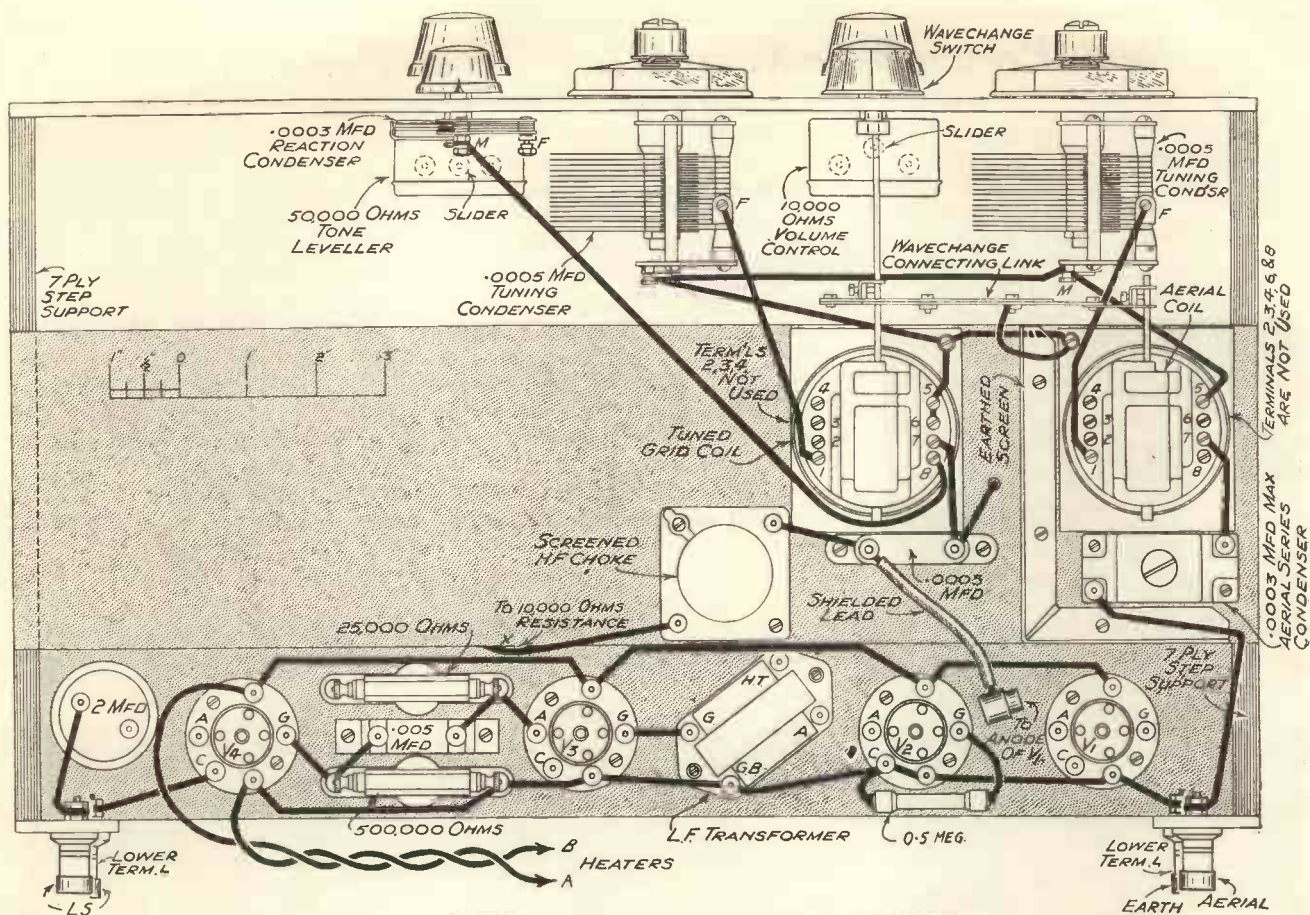
Proper Wiring Method

This, it is to be noted, is the proper way to wire up any step set. Wherever possible the wires must be run straight between the points to be joined, and if in some cases it is found that an obstacle makes a perfectly straight run impossible, then the wire must be taken round that obstacle by the shortest possible route. It will be

EVERY DETAIL ACCESSIBLE



In this plan view of the H.F. section you can see the short flex lead which earths the coil ganging link. Its end is bared and gripped under the holding-down screw of the aerial coil-base, from which in turn a lead of bare wire runs beneath the screen between the coils to the base of the grid coil.



These two diagrams together show the complete wiring of the receiver.

The Wiring is Direct from Point to Point

found in practice, by the way, that such divergences are only necessary in the case of a few unimportant wires on the valve step.

The importance of this characteristic of the step system cannot be over-emphasised. It means that if the constructor will use the right parts and lay them out in the correct positions he cannot fail to produce a perfect copy of the wiring of the

ing, for with these materials the operation of wiring becomes amazingly easy and quick.

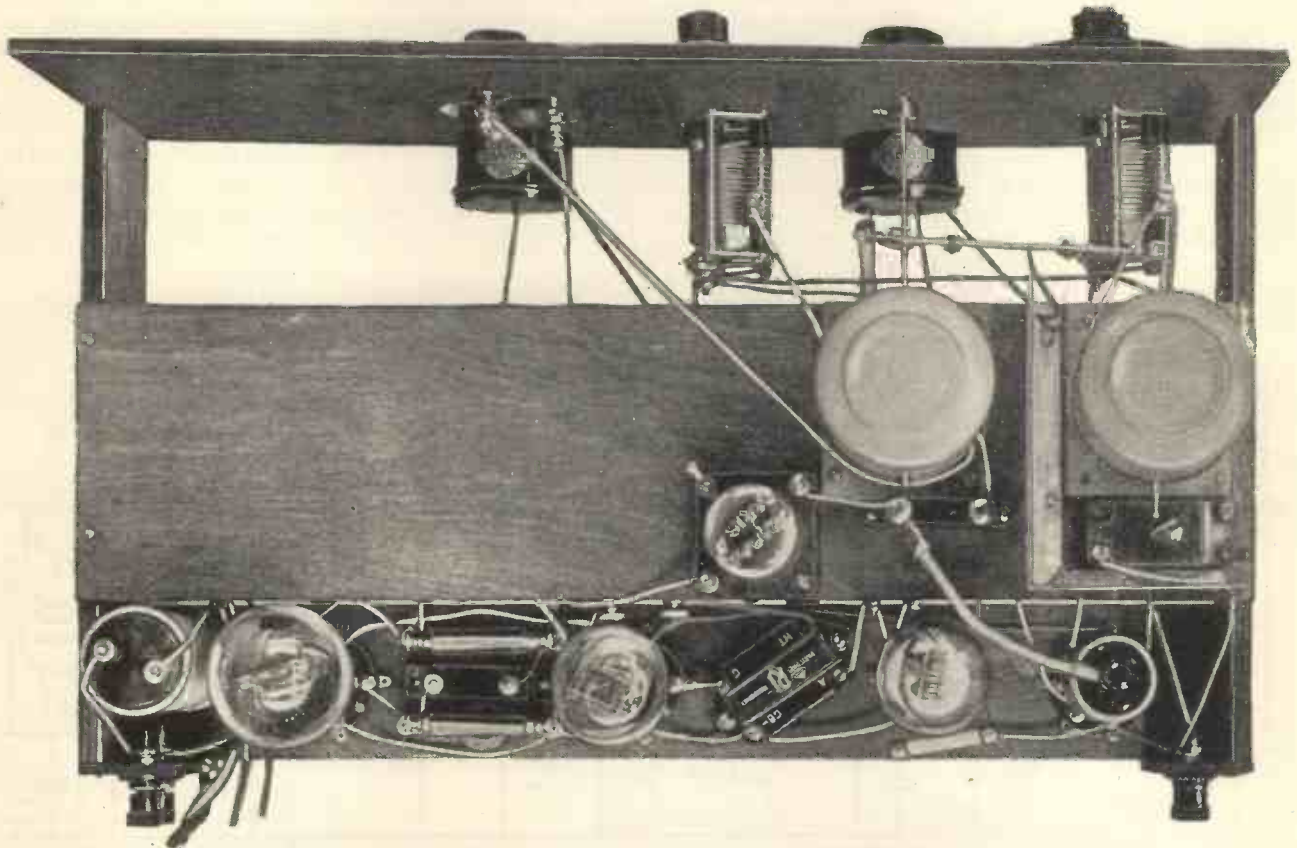
Fitting the Dials

An examination of the photos will probably show why I stress the question of the use of the right types of components. It will be seen that where wires must cross each other I have so chosen my components

in place, and before the screen or the .0005-mfd. fixed condenser are attached. Here again the limits of space imposed in this issue compel me to refer the reader back to the corresponding section of my article in the October issue on the battery model.

Just one hint about the mounting of the variable condensers on the panel. Insert a packing washer

All Complete and Ready for Work



The perfect accessibility of every section of a step system receiver is well shown in this view. Note how completely the system abolishes the usual awkward corner where the conventional baseboard meets the panel, and how conveniently the valves are arranged along the back of the set.

original set. The process is entirely automatic, and does not depend in any way upon the constructor himself. In particular, he does not have to pore over a lot of drawings and photos and then try to secure the right effect by bending a lot of wires into fancy and complicated shapes.

Easy and Quick

He should note, however, that to make the process as easy and successful as possible he should use a rather thinner gauge of wire than is often sold for the purpose. I advise No. 20 S.W.G., with ordinary Systoflex cover-

that the position and height of their terminals is such that the various wires are caused to run at different levels, so that they are spaced out from each other in the vertical plane.

So far as the actual assembly of the set is concerned, there is hardly anything I need tell the constructor, for the step system has the further merit that every part of the receiver is completely accessible at every stage, and it doesn't matter in the least how you set about building it.

The one and only exception is to be found in the coil ganging link. This should be fitted as soon as the coils are

between each condenser and the back of the panel, or you may find that the centre bush will project so far in front that the particular dials I used will not fit closely.

The Heater Circuit

Suitable washers are those sometimes supplied with terminals for use when fitted to a metal panel, but if you have no such washers in your junk box you will find the insulating bushes supplied with the Igranic potentiometers (and not otherwise required in the present case) will do the trick if you open out the centre

Full Constructional and Operating Data

hole a little (the tip of a hot poker will do this easily if you have no drill large enough).

Now a point about the wiring of the heater circuits of the valves. As shown in the wiring diagram, this is correct for those cases where a good earth is available and the mains themselves are what is called "good." I suggest you should at first wire up in this simple fashion, and note whether you get much hum. If you do, you will have to alter the heater wiring to a trifle more elaborate arrangement.

For Increased Stability

First, remove the wire which connects together all the heater terminals nearest to the front of the set, and replace it with a lead made of one of the various metal braided or otherwise screened materials, and earth the screening covering.

screened material, and earth all parts of the covering as before, but do not earth the heater circuit itself in the original way. Instead, earth the centre tap terminal of the heater winding on the power unit. All this is much easier to do than to describe, but it is worth trying the simpler arrangement first.

Now let me give the promised explanation of the question of extra screening of leads to increase the margin of stability of the set. As it stands it is just right for an average set of valves, but it is possible that with a particularly lively selection the set may be a little more "edgy" than is altogether pleasant.

This condition is always under control with the aid of the bias potentiometer of the S.G. valve, but if it seems that it might be limited with advantage, it can be done by using screened material for the following

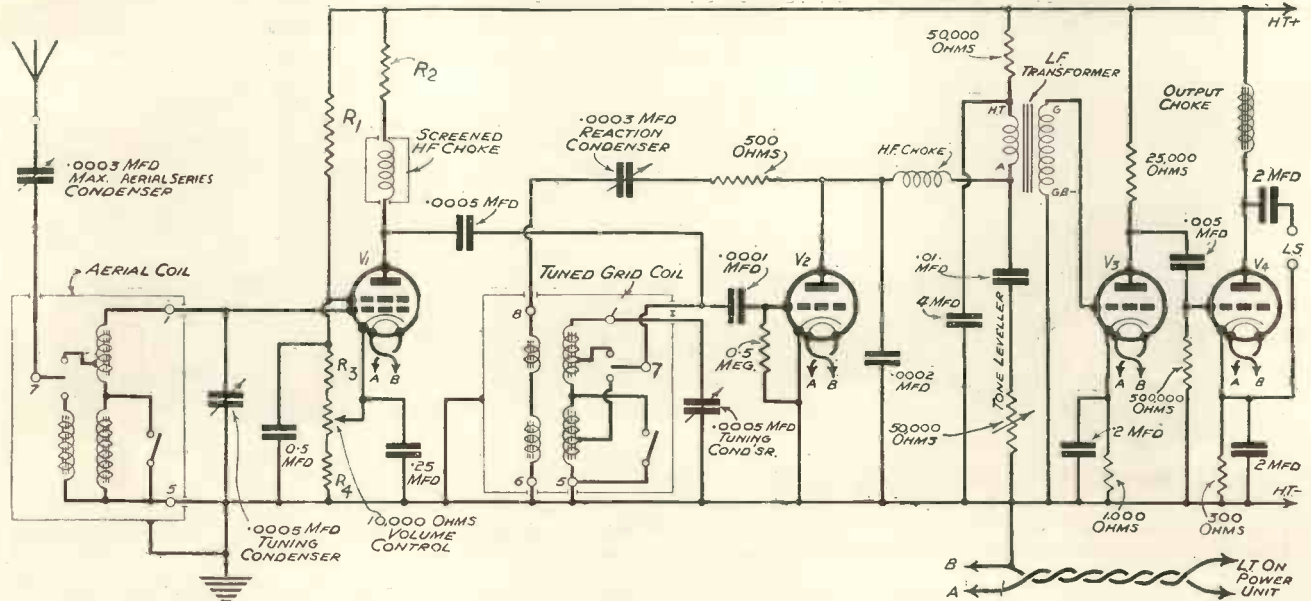
of the new H.F. pentodes in the set. In any case, they should be added one at a time.

Similarly, he may be interested to know that the general range of the tone-leveiling control can be varied in a simple fashion. As it stands it gives a range from medium to high tone, but if it is desired to make it run from low through medium to moderately high, you should connect a fixed condenser of .0001-mfd. across the secondary terminals of the compensating transformer. If it is desired to produce merely a lowering at the bottom of the range without effect on the top, raise the value of the output valve grid leak to 1 meg.

Two Constructional Points

While we are on the subject of resistances, I should perhaps explain that the values of those associated with

A Carefully Engineered, Ultra-Modern Circuit



Here you can see how the remarkable K4 circuit has been adapted on the modern lines for mains working. The values of the resistances, R_1 - R_4 , are given in a table elsewhere.

This alone will probably have the desired effect, but if it does not, remove the lead which joins together the following points: one end of grid leak of output valve, one terminal of 4-mfd. condenser, G.B. terminal of L.F. transformer, cathode terminal of detector, earth terminal of set, and all heater terminals nearest back of set.

Join up all these points again with the exception of the heater terminals of the valves. Connect the heater points to each other separately with

leads: grid of S.G. valve to first tuning condenser, grid of detector valve to grid condenser, reaction choke to reaction condenser. The screening covering of the wire should, of course, be earthed in each case.

Tone-Leveiling Experiments

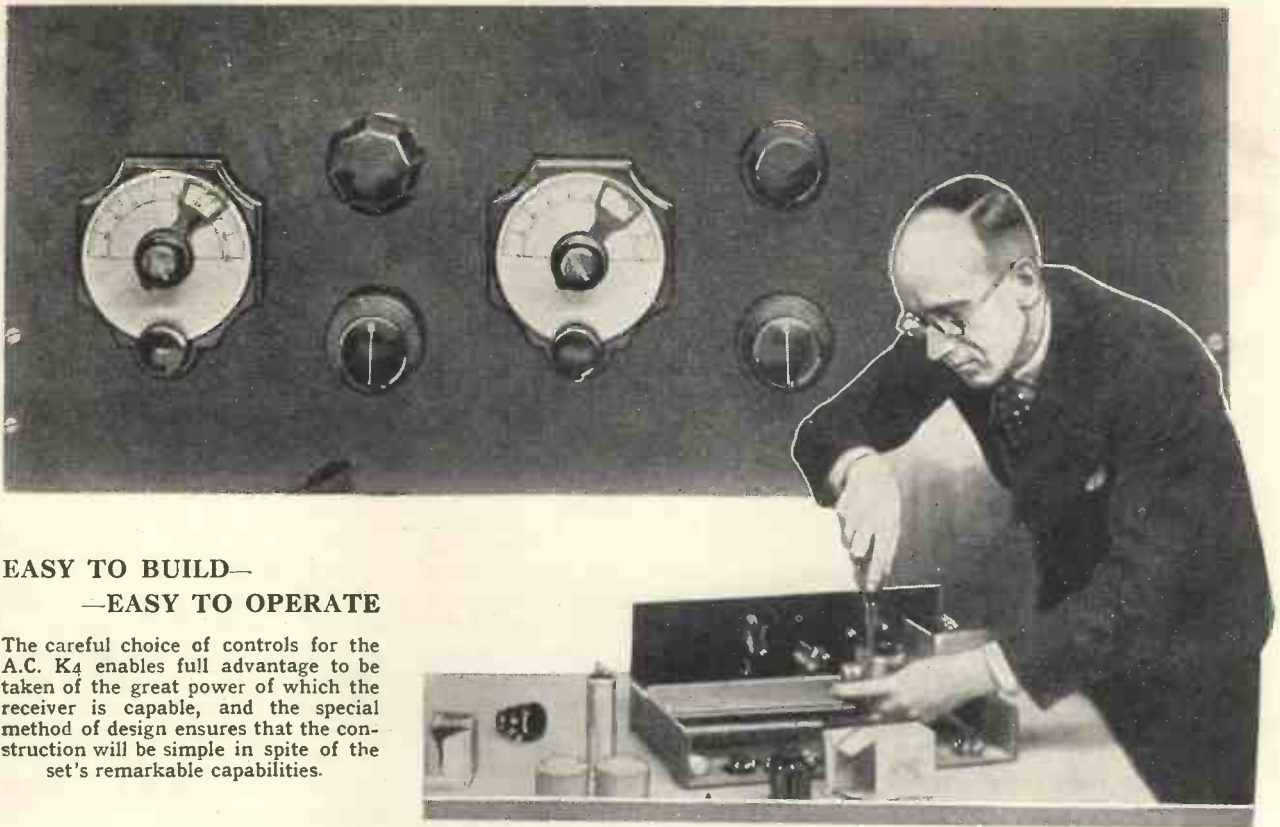
In most cases these expedients will not be needed (or desirable), but I think they may interest the reader with experimental tastes, particularly if he should some day want to try one

the S.G. will be found in a table giving the correct figures for various types of valve.

Now two final constructional points. The wiring diagram may perhaps look a little unfamiliar at first glance, being in two sections, but it is quite simple to use if you just remember that the two parts must be added together to produce the complete wiring.

Then there is the question of panel stiffening. Without extra support it

(Continued on page 567)



**EASY TO BUILD—
—EASY TO OPERATE**

The careful choice of controls for the A.C. K4 enables full advantage to be taken of the great power of which the receiver is capable, and the special method of design ensures that the construction will be simple in spite of the set's remarkable capabilities.

FULL DETAILS OF THE COMPONENT TYPES AND MAKES

Component	Make used by Designer	Alternative makes of suitable specification recommended by Designer	Component	Make used by Designer	Alternative makes of suitable specification recommended by Designer
1 Pair Ferrocart coils on separate bases	Colvern F.10 and F.3, with 5 1/4-in. switching rod	—	1 2-mfd. fixed condenser	Dubilier type 9202/BS	—
1 Coil control ganging link	Telsen W.217	—	1 4-mfd. fixed condenser	T.C.C. type 61	—
2 .0005-mfd. variable condensers (maximum projection behind panel, 3 in.)	J.B. Popular Log	Graham Farish, Polar, Utility	1 1,000-ohm resistance with wire ends	Dubilier 1-watt metallised	Varley "Electronic"
2 S.M. dials to suit	Ormond R/360	—	1 resistance with wire ends See separate table as to value before ordering this	Dubilier 1-watt metallised	—
1 .0003-mfd. reaction condenser	Polar solid dielectric	Telsen type W.354, Graham Farish, J.B.	1 .5-meg. grid leak with wire ends	Dubilier metallised	—
1 10,000-ohm wire-wound potentiometer	Igranic	Graham Farish, Telsen, Wearite, Lewcos	7 Horizontal resistance holders	Graham Farish	—
1 50,000-ohm wire-wound potentiometer	Igranic	Telsen, Graham Farish, Lewcos, Wearite	1 500,000 ohm resistance	Graham Farish	—
1 Screened type S.G. H.F. choke	Graham Farish H.M.S.	Telsen, Bulgin, Wearite	1 50,000-ohm resistance	Graham Farish "Ohmite" 1.5watts	—
1 Reaction type H.F. choke	Lissen L.N. 5092.	Graham Farish, Igranic, Telsen, Bulkin.	1 25,000-ohm resistance	Graham Farish "Ohmite" 1.5watts	—
1 Compensating type L.F. transformer	R.I. "Varitone"	Telsen, Audiotormer, Varley D.P.35.	1 500-ohm resistance	Graham Farish "Ohmite" 1.5watts	—
1 Output choke	Varley Nichoke No. 2, or similar compact type for preference. Larger types can be used, but must be mounted on upperside of second step	Telsen, Varley D.P.35.	3 Resistances of valves chosen from table in text	Graham Farish "Ohmite" 1.5watts	—
4 Five-pin valve holders	W.B. Telsen	Benjamin, Telsen Polar, Igranic	1 K4 framework	Peto-Scott	—
1 .0003-mfd. compression condenser	T.C.C. type 34	Dubilier	1 Panel, 18 in. x 7 in., and two terminal strips, 1 1/2 in. x 2 1/2 in.	Peto-Scott	Becol, Permcol
1 .0001-mfd. fixed condenser	T.C.C. type 34	Dubilier	1 K4 type screen	Peto-Scott	—
1 .0002-mfd. fixed condenser	T.C.C. type 34	Dubilier	4 Indicating terminals, "L.S.," "L.S.," "A.," "E"	Igranic	Belling-Lee, Bulgin, Clix
1 .0005-mfd. fixed condenser	T.C.C. type 34	Dubilier	1 Anode connector	Belling-Lee	Bulgin
1 .005-mfd. fixed condenser	Dubilier type 620	T.C.C.	7 Yds. 20-gauge tinned copper wire	Goltone	Lewcos
1 .01-mfd. fixed condenser	Dubilier type 620	T.C.C.	7 Yds. insulated sleeving	Goltone	Lewcos
2 2-mfd. fixed condensers	T.C.C. type 50	Dubilier	Small quantity of screened wire or screened sleeving. See text for amount	Goltone	Lewcos
1 .25-mfd. fixed condenser	Dubilier type BB	T.C.C.	10-amp. flex for "L.T." connection to power unit	Peto-Scott	—
1 .5-mfd. fixed condenser	T.C.C. type 50	Dubilier	1 Cabinet, 18 in. x 7 in. x 10 in.	Peto-Scott	—
Note.—All the above fixed condensers must be of the edgewise type with terminals on top			Power-unit	Heyberd, type M.W.60	—

QUESTIONS



ANSWERED

K4 H.T. Voltages

A. J. C. (Liverpool).—"I have built the K4 (described in the October issue of 'M.W.'), but am a little uncertain as to the best operating voltages. Is the detector H.T. voltage at all critical?"

If you wish to get the best results from distant stations it is advisable to experiment with various values of H.T. as far as the detector is concerned. The H.T.+3 voltage has a marked effect upon the smoothness of the reaction.

72 volts is an average value and you will find it worth while to try different tapings in the H.T. battery above and below the average figure until you discover which voltage suits your particular case best.

The anodes of the S.G. and Class B valves require 110-120 volts (H.T.+2 and H.T.+4 respectively). H.T.+1 goes to the screening-grid of the S.G. valve and needs about 60 volts.

How Far are They?

N. M. (New Cross).—"Among the stations that come in well on my three-valve 'M.W.' set are the following: Frankfurt (Germany), Breslau (Germany), Huizen (Holland), Langenberg (Germany), Warsaw (Poland), Milan (Italy), Oslo (Norway), Prague (Czechoslovakia), Turin (Italy), Stockholm (Sweden). Although these are only a few of the programmes I get, they come in so well that I thought I would like to know their distance from London. Can you tell me, please?"

The approximate distances from London are:

Frankfurt, 396 miles; Breslau, 743 miles; Huizen, 236 miles; Langenberg, 311 miles; Warsaw, 899 miles; Milan, 598 miles; Oslo, 715 miles; Prague, 640 miles; Turin, 575 miles; Stockholm, 886 miles.

Changing to Pentode

R. L. (Brixham).—"I have re-

cently fitted a pentode to my all-mains 3 in place of the power valve. Unfortunately the change-over has not been too successful. For instance, the tone has lost its depth. There is a shrillness about the reproduction that makes it sound unnatural. I am told that the trouble is due to my not having used a special output transformer for my moving-coil speaker. Is this likely to be so?"

Yes, the shrillness, or lack of depth, is quite possibly caused by the use of an unsuitable output circuit. When a change-over is made from a power

terminals on the transformer. This has the effect of reducing the over-emphasised high-note response which is a feature of pentode valves.

Curing Instability

B. S. T. (Islington).—"The usual size for a decoupling condenser on the low-frequency side of a set is 2 mfd. I have been troubled with a high-pitched whistle which is always present, in spite of the fact that both the S.G. and L.F. stages have decoupling resistances and condensers. When I change over to the gramophone pick-up the whistle increases in intensity, thus pointing to an L.F. fault. Do you think that a larger decoupling capacity would help?"

Undoubtedly a larger condenser would be of assistance in stabilising the amplifier, but the trouble may be more deep-rooted than you suspect. You must make sure, first of all, that the design is satisfactory.

Is the layout properly arranged so that there is no possibility of interaction between the various components? Also, are the grid and anode leads well separated? If so, by all means try a 4-mfd. decoupling condenser and note whether any improvement results. But you must remember that perfect decoupling does not exist in practice, and so it is necessary to see that the H.T. supply is well up to its work. A run-down dry battery or an unsuitable mains unit usually means a high impedance path in the common H.T.—anode circuit, and this is frequently the cause of unstable working.

As far as the pick-up is concerned, you might try the effect of screened leads, joining the metal screening to earth.

This simply means that you remove the existing leads from the pick-up and replace them by a twin flexible with metal covering. The only possible disadvantage here is that if the leads are very long there is some risk of high-note loss, but this does not apply to leads of normal length.

NEXT MONTH

This is the last separate issue of "Modern Wireless," and next month it will be incorporated with its world-famed sister journal

THE WIRELESS CONSTRUCTOR

Price only 6d. Magnificent Value.

In the December number of "The Wireless Constructor"—Now on Sale everywhere, John Scott-Taggart describes his latest triumph, THE "S.T. SUPER."

Order the January Number—On Sale December 15th, and make "The Wireless Constructor" your 1934 Radio Magazine.

valve to a pentode it is absolutely essential to match up the output circuit to suit the new conditions.

Modern moving-coil speakers are usually fitted with output transformers having ratios suitable for valves of various types. If your speaker is of this type you should make quite sure that you are using the correct tapping terminals on the transformer.

Also try connecting a .01-mfd. fixed condenser and a 10,000 ohm resistance in series across the two tapping

CHRISTMAS GIFT SUGGESTIONS



DOESN'T this Christmas-present business strike you as odd?

I mean, if in April or June or August you happen to see a book which you know Uncle Edward will like, a brooch which you think your wife will admire, or a railway engine which is just the thing young Frank has been waiting for—well, you buy it and they wrap it up for you or post it straight off, and there you are.

But because it happens to be December and Christmas, there has to be a positive orgy of making lists and buying coloured paper and last-minute visits to shops which have "Nothing left, my dear—absolutely nothing." And all your best ideas for suitable presents fold up their tents like Arabs, so that Christmas becomes anything but a time of goodwill!

* * *

And yet there are many of us who never have any trouble because we have realised in time that there is one

Being a methodical sort of person I have kept my last year's present list, and I have just been having a look at it. No good giving the same things again this year, but a little judicious mixing will work wonders. Let's see how we stand.

What shall I give for Christmas? The problem which arises each year in December is not nearly so hard to solve as many people think! In this article and in the accompanying pages of photographs, there are dozens of seasonable suggestions for your Christmas shopping list. You cannot go wrong if you take as your slogan: "Give Radio This Christmas."

Marconiphone all have new models which are among the finest in the world. It's just a matter of choosing the one for your own purpose. And



Representative fixed condensers in the vast range of modern capacity components manufactured by the Telegraph Condenser Company. A set of condensers in different values would be a welcome addition to any constructor's "laboratory."

prices have never been so low as they are this year.

* * *

Now for Mr. Robinson next door, who was so good to the children while you were ill in the autumn. He's always complaining that his batteries run down in no time. Why not give him one of the many super-capacity H.T. models which the battery firms are turning out? You might get one of the Q.P.P. models while you are about it, for all the big firms make them. Ever Ready, Hellesens, Pertrix, Lissen, Siemens, Ediswan—there are dozens of names to choose from, and the cost is ridiculously small. You might, perhaps, run to a mains unit, one of those by E. K. Cole, or Clarke's "Atlas" or Heayberd, shall we say. They're all good.

And don't forget that Uncle Edward is one of those unlucky people whose accumulator always runs out just when he has invited a few friends in to hear Christopher Stone. He'd be eternally grateful for a spare accumulator—and you'll find lots of them illustrated in the following pages.

* * *

Let's deal with the two "difficult" cases—your nephew who has never screwed a transformer and your cousin who knows all about everything. Is there any good reason why that young nephew shouldn't start in on radio

(Continued on page 503)



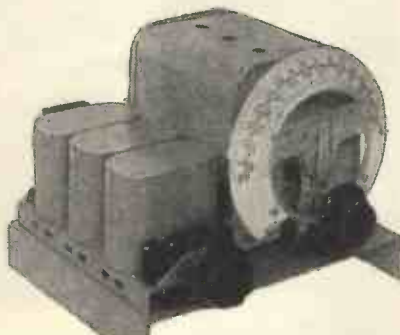
Class B and Q.P.P. output chokes and transformers are a speciality of Wright and Weaire design. The model shown here is representative of the types on the market, which vary in price between 8s. 6d. and 12s. 6d.

certain way of pleasing everyone—Radio.

Now don't look supercilious and start making objections. I know your Aunt Jane knows nothing about her commercial three-valve receiver. I know your young nephew has never screwed a transformer on to a base-board in his life. I know your Cousin Jim understands much more about wireless than you ever hope to learn. But don't let that deter you from your purpose. In radio there is something for everyone.

There have been a lot of startling changes in design since last Christmas which make things a lot easier. Almost everyone has brought out new sets or new components. Aunt Jane's three-valver is getting a bit out of date, so why not go the whole hog and give her a new receiver? There are plenty to choose from.

There's the Ekco Model 74 or the K.B. 666 if you are looking for something revolutionary in design and dependable in service. H.M.V. have a fine model incorporating an electric clock. Ferranti, Columbia, R.I., and



To provide greater simplicity in set construction has always been the aim of Colvern. Here is simplicity personified in their band-pass tuning unit which comprises a set of coils and a tuning condenser factory-matched for greatest efficiency.

SETS OF THE SEASON

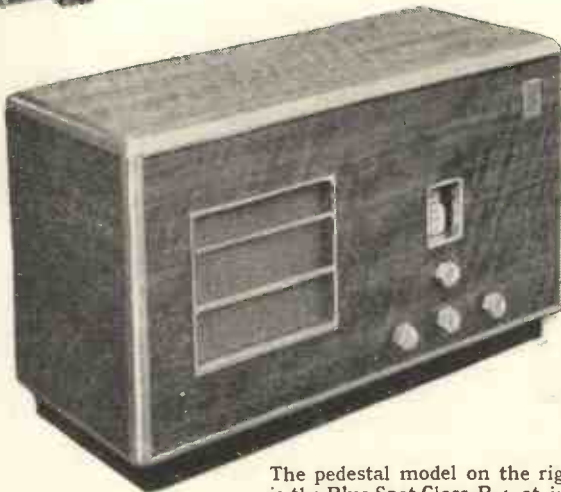
With the wealth of outstanding receiver designs on the market there is no difficulty in choosing a suitable Christmas present—if you know where to begin. These pictures show you some of the best modern sets.



To the left is one of the G.E.C. models for 1934—the Superhet Five. Designed in A.C. or D.C. types, it sells complete for 14 guineas. A bargain, and a set which makes a big appeal.



On the right is the Kolster-Brandes de luxe model "666," with its cabinet specially designed by a furniture expert. It incorporates the K.B. Rejectostatic System and costs only 18 guineas. An outstanding receiver in appearance and performance.



The pedestal model on the right is the Blue Spot Class B 4 at just under £13—and worth every penny of it! Above it you see the Telsen Model 464, a set with many unique features, including a sloping top for easier dial reading. Outstanding performance for only 9 guineas.



The family will love the Ekco 74 receiver, seen below on its chromium-plated stand. This model (obtainable for A.C., D.C. or battery working) was one of the sensations of the 1933 radio shows—and rightly so. In black and chromium it costs 14 guineas, and it is simplicity itself to operate.



His Master's Voice have brought to radio the same skill as has made them famous as makers of gramophones. The Superhet Selective Five, seen here, is an A.C. set and would make a most acceptable present for anybody. The price is 15 guineas.

RECEIVERS OF DISTINCTION

More modern receivers which lend themselves admirably to the Christmas present list this year.

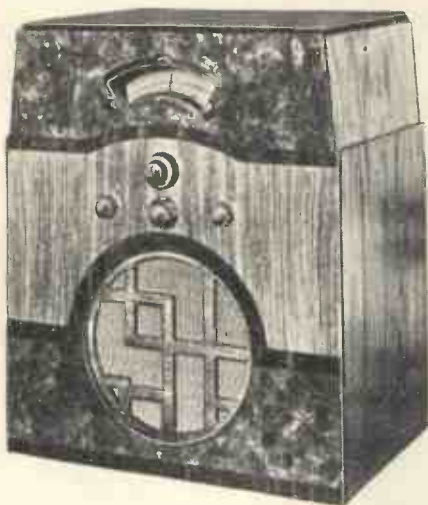


The Ferranti Gloria Consolette (24 guineas) has a number of unique features (the cabinet design is one) which make it worthy of a high place among the best receivers of to-day.

Below is the R.I. Class B four-valve battery set which will prove a boon to the "mains-less" listener. The price is 15 guineas.



The Columbia "C.Q.A. Battery Four," incorporating a new form of push-pull output which ensures excellent quality of reproduction no matter at what volume programmes are received, will prove one of the biggest aids to perfect reception this Christmas—and it only costs 11 guineas.



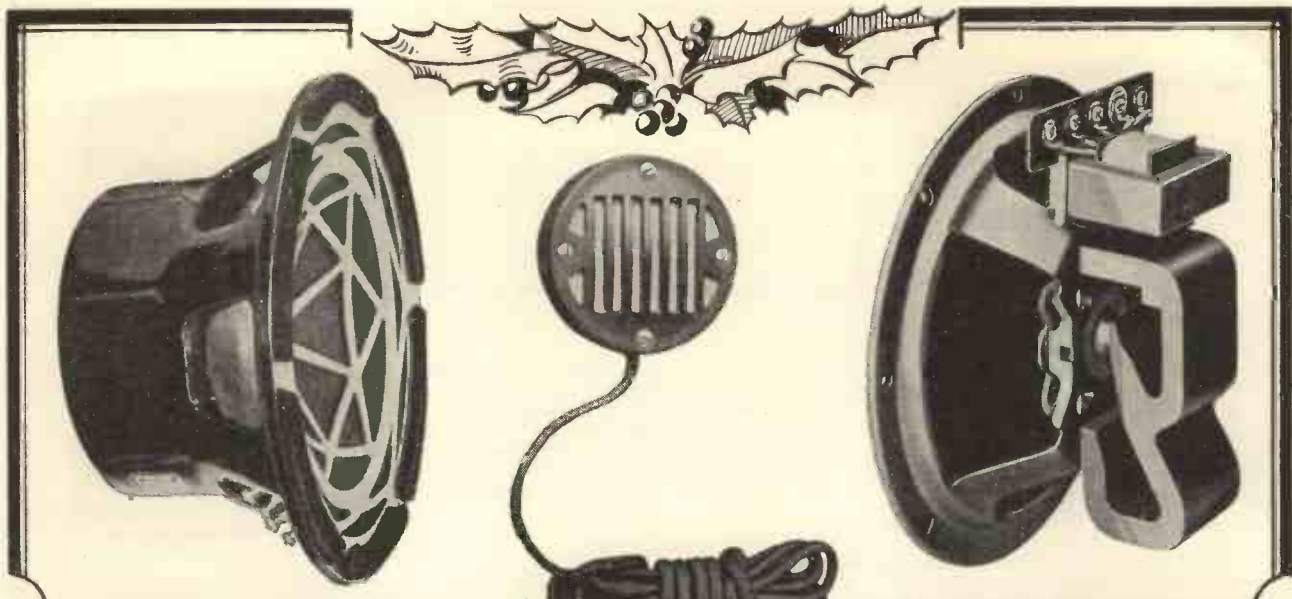
For the man who likes to build his own receivers, here is the chassis of the world-famous Lissen "Skyscraper 3," which can be bought (complete with valves, cabinet and speaker) for £6.5.0.



If you want real, honest - to - goodness "de luxe" quality, what about the Marconiphone Model 290 radiogram, a six-valve superhet with every modern refinement for £44.2.0.?

Among portable sets, the name of Pye has for a long time been recognised as the trademark of quality and efficiency. This year's models are no exception, and the Model Q./M.T. Battery trans-portable which you see on the right would make an ideal Christmas present to be enjoyed by every member of the family alike.

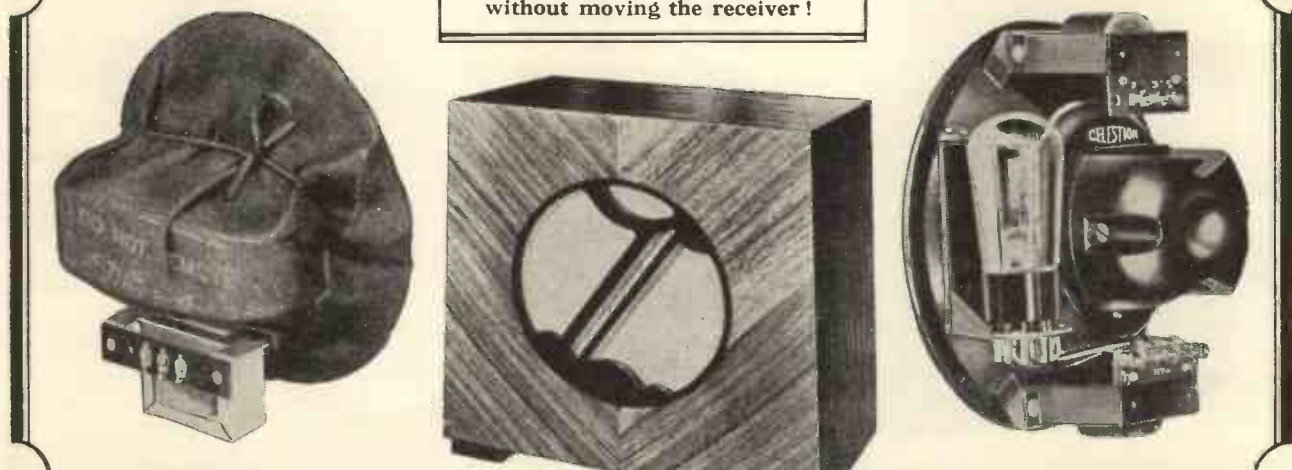




This model, manufactured by Reproducers and Amplifiers, Ltd., is typical of the fine design of modern loudspeakers. It is known by the name "Victor," and is priced at 70s. od.

A LOUDSPEAKER FOR CHRISTMAS
means radio in another room without moving the receiver!

Between the two loudspeakers is one of the Igranic buttonhole microphones with excellent characteristics for public address work. The Amplion speaker (above) is a permanent magnet moving-coil model.



Loudspeakers designed for Class B work are very popular this year. The Rola Class B model, seen here, is an excellent example of modern design.

W.B. speakers, made by Whiteley Electrical, have incorporated a new matching device which makes them outstanding. This is the P.M.4A Micro-lode in its handsome walnut cabinet.

A complete output stage is mounted in compact form on this Celestion Class B speaker chassis. The actual speaker shown is the P.P.M.9.



These two views of an Epoch permanent magnet model again emphasise the thoroughness of construction in the loudspeakers of to-day.

Your record-reproduction this Christmas will be much better if you fit a good modern pick-up. Drop a hint to your friends and you may get one of these fine Columbia Model 22's.

The Present Problem Solved

right away? Of course there isn't, and if you send him one of the Pilot Author constructor's kits which Peto-Scott make up, then you'll keep him out of mischief during many winter evenings. And Cousin Jim is always experimenting with new ideas of his own, isn't he? Then if you send him one of the various testing meters or, perhaps, a milliammeter or two for his Class B tests (Bulgin, Ferranti, or Igranic make most reliable models),

Loudspeakers can always be used in other rooms when the receiver already has a speaker incorporated, and the high standard of manufacture which is apparent this year gives you dozens of models to choose from. There is no space to mention them all, but such names as W.B., Blue Spot, Celestion, R. & A., Ormond, Rola, and Amplion spring to the mind in this connection, and you can see most of them illustrated in these pages.



Radio Instruments' Class B components (and we have photographed three of them here) will be much in demand for Christmas, 1933, when so many keen experimenters are trying this form of L.F. amplification.



British Radiogram components have made their appearance on the market since last Christmas—and there now seems no good reason why they shouldn't provide constructors with excellent value for many years to come! Here

is an example of a B.R.G. Class B component.

he'll think a good deal more of your radio knowledge!

Valves and loudspeakers are always a safe bet with experimenters and "ordinary listeners" alike. There are plenty of new types in the valve market which every keen constructor wants to have sooner or later. Class B, double-diode pentodes, metal rectifiers (or Westectors as they are called), are all useful. Have a look at the photographs in our gift pages; you'll find that all the valve people—Mullard, Cossor, Mazda, Marconi, Osram, Hivac, Tungram, Ostar-Ganz, and so on—have just what you want; while the Westinghouse catalogue includes two varieties of Westector.



There is not one of your constructor friends—and very few people aren't constructors in some form nowadays, even if they only tinker with their commercial sets—who wouldn't be



And here are three more bright suggestions! Above is an 8-mfd. dry electrolytic condenser in the range made by Dubilier. The Varley Nicore iron-cored coil in the centre is a well-known component of proved efficiency. Below is an example of the dry electrolytic condensers of Telsen manufacture.



set of indicating types such as are made by Belling-Lee or Clix can find a home in any set sooner or later.

Find out from your friends and relations whether any of them intend bringing their two- or three-year-old sets up to modern standards. Because if they are, then iron-cored coils will be almost a necessity. Colvern, Telsen, Wearite, and many other firms make these, of course, and can supply types for almost every receiver.

Aerials sometimes need renewing, too, and a box of Electron or Goltone aerial wire is a not-too-expensive and highly appreciated gift. And while aerials are being looked at, the addition of a Radiophone down-lead may make a lot of difference.

And there's the solution to your Christmas-present problem. If any of the family have not been accounted for in our brief survey, then have a look at the picture pages for further suggestions. You'll find tuning condensers made by people like Jackson Brothers, you'll see examples of the new Block plateless accumulators, you'll see—oh, lots of things! But forget that last-minute rush, forget those handkerchiefs, and ties, and chocolates, and give Radio instead.



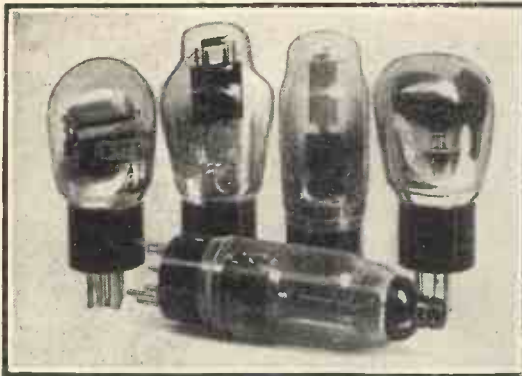
Don't forget that a choke is an integral part of almost every set, and Graham Farish have several for you to choose from. Either the H.M.S. or L.M.S. types, illustrated here, would be welcomed by any enthusiast. And they're not expensive!

grateful for a replenishment of his store of components and "gadgets."

Sets of condensers, in all shapes and sizes, are made by such firms as T.C.C., Dubilier, British Radiogram and Igranic, and are generally indispensable. Resistances and grid leaks, too, are useful, and Graham Farish can fill your requirements in this direction. Terminals may seem rather an inadequate gift, but a



Who wouldn't like this testing instrument which can tell you all you want to know about your set, its valves and its batteries? The model shown here is made by Pifco.



Ostar-Ganz valves of all types are available, as you can see by the photograph (left), and one of the universal A.C. or D.C. mains types would be welcomed.



The Osram B21 is one of the few Class B valves using positive bias.



New arrivals since last Christmas, the valves of the High Vacuum Valve Company have achieved popularity.



Tungsramp valves provide a full range of types for most purposes at prices which range from 6s. to 17s.



Class B valves are a necessity rather than a luxury these days. You cannot go wrong if you give a Mullard PD220 this year.

VALVES
of sorts and sizes for all kinds of sets!



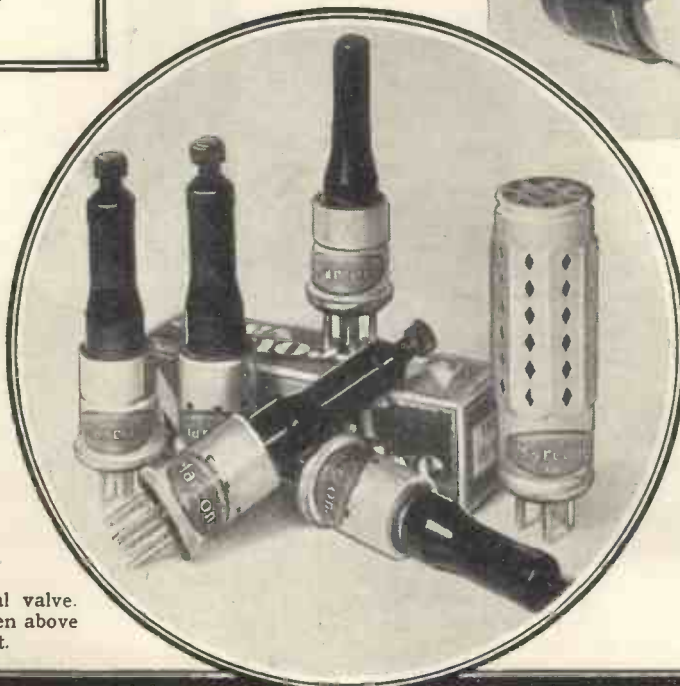
The Mazda L2DD is a unique valve in that it is a double-diode triode made for battery operation.



Coszor valves have had their place for years in thousands of sets. If you have a friend or relation whose set is not giving complete satisfaction, send him a set of Coszor valves (two popular models are shown here) and do him a really good turn!



The "Catkin" or all-metal valve. One of the Osram types seen above would be a novel gift.



★ ★ ★
The Marconi "Catkin" valves on the left may be sent through the post without any elaborate packing, and will arrive quite safely!

POWER FOR THE SET!

However good a set may be, however modern its design, its components, its valves, it's no good at all without some form of power supply.

Why not give a battery to your constructor friend this year? Or a mains unit? Or a transformer? Or a rectifier?

A fine display of batteries! There's the Grosvenor Mercury, British made, in many voltages. Helleseus have further improved an excellent range. Pertrix models, made by Britannia Batteries, are available for almost every set. The Ediswan 60-volt is a firm favourite.



Ever Ready batteries need no introduction and are as popular as ever. Block H.T. accumulators (right) made their appearance this year and scored a big success.



Mains transformers are another certain-to-please proposition. The Heayberd models shown below form the complete range from this reliable firm.



A representative collection of Exide products. These include accumulators for portable sets, other models of larger capacity suitable for the largest receivers, dry H.T. batteries of all voltages (the 60-volt type at 8s. 6d. being seen here), and grid-bias batteries. The Siemens battery on the right is a 1 1/2-volt cell for bias on an S.G. valve.



The name of Westinghouse has long been associated with excellent mains components. What better Christmas gift could you give to a friend building a mains receiver than one of these metal rectifiers?



The Ekco type K.25 seen above and the Atlas T.25 on the other side of this page are just the gifts for a listener who has mains in his house. Economical running of his set will be the result.

"M.W.'S." RECORD REVIEW



The latest recordings have something of interest for everybody. Both light and serious fare are represented in the following selection, which contains notes on records that everyone interested in radiogram work will find of special appeal.

THE big work of the month is, as last time, a Beethoven composition. The *3rd Piano Concerto* is played by Schnabel and the London Philharmonic Orchestra on H.M.V. DB1940-1944. There could not have been a better piece to follow the *Fifth Symphony*, for the same spirit of simple melody pervades both. The *3rd Concerto* is as guileless as a simple poem: the listener never loses sight of the way once, nor does he miss the beauty of the wonderful melody through meretricious effects. Lyric passages, flashes of serious drama, pastoral miniatures—all are there. Not the least of its charm is the perfect understanding between soloist and orchestra; their balance throughout is wonderful. I recommend these records as something that any discerning person will come to regard as one of his chief and valued musical treasures.

An Attractive Composition

The London Philharmonic Orchestra have been busy lately. They also figure in one of Handel's most attractive compositions, *The Water Music*. But here Sir Hamilton Harty conducts, and the records are Columbia DX538-9. This music has a particular appeal to Londoners, since Father Thames first heard it from a boat on his waters. There is more of it than these records contain, but you will find some delightful music—not typically Handelian at all—and a tranquil, rather sad air which is entirely captivating. On no account should you miss these two records.

Lovers of Russian music will be pleased with a performance of Glinka's *Overture to Russian and Ludmila*, on Parlophone R1631. The Berlin Grand Symphony Orchestra play this "beacon

light" of Russian music in luxurious Teuton style, and there are several passages which have great charm to the ordinary listener.

Light Music

There is quite a lot this month, but the real novelty is a modern arrangement of that lovable piece of Fetras, *Moonlight On the Alster*, and the *Dollar Princess Waltz*, on Columbia DB1208. First, there is extraordinarily happy interpolation of up-to-date methods of scoring, and then a most competent performance by some very able players, The Bohemians. It is all a most artistic compromise between Fetras, Fall, and the best of modern

musical skill, and the vast majority will enjoy it immensely. Nearer to the original mould is a fine piece of work by Marek Weber's Orchestra, who play *Dream Waltz* and *Maidens of Baden* on H.M.V. C2559. The last is especially good. I have just noticed that our German neighbours seem to be supplying nearly all our tea-time music this month, for here are some more of the sort of record which everybody welcomes. Try the *Pussy Cats' Parade* and *Gnomes' Guard* (Parlophone R1628). You have a brilliant dance band (Eric Harden's) giving two spirited and very tuneful numbers. With much of the grand manner, *Rustle of Spring* and *Très Jolie Waltz* (Parlophone R1632) are given by a Symphony Orchestra which can only have come from Berlin. Now for an English orchestra able to hold its own with any foreign competitor of similar strength—that of the London Palladium. Their performance of those two favourites, *The Forge in the Forest* and *Turkish Patrol*, on H.M.V. B8000, is a model of English playing, artistic yet straightforward, full-blooded yet beautifully controlled. A really splendid record, this.

Songs

Of songs there is a generous number, one or two of exceptional merit. We will take Gigli first (on H.M.V. DA1307). His singing of Rimsky-Korsakov's *Chanson Hindoue* would
(Continued on page 568)

RECORDING THE EVIDENCE OF SPECIAL WITNESSES

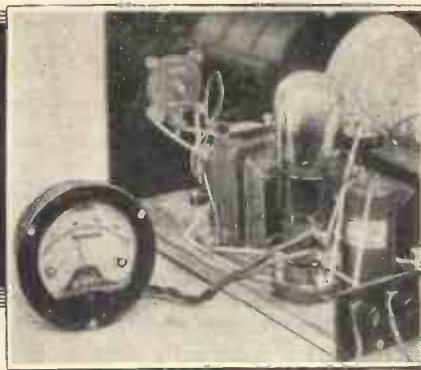


Gramophone recording is being put to a new purpose in Germany, where it is finding a place in connection with legal work. The photograph shows a record being made of the questions being put to a witness and of her replies



FAULTS I HAVE FOUND

By a
SERVICE ENGINEER



IT is a great pity that more reliable information concerning the care and maintenance of electric gramophone motors is not generally available. Like all other mechanical contrivances, these motors are affected by normal wear and tear and will not run perfectly for ever without attention.

The instructions issued by the manufacturers seldom go beyond simple remarks concerning lubrication—a matter that is usually too obvious to require printed advice—and, in a few cases only, a warning against over-oiling.

AN IMPORTANT POINT



The grid-bias battery should be tested fairly regularly, and replaced as soon as it shows signs of deteriorating. A run-down G.B. battery is often the cause of premature H.T. battery failure.

My experience in this connection has taught me that a great deal of premature breakdown and unsatisfactory running of gramophone motors would be prevented if home constructors were given some practical advice on the subject of adjustments that would compensate for normal wear and tear.

Simple Repairs

I say "home constructors" because it is reasonable to suppose that anyone who is capable of buying a motor and fixing and wiring it on a motor-board can easily remove it to carry out simple repairs.

Probably the most widely used type of electric turntable is the induction motor, which is suitable, of course, for A.C. mains only; from a purely

Wide first-hand experience in trouble-tracking in all kinds of receivers well qualifies the writer of this feature to advise readers how to locate faults in their own sets. Hints on keeping electric gramophone motors in good repair and advice on tracing faults in broadcast receivers are the subjects dealt with this month.

electrical point of view these are very nearly trouble-free, although a complete breakdown may take place, due to an open-circuited coil or broken down condenser.

Such major faults are best left to the manufacturer, but it is a good plan to make a careful inspection of the motor before returning it for repair, as it sometimes happens that the break or short-circuit is visible and can be repaired quite easily.

An Obvious Remedy

The "Universal" motor, for A.C. or D.C., employs a segmented commutator and brushes. Here, again, electrical breakdown is very unusual, but an occasional inspection of the moving part pays.

The commutator is to be found at one end of the armature, and is usually quite easily reached by means of an inspection plate or similar opening in the motor casing.

It should be quite clean and free from grease if the motor is to develop adequate power, but, unfortunately, after a few months' running, the lubricating oil and carbon dust from the brushes mingle and adhere to the copper surfaces of the commutator, thereby partially insulating them from the brushes which supply the driving current.

The remedy is obvious, and it is definitely advisable to make a periodic inspection of the commutator rather than to wait for trouble to show itself.

And now we come to mechanical troubles that are common to almost every kind of gramophone motor.

Speed Control

The speed at which the turntable revolves is usually controlled by means of a set of ball-governors which are driven off the main motor shaft by a reduction worm drive.

Almost everyone is familiar with this method of control, and you have only to watch it in operation on your own motor to see exactly how it works.

The governor springs are attached at one end to a circular metal plate which is free to move up and down the governor shaft; as the motor speed increases, so the governor balls fly farther outwards and the springs pull the circular plate farther up the shaft.

The movement of this plate is checked by means of an adjustable arm which carries a small pad of leather. This leather presses against one surface of the metal plate and therefore checks its travel up the shaft, thereby checking the speed of the turntable.

Cure by Replacement

Trouble may quite easily develop here, and it is usually known as "crazy governors."

WATCH IT RUN



To make sure that a joint is going to be sound, you must use a hot iron and watch the solder run

The cause is generally traceable to the leather pad being worn, and replacement will cure the fault.

The symptoms are excessive vibration and inconstant speed when the motor is running.

The bearings at each end of the governor shaft may have worn slack; these are adjustable by means of two set screws which hold each bearing in

How to Make Running Repairs to Your Radiogram Motor

place. If you loosen off these screws you will find that the bearings can be slackened or tightened by either pulling the bearings away or pushing them towards the shaft ends.

Another possible cause is that the circular plate has become bent, so that the checking pressure exercised by the leather pad is constantly varying for each revolution of the governor shaft.

A glance at a "governor" will, I think, make all these suggestions quite clear.

The Elusive "Short"

A particularly annoying type of fault with radio receivers of all kinds is the intermittent signal which comes and goes whenever the cabinet or panel is knocked.

When this trouble is acute, the difficulty is to isolate the cause of the fault, for it is generally found that the slightest disturbance of the receiver produces the symptoms. You cannot, therefore, even by the most gentle tapping, determine which component is most susceptible.

I have found that an ordinary pencil with some form of india-rubber cap makes an ideal weapon for attacking this fault.

With this it is possible to tap each valve or component in turn without in

what the trouble was. After nearly giving it up as hopeless, I found that the screw that held the holder to the baseboard was touching a nut which was moulded into the ebonite. That nut was part of the grid terminal, and when the holding screw was firmly in position the grid was shorted to earth via the nut, screw, and baseboard foil.

AN H.T. BATTERY TIP

Faulty cells in an H.T. battery can be shorted out in the manner shown.



On another occasion I was dealing with a three-valve receiver which employed a differential condenser in the aerial lead as a selectivity control. I found that for some reason or other, connecting the aerial to the set did not produce signals, although if the aerial lead was taken direct to the aerial coil, all was well.

A Strange Discovery

The next step was to examine the differential condenser, but this did not reveal any sort of fault; in fact, it appeared to be in perfect condition.

To make quite sure I replaced it with another, and the receiver then functioned perfectly.

Later I made a re-examination of that condenser, and found a fault that could not occur more often than once in a thousand times.

You know the terminal bolt that passes right through the corners of the fixed plates and carries the spacing collars? Well, believe it or not, that bolt was screwed dead tight against six plates and seven collars, and yet did not make electrical contact with any one of them—and it was perfectly clean!

Puzzling Reaction Trouble

It sometimes happens that when you have just completed building a new receiver that all is well except for a rather complicated reaction fault which produces oscillation at both

ends of the reaction condenser scale. There are many possible causes for this trouble, but the first thing to look out for is some form of coupling between an early H.F. stage and the reaction circuit itself.

Such coupling may cause H.F. current to be generated in the reaction coil in opposite phase to the required reaction current. Consequently, oscillation is produced by these unwanted currents when no true reaction current is allowed to flow. It is, however, speedily cancelled out as soon as the reaction condenser is advanced, for the true reaction current is sure to be a lot stronger than the unwanted one.

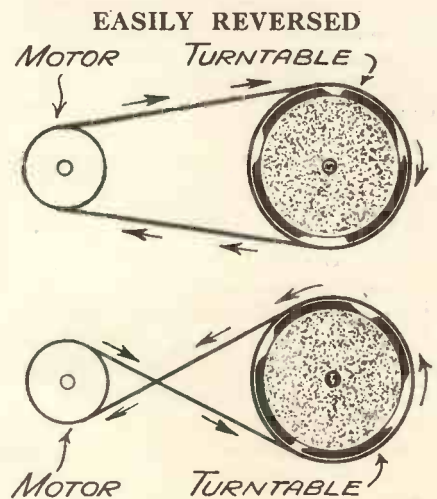
CRAZY RECORDS

Have you ever heard a musical item played backwards? Try the effect by temporarily modifying your gramophone as explained below.

A LARGE number of electrical gramophone motors can be made to rotate in an anti-clockwise direction for experimental purposes by putting a half-twist in the driving band linking the motor proper and the turntable spindle; this will result in the centre spindle rotating in an anti-clockwise direction instead of the normal clockwise direction.

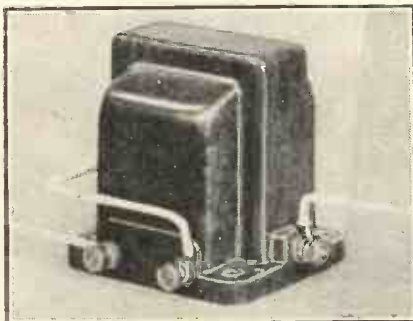
Should the driving band already have a half-twist, then remove the driving band and replace without the twist.

Do not forget that the pick-up must also be suitably offset to counteract this reversal of direction.



By putting a twist in the driving band the direction of rotation can be reversed.

EARTH THE CORE

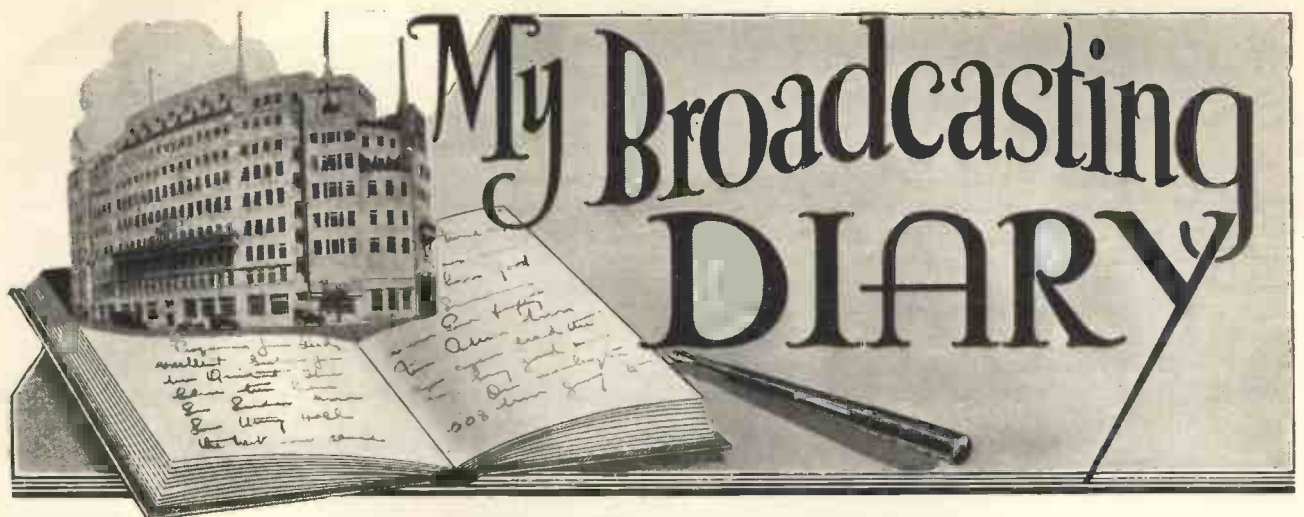


Many L.F. chokes are provided with a special terminal for earthing the core. It should be connected to the nearest earthed point of the set.

any way disturbing the rest of the set and in this way to discover which part produces the intermittent signal.

Almost any component part or connection can be suspected, so that there is always a very wide field for investigation when searching for this trouble.

Never take anything for granted when trouble tracking. I have on one occasion definitely isolated a fault down to a valve holder and then spent nearly two hours discovering exactly



IN the opinion of many at Broadcasting House, only a miracle can prevent serious trouble on January 15th, when the new Lucerne wavelength plan comes into force. On the medium waves there should not be much difficulty; Mr. Ashbridge, the Chief Engineer, is quite pleased with the outlook. But on the long waves it can hardly be called a plan at all, and there is certain to be a period of comparative chaos.

Fortunately, several of the Continental broadcasting organisations are not yet ready with their long-wave transmitters, so that it is just possible that it may be a month or so after January 15th before the congestion in the ether becomes serious.

Meanwhile, the B.B.C. is doing what it can—officially through the International Broadcasting Union at Geneva and “by suggestion” through the Post Office and Foreign Office—to bring pressure to bear upon the more obstreperous Continental wireless authorities.

The Problem of Tuning

Two other aspects of the Lucerne Plan that have caused some misgivings are the effect it will have upon listeners' radio sets and the problem of persuading manufacturers to build sets capable of covering the whole broadcast waveband of 200–550 metres. Under the Plan, the B.B.C. has been allotted an exclusive wave of 203 m. but many commercial sets will not tune as low as this. The trade is already a little agitated over the wave changes and unless the B.B.C. is diplomatic an unfortunate rupture might occur between the two interests.

More Rumours

Sir John Reith's visit to the U.S.A. has revived rumours of his resignation from the B.B.C. Friends in New York tell me that it was openly stated there that the Director-General had turned down one or two tempting offers.

Personally, I do not think Sir John is anxious to leave the B.B.C. until the expiring of the Charter in 1936. In any case, his friends assure me that it would have to be a very tempting offer indeed to get him into any commercial interest. The general view is that some offer from Whitehall alone could persuade Sir John Reith to abandon the B.B.C.

Keeping a critical eye on the affairs of the B.B.C., our Special Correspondent comments frankly and impartially for the benefit of listeners on the policies and personalities controlling British broadcasting.

The Television Position

The B.B.C. has good reason to be pleased with itself over the outcome of the television negotiations. It has successfully played off the various interests one against the other and secured what it wanted—a postponing of any definite decision. The Governors are most anxious not to commit the Corporation one way or another. Their aim at the moment is to wait and see without incurring criticism for failing to encourage new inventions.

“First Time Here”

The “First Time Here” variety programmes may soon be dropped through lack of support—not from the public but from the profession. It is difficult enough in any case to secure the services of five or six music-hall artistes who have never previously broadcast.

Add to this the problem of getting them to the microphone on a Saturday afternoon for a quite nominal fee, and you will see that John Sharman, the organiser of these popular matinees, has a most difficult task.

In any case, it is impossible to go on for ever bringing to the microphone all the people who have never broadcast before. There is a limit to the talent available.

A Christmas Bonus?

There will be jubilation among the B.B.C. staff if the suggestion for a double Christmas bonus this year finds favour with the Governors. The

HENRY ON HOLIDAY



Henry Hall, the famous leader of the B.C.C. dance band, snapped recently when going off for a well-earned holiday.

contention that the staff reorganisation plan has entailed extra work and in some cases almost hardship is fully justified. No overtime money is paid although many extra hours are put in annually, so that morally, at all events, every penny of the customary bonus is earned.

Items Worth Hearing

Perhaps the most outstanding play booked for this month is "Julius Caesar," which is to be produced by Howard Rose in the Sunday Shakespearean series on December 10th.

Great interest will also be aroused by Dumas' "Three Musketeers," which has been adapted for broadcasting by Patrick Riddell. Part 1 of this huge work is being produced in the National programme on December 20th by Peter Creswell. The second part will be broadcast some time in January.

Mention must also be made of the St. Hilary Nativity Play, which is being relayed from Cornwall on Friday, December 22nd, and "A Christmas Carol" down for December 18th.

A Relay from Bethlehem

Christmas programmes are being subjected to a little delay in organising owing to doubts concerning the length and timing of the broadcast in which the King will speak. A relay from Bethlehem is also under consideration, but until a definite time can be fixed the programme builders will be working under difficulties so far as the full Christmas plans are concerned.

The festive programmes may be said to begin with a Christmas Party, which is being given by the Kentucky Minstrels on December 23rd.

Christmas Services

Christmas Eve falls on a Sunday, so the usual "rollicking" programmes will not be possible. In the afternoon there will be the now customary carol service relayed from King's College, Cambridge.

A missionary talk by the Bishop of Jerusalem is due at 5.30 p.m., and in the evening there will be another carol service from St. Mary's, White-chapel.

On Christmas Day the morning broadcast begins with a service relayed from Christ Church, Oxford. In the afternoon the King will speak, and at 9.5 Mr. Lloyd George is making the annual appeal on behalf of the Wireless for the Blind Fund.

The Christmas Pantomime that Gordon McConnel is now working on is "Sinbad The Sailor."

Light Musical Fare

The first light musical programme of note this month is on Friday, December 8th, when Alfred Reynolds is conducting the B.B.C. Orchestra during a concert of his works written for A. P. Herbert's shows. A. P. Herbert will himself be in the studio

and other artistes taking part include Olive Groves George Baker, Tom Purvis, and Samuel Dyson.

On December 12th, Denis Freeman is producing a South American Operetta.

"Anywhere for a News Story"

Among talks the "Anywhere for a News Story" series has taken a firm hold. On December 16th H. W. Nevinson, the war correspondent, will describe The Relief of Ladysmith, and on December 23rd J. L. Hodson, of the "News Chronicle," talks about Interviewing the High and the Low.

The Varsity Rugger Match

The Varsity Rugger match—Oxford v. Cambridge—on Tuesday, December 12th, is to be broadcast. Capt. H. B. T. Wakelam will be at Twickenham to give the running commentary.

UP IN THE CLOUDS!



One of the masts in the course of erection on the site of the B.B.C.'s new high-power long-wave station at Wychbold They are to be 700 ft. high!

Regional Directors' Meetings

Proposals are afoot to hold the monthly meetings of Regional directors in the various regional headquarters instead of always in London.

This will mean that the Regional Directors will have an opportunity of meeting each other in their own territory and seeing for themselves how the region is administered.

The importance of these meetings cannot be over-emphasised, for it is only by council among themselves and advice from Headquarters that the Directors can hope to keep abreast of broadcasting development.

The B.B.C. in Canada

Mr. Malcolm Frost, the young "ambassador" of the B.B.C., is preparing to leave London for Canada shortly after Christmas. The projected trip will complete his tour of the British Empire which was primarily undertaken to obtain first-hand knowledge of conditions and public feeling over Empire broadcasts.

At the same time Mr. Frost sold gramophone records of B.B.C. programmes which were snapped up like hot cakes by the Dominion broadcasting authorities. Apparently they are hungering for such records and Mr. Frost predicts that there should be no difficulty in selling large numbers. At all events, he is taking some more with him to carry on the good work in Canada.

Meanwhile the B.B.C. is hoping to make a commercial success of the sale of records in this way, and proposals are being made for making them on a large scale.

It may be impossible to obtain direct financial support for Empire broadcasting from the Dominions and colonies, but possibly some small return can be obtained on records



Making H.T. Batteries

WITH the increase in demand for radio high-tension batteries, and also for dry cells for electric torches, the Ever Ready Co. (Gt. Britain) Ltd. has been forced to open another factory in London. This makes the eighth in the Metropolitan area, while the Company has other factories in the provinces as well as in the Empire and abroad, making a total of twenty-eight in all. They occupy a total of one and a third million square feet and employ over 12,000 people.

The new factory has been arranged throughout to permit every stage of dry battery manufacture to be carried on. It is said to be the only factory in England in which production is carried through from raw material to a finished battery.

The floor area is 175,000 square feet, which allows ample space for expansion to meet increased demand for the many types of cells and batteries made by the Ever Ready Company.

Entirely Self-Contained

The ground floor is devoted partly to a mill which crushes the raw manganese dioxide and partly to production lines on which finished cells are made up in battery form and sealed and packed for sale. These production lines mark the end of the steady flow of the cells through the factory.

Work on the dry cell, whether intended for torches or radio batteries, starts on the top (third) floor, to which the powdered manganese dioxide is forced under pressure from the ground floor mill.

Here the casings are made, the electrolyte for the cells is manufactured, and on this floor also all the machinery parts and tools needed in the factory are made and repaired.

Below, on the second floor, are the wash rooms, including shower baths for the manganese workers.

The general impression obtained from the factory is that of a wonderful organisation.

Some trade news and views that will prove of interest to readers, whether or not they are connected with the radio industry. Members of the trade are invited to send items of interest or photographs to be included under this heading.

New H.M.V. Portable

The Superhet A.V.C. Portable Grand 462, to give the full name to H.M.V.'s latest battery set, is a most fascinating receiver. It is compactly contained in a cabinet measuring just over 18 in. high by 15 in. wide and 8 in. deep.

It incorporates six valves and a full-wave Westector rectifier, which provides linear rectification and delayed A.V.C. The output stage consists of two Q.P.P. pentodes enabling the quiescent current of the whole set to be as low as 9 or 10 milliamps. The

sensitivity is astounding, for the set is a real range-getter, and it has also a maximum power output of something like 1,250 milliwatts undistorted.

At 15 guineas the set is excellent value, and should command a ready sale. It is certainly one of the most efficient portables (or "transportables") I have had the fortune to hear.

A Good Idea

We are all rapidly becoming more interested in the "works" of the articles we purchase. The motor-car has been a prime factor in this growth of inquisitiveness, or shall I say scientific investigation? At each motor show we are provided with various "sectional views" of different parts of chassis and engines of the latest designs, and it was inevitable that the idea should spread to radio.

Sectionalised valves are well-known

EVER READY'S EIGHTH LONDON FACTORY



Part of the army of girls at work in the new Ever Ready factory at Walthamstow. They are busily engaged in connecting up the groups of cells in H.T. batteries. Note the belt conveyor system running down the centre of the bench.

Letting the World See How It is Made

exhibits at the various radio shows, but as far as I can remember this year's Radio Show was the first to contain a sectionalised moving-coil speaker.

This exhibit was profoundly interesting and most instructive, so that it was not to be wondered that the manufacturers of it, R. & A., found it was one of the star attractions on their stands, not only in London but at Glasgow, Manchester, and the rest.

So interesting did visitors find it that a special photograph of the model has been prepared so that members of the public who did not go to either of the radio exhibitions may have an opportunity of examining the design and construction of the R. & A. "Challenger" speaker for themselves.

This photograph we reproduce here, and it will be seen to provide a remarkably clear insight into the method of construction of the modern moving-coil speaker in general, and the R. & A. "Challenger" in particular. It is a good idea and might well be followed by makers of other components and accessories. There is nothing like showing your potential customers *how* it is made, for a good piece of work can never be too fully displayed.

In the Lord Mayor's Show

A vivid representation of the services rendered to the community by the telegraph industry on land, sea, and air was provided in the Lord Mayor's Show this year by Cables and Wireless Ltd., with which is associated Marconi's Wireless Telegraph Co., Ltd.

Three cars were arranged in the procession to portray the cable and wireless routes of telegraph communication, the advance of radio during the twentieth century, and the various uses of radio in such things as depth sounding, direction finding, and so on.

The history section was particularly interesting in that a model of the coherer receiver used in 1901 by Marchese Marconi when he first spanned the Atlantic was shown; while by contrast attention was drawn to a modern Marconi commercial transmitter and receiver typical of the types used by many of the present-day radio stations.

New Tungram Valves

An interesting new two-volt battery output valve has been placed on the market by Tungram in the L.P.220.

This is a low anode consumption valve for battery sets, having an anode current of some 4 to 5 milliamps only. Incidentally, it is particularly suitable for Q.P.P. work.

Tungram are well noted for their mains valves, among which they market a complete range of universal A.C./D.C. types. These, I hear, are enjoying particularly large sales, and their popularity is spreading rapidly all over the country.

A big bottle among the Tungram range that is of more interest than use to MODERN WIRELESS readers, though it is extensively used in public address work, is the 21-watt Class B valve which is designed specially for big

power amplifiers. It takes the form of two valves, forming a pair which will give a peak output of 21,000 milliwatts. Something like a noise!

Addressing the Public

For the seventh year in succession Marconiphone public address equipment was used in London on November 11th to enable the vast crowds assembled at various places to hear the Armistice services which were being conducted.

At the Royal Exchange, for instance, there were seven loudspeakers and two microphones. One microphone was for the use of the Bishop of London at the Territorial memorial, and the second relayed the music of the bands assembled there. Two Marconiphone speakers fed Threadneedle Street, two fed Cornhill, while three speakers were used for the large space in front of the Mansion House and the Poultry.

Well Done!

For the second year in succession a Ferranti receiver has won first prize as the best value for money set at the Northern Radio Exhibition held in Manchester. The ballot was arranged, as last year, by the Wireless Retailers' Association, in conjunction with Allied Newspapers, and the Ferranti Lancaster Parva 5-valve Superhet has brought the cup to Hollinwood again.

The presentation was made to Mr. D. Z. de Ferranti on behalf of Ferranti, Ltd., by Sir William Davies, ex-Lord Mayor of Manchester. Incidentally, it is of interest to note that the Ferranti stand at Manchester was voted second place in the "Best Stand" ballot.

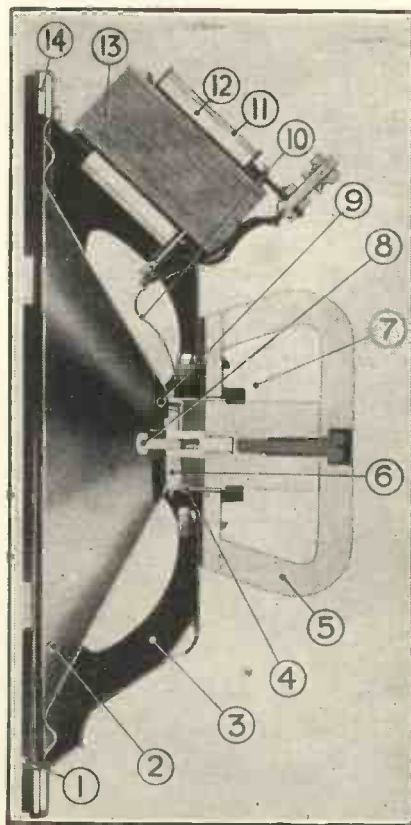
On both successes we here tend our congratulations to all concerned in Hollinwood, who must be justly proud of a fine achievement.

A Big Price Reduction

I learn from Mr. Graham Farish that he has decided to reduce the price of the Graham Farish Class B driver transformer. From 12s. 6d. the transformer has been reduced to the remarkably low figure of 8s. 6d.

Also a new "Snap" flat type H.F. choke has been introduced at 2s., while a universal metal bracket will be found invaluable to a large number of constructors who want to mount their volume controls, reaction condensers and the like, well back from the panel, or on a chassis which is to be placed in a cabinet.

INSIDE THE SPEAKER



The R. & A. "Challenger" speaker in section. The numbers refer to the following salient features.

- | | |
|---------------------------------------|------------------------------------|
| 1. Baffle felt. | 9. Centring spider. |
| 2. Diaphragm | 10. Speech coil lead. |
| 3. Chassis. | 11. Transformer secondary winding. |
| 4. Speech coil. | 12. Transformer primary winding. |
| 5. Magnet. | 13. Transformer core |
| 6. Speech coil pressure ring. | 14. Diaphragm clamping sector |
| 7. Speech coil dust excluding washer. | |
| 8. Spider locking screw | |

ON THE SHORT WAVES

ALL THE LATEST
NEWS AND
INFORMATION

By
W. L. S.

I WAS talking a little while back to a man whose name is a household word in the radio industry, and he made a remark that is worth passing on. "Well, old man," he said, "you're a bright chap, sticking to short waves like this. You're missing all the worry and having all the fun!"

I agreed quite instantaneously about the last part, but demurred on the first count. It eventually transpired that this gentleman looks on the short waves as the happy hunting-ground of the keen home constructor, but wouldn't touch them from the business point of view, even with the proverbial forty-foot pole.

The Future

I asked him what he thought about the future. His most profound remark was the following: "In five years' time it won't pay people to make their own sets. They'll still be doing it, as they are now, for the love of the game; but you just wait and see what you will be able to buy for a fiver in the year 1938!"

That led me on to ask him whether he really thought that home constructors ever made their own sets simply for the purpose of saving money. But my friend, being an Aberdonian, wouldn't commit himself.

Perhaps this all seems very remote from short-wave matters, but there is an important connection. You very seldom find that the man who has bought himself a complete broadcast receiver will take any interest in short waves. It is invariably the keener type of home constructor who is bitten by that particular bug; and the keener he is, the more severe are the effects of the bite.

Keen Constructors

Now, with the appearance on the market of complete receivers that really are almost incredible value for

The short-wave enthusiast, says W. L. S., is essentially a home constructor, and since everything points to an increase in the numbers of those who build their own sets, short waves must be increasing in popularity.

He administers a gentle rebuke to those ultra-keen short-wave people who become too one-sided, and points out the advantages of a dual personality which can enjoy short-wave and broadcast-wave listening.

Some notes on the relative sizes of different wavebands, and a buried-earth suggestion, are also included.

money, I have it on good authority that the home constructor has not diminished appreciably in number. This implies that nearly all of them are really keen. The word "amateur" means "lover," and I think a higher percentage than ever of radio enthusiasts—not listeners, but enthusiasts—are real lovers of their hobby.

Surely this seems to indicate that

the short-wave section of radio is slowly but surely coming into its own? I find evidence of it on every side. The most unexpected people are to be seen struggling with minute coils and condensers, exhibiting seraphic smiles and murmuring "W 2 X A D" under their breath. I appeal to all my regular readers to preach "short waves" this winter to all their acquaintances who haven't yet "broken in" for themselves, and to make this a real boom season for short-wave work.

Simple Apparatus

Don't think that I am advocating short-wave listening and experimenting as a substitute for broadcast reception. No one would do that but a real crank. But what's wrong with taking it up in addition to your work on the broadcast bands?

You don't need any expensive apparatus—the simplest receiver is

A WIRELESS CLASSROOM IN THE AIR



So that they will have practical experience of aeroplane wireless, R.A.F. students of radio technique receive part of their instruction in a Vickers Victoria machine equipped to carry an instructor, five pupils, and the necessary sets of apparatus.

Underground Aerials for Ultra-Short Waves

very often the best. It cultivates the admirable virtue of patience; and it places you on the plane (not too easily attainable these days) of being a *little* bit ahead of the other man in what you can get out of radio.

I must confess to being a sort of Jekyll - and - Hyde personality. As "W. L. S." I am terribly keen on short waves and everything pertaining to them, perhaps slightly derisive of ordinary broadcast listening.

Improving Reproduction

But as my own humble and retiring self, it is my great joy to banish radio technicalities from my mind altogether and to listen to the broadcast programmes purely from the entertainment point of view. Every day I have a go at my broadcast receiver with a view to improving the reproduction a little more; but when I listen to it I try not to think in terms of radio; but rather in terms of music, talks and vaudeville.

This is intended, as those who read between the lines will already have surmised, as a timely hint to ultra-keen short-wave people not to become too one-sided. A man with only one pet subject is *always* a bore.

The diagram is rather interesting. Originally drawn up to satisfy my own curiosity, it has shown me one or two things that I didn't

realise before. Since it is drawn on a scale of kilocycles, the "ribbons" indicating the width of the various bands are in perfect proportion to the "space-value" of those bands.

Arbitrary Limits

Some of the short-wave broadcast bands have to be fixed somewhat arbitrarily, but I have taken them as 50-46-69 metres, 31-6-30 metres, 25-63-25-14 metres, 19-84-19-56 metres, and 16-89-16-57 metres. I don't think those figures are far wrong, although there are in each case several stations working outside the bands.

From the diagram you will see that practically any two of them added together will total a space that is greater than that of our medium broadcast band. I have taken the two extremes of the latter as Ljubljana on 574.7 metres and Aberdeen on 214.3 metres.

The long-wave broadcast band is not worth showing as a "ribbon" at all—it would hardly be the thickness of the line denoting Daventry National!

The Five-Metre Band

The most amazing thing about the whole diagram is the tremendous width of the amateur 5-metre band, which, after all, is only a tiny slice of the ether in the region of 5 metres.

The full band-width is only 5-5.36 metres, but look at the "space"!

And don't forget that I have cut

WEIGHS ONLY A POUND.



Weighing only one pound, this U.S. Army transmitter is carried by a hydrogen-filled balloon and automatically transmits meteorological data to observers on the ground.

the diagram *very* short in the middle. Actually the space between 20,000 kc. (15 metres) and 60,000 kc. (5 metres), if the whole thing at that end were drawn to scale instead of being "cut," would be nearly twice the length of the whole diagram in its present state.

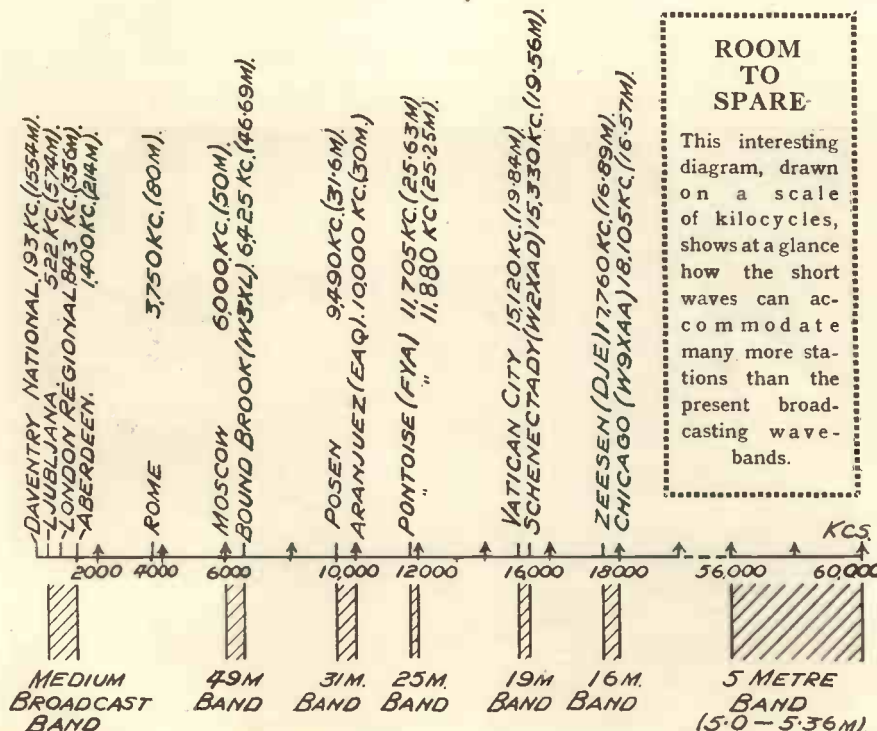
Who can deny the possibilities that the entire distribution of wavelengths may be altered in a few years? On the showing of this simple diagram, the way in which all our broadcasting stations on the medium waves are crammed together is too absurd for words.

What a criminal waste of good space is going on! Admittedly, the ultra-short waves have not yet been tamed, but several large concerns, I happen to know, cannot be accused of letting the grass grow under their feet.

I believe I mentioned quite recently a prophecy that I heard at a radio society meeting concerning the possible whereabouts of our broadcasting stations five years hence. I wonder.

A Fascinating Field

Now I want to put readers on to a fascinating field of experimental work. Years ago we used to have a craze for trying "underground aerials"; and several people, after much digging and other hard work, managed to get quite good results. I think an underground aerial for ultra-short waves would show up some interesting results, and be well worth trying.



KENDALL'S CORNER

HAVE you noticed the amusing controversy which is going on in certain quarters as to the desirability or otherwise of radio sets on motor-cars? It has been getting quite acrimonious lately, with one party maintaining that radio is bound to distract the driver's attention and the other replying that a fellow can't be much of a driver if a little thing like that can put him off his job!

The Set of the Future

With the merits of the question itself I am not much concerned, but there is another aspect of the whole matter of car radio which interests me very much.

I refer to the use of remote control, which is used for so many of these instruments. As the reader probably knows, a very common type of car radio outfit includes a receiver which is entirely enclosed in a steel case intended to be stowed somewhere out of the way, e.g. under the floorboards, a separate loudspeaker, and a control box which is fitted to the steering column or in some other handy spot within reach of the driver.

Now, I believe there is a moral in this which applies to the radio equipment which will be used by the general public in the future. It probably does not concern the home constructor, because I think he will always want to have his set where he can get at it easily, and, in any case, the type of receiver which appeals to him is not one which lends itself to distant control.

It is always interesting, however, to speculate as to the lines on which the layman's type of outfit will develop, and I have long cherished a pet theory on the subject.

I argue in this way: radio to the layman is just as much a domestic service as the hot water which he has laid on to various points in his house, gas heating, electric light, and so on. He takes no real interest in the source



On these pages our distinguished contributor, Mr. G. P. Kendall, sets forth his own personal opinions on certain important aspects of radio. The set of the future and considerations of component design, which particularly concern the home constructor, form the chief items for his pen this month.

of that service, and the fact that he has so far had to place it in his drawing-room has been merely a matter of technical expediency.

Those Costly Cabinets

To get him to do it at all it has been necessary to persuade him to regard his radio set as a beautiful piece of furniture, with a cabinet which perhaps cost more than the chassis which it houses!

The arrangement seems natural enough, but that is merely because we

owner was really rather busy this morning?

Not a very close analogy? All right, let us make it as close as we can to the radio proposition. The suggestion, then, would be a single generating plant located in the principal living-room, so that it could be turned on and off as required, the charging rates adjusted to the needs of the moment, and so on.

A Parallel Case

If light was wanted in other rooms extension lines would be run to them, and the plant would be housed in a beautiful cabinet with silence chamber for the engine, and so on, which would perhaps double the cost of the installation. Somehow, I don't think this scheme would meet with a much warmer reception than the previous one, do you?

Contrast it with the attractive features of a really modern private house lighting plant. Such a plant is either semi-automatic or fully automatic, and can in many cases be left to its own devices for quite long periods. It can be stowed away in any convenient outbuilding, and the house wired up exactly as for a public supply, the convenience of which such a system very closely approaches.

It is my belief that radio for the general public will ultimately develop along very similar lines. I visualise the radio-equipped house of the future as having a central receiver in a purely utilitarian metal box, placed alongside the gas and electricity meters in the coal cellar, or if coal cellars will be out of date by then, in the cubby-hole under the stairs.

The Logical Solution

From the central receiver leads will run to the various listening points, at each of which there will be a loudspeaker, presumably concealed, and a control-box which will govern both tuning and volume.

AN INSTANCE OF THE NEED FOR STANDARDISATION



It is amazing the variety of types and sizes of component terminals that are used by manufacturers. Just look at the assortment in this photograph! Mr. Kendall points out that there is really little justification for not having more uniformity in terminals.

are used to the idea. Let us try and look at the problem without preconceived notions of any kind. Imagine going to the owner of a large country house and suggesting that he should install electric light on the basis of a little engine, dynamo and battery in every room where light was required! Cannot you imagine the raised eyebrow and the frigid intimation that the

Fixing Baseboard-Mounting Components

The development of suitable control devices is by no means an insoluble problem technically, and I believe it is only a matter of time before some enterprising firm offers such an equipment. Actually, control systems of the required type were being worked out in America some time ago, but they were being treated purely as rather expensive adjuncts to receivers of normal type, and so were largely wiped out when times of depression arrived.

Certain recent experiences of mine have reminded me of one of the infuriating difficulties which still beset

the home constructor, and I am moved to take advantage of my "diplomatic immunity" in these pages to let off a little steam about it.

A Vexed Question

I refer to the question of the fixing of baseboard-mounting components, a matter which must have caused uncharitable feelings in the breast of everyone who has ever built a radio set. In the first place, why oh why will not some component designers realise that it is not enough just to provide room for a small screwdriver

to get at the heads of the fixing screws?

I can only conclude that they have never tried to build a set themselves, or they would understand that one ought to have room to get one's fingers there as well, in order to hold the wretched screw while it is being started. A simple and surely obvious point, yet how often does one find that minutes must be wasted in a temper-boiling struggle simply because the designer had apparently never thought of it!

Beyond Comprehension

Then, again, there is the question of the number of screw holes provided, which might well receive a great deal more attention than it actually does in many quarters. One finds quite large and heavy components provided with only two fixing holes, and small and light ones with as many as four. Surely somebody must be wrong!

I have a particularly flagrant case in mind of a valve holder which does not grip the valve at all tightly, so that there is very little strain when the valve is pulled out, and yet it has no less than four *extra large sized* holes for screws! (No, I'm not going to mention it by name, because I am about to be really rude, and I have a wholesome respect for the law of libel!). This kind of thing is enough to make one wonder whether the person responsible really is "responsible"!

Then there is the matter of the number of different lengths of screw required in building a set. I recently set to work with a selection of screws of no less than six different lengths beside me, and, believe it or not, by the time I had finished I had used some of every size and found one component which required a length I hadn't got.

Uniformity is Essential

This seems to me to be an entirely unnecessary obstacle to put in the constructor's way, but it is not one for which individual manufacturers can be blamed. It is just one more example of the lack of a reasonable measure of standardisation which is the natural result of rapid progress.

It does appear, however, that the time has now come when we might reasonably expect some attempt to be made in the direction of a certain amount of uniformity. It is not such a small point as it may appear to

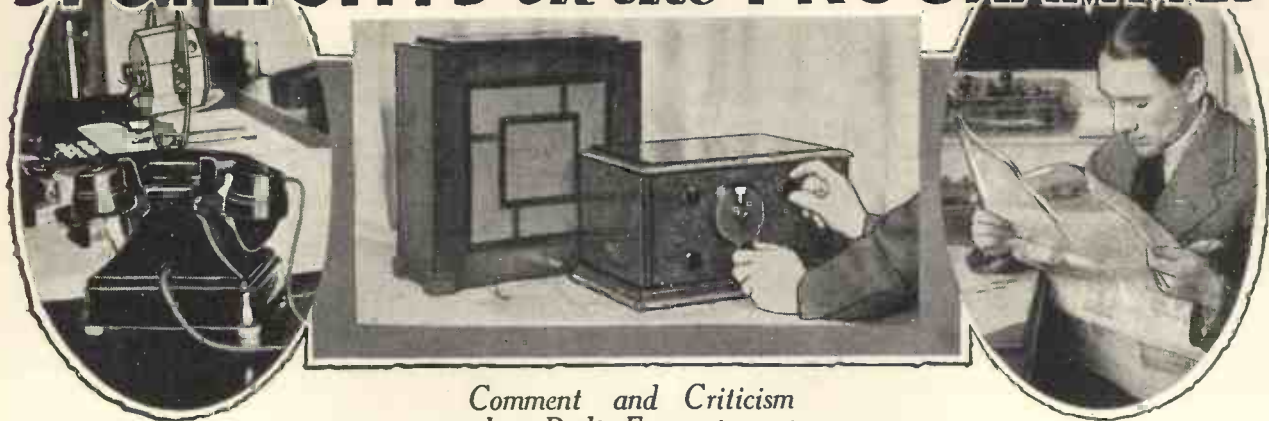
(Continued on page 568)

WHAT WILL THE SET OF THE FUTURE BE LIKE ?



Listening to one of the "His Master's Voice" superheterodyne receivers, a fine instance of the modern set with its attractive cabinet work. Extension leads, remote control and metal-encased receivers will play important parts in the home radio installation of the future as Mr. Kendall visualises it.

SPOTLIGHTS *on the* PROGRAMMES



Comment and Criticism about Radio Entertainment

NOBODY will be more delighted than Layton and Johnstone themselves that arrangements have now been made for them to be heard again in the B.B.C. programmes. When the "war" between broadcasting and the music-hall interests caused their departure from the microphone, Johnstone told me how much he admired the B.B.C. and the good it was doing. These fine singers will now be regular names in the programmes to everyone's delight.

I do not know who was responsible for the negotiations which brought about this armistice, but I do know that George Black, as representative of the music halls, did much to better the financial treatment given to the "big names" of variety by the B.B.C. His attitude—thought by many listeners to be somewhat high-handed—has now been justified up to the hilt. And everyone is happy!

Facts and Figures

It is not the habit of Broadcasting House to divulge information about the finances of the B.B.C. programmes. However, I have been able to obtain official facts about the respective costs of radio drama and radio variety which may help to knock down the Aunt Sally set up by a certain critic who maintained (without giving any facts to support his contention) that radio drama was the most expensive and the least appreciated branch of broadcast entertainment.

You will be interested to know that whereas an elaborate play like "Carnival," requiring many actors and nearly as many studios, can be given one performance for the price of £120, an average Saturday night "music-hall" programme needs at least £200 to see it through.

Moreover, the interest which has greeted the preliminary announcements of a new British Radio Play Society is proof that radio plays are much more widely appreciated than many people suppose.

Clothes Make the Programmes!

The announcement from Birmingham that the B.B.C. suggests "that artistes and announcers should wear

evening dress when appearing before the microphone has been hailed with pleasure by our contemporary, "Men's Wear."

While admitting that the broadcasting studio is a place invisible and apart, they think it is as well that listeners should know that there can be no "back-stage Bohemianism" behind the microphone of the B.B.C.

At the same time there are some occasions on which evening dress might not be quite suitable. One might imagine, perhaps, that a quick change into breeches and gaiters would give an announcer just that right amount of atmosphere to brighten the fat stock prices.

New Blood at Birmingham

While we are on the subject of the Midland Regional offices, it is interesting to note that Victor Hely-Hutchinson, the new Musical Director, and Martyn Webster, who was transferred from London at the end of October to look after the productions side of the programmes, have both settled down and are entering into their new work with an enthusiasm which augurs well for the success of future entertainment.

Outstanding productions during the remainder of the year include two shows by the Brothers Melhuish (originators of "Only a Mill Girl" and other musical burlesques) and a new thriller by J. C. Cannell, who wrote "Cabaret," one of the best light shows ever done from the London studio.

A Word About Vulgarity

Here's a thought for Sir John Reith when he returns from America. Why is it that studio comedians' scripts are most carefully scrutinised lest any

BLACK AND WHITE



Frida Petrovna, the famous dancer, dressed and made up for a broadcast from the Television Studio.

The Café Colette "Mystery" Solved

vestige of an idea that is "not quite nice" should creep in—while every day dance-band crooners (the B.B.C.'s own, amongst them) are permitted to sing the most unpleasantly suggestive dance tune lyrics?

These are sung over and over again in every type of programme, and no one on the B.B.C. staff of censors turns a hair.

Perhaps Sir John never listens to dance music and is unaware of what he is missing. If this is so I shall have much pleasure in sending him the words of the songs in question for his edification.

Not So Mysterious!

The B.B.C. programme announcements continue to make a mystery about the identity of the Café Colette Orchestra. An official communique which I have received pictures sleuths of the Press making exhaustive inquiries here, there, and everywhere. Was it from Paris or Brussels, Vienna or Marseilles? Was it an orchestra retained by one of the numerous luxurious restaurants of Piccadilly or Whitechapel? Was it the B.B.C. Theatre Orchestra trading under another name?

Just in case there were some of you who were not able to be part of the studio audience in St. George's Hall on November 25th, let me clear up the mystery here and now by telling you that the so-called Café Colette Orchestra is none other than Walford Hydens' tuneful and already famous band. So any sleuths who are still snooping around Piccadilly or Whitechapel can return to their loudspeakers and hear how good a British orchestra can be.

In Lighter Vein

I like the story of the dear old lady who asked what the peculiar stone thing was over the entrance to Broadcasting House. On being told that it was Ariel she replied, "Well, the B.B.C. can do what they like, but I'm going to stick to my pole and length of wire."

But perhaps nicer still is the true tale of the listener who telephoned

the Controller at Broadcasting House during one of Harry Hemsley's variety turns and indignantly informed him that she would have to take up the matter with the N.S.P.C.C. "It's disgraceful that children so young should be kept in the studio until this time of night."

Coming Events

One of the funniest and most clever burlesque operettas ever written is "The Policeman's Serenade," written by A. P. Herbert and set to music by Alfred Reynolds. The sad tale of

his provincial tour of the "Ridgeway Parade" has proved too popular to allow of it being cut short, and listeners will have to possess their souls in patience until May of next year.

After nearly two years, Holt Marvell's romantic operetta, "Good-Night, Vienna," returns to the microphone on December 6th, when Val Gielgud, B.B.C. Productions Director, will produce.

On the eve of its first broadcast it occurred to Holt Marvell that the piece would make quite a good film. One Sunday night he sat down and wrote to Herbert Wilcox at Elstree, describing what "Good Night, Vienna" was all about. Before he reached his office on Monday morning there had been frantic telephone calls asking him to go out to Elstree and discuss the matter. Arrangements for the film were completed before noon on the same day!

A BUSMAN'S HOLIDAY



Hugh Morton, B.B.C. star, "broadcasts" to an enthusiastic though perhaps "gullible" audience as a relief from appearing before the microphone.

the love-lorn policeman whose pretty housemaid is stolen under his very eyes by a burglar is not often heard to-day, and I am glad to see that it is to be included in the Memories of the Lyric, Hammersmith, programme, on December 8th. Olive Groves and George Baker will be supporting the B.B.C. Orchestra on this occasion. I am sorry that Tessa Deane is not included, to sing some of her lovely songs from "Derby Day." Unfortunately her radio successes have brought her so much fame with theatre managers that microphone appearances have had to be curtailed.

Philip Ridgeway was to have returned to the studio in January, but

Two Little Grumbles

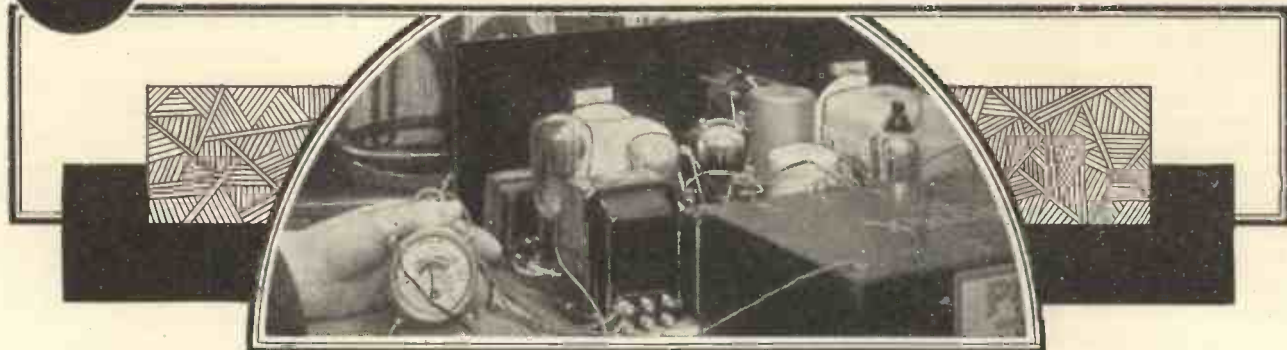
There has been an outcry in many quarters over the recent "C. B. Cochran Presents—" feature. I think the outcry is justified this time. In the course of the programme what purported to be an actual relay of a short speech by Gertrude Lawrence from her theatre dressing-room was put over, with a life-like ringing of telephone bells, and so on.

Actually this was taken from a gramophone record made beforehand. I know that on certain occasions recordings have to be used. In plays they don't matter. In news bulletins they are usually done so that it is obvious what they really are. In a true-to-life programme, however, it is not permissible to pretend that famous people are in the studio, or even on the telephone, when they aren't.

And another thing, why can't the Director of Programmes listen to the lunch-time music from Luxembourg on Sunday? He would then realise what a difference to Sunday music a full orchestra can make.

PATRICK CAMPBELL.

ON THE TEST BENCH

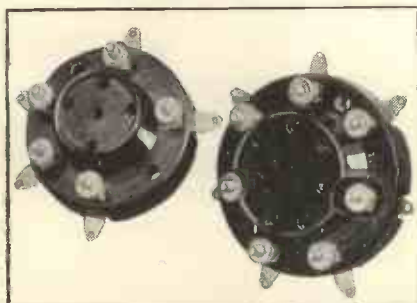


New Benjamin Products

WE have recently received a quantity of the new design Benjamin valve holders. These are clearly constructed from high-grade bakelite and have nickel-silver spring contacts.

A practical feature which will prove very popular among home constructors is that these new Benjamin valve holders have reversible terminals.

ADAPTABLE HOLDERS



The terminals on these five- and seven-pin Benjamin valve holders are reversible, so that the holders are adaptable for designs with sub-baseboard wiring.

That is to say, they can easily be inverted for sub-baseboard wiring. It is true that this can be done with some other makes (though not always easily), but we fancy that the quality has been introduced more by accident than design. We believe Benjamin were the first to realise its value to the constructor and deliberately to design their holders accordingly.

There are two types of these new Benjamin valve holders: a 5-pin at 10d., and a 7-pin for Class B, double-diode triodes, and other 7-pin valves, at 2s.

Both are first-grade pieces of work, and we can unhesitatingly recommend them to the attention of our readers

A Famous Line

We have also had sent us one of the new Magnavox loudspeakers—another

Our comments regarding some interesting new components.

famous Benjamin line. It is the Senior Model Type 252, selling at £3 3s.

Complete with an input transformer, it incorporates a permanent magnet. A silk-fronted dust-proof bag is supplied for direct fitting to baffle or cabinet.

A very excellent scheme, that. Not only is the difficulty of providing an ornamental fabric front for covering the diaphragm overcome, but the instrument is completely protected against the incursion of dust.

The input transformer enables close matching to be obtained in all circumstances. There are six ratios, including ones suitable for Class B and push-pull circuits. A colour code renders it extremely simple for anyone to choose the correct ratio.

The name Magnavox is synonymous with good moving-coil loudspeakers, as well it might be, for Magnavox moving-coil loudspeakers were being made in 1911!

And this latest addition to the notable range maintains the Magnavox tradition.

Pleasing Reproduction

Its response is most pleasing. There are no appreciable peaks, and low notes down to 50 cycles are reproduced clearly.

There is a standard model of this Magnavox permanent-magnet loud-speaker retailing complete with transformer at 37s. 6d. complete—that is, with the one exception of baffle and cabinet, and we would advise all those who are contemplating the purchase of a new speaker to consider both models carefully and, if possible, to hear them demonstrated. We feel that even the most critical will not be disappointed with either model.

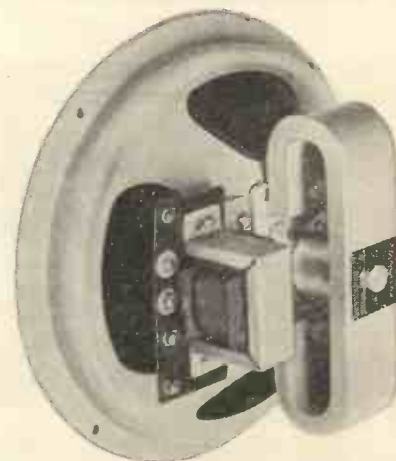
Bulgin Skeleton Components

There has recently been considerable discussion regarding the cost of components. On the one hand it is argued that by dispensing with polished cases, terminals and other such refinements, components could be sold cheaper without seriously, if at all, reducing their efficiency or usefulness.

It is held against this by another school of thought that in the majority of instances cases, for example, are integral parts of an economical construction and that little or no saving can be effected by dispensing with them.

In the height of the controversy Messrs. Bulgin have made a striking contribution to it of an entirely practical nature by introducing a large

FOR GOOD RESPONSE



This is the Magnavox Senior Model Type 252 moving-coil speaker which is provided with a six-ratio input transformer

range of "skeletonised" versions of various of their products.

Here, then, we have concrete evidence to examine, and its examination proves interesting and instructive.

It must be realised that the Bulgin "skeletons" are the technical equivalents of their more refined brethren.

Some Components that Save Money

Therefore, we must first ask ourselves whether or not normal Bulgin products are competitively priced. This is vitally important.

Now let us take some examples. There is a Screened Midget H.F. choke of thoroughly sound design suitable for general purpose work. It costs 2s. 3d. The Screened Standard type and the Screened Super retail at 3s. 6d. and 5s. 6d. respectively.

Bearing in mind their well-known standard of excellence, it must be admitted by all that these prices are very reasonable.

But in "skeleton" form they are obtainable at 1s. 6d., 2s. 9d., and 4s. 6d., savings of 9d., 9d., and 1s. respectively. A big advantage, comparatively speaking.

Then what about L.F. chokes? Minus cases and terminals there are no less than five "skeletons" ranging from a 20-henry at 50 m/a. for 8s. 6d. to a super power L.F. choke of 15 henries at 100 m/a. for 13s. 6d. A saving of 2s. in each instance!

There are several other "skeletons" in the Bulgin catalogue, including such things as short-wave chokes and coils equally attractive to the economical-

minded constructor who does not jib at soldering and who does not require each individual part of his set to be a polished, finished entity.

THE OSTAR-GANZ VALVE HOLDER



A feature of the Ostar-Ganz valve holder is the screening. This is accomplished by means of a circular metal plate and the shield between certain of the contacts

Maybe the principle in a wide application remains unproved, maybe it is proved to the hilt. We leave our readers to judge, and will conclude by again mentioning the fact that these Bulgin "skeletons" are perfectly sound components, all ready to wire into a set and as efficient as their standard equivalents.

Ostar-Ganz Valve Holder

One of the most interesting of all radio devices is the Ostar-Ganz valve. It is a high-efficiency mains valve suitable for either D.C. or A.C., a very attractive versatility.

Very few changes indeed need be made in an Ostar-Ganz set when changing over from the one type of mains to the other.

In connection with these valves Ostar-Ganz make an ingenious valve holder to supplement the shielding of the set and to eliminate all hum.

The Ostar-Ganz valve itself includes a vertical shield in its base which is connected to the cathode. This shield is continued by the valve holder, which also possesses a vertically placed screen, as can be seen in the photograph above.

This, together with a circular metal shield, which is also shown, completes a very comprehensive and successful system.

Polar Solid-Dielectric Condensers

A further addition to the remarkably fine range of Polar condenser products made by Messrs. Wingrove and Rogers is a .0005-mfd solid dielectric variable condenser fitted with an aperture slow-motion drive.

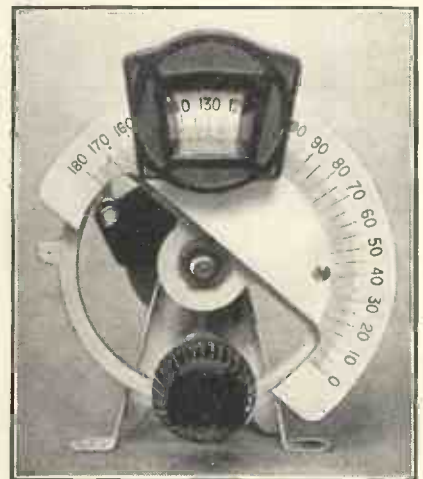
This is an extremely attractive outfit and brings all the advantages of modern slow-motion tuning within the reach of all constructors.

The scale is a wide open one and there is a beautiful little escutcheon in clearly moulded bakelite to contribute a first-class panel appearance.

A light is fitted to illuminate the translucent scale and firm and easy-to-handle fixing is supplied.

The movement is exceptionally efficient, and there is not the slightest possibility of slip developing. This is

WITH APERTURE DIAL



The Polar solid dielectric .0005-mfd variable condenser has an attractive aperture type slow-motion drive.

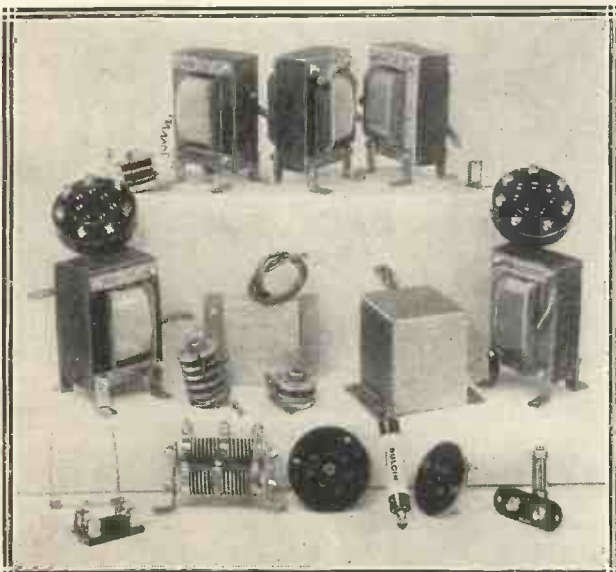
just one of the often-met faults that never occur in Polar designs.

The solid dielectric condenser is equally well-made, and it has hard brass vanes and a stout pigtail.

Watmel Resistances

We recently received samples of the Watmel Hy-Watt resistances. These are exceptionally fine components. They are wire wound on ceramic material, the whole being protected by a special heat-resisting enamel. The ends of the resistance element are spot welded to the lead connectors. On test we found these resistances to be in every way satisfactory. They are made in all values from 1 ohm to 50,000 ohms, and retail at 1s. each.

EFFICIENT BUT INEXPENSIVE



Although elaborate casings and terminals "that can be done without" have been omitted from these Bulgin skeletonised components, their efficiency is as high as that of the more expensive types



It is often said that radio is the cheapest form of entertainment there is—that for a mere ten shillings per annum we are enabled to take our choice of a vast selection of programmes that are being shot at us from all over the civilised world.

The fact that we have the choice of a colossal number of hours of aural excitation (it may not all be entertainment in the normally accepted sense of the word) I am not attempting to gainsay, but I do deprecate the oft-repeated assertion that the annual cost of such reception is ten shillings per set.

Inexpensive Entertainment

Nothing could be farther from the truth, for the figure is the mere licence cost of *permission* to listen, and does not necessarily cover any but a small fraction of the actual expense incurred.

I say "not necessarily," because I believe there are still quite a number of crystal set owners, but apart from the cost exceeds ten shillings

The running costs of a receiver do not end with the purchase of a licence. But the expenses beyond this item are extremely small with the "Q-B," in spite of its full-powered reproduction and "all-in" features. The system of quiescent anode current is used on the driver valve as well as for the Class B valve which it feeds.

By K. D. ROGERS

per annum, and the additional expense may be quite considerable.

This expense I am calculating on the actual money paid out per year, which (unless the hire-purchase system is used) does not cover the initial price of the receiver, nor its depreciation. I am not concerned here with any of the relay services, of course.

Let us assume Jones has a four-valve set. He has paid money in the purchase of it, or of the parts for it. But he has not started his *annual* expenditure for the reception of radio pro-

grammes. This is made up of the ten shillings plus the cost of running the set. Here, of course, the crystal set owner has the laugh over all other set users. But we are not concerned in this article with other than valve-operated receivers.

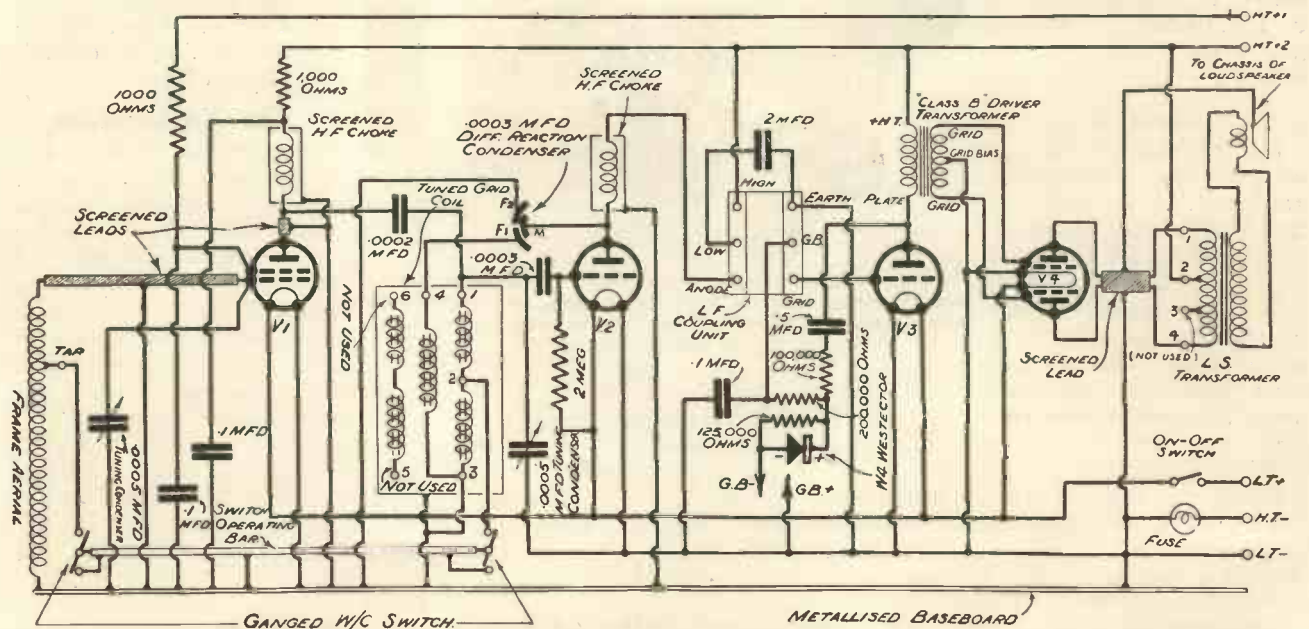
What Jones' expenditure comes to depends on many things, including the design of the set, whether it is mains or battery operated, the number of hours listening he puts in, and the cost of the power supply (mains or battery) he uses.

Good Value for Money

In the case of a mains set the running costs will probably be very much less than where battery power is employed, for if the latter is used and the set is a greedy one, the cost of a year's programmes may run into several pounds.

Not that they are dear at that price, but nowadays we all of us expect to get the very best value for our money that it is possible to obtain. Therefore,

An Up-to-date Circuit which Provides Economy with Efficiency



The S.G. high-frequency valve, connected to the frame aerial, is coupled to the detector by a parallel-fed tuned-anode circuit, thus providing selectivity and efficient H.F. amplification. Wired in circuit with the driver valve are the resistances, condensers and a Westector, which provide the varying grid bias for controlling the high-tension current of this valve.

A Receiver with Low Running Costs

if we can cut down our set's running costs, we naturally are eager to do so.

And it is remarkable how these odd costs for batteries, new H.T. and re-charging of L.T., mount up. The first cost of the set we are prepared for, but I am afraid that large numbers of set owners, when they buy or build a new receiver, are not wholly prepared, for the running costs of the acquisition.

As I said before, in the case of mains-operated sets, the costs are low and are hardly felt at all, but in most battery designs which are capable of giving anything like good loud-speaker strength, the costs run to a surprising figure.

Saving H.T.

It is not to be wondered at, therefore, that during the last few months a great deal of the energies of radio researchers has been expended towards the economising of battery-set up-keep. Better H.T. batteries have been devised, giving longer and more satisfactory life, while lower consumption S.G. valves have made their appearance.

The largest move forward has been made in the L.F. end of the set—where it was most required, of course—in the production of, first, Q.P.P., and then Class B, which enabled a very great saving in H.T. consumption for a given power output to be obtained.

Class B

This property of Class B especially (for it has superseded Q.P.P.) is not fully understood, I am afraid, by many constructors, for it is often taken that the saving in H.T. is obtained at the same time as an increase in power output. This is manifestly impossible, for one cannot obtain anything in radio for nothing, and to get power output one must have power input.

Where Class B scores is in the fact that a great power output is available for peak passages (drawing on those passages a full quota of H.T.), but that the full amount of H.T. required for the maximum power output is not drawn except when that power is being used.

In other words, instead of a flat rate of H.T. current being drawn whether or not full power is required, the current is drawn in proportion to the power required. Obviously, therefore, there is a great saving of H.T. during quiet musical passages, or speech, and while no modulation is being received from a station.

Where an ordinary valve would

for the output valve during a week's use of the set. So that the running costs of the receiver drop considerably.

Someone will immediately begin to rise up against me and say that this saving is offset to some extent by the need for a power valve preceding the Class B valve as a driver, and that this valve takes anything up to 6 milliamps or even more according to the size, which is pre-determined by the maximum power required from the Class B stage.

This is true, but it is not necessary to use a very powerful driver valve, though we must admit that it is advantageous to do so if anything like a good margin for peak passages is required in the power of the output stage.

Further Economy

But again recent developments come to the aid of the battery-set designer, and it is possible now to arrange the driver stage of the set as a quiescent stage, drawing H.T. as required by the strength of the programme in just the same way as the Class B valve.

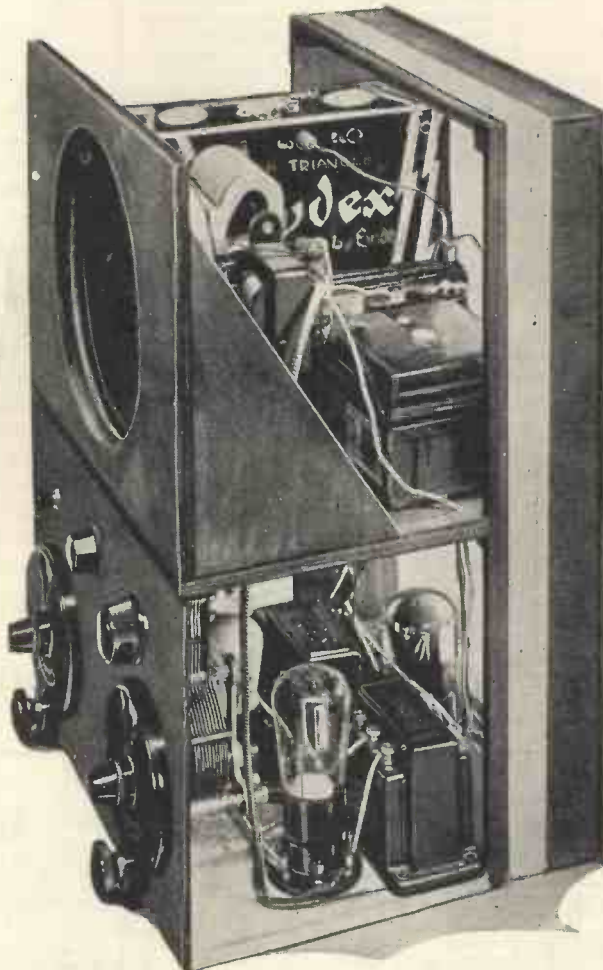
This development is the battery economiser; a variation of the use of the Westector which is applied to the anode circuit of a power valve and which automatically controls the anode current taken by the valve, by the simple expedient of controlling the grid bias.

The Explanation

How it works is this. The power valve normally takes, say, 6-8 milliamps, and it takes that current whether or no the valve is receiving any grid impulses. It is biased so that it is set in its most satisfactory state for delivering power—the grid potential is at the centre point of the grid volts-anode current curve.

If we under-bias the valve it will run into grid current before it delivers the full output of which it is capable, while if we over-bias it will partially rectify the negative L.F. impulses on the grid due to the bend in its curve. Either occurrence means distortion, and, incidentally, too little bias on the valve will cause more anode current to flow than is necessary.

THE COMPACT CHASSIS ASSEMBLY

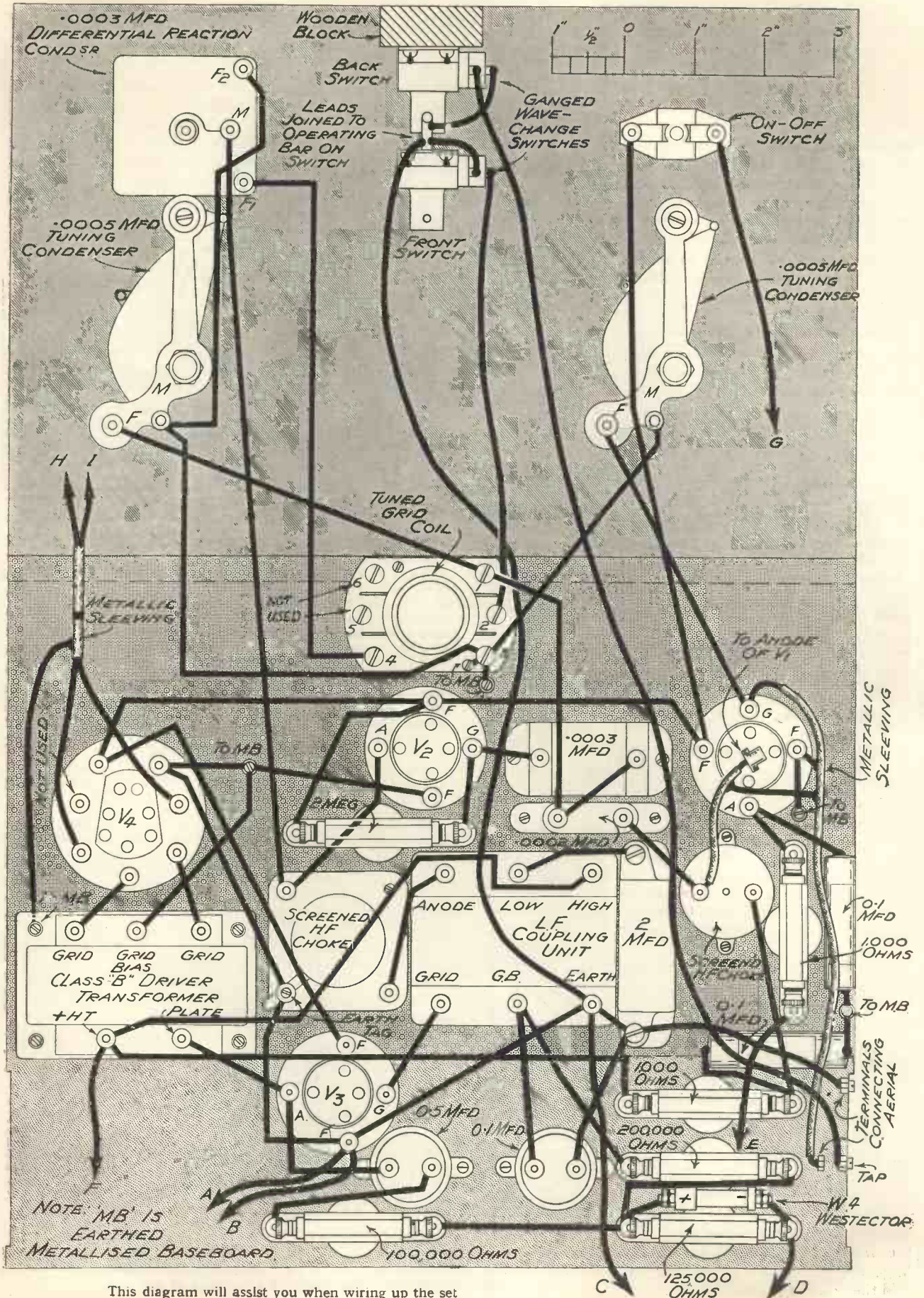


The whole receiver is built on to a chassis made from pieces of wood, and the complete assembly is fitted into an attractive transportable cabinet. Note the frame for the aerial winding at the back of the chassis.

take as much H.T. power during silent parts of the programme as it would during the loudest sections, the Class B valve requires very much less, something like 2.5 milliamps being the average "quiescent" current, the current increasing as required with the strength of the programme.

Increased Battery Life

This results in between 30 and 50 per cent saving of H.T. consumption

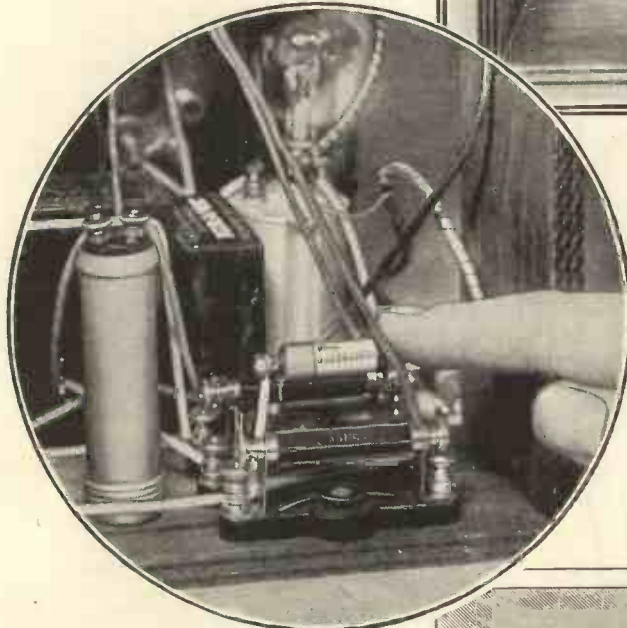


This diagram will assist you when wiring up the set

Overbiasing reduces the anode current, but causes rectification. This is where the Westector steps in. Obviously, if we could alter the grid bias of the valve so that it was always sufficient to give the grid a "straight swing," no matter how weak or powerful the input, we could slide the grid point about. In other words, if we biased the valve well down, leaving sufficient "room" for weak impulses, and then reduced the bias when a stronger impulse arrived, so that we still had sufficient "room," we should be able to keep the anode current down to the absolute minimum.

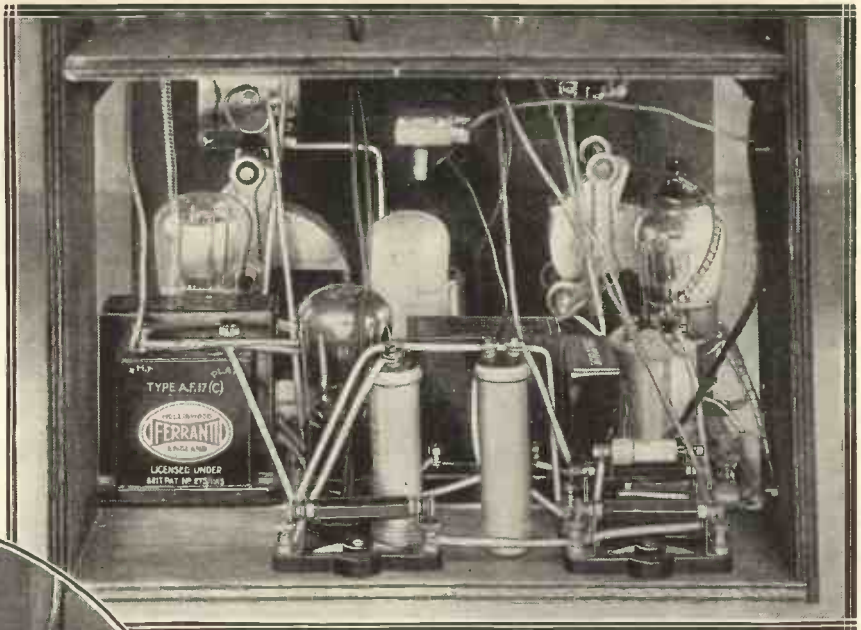
Automatic in Action

On weak impulses, or when nothing was coming through, the bias would be great, and the anode current would be



The Westector, indicated in the circle to the left, is the component which makes quiescent anode current possible with the driver valve. The connections to it may be followed from the wiring diagram on a previous page.

COMPLICATIONS ARE ABSENT FROM THE DESIGN



Now, if the valve is statically biased down to a point at which it is suitable for dealing with a small grid swing, we can apply that positive potential to the grid of the valve to reduce the negative bias. In this way a varying bias can be obtained, the variation being controlled by the strength of the incoming modulation. In other words the valve can be kept biased down to its limit at any given moment, and therefore drawing the minimum H.T. current required for its needs at any moment.

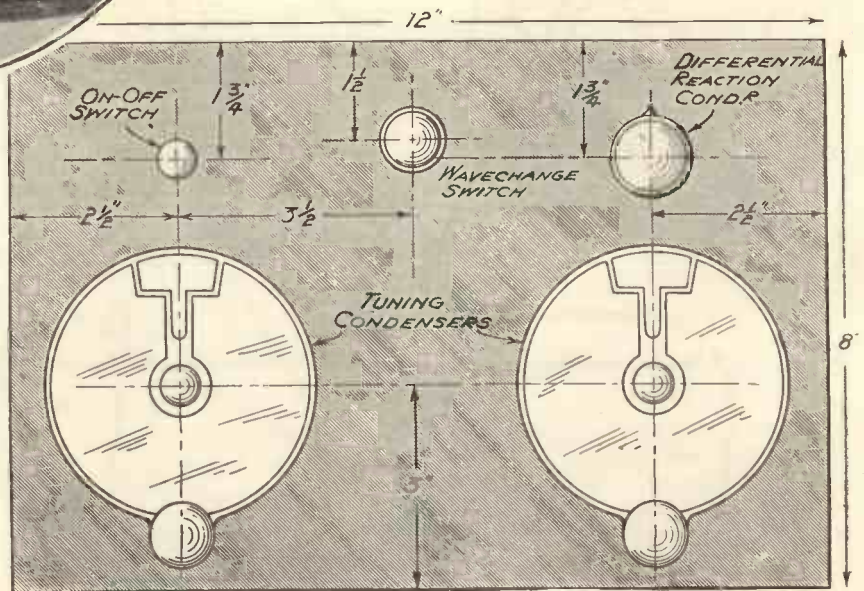
In practice this results in a very

small; while proportional decrease of the bias for increase of input would maintain straight working of the valve, but would increase the anode current only as it was required.

This is what the Westector economiser circuit achieves automatically. It taps off a slight portion of the A.C. output of the valve and rectifies it so that we have a positive potential available for application to the grid of the valve. This positive potential is obviously controlled in amount by the strength of the valve's output, which in turn is controlled by the strength of the incoming modulation.

The Static Bias

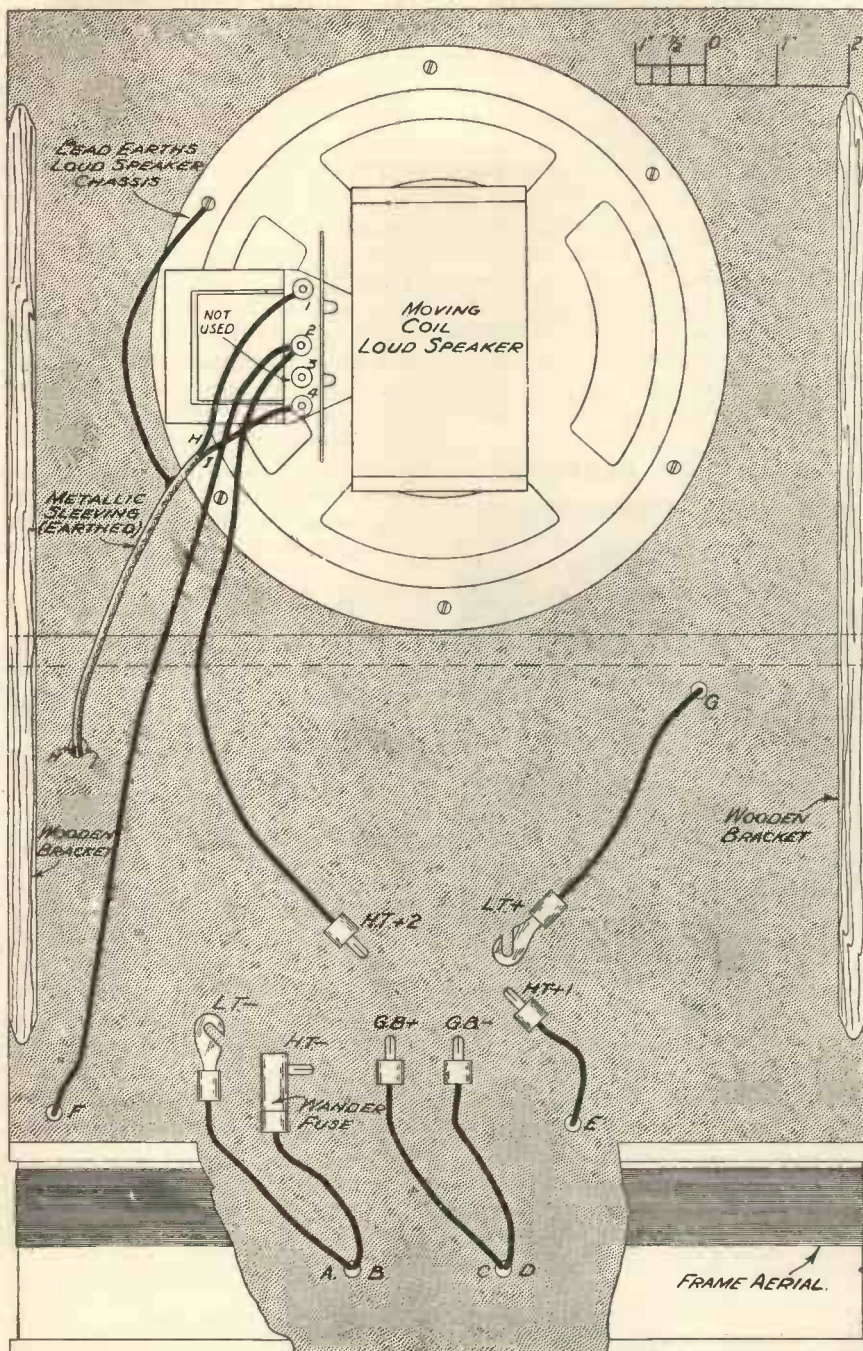
Thus, when a weak impulse is received the positive potential from the Westector is small, while when a large impulse is applied to the valve grid the positive potential is great.



PANEL LAYOUT

Like the construction, the operation of the "Q-B" is entirely without complications. The five controls, the positions of which are indicated in this diagram, are easy to understand, and enable the set to be handled by anyone.

THE CONNECTIONS FOR LOUDSPEAKER AND BATTERIES



The batteries are placed on the wooden shelf behind the loudspeaker; the leads to them being brought through the shelf from the receiver below. Note the connection from the chassis of the loudspeaker to the metallic sleeving over two of its leads.

marked saving of H.T. ; something like 40 to 50 per cent being obtained over a normal day's running for that valve alone.

An Interesting Scheme

Now we come to the application of the scheme in the set illustrated here—the "M.W." "Q-B." (Quiescent Class B). We have taken a circuit using ordinary Class B, with its recognised saving in H.T., and we have incorporated in the driver stage the new economiser circuit just described. This results in the

driver stage as well as the Class B stage operating in a quiescent manner, taking only what H.T. current is required by the strength of the grid input at the moment.

The net result of this is that the static anode current of the driver is cut down to something like .5 milliamp, while the average current works out at about only 50 per cent of the normal. This, in addition to the saving of the Class B valve, enables a remarkably economical four-valve battery set to

be designed, and that design we bring before you in the "Q-B."

In brief, this is a set that is intended for use mainly on local, or semi-local transmissions, rather than as a general receiver of programmes. It incorporates a frame aerial enabling it to be operated anywhere in the house with equal facility, for the batteries and speaker are included in the design, forming a completely self-contained set that is ideal for family quality reception.

The maximum power obtainable is about 1.5 watts with the valves used, ample for any ordinary listening, while the frame and its associated S.G. valve provide sufficient sensitivity to enable in most districts a number of stations other than the locals to be received.

Follow the Original

The design of the set is of necessity rather restricted in its flexibility, so that constructors are advised to adhere very closely not only to the layout, but to the parts used and the valves specified. For instance, the S.G. valve with which the set gave best results is the Marconi and Osram S.23 ; and, though other S.G. valves can be used, it is likely that the same results as were obtained with the original set will not be so closely duplicated.

The S.G. valve is the only tricky one, however, and the usual alternative types of detector, driver, and Class B valves can be used provided they are biased correctly, and that in the case

BONDING THE CASING



The metal shielding on all the screened leads has to be earthed. In the case of the anode lead to the S.G. valve, this can be effected by twisting the end of the metal ribbon round the adjacent screened lead.

Combines Attractive Appearance and Excellent Reproduction

of the Class B valve the correct ratio of transformer is employed.

Let us take the circuit in more detail. First of all there is the tapped frame aerial covering medium and long waves. This is connected across the grid and filament of the S.G. valve, the switching of the frame being carried out by means of an ordinary rotary snap switch.

Ganged Switching

This is ganged with another snap switch by means of a brass rod, which itself is used as a connection between one side of the second switch and earth. The second switch controls the grid tuning coil of the detector.

The anode of the S.G. valve is shunted to the detector grid coil, which is of the iron-cored variety; the secondary winding being used as a shunt tuned anode (or tuned grid), the primary winding of the coil being neglected.

The detector is operated on the usual leaky grid principle, with reaction applied to the iron-cored coil. Screened H.F. chokes are used for both the S.G. and the detector anode circuits, and this type of choke is an essential of the design of the set. If the screened type is not employed the chances of instability are greatly increased.

The L.F. from the detector is fed to an L.F. coupling unit and thence to the grid of the "driver valve. The driver is connected to the Class B valve in the usual way—through a special

driver transformer, but between its plate and grid circuits is connected the economiser network which has already been explained. This system keeps the anode current taken by the driver to the very minimum, and allows the use of a really large driver valve, with consequent advantage of a large power output from the Class B stage. If a small driver valve is used to keep the anode current down, as is often the case, the maximum output of the Class B valve on peak loads is auto-

matically limited, for the grid circuit of the Class B valve gets its power from the output of the driver valve.

The Class B valve is linked with the speaker by means of the special transformer which is incorporated in the design of the speaker, the transformer being tapped to allow for the various types of Class B valves on the market.

At first sight the theoretical diagram will probably appear unusually complicated; but this is only in appearance, for the circuit itself is quite straightforward. The reason that the diagram looks difficult is that it has been drawn to give as accurate an impression of the actual practical arrangement of the set as possible.

READY TO PERFORM



Although not visible in this photograph, a turntable is fixed to the bottom of the case to facilitate turning the set so that its frame aerial points in the best direction for the station being received.

It Simplifies Wiring

Thus, certain of the L.T. connections are made via the metallised baseboard, while others are taken direct to the points concerned. An example of this is the negative return of the S.G. valve holder filament which is made to the metal baseboard, while the return of the other valves go via wiring.

That also explains the peculiar arrangement of the tuning circuit of the detector valve in the theoretical diagram. At first sight the tuning condenser appears to be divorced from its coil at the earth end, but on following the wiring it will be seen that the return is carried out via the L.T. negative wiring and the metal baseboard. The screened leads are also marked, for these are vital parts of the design,

YOU WILL NEED THESE COMPONENTS TO BUILD THE "Q-B"

Component	Make used by Designer	Alternative makes of suitable specification recommended by Designer	Component	Make used by Designer	Alternative makes of suitable specification recommended by Designer
1 panel	Peto-Scott	—	2 1,000-ohm resistances and horizontal holders	Graham Farish	Dubilier 1 watt
1 cabinet, model Q-B.	Peto-Scott	—	2 Vernier dials	Igranic Indigraph	—
2 '0005-mfd. variable condensers	Graham Farish	Polar	1 screened coil	Telsen W349	—
1 Metaplex baseboard with aerial strips and baffle board	Peto-Scott	—	1 L.F. coupling unit	Bulgin transconpler	—
1 '0003-mfd. differential reaction condenser	J.B.	Bulgin, Polar, Ormond	1 screened H.F. choke	Bulgin HF10	Wearite, Telsen, Graham Farish
1 2-mfd. fixed condenser	Igranic	T.C.C., Dubilier, Telsen	1 screened H.F. choke	Graham Farish HMS	Bulgin, Telsen
1 6-mfd. fixed condenser	Dubilier 9200 LSB	Telsen, T.C.C.	1 Westector	Westinghouse W4	—
2 1-mfd. fixed tubular condensers	T.C.C. type 250	Dubilier 4404	1 Push-pull on-off switch	B.R.G. No. 49.	Bulgin
1 1-mfd. fixed condenser	Dubilier 9200 BS	Telsen, T.C.C.	2 rotary on-off switches	Bulgin S80B	—
1 '0003-mfd. fixed condenser	Dubilier 610	T.C.C., Telsen, Lissen	1 11 in. x 3/8 in. coupling spindle	Bulgin	—
1 '0002-mfd. fixed condenser	T.C.C. 34	Ferranti, Telsen, Lissen	3 four-pin valve holders	W.B.	Benjamin
1 2-megohm resistance and horizontal holder	Graham Farish	Dubilier 1 watt	1 seven-pin valve holder	Wearite	Telsen, W.B., Benjamin
1 200,000-ohm resistance and horizontal holder	Graham Farish	Dubilier 1 watt	1 Class B input transformer	Ferranti AF17(C)	—
1 125,000-ohm resistance and horizontal holder	Graham Farish	Dubilier 1 watt	1 Wander fuse	Belling & Lee	—
1 100,000-ohm resistance and horizontal holder	Graham Farish	Dubilier 1 watt	4 Wander plugs	Clix	—
			2 accumulator tags	Eelox	—
			4 yards insulated sleeving	Goltone	Wearite
			6 yards 18-gauge T.C. wire	Goltone	Wearite
			1 anode connector	Belling & Lee	—
			1 yard screened twin lead	Goltone R35/238	—
			1 yard screened sleeving	Goltone	—
			1 switch knob	Bulgin K10 with reducing bush	—

A Remarkably Economical Battery "Four"

and the emphasising of them on the theoretical diagram shows clearly where they are situated in the circuit.

The construction of the receiver is not difficult if taken in the right order. The cabinet and aerial frame are supplied ready made, the frame for the

on the upper surface. This end of the baseboard is recessed for the wiring of the under-side of the frame aerial, so that there is no likelihood of a mistake being made at this stage.

The battery shelf, speaker baffle and the three pieces of the aerial frame are

The three bolts and nuts (they are 6 B.A.) shown on the right of the diagram are used for fixing the frame aerial winding to the frame, and are later screwed through the thin wood forming the right-hand side of the frame looking from the back.

THESE ARE THE RECOMMENDED VALVES

Make	S.G.	Detector	Driver	Class B Output
Cossor	—	210HF	220PA	220B
Mullard	—	PM1HL	PM2A	PM2B
Mazda	—	HL2	P220	PD220
Marconi	S23	HL2	LP2	—
Osram	S23	HL2	LP2	—
Eta	—	BY1814	—	—
Hivac	—	H210	—	—
Tungsram	—	HR210	LP220	CB220

Earthed to the Baseboard

Certain of the components and wiring are earthed via the Metaplex baseboard, as will be noticed in the wiring diagram, and these points must be firmly connected.

When the set portion has been wired up the frame may be fixed in position and the three screws fitted as described earlier. The battery board can also be placed in position and the panel and aerial frame screwed to it. The wavechange switch, which will so far have

SUITABLE ACCESSORIES

- 1 Permanent magnet moving-coil speaker, Blue Spot type 29PM
 - 1 Ormond turntable R/322.
- BATTERIES :**
 H.T.—Drydex green triangle 120 volts.
 L.T.—Exide type J W.J.7.
 G.B.—9 volts. G.E.C.

aerial being packed flat and detached from the baseboard on which it has to be fitted. It will be noticed that the under side of the rear of the baseboard is used as the fourth side of the frame.

Rigidity is provided for the frame by the battery shelf, which is screwed in position when the wiring of the set has been completed. The internal woodwork when supplied by the cabinet makers will consist of a number of flat pieces, from which the inside framework of the set is built. The cabinet, of course, is supplied complete with handle and back.

The internal section consists of the two sides of the frame and the top; the baseboard, which is metallised up as far as the frame; the battery platform; the speaker baffle, and its two side supports; and the ebonite panel. Under the battery platform will be found two fillets, one running along one end, for the panel to be fixed to, and the other running along the centre from front to back for the mounting of the ganged wavechange switch.

Two small pieces of wood are fixed to the sides of the frame for the battery board to rest on when in position.

Some Useful Hints

The order of construction is an important matter if the task is to be really easy, and it is not necessary, or advisable, to build up the whole of the woodwork at the commencement of the construction.

The panel and the baseboard should be fixed together after the panel has been drilled in accordance with the drilling diagram, the baseboard being turned round so that the non-metallised section comes at the back, and

left off till later. The layout is the next procedure, for this must be done, and the set wired up before any further assembly of the structure is carried out.

The only precaution that has to be taken in the mounting of the components (as shown in the wiring diagram) is that the screw heads under the "Ohmite" holders shall not come in contact with the metallised baseboard. It is advisable to slip a piece of thin card under the holders when they are mounted in position.

AN IRON-CORED COIL



The pencil in this photograph is indicating the compact and completely screened-grid coil of the detector valve. The iron-core enables this component to be kept small without any loss of efficiency being entailed.

been connected up with flex leads, is now fixed finally in position.

The baffle is now screwed in position with the speaker attached to it. The frame aerial is easily wound with 30 gauge D.C.C. wire, and 44 turns are put on, with a tap at the 14th turn from the grid end for the wavechange switch. This tap is connected to the centre bolt of the three that are inserted in the side of the frame.

It should be noted that the earthed end of the frame aerial is that which is nearer the set.

Of the H.T. taps H.T.1 should have about 75 to 80 volts, while H.T.2 has the whole voltage of the battery. The grid bias is used only for the driver valve, and this has to be set by experiment. For the first trial of the set it is best to bias the driver about 6 volts negative, but this can be increased to about 9 volts in some cases. The rotary wavechange switch is turned so that the switch is "on" for medium waves and at "off" for long waves.

There is a certain amount of variation in valves which may result in the need for acoustic shielding of some specimens of the S.G. in this set. If this is so, denoted by a tendency to microphonicity, it is easily accomplished by means of a little plasticine and a cardboard tube put over the valve.

An Important Announcement

by

The Editor of Modern Wireless

With the coming of 1934 "Modern Wireless" will cease to be published as a separate one-shilling journal. This is the last number on sale at that price. In future it will be incorporated with its world-famous sister-journal

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and
Questions I am Asked

THE STORY SO FAR

New readers should start here.

★ ★ ★

AT precisely twenty minutes past ten one evening, the red light—indicating the progress of a broadcast play—on the wall of the Dramatic Control Panel Room on the eighth floor at Broadcasting House went out.

JULIAN CAIRD, B.B.C. Dramatic Director, and DESMOND HANCOCK, the Balance and Control Engineer, went down the stairs to join the actors in the studios. Hancock, going into Studio 7C to see if anyone was still there, found SIDNEY PARSONS, an impoverished actor who had been taking part in the play, "The Scarlet Highwayman," lying dead—strangled—at the foot of the microphone stand! They supposed that he had been killed during an actual strangling scene in the play—in fact, his murder might even have been heard by listeners!

GENERAL SIR HERBERT FARQUHARSON, the Corporation's Administrative Controller, immediately took charge of the proceedings, and before long CENTRAL INSPECTOR SPEARS, a detective with an excellent record, arrived at Broadcasting House.

Meanwhile, the General discovered two facts. First, that HIGGINS, a studio attendant with an attachment for a girl in the basement canteen, had left his post in the corridor leading from Studio 7C during the play; and second that LEOPOLD DRYDEN, the principal actor, had been wandering in the corridor when he should have been waiting in the studio for his cue.

In the studio, Spears questioned Dryden and his wife, ISABEL, but Dryden refused point-blank to answer questions until the next day, and Spears allowed them to go home.

Spears, accompanied by Caird and RODNEY FLEMING, the author of the play, who during the broadcast, had been waiting for a telephone call in the Listening Room between the main studios, made a thorough examination and found, amongst other things, that Parsons' copy of the script of the play had been mysteriously torn across.

Later they went down to the canteen in the basement where STEWART EVANS, a subordinate of Caird's in the Programme Research Department, was found wandering in the corridor. Evans and Caird had a strong dislike of one another, and Evans did not attempt to disguise his disdain for his superior.

Spears discovered that it was possible, through a Blattnerphone record which was taken of "The Scarlet Highwayman," to have the vital scene repeated over and over again. When this was done on the next evening, it was found that the words "Good heavens, you!" had been added to the script by Parsons—that they were actually the last words he spoke. A mysterious sound like the ticking of a watch was also heard on the Blattnerphone record.

Later the same evening Caird went to the Listening Room, where Fleming had been on the night of the murder—and there found Evans with a chisel and a bunch of keys. In the studio cupboard, which belonged to Higgins, the attendant, were found Leopold Dryden's gloves!

★ ★ ★

NOW READ ON

XIV.

SPEARS VERSUS CAIRD

TO Julian Caird, in spite of his familiarity with the detectives and the police work of fiction, Scotland Yard had retained its conventionally sinister reputation. When he entered its portals the morning after his midnight encounter with Stewart Evans he expected to be plunged into an atmosphere compounded of hard-faced gaolers with bunches of keys jangling at their belts, echoing stone corridors, and dungeons with windows heavily barred. Accordingly, Inspector Spears' office, with its comfortable furniture and thick carpet, its wide-open windows giving upon the Embankment and the river, and its owner's air of pleasant informality.

Concluding Chapters of our Radio "Thriller"

came as a considerable surprise. But after Spears had shaken hands warmly with his visitor, offered him a cigarette and put him into an almost luxurious armchair, he showed very quickly that he was not going to waste time in coming to the point of the interview. He sat at his desk with a newly sharpened pencil in his hands and a pad of pale green paper before him, looked Caird very straight in the eyes, coughed twice, and plunged into his questioning.

"Mr. Caird," he began, "I'm going to be as frank with you as I can. This is about as difficult and complicated a case as I've ever had to handle. I won't deny that personally it means a good deal to me. With an organisation like the B.B.C. involved, the whole country has got its eyes on the affair. The Press are in full cry and I've been before the Commissioner once already, which looks as if he were being pressed for information by the Home Secretary. As you'll easily understand, my main difficulty is that I know next to nothing about the inside of that box of tricks of yours, and I have asked

you to come here—just as I've asked one or two other people who are involved—because I am bound to be dependent upon you for a good deal of necessary technical information. I don't imagine for one moment that you will try to mislead me, but I want to emphasise that I should like you to answer my questions with the greatest possible care and with the full realisation that if you make mistakes I may be put off the scent altogether."

"Yes, I see that," said Caird uneasily. "I'll do my best."

"Thanks. I'm sure you will. Well then, first of all, would you mind telling me, as shortly as you can and so simply that a layman like myself can follow you, how you handle a broadcast play; and especially how you handled *this* broadcast play—explain all that business about the dramatic control panel and a whole lot of studios—why it is a producer sits two floors away from the studios in which his cast are performing, and why the whole cast doesn't perform in the same studio?"

Caird got out of his chair and stubbed out his cigarette.

AT BROADCASTING HOUSE

By Val Gielgud
and Holt Marvell

"If you don't mind, I'll prowl up and down a bit," he said. "I can think better on my feet."

"As you like," said Spears, smiling.

"Well," said Caird, "the chief reasons why we use several studios and not one, are two. The first is that by the use of separate studios the producer can get different acoustic effects for his scenes. That is to say, in a small studio like 7C, which is built so as to exclude all echo, you get the effect of a closed room or a dungeon—as in the scene where Parsons was killed. Whereas in a fairly large studio like 6A you can get the effect of greater spaciousness—as in the scene previous to the murder scene in 'The Scarlet Highwayman,' a ballroom. Secondly, the modern radio play depends for its 'continuity'—if you understand the film analogy—upon the ability to 'fade' one scene at its conclusion into

the next. You can see at once that there must be at least two studios in use for these 'fades' to be possible. In an elaborate play, therefore, the actors require as many studios as the varying acoustics of the different scenes require; while, in order to avoid their being confused by music or extraneous noises, sound effects have a studio of their own, gramophone effects one more, and the orchestra providing the incidental music yet another separate one."

He paused. Spears was making notes rapidly upon his writing-pad.

"Yes, I follow so far," he said. "Your Mr. Macdonald gave me the studio requisition sheet for 'The Scarlet Highwayman.' What's this studio allotted to 'Echo 8A'?"

"An echo-room," said Caird, "is simply a room built so that sounds made in it shall echo as much as possible. This echo can be added to the output of any studio when the producer so desires in order even more drastically to change its normal acoustic background. It is used very frequently in varying degrees for musical transmissions of all kinds, as well as to produce peculiar results in plays. The output of an ordinary studio is passed into the echo-room, collects the artificial echo from there, and is picked up by a second microphone in the echo-room and continues on its way towards transmission with the artificial echo attached. Is that clear?"

"More or less," said Spears. "You know, Caird, if you and your people had lived in the Middle Ages you'd have been burned for witchcraft!"

"Many thanks for dropping the 'Mr.' at last," said Caird.

"Well," said Spears whimsically, "I expect we'll be seeing a good deal of each other in the immediate future. Go on about this dramatic control panel of yours."

"It looks a good deal more complicated than it really is," said Caird. "You see, as I've explained, a radio play is made up of a mixture of various ingredients—actors, effects, and music. If a producer is to get a proper grasp of the perspective of the whole he wants to be remote from all those studios. That's why the producer sits tucked away in the dramatic control panel room, and that's why he has someone like Ian Macdonald to look after his actors to see that they keep their heads and preserve studio discipline."

"Yes, I see. Go on."

"All right. The panel itself is simply a switchboard, on which vulcanite knobs connected with the studios enable the output of each studio to be controlled in strength, and mixed. The reasons for controlling the strength are obvious, and this controlling enables the 'fades' which I referred to before to be carried out as the action moves from one studio to another. By means of the mixing, the sound effects and the musical background are kept at their proper strength when they are used simultaneously with the output of the actors in their studios."

"I'm getting there slowly," said Spears. "So your producer parcels out the ingredients of his play among the studios, and then controls them by twisting the vulcanite knobs of the dramatic control panel?"

"Exactly. Except that I don't happen to have a mechanical mind. I can't even drive a car with any degree of satisfaction to myself or safety to anybody else, so when I am producing I have a specially trained balance and control engineer—in this case Desmond Hancock—to do the actual knob-twisting under my direction. Whether he twists his own knobs or not is left to the discretion of the individual producer. Of course," Caird went on, "there are also the panel light switches connected with a green bulb in each studio, by means of which the producer, or his assistant on the panel, give their cues to begin or finish a scene to his actors, effects men, and so forth. And opposite the panel is a loudspeaker, as you saw, through which the whole play, as it is woven together by means of his direction from the panel, comes to the producer's ears."

"What about these return lights you were talking about?" asked Spears. "The lights that failed and sent you down into studio-6A, wasn't it?"

"Oh, yes," said Caird. "Sorry. I forgot that. That's an extra gadget we had put in after the move from Savoy Hill. It's often useful, particularly if the producer can't read a musical score, for a conductor or a studio manager to be able to send a light signal back to the producer from his studio. There's a row of these lights, each marked with the number of the studio from which it comes, on the wall of the panel room."

"Well, what about this failing?"

"I expected a return light from the orchestral conductor in 8A just before the end of the ball-room scene which preceded the scene of the murder. As a matter of fact, it was only a precautionary measure, for I knew where we were in the scene perfectly well. But a little later in the play there was a very urgent case for Macdonald to give me a return light from 6A. Now, I didn't get the light from 8A, and there have been cases where light circuits have gone wrong."

"Hardly surprising," murmured Spears. "How many thousand miles of wire have you got in that precious building of yours?"

"Heaven knows!" grinned Caird. "But several thousand, I believe. Well, as you can imagine, one gets pretty worked up during these transmissions. I know I'm always as nervous as a cat."

"Had you any reason," interrupted Spears, "to be specially nervous about this play?"

Caird, who had been walking up and down, stopped and looked at the detective in astonishment, for this question had come at him like a bullet.

"No, I don't think so," he said at last. "Except that it was about as complicated as one of these plays can be from the technical point of view. I think Rodney Fleming had done his best to put me on my mettle. He put every trick and gadget he could think of into the script. In fact, he told me that he wanted to see if I could justify my boast that I could do anything with the panel and my own little nest of studios. Of course, rehearsals hadn't been too easy, but then they seldom are when you've got a star actor—especially when he's a temperamental lunatic like Leo Dryden. Of course," he added hastily, "Leo hasn't been a bit well for the last ten days. Not a bit like himself."

He stopped abruptly, wondering whether he had only succeeded in making bad worse.

"All right," said Spears. "Let's get back to the light that failed. You were saying that you found these shows nervous work."

"Yes. I was only trying to explain to you why, when I didn't get that return light from 8A, I did what must seem to you a pretty wild thing. But I was so afraid that the whole circuit for the return lights might have gone wrong; and if it had, it was essential that Macdonald should

know, or there might have been an appalling mess later on."

"Why did you go down yourself?"

"I had to. Hancock couldn't leave his knobs, and the engineer on duty was simply there in case of a mechanical breakdown (and had to inform the main control-room engineer-in-charge)—he didn't know enough about the play to be able to explain to Macdonald. There was no one else in the room. Besides, I knew there was the Parsons' soliloquy and murder scene to follow, which I could safely leave to Hancock, and I expected to be back in the panel room in time for the scene which followed the murder."

"That's clear enough," said Spears. "Now how exactly did you go down? And how long did it take you?"

"Well, under five minutes, I should think, all told. I went down the staircase from the D.C. panel room to the seventh floor, then along the passage which leads into the tower, and down the central corridor with 7B and 7C on my right and the upper part of 6A on my left. You remember 6A, owing to its height, covers two floors?"

"Quite. Go on."

"First of all I noticed that Higgins wasn't on guard outside the door leading into the tower on the 7th floor, as he should have been. But I think I only noticed that subconsciously. It didn't strike me at the time."

"You didn't look into 7C?"

"Obviously not. I was in a hurry and I didn't want to put Parsons off. I bolted straight down the tiny spiral staircase from the 7th floor to the 6th."

"Yes, I've got the plans of those floors here," said Spears. "Coming down that passage from north to south as you were, it's on your left immediately beyond the 6A listening room. Is that right?"

"Yes."

"Well, what happened when you got down into 6A?"

"Just as I got into the studio, the white light, which means a telephone call from the control room for whoever's on duty in the studio, went on. I hurried out, answered it, and was informed by the engineer at the other end that the return light circuit was working, and it had simply been a mistake on the part of the conductor in 8A."

"So even the B.B.C. make mistakes?" said Spears.

"Now and then," agreed Caird airily. "Just to prove its essential humanity, you know."

"And you went back to the panel room feeling better?"

"Between shock and reaction I was sweating like a pig," said Caird inelegantly.

"Did you go back the same way?"

"I did."

"And did you notice anything out of the usual?"

"I suppose so."

Spears looked up sharply.

"What do you mean?"

"Well," said Caird desperately, "I don't want to lead you to draw any false conclusions—"

"I'll take care of that, Caird. What happened?"

"Well, just at the top of the spiral staircase I saw Leo Dryden coming along the 7th floor passage through the centre of the tower from the direction of the lifts."

"And I suppose he had no business to be there?"

"I didn't notice that he wasn't in 6A amongst all the others," said Caird reluctantly.

"Did you speak to him?"

"Yes. I asked him what the devil he was doing out of the studio. He said he had felt ill and gone outside the tower for a breath of fresh air. Of course, you know that all the air inside the studio tower is pumped through an elaborate ventilating system? People who haven't

broadcast in a play before occasionally find the atmosphere rather trying."

"Never mind about that," said Spears. "Was he ill?"

"He looked ghastly; very much as he did when you saw him later that night. Macdonald confirms that Dryden got leave from him to go out of the studio for a minute or two."

Spears looked carefully at his plans of the various floors spread out on his desk.

"That's all very well, but couldn't he have got fresh air on the 6th floor? Why should he have gone up to the 7th?"

Caird shrugged his shoulders.

"I can't possibly answer that," he said. "No. Perhaps Mr. Dryden had better answer that question himself. Anything else?"

"One thing. I thought that Rodney Fleming, who as you know was in the 6A listening room, might have noticed me rush down, and have got nervous about some disaster happening to his beloved play, so I put my head into the listening room, after hunting Dryden down the spiral staircase, to reassure him."

"Was he duly reassured?"

Caird smiled.

"It was typical of Rodney that he didn't need to be reassured. He hadn't noticed me go. He'd been telephoning. His call must have come through just before I went down, and he was still telephoning when I put my head into the listening room. So I left him to it and went back to the panel room."

There was a pause, broken only by the scratching of Spears' pencil.

"Yes, I've got a pretty good idea of it now," he said quietly, almost to himself. "When you got back, the murder scene was over?"

"Yes. Desmond Hancock was grinning like a Cheshire cat because it had gone so well. I don't think there's anything more to tell you. The play finished on time, and it was on our way down to the studios that Hancock looked into 7C and discovered the body."

"Thanks very much, Caird. All this is most helpful. I suppose you didn't meet anyone else—someone, for example, quite unconnected with the play—between your meeting with Dryden, your look-in upon Fleming, and your return to the D.C. room? There was no one else in the passage?"

"Higgins would have been," said Caird. "Only he had deserted his post. Why?"

"Oh, nothing," said Spears. "I just wondered. Good-bye."

He bent over his notes.

Caird realised that the interview was over, and took his departure. It was only as he emerged into Whitehall that the significance of the detective's final question struck him—that he had been asked for evidence to confirm his own story that he had gone straight back to the D.C. room after looking in upon Fleming in the 6A listening room; that he was on the list of possible suspects.

The sun was hot overhead, but he felt a chilly sensation at the base of his spine. For, being essentially fair-minded, he had to admit that it would have been just possible for him to have turned from the door of the 6A listening room through the door of 7C, and to have caught Parsons at the close of his speech. With that realisation, his collar felt uncomfortably tight about his neck.

He would probably have been relieved had he only known that at the same moment Rodney Fleming in his turn was entering Spears' office to have his answers recorded on another page of that same pad of pale green paper.

XV.

SPEARS VERSUS FLEMING

THERE was no trace of the proverbial diffidence or shyness about Rodney Fleming's entrance into the office of Inspector Spears. But then Fleming, for

his years, was a sophisticated person, who did not share Caird's illusions about the impressiveness of Police Headquarters.

"Jolly place you've got here, Inspector," were his first words. "I like your view. But can't you bribe the English Fascists to burn down the County Hall, on the same principle as the Nazis burned the Reichstag? Don't pay any attention to this chatter of mine. I'm always professionally bright in the morning. May I smoke?"

"By all means," said Spears. "But I'm afraid I don't keep Egyptian cigarettes. Have the armchair."

Fleming sat down.

"So you've observed that I don't smoke gaspers, my dear Holmes. You restore my faith in the police. Now, complete the cure, Inspector. Bring out your handcuffs."

"What do you mean, Mr. Fleming?"

Rodney Fleming smiled; and when he smiled, his face became really attractive.



"You'll answer a few questions, I imagine?" said Spears.

"Delighted, Inspector," said Fleming. "Turn on your third degree. What do I get—rubber truncheons, fire hose, or simply solitary confinement and no sleep?"

"Well, I can't expect to get out of Scotland Yard without gyves upon my wrists, can I? After all, look at me—promising young playwright, *vide* daily press. That's almost enough to hang a man by itself, when you think of the company it puts me into automatically. I've been referred to as a second Noel Coward. No visible means of support, except one successful play now off; one play broadcast, in which one of the actors dies a violent death; a second play bought for production by Leopold Dryden; various

journalistic efforts and a number of stories. Apart from that, what do you know about me, except that I was on the scene of the crime and most uncomfortably close to where it was committed? My dear Inspector, if you don't arrest me, I shall have to think very seriously about having a question asked in the House about the police. And you know what the House feels about *that* subject!"

"I like your little jokes, Mr. Fleming," said Spears, glancing at his wrist-watch, "and if you don't mind my saying so, I thoroughly enjoyed your first play. But it is because I don't know very much about you that I asked you to come and see me this morning. You'll answer a few questions. I imagine?"

"Delighted, Inspector. Turn on your third degree. What do I get—rubber truncheons, fire hose, or simply solitary confinement and no sleep?"

"I'll tell you when you start refusing to answer," said Spears.

"Well, suppose I start with a few biographical details. The second son of my mother, and she a widow. My father an undistinguished Civil Servant, some years deceased. We lived on his pension. Showed some mental agility as a small boy, and got scholarships at Oundle and Clare—Cambridge, you know."

"Oh, I know," said Spears. "I was at Oxford myself. Not the University, but Magdalen College School."

"I beg your pardon, Inspector. That was not polite. Intended for the chartered accountancy. Disliked the notion heartily when I came close up against it, and drifted on to the stage. All the symptoms of going to the dogs, you see. Scraped a living in the provinces for a few years, with occasional bursts of understudying and walking-on in London. I lived with Julian Caird on one of those tours, and we became friends—that's how we got to know each other."

Fleming sat up in the chair and became serious.

"I had several reasons," he said. "The first was frankly commercial. Most authors are not intelligent enough to see it, but there is no advertisement in the world like having your work broadcast. Now, as I told you, Leopold Dryden has accepted my second play. He means to do it this autumn—that is, of course, if you don't hang him instead! Sorry, that's not in very good taste. However, that was the idea. It struck me that if I could write him a lush part in a radio play and get Julian to accept the play and Dryden as a proposition, I should get an admirable 'trailer,' as it were, for my production in the autumn."

"I see."

"Secondly, I wanted a holiday, and the fee for 'The Scarlet Highwayman' would just about pay for one rather nicely. And lastly, I wanted to show Julian Caird that in spite of his infernal technicalities, I could, simply by listening rather carefully to several plays, write him a perfectly good one at my first shot. I did about three months' intensive listening. I came to the conclusion that if I couldn't write better stuff than that, I'd better shoot myself. Then I got him to let me watch him rehearsing a couple of plays at Broadcasting House. And then I went away for a fortnight and wrote 'The Scarlet Highwayman.'"

"Please go on, Mr. Fleming."

"Julian accepted it. He couldn't very well do anything else, because, false modesty aside and conventional period stuff though the piece is, it's really not half bad, and I'd written it in such a way that it was practically a straightforward challenge to Julian's ingenuity as a producer. He was bound to take it, or let me laugh at him, and you've probably noticed that he doesn't like being laughed at."

"I see you corroborate each other perfectly," said Spears, turning over his notes.

"Not too perfectly, I hope. That would be horribly suspicious. Whoever did it, Inspector, we didn't do it together. I decline to share a gallows-tree with Julian Caird. I found it hard enough to share rooms with him."

Spears tapped his desk with his pencil a little impatiently.

"Suppose we go on to the actual night of the crime," said he. "Was it your suggestion, or Mr. Caird's, that you should listen to the play in the building rather than on a set outside?"

"Oh, mine," said Fleming. "It wasn't so much that I wanted to hear the play, as that I wanted to see such scenes as I could be done by the cast in 6A."

"It was to see the scenes," persisted Spears, "that you sat in the 6A listening room and not in the D.C. panel room?"

Fleming looked a little surprised.

"Certainly."

"Was that the only reason?"

"Not quite. I expect Caird told you that I asked him if I could sit somewhere where I could have a telephone call put through to me without disturbing anyone else?"

"I remember something about it. Do you object to giving me some more details about that call?"

"Not in the least. It was a call from my brother."

"Your brother?"

"Yes. He's doing business manager for the tour of that first play of mine. It's on its second week in the provinces at the Imperial Theatre, Leeds. We've had a certain amount of bother over the part of the father-in-law—you remember it? The actor playing it on tour is quite the wrong type, and at the end of the first week, George—my brother—wrote to me that the part would have to some extent to be re-written to suit this man's type. Well, I didn't much care. I'm sick of the play,

"Quite so," nodded Spears.

"But then I wrote a play that you said you saw. I was lucky with it. It's a bad bit of work, but it caught on. I'm afraid the reason was because I managed to get an expression not usually employed in the drawing-room past the Censor. You'll forgive my modesty in not agreeing with your opinion of its merits, Inspector?"

"Just as you say, Mr. Fleming. Now would you mind giving me your reason for writing this play for broadcasting—'The Scarlet Highwayman'?"

anyway. It's dead bones, so far as I'm concerned. I told George to go ahead and alter the part as he liked, only I wanted to talk it over with him finally once, before the re-written part was actually staged. He said that he would have the job done by the night before last, and ring me up from the theatre. So I let him know the times between which I would be at the B.B.C."

"And the call came through—when?"

"I'm afraid I can't give you the exact time. You might get it from the B.B.C. private exchange."

"Ah, yes," said Spears, making a note.

"But I can tell you this," Fleming went on, "the telephone rang just as the ball-room scene before the murder scene was finishing. I remember being amused at Ian Macdonald quieting the chatter in 6A by waving his arms up and down like a more than usually demented conductor. It struck me that the listening audience would have had a good laugh if they could have seen that crowd, which I had carefully defined in my dialogue as 'powdered and bewigged, in brocades and satins, with snuff-boxes and small swords,' moving to and fro from a suspended microphone slung on a wire, and wearing the most ordinary lounge suits and summer frocks. Dryden, of course, was in evening dress, jewelled studs and all—"

"Yes, I can imagine all that," Spears interrupted. "How long did your call last?"

"Again, I can't tell you exactly. The next thing I noticed was Julian poking his head round the door and saying something about a return light failing, and he hoped I hadn't been worried. As a matter of fact, I didn't notice that anything had gone wrong, and I didn't pay much attention to him, except to wonder mildly why he was not up on his knobs, because George was still on the telephone. I suppose we finished about two minutes after that."

"In fact, you had two lots of three minutes? Or three?"

Fleming made an indeterminate gesture with his cigarette and blew smoke through his nostrils.

"I expect that's important," he said. "Times always are in murder mysteries, but as I don't want to put you wrong, I must refer you to the exchange."

"You didn't see anyone except Mr. Caird pass the door of your listening room?"

"I didn't; but that proves nothing. I don't suppose I looked at the door until Julian came in and I turned round."

"And you saw nothing of Mr. Dryden during the play?"

"Dryden? I believe I did see him through the glass panel speaking to Macdonald and leaving the studio. But he didn't come anywhere near me. I thought he was going out for the obvious reason."

"Tell me this, Mr. Fleming. Did Leopold Dryden impress you as being quite normal that evening?"

"Is what I think evidence, Inspector?" smiled Fleming. "Don't look annoyed—I'm only pulling your leg. I thought Dryden looked ill. He looked that when he arrived. But, apart from that, he was much his usual tiresome, temperamental self. Ill or not, he gave a first-rate performance. That I'll swear to in any court you like."

"Macdonald confirms that Dryden was back in 6A for the beginning of his next scene," murmured Spears, almost to himself. "Do you agree?"

Fleming shrugged his shoulders.

"That scene had started before I finished my telephoning. He was in the studio when I looked through the glass again."

"Thank you. One more thing, Mr. Fleming. I believe Mr. Caird said that it was on your suggestion that he engaged Sidney Parsons for a part in your play. Was he a friend of yours? How did you come to know him?"

Again Fleming shrugged his shoulders.

"You know how one picks up acquaintances on the stage, Inspector. As a matter of fact, Parsons understudied in my first play, and I got to know him then. He wrote to me afterwards saying that he was very hard up, and could I do anything for him. There was nothing suitable for him in the new play I had sold to Dryden, but I thought that he'd do for the gaoler in 'The Scarlet Highwayman,' and I suggested him casually to Caird. That's all."

"Then there's nothing else you can tell me that might throw any light on the affair?"

"I'm afraid not," said Fleming, getting up. "I'd like to help you, and if you've got room for a would-be helpful amateur in any sleuthing you may do, I'd like enormously to be in on it. Not sheer altruism, you know. The promising young author hunting for copy."

"I'll remember," said Spears gravely.

"Thanks ever so much. Nothing more you'd like to ask me? You're not thinking seriously that Dryden did it, are you, Inspector? You can take it from me that he didn't."

"Any particular reason for your certainty?"

"Instinct of the born psychologist," said Fleming airily. "Well, I suppose you won't tell me whom you are going to arrest, if it isn't me, and, as usual, I'm talking too much. Let me know if you want me again. Good-bye, Inspector. And I really do like your room." And with a comprehensive glance all round it, and another charming smile, Rodney Fleming lighted a fresh cigarette and departed, leaving behind him a smell of expensive Egyptian tobacco and a considerable increase in the pile of Inspector Spears' notes.

XVI.

BANNISTER ON THE TRAIL

IT happened that this same morning which witnessed the examination at Scotland Yard by Inspector Spears of Caird, Fleming, and—as will shortly appear—Stewart Evans, marked also the beginning of a week's holiday for Bannister. The head of the Effects Section lived a curious irregular existence, owing to the rather peculiar conditions of his work; which necessitated, among other things, that he should take his holidays less when he wanted them than when the exigencies of broadcast play production permitted. That is to say, that whenever a rare week in Julian Caird's schedule made its appearance not including a play which required activity on the part of the staff of the famous Effects Studio, Bannister snatched the opportunity to take a week's leave. One of Caird's difficulties was to persuade Bannister ever to take a holiday at all. For the latter was seldom really happy away from his gadgets, and had been discovered on more than one occasion paying unofficial visits to the Effects Studio for experimental purposes when he was supposed to be away enjoying himself. He lived alone in a studio flat in Hampstead, had no hobby apart from his work, and apparently no friends outside London. So, as usual, he had absolutely no idea what to do with his leave, and had, in fact, made no plans of any kind till the death of Sidney Parsons gave a completely new twist to his thoughts.

For, as he had said, both to Spears and to Caird, Bannister had ideas about the tragedy. Like Stewart Evans, he had no great confidence in the official police, though for quite a different reason. To Evans any constituted body was *ipso facto* suspect. To Bannister it simply seemed improbable that a Scotland Yard detective could grasp details of the inside working of Broadcasting House sufficiently clearly within a short time to be able to solve a murder whose personalities and geography were so inseparably connected with the methods and ingredients of broadcast play production.

It was not unreasonable that he should have thought after this fashion, for, of all the Programme Branch, Guy Bannister was most nearly connected with that aspect of broadcasting which seems so mysterious to the layman. He spent hours in explaining the whys and wherefores of the contents of the Effects Studio to interested visitors. He gave continual demonstrations of what can be done with thunder sheets and wind machines, with cylinders of compressed air, with tables with specially-prepared surfaces, with electric resistances. But he was only too miserably aware of the extreme lack of comprehension shown by most of the same visitors in the face of all his efforts. In short, he believed that Spears neither knew the background against which the crime had been committed nor appreciated the importance of such knowledge. Further, like Caird and various Cabinet ministers, he read a good deal of detective fiction. The death of Sidney Parsons had contained so many of the sensational elements common to the creations of the writers of sensational fiction, that Bannister could not help looking for the inevitable, and inevitably successful, amateur detective indispensable in all such cases. Caird certainly did not fill the bill. He was much too nervous and worried about the whole thing. Rodney Fleming was not sufficiently interested as far as he could see, except from the point of view of obtaining possible "copy." And Dryden was both an actor and under considerable suspicion. Though he kept the idea very much to himself and in the background of his mind at that, Guy Bannister began to wonder whether he might not do something about it. After all, he did know the background, and he wasn't altogether a fool. And then he suddenly realised that he was due for a week's leave, and that for once he could find something to do with it.

He told no one of his intention, but he decided that his first step was to investigate the whole question of Higgins. It seemed to him that Higgins was being grossly neglected by everybody concerned. Besides, he knew a good deal about Higgins. He saw a good deal of the various studio attendants in his professional capacity, and he probably knew a good deal more about Higgins than did Caird—certainly more than Inspector Spears could have gathered at second or third hand. For Higgins had interested him; compelled his attention by his queer fits of bad temper, his occasional bursts of eloquent grievance; and simultaneously roused his pity by his obvious ill-health, his hollow grey cheeks, his furtive pleading eyes, and his desperately thread-bare appearance whenever he was not wearing his studio attendant's overalls. He had been, too, more impressed than he had admitted by Ian Macdonald's account of Higgins' quarrel with Parsons during the rehearsal of "The Scarlet Highwayman." The impassive and taciturn Scot had been genuinely struck by the man's febrile fury in the face of Parsons' calculated insolence, and since his questioning by Inspector Spears on the night of the murder, Higgins had neither been seen nor heard of at Broadcasting House.

Accordingly, Bannister secured Higgins' address from the House Superintendent's secretary—at a moment when that young woman was too busy with a question of the simultaneous accommodation of three different dance orchestras, a quintet, the National Chorus, and an orchestral concert, specially compered by Christopher Stone, to ask him why he wanted it—and made his way thither about the same time as Julian Caird entered Spears' office at Scotland Yard. The address in question was No. 17, Gentile Street, Soho, and was found to consist of a single room at the top of a dingy, narrow house. The rest of the house consisted of a greengrocer's shop and the same greengrocer's domestic accommodation for himself and his family. Gentile Street runs eastward from

Wardour Street towards Soho Square. Like various other Soho streets, it is mean and squalid, with many of the disagreeable features of similar streets in continental towns and none of the latter's attractiveness. The houses are old, tall and shabby, and seem to lean towards each other from each side of the street. It smells strongly of orange peel, of cats, of fish and chips; and, in the summer, of human sweat. Its pavements are always littered with dustbins and milk bottles, with orange peel and bits of old newspapers, among which thin cats slink furtively, and dirty, sallow-skinned children play noisily.

Apart from Higgins' greengrocer, its principal features were a café-bar, much frequented at night by negroes and harlots, and a little farther along on the same side, a rather good little shop which sold Italian foodstuffs, with two sidelines in retailing dubious picture-postcards, and serving as an accommodation address. It was not, therefore, easy for an amateur investigator, especially one of the striking individual appearance of Guy Bannister,

tained that nothing which smelt so strongly could be, or should be, edible—began a discussion with the proprietor upon the respective merits of macaroni, spaghetti and vermicelli, and ultimately brought the talk round to Higgins. But Signor Balbo, who wore tiny pointed waxed moustaches and a black shirt under a seedy coat, apparently neither knew Higgins even by sight nor cared about him in any capacity whatsoever. In fact, he became indignant.

"Why could he not have come to me for a room?" he demanded, with an emotional sweep of his right hand towards the strings of onions that hung from his ceiling. "Why should he go to No. 17? No. 17 is a bad house, a dirty house. The man, Carter, who owns it, he is a Socialist—a Communist. He sells bad vegetables. He doesn't like me because I am loyal to Mussolini. His rooms are dark. I have a fine, light room to let. Why should your friend not have come here?" He struck himself smartly on the chest and glared at Bannister, who realised, too late, that

morning, it was entirely empty, except for an anæmic young woman, with protruding front teeth and in a dirty overall, who was slopping dirty water on a discoloured oil-cloth-covered counter with a complete absence of conviction and an almost equally complete absence of result. She did not even bother to look up when Bannister spoke to her.

"Nothink doin' yet," she observed laconically. "Too early. Everyone's asleep except me, and I wish I was."

Bannister inquired whether she knew a man called Higgins who lived at No. 17.

"Never 'eard of 'im," said the young woman. "Nor don't want to. But if 'e comes in 'ere, 'e must be barmy or a bad lot. They don't 'ave no other kinds." She slopped more water on to the counter and dabbed at a discoloured tea-urn with a dirty piece of rag. "You might come in to-night and ask Mr. Butter, but I warns yer, it's a pretty tough crowd 'ere. Leave yer gold watch and yer five-pound notes at 'ome!" With which she turned her back on him.

Bannister, observing that from the café it was possible to see not only the door but also the upper windows of No. 17, decided that he would avail himself of her advice, and use the place as an observation point if he failed to complete his investigations before evening.

Then he walked hurriedly across the street and entered the shop of J. Carter, Greengrocer. For a moment Bannister had considerable sympathy with Signor Balbo. Whether its produce was bad or not, he couldn't tell, but dirty the shop certainly was. It was dark and dusty, with stained and grimy windows. It was full of assorted smells. Three flypapers hung from the ceiling, each thickly coated with a nauseating glutinous mass of victims, some still faintly twitching, and yet live flies buzzed everywhere. A mangy fox-terrier lay just inside the door, biting at the roots of its own tail. If this was the shop-window of the house, thought Bannister, what unspeakable horrors of darkness and corruption might not be hidden in the rooms above? More prosaically, how could anyone endure to live over such an accumulation of filth, such a concentration of offensive odours? He would have fled incontinently, except that a fat woman with a pencil behind her ear and a large cauliflower in one hand emerged out of the shadows at the back of the shop and asked him what she could do for him. Bannister took the bull by the horns.

"Forgive my asking," he began, "but I believe you have a man called Higgins who lodges with you?"

"We 'ave a lodger," the woman admitted cautiously.

"And his name's Higgins," Bannister repeated. "He works at the B.B.C."

"That's what 'e told Mr. Carter—that's my 'usband," said the woman. "Though I can't say as 'ow I ever believed it meself. I've never 'eard 'is voice on the wireless, and I'm what they call a regular listener in the 'Radio Times.' I wrote and told 'em so."

"Did you, indeed?" said Bannister politely.

"I certainly did," said Mrs. Carter, with asperity. "Why not? Don't I pay my ten shillings like everybody else? Isn't my money as good as theirs?"

Bannister assured her hastily that it was so.

"Exactly!" said Mrs. Carter emphatically. "But I can't stand 'ere gossiping with you, unless it's in the way of business, of course."

For a moment Bannister harboured the insane notion of adding a pound or so of dubious potatoes and a couple of wilting cabbages to what he had already purchased from Signor Balbo. But he remembered a curious weakness shared by all members of the lower classes for discussing illness or disease. And he baited his hook accordingly.

"I asked him what the devil he was doing outside the studio. He said he felt ill and had come outside for a breath of fresh air."



to appear in Gentile Street without exciting a good deal of comment. At the same time, he knew it would be entirely against the rules to go straight to No. 17 and ask to see Higgins. To be perfectly frank, he hadn't the least idea what he should do if he were brought face to face with the man.

First of all, therefore, he entered the Italian shop, purchased a quantity of salami sausage—which led to a considerable controversy with his landlady later the same evening, when she main-

he had thrust himself upon the unfortunate Carter's most deadly political and business rival. To cover his confusion, he purchased a large bottle of Chianti and beat a retreat most uncomfortably burdened.

The bar was no better. It might be said that it was worse, for it did not even provide salami and Chianti. It being

"You mustn't think," he said, "that I've come here to gossip about Higgins. Not at all. This is—er—well, almost a medical inquiry, if I may put it like that. You see, I come from the B.B.C. myself."

"Oh, do yer?" interrupted Mrs. Carter.

"Then why didn't yer say so at first, instead of encouraging me to make a fool of meself?"

"Higgins hasn't put in an appearance during the last two days, and we wondered if he were ill, as he hasn't sent any message to explain why he hasn't turned up."

"Ill!" snorted Mrs. Carter. "Ho, yus, I don't think!"

"Might one ask why not?" inquired Bannister.

"Because if 'e's ill, why is it 'e goes out at nights? Stayed in both these last two days, 'e 'as. On goes out when it's dark, round about ten o'clock at night. A man who's ill doesn't gad about the streets in the dark, unless 'e's cracked!"

"You have seen him during these last two days, then, Mrs. Carter?"

"Well—ardly," the greengrocer's wife admitted. "But I've seen 'im slippin' out. Couldn't 'elp that, sittin' in my window on the first floor as I do of an evenin'. I see most things in Gentile Street from that window. Very 'andy it is."

"Then Higgins is in now?"

"'E's in. At least, I left 'is breakfast outside 'is door and it's not there now. Shall I tell 'im you're 'ere?"

Bannister hesitated for a moment.

"No, don't tell him I'm here," he said at last. "It seems to me as if he's got some private trouble. I don't want to butt in."

"Just as yer please, of course," said Mrs. Carter. "Trouble 'Iggins may be in, but as for it's bein' private—I reads my 'Daily Herald' regular, and it looks to me as if 'Iggins' trouble might 'ave something to do with what was referred to in the paper this mornin' as a matter of public interest. This 'ere murder at the B.B.C." She leaned forward, breathing heavily, and pointed a stubby thumb at Bannister's chest. "I don't want no murderers in my 'ouse, young man. If you don't want to see Mr. 'Iggins, I bloomin' well do, and that's what I'm going to tell 'im flat, see? I'm goin' to 'ave 'im out of 'ere by to-morrow mornin' at the latest!"

Bannister drew back hastily and murmured "Good morning." As he turned, he almost cannoned into a thin-featured little man in a cloth cap.

"'Ere, mind where yer going," said the latter. "'Alf a pound of tomatoes, missus. English."

Bannister, who had taken a violent dislike to Mrs. Carter, could not resist a parting shot.

"I beg your pardon," he said, taking off his hat. "I'm glad to see, Mrs. Carter, that you're so broad-minded as both to read the 'Daily Herald' and to support the Imperial Idea by selling English produce."

The only reply he drew was an indignant snort.

He walked away along Gentile Street, by no means displeased with his first essay in the art of practical detection, disappeared into the first public telephone box he saw, and asked for Temple Bar 2261.

XVII.

EVANS VERSUS SPEARS

"I M grateful to you for asking for this interview," was Inspector Spears' greeting to Stewart Evans, when the latter arrived in his office a few minutes after Rodney Fleming's departure.

"Really, Inspector," said Evans. "May I ask why?"

"Merely because it saves me the trouble of asking you to come here myself. I'm getting full statements from everybody in Broadcasting House that night whose movements cannot be fully accounted for by the corroborative evidence of other people."

"I see," said Evans. "That celebrated Scotland Yard method, which includes any

amount of inquiry into details. I shall be delighted to answer any question you put to me, but first of all perhaps you'll give me the opportunity of saying way I wanted to see you."

"And in good time, Mr. Evans. Sit down, won't you? In the first place, how old are you?"

"Forty-four."

"And you've been with the B.B.C.—how long?"

"Four years."

"You work in Mr. Caird's department?"

"I do."

"Would you mind telling me, Mr. Evans, just why you should have been working, as I gather you were, in your own office long after office hours on the night of the tragedy?"

Evans leaned forward in his chair and clasped his rather podgy hands together between his knees. With his bald head, his big tortoiseshell-rimmed spectacles, his thimble mouth and rather pointed ears, he gave the impression of a malicious gnome.

"My dear Inspector," he said condescendingly, "I'm afraid you share the general prevalent belief that the work of composing broadcasting programmes is purely one of routine. Oddly, enough, it's nothing of the sort. It calls for a singular combination of artistic, dramatic and journalistic talent. A fact which was recognised by the authorities when they created Programme Research, to which I belong. I work outside office hours, Inspector, because often it is easier for me to work outside than inside them. During the day I am liable to perpetual interruptions, so that when I am doing creative work I frequently return to the office after dinner and work quietly and without interruption in my own office."

"Did Mr. Caird know you were working late like this on that particular night?"

"No."

"Shouldn't he have known?"

"Mr. Caird's control of Programme Research is purely administrative," said Evans. "Our methods of work, thank God, are entirely our own affair!"

"Was it a thing you had done before?"

"Dozens of times. If you want corroboration of that, you can get it from the commissionaires at the reception desk, who've seen me come in and go out."

"Do other members of Programme Research work like that?"

"I believe so," said Evans indifferently.

"We all have our own ways of working."

"I see. Now, Mr. Evans, did you know Sidney Parsons?"

"Never. Nor did I ever set eyes on him."

"And Mr. Dryden?"

"I have the honour," said Evans formally, "to be a friend of Mrs. Dryden's. It is in that capacity that I wanted to see you."

"I see," said Spears. "Then we'll leave that for the moment. Do you know Mr. Fleming?"

"I've met him in Caird's office. Conceited young ass!"

"You don't like him?"

"I've no particular reason to dislike him, except that he has achieved success, as most of these so-called promising young men do, by doing facile, bad work and getting away with it. In my view, Caird had no business to accept that extremely silly piece. But such a point of view can't be of any importance."

"You didn't listen to the performance of 'The Scarlet Highwayman,' Mr. Evans?"

"Certainly not. I've too much respect for my mind. Romantic twaddle! Caird's like that, Inspector. He ought to have died in the first year of the Great War. I believe he's got an honest weakness for uniforms, crusades, the Prisoner of Zenda—all that trashery. There's something a bit ironic, when you come to think of it, in a romantic medievalist in charge of a department of broadcasting!"

"Leaving that aside," said Spears gently, "when did you first hear of the tragedy?"

"My office, Inspector, is on the fourth floor. About half-past ten I went down to

the canteen to have some food after my work. The work, by the way, was a special adaptation for broadcasting of Shakespeare's 'As You Like It,' which I am producing very shortly. Caird will confirm that for you," he added, with a sneer.

"Coming back from the canteen I met Caird, and I gathered from conversation with him that something had gone wrong with the transmission. He seemed in an odd state—nervous and, even for him, unusually offensive."

"A pair of you!" thought Spears to himself.

"I admit I was interested," Evans went on. "I made inquiries at the reception desk, and I understood that Scotland Yard had been sent for. As Caird no doubt has told you, I'm interested in criminology. I hung about until after your men had taken their photographs, and so forth, and I have to confess to having corrupted one of them to the extent of a ten-shilling note to tell me all he knew. You won't drop on him for that, will you?"

"If I dropped on anyone," said Spears shortly, "it would be you, Mr. Evans. You're too old a man to indulge in that sort of idiotic conduct. Well, what else have you to tell me?"

"Simply this, Inspector. I know the official police aren't supposed to jump to conclusions, but I'm not one of them, so I may be able to save you trouble by putting you on to a short cut. Leopold Dryden's your man!"

Spears looked up.

"You know, Mr. Evans, this is a pretty serious accusation to make."

"I don't give a damn how serious it is! Leopold Dryden's one of those actors who call themselves artists with a big A. He's as conceited as the devil and selfish as blazes, simply because he's got a handsome profile and wavy hair, and can spout lines like an organ without having the slightest idea what they mean. As I told you, I'm a friend of his wife's. She's been good enough on one or two occasions to ask me to their flat. I don't know if you've met Mrs. Dryden outside this case, but she's a singularly charming woman, kind, well-bred, altogether delightful."

"I don't quite see how this——" began Spears.

"Wait a minute! Dryden treats her like dirt. He's inconsiderate, he's jealous, he's abominably rude to her in front of other people. He's even rude to her friends. You may think that it's my vanity that's been injured because I'm talking like this, Inspector, but there's a lot more to it than that. I don't expect a man like Dryden to fall on my neck—I'm not his kind—but I do expect a little common civility when his wife asks me to dinner."

"How long ago did this incident take place, Mr. Evans?"

"About ten days. But I'm not calling Dryden a murderer because he's been rude to his wife and to me. I'm not going to tell you why he murdered Parsons. I don't know that—yet. But, in my view—the sensible psychological view—he's just the type of man who would murder, and that's why I investigated the possibilities, assuming that he was guilty."

"Go on," said Spears.

"Now I know—for your police had said so—that Parsons had been strangled by a man wearing gloves. What had happened to those gloves?"

"As we had no chance of searching presumable murderers, I don't know," said Spears. "I expect he's still got them; or, more likely still, he burned them or slung them into the Thames."

"You might have made a search, all the same, Inspector," said Evans, getting up and going forward to the desk. "Whose are those?" And he whanged down a pair of gloves on Spears' blotting-pad.

Spears took them up and looked at them closely.

"Well?" he said.

"These gloves," said Evans deliberately,

"were found by me in a cupboard belonging to the studio attendant, Higgins, which is just inside the triangular listening-room outside 7C. Your people probably didn't bother to search it because, when it's closed, the cupboard door is flush with the wall. I should, perhaps, add that Caird turned up while I was searching the cupboard. That was late last night, again after office hours. Please, Inspector, don't imitate his extraordinarily fatuous example and ask me whether I suspect Higgins, will you?"

"You say the gloves belong to Leopold Dryden?"

"They do. Any other actor in London will confirm that. Look at them." And Evans held them up, dangling foolishly. "Look at the stitching. Look at those scalloped gauntlet wrists. No one but a *farceur* like Dryden would be seen dead in the things!"

"Curiously small for a man," said Spears, almost to himself.

"Quite," said Evans. "And a man who is proud of having small hands might easily murder his mother! I may tell you that lazy swine, Higgins, was in the habit of leaving that cupboard door open because it was self-locking. Dryden had spotted that, and as he left 7C he, obviously, took one step into the triangular listening room, threw in the gloves, slammed the cupboard door, and moved away. It wouldn't have taken him twenty seconds."

"Do you know why Mr. Caird was prowling about so that he found you making your investigations last night?"

"No idea," shrugged Evans. "Perhaps he had ideas about gloves, too."

There was a pause, and Spears took up his notes, shuffled them together into a thick pile, slipped them into one of the drawers of his desk, and looked it. The gloves he put into his pocket.

"They are important evidence," he said, "and I'm grateful to you for having brought them to me. I would have been more grateful still if you'd pointed out the possibility and let the police find them in the normal way. But I shouldn't be too free and easy, if I were you, with your accusations against Leopold Dryden. The fact that his gloves were used by the murderer doesn't necessarily mean that he was the murderer. I'm not denying the value of psychological instinct, Mr. Evans, but there's one thing better, and that's cast-iron proof. And that's what I'm looking for."

Evans put on his hat.

"I expected that, Inspector," he said. "It doesn't depress me. You were bound to say it." He walked to the door and turned round. "Besides, when I come to see you again, I may be able to bring you cast-iron proof. There's no alternative, if you can't hang Leopold Dryden without it!"

The door closed behind him, and Spears took up his telephone.

"Can I see the Assistant-Commissioner, please? Central Inspector Spears speaking. In twenty minutes, you say? Thank you, that will do very well. Ring me, will you?"

XVIII.

INTERLUDE IN A FLAT

BANNISTER'S attempt to get Julian Caird on the telephone after leaving Mr. J. Carter's shop had failed, for Caird had not yet returned from his visit to Scotland Yard. There is little if any fun in hunting alone, so Bannister looked elsewhere for a companion for the chase. By now it was a little after eleven o'clock in the morning, and therefore no longer impossibly early to call on a lady. And this Bannister proceeded to do.

Patricia Marsden lived with a girl friend in a tiny flat just off Mecklenburgh Square. She was nineteen, dark, and rather attractive, and two years before had run away from home to join the chorus of a musical

comedy. Although the musical comedy in question had run successfully for a year, a chorus girl's life had proved neither so romantic nor so amusing as it had appeared hypothetically. Miss Marsden, who had been disowned in the good old-fashioned way by her rather tiresome county family, found life in London on three pounds a week to be very much "one damned thing after another."

She was fortunate in making friends first with a common but extremely kind-hearted platinum blonde in her dressing-room, who called herself Topsy Levine, which was certainly not her real name; and in the second place with Guy Bannister, whom she met at a Bloomsbury party, and whom she appreciated extremely for the way in which he looked after her and took her home on the first occasion in her young life when she had had rather more to drink than was good for her.

She was a merry little person, full of spirits, and always mad keen to indulge in a new experience. To Bannister she was a never-faillingly delightful audience, and he thought that this adventure in Soho might appeal to her. In a way, of course, he would rather have had Caird, but he was not going to spend all day chasing him. And Caird had been a little cavalier with regard to Bannister's pretensions as a detective.

Miss Marsden and Miss Levine received Guy Bannister's visit with enthusiasm. A lover of the conventions might have thought that rather less enthusiasm and rather more clothes would have been to the point. But the young ladies had only been up about half an hour, and as, until four days ago, they had been accustomed at eight performances a week to appear for the benefit of tired business men in the very minimum of clothing, they could hardly be blamed for having their breakfast wrappers over their underclothes and continuing so to do after admitting Guy Bannister to their flat.

The latter propounded his plan, and asked Patricia if she would come with him. "Come! I should jolly well think I would! But don't be mean, Guy. Let's take Topsy, too."

"If you don't," said that young lady elegantly, "you're just a mean skunk."

Bannister took off his spectacles and rubbed them absent-mindedly on a not very clean pocket-handkerchief.

"I don't know about two of you," he said. "I'll guarantee to look after one all right, but there's just a chance it might turn risky."

"Come off it!" cried Topsy, springing up from the table and waltzing round the room with her wrapper streaming behind her, rather to Guy's embarrassment. "My middle name's risky, isn't it, Pat? Risky and Frisky and a little drop of whisky—I'm the girl for you!" And she collapsed into an armchair screaming with laughter.

"Well, it doesn't seem to me that I've any alternative," said Bannister. "Now, listen! We'll meet for dinner at Beltrano's at seven o'clock—"

"Oh, girls, the Fairy Prince will now appear!" said Miss Levine.

"Shut up, Topsy!" said Pat. "Go on, Guy!"

"There you shall dine, with luck, at my expense—though Topsy doesn't deserve to—and from there we're only about five minutes' walk from the corner of Gentile Street."

"What do you want us to wear?" asked Pat. "Something quiet, I suppose. Which means I'll have to lend Topsy a disguise."

"Beast!" said Topsy.

"I suppose so," said Guy. "No, by Jove, nothing of the sort! I forgot. Our observation point is that café bar I was telling you about. I gather that quietness and respectability are the last qualifications of its clientele. You may follow your natural inclinations, darlings, as ladies of the chorus, and put all the make-up you've got left over from the run of 'Viennese Hussar' on your sweet little faces."

And Guy Bannister took his leave to lunch at a pub on a ham roll and a pint of stout, brooding the while on the possibilities that the evening might bring forth.

XIX.

NIGHT IN SOHO

LITTLE after eight o'clock that evening Bannister and his two companions turned into Gentile Street, entered the café bar, and sat down at a table which, there being no actual door to the bar, had its two outside legs practically on the pavement. Guy had intended to make a preliminary reconnaissance in the direction of No. 17 to make sure that Higgins was at home, but as soon as he sat down he saw that there was a light in the top window of No. 17. And a little later, as he ordered the drinks, the silhouette of a tall, thin man passed clearly across the lighted window.

So far the café was anything but full. In the farthest corner a mechanical piano ground out a succession of out-of-date tunes. Three negroes and a couple of pathetically elderly street walkers lounged against the bar, while at an adjacent table a man who looked like a cross between a publican, a bookmaker and a pugilist, was drinking beer and talking racing to the proprietor, Mr. Butter, and the thin little man against whom Bannister had bumped in the greengrocer's shop that morning.

Mr. Butter lived up to his name in his appearance. His corpulence was terrific; his eyes mere slits in his vast and pendulous cheeks; his nose a smaller fat blob upon the large fat blob which was his face. But though his business was small and the café empty, there was little about Bannister and the two girls to draw attention or suspicion. Bannister himself was never particular about his clothes. His collars and cuffs tended to indeterminate grubbiness, his trousers to bagginess at the knees. Tonight, in addition, he wore a shapeless black hat with the brim turned down, and smoked shag in a short clay pipe. "Which I call overdoing the necessary atmosphere," Pat Marsden had said when he first lighted it.

Pat and Topsy wore respectively bright red and bright green jumpers, and tiny, three-cornered woollen caps to match, cocked very much over one eye and revealing considerable expanses of dark brown and platinum blonde hair. Shoes rather down at heel and stockings of so artificial a silk that they positively glittered, combined with rather more than the usual application of lipstick and make-up, completed their ensemble—an ensemble defined by Bannister, straining desperately after epigram, as being "too true to be good."

Outside the street was rapidly darkening. A wind was rising, and black clouds coming up from the south-west were shredded across the full moon. Torn pages of old newspapers fluttered raspingly along the pavement. Dust rose and scattered in little whirls. A barrel organ was trundled along to compete unsuccessfully with the mechanical piano, and after a little was trundled away again. A taxi drew up outside, and its driver came in for a cup of coffee and the exchange of a couple of risqué stories with Mr. Butter. Guy Bannister bought another packet of gaspers, more lager beer for himself, and a second round of gin and ginger-beer for his accomplices. And still the light burned in the window at the top of the dark and gloomy house numbered 17, and the silhouette of Higgins passed and repassed intermittently, as though he already prowled like one of the greater cats in captivity behind bars.

The café began to fill up. The mechanical piano was hard put to it to prevail against shouting and raucous laughter. The smoke of cheap cigarettes eddied in clouds up to the ceiling. Occasionally a glass was smashed, or a woman screamed—each noise invariably followed by a howl of laughter.

Mr. Butter retired behind the bar to give a hand to the overdriven barman, and cursed the latter for having to do so. One of the negroes struck another across the mouth, and was promptly pitched into the street.

"I'm not sure that I'm not getting a bit scared," Pat Marsden whispered across the table.

"All I know is," said Topsy, "that if I drink any more of this fizzy stuff I shall go up like a balloon! All right, Guy, don't look so worried."

"I am a bit worried, all the same," Bannister confessed. "I thought he would have gone out by now, and we'd have followed him. Sssh!"

A little man with a grubby cap, a check bow tie, and buttoned boots had stopped beside Guy's chair.

"May I sit here?" he said in a gentle, rather refined tone. "Beg pardon if I intrude, but I suffer with my throat, and it's so smoky inside by the bar. I'd be grateful if I might drink my coffee here."

"By all means," said Guy. "We'll probably be shifting now at any moment."

The stranger grinned placatingly, sat down and sipped at his coffee.

"Haven't had the pleasure of seeing you here before, have I?" he inquired after a little. "Oh; I beg your pardon!" And he took off his cap and put it carefully under his chair.

"Don't mention it," said Topsy cheerfully. "All friends here to-night."

"Thanks, I'm sure. Do you live about here? I've been in Gentile Street—Number Thirteen—for seven years."

"Picturesque neighbourhood," said Guy.

"Picturesque's the word," said the little man. "And interesting, I can tell you. You can take my word for it, you see a bit of life in Gentile Street. Things happen you wouldn't believe."

"Really?" said Guy absent-mindedly, doing his best to listen to the stranger and simultaneously to concentrate with all his senses on that lighted window across the street.

"Oh, yes!" the stranger rattled on happily. "Surprising the people who live in this part of the world. Would you believe that you'd find a member of the staff of the B.B.C. living in this street?"

"You don't say so!" said Topsy admiringly, leaning forward with her chin on her hands and her elbows on the table, looking; it must be admitted, exceedingly pretty in a rather overpowering way.

The stranger blinked.

"Corkran's my name, miss—Alf Corkran. Very fond of music, that's what I am, and a steady listener twice a week. Not that dance band stuff, but the Wireless Military Band, that's my line. Something classical. So when I found out that this chap—Higgins, his name is—works at Broadcasting House, I palled up with him. Very interesting their work must be."

Bannister transferred his concentration from the window to the man.

"Yes," he said tensely. "Go on."

"Well, we used to go about together a bit," said Mr. Corkran. "Have drinks in the evening. Not so much here—Higgins had a prejudice against negroes—but there's quite a nice little pub down at the end of the street—the Blue Unicorn."

"I know it," said Bannister.

He didn't; but he wanted to encourage Mr. Corkran.

"Naturally, I was particularly interested when that murder happened the other day at the B.B.C.," Mr. Corkran continued.

"Ooh!" said Topsy, and Pat Marsden kicked her ankle viciously under the table.

"I hoped I might get what they call a bit of inside information from this chap Higgins. But he's been very queer just lately. I found him in the Blue Unicorn last night, carrying a parcel, he was, and, to tell you the truth, he wasn't strictly sober. Well, I picked the parcel up casually, and it weighed more than you'd believe. But he snatched it away from me as if I'd been trying to steal it—wouldn't

have a drink or anything. I was so struck I went in to-day and inquired for him."

"The devil you did!" thought Bannister.

"And, believe it or not, Mrs. Carter told me that he hadn't been out to-day. All the makings of a drama there, don't you think, mister?"

He finished his coffee, and sat staring at Bannister with shining eyes.

"I wonder what he had in that parcel," said Pat.

"Yes, by George, so do I!" said Guy.

"Sorry I can't tell you, miss. He snatched it away too quick. I think I'll try and look him up again to-morrow. It's good of you to have let me sit with you like this. So-long, all."

He replaced his cap, took it off ceremoniously to the two girls, and walked out into Gentile Street, carrying it in his hand.

"What do you think that means, Guy?"

"My dear, I don't know, except that it seems to me the plot thickens. Hallo!"

"What is it, Guy?"

"Can't you see?" said Bannister. "The light's out. Get ready to move quick. I'll just pay the bill. I want to get somewhere where it isn't so light, so that we can watch the doorway for him and see where he goes as soon as he comes out."

"I get you," said Topsy. "Overture, beginners please! We'll be there."

And she dropped her half-finished cigarette into her tumbler.

XX

THE ASSISTANT COMMISSIONER

WHEN entirely frank with himself, or in an unusually bad temper, Central Inspector Spears admitted to a disapproval of Major Cavendish, the Assistant Commissioner, that almost amounted to dislike. Spears was one of a good many members of the police force who felt it as a personal grievance that since the war so many military officers had been called in to fill the highest posts at Scotland Yard, and he had all the policeman's natural suspicion of the regular soldier. It was not, he said to himself, that he objected to discipline, but officers like Major Cavendish—who had behind him a record of twenty years' service in English and Indian Cavalry regiments—seemed to put discipline first and results, in comparison, nowhere.

So he was not in a particularly good humour as he walked along the corridor to the Assistant Commissioner's room. He wished he had not asked for the interview, although he knew that his main object in asking for it had been to forestall being sent for.

He knocked and walked in. Major Cavendish was making notes in the margin of a typed report, and continued to read to the bottom of his page before he looked up. He had the handsome, narrow Norman head to be seen so often on parade grounds, polo fields, and out hunting; a stubborn, courageous head, not overburdened with imagination. Hard, grey eyes, a cropped military moustache, grizzled fair hair, and a formidable chin completed the picture.

Spears moved a pace nearer to the Assistant Commissioner's desk and coughed. Major Cavendish folded the report deliberately, put it into a drawer, and locked it up.

"Yes, I heard you come in, Spears," he said. "I wish you'd remember that if you've got an appointment, or if I've sent for you, I don't want you to knock. This is an office, not a young lady's bed-room." "I beg your pardon, sir," said Spears stiffly.

"That's all right. Sit down. Smoke if you want to. As a matter of fact, I'm glad you came in, Spears. I had intended to have a talk with you this morning, anyway. As perhaps you know, the Commissioner's abroad. As you probably don't know, I have to see the Home Secretary this afternoon about this Broadcasting House case.

I want to know from you exactly how we stand. I know you haven't had very long, but isn't it time we had an arrest?"

"The Press seem to think so, sir."

"The Press can go on thinking!" snapped Major Cavendish. "The point is that I'm beginning to think so. After all, there can't be any lack of material evidence. I presume you've had time to question, everyone involved? Are you really at sea, or have you made up your mind and can't prove it?"

The Assistant Commissioner dropped his martinet's manner and became almost pleasantly confidential. "You see, Spears, this isn't an ordinary case. You know what broadcasting is. It gets the public in their homes. There are nearly five million people who feel as if anything that happens inside Broadcasting House has happened by their own firesides: Not that this murder's harmed broadcasting. Licences have jumped up about ten thousand in the last two days. But the public do want this particular murder solved. If you don't solve it quickly, you're liable to get an amount of amateur help you never dreamed of. I suppose you're not forgetting that every listener who heard that damned play heard the murder committed? That means a few thousand amateur detectives on the trail. I shouldn't be pleased if one of them solved it by a fluke and left us standing."

"Nor should I, sir."

"Very well. Let's have your difficulties. Is it no suspect?"

"Just the reverse, sir. There's a perfectly good case to be made out against four people, with a possible fifth. There's nothing to be proved against any of them so far."

"Suppose," said Major Cavendish, "you give me each of these cases in brief." He pressed a button on his desk and a stenographer appeared from the adjoining room. "I'll have your five cases taken down and tabulated, and then I'll have something cut and dried for the Home Secretary this afternoon. Go ahead."

It was typical that he did not speak directly to the stenographer, and that she, without further instructions, pulled up a chair, sat down, and opened her notebook, looking expectantly at Spears.

"I'll do my best, sir."

"Damn your best! I want accuracy. Go ahead!"

"First of all, then," said Spears, "there's this studio attendant, Higgins."

The stenographer began to scribble. Major Cavendish took an already filled pipe from a small bronze Indian ashtray beside him, lit it, and leaned back in his chair, gazing up at the ceiling.

"The case against Higgins," continued Spears, "is that, in the first place, there's reliable evidence that he quarrelled with the deceased during the rehearsals of the play during the performance of which the latter was killed. He's an ex-soldier. He suffered from gas and shell-shock during the war, appears to be thoroughly neurotic, down-at-heel and in financial straits. His domestic background is miserable. He is separated from his wife, to whom he pays a substantial separation allowance. He lives in a single room on the top floor of a house in Gentile Street."

"Poor devil!" muttered the Assistant Commissioner.

"He admits to having attempted to begin an affair with one of the girls employed in the canteen at Broadcasting House. The attempt was apparently not reciprocated by the young woman. There's corroborative evidence of this. He undoubtedly had opportunity to commit the crime. He was on duty on the floor of the studio in which the murder was committed. We are fortunate in being able to tell exactly when the murder was committed—at any rate, within a minute or two. After taking the evidence of the various people most nearly concerned, I put it at between eight and ten minutes past ten. At that time Higgins

was absent from his post. He admits as much. His story is that he made a date with his canteen girl to meet him in one of the offices, which are outside the studio tower; that he kept that appointment, but the girl did not. I have questioned the girl; she denies that any such appointment was made. I think it is only fair to add, sir, that though I did my best not to scare her, she seemed frightened out of her life, and in my view may quite well be lying in making such a denial. Since my questioning Higgins has not returned to Broadcasting House and has sent no message to explain why."

"You've got him under observation?"

Spears looked pained.

"Yes, sir; of course. He can't get away, if that's what you mean."

"All right. Let's get on to number two."

"Number two is Julian Caird, the dramatic director who was producing the play."

Major Cavendish raised his eyebrows.

"Do you seriously suspect Caird, Spears?"

"Speaking personally, no, sir. But he's bound to be on any list. Of course, there's no motive that I've been able to discover as yet, and he denies having known Parsons at all, except as an actor."

"Some people," said Major Cavendish, with a suspicion of a twinkle, "might consider that any actor was any producer's fair game. But perhaps murder is going a little far, however bad an actor the fellow may be!"

"Just before the murder was committed," went on Spears, taking no notice of his superior's interruption, "Caird left the Dramatic Control Panel-room and, according to his own story, must have passed Studio 7C during the very moment at which the crime was being committed. Not on his way down to Studio 6A, sir, but on his way back. There's evidence that he went to 6A all right, and the reason he gave for coming down is confirmed, though it still seems to me that he would have done as well to have stayed where he was rather than go rushing about the place. But Desmond Hancock, the man left in the Dramatic Control Panel-room, can't give the exact time of Caird's return. Very naturally, he says he was busy on his job and didn't notice exactly when Caird came back. Undoubtedly it was physically possible for Caird to have done the killing. At the same time, his background is unexceptionable, his record at the B.B.C. good, his financial position stable. He seems to have been in rather a jumpy state that night, but presumably the fact that he was in charge of a complicated production explains that."

"All right," said the Assistant Commissioner. "Next."

"Rodney Fleming," said Spears.

Major Cavendish whistled.

"One of our bright young hopeful authors? You are asking for trouble, Spears. What about him? From your tone of voice I gather you don't like Mr. Fleming. Was he funny at your expense?"

"He did his best to be, sir. As a matter of fact, there's a pretty strong case against him. First of all, he wrote the play."

"Was it as bad as that, Spears? I'm sorry. I must cure myself of pulling your leg. Carry on."

"Secondly, he suggested Parsons as one of the cast. Admittedly there's a good reason for his having done so, but it shows that he had some knowledge of him before. In the third place, unlike the average author, he took the trouble to go to Broadcasting House on the night of the transmission. And again I must admit he had a pretty good reason for doing so. It was not unnatural that he should want to see the wheels go round."

Major Cavendish nodded.

"About evens, so far," he murmured.

"Where was he at eight minutes past ten?"

"Well, that's the point, sir. The listening-room in 6A, where he says he was, is exactly forty seconds' distance from the door into 7C. I've timed it. If he wasn't

doing the job, he was nearer to it than anybody else, except Caird, who may have been actually in the passage outside the door."

"Why was he in that room?"

"He says—and Caird confirms it—that he had asked to be put somewhere where he could see the scenes in his play being acted in 6A, and that listening-room was the only place that could fulfil that condition. Secondly, he had asked to be put somewhere where he could get a private telephone call he was expecting. That was possible in the listening-room, but would have been most inconvenient if he had been up with Caird in the Dramatic Control Panel-room."

"Hum!" said Major Cavendish.

"Exactly, sir. It all looks a bit peculiar. It looks even more peculiar when I tell you that that telephone call came through at almost precisely the same moment as Caird left the D.C. Panel-room. So I went into it pretty carefully, and there's no doubt about it, it came through. This is checked by the girl on the B.B.C. exchange. It came from Leeds, as Fleming said it did, and it lasted for six minutes. We have Caird's evidence that Fleming was still talking when he came up from his visit to 6A, and we've the further evidence of the telephone girl, for during those six minutes she listened-in two or three times for an instant to see whether the call was still in, and in each case it was. Naturally—though rather unfortunately for us—she didn't listen to the conversation. I haven't had time to check up the Leeds end of the call yet, but I've had Fleming's explanation, and it rings pretty true on the face of it. I'll deal with the Leeds end, of course."

"If the Leeds end's all right, that lets him out," said Major Cavendish, frowning. "Unless, of course, he and Caird are accomplices."

"I confess I hadn't thought of that," said Spears.

"Well, think of it now. Though I don't believe it for a second. What about Mr. Fleming's background?"

"Right as a trivet, sir. He made quite a lot of money recently, and is generally regarded as one of the coming young men, as you said yourself. There's no apparent motive that I can see."

"Hum!" said Major Cavendish again, and knocked out his pipe. "I think I can guess number four for you, as you've got both author and producer on the list. I suppose you really came to ask me whether I would back you up if you took the responsibility of arresting Mr. Leopold Dryden?"

"Well, sir, I was going to ask you that," Spears confessed.

"It'll make the deuce of a scandal," sighed the Assistant Commissioner. "What have you got on him?"

"Quite a good deal, I'm afraid, sir. To begin with, he was quite unlike his usual self that night. There's any amount of evidence to that. He'd quarrelled with his wife at dinner. He has refused to give me any explanation of his conduct or movements at all, but she gave me a lying explanation of that quarrel. He was supposed to be in Studio 6A during the time when the crime was committed, and just about eight minutes after ten he got leave from the studio manager to go out for a breath of fresh air, saying he felt ill. He went up to the seventh floor, quite unnecessarily, to go outside the studio tower for his fresh air, and was met by Julian Caird inside the studio tower on the seventh floor when Caird was on his way back from 6A, looking, according to the latter, perfectly ghastly."

"To-day I came into possession of a pair of his peculiarly distinctive gloves, which had been hidden in a cupboard in the triangular listening-room just outside 7C. And finally, amongst Parsons' papers were found three letters from Dryden's wife, which made it perfectly clear that Parsons had been blackmailing her by

threatening to reveal to her husband some incident in her past.

"Mrs. Dryden broke down at being confronted with one of these letters, and admitted that it was over the arrival of one of them that the quarrel at dinner before the performance between herself and her husband had occurred. Oh, yes, sir—and one more thing. When we searched the studio we found a piece of the outside sheet of Parsons' script of the play had been torn away. I happened to notice a little green label which says that these scripts are the property of the B.B.C., and are not to be mutilated in any way. I asked Mr. Caird if they were often torn or defaced, and he said that they were frequently marked at rehearsal, but seldom torn." Spears dropped his voice impressively and went on: "I found that torn piece of paper, sir, screwed up like a quill, with one end charred, and shoved into one of those funnel ash-trays. That ash-tray was on a slab in the triangular listening-room outside 7C. The murderer had screwed the paper up, put a match to it, and jammed it into the ash-tray, where, unfortunately for him, it went out."

"But what did he want it for?" asked Major Cavendish impatiently.

"I don't exactly know, sir, but these words were left on the part of the paper that wasn't burned: 'Your darling Isabel.' They were in Parsons' handwriting. And Isabel is the name of Dryden's wife."

"Then you think—"

"I think I am justified in deducing from that, sir, that Parsons had written some sort of message referring to Dryden's wife to Dryden on the outside of his script, and that Dryden tore it off to avoid having attention drawn to him."

"Damn it, I must confess I'd rather it was any one of the others," said the Assistant Commissioner. "But I don't see how a coroner can help himself with this little set of bouquets. The inquest's tomorrow, isn't it?"

"Yes, sir."

"Then I'm afraid you'd better take a pair of large-sized handcuffs, Spears."

"Small ones, sir," corrected Spears, smiling delightedly at the opportunity of catching his superior officer out. "Dryden's got singularly small hands, of which he's very proud."

"I don't think their size matters at all," said the Assistant Commissioner chillingly. "But look here, Spears—didn't you say you had a fifth candidate?"

"He's only a 'possible,' sir. Mr. Stewart Evans. But I've very little against him, except that he's generally disliked, not very successful, happened to be in the building that night for what seemed to me a thoroughly inadequate reason, and has been indulging in private detective work on his own. Apparently trying to pin the crime on to Leopold Dryden. It was he who brought me the gloves."

"If he found the gloves, you ought to have been able to, Spears. I hope you've told off whichever of your men let you down over that? Evans! It doesn't seem much to go on, certainly."

"He obviously hates Dryden, and I should say he has a weakness for Dryden's wife," said Spears. "But that's no reason why he should murder Parsons. He'd never even spoken to him. That's the lot, sir."

Major Cavendish sat up.

"Very well, Spears. Thank you." He turned to the stenographer. "Type that, please. I shall want it before lunch. I'll speak to you again to-morrow morning before the inquest, Spears. It seems to me we're between the devil and the deep sea. We can either give the Press the time of their lives by confessing that we're baffled, or give them the finest story of the year by arresting Leopold Dryden. However, I expect the inquest will force our hands. You don't seem to have done badly so far,

Spears, but don't let up on it. Good luck!"

He picked up an umbrella and a bowler-hat from a chair in the corner and went out.

Spears and the stenographer looked sympathetically at each other.

"It's a way they have in the Army," hummed Spears ruefully.

"Brutal and licentious soldiery," I don't think," said the stenographer, who knew her Kipling. "You might as well work for a block of wood!"

"You might—I might—we all might," said Spears. "What's the odds?"

He left the room in his turn, and achieved a certain amount of satisfaction by slamming the door behind him.

XXI

A SHOT IN THE DARK

HIGGINS emerged from the shadowy doorway of No. 17 just as his three watchers came level with it on the opposite pavement. He stood for a moment under a lamp-post, giving Bannister ample opportunity to observe that he was unshaven, more white-faced than ever, and unsteady on his feet—the latter probably from drink. Bare-headed and with neither collar nor tie, he reminded Guy of the illustrations of prisoners on their way to the Guillotine.

Higgins looked up and down the street, cleared his throat and spat into the gutter, and then marched off eastwards along the pavement. He took no notice of the tall, spectacled young man with a black hat and clay pipe, who followed about fifteen yards behind him, a girl hanging on to each of his arms, and the whole party uplifting their voices in such unmelodious song as to draw a distinctly unfavourable glance from the policeman on point duty at the corner opposite the Blue Unicorn.

Higgins vanished into the saloon bar, and there followed the deplorable spectacle of a B.B.C. official arm-in-arm with two young women whose appearance left little doubt as to their occupation, entering the private bar of the most disreputable of Soho public-houses, and drinking tepid beer therein, with every appearance of satisfaction, to the accompaniment of much laughter and ribald conversation.

What might not have been observed was the way in which Topsy Levine's bright little eyes kept Higgins under steady observation through the gap which showed conveniently through the glass and wooden panels of the partition which separated the private from the saloon bar. She stopped a good proportion of her second half-pint on to Guy Bannister's trousers, and under cover of leaning over to mop it up with her handkerchief whispered that Higgins had already drunk two double whiskies neat and had ordered a third.

"It isn't going to help us much if he passes out," whispered Guy uneasily. "Oh, damn!"

The genteel Mr. Alf Corkran sidled into the bar, expressed the greatest pleasure at meeting them again, and insisted on standing a round.

"Pleasant surprise," he observed, "though I won't say that I didn't come in half expecting to find old Higgins here. I'm sorry for that chap."

Pat Marsden, unused to detection, nearly gave the game away.

"If you want him," she began, "he's —"

"Hell!" said Guy loudly, dropped his lighted cigarette on to the back of his other hand, and knocked Mr. Corkran's drink on to the floor.

When the confusion had died down and the mess had been more or less put to rights, Topsy leaped in to cover Pat's embarrassed contrition. The latter was bright scarlet and on the verge of tears.

"My friend was going to say that she thinks Mr. Higgins must be out," said

Topsy quickly. "We were having a drink in the café after you'd gone, and she noticed the light in his window go out."

"Ah," said Mr. Corkran with a wink. "I see your friend's a smart girl. Keeps her eyes open." And he would have poked Patricia in the ribs if Bannister had not intervened with the inevitable "And now, Mr. Corkran, what's yours?"

"A pink gin," said that worthy. "I picked up the habit through knowing a lot of chaps in the Navy, and I can't get over it." When the drink was brought, he swallowed it at a gulp. "Well, I must be toddling. Good-night, all. Glad to have met you again. See you here again one night soon, I hope."

"Thank goodness he's gone!" said Bannister heartily.

"That's all very well," said Topsy, who had turned back to the partition. "But so's Higgins. We'd better beat it quick."

They beat it so quickly as to arouse unworthy suspicions in the mind of the barman that they were trying to leave without paying. But Guy, in the best manner of fiction, hurled a ten-shilling note on to the counter and bade him keep the change. The barman stared after them as the swing-doors closed.

"Not bilkers—simply blurry fools!" he observed to no one in particular, scratching his head and automatically mopping the counter.

Out in Gentile Street it was now very dark. The moon was entirely obscured by thick black clouds, promising rain. The wind had dropped. Hardly any of the windows showed lights, and the garish brilliance of the café-bar stood out like an oasis of noise and light in the silence and darkness of the narrow street.

Higgins had got a good start of his pursuers by making his retreat under cover of Mr. Corkran's tiresome geniality. He was a good fifty yards away when Bannister and the girls emerged from the private bar of the Blue Unicorn, and his paces, though uneven, were fast. They watched him stagger rather than walk across the little patches of light from the lamp-posts, and moved steadily in pursuit.

Suddenly Guy pulled up.

"Steady, you two," he said. "It's ten bob to a tanner he's going back to No. 17, so we needn't rush things. Look here, Topsy, are my eyes playing tricks, or is that someone following him?"

All three stood staring through the murk. "There's someone there, all right," said Pat, screwing up her eyes.

"You're right, darling," said Topsy. "But it's probably only Guy's little friend Corkran, or a stranger."

"I don't think so," said Guy. "Why is he keeping right up to the railings like that? He's not tight—he's walking too steadily for that, and unless I'm very much mistaken, he's not walking on his heels at all. You may be right, Topsy, in thinking it's Corkran, but I wonder what the devil he's after Higgins for, if it is."

"Let's go on," said Pat, tugging at his sleeve.

They went on accordingly, once more adopting the rôles of three bright young people of the lower classes "out on the bend." But the chase was not to last much longer. With a final lurch, Higgins disappeared into No. 17. His immediate follower, whether Corkran or not, moved over to the other side of the street and apparently gave the lie to their suspicions by walking on steadily until he was out of sight. Bannister, Topsy and Pat stopped in Mr. J. Carter's doorway, and looked at each other.

"What now?" asked Pat.

And as if in slightly sinister answer to that question, the door, which had slammed behind Higgins, slowly opened.

Automatically, they drew back, but no one and nothing came out, except a strong smell of vegetables no longer fresh. It was clear that the door had been on the latch, which had not properly clicked home.

"Well, I think," said Guy, "that you two girls had better cut off home while I go up and interview Higgins."

Topsy made a most inelegant grimace at him.

"If it mightn't give the show away, I'd laugh," she observed. "What do you take us for? The Girls of St. Chad's or a couple of aunts from the Children's Hour? You go first, and we'll follow to pick up the pieces."

"Yes, that's all very well," said Bannister, "but if he's drunk, there may be a rough-house."

"Rough nothing!" said Topsy. "He'll be glad of a nice girl's hand to soothe his fevered brow."

"Bar rotting, Guy, we aren't going home," said Pat. "How could we? We've helped you do the dirty work, and now we want to see the fun."

For a moment Bannister hesitated. He pushed his spectacles higher up his nose with his thumb, put his pipe in his pocket, and shoved the door of No. 17 wide open, revealing a dingy hall, with scrofulous matting, a dilapidated hat-stand, and a flight of narrow stairs at the far end, faintly illumined by a night-light.

"All right," he said. "Have it your own way. But don't follow me too close, and if there's a row I'd be grateful if you didn't imitate the pictures. Don't stand about watching in picturesque attitudes, or try to get into it yourselves. Nip out and call in a policeman!"

"O.K. chief!" said Topsy Levine. "Let's get going!"

So, with Bannister leading, Topsy at his elbow and Pat Marsden bringing up the rear, they tip-toed up three flights of bare, uncarpeted stairs. After the first landing, there was no light of any kind, apart from patches of grey indeterminateness which marked a couple of stairway windows and seemed only to intensify the general blackness. The stairs creaked abominably, the reek of stale greengrocery was almost overpowering, and from behind closed doors on the first and second floors, sounded the voluptuous snorings of the Carter family.

At last they reached the top of the third flight, and found themselves faced by a short passage and a closed door, under which shone a thin ray of golden light. Bannister looked round. The girls were standing close behind him, holding each other's hands, and breathing rather quickly. What should he do next? Burst in, or knock? And whichever he did, what was he going to ask Higgins? Mentally, he abused himself for a precipitate ass, because he had not thought out properly the ultimate implications of his shadowing and his pursuit of the studio attendant. But something had obviously got to be done, if he was not to cut an altogether ridiculous figure in the eyes of the two girls, and in particular in the eyes of Patricia Marsden.

What actually happened was that his mind was made up for him by an outside circumstance. That circumstance was the distinct sound of feet on the lower flights of stairs. Pat tugged at his coat.

"Listen!" she said urgently.

"I know," said Guy. "It's no use our trying to get out of the way. There isn't cover for a rat anywhere on the staircase or landings. Besides, this may be friend Corkran after Higgins, in which case I want to be there. Come on. We're going in. Damn the odds!"

He marched boldly forward, and the girls followed. Now that they were no longer on tip-toe, their high heels made an incredible clatter on the bare boards of the staircase and passage. Bannister raised his hand to knock at the door, and, as he did so, the light that showed from under it vanished, and almost simultaneously came the crash of a revolver shot fired at close range.

Pat and Topsy screamed.

Bannister flung the door open, and from behind them came the sound of footsteps pounding up the staircase—

"Come in," said Guy in a strangled voice. "But don't look."

The girls obeyed, and stood together against the wall just inside the door, their faces white under their make-up. The room seemed full of smoke and the acrid smell of gunpowder. It contained nothing but a camp bed, a small wooden table and chair, a dilapidated washstand and a chest of drawers. So much was visible in the pallid, ghostly light of the moon, which had chosen that moment to break out between the lowering clouds, and to reveal also the body of a man wearing only a shirt and trousers, which had pitched head foremost into the empty grate.

It was Higgins.

He was hideously shot through the side of the head, and lay in a pool of blood with a heavy revolver gleaming dully beside him.

"Keep looking out of that window, you two," said Bannister. "We've got to see who's coming upstairs." And with a shaking hand he lit the two candles on the mantelpiece, which Higgins must have blown out a moment before the shot was fired which killed him.

As the candles flared up, sending the shadows dancing eerily about the room, the footsteps, now clearly recognisable as being those of two people, came along the passage and stopped.

"Come in," shouted Bannister, "for heaven's sake! Who are you?"

And then he cursed himself for a fool; for the two men who entered were Alf Corkran, and the thin-faced, foxy little man against whom he had bumped in the shop that same morning.

Mr. Corkran gave one practised glance round the room.

"Thought as much, Ring," he said. "Couldn't be helped, though. Don't see how we could have stopped him, do you?"

The foxy little man shook his head.

"I think you might have kept off our manor," Mr. Bannister. This is no place for ladies," he added.

"Who the devil are you?" demanded Guy.

"We're watching Higgins," said Mr. Corkran. "We're detectives from Scotland Yard, detailed for work at the moment under Central Inspector Spears. Go and telephone him, Ring, will you? I'll look after things here. Well, it looks like the end of the case."

"Sorry, you two," said Bannister. "Afraid I've given you rather a dreary evening for nothing. Cut along! I'll meet you downstairs. I suppose I owe you an apology, too, Corkran."

"Thought we'd forgotten Higgins, and that you'd do that part of the job for us?" inquired Mr. Corkran pleasantly.

"More or less," muttered Guy. "I say, what's that?" And he took a step towards the mantelpiece, where something white stood between the candles.

But Mr. Corkran was too quick for him. He twitched the piece of paper away before Bannister could get his fingers on it, and slipped it into his pocket.

"I'll keep this for Inspector Spears, if you don't mind, sir. Bound to be a confession, though. I expect the ladies will be waiting for you downstairs, Mr. Bannister. They'll be needing an escort in Gentile Street at this time of night."

For a moment Bannister glared at the detective angrily. Then, realising that he had no case, he took the hint and descended the staircase slowly and gloomily.

"Cheer up," said Topsy, when he reached the bottom. "How could you tell that little beast Corkran was a policeman? He looks like a commercial traveller—the sort that travels in sponge-bags. Come back to the flat and have a drink."

"Thanks. I will," said Guy. And it must be admitted that he found considerable consolation in the way in which Patricia Marsden, who had been badly shaken by the climax of the night's events,

snuggled affectionately against him in the taxi all the way back to Mecklenburgh Square.

XXII

LUNCH FOR TWO

JULIAN CAIRD had little appetite for his breakfast the next morning. The first thing he saw when he opened his morning paper was the death of Higgins, reported under splash headlines. There were no details; the brief paragraph merely stated that the unfortunate studio attendant had been found shot through the head in his room in Gentile Street. But to Caird, as to Bannister, it seemed the end of the case. Presumably the inquest on Parsons would be followed by an inquest on Higgins. The verdict on the latter would be "Suicide while of unsound mind," and the ordinary routine of life in general and of broadcasting in particular would be speedily re-established.

This was the view he expressed to Rodney Fleming as they went together to give evidence at the inquest on Sidney Parsons. The latter proved sceptical.

"Too easy, Julian," he said. "Too easy altogether. Of course, if the police want a solution at any price, this gives them a convenient way out. But I don't believe that poor devil did it, any more than Leo did. Neither is a sensible solution psychologically, as your friend Stewart Evans would put it. He's a tiresome man, but he's right about one thing—if you're looking for a murder one of the first things to be considered is whether your suspects are the sort of people who would in any circumstances commit murder. Higgins was just the type to shoot himself—I presume he did shoot himself?—but I'll swear that he never strangled Sidney Parsons."

"Then who the devil did, Rodney?"

Fleming shrugged his shoulders.

"I don't know, and so long as they don't pitch definitely on Leo, I don't particularly care. I'm not going to pretend much sorrow for Parsons; but if they hang Leo, or even arrest him, he won't put on my new play. And that's a very serious matter."

"You're incorrigible, Rodney!"

At which point they were interrupted by Guy Bannister, his hair more than usually untidy, his eyes gleaming with excitement behind his spectacles. He poured out the story of his previous night's adventures, omitting nothing except the irrelevant feature that he had remained at the flat in Mecklenburgh Square until nearly four o'clock in the morning, stiffening the shaken morale of Topsy Levine and Patricia Marsden. Especially of Patricia Marsden.

"Well, what do you think of that?" he concluded.

"I think," said Rodney Fleming, "that you're exceedingly fortunate, young man, not to find yourself under arrest. After all, suppose you murdered Parsons, that Higgins saw you, and that you shot him last night to stop him giving you away? What about that?"

For a moment Bannister looked scared. Then he grinned.

"Nothing doing. Luckily, I couldn't have murdered Parsons even if I wanted to. I was in the Effects Studio all through the play, and there's the evidence of four of the Effects boys to prove it. Besides, to be quite honest, I was making an ass of myself last night. The police were watching him a darned sight more efficiently than I was. They only slipped up for a minute when they let the girls and me get into No. 17 before them."

"Yes—you're safe," said Fleming. "I suppose it's certain that Higgins shot himself?"

Bannister looked round cautiously before replying.

"Well. I don't know," he said.

"What?" rapped out Caird.

"All right, Julian. Don't bite my head off. It's ten to one he did kill himself. He left some sort of a message behind him on the mantelpiece, only the police got it before I could look at it. I expect it's a confession. But there's just one point which struck me as a bit queer. There were two windows to that room of Higgins'. It struck me as odd that one should be shut and curtained, and the other uncurtained and open."

"Really open?"

"As open as it could be."

"Did you point that out to the police?" said Fleming.

"No," admitted Bannister. "It didn't strike me as significant at the time. I was pretty upset, you know—especially with a couple of girls on my hands."

"That'll teach you not to try combining business with pleasure next time," said Fleming. "Did you look to see whether there was anything outside that window except a sheer drop to the street?"

"I'm afraid I didn't."

"Then you'd better take the first opportunity to go back and find out that extremely important point. Well, here we are, Julian. Are you going to sit the whole thing through?"

"Not if I can get away," said Caird. "My office work's going all to blazes. Suppose we meet for lunch?" He was not going to admit even to Fleming that his main reason for wanting to get away from the inquest at the first possible moment was to avoid having to watch Isabel Dryden's tortured face while her husband was being questioned.

"Right," said Fleming. "Lunch it shall be. Let's make it the Bay Tree at half-past one, shall we?"

* * * *

The Bay Tree, that celebrated restaurant so dear to the members of the theatrical profession, is situated in a small street off Leicester Square. Once the stage had ceased to be the preserve of rogues and vagabonds, and acting became an occupation eminently suitable for ladies and gentlemen, the demand naturally arose for a restaurant in which actors and actresses could obtain first-class food at rather less than first-class prices, and enjoy the amenities of what was practically a mixed luncheon club, without having to pay a subscription or risk the perils of election.

Not that actors and actresses were the Bay Tree's only clients; far from it. About fifty per cent of the regular *clientèle* was composed of those members of the public who, not unreasonably, preferred to see a dozen theatrical stars for the price of a good lunch, rather than watch two or three for the price of stalls at a play which might or might not be good.

The Bay Tree at lunch-time was, in short, a microcosm of theatrical London. Optimistic managers invited prospective backers; would-be playwrights invited pessimistic managers. The doorway was almost continually impeded by the entrance of one promising young actress after another, who would pause just inside and look deliberately along the line of tables, presumably for her host, but actually to "register" her appearance with every manager who might be present, and any members of the public who might recognise her. Theatrical gossip was retailed loudly from table to table with little or no regard for the comfort of the uninitiated at intervening tables. Various well-dressed and ladylike young gentlemen fluttered from one party to another, waving their hands a great deal, and kissing the finger-tips of elderly actresses with self-conscious gallantry.

But it was not necessary to lunch at the Bay Tree elaborately or in a noisy party. Manfred, its proprietor, appeared just as gratified to see you if you lunched alone on nothing more exciting than a chop and

a glass of lager beer. So, while the stars twinkled, the gossip shrilled, the young ladies postured and the young gentlemen gyrated, it was possible to observe a well-known dramatic critic, the editor of a theatrical paper, and the London representative of a big American film company sitting in splendid isolation and seemingly quite detached from the hubbub all round them.

Julian Caird arrived punctually and secured a table in the corner farthest from the door. He had not been kept long at the inquest, and his evidence had consisted solely of a repetition of what he had already told Spears at Scotland Yard. He sat down, ordered a cocktail, and wished heartily that he had had the sense to think of some other restaurant. For the Bay Tree was full of his acquaintances, and each one of them wanted to ask him about the inquest in general, and Leopold Dryden in particular. One after another they drifted up, giving one excuse more unlikely than the last, talked casually of this and that, and at last proceeded shamelessly to satisfy their morbid curiosity. Never a particularly genial person, Caird had become positively offensive to two or three of his questioners by the time Fleming put in an appearance.

"Don't scowl so, Julian," said the latter. "Do you mean to say you haven't ordered me a cocktail?"

"Why on earth didn't we go somewhere else?" said Caird.

"I must come here regularly now," said Fleming airily. "The penalties of approaching fame. If I don't, no one will remember that I'm a playwright at all. Besides, it's about time I began to think about casting 'Bolt from the Blue,' and this place is far better than any agency. There you are!" And he pointed across the room. "There's the Sheila Courtenay—I didn't even know she was back from America. She'd be ideal for Priscilla."

"Oh, damn your play, Rodney! What happened at the inquest after I left? Did you stay to the end?"

"I would have; but I thought you'd be ramping for your lunch. You're so greedy, Julian. What have you ordered? Fried sole and lamb cutlets? Not very original, but 'twill serve. If it wouldn't look so damnably ostentatious, I'd stand us a bottle of champagne. I need it."

"But what happened, Rodney?"

"Oh, nothing much. It was all desperately formal. Myself, I don't believe the police have put down half their cards. But you know, Julian, Leo's behaving like a lunatic. I'm beginning to believe that either he's frightened about something else, or that he really did it. He pretended that he'd been too seedy that evening to remember anything accurately about it at all; and when he was asked why he went up to the seventh floor for fresh air instead of going outside the studio tower on the sixth floor, he said, 'I suppose I thought subconsciously it would be fresher higher up.' Well, I ask you!"

"How did Isabel stand it?" asked Caird. Fleming started.

"Isabel? I hardly noticed. I didn't like to look at her too much. I didn't want to embarrass her. But she sat through it and, as far as I could see, never turned a hair. Leopold was doing all his stuff—jaw thrust out, upper lip stiffened, one eyebrow lifted—all his tricks. But I don't think he impressed the coroner a bit."

"And what about Higgins, Rodney? What did Spears say about that?"

"Practically nothing. And, frankly, I don't understand that, Julian. If Higgins left a confession, surely Spears would have said so. And the thing would have been cleaned up on the spot."

Caird attacked his cutlets, which had just arrived.

"Well, I shall go down to Scotland Yard after lunch," he said, between mouthfuls, "and ask Spears about this Higgins business. It's absurd leaving us on tenterhooks

like this. Look here, let's talk of something else, shall we? Everyone within thirty feet is straining his ears to hear what we're saying about the beastly business."

"You can't blame the poor brutes," said Fleming. "The stage is hard up for dirt at the moment. Hallo, what's that?"

A slim young man in a startlingly green suit, exaggeratedly waisted, with fawn-coloured hair brushed straight back from his forehead, a carved emerald ring on one little finger, and suede shoes, appeared in the doorway of the restaurant, brandishing a newspaper. He moved slowly down the line of tables, and behind him as he walked the hubbub of voices rose in a crescendo of amused excitement.

"What is the thing, Rodney?"

"Timothy Brabazon?" said Rodney Fleming. "He writes the gossip column for the 'Mercury.' Try and be polite—he'll come and speak to me."

"Ye gods!" muttered Julian. "I think you'd better order that champagne, after all."

"All right," said Fleming. "Well, Timothy?"

The young exquisite held out his paper with a malicious grin which exposed rabbit teeth.

"I'm sorry about your play, Rodney," he drawled. "But I suppose this'll put the lid on it. I suppose Dryden's got an option? What happens to an option if the owner's hanged?"

"Not very amusing, Timothy," said Rodney Fleming.

"Not? Well, it amuses me to think of Leo Dryden in gaol. How he'll hate the absence of modern conveniences!"

Caird snatched at the paper.

"My God!" he said. "They've done it! Arrested as he was leaving after the inquest, but the coroner's verdict was murder by some person or persons unknown." The police were holding something back, Rodney.

"I'm glad I've managed to interest you, after all," said Timothy Brabazon.

"I don't think you know Julian Caird," said Fleming.

"Delighted," murmured Brabazon. "Oh, yes, of course. You were engaged in this business, too. How strange and amusing to broadcast plays! It must be an enthralling occupation. Well, I expect you're glad the mystery's cleared up. It wouldn't have looked well for the B.B.C. if one of their staff had turned out to have done it."

"Oh, dry up, Timothy!" said Fleming.

"I don't see quite why you want to walk round the Bay Tree brandishing this rag, anyway. People will know soon enough."

"My dear Rodney"—Brabazon's tone was pained—"I'd never seen the place look so flat and dull as when I came in. I had to do something, or Manfred might expect me to pay my account. And in any case, surely you'd have expected me to offer my sympathy on the misfortune of your play?"

"If you haven't any sympathy for Leopold Dryden, Mr. Brabazon," said Caird angrily, "I think you might spare a thought for his wife."

Brabazon raised his eyebrows.

"Little Isabel? I'm devoted to her. Why, she'll be inundated with messages of sympathy all the afternoon, after this. I can assure you, Mr. Caird, she won't lack consolation. She has many admirers, I know."

Caird half rose from the table, clenching his fists. Brabazon stepped back.

"Dear me, Rodney, what impetuous friends you have! If I've offended in any way, I apologise most earnestly." He turned away. "Of course," he said over his shoulder. "So stupid of me. I seem to remember hearing that Mr. Caird was one of those admirers." And he sauntered away, trailing an odour of expensive scent.

Caird glared after him, wishing, not for the first time, that he lived in a less civilised age.

Rodney Fleming put a hand on his sleeve.

"Here's the champagne," he said. "Pull yourself together, Julian. Murder was rather out of place in Broadcasting House, but it's a sheer impossibility in the Bay Tree."

"Murder," growled Caird, still looking after Timothy Brabazon, "would be hopelessly inadequate. Have you ever looked up the details of drawing and quartering, Rodney? If not, you might. And then imagine the process applied to Mr. Brabazon. Why is that sort of creature allowed to live?"

Rodney Fleming sipped at his champagne.

"Modern Society," he observed, "lives by its scavengers. You'll see, I'll bet you a fiver I get a paragraph to myself in the 'Mercury' on Sunday."

Caird got up.

"I'm sorry, Rodney," he said, "but I can't stand any more of this monkey-house. It makes me feel sick. I'm going to try and find Spears. Damn it, we can't leave things like this. We both know that however bad appearances may be, Leo never did it. We've got to find out who did. Coming?"

"I think not. You'll do better alone—you're so much more becomingly serious. I shall continue to contemplate the mutability of human affairs, and incidentally I will pay for the lunch."

But Julian Caird had not bothered to wait for the end of the sentence.

XXIII

THE NOTE AND THE BLOTTING-PAPER

BUT Caird did not go to Scotland Yard after all. Just as he was passing the National Portrait Gallery, he remembered that he was due for his weekly meeting with the Director of Programmes at half-past two, and that, as far as he was concerned, amateur detection had to come second to his broadcasting duties. Accordingly he took a taxi and drove back to Broadcasting House.

He had hardly entered his office when his telephone-bell rang twice, sharply.

"Is that you, Caird?" inquired the voice of General Farquharson. "Would you mind coming down to my office immediately?"

"Of course, sir, but I have a meeting with the Director of Programmes in ten minutes."

"Then put it off, Caird—put it off!" said the Controller testily, and rang off.

When Caird reached the Controller's office on the third floor, he found a curious little group assembled. The General was standing looking out of his window, fingering his moustache uneasily. At his desk sat Spears, with, facing him, Guy Bannister, very flushed, and a rather attractive, plump, fair girl in a canteen overall, who was sobbing noisily into her handkerchief.

Caird paused awkwardly in the doorway.

"Come in, Caird, come in. Take a chair," said the General. "Inspector Spears wanted you to be present. I only hope this means that this dreadful business is nearly done with and we can get back to our normal work. Incidentally, I should like both you and Bannister to understand clearly that I don't consider it your business to try and do the work of the police for them. You've got plenty to do here, and your duty is to the listening public. I should be glad if you wouldn't forget it."

Caird and Bannister looked at each other uneasily.

"All right, Inspector," the General went on. "If you want me, I shall be next door in the Director-General's room."

He went out, and everybody except Spears drew a long breath of relief.

Spears leaned forward across the desk, and spoke to the canteen girl.

"Your name's Essie Lurgan?" he asked, gently enough.

"Yes, sir."

"How old are you?"

"Twenty and two months, sir."

"And you've been at Broadcasting House—how long?"

"Five months, sir."

"Now, don't cry," went on Spears persuasively. "You can take my word—there's nothing to cry about. No one's going to be hard on you. You haven't done anything wrong. All I want you to do is just to answer a few questions truthfully and carefully."

Effie Lurgan sniffed dismally.

"I'm sorry," she whimpered, "but it's all so dreadful. You see, he was fond of me, sir, and I was fond of him, in a way. Although, of course, nothing could come of it, him being married, though I know it was true that he wasn't living with his wife and that she treated him something terrible."

"Just a minute," said Spears. "You've got in your hand a farewell message that Higgins left for you last night. Would you mind reading it to me?"

The answer was a fresh burst of sobs.

"I couldn't—really I couldn't. You read it, sir, please." And the girl dropped a crumpled piece of dirty paper on the desk in front of the detective. It was an ordinary piece of lined copy-book paper, folded across, with "Miss Effie Lurgan, Broadcasting House," written in pencil, in block capitals, on the outside.

Spears unfolded it, and read:

Effie.—This is just a line to wish you good-bye and to say as I am sorry for all the trouble and pain I have caused you, loving you all the time as I do. I can't stick it no longer. They keep following me about, and the noises won't stop in my head. Mabel keeps writing for money, but she's had all my savings and I can't send her no more. I'm not afraid of going out, but I don't want people to think as how I might have killed that Mr. Parsons. You know, we had arranged to meet that night, Effie, so please tell the police so, and let me go out with a clear name. I can't think of more to say, so will now draw to a close.

"JOE."

To Caird, this message from the dead, so inadequately phrased, seemed indescribably pathetic. Effie Lurgan went so white that he was afraid she would faint, and he got up hurriedly out of his chair, and pushed it towards her.

"Now, I don't want to trouble you more than I need, Effie," Spears went on. "But just tell me; 'Mabel' is his wife, is she?"

"Yes, sir. But I don't know where she lives. I don't know anything about her, except that she treated him badly."

Spears nodded.

"Now, this appeal of his to you. Is it justified? You remember that when I interviewed you before, you denied that there had been any arrangement between the two of you to meet that night?"

"I know. But you got me so scared I hardly knew what I was saying. Oh, I know you didn't mean it, but a girl like me isn't used to the police."

"But you'll tell me the truth now?" insisted Spears.

"Oh, yes, sir. Joe sent me down a note during the afternoon, asking me to meet him in an office on the seventh floor. We'd met there before, you see, sir. He wanted to talk things over, though I hadn't any more to say to him, as I'd told him already, I was afraid of losing my job, sir, if it came out that I'd arranged to meet him again. It isn't easy to get jobs now, and I have my little sister to look after."

"I see," said Spears. "You've behaved very sensibly on the whole, Effie, and I hope that if you ever have to answer questions by the police again, you'll remember to tell the truth the first time and not be afraid."

Effie Lurgan looked up wide-eyed, and nodded.

"Perhaps you'd like to have this back," said Spears, holding out Higgins' note.

"Oh, no, thank you," said the girl, recoiling. "I want to forget all about it, please. Can I go now?"

"Very well," said Spears.

Bannister opened the door, and with a quick, shuddering glance over her shoulder, Effie Lurgan bolted out of the room.

There was a little silence, finally broken by Caird.

"Poor little beast!" he said. "They're not going to make her suffer for this, are they?"

"No, no," said Spears. "I've fixed all that. It wasn't surprising that she lost her nerve. Well, Mr. Bannister, I thought you'd like to be in at the death, as it were, after all your efforts. I ought to be pretty angry with you, but I don't think there's any real harm done, so I won't bother. Well, we aren't much farther, are we?" He put his hands in his pockets, and leaned back in his chair. "Higgins is let out, which means one suspect less, but that's all we get out of that. The note's genuine enough, and I'm sure that girl's telling the truth now."

"But are you sure Higgins shot himself?" said Bannister.

"Why not? Have you got another idea?"

"Oh, I know you're beginning to think me an interfering young ass," said Bannister. "But I can't help noticing things. Did your Corkran or Ring spot the fact that one of the windows in Higgins' garret was open last night, while the other was closed?"

Spears smiled.

"It's a pleasure to have you to work with, Mr. Bannister, in some ways. You ask all the right questions. Ring did notice it, but he also noticed that there's nothing outside it, above or below, that a cat could stand on, let alone a potential murderer. And there's another thing: it'd be drawing the long bow of coincidence a bit too far for someone to have turned up on Higgins' window-sill and shot him through the head just as he finished writing a note like this." And he tapped the bit of paper with his forefinger. "No, that doesn't happen in real life. Mr. Bannister. Higgins shot himself all right. Ring and Corkran only made one mistake, and it was rather a bad one. They didn't follow Higgins sufficiently closely when he bought the revolver. If they had, they could have pulled him in for possession of a firearm without a licence, and we would have saved his life."

"Do you honestly think it was worth saying?" interrupted Caird. "You can't do much for a chap when he's got into that state. He's just one more war victim—the sort who get neither recognition nor sympathy. I know what I want to ask you—why have you gaoled Leopold Dryden? But I don't suppose you'll tell me."

"I don't mind," said Spears whimsically, "so long as you and Mr. Bannister will promise to keep it to yourselves. I have three reasons. The first is that somebody practically had to be arrested; the second that there's a great deal of unpleasant evidence against Mr. Dryden; and the third is that I hope that now he's arrested he'll realise that he's got to open his mouth and answer questions. And if he won't, perhaps his wife will."

"There's a wall of silence covering those two, Caird, and it's got to be broken down somehow. If this doesn't break it down, I shall begin to believe that my instinct is wrong."

"Then privately you don't believe that Leo is guilty?"

"I do not. But my belief's got nothing to do with it either way. If you're a friend of Mrs. Dryden's, Caird, as I believe you are, I'd recommend you to advise her to use all her influence on her husband to get him to talk, and when he talks to tell the truth. I don't want to scare her, but you can tell her from me that I've known

men hanged on a darned sight less evidence than there is against Leopold Dryden at this minute."

"I'll do what I can," said Caird. "In fact, I was to dine with her to-night, but, of course, now that Leo's in gaol, I was going to put myself off. Perhaps, in the circumstances, I'd better go. Rodney Fleming was coming, too, and he's known her longer than I have. I'll see if I can get him to put in a word."

"If you succeed, you'll be helping both me and the Drydens," said Spears. "Well, I think that's all for the moment."

But Guy Bannister, who had been wandering restlessly up and down, looking at the uninspiring backs of the Controller's collection of bound volumes of the "Radio Times," suddenly turned round.

"I say!" he said.

Spears laughed outright.

"Not another idea, surely, Mr. Bannister?"

"I don't care if you do pull my leg," Guy went on. "But I want you to listen to me a minute. It may seem a rotten thing to say about a chap who's a colleague of one's own, but have you thought at all about Stewart Evans?"

Spears and Caird exchanged glances.

"Just a bit," said the former.

"No, but seriously. After all, what was he doing in Broadcasting House the night of the murder? He could surely have done his work on 'As You Like It' in his own flat. And what was he doing with those gloves of Dryden's which he gave to you? I know what he told you, but suppose what he was really doing was getting the gloves in order to destroy them—to destroy them because he had used them himself? Why's he trying so hard to pin the thing on to Dryden? Besides, Julian, you know his head's stuffed full of criminology, and—as we're being frank—everyone here loathes the sight of him!"

"Steady, Guy! All this is perfectly true, but none of it's proof, and it's proof we've got to be specially careful about when, as you say, we don't like Evans."

"Like!" snorted Guy. "Disagreeable brute!"

"But, anyway," Caird went on, "I know that the Inspector's got his eye on Evans, even if it isn't quite the jaundiced eye that you and I would like him to have."

"Well, most of my ideas seem to be pretty stale before I can get them out," said Bannister, groping frantically in an inner pocket. "But I've got here something that you don't know about—and can't know about. I suppose I ought to have shown it to you before; but there's been so much doing, what with Higgins and all the rest of it. I tucked it away in my pocket-book, and forgot it until we started talking about Evans in here. Look here, Inspector!"

He put down on the desk and unfolded a large piece of white blotting-paper that had obviously seen considerable use.

"Well?" asked the detective. "I suppose this means we've got to go and find a mirror. I see your General's a Spartan—he hasn't got one in his office."

"Mirror?" repeated Bannister.

"To read the letter that was blotted on this piece of blotting-paper," Spears went on. "Where did it come from, by the way?"

"Mirror—bosh!" said Bannister rudely. "I'm not going in for that fool penny-dreadful stuff! This comes from the blotting-pad in Stewart Evans' office."

"But what the devil," inquired Caird, not unnaturally, "are you doing with it?"

"Because," said Guy desperately, "I had my ideas about Evans from the first moment I heard of the murder, and knew he was in Broadcasting House the same night. I went up to his office just on chance to see whether I could put my hand on anything. Naturally, I looked at his blotting-pad. Now, look in that corner, Inspector!"

Inside a pencilled square, and written in a neat, microscopic handwriting, Caird and Spears read:

"S. Parsons, 93, Lupus Street, Pimlico."

And below the address:

"Mean, cruel, under-sized, hard to handle."

What about that?" Bannister concluded excitedly. "Doesn't that point to some connection between Evans and Parsons? Doesn't it?"

"Perhaps," said Spears. "Thank you, Mr. Bannister. It gives me an idea, anyway."

Julian Caird stood up.

"I'm sorry to pour cold water, Guy, but I think you're barking up another wrong tree. Why shouldn't Evans make a note on his blotting-pad about Parsons' capabilities as a radio actor? I don't suppose he made it on the night of the murder at all. In fact, I'm sure he didn't, as he didn't hear the play. This is simply a note of his impression of Parsons' performance from listening to a rehearsal, and he put down the address in case he wanted that type for a part in one of his own productions. You'll probably find that he transferred it verbatim to his files. I've done that sort of thing myself hundreds of times about an actor whose work I don't know."

"Damn!" said Bannister. "Sorry, Inspector. I've sold you another pup."

"Don't apologise," said Spears. "As I said, you've given me an idea."

At that moment the door of the office reopened, and the General returned.

"Are you nearly through, Inspector?" he said.

"Very nearly, sir. You remember my asking you if I could have that piece of blattmerphone—I think you called it—tape sealed up and kept for me?"

"Certainly," said the General. "The house superintendent has got it under lock and key."

"Could it be arranged for me to hear it played through again some time during the next day or two? There's no hurry—quite at everybody's convenience."

"I'll arrange it, and let you know the time at Scotland Yard," said the Controller. "I don't wish to appear inquisitive, but is any real progress being made?"

"I think," said Spears grimly, "we're just beginning to get on."

XXIV

DIFFICULTIES OF A DETECTIVE

IN spite of his optimistic words to the Controller, Spears was a tired and exasperated man by the time he reached home for a belated supper. Seldom before, he thought, had the sitting-room of the little Norwood villa appeared so thoroughly unattractive; never had cold ham, coffee, and his favourite cheese seemed so entirely unsatisfying. He waited in sulky silence, chewing an empty pipe, while the food was being got ready. He glowered while he ate it, and violated an admirable custom of some years standing by topping up with a whisky and soda.

All this was sufficiently depressing to a devoted wife, especially as she had taken a good deal of trouble over the cheese, and had for several days seen nothing of Simon Spears between eight o'clock in the morning and nine o'clock at night. However, being a sensible woman, she asked no questions, attended to his bodily needs, ignored his sulkiness, and waited for him to break his silence in his own good time. She had been married to Simon for three years, and unlike the majority of women, knew how to profit by her experience.

At last he finished his whisky. As he did so he noticed that his slippers had miraculously put in an appearance and

were standing by the fender conveniently within arm's length. He unlaced his shoes, replaced them with the slippers, leaned back in his chair and grinned feebly.

"Sorry for being such a bear, Madge," he said. "But things aren't going too well."

"Not?" Madge Spears pulled up another chair and sat down placidly to the knitting of an emerald green jumper—a colour which she knew Spears favoured.

"No," Spears went on. "I thought things were moving when we got the Higgins part of the business settled up after lunch, and Dryden under lock and key in the morning. But I don't think that really we've advanced a yard. There's a good case against Dryden from the point of view of opportunity, and it's reinforced by his refusal to give any account of himself. But it's motive that I'm looking for all the time—motive. And I can't find it."

"But what about those letters from Mrs. Dryden that were found on Parsons?" Madge inquired. "You say they proved Parsons was blackmailing her, and you as good as got her to admit that she quarrelled with her husband on that very point at dinner before the transmission of the play. Surely that's a good enough motive for anyone?"

"On the face of it, yes," said Spears. "It holds water until you look into it. But do you mean to say that if Dryden had killed Parsons for blackmailing his wife he would have left letters proving that blackmailing in Parsons' pocket-book? Oh, I know murderers always make mistakes, but that was the one mistake Dryden wouldn't have made if he'd been guilty."

"He wouldn't have had much time to avoid making mistakes," said Madge, "to judge from what you've told me. According to you, the whole thing was done in about a minute and a half."

"I know," Spears agreed. "But there's something in my bones that tells me that Dryden's not guilty. Unless, of course, he merely meant to give Parsons a hiding, and killed him by mistake. But if that was so, why on earth choose that place and time? It isn't sense."

"No murderer's sense, dear, if it comes to that." The knitting needles clicked steadily for about a minute, and then Madge looked up. "Simon, what makes you so sure that it must have been one of those three or four people who actually did the killing? What about the rest of the cast? What about all the other people in Broadcasting House that night—engineers, and so on? You haven't forgotten that with the studio attendant absent from the door into the tower which he was supposed to be watching anyone could have got along that passage on the seventh floor and into the studio?"

"I'd thought of that," said Spears. "It's possible, but it's only possible if you're prepared to admit the most extraordinary length of coincidence. In the first place, you can leave the other members of the cast out of it. There's any amount of evidence to prove that they were all in the various studios where they should have been during the period in which the crime was committed, and there's the same unshakable alibi evidence to cover the studio manager and the Effects staff. So they're let out."

"Now let's take your suggestion that it might be someone outside altogether—even suppose it's this man Stewart Evans, whose activities want a good deal of explaining. I don't think you realise, Madge, the extraordinary delicacy of the machinery and time factors. How could anyone who wasn't intimately concerned with the production of the play know (a) where Parsons was; (b) that he was alone; (c) the particular moment at which he would be playing that particular scene, so that if he was murdered during it no one would notice anything out of the ordinary

until the end of the play? All these things mean most careful timing and planning. I don't believe that an outsider or any member of the Broadcasting House staff could have fluked along that passage at the critical moment, and if he had, he would have been a lunatic to have taken such a risk. You don't want me, surely, to fall back on our last trench, and put the thing down to an inexplicable burst of homicidal mania on the part of someone unknown?"

"But surely certain engineers would know all about a play like that?"

"Only the ones engaged on its actual transmission, and as they work in shifts, you don't even have the same engineers on duty for the transmission as you do at rehearsals. Besides," Spears went on, a little irritably, "I've checked up all that side of it, my dear. The movements of all the engineers in the main Control Room are accounted for, and it's so close to the Dramatic Control Panel-room that the engineer on duty in there had no time to do anything but his actual job. That's to say, to go from the D.C. room into the engineer's Control-room to tell them about the failure of the return lights, and come back again. Hancock knows when he left the D.C. room. His arrival in the engineer's Control-room was logged, and he was back in the D.C. room before Parsons had started his soliloquy. There's nothing on him."

"It is difficult, Simon."

"It's more than difficult—it's damnable! It'd have been bad enough if it hadn't been for these various 'accidents' that complicate it so tiresomely. If the return light hadn't failed, we could eliminate Julian Caird. Mark you, I don't see how he could have arranged for that light to fail without the orchestral conductor in 8A being his accomplice. But the fact remains that he was away from the D.C. room over the critical period, and there's no one to corroborate his story that he came straight back after seeing Dryden and Fleming on his return from 6A."

"Then there's Fleming. His yarn sounded thin enough, lord knows, but it's cast-iron, unless he made an accomplice of one of the girls on the telephone switchboard; which reminds me, incidentally, that I must send someone to Leeds tomorrow to check up the other end of that telephone call. And then Dryden. His story's the thinnest of all in a way—going out of the studio for fresh air and up a flight of stairs needlessly into the bargain. But that it is so thin almost convinces me. Surely if he was guilty he would have thought of a better story than that? Or did he take a chance that he wouldn't meet anyone on the seventh floor at all? It seems an insanely long shot to me."

"But what about his gloves?" asked Madge, who wanted her husband to go on talking, and thereby get his present discontents out of his system.

"Those gloves," said Spears, "may mean anything or precisely nothing. Dryden gives no explanation of them, except that two rehearsals before the transmission of the play he mislaid a pair of gloves. That's possible enough. In fact, Caird goes so far as to say that he thinks he remembers Dryden saying something to him about it. But then Caird wants to do his best for him. Anyway, there's been too much fuss about those gloves altogether. They may not even have been used to strangle Parsons at all. Suppose the murderer used his own gloves and put Dryden's in that cupboard to draw a red herring?"

"Didn't you say they were exceptionally small gloves for a man?" said Madge.

"You mean they might have been used by a woman? That's a notion I hadn't thought of, my dear. It's ingenious, but I'm afraid it doesn't hold water. All the women in the case are accounted for."

"Including Mrs. Dryden? If she were being blackmailed she had a real motive."
 "She wasn't out of Macdonald's sight all through the play. There's motive there, but not opportunity, Madge. That won't wash. Besides, I doubt if any woman would be strong enough. The killing was done very quickly, remember. Whoever did it must have had powerful hands, however: small they were."

"You've never said any more," Madge began again, after a little pause, "about that watch ticking that Mr. Bannister drew your attention to when you heard that steel tape recording played through."

"That doesn't mean I haven't thought a lot about it. I think it's clear enough how it got there. I was careful to get from Caird Parsons' exact position during his soliloquy. As it was being said in a low, subdued tone of voice, Parsons was placed within about a foot of the microphone. What I conceive to have happened was this: he was caught from behind by the murderer, who put his left hand over Parsons' mouth and simultaneously took him by the throat with his right. It was during the first few seconds, while his left hand was across Parsons' mouth and his wrist-watch on his left wrist was between Parsons' mouth and the microphone, that the ticking of the watch was heard. Then, no doubt, the left hand was shifted down to join the other at Parsons' throat, and, as he slowly choked him, to help lower the body silently to the floor of the studio."

"It couldn't have been Parsons' watch?"

"It could not; he wasn't wearing one. Unfortunately, Leopold Dryden, Julian Caird, Rodney Fleming, and Stewart Evans all wear wrist-watches, and were wearing them that night, and in spite of everything Guy Bannister may say, I don't believe you can tell one wrist-watch from another by means of its tick through the microphone."

"Bother," said Madge, "I've dropped a stitch. Would the murderer know that?"

"Know what?"

"That the ticking of different wrist-watches would sound just the same. Suppose you staged a test?"

"By Jove!" said Spears. "There may be something in that. In fact, now I remember it, Rodney Fleming suggested something of the sort—at least, I think he did. Madge, that's a notion. Something might come of it. But it wants staging, though."

"You'll see, dear," said his wife placidly, "it'll work out. You've still got plenty of loose ends to follow up. It isn't as if you were against a blank wall."

"I know. If only they'd give me time, and not badger me so much," said Spears bitterly. "Cavendish was at me again this afternoon. After practically giving me the hint to arrest Dryden, he now says he thinks it was precipitate. I didn't understand what he was getting at, until I saw the evening papers. It's a perfect curse that Scotland Yard's so much in the news. What with the Police Reforms on the one hand, and the news value of Broadcasting House on the other, work on this case is like doing a job under about eighty searchlights. Besides, the amateurs are beginning to take a hand."

"What, Mr. Caird and Mr. Bannister? Are they doing much harm?"

Spears smiled.

"I don't mean them—they're all right. They only reach the conclusion I have already achieved about a day later. It amuses them and it doesn't hurt me. But as the Assistant Commissioner said, everyone who was listening to that blasted play has got some theory of how the crime was committed. Even Cavendish is right sometimes. There was a pile of letters like a film star's mail at the Yard this morning, and another at the B.B.C. The Editor of the 'Radio Times' had a third, which he sent down to me by special messenger."

"Aren't any of them helpful, Simon?"

"My dear Madge, have you ever read representative letters as written to public

institutions like the Police or Broadcasting House? Several suggested that Parsons strangled himself; two that the murderer was hidden in the ventilating plant; a third solemnly puts forward the suggestion that he had been electrocuted by some diabolical device of Julian Caird's from the D.C. Panel. And as for the things they say they heard! Apparently there was everything in 7C that evening from a buck nigger—an old lady who'd lived in Jamaica wrote to say that she recognised his typical stertorous breathing!—to a woman with false teeth which didn't fit properly. That was the theory of a dentist in Hull. The only intelligent suggestion came from a retired colonel at Bath, who wrote to ask if we had considered the possibility that the murderer had killed Parsons earlier than we thought and had played his scene for him, imitating his voice. Of course, that is a possibility, and if it was a fact, we should have to start all over again, and reconsider all the various alibis. If Parsons was killed earlier, it would let Caird out. He would have been in the D.C. room. It would wreck Fleming's alibi altogether; and it would probably let Dryden out, though he was moving from one studio to another at different times during the course of the play, unlike the majority of the cast—we should have to go into that very carefully, to be sure."

"Do you think that's honestly possible, Simon?"

"I don't know, Madge. But as I see it, I am bound to take the word of the people who knew Parsons' voice, and who heard the scene. If it hadn't been for the blattnerphone record, it would have been a nice point, with Caird away from the Panel-room. I should have had to rely entirely on Hancock's opinion. But with the blattnerphone, it's different. Caird, Fleming, Macdonald, Bannister and Hancock all agree that it's Parsons' voice, and there's no doubt about it, it isn't a voice that could be easily imitated by anybody. In fact, it's just the sort of intelligent amateur suggestion that might well send us on an altogether false trail. Let's drop the thing, Madge. I shall have more than enough of it again to-morrow. Let's talk of something else. Julian Caird and Fleming are dining with Mrs. Dryden. Perhaps they may get her to persuade her husband to talk—if only he's got anything to say."

"All right, dear," said Madge. "Would you like some music?"

"If by that you mean the wireless," said Spears, "if you put on the infernal thing, I'll drink more whisky, I warn you."

"It isn't really music," said Madge soothingly. "It's nearly midnight, so it'll be a dance band from that new restaurant they've just opened."

"I never want to hear the wireless again," said Spears. "Don't you dare to renew our licence next year!"

"Just as you like, dear. Well, I expect you've got to be up early again in the morning. Suppose we make a long night of it, and go to bed now?"

"Quite a good idea," said Spears. "I'll just put away the whisky."

He took up the bottle, and went out into the narrow hall.

As he did so, the front door bell rang vigorously. He opened it, and found himself facing a hatless young man in evening clothes. It was Julian Caird, breathing hard and with a queer distorted expression on his face.

"Hallo, Caird! What's the matter?"

"May I come in and sit down for a minute, Spears? I thought I'd better come and see you at once. Someone's just tried to put me under a train!"

"Put you under a train?" said Spears, shutting the door behind him. "Who?"

"Stewart Evans," said Caird savagely.

"Are you serious?" said Spears, re-opening the sitting-room door. "Go in and sit down. I don't think you know my wife. Oh, Madge, this is Mr. Caird."

Spears was just about to follow his unexpected guest, when suddenly the telephone rang sharply.

"Hallo," said Spears. "Yes?"

"Are you Inspector Spears?" inquired the voice at the other end.

"I am," said Spears. "Why?"

"I thought perhaps," said the voice, "it might interest you to know that an attempt has just been made on my life. Perhaps you would care to come and talk over the details with me to-morrow morning at Broadcasting House?"

"Broadcasting House?" stammered Spears.

"Who are you?"

"Stewart Evans," said the voice, and rang off, leaving Spears staring bewilderedly from the instrument to the open door of his sitting-room, through which came the pleasant tones of his wife's voice making herself agreeable to Julian Caird.

XXV

DINNER WITH ISABEL

JULIAN CAIRD had not been looking forward to dinner that evening with any degree either of pleasure or satisfaction, and in spite of the encouragement he had received from Spears to keep the engagement, he was still in two minds as to whether he would not put himself off at the last moment when he met Fleming at the club in Brook Street to which they both belonged.

He found Fleming in the empty billiard-room, attempting elaborate experimental canons, and consoling himself for his continual failures with a pint of draught cider. It was then about six o'clock, and they were due at Isabel's at half-past seven.

"Hallo, Julian! We've just got time for a quick fifty before we push off."

Caird grunted, and chose a cue with care from the rack on the wall.

"You 'break,' Rodney," he said, taking off his coat. "Look here, do you think we ought to go?"

Fleming just failed to achieve a double ball with his opening shot.

"Go? Why not? Delicacy's all very well, Julian, but it can't be very amusing for Isabel to be sitting there all by herself, imagining what Leo looks like in durance vile. You and I know the sort of way he'll be going on, and so does she. He'll be striding up and down giving his celebrated impersonation of the noble martyr. Then, at intervals, he'll realise that he's got no audience worth speaking of, and he'll give a dreary exhibition of rather ill-bred bad temper. It's a bore when tiresome people get into trouble; it's so difficult to sympathise with them properly."

"But I thought you liked Leo, Rodney?"

"I'd like Beezlebug if he'd put on one of my plays," said Fleming. "What will you drink?"

"Nothing, thanks. Don't you think, honestly, that she's bound to feel we're butting in—"

"Unwarrantable intrusion into a house of sorrow?" interrupted Fleming sarcastically. "My dear Julian, is it continual listening to news bulletins which fills your mind with these regrettable *cliches*? Now, don't talk humbug. We'll go down and cheer her up. Ultimately I may even go so far as to play the piano to both of you. In short, we shall have a most successful evening." He potted the red smartly, went in off the white, failed to do it again, and retired to the mantelpiece to finish his cider.

Caird miscued, swore, and put the cue back in the rack.

"It's no good, Rodney," he said. "I can't play. This infernal business is getting properly on my nerves. If it isn't cleared up soon I shall start suspecting you, or believing I did it myself without knowing it."

"Then have a drink, my dear fellow."

"It's all very well for you, Rodney, but it isn't at your elbow all day long. I can't begin to tell you what the office is

like—everyone bursting with curiosity, and no one saying a word in case it's bad form. As a matter of fact, the authorities have handled the thing with extreme discretion. In spite of all the nonsense that's talked on the subject, I think there's a good deal to be said for the common-sense military point of view in a crisis. But you can't help human nature, and, of course, my own people are the worst of the lot. You can imagine how the Effects boys and stenographers are taking it. I'm beginning to get used to being looked at rather curiously as a hypothetical murderer, but I can't reconcile myself to the amount of bad work that's being done as a consequence. Hancock was on the Panel for a rehearsal this afternoon and made mistakes solemnly for three-quarters of an hour. Guy's almost forgotten what Effects are for, and if I want to speak to Stewart Evans, I have to send for him officially. Damn the whole business, I say! But who do you really think did it, Rodney?"

"My dear Julian, how do you expect me to answer that? I don't suppose you expect me to incriminate either myself or you. Who remains? Dryden and Evans. Neither you nor I believe it was Leopold, and I can't see any definite proof against Evans whatsoever. The mere fact that you dislike him intensely is probably in his favour. If only I'd seen him mouching along that 7th-floor corridor that night at some time or another—but I didn't. Besides, as your friend Spears would say, where's the motive? The only thing I thank heaven for is that we're not in America."

"Why?"

"Because if we were," grinned Fleming, "this is just the sort of case that would infallibly attract the attention of that pretentious, consequential snob Philo Vance, who would waste hours of our valuable time in explaining to us exactly how much he knew about frequencies and decibels from an intensive study of the technical wireless press. No, Julian, I see no solution. Unless it's another 'Mystery of the Yellow Room,' and Spears did it, disguised as a microphone! Come on, let's go along to Isabel's and make her give us a cocktail. I'll tell 'em to call us a taxi."

In due course they reached the flat in Upper St. Martin's Lane, and Isabel answered the door herself.

"Come in," she said, with a forced cheerfulness. "But I'm afraid you've only got a cold dinner. Leo's manservant walked out on me as soon as he heard of the—arrest. Said he couldn't afford to be mixed up in that sort of thing in his profession." She laughed a little hysterically. "And I had to send Matilda out. She would come into my room and try to sympathise with me. So I made her lay the dinner and told her to go to the Empire."

Rodney Fleming put a soothing hand on her shoulder.

"Between us, Julian and I make the perfect domestic staff," he said. "I will begin by mixing a capital cocktail if you can find me the shaker. Or would you rather we went out?"

Isabel shuddered, and Fleming wondered why it was that while some women's taste in clothes was stimulated visibly for the better by an emergency, Isabel's seemed entirely to have gone to pieces. Surely she was intelligent enough to realise that with very pale cheeks almost entirely without make-up, and darkly hollowed eyes, a black frock made one look ghastly.

"Out?" she repeated. "I don't think I shall ever be able to go out again. And to think that I used to like people looking at me in restaurants, and knowing that they were whispering: 'That's Isabel Palmer—you know, the girl who married Leopold Dryden.' I couldn't cut the telephone off, in case the solicitors wanted to speak to me, and ever since lunch one kind friend after another has been on to me, pretending to be sympathetic and really only wanting to satisfy their odious curiosity. What

beasts people can be! I thought they liked Leo and me."

"Damn Timothy Brabazon!" muttered Caird.

"Who?" asked Isabel.

"One of the more unkind friends," said Fleming. "We saw him in the Bay Tree at lunch, having the time of his life. As you know, my dear, it's one of my principles to keep on good terms with the Press, but Julian leaped in where angels fear, with his usual impetuosity, and was very rude to him—not that it did any good."

"Thank you all the same, Julian," said Isabel.

They drank Fleming's cocktail and sat down to their meal in silence.

"You know," Isabel went on suddenly, "I think I could bear all of it if it wasn't for the papers. Do you know I've had eight reporters trying to see me this afternoon? And then those awful bills and the shrieking headlines—" She broke off.

"Wouldn't you rather talk about something else, Isabel?" said Fleming gently.

"No," said the girl. "I think it helps, rather, to talk about it to people who understand."

Julian Caird took the bit between his teeth.

"All right," he said. "I'll take you at your word, Isabel. Look here, can't you make Leo talk? I'm sure—at least, I'm practically sure—that the police would never have arrested him if it hadn't been that they hoped by doing so to compel him to break this stupid silence."

Isabel went whiter than ever.

"Yes, I know, Julian. But no one seems to be able to believe that Leo mightn't have anything to say. He's said all he can. He *was* ill that night. I know it was partly an attack of nerves, between the play and the row we had at dinner, but he was ill, all the same. He *did* go out of the studio for fresh air. That isn't so difficult to believe, surely?"

"But why on earth couldn't he have gone outside the tower on the 6th floor, instead of going up to the 7th?" said Caird irritably. "That's the thing that sticks."

"I know," said Isabel helplessly. "It sounds absurd, but wouldn't your first instinct, if you were going out for air, be to go as high as you could? It isn't as if Leo knew the geography of that wretched building of yours backwards, as you do. The first thing he saw when he got outside the studio was that spiral staircase. It doesn't seem to me so impossible that he should have gone straight up it, and then out of the tower on the 7th floor." She put down her knife and fork and stared miserably in front of her. "What I can't bear," she said, "is that I know it's really my own fault. If I hadn't lost my head and shown Leo that blackmailing letter from Parsons, no one would have believed the possibility of his guilt for a second. And then I lost my head again and lied about it, when everybody knows that Leo is inclined to be rather absurdly jealous—I know it looks bad, but neither of you believe that he did it, do you?"

"Of course not," said Caird. "And—"

"Not for a moment," said Fleming. "Do you know," he went on, "I don't think that suspicion would have focused itself on Leo as it did if he hadn't been so stupid when he was first questioned on the night of the murder. Why did he try the Archangel Gabriel stuff?"

"You know what Leo is, Rodney. He can't help being a little bit spoiled, like all successful actors. Besides, he was feeling rotten, and wanted to get home—"

"Look here, Isabel," said Fleming. "I suppose he didn't shut up like a trap because he thought *you* might be concerned?"

"Rodney!"

"Of course, he wouldn't tell you that. But mightn't it have been so? Could you have been out of the studio at the same time as he was?"

"I could," said Isabel unsteadily. "But he had only to ask Mr. Macdonald—he knows that I wasn't out of the studio the whole evening."

"But don't you see," cried Caird, "that if he had asked Macdonald, and you had been, he would have drawn suspicion immediately upon you! Perhaps he still thinks that that's the truth. When are you going to see him again?"

"To-morrow, I hope, but he doesn't seem to want to see me much." Her lips quivered pathetically.

"That must be it," Caird went on. "That explains it. You can disabuse his mind of that notion, anyway. And when you've done so, he'd better explain to Spears that that was why he kept quiet."

"Yes," said Fleming. "I think that's sound."

"I'll do it, of course," said Isabel. "But I'm absolutely certain that the only way to make Leo safe is to find the real murderer. Julian, who *could* it have been? I know that I'd have killed that little brute Parsons myself gladly, if I'd been strong enough and clever enough to think of a way. But who else could have wanted to?"

"If he was a professional blackmailer," said Fleming, "I don't suppose you were his only victim. By the way, I shouldn't talk to the police about your having wanted to kill him, if I were you! They might assume that you'd talked like that to Leo, and that he'd acted on it."

"But Leo only said he'd thrash him when I showed him the letter," said Isabel.

"I'm quite certain," said Fleming with a faint laugh, "that what he actually said was that he'd horse-whip him. Though personally I've never been able to understand how it's either easy or sensible to horse-whip anyone. A crop's much easier to use, and would, I imagine, be far more painful. Besides, has Leo got a horse-whip?"

"Oh, for God's sake, be serious, Rodney!" said Caird. "Sometimes I get a beastly feeling in my bones that all the time you're trying to work out appropriate dialogue for using this thing as the plot for a play. It isn't human."

"I've thought of it," admitted Fleming. "But I don't think it would work out. Don't mind me, Isabel. It's only the nature of the beast. You know I'll do anything in the world for you, don't you! Come along, let's go into the drawing-room, and I'll play the piano to you."

"Just one more thing," said Caird, "before we drop the subject. Rap me over the knuckles, Isabel, if I'm being impertinent, or anything, but did Leo have a row with one of my colleagues—a man called Stewart Evans?"

Isabel started.

"Yes. Why?"

"Nothing particular, except that Evans is one of those people on the fringe of the case, whose activities want a bit more explaining than they've had. And it seems to me that, one way and another, he's doing his best to make people believe that Leo's guilty. What was the row about?"

To his surprise, Isabel sat down again and burst into tears.

"Drop it, Julian," said Fleming.

"You're being an ass."

"That's all right, Julian," said Isabel, dabbing at her eyes with an inadequate fragment of lace and chiffon. "But it's all so silly. I met Mr. Evans in Nigel Druce's dressing-room at the Shaftesbury about eighteen months ago. He was very amiable and flattering, and I lunched with him two or three times, and so forth. And then he began to get a little tiresome—oh, nothing really, but you know what middle-aged men are like sometimes. So I thought it would be best to stop going out with him and have him here. I know you don't like each other, Julian, but he's extraordinarily interesting in some ways. He's been all over the world, and he talks extremely well."

"I know what you mean," said Caird. "But you won't admit it? Well, anyway," Isabel went on, a little defiantly, "I

liked seeing something of him now and then. He isn't a bit like most of the people I know. He came here two or three times, and it was all right, but he wouldn't drop this absurd pretence he had established of being in love with me. Well, you know how Leo keeps up this pose of being extremely casual with me in front of other people. He's always done it—he says it isn't good form to be affectionate to your wife in public."

"The silly snob!" thought Fleming to himself. "And how typical!"

"Well, I suppose Mr. Evans chose to infer from that that we weren't happy together, or something. Anyway, he practically made open love to me one evening when Leo was in a particularly bad temper, and it ended in a ridiculous scene, and Leo forbidding him the flat."

"But they didn't come to blows, or anything?"

"Oh, no! Stewart would never fight. He says he has a particular horror of physical violence."

"I see," said Caird. "Sorry if I upset you."

"Oh, I wish you weren't on bad terms with him!" burst out Isabel, after a little pause.

"Why on earth?" asked Caird.

Isabel twisted her handkerchief desperately between her fingers.

"The second he heard of Leo's arrest he rang me up," she said. "He rang up three times this afternoon, and at last he said he was coming round this evening. I can't see him, Julian. It isn't fair when I'm feeling like this—when I'm tired and miserable and all on edge!"

Fleming and Caird exchanged glances.

"Now, listen to me, Isabel," said the former decisively. "We'll see that you're not bothered. You and I are going into the drawing-room, and you shall put your feet up on the sofa and I will play Chopin to you until you go to sleep. When the bell rings Julian will answer the door, and he won't be the chap I take him for if Mr. Evans comes up that staircase to-night. What about it, Julian?"

"I'll deal with him," said Caird grimly. "You can count on me for that."

"But you won't do anything stupid?"

"There shan't be a second murder, if that's what you're afraid of, Isabel."

They left the dining-room, but just as Rodney Fleming was opening the piano, the front door bell rang.

Fleming struck three martial chords on the piano.

"Cue for entrance of hero to rescue oppressed heroine," he said lightly. "Run along and do your stuff, Julian."

The latter nodded, took up his hat, and went down the stairs, while Rodney Fleming covered his departure with the strains of an extremely lively mazurka.

XXVI.

ARMISTICE

ARRIVED at the bottom of the stairs, Caird drew a deep breath and opened the door. As he expected, he found himself facing Stewart Evans, an opera-hat rather on the back of his head and his evening overcoat unbuttoned, which gave him a curiously raffish appearance.

"Hallo, Evans! Who'd have thought of meeting you here?" said Caird, assuming a cordiality which he emphatically did not feel, and taking a pace forward out of the doorway, so that Evans had to step back to save his toes from being trodden on. Whereupon Caird took the opportunity to slam the door of the flat.

"Why do that?" said Evans angrily. "Couldn't you see I was paying a call on Mrs. Dryden? I imagine that's what you've been doing."

"I've been dining with her," said Caird coldly. "You know, Evans, I think it would be kind to leave her to herself this evening. Naturally, she's feeling the strain."

"What business is it of yours, Caird?"

"None, I admit, except that I'm leaving early for that specific reason."

"And you wish me to follow such an admirable example?"

"Oh, hang the example, Evans! It's a question of humanity and imagination, that's all."

"My dear Caird," said Evans patronisingly, "I'm some years older than you, and I flatter myself that I've seen a good deal more of the world. I think I can guarantee that Mrs. Dryden will appreciate a visit from me, even at a time when she finds your society a little—"

"That's enough!" snapped Caird. "I was trying to be reasonably amiable and give you a hint. If you won't take it, here's the truth. Mrs. Dryden doesn't want to see you. She's very tired, and she's going to bed early. Will that do?"

Evans moved forward aggressively, but Caird did not budge, and they remained standing ludicrously toe to toe, glaring into each other's eyes, far too angry to appreciate any humour in the situation. From the window overhead sounded the fierce exhilaration of Rodney Fleming's mazurka.

"Going to bed early," sneered Evans, "with that row going on? Do you take me for a perfect fool?"

With the light from an adjacent lamp-post behind him, he appeared to Caird as an almost featureless grotesque silhouette, ugly and menacing. The glasses, the weakly, malicious fat features, the baldness, were all hidden; and it suddenly flashed into Caird's mind that the thing might come to a physical issue. He glanced rapidly up and down the street. It would hardly do for the papers to be able to add to their bag next day a paragraph about two B.B.C. officials brawling in the West End.

And almost at the thought Evans hit out—a futile round-arm jab, with the thumb inside the fingers of his right hand. Caird dodged, closed, and pinioned him by both his wrists.

"Don't be such a sanguinary fool!" he said hoarsely. "We can't have a fight in the street, like a couple of drunks!" And, as Evans continued to struggle, he went on: "Drop it, I tell you! I know just enough jiu-jitsu to break your wrist for you comfortably. Will you behave?"

For an instant he was afraid he might have to carry out his threat, but then he felt the other go limp in his hands, and he let him go. Evans almost collapsed. His hat fell off, and he stooped for it, groping clumsily, his glasses laughably askew, his breath coming in painful gasps.

"For two pins," he muttered, standing up again and putting his hat under his arm, "I'd give you in charge for assault!"

"Oh, for goodness' sake," said Caird wearily. "Quite apart from the fact that you started it—look here, Evans, I'm sorry. Aren't we both making rather needless fools of ourselves? I know we're temperamentally antipathetic, but we can't help that. But can't we call it quits, and try and find some reasonable modus vivendi? We can't go on scrapping like this when, owing to circumstances, we've got to continue working together. The situation's becoming intolerable. Oh, I know that you think me arrogant and superior, just as I find you tiresome and difficult; but it's absurd for us to quarrel over Mrs. Dryden. After all, we're both friends of hers. I know she values your friendship, and she told me so to-night, and the fact that she doesn't want to see you this evening is no reflection on you. Surely you can see that?"

During the silence that followed, the mazurka stopped with a crash, and was followed by the caressing melancholy of one of the Preludes.

Evans shrugged his shoulders and turned away.

"If she can put up with a party—" he began. "I'm not a pariah!"

Caird followed him and caught his arm. He could now see Evans' face, and it wore a twisted, miserable expression as of a man ridden by nightmare.

"It isn't a party," said Caird. "It's only Rodney Fleming, and even if you don't like him, you must admit that he plays extremely well. After all, there's the best authority for falling back on music to drive out the devils of depression and anxiety. You remember David and Saul?"

Evans looked back over his shoulder at the lighted window.

"Fleming?" he repeated. "I wonder— all right, Caird, you win. I'll go quietly."

He tried to wrench his arm free, but Caird hung on to it firmly.

"Splendid!" he said. "And we'll start a clean sheet. What do you say?"

"Yes—if you'll spare me the Kipling concomitants."

Caird laughed.

"I'll spare you anything you like, but you must come along to the club and have a drink on it. Let's walk, shall we? It's no distance there, and it's a marvellous night."

Marvellous it certainly was, as in a fine summer a London night can be. The sky was powdered with stars, save where the moon flooded them out of existence, hanging in the blue darkness like a great Japanese lantern. Against the sky the roofs made a pattern of irregular silhouettes that would have delighted René Clair; and even the electric lights outside the theatres and the sky-signs in Piccadilly Circus seemed to have abandoned something of their quality of advertisement in exchange for an undeniable something that might for once, not too fantastically, be termed magical.

It was during that walk that Caird, in spite of his natural intolerance and his ingrained personal antipathy for his companion, began to feel and understand some of the qualities of Stewart Evans which had been discerned in him by Isabel Dryden. Perhaps it was because Evans, for the first time, revealed himself to Caird unmasked, and that for the first time Caird began to see him for what he was—a man in many ways brilliant, much travelled, widely read, but fatally cursed by two things—an inferiority complex, which he owed largely to an overpowering sense of his physical deficiencies, and an almost total inability to suffer fools gladly.

In a world so appreciative of face-values and so largely composed of fools, a man could scarcely be more heavily handicapped, and so it had proved. For Evans had been bullied at his Public school because he played games badly; encouraged to intellectual snobbery at his University because, while his work was brilliant, he was a bad "mixer." For some years he worked as a private tutor, maintaining his appointments by his outstanding qualities as a teacher, though never achieving popularity either with his pupils or his employers.

Barred from active service in the War by his sight, he had followed so many others into the Civil Service, going as an interpreter attached to various foreign missions in their dealings with the Ministry of Munitions. After the War, while most of his colleagues achieved permanent appointments from the professional friendships they had cultivated, Evans, as usual, found himself friendless and unwanted, and had drifted back into teaching, and thence to the B.B.C. To Caird it appeared a singularly moving story of capacity thwarted by personality; a combination of forces which he knew himself how to appreciate, though in his own case he had succeeded in toughening his skin, hardening

his heart, and adopting a pose of vigorous aggressiveness.

It was nearly ten o'clock when they reached the club. The big room upstairs was almost empty. Caird ordered brandies-and-sodas and cheroots, and the strangely assorted pair sat in adjacent armchairs, exchanging reminiscences and comparing personal experiences. But after a little the conversation turned on personal hobbies: on Caird's singular combination of cats and naval history, and Evans' medicine—he had at one time thought of becoming a doctor—and criminology. And from the last inevitably to the crime at Broadcasting House.

Immediately Caird found his flow of sympathy dammed, for on this point Evans either would not, or could not, conceal the superiority and the satisfaction which he felt in the confirmation of his theory by the arrest of Leopold Dryden. He regarded the latter's guilt as assured, and accordingly spoke of the whole case now as dispassionately as if it was an historical fact.

"It must be almost unique," he observed complacently, lighting a cigarette from the stump of his cheroot, "not so much from its incidentals as from its mixture of cunning and extreme stupidity. I think it was that first put me on to Dryden. There was considerable ingenuity in making use of Parsons' isolation in that studio and in the timing of the actual crime, just as there is considerable superficial brilliance about Dryden as an actor. You know as well as I do, Caird, that he gets his effects almost entirely from his physical equipment—his appearance and his voice—and there's hardly any grey matter behind it at all. Just look at the murder. You'll find precisely the same thing. Superficial brilliance achieved by strangeness of setting and extraordinary complication of all kinds. But I tell you that the great crimes have been the simple crimes, and that the more complicated a murder appears, the simpler it is in the long run to solve. What's the easiest way of murdering anybody?"

"I've never thought about it," said Caird, glancing surreptitiously at his wrist-watch and seeing that it was already eleven o'clock.

"Then think now," said Evans. "Suppose you want to do someone in, would you choose a place like Broadcasting House? Of course you wouldn't. The idea's grotesque. But suppose you're walking arm-in-arm with someone along the street, and just as a 'bus comes up behind you, you push him sideways and draw your arm clear? It may look a bit suspicious, but if you concealed your motive properly and if you say you stumbled no one could prove otherwise. That's a simple crime, and I bet you what you like it occurs far more often than you would like to imagine."

"Except," yawned Caird, "that the average 'bus driver's too careful to complete your crime for you. There aren't many people killed by buses every year, you know. And if your victim's not killed, then you're in the soup."

"I don't say the motor-bus is the ideal instrument," Evans admitted. "But what about the Tube train? Suppose you stumble against someone on a platform just as the train comes in. There won't be much mistake about it then. That's what I call an intelligent murder—easy, safe, certain, and above all, simple. You've only got to think of one thing—concealment of motive."

"I expect you're right. Shall we go? We seem to be the last, and I don't much like keeping the servants up. Where do you live? Somewhere in Chelsea, isn't it? How are you going? I think you've just about got time to catch the last train from Dover Street. Do you mind if I come with you as far as South Kensington?

It gives you a chance for your ideal murder." And Caird grinned.

"As you like," said Evans. And they left the club together.

XXVII.

WHAT HAPPENED AT DOVER STREET?

WHAT actually did happen on the platform of Dover Street Tube Station between eleven and a half-past that night? That was the point principally under consideration by Inspector Spears as he was whirled northward in a first-class carriage on his way to Leeds, whither he was bound to investigate the other end of Rodney Fleming's telephone call. He had heard one account from Julian Caird at Norwood the same night, and a second from Stewart Evans that morning at Broadcasting House, and the more he thought of it, the more singular the whole occurrence seemed. Fortunately he was alone in the carriage, so he could light his pipe, put his feet up, and give his undivided attention to getting this particular off-shoot of what was now generally known as the "Broadcasting House Case" into its proper perspective.

Caird's account, divested of its more emotional trimmings and a good deal of almost hysterical repetition, came to this: He had on Rodney Fleming's suggestion—with which he heartily agreed—prevented Evans from paying an intended call on Mrs. Dryden after dinner. As a result a fight between the two men almost eventuated. Caird, ashamed that a personal antipathy should have gone to such lengths, made a suggestion of reconciliation, which Evans received first coldly, but ultimately with every appearance of gratitude and sincerity. They walked together to Caird's club and sat there talking pleasantly and intimately until about eleven o'clock, the conversation ultimately turning upon the Broadcasting House murder, and from that to a discussion of murder methods in general. This part of the conversation, Caird insisted, was initiated by Evans, at a time when he felt sleepy and was only too anxious to find an excuse to go home. Evans ultimately produced the theory that the easiest way of murdering anyone would be to push him under a Tube train as if by mistake. This was referred to again jocularly by Caird when at last they decided to go home, and left the club together to walk to Dover Street Tube Station.

So far, the two stories coincided fairly exactly, except that Evans omitted the struggle which had taken place outside Mrs. Dryden's flat, and said that it was Caird who had brought the conversation at the club round to murder. The statements of both men further agreed in bringing them to Dover Street Tube Station at about twenty minutes past eleven, and in saying that the platform for trains westward bound was by that time entirely deserted except for an elderly gentleman of military appearance, who looked rather the worse for drink and was sprawling rather than sitting upon a wooden bench just inside the entrance to the platform. Thus far things were pretty clear. As to what had followed, while the facts in each story were the same, the rôles of the protagonists were precisely reversed. According to Caird, as they reached the platform a train drew out, and knowing that at such a time of night there is always a considerable lapse of time before the arrival of the next one, he linked arms with Evans and walked with him up and down the platform talking departmental "shop." He insisted that he was on the outside, that is to say, nearest the rails. According to Evans, arms were never linked, and they walked up and down in silence.

These small discrepancies seemed to Spears comparatively unimportant.

In any event, about seven minutes later as the roar of the next train swirled down the tunnel and flooded into the station the two men were standing at the extreme western end of the platform. They were just about to turn inwards to walk back, when hearing the train they stopped and faced the rails, standing side by side. On this point, and on the further one that Caird was standing the nearer of the two to the approaching train, the statements agreed. What followed?

According to Caird, Evans suddenly caught him by the right elbow, and effecting to stumble, pushed him violently forward, so that he would have been bound to fall under the wheels of the approaching train if he had not flung himself desperately sideways and landed on the platform on the point of his shoulder. Evans' tale was that he actually did stumble, and Caird seized the moment when he was off his balance to try and push him on to the rails. He went on to add that after the conversation in the club he had anticipated the possibility of such an action on Caird's part, and so was sufficiently prepared to avoid the thrust of Caird's elbow, the result being that Caird overbalanced and fell on the platform.

In other words, each man accused the other of a deliberate attempt at murder by the same method, a method whose feasibility they had previously discussed in the smoking-room of a club only a quarter of an hour before.

To be honest, Spears was less interested in what had happened at the Tube station than in what such happening implied with regard to the murder of Sidney Parsons. Perhaps his principal merit as a detective was his ability to keep his eyes on the essential part of a case and to disregard the less important off-shoots from it. There were three possibilities. If Caird had tried to murder Evans the reasonable deduction was that Caird was the murderer of Parsons, that Evans was getting unpleasantly near the truth concerning that murder, and that Caird had done his best at the Tube station to silence him for good.

If Evans had tried to murder Caird the converse would apply. Or alternatively, Caird, driven beyond endurance by Evans' persecution of Dryden, had chosen this way of putting the latter's most dangerous enemy off his trail for good. Or perhaps—

If only it had been possible to track down the intoxicated man of military appearance or if the driver of the train had seen something conclusive the detective might have had some sort of clue to work on. But the former had vanished without trace, and the latter had seen nothing more significant than Julian Caird getting up from the platform with a furious expression on his face, rubbing his shoulder and dusting his clothes preliminarily to bolting back up the stairs which led from the platform to the lifts.

Evans had gone on to Earls Court in the train. Caird had taken a taxi to Norwood.

Immediately after he had received from Stewart Evans his account of this peculiar incident, Spears, finding that he had a spare half-hour before it was necessary for him to leave to catch his train to the North, had asked for an interview with General Farquharson. He found the latter in his office, his desk encumbered by a mass of formidable-looking files.

"I'm sorry to bother you again, sir," began the detective. "I can see you're busy—"

"Not at all, Spears,—not at all. Glad to see you. Sit down, won't you? Well, I hope this means that you've some good news for me?"

"Well, not exactly," Spears confessed. "In fact, you may feel that what I'm going to ask you is something of an impertinence. But, in any case, I should like you, if you will, to treat my question as an entirely confidential one."

The General looked grim.

"Well, Inspector?"

"Well, sir, would it be possible for you to give me in confidence your opinion of two members of your staff—Mr. Caird and Mr. Evans?"

"Caird and Evans, Inspector? What's all this? Has there been some new development?"

"Not exactly, sir." Spears was feeling his way cautiously. He did not feel justified in damaging the professional prospects of either Evans or Caird by telling the Controller what had happened at the Tube station. "I'm bound to make every sort of inquiry, you'll understand, into the background of each of the people who were most intimately concerned with the tragedy—"

"Come to the point, Inspector. You mean that both Caird and Evans are on your list of possible 'suspects'?"

"Yes, sir," said the detective reluctantly.

"Not that personally I've anything—"

"It isn't your business to have anything personally against anyone, I know that. I know that you've got to do your duty, Inspector. You needn't be so apologetic about it. But I can tell you this"—and the General took out his eyeglass and spun it on the blotting-pad in front of him—"I no more believe in the possibility of the guilt of either of those two members of my staff than I do in my own! Is that good enough for you?"

"I expected you to say that, sir. But at the same time your impression of them as individuals might be helpful."

"Very well," said the General. "But you must understand clearly that I'm giving you my impressions, and that you'll be very wrong if you draw any definite conclusions from anything I may tell you."

"I know, to begin with, that Caird and Evans don't get on well. It's an unfortunate fact; but I think it's greatly to the credit of each of them that this lack of a good personal relationship has, to the best of my knowledge, never damaged their work. Caird's departmental reports upon Evans have always been scrupulously fair, and Evans has never tried to go behind Caird's back or over his head—if you follow me?"

"Quite so, sir."

"From the point of view of broadcasting, I've nothing but good to say of both of them, though, on the whole, you may be surprised to hear that I think Evans is probably the more valuable of the two. Caird is a good producer, and runs his department competently enough, but he's by no means irreplaceable. He hasn't much imagination, and certainly no distinctive creative ability. I don't mean that he's stupid, but he's a good deal of a romantic sentimentalist. He's not really up-to-date, and the one thing that I really have against him is that he's damnably intolerant, particularly of men like Evans, who are a little queer temperamentally."

"I see, sir. Please go on."

"Evans is frankly a queer fish. I know he's not popular, and he's completely lacking in charm, but from the point of view of brain and knowledge of the programme side of broadcasting, he's one of the best men we have. Perhaps Caird's worst failing has been his inability to find the proper sympathetic treatment necessary to bring out the best in Evans."

Spears nodded.

"But I must repeat, Inspector, don't draw false conclusions. If I have seemed to sum up rather against Caird, it's only because I am particularly anxious to be fair to Evans. To come down to brass tacks, if I was asked which of the two would be more likely to commit a murder, I could only reply—with the greatest emphasis—neither; and their

behaviour since the discovery of the crime is only a confirmation of my view."

And with that Spears had had to be content, and leave the General to refix his eyeglass and return to the consideration of his files.

XXVIII.

WHAT HAPPENED AT LEEDS

IT was, therefore, with considerable relief that the detective abandoned for the time being his intensive chewing on such an indigestible lump of new material and applied himself to his purely routine investigation in Leeds. He was met at the station by a youthful but intelligent member of the local constabulary, who regarded him with satisfactory awe, and evidently accepted his arrival as something of a personal compliment.

The stage-door of the Imperial Theatre at Leeds is very typical of its kind. The theatre itself is old-fashioned, and, like so many provincial houses, is suffering severely from a refusal to recognise that a touring company in a London success, housed in a theatre with comfortable and expensive seats, can hardly hope to vie on equal terms with an up-to-date cinema showing up-to-date films at about half the price.

The Leeds policeman, whose name was Stevens, led Spears up a narrow alley, grimy and ill-paved, and knocked at a door from which most of the paint had long disappeared. Above it a pane of frosted glass bore the cryptic letters: "ST-G-D-O—." No one answered his knock, and after a bit Stevens laughed, turned the handle, and went in. Spears found himself thrust straight away into that singular back-stage atmosphere so incomprehensible in its confusion to the layman. On his right was the stage-doorkeeper's little office, its walls plastered with the signed photographs of actors and actresses covering the last four decades. A neglected kettle on a gas-ring spouted forth a melancholy cloud of steam. Just inside the door on the left was a green baize board, across which lengths of faded tape had been fastened with drawing-pins, so as to hold letters. Two framed and signed photographs held places of honour at each end of the red repp-covered mantelpiece—one of Ada Rehan, in the remarkable tights of her period, as Rosalind; the other of Ellen Terry as Beatrice. Between the two a small ginger kitten slept unconcernedly with its tail over its face. Spears nodded with satisfaction at the sight of an old-fashioned telephone of the type with a handle in the far corner of what was no more than a cubby-hole, half-buried between a pile of programmes and a confectioner's cake-box.

"The stage-doorkeeper will be back for his tea in a minute—sure to be," said Stevens. "Or would you like us to go through, sir, and try and find the manager? I'm afraid none of the company will be about at this time of day."

Spears hesitated. Straight ahead of him a bare stone passage led away into darkness and obscurity. Another green baize board held two or three advertisements from local laundries and local landladies, the company's train-call for the following Sunday, and a list of dressing-rooms with their allotted occupants. Two or three large hampers, which he realised must be what are technically known as "theatrical baskets," lay about forlornly. Through half-open double doors on the left a few yards along, Spears could see the desolation of a half-stripped stage, the dusty piles of properties and furniture, and the uninspiring back of a lowered curtain. But, apart from the cat and the kettle, there was no sign of life or movement, and Spears, contrasting it with the never-ceasing activity of Broadcasting House, felt as if he had not only travelled to Leeds, but backwards some thirty years in time.

Spears was just about to tell Stevens that they would give up the stage-doorkeeper and investigate the possibilities of

the manager's office in the front of the house, when the stage-door behind them reopened, and a young man, wearing a smart grey felt hat and double-breasted grey flannel suit, walked in with a burberry over his arm.

"I beg your pardon," said Spears, "but can you tell me where I can get hold of the stage-doorkeeper?"

"Sorry, no idea," replied the young man, smiling amiably and showing excellent teeth. "Anything I can do?"

"Not unless you can put us on to the manager, or the manager of the company that's playing here this week," said Spears.

"If that's what you want, you've come to the right shop," said the young man, throwing his burberry on to the chair in the stage-doorkeeper's cubby-hole. "I'm managing this show—for what it's worth, which, believe me, isn't very much, though it was my brother who wrote it. I told him it was too sophisticated for the provinces, but he wouldn't believe me. Obstinate devil!"

"You are Mr. George Fleming?"

"I am George Fleming," said the young man, with a little bow. "A poor name, but mine own. What can I do for you? Who are you, anyway? Don't tell me it's a reporter and fame at last!"

"Nothing so exciting, I'm afraid," said Spears. "My name's Spears. I'm a detective from Scotland Yard."

"Scotland Yard?" said the young man.

"What-ho! Which of the cast are you after? I warn you, I've no capable understudies, so if you pinch any of my principals, you'll be responsible for ruining a perfectly good tour!"

Stevens looked at Spears anxiously. But if he expected to witness a marvellous example of subtle professional inquiry, he was disappointed.

"Nothing as serious as that, Mr. Fleming," said Spears. "This is purely a routine inquiry. Of course, you've heard of this unfortunate Broadcasting House case?"

"I should think I jolly well had! That lucky beggar Rodney's bang in the middle of it. He does get all the luck, that brother of mine. Never let one of your brothers become a celebrity, Inspector. It's the deuce of a handicap to a commonplace, hard-working fellow like me, I can tell you."

"I've just come up to make this routine inquiry on the spot," said Spears, taking out his notebook. "Would you mind answering me a few questions?"

"Of course."

"I believe, on the night of the crime, you spoke to your brother at Broadcasting House on the telephone?"

"Yes."

"Can you give me the time you put the call through?"

George Fleming shook his head.

"Afraid not. But probably the stage-doorkeeper could. He got the number for me."

"Do you mind giving me the subject of that call?"

"I say," said the young man, "is old Rodney under the eye of the police? What a lark! No, of course, I'll tell you. I don't suppose you want me to go into a lot of detail, but, shortly, it was like this. One of the parts in this play of my brother's was hopelessly miscast for the tour, as we found out during the first week—that's last week, at Birmingham. Well, we couldn't get another actor, so I suggested to Rodney that the part should be rewritten. He agreed, after a good deal of grumbling—you know what these authors are—and as he was pretty busy over this broadcasting thing of his, he left the rewriting of the part to me."

"Yes?"

"Only he insisted that, before the rewritten part was actually staged, I should talk it over again with him on the telephone."

"I see," said Spears. "Was there much of it?"

"Not much," said George Fleming. "Do you happen to know the play?"

"I saw it when it was being done in London."

"That's a help. You remember the part of the father-in-law, then?"

"Yes, well."

"Well, it was the first scene of the last act he couldn't play. I suppose I rewrote about three pages."

"I see. Tell me, why did you choose that time of night to telephone to your brother?"

"I say, Inspector," said George Fleming. "are you trying to get something on me?" But Spears' expression did not change, and the young man went on: "Oh, I don't know. In the first place, it's much easier to get a line quickly at that time of night; secondly, it's much cheaper; thirdly, I was certain of catching Rodney, as he'd told me where he was going to be; and, finally, there's a telephone here which there isn't in my digs. Is that good enough for you?"

"Quite, thanks. How long did your call last?"

"As far as I can remember, I had three minutes twice."

"Anyway, I can get that from the exchange," murmured Spears. "Thank you very much, Mr. Fleming. I suppose you didn't happen to know this Mr. Parsons?"

"Never heard of him," said George Fleming cheerfully. "Anything else I can do for you?"

"One thing," said Spears. "Could you let me have a copy of that part of the last act which you rewrote? I'll send it back to you to-morrow."

George Fleming stared.

"Of course," he said, "if you want it. But it's all right you know—Rodney agreed to it, and we're playing it with that revision now."

"Still, I'd like it," Spears insisted.

"I'll get it," said the young man. "It's in my dressing-room." And he walked away along the passage whistling cheerfully.

As he did so, an old man with a thick crop of very white hair, a limp, gold-rimmed spectacles and a cherry-wood pipe, came out of the door leading to the stage, and with a muttered "Excuse me," hobbled over to the steaming kettle and turned off the gas with one hand, scratching the back of the kitten's neck with the other.

"Are you the stage-doorkeeper?" asked Stevens.

The old man turned round. His face was very red and seamed all over with fine purple veins, but his eyes were extremely blue and twinkling.

"I am that, sir. Harold Staples, my name is—known mostly in the profession as Old Harry. Been on this door for the best part of forty years, I have. And what might I have the pleasure of doing for you?"

"I would be glad, Staples, if you'd answer a few questions that this gentleman will ask you. He's a detective-inspector from London."

"Police?" said the old man briskly. "Now, look here, I've been on this door, as I say, for the best part of forty years, and never had so much as words with a policeman all that time. It's been said as I'm past my work, but no one's ever dared to say anything about my honesty! Besides, I've got my tea to get."

"Mr. Staples," said Spears. "I don't want you to misunderstand me. There's no question of your honesty. There's nothing whatsoever against you, but I'm making a routine inquiry in connection with this Broadcasting House murder, and I'd be grateful if you could tell me one or two things."

The stage-doorkeeper dropped his indignation as swiftly as he had assumed it, and became almost genial.

"Ah, that Broadcasting House case!" he

repeated. "Very interesting and mysterious, I find it, sir. As you can imagine, I've plenty of time to give to listening, sitting here night after night. I've got a little portable, and when it's tuned down it's safe not to be heard on the stage, so I can amuse myself in my own way. But I must say, sir, I was properly aggravated about that case."

"Were you, Mr. Staples? Why?"

"Because," said the stage-doorkeeper, "I heard two-thirds of that blasted play, and pretty dull I found it, I must confess. I don't hold with these plays, sir, if you ask me. The talks is what I follow. Mr. Bartlett and Mr. Heard. Amazing how much they know, and what I say is, it's never too late to be educated. But I never heard the murder scene. I reckon that would have been something like a thrill!"

"Do you mean to say you switched off?" said Spears.

"I had to, sir. You see, Mr. Fleming was in here with me listening, too—of course, you know it was his brother as wrote the play—and when he asked me to get him a call through to London, I had to turn the set off."

"You were in here when Mr. Fleming spoke on the telephone?"

"Certainly I was, sir," said the old man with dignity. "This is my room, and Mr. Fleming said nothing about it being private. Not that I listened, sir, of course. But I couldn't help hearing that it was something to do with a bit of this play that's here this week. A scene had been rewritten, I understand."

"And did you switch on again when Mr. Fleming had finished telephoning?"

"No, sir. To tell you the truth, the public close here at half-past ten, and when he'd finished, Mr. Fleming said: 'Harry,' he said, 'that's done. I think we've just time for a last quick one,' and he took me over the road to the King's Head. A pleasant young gentleman, Mr. Fleming. Oh, here he is, sir!"

And George Fleming came back along the passage, still whistling, carrying some pages of typescript loosely clipped together.

"Here's what you want, Inspector," he began. "Oh, I see you've found old Harry. He can tell you anything more you want to know about that famous telephone call. He put it through for me."

"So I understand," said Spears. "Well, I don't think I need trouble either of you further. Thank you for answering my questions so straightforwardly."

And refusing a rather diffident invitation from Stevens to have dinner with him, the detective returned to the station and caught the next train back to London, leaving George Fleming and Old Harry respectively with considerable food for thought and gossip after their separate fashions.

It was a pity for young Stevens, who for a provincial constable was well above the average both in ambition and intelligence, that he could not accompany Spears on his return journey, anxious as he was to see a Scotland Yard man working at close quarters.

This time Spears was not alone in his carriage, and the wealthy Yorkshire manufacturer and his rather over-dressed, plump daughter who shared it with him were first puzzled, and finally rendered acutely uneasy by the detective's behaviour. For a long time he lay back in his corner seat, his eyes shut and his expression perfectly blank, while the whole panorama of the case was passed slowly through his mind.

In his imagination, the various incidents of the tragedy repeated themselves like the scenes of a film unreel in slow motion. In his mind's eye, he saw Julian Caird at the Dramatic Control Panel whispering hurriedly to Hancock, jumping up from his chair, and hurrying to 6A. He saw Rodney Fleming, languid and debonair, in the 6A listening room, the telephone to his ear, his eyes on the actors in 6A.

He saw Stewart Evans prowling furtively along a corridor; and Parsons hissing his

soliloquy into the microphone, while a gloved and faceless figure tip-toed through the door of 7C behind him. He saw Higgins' ravaged face; the General's eye-glass; and Bannister's untidy hair. Once more he sat in Listening Hall No. 1 and heard the blattnerphone recording of a dead man's voice and the ticking of an unknown watch.

Suddenly he sat up, opened his eyes, and said "By heavens!" with such a wealth of expression that the Yorkshire manufacturer dropped his newspaper; while his daughter glanced downwards under the cover of her magazine to make sure that she was not exposing too much leg.

But Spears was completely oblivious of the effect he was producing on the other occupants of the carriage. He took from a leather portfolio which he carried with him, the copy of Parsons' script of "The Scarlet Highwayman" with its mutilated outside page, and for perhaps the hundredth time he read over most carefully the scene of the goaler's soliloquy and murder. At the end of it he drew a long breath, grinned with satisfaction, and made a pencil note in the margin. Then he took out the script which George Fleming had given him at the Imperial Theatre, Leeds, glanced at his wrist-watch, and began to read that also. As he read it, his lips moved distinctly, and the wealthy Yorkshire manufacturer was seriously considering pulling the communication cord, or at least moving along the corridor to another compartment, when Spears, with another glance at his watch, folded up the second script, replaced them both in the portfolio, leaned back in his corner, folded his arms and went to sleep.

"There's nothing," he murmured to himself as he dropped off, "like travel for broadening the mind!"

XXIX.

TOPSY DOES HER BIT

IN spite of what Caird had said about the growing unpleasantness of "atmosphere" at Broadcasting House, there seemed to be a complete absence of any change in the normal routine when Spears crossed its threshold the morning after his visit to Leeds. Prospero still regarded Portland Place over one shoulder, with his enigmatically cynical expression. Uniformed small boys conducted visitors, or carried messages and antiseptic sprays upon their lawful occasions. The reception desk telephones and the general office typewriters buzzed and clattered unceasingly. The glass-fronted boards opposite the artists' lifts showed their usual lists of rehearsal and transmission studio accommodation.

In fact, the only change from the normal was provided by a respectable old lady accosting one of the commissionaires outside the main entrance. Brandishing a battered parasol at Eric Gill's statuary, she observed in a high and penetrating tone: "If that's the kind of aerial the B.B.C. puts up for itself, I hope they don't expect me to follow their example. I've always lived in a respectable neighbourhood, and a pole and a bit of wire's good enough for me!"

Not that Spears overheard this masterly defence of British proprieties. By the time it was being delivered he was again in Caird's office, and wondering not for the first time why that young man decorated his walls with a set of admirable drawings of cats interspersed with photographs of the interiors of the group of dramatic studios. Caird was out of the room at a meeting, and, while he waited, Spears stared for several minutes at the photograph of 7C. It had been taken from the doorway, and showed the studio precisely as it must have appeared to the murderer as he entered it that evening. Had he really got it at last, Spears wondered? Or was he really being just a little bit too darned ingenious? And the more he looked at the photograph, the more his self-confidence diminished.

At the same time, whether he was being over-ingenious or not, Spears was only too well aware that he had to risk it. For the attempt to break down Leopold Dryden's silence had failed—or if it had not completely failed, it had only led to another dead end. He had heard that morning that, pressed to speak by Isabel in the presence both of his solicitor and of no less a person than the Assistant-Commissioner himself, Leopold Dryden had admitted that his original attitude had been dictated partly by natural arrogance, but mainly because he had feared the implication of his wife. Having been out of the studio at the critical moment, it was impossible for him to find out whether she also had been absent or not without drawing other people's attention to this possibility. That he had not dared to do, and accordingly he made up his mind to maintain silence at all costs, without realising that there are times when a refusal to speak can be as dangerous as any amount of garrulity.

So far, so good. It provided a reason for his silence, but when it came to the point, Dryden was revealed as having next to nothing to say. "Very well," he had exclaimed, and it was easy for Spears to imagine the flash of his blue eyes and the histrionic toss of his head with which he faced Major Cavendish, "I'll make a clean breast of it. I had quarrelled with my wife at dinner over a letter from Parsons. It appears that he'd got a certain amount of money out of her by threatening to tell me of some secret in her past life. I was angry, not because of what that secret might be—I believe, Major Cavendish, that a woman's past life is her own affair—but because she hadn't told me about this revolting attempt at blackmail in the first instance. It argued a want of trust, which hit me hard. I admit I fully intended to take the first opportunity of horse-whipping Parsons, but I wouldn't have chosen a time during which I was professionally engaged to do such a thing. Still less would I have risked the possibility of hanging for such a miserable specimen of humanity. I have my own pride, Major Cavendish. In addition, I was ill that night. I suffer considerably from"—he coughed—"my stomach, especially when under any form of nervous strain. My first nights are always agony to me. I found the atmosphere of the studios rather trying. I know the ventilation is scientifically perfect, but to anyone at all susceptible to claustrophobia, padded walls and an entire absence of windows—well, you understand.

"If you ask me why I went up to the 7th floor, I can only repeat that I followed that spiral staircase automatically. Being ignorant of the building's geography, I thought it would probably take me out of the tower more quickly than any other way. I was naturally abashed when I ran into Mr. Caird after I had had my breath of fresh air. I am most sensitive professionally, and I thought that he, ignorant of the circumstances, might have thought that I was neglecting my work. I'm afraid there's nothing more I can tell you."

So much for Leopold Dryden's statement. Spears had found a copy of it on his desk at Scotland Yard that morning, with a covering note from the Assistant Commissioner.

"Dear Spears," ran the note, "I must tell you that I believe the attached statement to be strictly within the bounds of truth. In the circumstances, I consider it vital that Dryden should not be brought to trial. The real criminal must be found, and found quickly. To release Dryden without making another arrest would produce a deplorable impression on the public. But we shall, of course, be compelled to do so, unless the real solution can be discovered within forty-eight hours. I rely on you to make the most of your chances." Which is, thought Spears, a polite way of hinting that there'll be the devil to pay if I don't bring it off.

He had just arrived at that depressing conclusion, when Caird returned from his meeting. The Dramatic Director was not

looking his best. His eyes looked blood-shot, as if he had not been sleeping, and the hand with which he offered the detective his glass cigarette-box was none too steady. "Well, Spears, what is it now?" he said wearily. "I don't mind telling you, I'm feeling dead to the world. I simply can't do my normal work with this filthy thing hanging over my head. Would you mind if I asked for a few days' special leave? I'm afraid I shall crack up if I go on much longer."

"I'm afraid you must wait for a day or two yet," said Spears. "But I hope it won't be longer now than forty-eight hours."

Caird stiffened in his chair.

"Have you really got somewhere?" he exclaimed.

"I'm not sure," said Spears cautiously, "but I'm beginning to think so. You'll be glad to hear that Leopold Dryden, though still officially under arrest, is authoritatively considered out of the running."

"So Isabel made him speak? Thank heavens for that! What did he say?"

"Very little, except to give as a reason for his silence that he was afraid to implicate her."

"I see," said Caird. "Well, that narrows the field a bit, doesn't it? Higgins dead—Dryden out—it only leaves Evans—Rodney—and me!" And he laughed nervously. "Do you remember playing eena, meena, mina, mo, when you were a kid? It used to be quite exciting." He moved away from his desk and walked up and down the room.

"Now listen, Caird," said the detective sharply. "You know the Controller promised me another play-through of that steel tape recording? Can you arrange for it to be done to-night?"

"Yes," said Caird, stopping in his nervous prowl. "I think so."

"The point is," said Spears, "that naturally we want to release Dryden as quickly as possible; but for our own sake," he added, with a suspicion of a smile, we want to have someone else ready to fill the vacant cell, so I've got to work quick. You remember what Mr. Bannister said about that watch ticking? Well, immediately after hearing that recording played through, I want you to arrange for the people who had wrist-watches on that night and who were possibly concerned—that's to say, yourself, Mr. Fleming and Mr. Evans—to be in 7C. I'll bring Mr. Dryden and his watch along. Will you arrange for the microphone to be alive and connected to some conveniently adjacent loudspeaker, so that I can hear what these various watches sound like?"

Caird scribbled some notes on his pad.

"Will about half-past eleven to-night suit you?" he said.

"Capitally, thanks. And you'll ask Mr. Fleming to come along, and Mr. Evans?"

"I will," said Caird. "By the way, what about that Tube station business?"

Spears shrugged.

"My dear Caird, what do you expect me to do about it? There were no witnesses worth a darn, and your stories contradict each other mutually and absolutely." He went to the door, and turned round. "If I were you—and you can tell Mr. Evans so from me—I'd wash it out as an accident exaggerated into something else by a couple of vivid imaginations. Till to-night, then."

And he went out, leaving Caird, who had been looking forward to a long night's sleep, to mutter various and undignified oaths, and then to press the button on his desk for Ian Macdonald, whom he instructed to make the necessary arrangements with the Sound Recording Section and the engineers to meet Spears' requirements for the evening.

As Spears crossed the hall on his way out, one of the receptionists moved towards him from behind his desk.

"I beg your pardon, sir," he said. "But you are Inspector Spears?"

"Certainly."

"Well, sir," went on the receptionist, his voice discreetly lowered, "there's a young lady here inquiring for you, but I don't

think she knows you. If you want to slip away, I can easily—"

"What's her name?" interrupted Spears.

"Miss Levine. I believe she's a friend of Mr. Bannister's, sir. I've seen them together."

Spears cautiously took a "lunar" over the receptionist's shoulder. He remembered Corkran's report on the incidents concerning Higgins' suicide, and accordingly he had no doubt that the owner of an extremely attractive pair of legs and a quantity of curly platinum hair under a minute woollen cap that resembled more than anything else an Army forage cap of the 'eighties, was Miss Topsy Levine.

"I'm in rather a hurry," he said. "If the young lady doesn't mind walking down to Oxford Circus with me—"

"I'll tell her," said the receptionist.

It was clear that nothing was likely to deter Miss Topsy Levine from the pleasure of walking as far as Oxford Circus with Central Inspector Spears. She bounded across the hall like a puppy, introduced herself shrilly, and proceeded to take Spears by the arm, rather to his embarrassment and distinctly to the amusement of the General, who happened to be crossing the hall at the same moment on his way to an early lunch.

"I know I oughtn't to bother you like this," babbled Topsy cheerfully, as they passed the Round Church, "but it's only because you've frightened poor Guy so much, Inspector. You see, he and Pat and I were out together again last night. It's really awfully nice of them to take me along, when they're as soppy about each other as they are. But then there's nothing like good nature, is there?"

"But how have I frightened Mr. Bannister?" asked Spears.

"Well, not so much frightened, perhaps," said Topsy, "as snubbed. You know—all the ideas he's had about the murder. Each time you've thought of the same thing first and only told him afterwards, so that you've made him feel pretty small. But we were talking it over again last night, and he told us he'd got another idea, only he was too scared to come and tell you about it."

"So you thought you'd come and tell me in his place, did you, Miss Levine?"

"Well," said Topsy frankly, "men are so silly, aren't they? A girl's just got to take them by the scruff of their necks and give them a kick in the pants!"

"Er—quite," said Spears. "Well, what's the great idea?"

"Ooh, you mustn't get sarcastic with me, or I shall cry. I'd better warn you, Inspector, I cry terribly easily."

Spears patted her arm comfortingly.

"Come along," he said. "I shan't bite."

Topsy screwed up her face into an expression of puzzled, but attractive, bewilderment, and hesitated.

"Well, I'm sure I hope I've got it right," she burst out. "But I think what Guy said was this. He wondered why nobody seemed to be worrying much what it was in Mrs. Dryden's early life that Parsons had been blackmailing her for."

"Yes, I know, said Spears.

"Oh, so you did think of it?"

"The idea had certainly crossed my mind, but don't you see the difficulty, Miss Levine? Mrs. Dryden's letters, which were found on Parsons' body, gave no clue to the matter. Parsons isn't alive to tell us, and Mrs. Dryden declines to—not altogether un-naturally. Now, it isn't as if there were any complete record in existence of Mrs. Dryden's life, and this might have to do with anything that has happened during the past ten or twelve years. Mrs. Dryden is not a lady with a notorious reputation or anything like that—most actresses are entirely respectable. I've made certain inquiries, and certainly since her marriage there hasn't been a word of scandal about her, apart from entirely insignificant gossip.

"Of course, before her marriage, she might have done anything, but it isn't easy to get any details of the private life of a

woman over four years ago, when there was nothing about that woman at the time to make her interesting or worth while observing. After all, she was only a chorus girl, and then a touring actress. I made investigations at the stage doors of one or two London theatres at which she had appeared, and I then got hold of one or two touring managers who had employed her. But apart from her name, and in one case her looks, nobody remembered anything about her, except that afterwards she married Leopold Dryden."

Topsy suddenly tugged at the detective's sleeve.

"Would you mind giving me a drink?" she said.

"Of course I would be delighted to," stammered Spears, "but I'm really in rather a hurry."

"Oh, rats!" said Topsy rudely. "I'm not cadging a drink, but we can't talk out here with all this shocking traffic noise, and now I've got something to tell you! And this isn't one of Guy's ideas. It isn't even an idea, it's a fact."

Spears looked down at the eager, painted little face and made up his mind.

"All right," he said. "We'll go to the balcony of the Café Royal *brasserie* and drink beer."

"Gin and tonic for this little girl, if you don't mind," said Topsy. "But let's go."

They went. And Topsy having been provided with the drink she wanted and headed off various alternative subjects, such as the new decoration of the restaurant and why certain young men wear bracelets and green trousers, came to the point.

"You know, Inspector," she began, "I think you've got hold of the wrong end of the stick, going to see touring managers and stage-door-keepers. Why don't you get hold of the old programmes of Mrs. Dryden's tours, and then find people who'd been on the tours with her?"

Spears sipped at his beer thoughtfully.

"Yes, there's a good deal in that," he admitted. "But do you mean to tell me, Miss Levine, that there would be any chance of finding actors who had been out on tour four years ago? As likely as not they're in Australia, or retired, or dead. And if they've succeeded enough to be in London, I'd be prepared to bet that they wouldn't remember what had happened to the other members of the cast of a tour four or five years ago."

"Well," said Topsy excitedly, "you'd lose your bet!"

"I beg your pardon?"

"I said you'd lose your bet, Inspector. For one, this little girl was on tour with Isabel Dryden—Isabel Palmer she called herself in those days—in a play called "Overseas." I was understudying and doing assistant stage manager on three quid a week. That's the type your touring manager is whom you're so fond of! Isabel Palmer had quite a small part—"

"Yes, yes," interrupted Spears. "But what do you remember about her?"

"I was just coming to that," said Topsy in an injured tone of voice. "I don't remember much, of course. You wouldn't expect me to. For instance, I can't remember at all what the play was about, except that the hero had a pet dog which was always misbehaving itself on the stage at awkward moments. But there were two or three things which might be useful to you. A fellow called Parsons was in the company, and a nasty bit of work he was, too. Tried to kiss me once, and how I smacked his face!"

"Are you sure of that?" said Spears. "That his name was Parsons, I mean?"

"Of course I'm sure. Aren't I telling you? And the other thing is that I can remember there being a lot of talk about Isabel having an affair with another chap in the company called Evans. At least, I'm pretty certain it was Evans. That's why, as I told you, you ought to get hold of some programmes."

"Evans?" repeated Spears. "But—"

You haven't got one of those programmes, I suppose, Miss Levine?"

"Sorry, nothing doing. I never keep anything. No possessions means a long life, I always say." And Topsy finished her drink. "I'm afraid I haven't anything more to tell you, Inspector. I wish I could remember whether that name really was Evans or not, but I'm almost certain it was."

"I wish you could, too," muttered Spears. "'Overseas' you say the name of the play was?"

"'Overseas'—or 'The Rover of the Seas'—or something silly like that."

"Can't you be a bit more certain or accurate?" Spears pleaded. "This is desperately important, you know."

"'Fraid not," said Topsy. "In fact, to be strictly honest, the more I think about it, the easier it is for me to think of other names. But I'll swear it was something like Evans. They used to go to the same digs, you know, and all that sort of thing. Lots of us thought they lived together, but you never know, do you? People are so funny. Well, I must fly. So-long!"

Left to himself, Spears ordered more beer and lighted a pipe. What Topsy had told him gave him very furiously to think. Of course, it was possible that Stewart Evans had done a spot of acting in the course of his chequered career, and that Isabel had once been his mistress. That might account for the fury with which he had assailed Dryden, and for his apparently extraordinary conduct all round with regard to Dryden's wife.

But if that had been the case, why hadn't Isabel said so and driven the suspicion which Evans had tried to rouse against Dryden back on his own head? It was surely inconceivable that she could be in love with him. But one thing was very clear: Isabel must be strictly questioned about that tour of "Overseas," or whatever its name was. And mentally he cursed Topsy's relatively inefficient memory. The whole resources of Scotland Yard, if necessary, must be put on to finding a copy of the programme of the tour of that old and forgotten play.

"Between this yarn and the evidence of the recording tape," Spears muttered to himself, "I'm damned if I don't begin to believe that Stewart Evans did it, after all!"

XXX.

ISABEL AT BAY

WHILE he hurriedly devoured a tongue sandwich and a little potato salad, Spears, after his own plodding remorseless fashion, took his decision. After what Topsy Levine had told him, there was little doubt but that the final solution of the mystery lay with Isabel—or, at least, in her flat. It would be a sufficiently unpleasant business, but she would have to be tackled face to face, and the sooner the better. Besides, from his own point of view, he had no time to lose, and it was more than likely that she would be in her flat between one and two.

He paid his bill and walked rapidly from Regent Street to Upper St. Martin's Lane; and was lucky in that Isabel answered the door herself. He noticed that she was looking considerably more cheerful, and that she was wearing bright colours and a certain amount of jewellery. So she had obviously drawn the right conclusions with regard to the change in Leopold Dryden's prospects.

"What can I do for you, Inspector?" she said. "I'm afraid I'm having my lunch. It's only half a lobster and a salad, but I expect I could find a scrap for you if you haven't had yours already."

"Thanks very much," said Spears, "I've lunched, but perhaps you wouldn't mind my asking you a few more questions while you finish yours?"

The gaiety died out of Isabel's face at once.

"Not more questions?" she whispered. "Surely it's all over now as far as I'm concerned?"

Spears shifted his feet awkwardly.

"I beg you to believe that I'm more than sorry to trouble you again, Mrs. Dryden, but it's really very necessary that I should have another talk with you."

"Oh, very well!" said Isabel, and led the way upstairs into the white dining-room. She gave Spears a chair and sat down herself in her place, although she showed no disposition to resume her meal. But Spears noticed that she finished her glass of wine at a draught. "Well, what is it, Inspector?" she said. "I thought you'd realised by this time that I've nothing more to tell you which could possibly be helpful."

"But I'm afraid that's where I must disagree with you, Mrs. Dryden. There's one thing more which you can tell me and which it is most essential that you should. There have been certain developments which make the omission of this particular information a crucial point in the case, and if, therefore, it involves delving into your private affairs, which I am naturally very loth to do, I feel it is my duty to say to you as emphatically as possible that the moment has come for you to give me information concerning the episode in your life which Sidney Parsons was using for the purpose of blackmail."

He paused. Isabel did not speak. She sat quite rigid in her chair, the fingers of her right hand playing nervously with the stem of her wineglass.

"If I could, Mrs. Dryden, I would go further, and promise you that any information you gave me on the point would be regarded as strictly confidential. But it would not be fair of me to give you any such promise. You will see as well as I do that it may be necessary for the whole story to come out in open court when the criminal is tried. But, however painful that possibility may appear to you, surely you will see that nothing must stand in the way of the conviction of the guilty person. The possibility of that conviction lies, I am convinced, in your hands."

"I think you've been very fair, Inspector," said Isabel at last. "You haven't tried to trick me, or bully me."

"No," said Spears, "that's not in the English police tradition. But that it is not in our tradition is because we rely upon the co-operation of the public."

Again she did not reply, and Spears, who was growing a little impatient, made a false move.

"Mrs. Dryden," he went on, "if for no other reason, you must want to achieve your husband's release by fastening the guilt where it should properly belong. He must remain in danger until you speak. I am positive that you could rely on his understanding, and, if necessary, his forgiveness."

The colour came back into Isabel's cheeks.

"If my husband was in danger," she said, "I would tell you anything. But I know he's not. I was there yesterday when he saw the Assistant Commissioner—when he made his statement. Major Cavendish assured me that after that his release was only a question of time."

Spears mentally consigned Major Cavendish's chivalrous consideration to the devil.

"So long as Leo goes free, what do I care about the rest of it, Inspector? I'm a woman, not a member of your public, as you call it. It may sound a horrible thing to say, but I've no regrets that Sidney Parsons was killed. He deserved to die a hundred times. I'm almost—grateful—to his murderer. He was blackmailing me for something that happened many years ago now, when I was a very young girl and didn't know my way about. What happened then I have regretted ever since; but until Sidney Parsons brought it up again, and held it over my head, it was buried and forgotten. You must be reasonable, Inspector. You can't be so inhuman as to imagine that I could tell you about it now in cold blood, knowing that I shall

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probably have to hear it re-told in court, sniggered over by my friends, commented on afterwards in the newspapers, because now I am Leopold Dryden's wife!"

"You can be forced," Spears began angrily.

"Unless I tell you," interrupted Isabel, "you say you can't bring the matter home. I suppose you're going to say that you could make out that I'm the murderer's accomplice by refusing you vital evidence? Well, I suppose you could, but I don't see how you can until you find the murderer. It's a complete circle, isn't it? After all, what good does it do to hang any man because Parsons was killed? He isn't worth killing a rat for, let alone another human being."

"That has nothing to do with me," said Spears. "I warn you, Mrs. Dryden—though I can to some extent sympathise with you—you're taking up a very dangerous position."

"Well," said Isabel defiantly, "I'm taking the risk. Don't say any more. I've made up my mind, finally."

Choking down a violent gesture to lose his temper, the detective got up from his chair, and as he did so the telephone rang.

"Excuse me," said Isabel quickly. "It's in my bed-room. Perhaps you'll let yourself out?"

Spears made a stiff little bow, and she hurried out of the room. As he turned to the door, he heard her voice as she answered the instrument.

"Hallo! Who is it? Yes, Rodney? Yes. Why can't you give me supper? Going to Broadcasting House again—haven't they finished with you either?" And then apparently she remembered her visitor, for the door of the bed-room was closed.

Spears felt a momentary satisfaction in that his arrangements had at any rate interfered with Isabel Dryden's supper-party. Though baffled, he was not yet beaten, and he had no intention of allowing Isabel to break off the interview in her own time. If she would not speak on the cue he had given her, he would assume a knowledge he hadn't got, and press her directly concerning Stewart Evans. Perhaps that would break through her defences.

And with a desire, as it were, to entrench himself more firmly in the flat, he went out of the dining-room through the door which led into the drawing-room, and sat down in an armchair with the air of a man set upon a considerable stay.

Like the white dining-room, this drawing-room had character of its own appropriate to the generally exotic nature of the actor who owned it. The walls were plastered with the play bills of his London successes; the rapier he had worn as Hamlet hung above the mantelpiece, flanked by the daggers of Romeo and Macbeth; on a side table, under a glass case and carefully labelled, were three rings worn by Garrick and Macready, a chain of Irving's, a glove of Lewis Waller's, and a snuff-box of Fred Terry's. Indeed, except for the piano, the room gave the impression of a theatrical museum. The bookshelves contained nothing but plays; volumes of theatrical criticism; various theatrical histories and six thick tomes, calf-bound and with gold lettering on their backs: "LEOPOLD DRYDEN. PERSONAL RECORDS."

"Dash it all!" muttered Spears to himself. "If only I was investigating Dryden's past instead of his wife's. He's got the whole thing docketed out. I expect I'd find his birth certificate on the first page, and if I came back in a month, probably all the cuttings relating to this case."

And then, while he still stared at those six massive tomes, and pondered the remarkable personal vanity which they embodied, Spears started violently. He got out of his chair, and crossed to the dining-room door. The door into the bed-room was shut, but he could hear the faint murmur of Isabel's voice still talking on the telephone. Quietly he shut the door

between the dining-room and the drawing-room, and walked over to the bookshelf. For he noticed, next to the sixth of Dryden's press cutting books, a modest little canvas-bound volume, unlettered. It had obviously been pushed into place hastily and so far as to be nearly invisible, so insignificant did it seem by the side of its impressive comrades. Could it be possible, thought Spears, stretching out his hand towards it, that this contained the cuttings of Isabel Dryden's personal record?

With another glance over his shoulder, he reached it down and opened it. By Jove, he was right! And a singular collection it contained. Family snapshots; dance programmes; even occasional letters were sandwiched between cuttings from provincial papers and old programmes. . . . "Old programmes!" said Spears aloud. "Overseas!" And, without considering the ethics of burglary, he jammed the book under his arm, turned on his heel, picked up his hat and walked rapidly down the stairs. He could not believe that any private telephone call could last much longer, and he did not wish to be compelled to examine Isabel's cutting book under her own eye.

It was not until he was safely back in his own office at the Yard that he could plough steadily through the book. But when he did, on page twenty-two, quite out of chronological order, and sandwiched between a programme of the Military Tournament and a photograph of a young man with the signature scrawled hastily across it, he found what he was looking for. It was a programme of the Shakespeare Theatre at Brighton, for a week in the August of 1927; and, dexterously hidden amongst innumerable advertisements, Spears found a play-bill of "Go As You Please! A Farce in three acts by Harvey Cumberland." A note on the side of the programme said: "Tour of 'Go As You Please,' June, July, August, 1927. South Coast towns, Weston-Super-Mare to Folkestone."

Hastily Spears ran his eye down the vilely bad print on the faded paper, and then he sat back in his chair and swore. For the name of Isabel Palmer was there as having played the part of the Hon. Enid Faversham, and the assistant stage manager was mentioned as being Miss Topsy Levine, and there was a special note with regard to the leading actor's dog, which had apparently been specially trained and lent by Major Bloodworthy of Chipping Sodbury. But of Stewart Evans there was no sign. And though the possibility remained that he had been in the cast, but under another name, such a chance intensified the difficulties a hundred-fold, unless Topsy's singular memory could be jolted again upon the point. Not even the fact that Sidney Parsons was duly mentioned as playing the part of Sam Buckley, a jockey, could afford Spears satisfactory consolation in his disappointment. He lighted his pipe and stared grimly at the old programme.

"Damn it!" he said, and almost automatically he began to read down the list of the cast again, speaking aloud:

Sir Christopher Faversham . . . *Barrie Lloyd*
 Lady Faversham, his wife, *Agatha Wellman*
 The Hon. Enid Faversham . . . *Isabel Palmer*
 Gerald Whitty *Frank Harris*
 'Cappy' Burroughs, a trainer, *Terrence Bray*
 Sam Buckley, a jockey . . . *Sidney Parsons*
 Caroline, a maid *Geraldine Santley*
 Evans, a butler
 "Evans, a butler! By heavens!" said Spears, and repeated:
 Evans, a butler *Philip Nelson*

He broke off and scratched his head. "What the deuce!" And then his expression slowly changed and became very set and grim. Now that he looked at it more closely he saw that the photograph of the man on the page of the cutting book adjoining the programme of "Go as You Please" was signed "Yours, Evans."

XXXI.

THE TEST OF THE WATCHES

BROADCASTING HOUSE has only too often been compared with a ship, particularly with a ship forging down Portland Place towards Oxford Circus, though if the comparison is at all justified, it should really be with the stern half of a ship forging northwards towards Regent's Park, if expert naval opinion is to be believed.

Julian Caird had never thought much of the comparison, perhaps because so many other people had thought of it first. But on this night of Spears' final experiment, as he approached the building from Chandos Street, he had to admit that there was something not altogether inappropriate in the conception. It is probably the best point of view from which to look at the building. The whole curving length of its western side is exposed, and the eight storeys above ground climb steadily upon each other, and their lighted windows in the dusk seem in some sort to form the lighted rungs of a ladder between earth and stars.

This night was clear and starlit. About the entrance and on the opposite pavement by the Langham Hotel were clustered little groups of people, the former for the most part regular "fans" of Henry Hall, who was directing the B.B.C. Dance Orchestra between eleven and twelve o'clock that night; the other composed of the curious, silent onlookers who are always to be found in England about the scene of any crime. This group, considerably varying in size, had become a permanent nightly feature of Portland Place since Sidney Parsons' murder, and had resulted in two uniformed constables being specially posted on duty to see that it did nothing beyond staring and exchanging gossip of the most fantastic character.

Eleven o'clock struck from the Round Church, and Caird slowly strolled across the road. Frankly, he would have given much to have been out of it. He was tired, irritable, and nervously apprehensive of what was going to happen. He had lost confidence in Spears, and his general discomfort was not alleviated by the fact that Stewart Evans arrived exactly at the same moment, so that they walked practically cheek by jowl across the hall. Since the episode at Dover Street they had not exchanged a word, and neither man was inclined to be the first to break the silence now. If Caird looked ill, Evans looked ghastly. His cheeks looked flabbier than ever and in colour resembled grey paper.

Although it was a hot night he was wearing a light overcoat with the collar turned up to his ears, and a black hat with the brim turned down. A half-smoked cigarette stump was stuck to his lower lip, and altogether he gave a dismal impression of shabbiness and ill-health. To Caird's relief he went along to the cloak-room to leave his things, and Caird was left to go up in the lift by himself to the 7th floor, where the party for the test was to assemble in 7C.

Gradually they trickled in, Bannister straight from Patricia Marsden's flat, with his hair sticking up and evidently bursting with spirits; Evans, who without his coat, hat and cigarette-stump looked depressed and unhealthy, but no longer ghastly or sinister; Rodney Fleming, with a red carnation in the lapel of his double-breasted dinner-jacket, his black hair very smoothly brushed, a little less languid than usual, and evidently considerably irritated at having been dragged from his supper party; and Leopold Dryden, worn and haggard, but holding himself very stiffly, and looking about him with an effective leonine arrogance, as if challenging comment upon the fact that the insignificant Mr. Corkran was at his elbow with a pair

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of handcuffs ill-concealed in the pocket of his raincoat.

Caird went over to Dryden, and held out his hand. But the actor drew back and put both his hands behind him.

"No, Julian," he said, "not yet. When my innocence has been fully established I shall be delighted. Until then I prefer to keep my own company." And he sat down on the further end of the couch that stretched along one side of the studio. Corkran followed him, taking the opportunity as he passed Guy Bannister to give the latter a cheerful wink and to murmur: "My regards to the young ladies, sir."

Lastly, and exactly two minutes before the half-hour, came Spears, and with him a bent and bespectacled old man, carrying what looked like a miniature Gladstone bag, and wearing a shiny suit of old-fashioned black clothes.

The detective looked round him. He would have liked to have added either the Assistant Commissioner or General Farquharson, or both, to his audience, but he was not quite certain that what he was about to do came strictly within the methods officially approved by the authorities at Scotland Yard, and he had not dared to take the risk of inviting them.

"Well," said Caird abruptly, "we're all here, aren't we? Can't we get on?"

Spears looked surprised.

"Yes, I think so," he said. "Without going in for introductions all round I should like you gentlemen to meet Mr. Weisskopf. Mr. Weisskopf has been of considerable assistance to Scotland Yard on various occasions, as an expert on watches. He is a Swiss, who has been a naturalised Englishman for many years." Mr. Weisskopf smiled and bowed ingratiatingly. "It is probably true," Spears went on, "that he knows more about watches than any man in England, and probably in Europe. Now, what I propose to do is this. As I think you all know, a steel tape recording was made of the scene in 'The Scarlet Highwayman,' during which Sidney Parsons met his death. I propose that Mr. Weisskopf shall listen to the recording, because it has been pointed out to me, thanks largely to Mr. Bannister, that the sound of a watch ticking is to be heard immediately following Parsons' last words. I believe that watch to have been the murderer's watch, for Parsons wore no watch that night. I think, gentlemen, that you have each brought with you the watch that you wore on the evening of the crime, and I propose that after Mr. Weisskopf has heard the recording he shall, through this microphone—which is the microphone used by Parsons on the occasion of the crime—hear the ticking of your various watches. It is possible—I won't go further than that—that Mr. Weisskopf may be able to distinguish and identify the ticking of the recorded watch. Would you mind, therefore, handing me your wrist-watches?"

Stewart Evans jumped up.

"Inspector, I protest most strongly against this! It's an outrageous infringement of our personal liberty. I'm not at all sure that you have any right to do such a thing. Do you mean that you propose solemnly to convict one of us upon the evidence of a sound not only distorted upon a microphone, but further distorted in addition by recording on an admittedly rather imperfect steel tape? I imagine you know your own business, but a considerable knowledge of criminology tells me that a defending counsel would make evidence of that sort look not only grotesque, but even dishonest or worse."

"I think, Mr. Evans," said Spears coldly, "that is my business. May I have your watches, please?"

Evans looked round for support, but Dryden was handing over an elegant, almost effeminate little platinum watch to Corkran; Fleming was yawning, and

Caird was holding out a small, black-faced silver wrist-watch.

"Very well," said Evans sulkily, "but I should like you all to note my protest."

And in his turn he passed over his watch, which was of a rather heavy, old-fashioned type and set on an unusually broad leather strap.

"Many thanks," said Spears, collecting them. "Hallo, Mr. Evans, your watch isn't going."

"I forgot to wind it up last night," said Evans. "You can easily set it going, if you want to, can't you?"

Spears nodded, and handed the watch to Mr. Weisskopf with a shrug. The latter wound it vigorously, listened, and smiled.

"It goes," he said. "It goes most healthily. It has been a good watch."

"It is a good watch," said Evans angrily.

"Quite so, Mr. Evans. Now, Caird, where can we hear this steel tape recording?"

"I thought it would be simplest in the Dramatic Control Panel-room," said Caird. "If you're ready to go up I'll let the Sound Recording Section know."

"Very well," said Spears. "Mr. Weisskopf, Mr. Bannister and I will go up to the Panel-room. I shall be glad if the rest of you will remain here until I come back. Mr. Corkran will chaperone you in my absence. And Corkran—"

"Yes, sir?"

"When I've heard the recording through I'll get Mr. Bannister to press the switch on the panel which puts on the green light which you can see there on the wall, do you understand? That will be in about five minutes' time."

"Yes, sir."

"As soon as you see that green light will you please put these watches in any order you like in front of the microphone, at a distance of about six inches? Mr. Caird will show you the exact position occupied by Mr. Parsons immediately before his death."

"I understand, sir."

"Leave ten seconds between each watch—no, better still, Mr. Bannister will put on the green light as a signal to you to put each watch separately in front of the microphone. Then when Mr. Weisskopf is satisfied that he has heard as much as can be useful to him I shall come down here again."

"Very good, sir."

"I am sure you will realise," Spears continued, turning to the others, "that it is for the good of you all, except, of course, for the murderer, that you should all remain here during the whole of this test. None of you therefore must in any circumstances leave the studio until I return."

"Do you think you'll get through by midnight, Inspector?" drawled Rodney Fleming. "I'm keeping a lady waiting, you know."

"I shan't be longer than I can help, Mr. Fleming. Come along, Weisskopf. Will you lead the way, Mr. Bannister?"

"Oh, Bannister," said Caird, "you'll pass the blattnerphone-rooms at the end of the passage. Just put your head in and tell Agnew of the Sound Recording Section to go ahead in two minutes. That'll give you lots of time to get up to the Panel-room."

"Right you are, Julian."

And Bannister, Spears and Weisskopf went out.

They left silence behind them, silence so acute that the ticking of the four watches in Corkran's large hands was distinctly audible. To Caird, the sound of that ticking was appalling. Trained as he was to differentiate and apply sounds dramatically, the ticking of those four tiny wrist-watches seemed to swell and beat upon his ears as if they were hammering out the last moments in a condemned cell.

Dryden sat back in his corner, his long legs crossed, his arms folded, his eyes on the ceiling, and his lips twisted into a saturnine sneer. Rodney Fleming took out his cigarette-case, remembered that he must not smoke, and snapped it back irritably into his pocket, while the last of Evans' vitality seemed to have left him with his protest. He had slumped down on an upright chair made of canvas and metal, which looked too small for his bulk, and sat, one arm askew over its back, looking at the floor and quite still, except that now and then his throat moved convulsively.

Only Detective-sergeant Corkran sat like a statue, having slid three of the wrist-watches into various pockets on his person, and holding one—Leopold Dryden's—in his hand, the statutory six inches from the microphone, and watching the green glass of the signal light like a cat at a mouse hole.

To Caird those five minutes were interminable. Apart from the artificially-padded atmosphere of the studio, Dryden's histrionic pose, Fleming's irritability, Evans' nervous collapse, and his own apprehensiveness, there was something else—there was the presence of the real murderer. And as the clock on the wall ticked away the seconds Caird looked round at his companions almost believing and fearing that he might see murder clearly mirrored in a pair of eyes, or blood dripping from a pair of hands. That Spears knew his man, Caird was now certain, and now for the first time he realised what it must mean to crouch on the freestep of a trench, following the second-hand of a wrist-watch ticking round to zero hour, when zero hour means the materialisation of battle, murder, and sudden death.

The green light flickered. With the slow movement of an automaton, Corkran raised the first wrist-watch to the microphone, held it there while ten seconds were ticked away by the clock on the wall, and repeated the process with the other three watches, as the green light flicked again and again and again.

It was over. And Corkran, holding the watches in his hands, walked to the door of the studio and set his back against it. But no one showed any sign of trying to leave the studio.

"Oh, come on, let's talk!" said Rodney Fleming at last. "We're not all deaf mutes, even if one of us is a murderer. Old Whiskers is a deuced ingenious chap if he can get anything out of that, that's what I say. What do you think, Julian? You ought to be an expert on sound after all these years."

"Heaven knows," muttered Caird uneasily, "I don't."

Stewart Evans suddenly threw back his head.

"I call such methods American—positively American," he burst out. "I'll get a question asked in the House. I don't see why we should put up with such treatment—"

But there he broke off, for Spears, Weisskopf and Bannister reappeared, Bannister very flushed, Weisskopf smiling and rubbing his hands, and Spears with his lean face like a rock.

"Thank you, gentlemen," said the detective.

"None of them made any sort of move, sir," said Corkran.

At that Spears frowned, and Evans burst out:

"Do you mean to say that was simply an attempt to work on our nervous systems? If so, it's even worse than I had imagined."

"Mr. Evans," said Spears quietly, "I think the less you say just now the better. I may as well tell you that the test was an astonishing success. For Mr. Weisskopf says that he has been able to identify the watch. Give him the watches, Corkran, please."

"Well?" said Caird in a strangled voice. "Whose is it?"

"I haven't quite finished yet," said Spears. "Having given Mr. Weisskopf a demonstration of the watches I now propose to give you a demonstration. I propose to show you how the crime was committed."

"Isn't that rather an unnecessary waste of time," said Rodney Fleming, "if you know already? Can't you"—he paused artistically—"make an arrest and let the rest of us go about our normal affairs?"

"It won't take long, Mr. Fleming, I promise you. I quite understand your anxiety to get away. Now what I propose to do is this: I am going to ask you, Mr. Caird, to behave exactly as you behaved on the night of the murder, so that the timing may be exact. I shall impersonate the murderer, and I think everything at last will be made perfectly clear."

XXXII.

THE TEST OF NERVE

"AGAIN, Spears went on, after a little pause, I shall have to ask all of you, except Mr. Caird, to remain precisely where you are. I shall ask Mr. Weisskopf here to impersonate Sidney Parsons, and here, incidentally, is Mr. Parsons' script. Mr. Bannister, will you come with me and Mr. Caird to the Dramatic Control-room, so that you can give the light cue for Mr. Weisskopf to start Mr. Parsons' soliloquy? Caird, of course, will already have left the D.C. room on his way to 6A."

Bannister nodded.

"By the way, Caird, on your way to the D.C. room would you mind drawing back the curtain which covers the glass panel between this studio and the triangular listening-room? I want my audience, here to be able to follow the murderer's actions after he leaves the studio."

"Very well," said Caird.

"You will find me," Spears concluded, "where the murderer went immediately after he had committed the crime. As before, I leave you under Mr. Corkran's care."

He opened the door for Caird and Bannister, saw that the curtain across the glass panel was duly drawn, and disappeared along the corridor.

If the atmosphere in 7C had been tense before, it was now electric.

Dryden threw aside his assumed composure, and began to prowl up and down, until Corkran put a hand on his elbow. Whereupon he jumped away as if he had been stung, and sat down again, his clasped hands gripping one knee. Fleming licked dry lips; while Evans, patently on the edge of complete collapse, fumbled at his collar and began to mutter to himself.

But this time the suspense was not to last long. Through the glass panel they saw Caird, his face white and drawn, hurry across the triangular listening-room on his way to 6A. Almost simultaneously, the green light flickered in 7C, and Weisskopf began to mutter Parsons' soliloquy. A few seconds more, and the door into 7C opened quite silently. Spears appeared in the doorway, moving on tip-toe. His hands were gloved. Closing the door noiselessly, he tipped up behind Weisskopf. The latter, approaching the end of his speech, half-turned his head and saw him. Breaking his sentence—"Good—Evans—you—" he gasped out.

Before the staring eyes of the little group assembled in the studio, Spears had whipped his left hand across Weisskopf's mouth, his right round his throat. For a moment or two Spears' left wrist, on which a wrist-watch ticked, was held within six inches of the front of the microphone. Then Weisskopf went limp. Spears shifted his left hand down to join his right round

the little man's throat, and, still pretending to choke him, silently lowered him to the floor of the studio. That done, Spears made the movement of tearing the outer page off the dead man's script, and again on tip-toe, walked to the door of the studio, and left it as silently as he had entered.

There was a scream from Stewart Evans. "My God!" he cried. "It's a frame-up! He twisted that blasted recording into my name! He—"

"Shut up!" snapped Detective-sergeant Corkran. "Keep quiet!"

Spears came into sight again in the triangular listening-room. From his pocket he drew a second pair of gloves—those unmistakably scalloped, gauntlet-wristed gloves of Leopold Dryden's—tossed them into Higgins' cupboard, and slammed the door. Still coolly deliberate, he could be seen striking a match and setting light to the torn page of script now twisted to the shape of a spill, and jamming it, lighted end downwards, into the funnel ash-tray. Then again he passed out of sight, and perhaps eight seconds later, Caird recrossed the triangular listening-room in the opposite direction, on his way back to the Panel Room.

"Well, I think that's all," said Corkran, "except for finding the Inspector."

"You'll let me out at once!" yelled Evans, making a rush for the door. "Tomfoolery's one-thing, but when it comes to faking evidence—I tell you I was never on the landing! I was never higher than the fourth floor that night. Let me out, I say, dash you!"

Corkran disregarded him, and still stood firmly with his back against the door.

"We shall leave the studio now in this order," he said, in what he fondly believed to be an official tone of voice—for it must be confessed that the Detective-sergeant was enjoying himself considerably—"Mr. Fleming, Mr. Evans, Mr. Dryden, and myself. And the places where Inspector Spears is to be looked for are the Dramatic Control Panel Room No. 1, the listening-room to Studio No. 6A, Studio No. 6A itself, and Mr. Stewart Evans' office on the fourth floor. I might add, gentlemen, in case any of you don't feel inclined to stay with the party—and he looked Stewart Evans very straight in the face—"that the Inspector has a couple of plain-clothes men on duty in the entrance-hall, which I understand to be the only means of egress from the building at this time of night. Now, Mr. Fleming, will you lead the way?" He stood aside and opened the door.

Fleming stood up, and passed a hand over his hair.

"Thank heaven, one can smoke in the passages, anyway," he said, took out his cigarette-case, and passed through the door. Evans almost treading on his heels, Leopold Dryden and Corkran bringing up the rear.

Suddenly there came a cry of pain from Evans, for Fleming had trodden back violently on to his toes, and his cigarette-case had clattered to the floor.

The door of the listening-room to 6A was open; and there sat Spears, the telephone to his ear, exactly as Rodney Fleming had sat when Caird passed him, on the fatal evening, on his way back to the Panel Room from Studio 6A!

XXXIII.

GONE AWAY!

IT was just at this moment that Julian Caird, with Bannister at his elbow, on their way down from the D.C. Room and their share in Spears' reconstruction of the crime, opened the door of the triangular listening-room.

For an instant, the tableau of clustered motionless figures was reminiscent of wax-works, or the curtain of the second act of a play. Then two things happened simultaneously. Spears laid down the receiver of the telephone; and Fleming stooped deliberately to the floor and picked up his cigarette-case.

"I think I begin to agree with Mr. Evans, Inspector," he said, "that your methods—"

"That'll do!" snapped Spears. "I propose to put you under arrest for the murder of Sidney Parsons, and I warn you formally that anything you say may be taken down and used in evidence against you."

"But, Rodney—" gasped Caird. "Spears, you can't mean—"

"I suppose this is another of your clever tricks," said Fleming. And now all the drawl had gone out of his voice. "I warn you, I don't stand for this sort of thing, Inspector. I've got a perfectly good alibi, and you know it. Unless you've neglected your duty grossly and failed to investigate it from the other end."

"I don't think we'll argue it," said Spears. "That alibi was an extremely ingenious fake. It's perfectly true that you got that call, and it's perfectly true that the telephone was used for six minutes. But only one person spoke on the telephone. Mr. Fleming, and that person was your brother reading the re-written scene of your first play. I've timed it, and it lasts exactly five minutes and a half. It was while he was reading that that you murdered Sidney Parsons."

"Very ingenious, Inspector. I only hope you'll be able to prove it in court. Would you mind telling me just why I murdered him?"

"You murdered him because he was not only blackmailing Mr. Dryden, but because he was also blackmailing you. He was bleeding you separately, but it was for the same thing—for a liaison that existed between you and Mrs. Dryden when you were both on tour some years ago in a play called 'Go As You Please.'"

But still Rodney Fleming faced the Inspector steadily.

"Your imagination's a pretty one, Inspector. Perhaps you can also find an explanation of why Parsons, according to your own reconstruction of the crime, should have addressed the murderer as 'Evans'?"

"Mr. Fleming, when you were on that tour, you were acting under another name. You took the name of Philip Nelson, and the part you were playing was that of a butler called Evans. No doubt the other members of the cast on that tour came to address you by the name of your part. Actors tell me that sometimes happens. Besides, are you going to deny this?" And he took from his pocket the photograph from the page of Isabel Dryden's press cuttings book, adjacent to that on which had been pasted the programme of "Go As You Please," at the Shakespeare Theatre, Brighton.

And Caird, peering forward, recognised with a sickening feeling in his stomach that the face in the photograph was a younger edition of his friend's, and that the signature "Yours, 'Evans,'" was undoubtedly in his handwriting.

Spears took a step forward.

"I think I've kept my promise, and cleared things up," he said. "Will you give me your word to come quietly, Mr. Fleming? Or must I use these?" And he touched the pair of handcuffs in his pocket significantly.

"A murderer's word? You are trustful, Inspector. Anything you like."

All this time he had been holding his cigarette-case, and now he proceeded to pocket it. A second too late, the detective saw that his hand was approaching, not the side pocket of his jacket, but the hip-pocket of his trousers, and in a flash Fleming had jumped sideways, so that he had the corridor clear towards the lifts at his back and the others looking into the muzzle of an automatic pistol.

"I don't want to have to hurt any of you," he said. "Unless perhaps it's you, Evans. You've been a friend of mine, Julian, and so have you, Leopold; and for a detective, Inspector, I call you damned

ingenious. But I'm not going out of this building with gyves upon my wrists, and don't you think it! I expect you will agree with me that another murder in Broadcasting House would be out of place. But the first one of you who moves forward, by heaven, I'll shoot him—and I'll shoot him dead!" And he began to back down the passage, his lips very set, his eyes as hard as agates above the wicked little barrel of the pistol.

Caird simply stood and stared. For the moment the bottom had fallen out of his world.

Evans and Dryden, frankly deeming discretion the better part of valour, backed hastily into 7C, out of the line of fire. But neither Spears nor the detective-sergeant were the men to flinch in the face of a merely physical risk, and Corkran, pushing violently past Stewart Evans, rushed straight down the passage, with Spears at his heels. The detective was followed by the incongruous figure of Mr. Weisskopf, displaying remarkable agility for his appearance, and straightening out as he ran into a short but vigorous young man, whose real name was marked as Winter on the appropriate list at Scotland Yard, with a note to the effect that "This man has a singular aptitude for all kinds of disguise and the simulation of expert mechanical knowledge."

Fleming, who, to do him justice, had no desire to shoot, and believing himself to have got sufficient start, whipped round and ran for it. Had he turned left at the end of the passage, he could in three strides have been at the staircase that served the whole of the studio tower, and would only have been faced with the necessity of coping with the plain-clothes men in the hall. But as it happened, he made a simple blunder in geography, turned right, and found himself immediately in the corridor between the studio tower and the offices, with his pursuers at his heels. This mistake shook his nerve. He had neither time nor opportunity to think out an alternative line of retreat; he could only run for it. And run he did, straight along the dimly-lighted corridor and through the swing doors at the far end. It may have been that he thought he could outdistance, or at any rate puzzle his pursuers, by getting up to the Engineers' Control Room on the 8th floor, and by crossing it—occupying as it does the whole of that floor—regain access to the staircase in the studio tower. Whatever his motive, Spears, to his amazement, saw him go up the stairs and not down when he passed the swing doors.

"Don't be a damned fool!" he roared. "You can't get away—you'll be held at the entrance!"

But Fleming only laughed; and turning on the landing half-way to the 8th floor, sent a pistol-shot crashing through the glass panel of the door within a foot of the detective's head. Glass flew in all directions, and a fragment of it gashed Spears jaggedly on the cheek. The latter grunted and staggered. Corkran turned to see if his superior was hit. It remained for Detective-constable Winter, alias Weisskopf, to fling himself up the stairs, just as Fleming wrenched open the landing window, stepped out on to the balcony, and, with the aid of the iron railing and a flagstaff, hoisted himself towards the roof. Winter jumped to grab his legs, but received a fierce kick in the face, which smashed Weisskopf's glasses, and sent him sprawling. For an instant, Fleming's trousered legs hung suspended in the window, then evidently he achieved the hold he wanted, for they vanished upwards.

"Damnation!" said Spears, wiping the blood from his face with a handkerchief. "He's gone for the roof. Ah, Caird—you're there. Can he get away?"

"I don't know," said Caird. "Only the engineers have access to the roof."

"Do you really not know? Or do you want to give the fellow a chance?"

"Damn it all, Spears, the man's a friend

of mine—or was. I can't believe he did it, even now."

"Well," said Spears impatiently, "you can take my word for it he did. And we've got to get him. What about you, Mr. Bannister—haven't you any bright ideas?"

"Oh, go on, Guy—join the hunt," said Caird bitterly.

Bannister looked puzzled.

"I'll get hold of the engineer-in-charge in the Control Room," he said at last. "He may be able to tell us."

"Good!" said Spears. "Winter, you'd better stay here, in case he tries to break back through the window. If he does, he'll have to come feet first, so you needn't be afraid of his gun. But don't put your head out to look for him, or you may get hurt again."

"Right you are!" grinned Winter.

"And for goodness' sake, man," Spears continued, "take your wig off! Now, Mr. Bannister, where's your engineer-in-charge?"

The aforementioned curiosity-ridden little group outside the Langham Hotel was beginning to break up. Midnight had struck from the Round Church. Henry Hall's admirers had duly watched him depart after enriching them with his autograph, and the uniformed constables no longer troubled to conceal their yawns. Miss Emily Barker of Twickenham started the rot by saying in a loud voice she didn't intend to miss the last Tube home, not for no murderers! Master William Hicks observed that he thought it was all a fair wash-out, and various amiable nonentities began to express a certain degree of mild wonder as to why they had spent two or three hours on a lovely summer night in staring at a building so completely unresponsive.

Then two girls who were standing giggling to each other in low voices, with their arms round each other's waists, uttered shrill squeals; and Mr. Samuel Tubbs, a prosperous butcher who had been having an evening up West, and had joined the crowd for a minute or two on the way home—being, it must be admitted, a trifle exhilarated by a combination of whisky and port—suddenly said loudly, "Did you hear that? That was a shot, that was!"

Master William Hicks observed rudely, "Shot nothing!" While the Twickenham spinster suggested mildly, "It might have been a door banging."

"Door!" said Mr. Tubbs truculently. "I wasn't four years in the front line for nothing. That was a pistol-shot, young woman, you can take my word for it. And I know what I'm talking about."

And as the group bunched together again, whispering excitedly, there was another squeal from the giggling girls, and one of them pointed apparently at the zenith.

"There's a man on the roof!"

"Yes," said Mr. Tubbs professionally, "and he looks as if he was trying to take cover," as a tiny crouching silhouette vanished into the shadow of one of the great metal ventilators.

"And chaps after him, too!" whispered Master Hicks intensely, as other silhouettes came into sight, dim against the star-lit sky.

To Spears, that man hunt on the roof of Broadcasting House was one of the most thrilling incidents in his career. It was almost like hunting on the crest of some gigantic mountain, with a precipice on each side, and nothing overhead but the stars, and the two slim trellised towers of the experimental short-wave transmitter thrust upwards like queer steel fingers into the face of infinity.

It was, of course, only a question of time, for there was only one method of normal approach to the roof, and that Spears, Corkran, and Guy Bannister—who had refused to be shaken off—had taken. But of the hunters only Spears was armed, and Rodney Fleming had still presumably seven shots in his pistol. They slunk forward between the towers and in the shadow of

the great metal air-shafts as though crossing No Man's Land on a raid. Then suddenly a spurt of fire split the darkness. A bullet whanged against metal, and the ghost of a scream drifted up from the pavements of Portland Place far below.

Spears pulled out his own revolver. He was extremely loth to make use of it, according to the best traditions of the Metropolitan Police, but it looked as if Fleming was getting desperate. However, he took one final chance. He sprang out from his cover, and stood with his thin, tall figure clearly visible against the sky and his revolver pointing upwards, and shouted, "For the last time, Fleming, will you surrender? Drop your gun, and put up your hands!"

The only reply was a burst of mocking laughter, and then Fleming in his turn broke cover. He had been crouching at the base of the southern of the two trellised towers, and now he ran to the very edge of the roof, swung round on his pursuers, and emptied his pistol as fast as his finger could press the trigger. Corkran had his left knee smashed, and Bannister was able next day to point with extreme pride to two bullet holes in his coat. But Spears was untouched, and Fleming's last shot was answered by the deeper crash of the detective's revolver.

Fleming was hit in the wrist of his pistol hand. The shock spun him half round, and for a moment Spears saw his face in profile, at last twisted out of its languid non-chalance, distorted with horror and despair. The pistol clattered on the roof, and then—whether the pain of his wound made him lose his balance, or whether the act was deliberate, no one can tell—he fell sideways as a man collared at Rugby football falls on the point of his left shoulder, and dropped a hundred and twelve feet to the pavement below.

XXXIV.

SPEARS EXPLAINS

IT was a week later.

The thunder and the shouting had died down; and as a crisis had arisen in the Balkans, and an attractive typist had had her throat cut by her sweetheart at Birchington-on-Sea, Fleet Street had forgotten all about the Broadcasting House case. Stewart Evans had departed on a month's special leave owing to a nervous breakdown, and Detective-Sergeant Corkran was in hospital. Rodney Fleming, untouched by the fitful fever of newspaper headlines attending the inquest on his shattered body, had been cremated at Golder's Green.

Leopold and Isabel Dryden had gone to America. With the common sense which formed such an unusual part of his complex make-up, the actor had seized the opportunity to exploit, on the other side of the Atlantic, an extent of publicity which in England was likely to prove for some time only an embarrassment, and he had arranged for a Shakespearian tour, starring himself, through all the principal cities in the United States, which would keep him abroad for at least a year.

Julian Caird, however, remained in London. Like Evans, he had been offered special leave by the Controller, but he had preferred to stay and go on with his work. The tragedy of Fleming had hit him hard; harder probably than he would have been prepared to admit. Caird was not a man to make friends easily nor to undervalue those friends he had. Various people had suggested to him that he should go away, preferably to the south of France, and sit in the sunshine amongst the orange trees and the cicadas, and look at the green-shuttered pink and yellow villas beside the deep blue sea, and smoke cheap French cigars and drink *vermouth-cassis* and forget "The Scarlet Highwayman" and all that ill-omened play had involved.

But Caird feared that if he went, he would see continually in his mind's eye Rodney Fleming's face, so changed from



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the pleasant languid face that he had known, above the automatic pistol; or that pair of legs swinging so desperately at the moment when he had made his frantic climb through the landing window to the roof of Broadcasting House.

So he preferred to stay. And it was largely for his sake that Guy Bannister, enriched by a small and entirely unexpected legacy from an aunt whose existence he had never even suspected, gave a dinner in the single private room of a small Soho restaurant, and invited Inspector Spears, Topsy Levine, and—oddly enough—Patricia Marsden.

Guy Bannister's motives were mixed. Admittedly, he longed to satisfy his own curiosity; admittedly he had been encouraged, blatantly by Miss Levine and more subtly by Miss Marsden; but he hoped that if only he could get Spears to talk and Julian to listen, that the latter would see the case from beginning to end as it really had been, and by getting it into proper perspective, no longer view it from the point of view of exaggerated horror and self-reproach.

He was sufficiently diplomatic to leave the subject alone till dinner was over, but with the arrival of some tolerable brandy, he felt that the moment had come.

"Look here, Inspector," he began, "I don't know how closely you're bound by the Official Secrets Act, or its equivalent—and all that sort of thing—but—"

Spears laughed.

"I guessed as much," he said. "But I suppose it would have been too much to expect you to have been happy until you'd got it. Especially you, Mr. Bannister, with all your ideas! But aren't you all sick and tired of it? I shouldn't imagine Caird ever wants to hear of it again."

But Caird rose to the bait.

"I think if I could hear all about it once and for all," he said, "then I might have a chance of forgetting it. Honestly, Spears, it would help me a good deal if you'd explain the various loose ends. I suppose you were right—I know you were right. But when it's a man one's shared digs with and laughed with and rehearsed a play with, somehow it's inconceivably difficult to shift one's whole point of view and think of him as a murderer. It sets one's values all wrong, somehow." He broke off, and drank some more brandy.

"Oh, do tell us, Inspector," said Topsy. "After all, I did help, didn't I?"

"You certainly did, Miss Levine. I'll go so far as to say that without you I very much doubt whether I should have brought it off."

"Well, then, go on," said Topsy.

"Very well," said Spears. "You can stop me if I become boring."

"The curious thing about the case was that it was both extremely simple and extremely complicated. It was extremely complicated only because it took place under very remarkable conditions—conditions which you wouldn't find repeated anywhere else, and for which, of course, there was absolutely no precedent. No one had been murdered in a broadcasting studio before, and I think it's hardly likely to happen again for some time. But the essence of the crime was its absolute simplicity. That was, from the criminal point of view, its merit. I believe Mr. Evans said something at one stage about simplicity being the key-note of all great crimes, and, of course, there's any amount of truth in it. I think the easiest thing to do would be first to give you the actual story, and then explain how I got on the track."

"Well, Sidney Parsons was an unsuccessful actor, and a successful amateur blackmailer. As he went downhill on the stage, so he took more and more to the use of his second string. In an unlucky moment for himself—perhaps because he had found it so easy to screw money out of Mrs. Dryden—he added Rodney Fleming as a subject for his activities, using the same secret which he had held over Mrs. Dryden's head, but keeping each of them in ignorance that he was

blackmailing the other. But it was one thing to blackmail a frightened, rather commonplace little person like Isabel Dryden, who was terrified of her husband, nervous about her reputation, and with nothing positive about her except the obstinacy of a thoroughly weak nature."

"Poor Isabel!" muttered Julian Caird.

"But Rodney Fleming was quite another pair of shoes. Of course, I don't know much about that kind of thing, but I imagine he had it in him to become a great playwright, and for his first essay in crime I take off my hat to him for his murder of Parsons. And he had extremely bad luck in some ways. What he did was this. He wrote that play, 'The Scarlet Highwayman,' with two things in his mind: the certainty that as soon as its production was published, Parsons would blackmail him for a part in it—and that is actually what happened—and secondly, keeping firmly before him the mechanical technique of broadcast play production, which would give him an opportunity to kill Parsons during the play and in an entirely inexplicable fashion."

"I believe the whole of the play to have been constructed for that end. That's why, Caird, Fleming took the trouble he did to learn as much about the technique of your production methods and the geography of your studios as he could before he wrote the play. He himself gave me a clue there during his first interview with me at Scotland Yard, but I admit I was too dense to see it."

"Very well. Fleming writes the play.

You accept it for production. Parsons demands a part in it. Fleming, apparently under pressure, persuades you to give him one. There was no question of his thrusting Parsons into the cast for an important part. He suggested him tentatively for a part so small—there was nothing to it but the soliloquy and the death scene—that there was no earthly reason why you shouldn't accept the suggestion."

The rest of the play was constructed in such a way that Parsons was bound to be placed by himself in a single studio, while the rest of the cast were engaged in another one.

"Next, of course, it was necessary for him to be within reach of his victim. This would have been impossible if he had found himself billeted in the Dramatic Control Panel-room. It was much too far away, and his absence from it would be bound to be noticed. But the 6A listening-room, which was two steps across the passage from the door of 7C, and which gave a view down into studio 6A, and in which he could hear the whole play on a loudspeaker, offered him a simple and heaven-sent solution. And when he realised that, in addition to that, there was a telephone, by means of which and with the aid of the Broadcasting House exchange, he could establish connection with an ordinary outside caller, he saw that the 6A listening-room could be made the scene of an unrivalled alibi."

"What is his next move? He deliberately instils into his brother's mind, during the rehearsals of the touring company in London, doubts as to the ability of one of his actors to play one of the scenes in the play that is to be toured. George Fleming, as appeared quite obviously in my interview with him at Leeds, was devoted to his brother and completely under the spell of his personality. Fleming counted on this, coolly and accurately, and as soon as he reasonably could, suggested that those three pages at the beginning of the last act should be re-written by his brother for the benefit of the actor concerned."

"Fleming knew perfectly well that those three pages played roughly about five minutes, and that re-written they would take about the same amount of time to read. He then told his brother, George, to listen to 'The Scarlet Highwayman,' and at a certain point in the script, to put through a call to Broadcasting House. The reason he gave was that he wanted to hear as much of the play as he could, but that if it

was left until later in the play, the call might not get through in time to catch him; and that, anyway, he was not altogether satisfied with the end of 'The Scarlet Highwayman,' and could perfectly well spare the last five minutes to hear the three pages of the touring play that had been re-written by George."

Spears paused.

"Please go on," said Patricia Marsden softly.

"Imagine, then," Spears continued, "George Fleming at Leeds, listening on Old Harry's portable set in the stage-door-keeper's cubby-hole till the beginning of the ball-room scene, when he tells the old man to put through a call to Broadcasting House. Fleming is sitting in the 6A listening-room, perfectly at ease, looking down into 6A, waiting quietly for his plan to develop. Suddenly the call comes through, and is noted by the girl at the B.B.C. exchange. Fleming turns down the loudspeaker in the listening-room, picks up the receiver, and establishes the connection. 'Very well,' he says, or something to that effect. 'Go right ahead, George. I won't interrupt you till you get to the end. Then we'll discuss, if it's necessary.' And George Fleming begins to read the scene."

"You see the point?" said Spears, looking round the table. "The girl was almost bound to listen in once or twice during such a long call just for an instant, and each time she would have heard what she must have imagined was a conversation in process. She wasn't to know that it was only George Fleming who was speaking, and that Rodney Fleming, instead of listening, was in 7C."

"Gosh!" muttered Bannister.

"It was devilishly ingenious, and extremely simple. It would only take him forty-five seconds to cross the passage and enter 7C; two minutes at the outside to dispose of Parsons; another forty-five seconds to get back; and then he could peacefully finish listening to his brother, have a brief discussion, and ring off, with a perfectly established alibi properly witnessed by the corroborative evidence of the girl on the telephone exchange that he never moved from the 6A listening-room during the critical time. If he'd been lucky, the mystery might never have been solved."

"But surely he was very lucky," said Caird, "not to have met anyone in the passage?"

Spears shook his head.

"Surely not. He didn't leave it to luck. He knew that you'd posted Higgins to keep that passage clear. He didn't know that Higgins had gone off philandering. His first piece of bad luck was your conductor's failure to press the return light in 8A, which sent you down in a panic to see Ian Macdonald in 6A. That was nearly disaster. If you'd been ten seconds quicker, Caird, or if Fleming had been ten seconds slower in crossing the passage, you would probably have met as he was entering the studio."

Caird wiped his forehead.

"I see," he said. "Go on."

"However, to that extent his luck holds. He is already in 7C when you go through the triangular listening-room, past the door which has just closed behind him, and down the staircase to 6A."

"Then more unforeseen events take a hand. In the first place, Leopold Dryden, who undoubtedly was genuinely ill, who had had this quarrel with his wife at dinner, had taken the opportunity of a five minutes' break in his part to get leave from Macdonald to be out of the studio. I am convinced now that his excuse for being on the 7th floor, which appeared so thin at the time, was perfectly genuine. He went as high as he could for air, which isn't such a very extraordinary thing to do, after all, when you look at it without an angle of suspicion. So that, instead of Fleming producing a crime that was

unattributable to anybody, here were already two people—you, Caird, and Dryden—whom he had thought were firmly fixed in the D.C. Room and 6A respectively, loose and roaming about that suite of dramatic studios at the critical moment, and therefore throwing themselves open to suspicion.

"Then another thing. Probably Fleming, who must have been fairly well keyed up—time being so short and the matter in hand so vital—failed to close the door of 7C quite noiselessly behind him. At any rate, he made some sort of noise, and Parsons half turned and saw him just before he got his hands on his throat. Now that exclamation 'Evans' could probably have passed for a normal watering down or mistake in the script by Parsons if it hadn't been for the steel tape recording. You remember, at the time Hancock hardly noticed it. But heard again and again, it gradually impressed itself upon one as being out of place and abnormal.

"It was bad luck for Fleming that the play was being recorded for the Empire that night. That was a point of internal routine he probably hadn't appreciated, and it was probably the one bad slip which, in the long run, cost him his life. Parsons obviously was in the habit of using that nick-name under which he had known Fleming at the time when the incident occurred for which he was blackmailing him, and choked it out automatically when he saw his murderer's face over his shoulder.

"Fleming killed him quickly and silently, except for the wrist-watch, according to plan. I might say here that I got a slight pointer towards Fleming, Caird, when I heard from you how he had been playing the piano that night to Mrs. Dryden. You can't play a Chopin mazurka without strong and well-controlled fingers, and that mazurka was a much more important clue than those gloves of Leopold Dryden's, which nearly put us on a false scent altogether, and concerning which, oddly enough, there is a curious little story."

"What's that?" said Caird. "Something to do with Stewart Evans?"

"No," said Spears, smiling. "You remember Dryden said he'd lost them at a rehearsal? He had. But he'd only lost them because Parsons, like the rat he was, had stolen them. He must have had them in his pocket when he was killed. Fleming, going hastily through his pockets, found them. Now, the last man in the country on whom he wanted suspicion to fall was Leopold Dryden, for his interests were bound up with Dryden putting on his new play in the autumn.

"Accordingly, he took the gloves away with him from the studio and hurled them into the first hiding-place he saw, which happened to be Higgins' cupboard, which the studio attendant had, as usual, left carelessly unlocked. He wasn't to know that Evans, pursuing Mrs. Dryden with all the fanaticism of a hopeless affection, was going to move heaven and earth to get Leopold Dryden hanged, and ferret out the gloves as one of the strands in the rope."

"But if he took the gloves," said Caird, "why did he leave Isabel Dryden's letters? And what about the torn script?"

"Just a minute!" said Spears. "Everything in its place. It's difficult to give you positive answers about those two points, as no one was there to see. Parsons was killed, and Fleming made no statement before he died. But what I assume happened was this—you must remember Fleming is being pressed for time. He opens Parsons' pocket-book and sees the letters. A glance tells him that they are something to do with Parsons' blackmailing activities. He cannot resist the temptation of reading them, however hastily, and sees with relief that there is no mention of him, that they are only letters from Isabel to Parsons.

"Isabel is safe in 6A, and so, to the best of his belief, is Dryden. If he leaves that

clue as a red herring, there can be no harm done. He leaves the letters, therefore, in the pocket-book. But then he notices the outside of Parsons' script.

"Now, here I am being purely imaginative—I can't help it—but I believe that Parsons was occupying some of his time while waiting for his cue in writing a note on the lower half of the outside of his script, which he intended to pass over to Fleming at the end of the play. It must have run something like this:

"Dear Fleming,—You'd better pay up, or I'll make things hot for you and your darling Isabel."

"There was no paper in the studio, and he probably thought he could tear off half the outside sheet of the script, and explain to Macdonald that it got ripped by accident. Why the note was never finished, we don't know. Fleming sees this note, which connects him blatantly with Isabel, and is a direct pointer to himself as the murderer, staring at him from the face of the script beside Parsons' body.

"Time's getting on. He must be back in the listening-room to speak to George before the call closes. He rips off the pencilled scrawl jaggedly and leaves the studio. Again he is lucky in that you, Caird, on your way back from 6A, and Dryden, returning from his excursion outside the tower in search of fresh air, must have missed seeing him in the passage literally by seconds.

"I repeat, it was not unreasonable for him to have counted on neither of you being there at all. He doesn't want to keep this damning scrawl about him anywhere. He has already stepped into the triangular listening-room to push Dryden's gloves into Higgins' cupboard. As he turns back, he sees the funnel ash-tray on the slab. Quick as thought, he whips out a box of matches, twists the piece of script into the shape of a spill, lights one end of it, and shoves it into the ash-tray, imagining that as it is pushed in with the lighted end down the flame will run up it and reduce it to ashes.

"Unfortunately for him, those ash-trays don't work like that, and almost immediately the spill was thrust into it, it was extinguished. However, Fleming doesn't know this, and back he goes to the 6A listening-room, picks up the receiver, and, according to plan, is just in time to hear the end of his brother's reading, and to say: 'All right, George. I think that'll do well. Go ahead,' before the second three minutes asked for by George Fleming are up."

There was a long pause after he finished, and Bannister suggested another glass of brandy all round. He walked round the table filling the glasses, but Topsy Levine could not repress her curiosity, and burst out eagerly but ungrammatically:

"But how did you find out it was him, Inspector? That's what I'm dying to know!"

Spears looked at her. "Shall I go on?" he said. "Yes, please."

"Well," said the detective, "I'm afraid that the principal way that I ultimately got on to the truth was the dulllest of all methods of criminal investigation. It was our old friend the process of elimination. As you know, in the first place, everything pointed to Leopold Dryden. He had no alibi. His excuse was flimsy. There was the motive of revenge for the blackmailing of his wife. There was his own stupidly obstinate attitude; and then there was the curious episode of the gloves. But though in the circumstances we were practically bound to arrest him, the case against him was never, in my view, cast-iron. His personality was not the least that of a murderer, and the gloves, if anything, did a good deal towards convincing me of his innocence. They were such easy things to have been planted, or even used, by the real criminal, and, as we now know, they actually were hidden by the real criminal,

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"Death at Broadcasting House"—cont.

who hadn't the least desire to have Dryden suspected.

"Personally, if I had been able to shake Ian Macdonald's flat and positive conviction that Isabel Dryden had never been out of his sight all the evening, I should have far more easily suspected her. She had a motive. She was liable to gusts of almost febrile fury, during which a woman can commit astonishing actions of violence—actions, too, that need considerable strength—and she certainly had one of the strongest of all possible motives that can incite to and explain murder. But her alibi was impregnable, and as Dryden retired into the back-ground, I was left with yourself, Caird, Stewart Evans and Fleming, apart from possible outsiders.

"Of course, I was very fortunate in this, that owing to the conditions under which that play was being produced, the vast majority of the cast and people not concerned with the play in Broadcasting House could all be eliminated, owing to lack of physical opportunity. I almost immediately came to the sound conclusion that it was impossible for a complete outsider to have fluked along that passage at the right moment and to have caught Parsons at just the right time in the play for the murder to go undetected until its close. So it was down to you three. There was a big black mark against each one of you.

"I admit I began by thinking it must be Fleming, because in that listening-room he was in such a far better position to accomplish the crime than anyone else, and he had undoubtedly planted himself in that listening-room for reasons which didn't carry too much weight. But his telephone trick deceived me for the time being. It was confirmed by the girl at the exchange and by Trunks, even before I went to investigate personally the putting through of the

call from Leeds. There was certainly no doubt that the call came through, that it had been taken by Fleming, that it had lasted for six minutes, and that he had been heard completing it. Of course, I was deceived. You know that now, and I know it. But I don't think it appears so very unreasonable that I shouldn't have spotted it at the time. So that for the time being, Fleming, too, was eliminated.

"And then it came to the question of you or Stewart Evans. I never seriously sus-

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pected you, though your manner, as the case went on, did about all it could to make me wonder whether I hadn't put you out of the running too easily. But I could find no vestige of motive, which was the chief point in your favour, nor did I see how you could have arranged for the return light from 8A to have failed, to give you your excuse to leave the Dramatic Control Panel-room, unless your orchestral conductor or some engineer had been your accomplice. And for this there was no vestige of evidence, though I made a certain number of tactful inquiries."

"What-ho!" observed Guy Bannister frivolously. "I should like to have seen Billy Sanderson's face when you started those inquiries!" For Billy Sanderson was the orchestral conductor concerned, and a very positive and peppery character into the bargain.

"Finally, Mr. Stewart Evans. Evans, of course, was the 'mystery man' of the case—a real Edgar Wallace character. The trouble about him was that not only were all of you only too anxious to find that he was guilty, but that he apparently wanted to do everything on earth he could to confirm that impression himself. No doubt his reason for being in the building on the night of the broadcast was perfectly sound, but it looked like an astonishingly feeble excuse to a detective uninitiated into the mysteries of the internal workings of the B.B.C.

"He started amateur sleuthing, which is enough to make anyone an object of suspicion—with apologies to you, Mr. Bannister."

Guy grinned, and Pat Marsden took the opportunity to squeeze his hand under the table.

"If he didn't 'plant' Dryden's gloves, he did the next best thing by finding them and bringing them to me. And then, of course, there was the infernal coincidence of his name. You see, I thought I'd done a masterly piece of detection, according to the best Roger Sheringham traditions, when I spotted that exclamation of Parsons as being 'Evans,' and not 'Eavens,' and though I say it as shouldn't, it was a fairly intelligent thing to notice. But it very nearly led me to make my worst mistake and again arrest a wrong man! If only I could have found the slightest evidence to show that Stewart Evans had been seen on any floor higher than the 4th on the night of the crime, I certainly should have arrested him.

"You see, it so rapidly became obvious that he was passionately in love with Mrs.



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"Death at Broadcasting House"—cont.

Dryden, though she did not reciprocate, that for motive it was possible to put down the elimination of Parsons as a piece of quixotic service to her. Then there were his further attempts to blacken Dryden, and his generally obstructive attitude towards myself in the later stages of the case. But it was no good. There was that hopeless gap which I had no means of bridging between his office on the 4th floor and the murder on the 7th. Lastly, I doubt if he had the physical strength to kill even a man like Parsons with his hands."

"But what about that lunacy of his at the Tube station?" interrupted Caird.

"My dear Caird," said Spears, "I'm sorry to seem superior, but I'm positive that I told you the truth when I advised you to drop it and call it a mutually-exaggerated accident. That was precisely what it was. At that moment, you and he—particularly he—were suspecting each other rabidly. His suspicions were increased that night by your attempt at fraternisation at your club. What I believe happened, in fact, was this: Evans genuinely stumbled; you automatically caught hold of him to support him; he promptly imagined you were trying to put him under the train, and wrenched violently away, so that you fell to the platform, thinking that he'd tried to push you under the train."

"While, in fact," Bannister broke in, "neither of them had the slightest intention of pushing either of them under the jolly old train!"

"Precisely."
"I'm sorry to have dragged that particular red herring," said Caird.

"Oh, don't say that. As a matter of fact, it was rather helpful. These mutual accusations struck me as so fantastic—for if either you or Evans were the criminal, it meant he was entirely losing his head—that I began to think again, by the process

of elimination, about Fleming. Mark you, I hadn't completely eliminated Evans. I never did as a faint possibility, right up to that test demonstration. That was why I held it. And incidentally, I've been properly ticked off by the Assistant Commissioner for using the method at all!

"But it seemed to me worth while to investigate the whole question of Fleming once more, and as fully as it could be done. By the way, Mr. Bannister, I take it you don't want me to go into the rather painful subject of the studio attendant, Higgins?"

Guy Bannister flushed, and Topsy said indignantly:

"We know all about that, Inspector. We were there."

"Still," Spears went on, "I suppose, on the principle of strictly chronological elimination of all possible suspects, I ought to have mentioned him earlier. However, I'll go back to Fleming. As you know, I went myself to Leeds to investigate the other end of his alibi. I saw George Fleming, and I was immediately convinced of one thing that if he was an accomplice, he was a completely innocent one."

"But it was in talking to him that I got my first real pointer—it was when I discovered that the famous re-written scene was only three pages long. Its significance didn't come to me at once, but it struck me as a little queer. It also struck me as odd that George Fleming should have broken off listening to his brother's play in order to put a call through, especially as it became obvious that it was Rodney Fleming who had arranged just when the call should be made. I was thinking about those two things in the train coming back, when, quite independently, I had my brain-wave about 'Evens—Evans.'

"That, of course, told heavily—to the best of my knowledge—against Stewart Evans. But I also took the opportunity to time a reading of those three pages of script re-written by George Fleming, and to note that they took exactly five and a half

minutes. So it obviously lay between Stewart Evans, against whom I had the overwhelming conviction of Parsons' own voice addressing him by name; and Fleming, who had arranged for a telephone call to be made to him at the critical period of the evening—a telephone call which could consist of an entirely one-sided reading by his brother in Leeds. It was one or the other—but which? I was blown if I could see, and the more I thought about it, the less I could make up my mind, for there was no conclusive proof against either of them, and, frankly, I didn't see how to get it."

"And then," said Topsy, raising her glass, "little Topsy popped in and blew the gaff."

"That," said Spears gravely, in turn, lifting his glass towards her, "is precisely what Miss Levine did."

"Miss Levine," said that young lady, "would be glad if she might be called Topsy for a change. She's not as refined as all that, thank you very much."

"All right—er—Topsy," said Spears. "But, quite seriously, it was Topsy who saved the situation. To some extent, of course, it was my own fault. I ought to have thought of delving into Isabel Dryden's past, and on the face of it, it may look as if I'd been casual in not doing so. But the difficulties involved in tracing the existence of an actress at the time unknown, several years ago, had seemed to be so stupendous as hardly to be worth the trouble, though, as you know, I did take certain abortive steps in that direction."

But Miss Levine's information about a touring company of which she, Parsons, and Isabel Dryden had all been members, gave me a definite line. If only she'd known that Philip Nelson was Rodney Fleming, we'd have had the solution in a jiffy, but, of course, she didn't—there was no reason why she should. Fleming had taken care not to mention that he had acted under a



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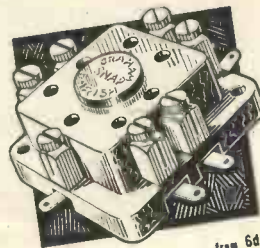
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"Death at Broadcasting House"—cont.

false name, in his description to me of his past life, though he admitted that he'd been a touring actor."

"He had to do that," said Caird, "having been out with me."

"Ah, yes. As it was, for the moment it darkened the case against Stewart Evans, because Topsy—like everybody else in that company, apparently—referred to Nelson-Fleming by his stage-part name of Evans."

"Yes—silly, wasn't it?" said Topsy. "But there's another thing I don't see. If Isabel Palmer really had an affair with 'Evans'-Nelson—oh, I don't know now *what* to call him—how could she be friends with him now? The affair wasn't on still now, was it?"

"I think," said Spears, smiling, "that they belonged to that up-to-date lot who manage to go on being friends with their lovers after they've left them, or their husbands after they've been divorced. I don't understand it myself, but then I'm old-fashioned."

"I think," said Caird, "you're being unfair to Isabel. Fleming was Dryden's friend, not hers. Would you expect her to go to her husband and say, 'You mustn't use this promising young author's excellent play, because he was once my lover'? She very sensibly made the best of it, for everybody concerned. Held her tongue, and was normally friendly, and Rodney was far too keen on his career to upset it on his side over old bones."

"The biggest irony of all," Spears continued, "was the fact that if it hadn't been for this very friendliness, for his own telephone call which took her out of the room while I was cross-examining her in her flat, I shouldn't have had the opportunity to spot and study her press-cuttings book, and I might never have found the programme of 'Go As You Please' and the

photograph of Fleming, signed 'Evans,' that was the one piece of sheer, howling luck that I had in the course of the case. And perhaps it says something for the gods being on the right side, that Fleming should have made that telephone call at that moment."

"Well, of course, after that, I was pretty certain. But I was still worried about Stewart Evans. I wanted to clarify things finally, and that's why I did the test of the watches and the demonstration of the crime. The first, of course, was sheer, undiluted fake, with the aid of young Winter disguised as Weisskopf. For, while I was sure that if Fleming was the murderer his nerve would stand it, if Stewart Evans was, his would not."

"But though Evans began to go to bits, he didn't collapse, and I went on to the second part of the demonstration in the hope, frankly, of giving Fleming a tremendous shock and scaring some sort of confession out of him, because I foresaw considerable difficulty—whatever our mental and moral convictions might be—of establishing his guilt against a first-class defence."

"You know what good barristers are. Fleming was a clever devil, and it wouldn't have been very difficult to pick holes in a prosecution's case that had to cover complications like the activities of a touring company, six years old, and the evidence of steel-tape records and the relative geography of the studios at Broadcasting House."

Spears pushed back his chair. "As you know," he said, getting up. "I was wrong. I suppose I ought to have known that a man of Fleming's calibre wouldn't give in without a run for his money; and the way he tried, even after he had dropped his cigarette-case, to brazen the thing out, was a superb exhibition of self-control. I've never seen anything to touch it. What happened then is ancient history. And, in a way," he con-

cluded, "I'm glad he took the long rather than the short drop."

"Good heavens!" burst our Julian Caird. "Parsons was a blackguard, anyway, but Rodney—I don't care what any of you say—Rodney was a darned good chap."

"He was an infernally intelligent chap," said Spears.

"I think I'm sorry for him," said Pat Marsden shyly.

And as Caird and Spears turned to the door, Guy Bannister put his arm round her shoulders.

XXXV.

IN CONCLUSION

BY way of conclusion, the following quotations from various sources may be of interest.

From "Modern Wireless":

"Mr. Stewart Evans, one of the best-known members of the Research Section of the Dramatic Department of the B.B.C., has been offered, and has accepted, an important appointment with the National Broadcasting Company of America. This augurs well for the growing interest of the United States' broadcasting organisations in Radio Drama, which has so far been somewhat neglected on the farther side of the Atlantic."

From "The Times":

"A marriage has been arranged, and will shortly take place, between Mr. Guy Bannister, son of the late Mrs. Gerald Bannister, of Bunstead Hall, Shropshire; and Miss Patricia Marsden, daughter of the Hon. Philip Marsden and Mrs. Marsden, of Cirencester."

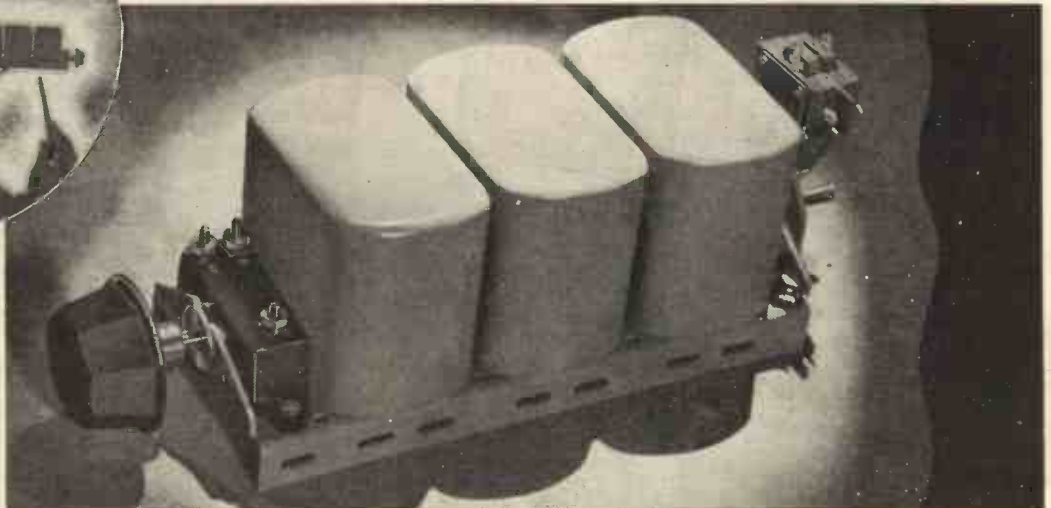
From a letter to Central Inspector Simon Spears, from Major Charles Cavendish, C.B., D.S.O.:



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"Death at Broadcasting House"—cont.

"... the Commissioner tells me that he has already complimented you formally on your handling of the case, but I should like to take this opportunity of letting you know, quite informally, my admiration for the courage, persistence and skill which you showed all through what must have been a devilish tough job. I hope this may do something to make up for the official 'carpeting' which I was bound to give you, owing to your slightly unconventional methods towards the end of the case."

From a memorandum from the Controller (Internal Administration), Broadcasting House, to the House Super-

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intendent (Copies to all Heads of Branches, Heads of Departments at Head Office):

"... and therefore the following two regulations are laid down, and should be put into operation forthwith:

(1) With the special exception of programme items arranged by the Talks Branch, no artiste employed by the Corporation in any programme item is in future to be left completely alone in a studio.

(2) The iron balcony, by means of which it was possible for the criminal in the recent deplorable case to gain access to the roof of the building, must be removed, and all similar balconies should be examined to ensure that in no circumstances might they be put to a similar use.

(3) The general supervision, during hours of night duty, over all corridors, offices and studios, must be improved, and I wish to receive a report from you at the earliest opportunity as to whether the carrying out of this order will imply any increase of staff."

THE END.

**SOME HINTS
FOR MAINS USERS**

Dial Lights for D.C. Sets

THE only satisfactory way of providing dial lights in a D.C. all-mains receiver is to insert the filaments in series with the valve filaments.

It is obviously necessary for the dial lamp bulbs to be rated to pass the same current as the particular valves used. For example, if .5-amp. type D.C. valves are used, 6-volt 3-watt motor-car lamp bulbs may be used.

In the case of .25-amp. valves special bulbs of suitable types may be obtained from several makers.

It should be noted that allowance must be made for the voltage dropped across the bulbs when determining the value and type of the heater resistance to be used.

Eliminating Pick-Up Troubles

When using a gramophone pick-up in conjunction with a radio set, instability is sometimes experienced if the volume control potentiometer is mounted on the motor board.

As it is frequently more convenient to have the volume control in this position than near the set, the best plan is to screen the connecting leads. It is also often of assistance to connect a 50,000-ohm resistance across

the pick-up leads where they connect to the set.

Automatic Grid Bias

Practically every D.C. mains receiver is designed to use automatic grid bias. Since the high-tension voltage available is limited to something less than the voltage of the mains, due to voltage drop in smoothing chokes, etc., it is not very desirable to lose any more volts by employing automatic grid bias.

Consequently, it may be a good plan to use battery bias. Incidentally, it will save the expense of several fixed condensers and resistances. Provided that good quality batteries are used they may be forgotten for several months

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In every way Superial is superior to all other Aerials. It has longer range, super selectivity and crystal clear reception. It is simple to fix—no insulators are necessary and no separate lead-in is required.

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INSURING AGAINST INTERFERENCE
A survey of the causes of interference with broadcast listening and how they may be overcome.
By **W. J. WILSON.**

FIGURES issued by the General Post Office indicate that the cost of assisting wireless listeners who have complained to the B.B.C. of disturbances of an extraneous nature is heavy. Yet in comparison with the amount of revenue received the percentage is low.

Increased Cost Probable

It is probable that with the adoption of more powerful receiving sets, capable of picking up more minute wandering electrical impulses, the number of complaints will grow and the cost of inquiry increase correspondingly. Whether the cost will be balanced by the annual increase in the number of wireless licences issued is a moot point.

Nevertheless, the conferences between the postal authorities and all the electrical trade federations of all countries do not appear to have greatly assisted in solving the problem of electrical interference which is the cause of many difficulties in congested town areas.

By the absence of statutory authority to compel electrical plant proprietors to adopt apparatus to prevent their motors from causing disturbance, the General Post Office is greatly handicapped.

Most Owners are Helpful

It is difficult to refute the argument that as motors were in use before the birth of present-day broadcasting, the cost of any remedy should be borne by the newcomer. Yet, from a purely ethical point of view, broadcasting has become a necessity of the people, imparting delight to thousands at a low cost. Any means of arriving at trouble-free reception should not be hampered by diverse interests.

Most owners of electrical plant are solicitous in their desire to help the listener. Especially is this apparent where big manufactories are concerned. In shopping areas, too, the

butchers, bakers and smaller tradesmen evince interest in these matters. Salesmen representing electrical motor manufacturers frequently receive orders with the proviso that anti-interference apparatus is incorporated.

It is possible that a loss of business has eventuated at premises where interference is created, for the public need not patronise those shopkeepers who thus mar the enjoyment of their customers. After all, the cost of smoothing and radiation quenchers is not excessive. Most of the apparatus needed can be purchased from a reliable electrician, who is usually able to advise as to the method of fitting.

The ideal to realise is to have every electrical motor causing interference to be fitted with anti-interference devices. This needs Parliamentary

NEXT MONTH

This is the last separate issue of "Modern Wireless," and next month it will be incorporated with its world-famed sister journal

THE WIRELESS CONSTRUCTOR

Price only 6d. Magnificent Value. In the December number of "The Wireless Constructor"—Now on Sale everywhere—John Scott-Taggart describes his latest triumph, THE "S.T. SUPER."

Order the January Number—On Sale December 15th—and make "The Wireless Constructor" your 1934 Radio Magazine.

sanction. The Government compelled owners of motor vehicles to take out insurance against accident.

Therefore, it should not be a difficult matter to compel owners of electrical motors, traffic and railway signals and similar installations causing offence, to remedy the trouble. The co-operation of the large insurance corporations is required who could issue policies to cover possible cost of experimental investigation and the fitting of anti-interference components. Actuarial valuation will easily determine the premiums to be charged to embrace the new form of insurance, which should be profitable to the insurance companies and solve the troubles of many hundreds of licence holders.

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Full particulars in Leaflet 'P.S.' Free.

HOW TO BUILD THE A.C. MAINS K4
—continued from page 496

is apt to bow in the middle, as a result of the pull on some of the wires from the components, so when the set is finished it is advisable to fit another narrow strip of wood running along behind the lower edge.

This can be secured to the side members of the step framework at the ends and to the panel by means of small screws passing through the lower edge of the latter. Positions for these are not shown on the drilling diagram, because they are not required in those cases where the type of cabinet is such as to position the bottom edge of the panel.

When the set is finished, the first question is that of suitable valve types. For the S.G. position the following are suggested: Osram or Marconi V.M.S.4 (Catkin), Mullard M.M.4V. (metallised), or Cossor M.V.S.G. (metallised). For the detector, Mullard 354V., Mazda A.C./H.L. or Cossor 41M.H.L. For the L.F. position, Mullard 164V., Osram or Marconi M.H.4.

For the output stage you want one of the following: Cossor 41M.X.P., A.C./P.1 or Mullard 104V. The latter valves have a considerably smaller output than the first, and call for an alteration in the bias resistor. For the A.C./P.1, use 1,200 ohms instead of 300, and for the 104V. you want 500 ohms.

When it comes to operating the set I'm afraid I must refer the reader back to my original articles on the battery model. I'm sorry about it, but I simply can't help it. Space limitations in this issue are so stringent that I really have no choice in the matter.

Very briefly, then, the first thing to do is to adjust the aerial (compression) condenser to suit your conditions, increasing capacity to reduce selectivity and increase volume on a small aerial, and reducing if a large aerial makes this necessary.

After this it is chiefly a matter of getting the hang of the tone-levelling control, which is what I had chiefly in mind when asking the reader to refer to previous issues. This is a very important point in the use of the K4, and I can only hope to outline it here.

The point to grasp is that when an appreciable amount of reaction is being used a slight adjustment of the tone-leveller enables correct quality to be obtained, while on the powerful

stations which require no reaction, another setting once more ensures correct reproduction.

Turning the control knob towards the left produces a lowering of tone, and vice versa. In the case of the mains model you will generally find a correct tone balance with the control turned nearly to the full extent of its travel to the left, only seeking to raise the tone higher on those rare occasions when so much reaction is being used that it would otherwise be too low.

And there I can safely leave you to go ahead and discover for yourself what a K4 receiver will do. I already know, and I look forward to hearing how it impresses you.

THE RESISTANCES YOU NEED				
Valve.	R1	R2	R3	R4
V.M.S.4	30,000	3,000	15,000	100
M.M.4V.	25,000	5,000	20,000	200
M.V.S.G.	35,000	4,000	15,000	150

A RADIO DIARY FOR 1934

A COPY of the new "Wireless World" diary should be in the hands of every radio enthusiast. Apart from the usual entry space for notes, there is considerable specialised and compact information invaluable for reference purposes.

These pages include a summary of the regulations governing the issue of wireless licences, a list of European broadcast stations arranged in the order of their wavelengths under the new Lucerne Plan, and a list of the more important short-wave broadcasting stations of the world.

Then there are a collection of useful formulæ, thirteen pages of Abac diagrams for making quick calculations, sixteen pages of circuit diagrams, wire tables, and a list of the current receiving valves with many details about them.

A practical hint is given for each week of the year, and anniversaries of important radio events are marked against a large number of the days of the year. It is undoubtedly a most useful reference book for everyone interested in radio.

In spite of its remarkable value, the diary is of extremely convenient size and costs only 1s. 6d., complete with pencil, in leather cloth binding. It may be obtained from the publishers, Messrs. Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1, or from booksellers and stationers.

A. S. C.

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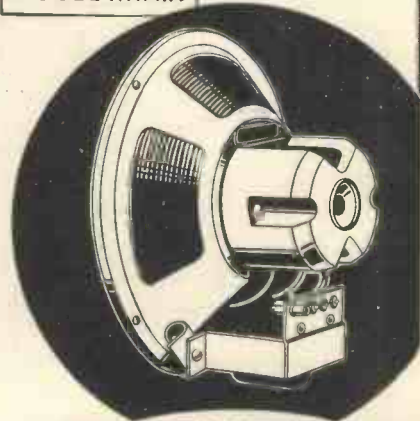
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MODEL P.P.M.19



CELESTION

The Very Soul of Music

THE FOREMOST NAME IN SOUND REPRODUCTION

"M.W.'s" RECORD REVIEW

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make the record cheap if that were all ; but there is also *Triste Maggio*, a much more dynamic song, and Gigli is just as good in this, too. Now Tauber, for whom everybody looks each month. He has two records, the first *I Greet You, My Beautiful Sorrento* and *Every Day is Not Sunday* (Parlophone R020228). Don't bother with the second—it is poor stuff—but the first is a real jewel, both as a song and as a

A Spanish Tenor

Now for a more sober record. A new Spanish tenor, one Tirado, with a very fine voice, sings *Cancione Florecita* and *Te Quiero Dijiste*, on H.M.V. B4497. Altogether delightful and out of the rut. I wish our own distinguished tenor, Heddle Nash, had chosen a better backing to *Your Tiny Hand is Frozen* than the *Serenade from the Fair Maid of Perth* (Columbia DX540). He is very good in the first, evincing the fluent, easy style which famous arias demand ; but the other somewhat shapeless air does not do him full justice. Our grand old singer, Ben Davies, sings *Tom Bowling* and *Come Into the Garden, Maud*

KENDALL'S CORNER

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those who rarely make a set, and it should be obvious that any reform which makes home construction easier and more pleasant would benefit the manufacturer as well as the consumer.

If we could persuade those concerned to make the attempt we might also perhaps give them a tactful hint that it would also be a good idea to make a decision as to whether they intend to standardise on round or counter-sunk head screws! The present mixture is another hindrance to the constructor, because it compels him to keep almost a double stock of the likely sizes.

Terminal Sizes

Another very useful bit of standardisation might be accomplished in connection with the sizes of the terminals fitted to components. The general idea at present seems to be to use 6 B.A. threads for the small components and 4 B.A. for the larger ones, with an occasional lapse into Whitworth sizes for no reason that I can discover.

The result is that if you lose the terminal nut from a component you may have quite a search in the junk box before you find another to fit. If some simple rules could be applied here it would certainly make life easier for us, and actually I cannot see why it should not be possible to decide on just one standard size for the terminals of all ordinary components.

A Practical Point

Surely, the only question to be considered is this : What size of terminal will most satisfactorily grip the sort of wire generally used for connections ? I fail to see that the size of the component has any real bearing on the matter.

T. O. W.

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performance. One of his best, which is saying a lot! His other record will probably create a sensation—the now famous *Night and Day*, coupled with *Let Me Love You To-night* (Parlophone R020230). He sings in English—wonderfully improved—and he has done handsomely by the composer of what is really a very indifferent bit of work. The other is in quite a different gallery! There is something in this second song, and Tauber puts so much more into it as to thrill every ecstatic maiden for many months. Very definitely a desirable present for the ladies!

on Columbia DB1205 with amazing virility (he is seventy-six!). "Tom" is a wonderful effort, indeed. Two songs of the countryside, *The Merry Go Round* and *When the Harvest's In* (Columbia DB1204), are more than safe with Harold Williams. I like the latter one immensely in its class.

If you like old tunes "vocalised," I can assure you that that very charming radio favourite, Anona Winn, has a treat for you in *Rendezvous* and *Hearts and Flowers*, on Columbia DB1203. Her clear, pleasant voice is most enjoyable.

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