POWER MODEL AIRCRAFT

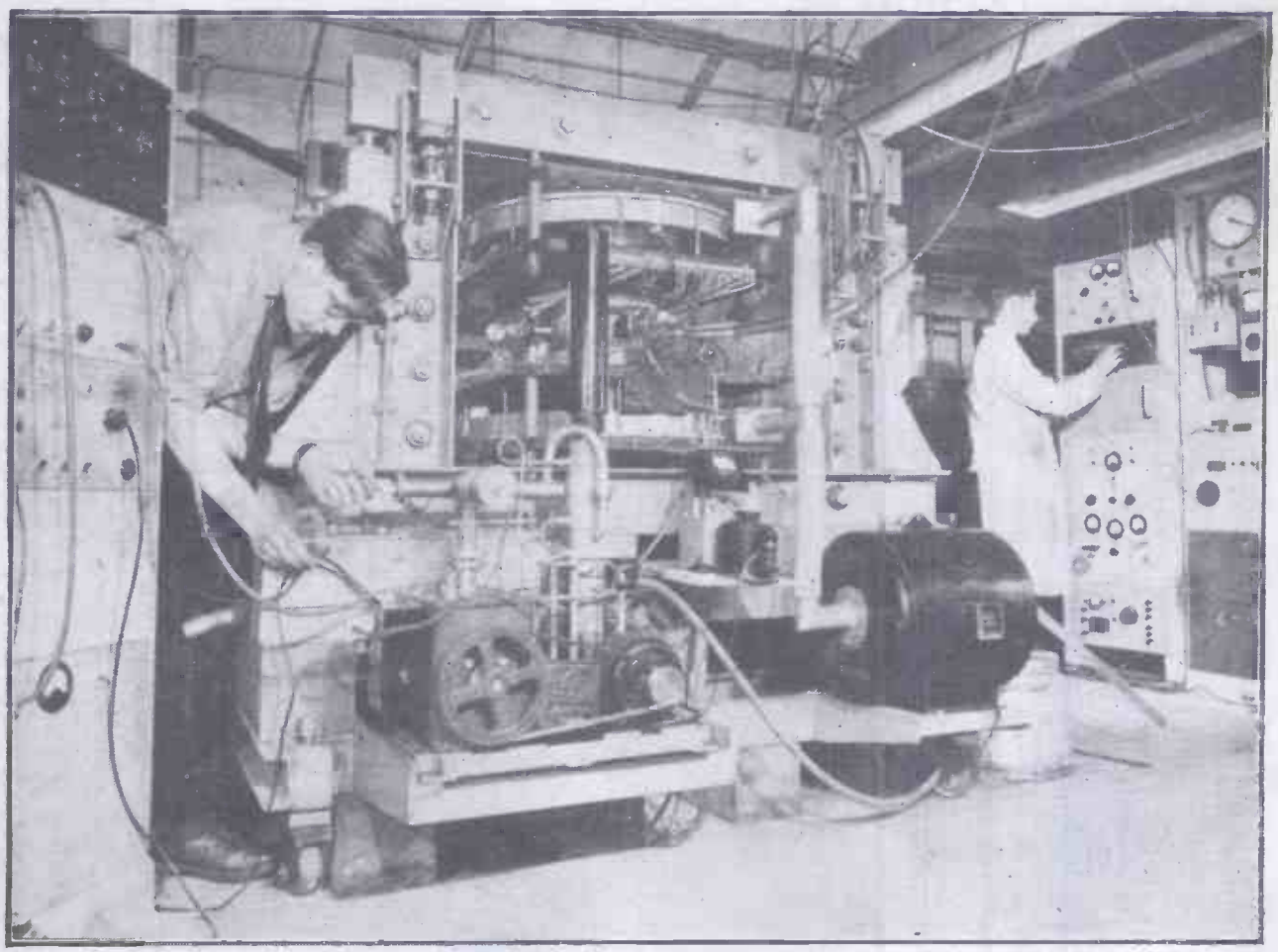
NEWNES

PRACTICAL MECHANICS

9D

EDITOR = F. J. CAMM

SEPTEMBER 1948



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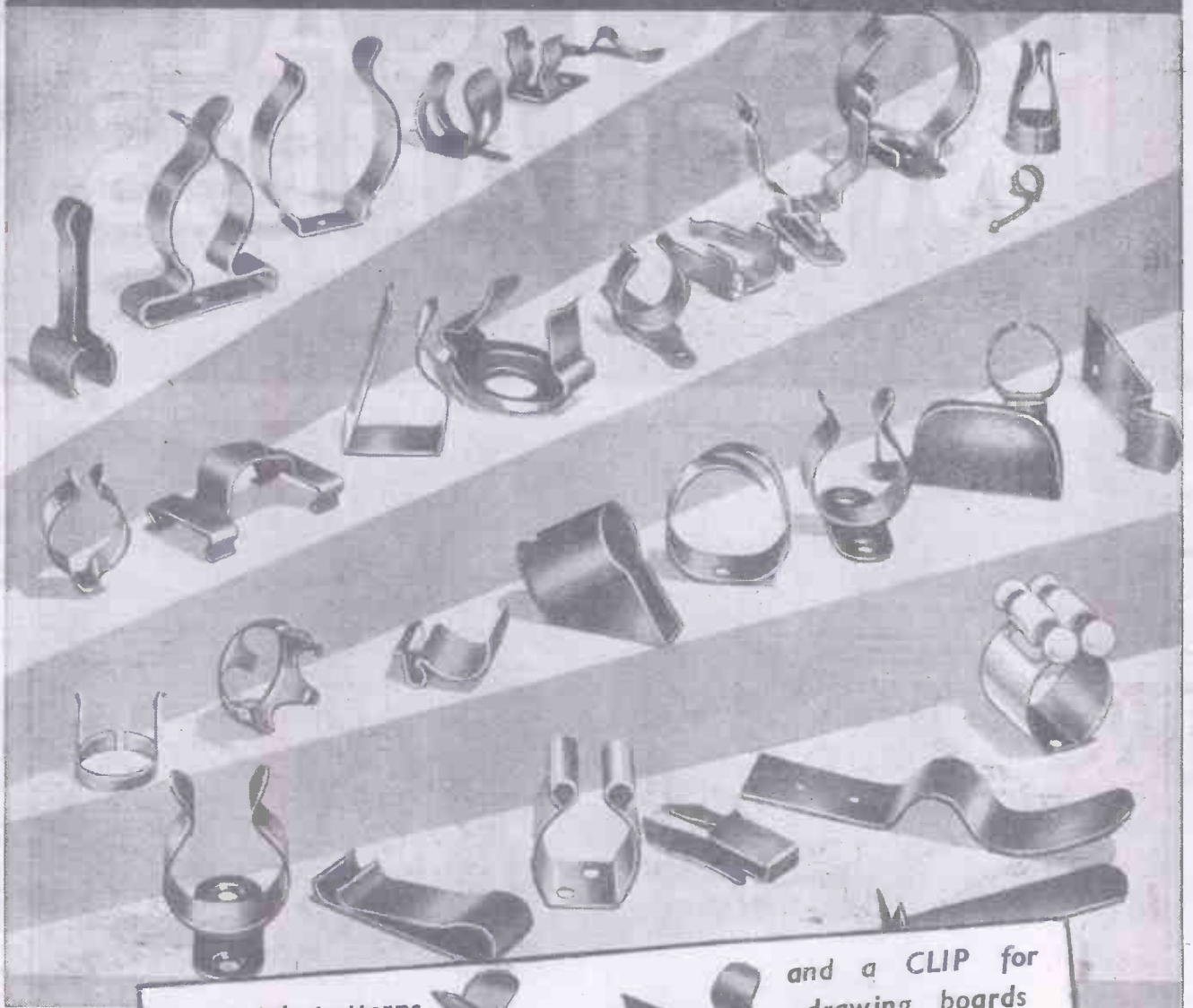

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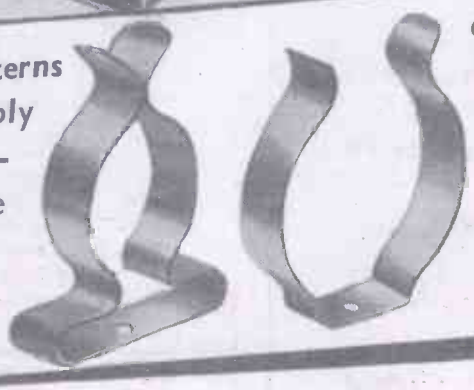

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PRACTICAL MECHANICS

Owing to the paper shortage "The Cyclist," "Practical Motorist," and "Home Movies" are temporarily incorporated.

Editor: F. J. CAMM

VOL. XV SEPTEMBER, 1948 No. 179

FAIR COMMENT

By THE EDITOR

More About Inventions

IN a previous issue I dealt with the New Inventions Bill and drew attention to the long delays which occur in the grant of a patent. I suggested that the time was opportune to overhaul and reorganise the archaic machinery of the Patent Office, and that patent fees are in need of revision.

Two of my friends closely associated with inventors, Sir Arrol Moir and Prof. A. M. Low, have written to me on the subject. Sir Arrol congratulates the Government on its new Bill which will assist in the development of the inventive talent and help to keep ideas worthy of industrial development within the Mother Country and the British Empire, selling them to other countries after full development at a price equal to their work instead of allowing many of them to go abroad for some other country to reap the creative as well as the financial credit for them.

During the first World War Sir Arrol's father, the late Sir Ernest W. Moir, formed the inventions branch of the Ministry of Munitions. Although many ideas were sent in only about 5 per cent. were worth attention. These inventions, of course, related to methods of destroying the enemy. In peacetime the subject field is far greater, and there is the element of opposition from established trades.

A Suggested Organisation

Sir Arrol suggests an organisation divided into three main sections.

(1) Investigation for selection or rejection with a sound unbiased report. The introduction of those selected to trade at home or abroad through the medium of correspondence, interview and exhibition, the latter to be in the order of about four per annum given in twelve industrial centres, thus providing each with an exhibition once in three or four years.

(2) Practical and theoretical investigation of ideas, which have started wrong in commerce, on a cost plus per cent. basis of contract; the means by which the Mellon Institute built up its financial strength in just over a quarter of a century, moving into a building bigger than Buckingham Palace at the beginning of the second World War, turning work away, together with the carrying out of the research necessary to the development of some inventions, which is definitely different to the research necessary for the maintenance and improvement of established constructive commerce.

(3) The collection and tabulation, for quick and economic distribution, of current data published in the best of technical and commercial periodicals, and provided by our technical institutions and similar bodies in lectures and discussions.

The Institute of Patentees

All this can be achieved by the co-operation of our existing public bodies, the results being submitted to our new Government Department for adaptation and financial assistance as thought fit.

Section 1 could be undertaken by the Institute of Patentees, a public body which has been in existence for this kind of work since 1919. Enlargement and recognition is all that is required, as its basic principles are correct and the work done for its members active and extensive, although hampered by lack of support from industry and inventors whose ideas are sure of recognition and capital achievement. Co-operation with the patent agents and other public bodies could be extended to the advantage of all.

Section 2 could be undertaken by the Departments of Scientific and Industrial Research and Universities on a contract basis, assisted financially by the new Government Department when thought fit by the Board of Trade.

Section 3 could be achieved by our various technical and commercial institutions adopting a loose-leaf system of analysis of the best of current publications on the subjects akin to the profession or trade that they represent, selling short abstracts under classified headings at so much per sheet. A body like ASLIB could become a central collecting house for comparison with foreign publications once the system has become established. The extra work involved would only mean the addition of two or three intelligent personalities to the staff, and the money obtained would soon pay for the extra expense involved, with much to spare.

Probable Results

With such organisation and co-operation it can easily be seen that very soon results would more than pay for the cost of establishment and subject maintenance, and, with the Government financial backing, would be well provided for.

The finance provided by the Government could be amply covered by the profits of the Patent Office, which it is felt still run at a high figure, i.e., well over 50 per cent.

Suggestions Invited

These are a few preliminary notes put forward as shortly as possible to promote discussion, criticism and further suggestions on practical lines, which is the surest way to perfect the right and rapid development of a Government step, which will fill a long needed want, in the maintenance of the economic development of our export trade throughout the industrial world.

Professor A. M. Low, who is closely associated with the Institute of Patentees, writes making suggestions somewhat similar in character. The subject is an important one and I throw it open for discussion among my readers. Please mark envelopes "*Inventions*."

Power Model Aircraft—1

Control-line Models : Wing Sections : Small-sized Models

By C. E. BOWDEN, A.I.Mech.E.

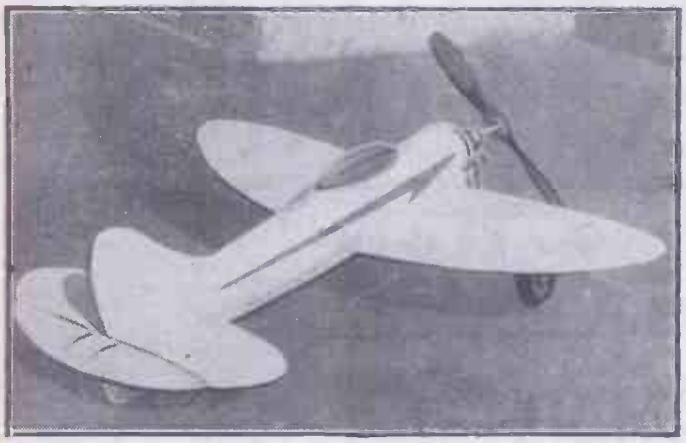


Fig. 2.—This little diesel-driven 18in. span model, fitted with thin, solid balsa wings, is tricky to land.

Control-line Models

THIS series of articles will deal with power model aircraft. This includes petrol, diesel and jet, free flight, control-line and waterplanes. I am starting off with control-line, for control-line flying has swept the American model world for the past few years, and is now intriguing people in our country.

High speeds of over 150 m.p.h. have been recently reached by the top line people in the U.S.A., and stunt flying has also been the order of the day. The winners of the stunt competitions put in as many hours practising as winning golf champions. Pure speed has a fascination for the engine enthusiast, but to the average modeller speed alone becomes rather boring and a trifle dizzy-making. There is a far greater thrill in controlling a model so that it performs spectacular figures in the air, something like the real thing. There is also a lot of fun to be got from mild stunting, allied to steady control-line flying, as a side line to free flight.

The fact that the pilot is limited by his length of line and having to fly around a circle definitely limits the thrill, but, nevertheless, there is a great stimulation to be got out of skilful control-line flying, and as an old "full size" pilot I can assure any reader who has not yet tried this form of fun that there is a very real kick to be had from measuring one's skill in flying a model at the end of control-lines, provided the model is a sound one and properly balanced. For one thing, the model's reactions to the "stick" movements can be seen even better than when flying a full-sized aeroplane. There is the background of trees, etc., to set off the manœuvres.

There are many different types of model aircraft that can be control-lined, although I regret to note that most of the model designers, and journals, too, foster one type only, which to my mind loses half the charm of experiment. One can, for instance, rig up a really large model of 8ft. span and fly it slowly fitted with wing tip slots and even flaps, or one can fly a little screamer round at terrific scale speeds, powered by a large motor. One can try out many ideas which can be watched closely when control-line flying, as well as observing the effect of different wing sections, different pitch propellers at take off and during flight. Retractable undercarriages that work, bombs that can be dropped, and balloon bursting can all be indulged in. There is a first-class view by the pilot from inside the circle. There is also a method that allows the pilot to control the model from outside the circle, but we will content ourselves in this description with direct control from the centre of the circle so that newcomers to the game can easily grasp it.

It should be mentioned that all the above points form useful data when designing free flight models. Control-line flying particularly suits the scale enthusiast, for practically any full-sized aircraft can be scaled down and will fly successfully as a control-liner. Lateral stability is taken care of by the outward pull on the lines, due to centrifugal force, and all the pilot has to worry about for the safe handling of his cherished scale job is the manipulation of his elevator for fore and aft stability.

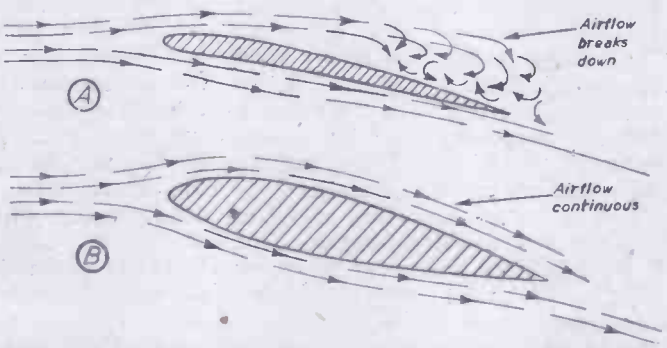


Fig. 1.—Control-line Wing Sections. (A) The solid balsa thin wing is critical and air flow easily breaks down at other than low angles of incidence. (B) The "thick" symmetrical wing section (built-up) is far less critical—flies with greater smoothness of control, is faster and lands better. Is now used almost universally in America for speed and stunt models.

"Stunt" Flying

The Americans started control-line flying, and we in this country are now rapidly becoming enthusiasts for the sport. There is still, however, a great deal of misconception over the subject in some quarters over here. As the Americans have put in a great deal of time on the subject, and have got leading results in speed and stunting, it behoves

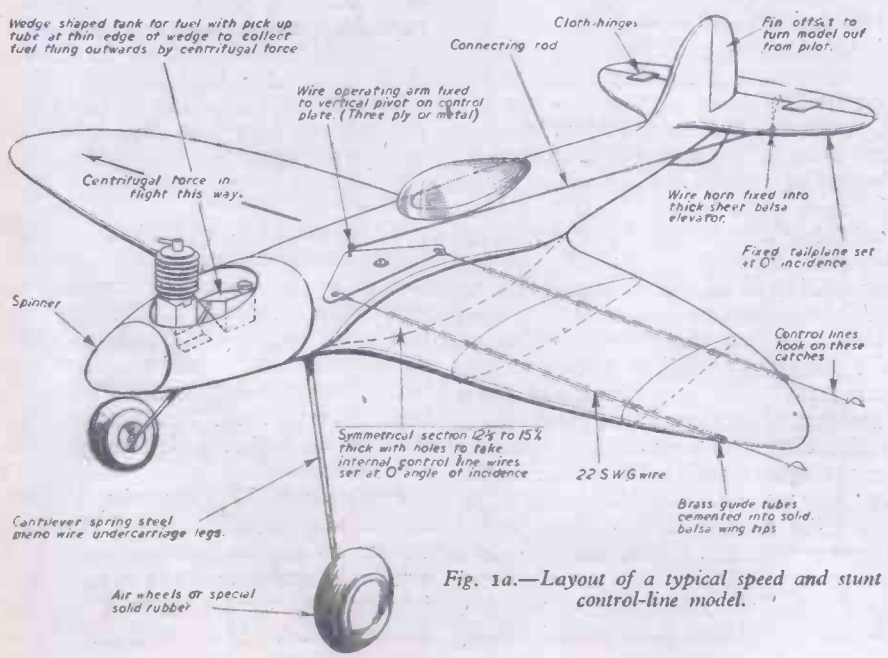


Fig. 1a.—Layout of a typical speed and stunt control-line model.

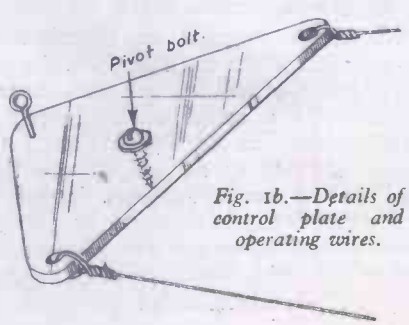


Fig. 1b.—Details of control plate and operating wires.

us to study their methods that have been evolved from hard experience. We are really only feeling our way over here. The Society of Aeronautical Engineers, the governing body of model aeronautics in Great Britain, have recently got out rules for control-line contests and speed records, which will add incentives and provide standards to aim at. The lack of really "hot" motors of the larger size in Britain is our trouble at the moment. Except for those of us who happen to be the fortunate possessors of the larger American motors which have been highly developed for this sport, and model car racing, we are short of suitable engines to catch up the all-out speeds that the Americans have attained. There are, however, one or two large motors on American lines being developed here now, and we do definitely excel in well-developed small and medium-sized diesels, which make very useful power units for the smaller control line models. Again, we are coming along with the glow-plug motor, which, like the diesel, has the advantage of great simplicity, as well as cutting out the weight of ignition gear when in flight. I will deal with this form of motor later.

At the British Nationals this year some really first-class stunt control-line flying was attained by entrants using the small type British diesels. Peter Cock won first place with a 2 c.c. E.D. diesel "Competition" model. His stunts included five consecutive loops, outside loops, figure eights, and two laps of inverted flying. That repertoire is not too bad when using such limited horse-power. The second place was gained by D. Allen, using a 10 c.c. American Super Cyclone petrol motor, the model weighing 28 oz. The motor was mounted with its cylinder on its side.

I am fortunate in having a suitable garden control-line circuit on a close-cropped lawn, so that I can fly whenever opportunity and inclination dictate. A convenient summer house beside the flying ground acts as a nearby hangar. Thus no time is wasted, and there is always the temptation at hand to fly, and many people visit me with flying aspirations. All this leads to many new designs and plenty of practice, kept stimulated by having access to the doings on the other side of the Atlantic, where control-lining is really a hot number! Although speed and stunting are the chief preoccupation over there, which puts us on to many valuable ideas in design, I feel that there are many other sides to control lining that suit the natives of this less highly specialised land. For instance, general purpose and scale models, and experimental machines all intrigue. These offer a great deal of interest and fun to newcomers to control-line flying, and, indeed, to many a free flight enthusiast who only takes to control line work as a side-line, for, in my opinion, free flight takes a lot of beating, because of its adventurous uncertainty of where the flight is going to take the model. Once one has mastered C.L. flying it is more a matter of trying new models that one has conceived, unless, of course, one aspires to become a stunt champion, when daily practice will keep one's nose to the grindstone of ambition.

It is usual to find that a newcomer to control lining starts off with a small model, and this soon grows to more power and greater size. Anyway, I propose to discuss various aspects of control line models, and not limit myself to only one type. Our new friends can then decide for themselves what most interests them.

Wing Sections

Before one starts control-lining it is essential to decide on the type of performance that is required; the size of engine and model, and particularly the kind of wing section. I seldom see this wing-section business made much of in British journals, and yet it makes or mars a control-line model. It makes the model's performance, and particularly it makes flying, easy or difficult. So let us first understand what a particular wing section does, and then we can proceed with detail design and operation. There are many people in this country who design and even fly quite extensively, and have not yet learnt the American lesson of the importance of wing section for control-line flying. It was at first thought that a control-line model should have a very high wing loading as in full-sized fighter aircraft practice. Centrifugal force loads were overlooked. The thin wing of the "flat plate" variety was thought to be the thing and often still is. As a result, most of the early models had heavy fuselages, very small and very thin solid balsa wings, which led to many people dubbing a control-line model as a brick being whirled on the end of a line. If a good wing section is fitted there is no feeling of such an elementary article in operation.

Most aero-modellers will know that a "flat plate" type of wing is critical to angles of incidence. The air flow soon breaks down at even slightly coarse angles, and then lift becomes uncertain and drag sets in. Drag *pulls up a model aircraft*, and makes it fly badly and with uncertain control. Furthermore when landing time arrives and speed drops, the lift dies suddenly, and the model drops like the proverbial brick. How often I have seen modellers turn their cherished model over onto its back when landing, and they accept this as a necessary part of the game. Also what a frequent sight it is to observe a model with a touchy, wavy flight path. None of these things need happen if a good wing section of nearly symmetrical or completely symmetrical shape is used. The latter is best for a speed machine, and the former for other types. The section must be fairly thick.

The Americans now use this type of section on all their real speed and stunt models. Since I tried the section I find the "flat plate" solid wing is dull to fly and difficult to land, and I have therefore discarded it for my own models. The advantages, sweet landing, and excellent handling features of the thicker symmetrical wing with a real section make such a vast difference to enjoyment of control-line flying.

Fig. 3.—The small model shown has the same wing span as the machine seen in Fig. 2, but has the advantage of a thicker built-up wing section, and as a result flies under better control with greater speed range, and lands well. It is also faster. (See Fig. 1 for reasons.)

The thin wing made of solid balsa is useful for quick construction, and often for cheapness to suit certain kit models, but otherwise the keen modeller will do well to take a leaf out of the American book of experience, and use a "section." The illustration, Fig. 1, will make the section idea clear. Should a really slow flying model of the converted free-flight type be required, a normal free-flight section is suitable. In these cases I use a Clark Y or my own special section C.E.B.—8.

The construction of a built-up sectioned wing is not difficult if done on the system described later in this article. The accompanying photographs will iron out any doubts the reader may have. Let us sum up by saying that small models can be quickly produced with the solid wing sanded to a thin section of the almost "flat plate" type, but that larger models are far superior flying machines if the thicker symmetrical, or nearly symmetrical sectioned wing is used. Even small models are usually nicer to fly when fitted with the latter kind of wing, with its built-up thicker section, and in America, the birth place of control-line flying, this section is used on all hot models irrespective of size. I have just completed a really tiny hot little speed model that flies delightfully, with a built-up wing, and powered by the famous baby American Arden glow-plug engine of terrific performance and light weight.

Fig. 2 shows a little solid balsa-winged model fitted with a 1 c.c. diesel. The wing span is 18in. This model is difficult to land without a fairly frequent turn over onto its back and an occasional propeller break up, even when the pilot is experienced, whereas the same span model fitted with a wing section, as seen in Fig. 3, can be relied upon

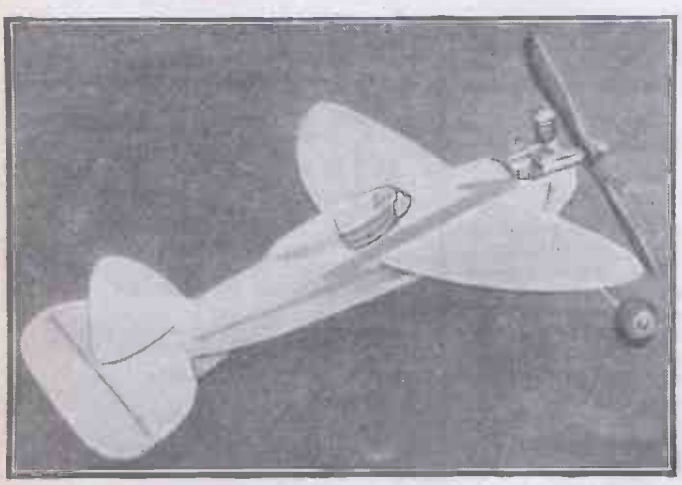


Fig. 4.—Here we have a small 15in. span control line model fitted with a tiny 0.8 c.c. AMCO diesel engine. This model of the writer's was made in a couple of evenings from solid balsa. The component parts can be seen in Fig. 5.

to land right side up on all reasonable occasions, and furthermore the model is faster, although approximately the same dimensions and provided with a motor of the same power.

Weight

Weight must be considered, particularly if the reader wants to try manoeuvres like looping, which can be done even with small motors around the 1 c.c. diesel size, such as the "Frog 100," and the "Mills" 1-3 c.c. engines. A heavy model flies in a groove and requires considerably more energy, due to inertia, to move it rapidly from its path when stunting. So if the reader wishes to stunt fly he should design and build light, within reason. This does not suggest that we should build horrid paper-covered rubber duration affairs. Such models will spend most of their lives under repair or on the rubbish heap as crashed wreckage. It is quite possible to build a model lightly and yet robustly as explained in this article. "Paper bag" models are necessary for the smaller rubber duration models but show a lack of designing skill and experience when applied to power.

Small-sized Models

When considering sizes of models we must speak broadly, but it is possible to give rough indications. These dimensions will naturally vary according to design. Let us look at a few general examples of control-line model pictorially. This will help the newcomer to control-line work to get a sound impression. We have seen examples of 18in. and the even smaller 15in. models. The next popular size is the 24in. span model. This makes an excellent general purpose type of small model that is easy to transport and can be powered by motors that can be easily obtained in Britain, between 1 c.c. to 2·5 c.c. The size gives us a range of many suitable and popular engines such as the Frog 100, 1 c.c. diesel or the larger Frog 180 diesel, the Mills 1-3 c.c. diesel, the E.D. 2 c.c., and the E.D. 2-4 c.c. Mark III diesels. The Majesco 2-2 c.c. diesel and a number of other diesels around these capacities are also well developed in Britain today. Then there is the Frog 160 glow-plug motor, and the E.D. Mark III which is also supplied as a glow-plug motor, and of course those fortunates who have a choice of American engines can get many glow-plug types.

Fig. 6 shows a model that I developed for this range of engines and which has a wing section to provide for flying fast or slow to suit all kinds of people and yet provide a model with a modern streamlined new monocoque look! I call the model the "Bowden Bullet" and it has recently been put on the market as a kit. The model can be flown slowly with nose slightly up, but as soon as the nose is put down the speed rises assisted by its very clean aerodynamic form. The fuselage can be made from solid balsa or planked. The method of planking is shown later in these articles by photographs of the model under construction. The same model is also shown being built from solid balsa block for those who prefer this method. The block is, of course, hollowed out for lightness. Contrary to popular belief planking in my opinion is the most simple method, and therefore I chose it for the kit.

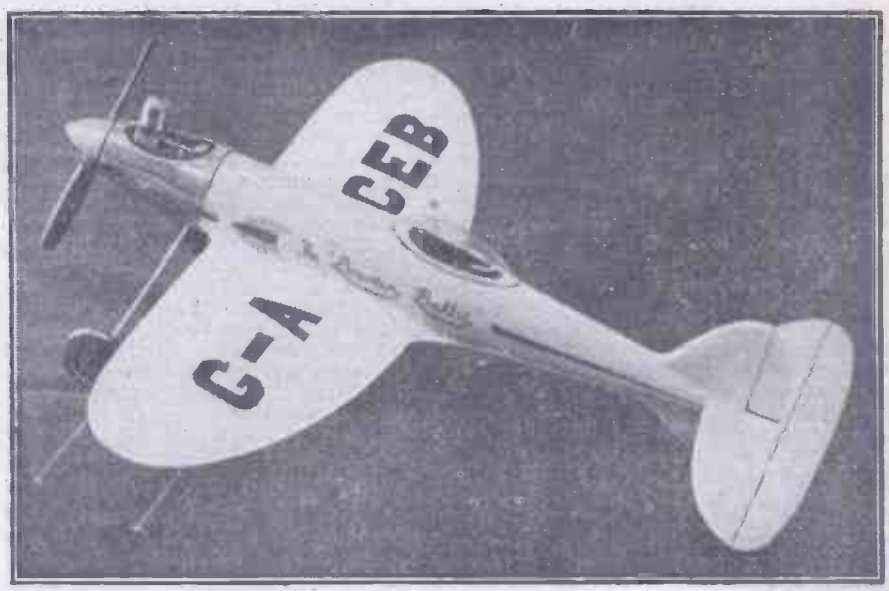


Fig. 6.—The writer's "Bowden Bullet" 24in. wing span monocoque control-liner is fitted with a wing section that gives a large speed range. The model can be flown slowly without dropping out of the air when landing time comes along, or it can be speeded up by merely manipulating the control line handle.

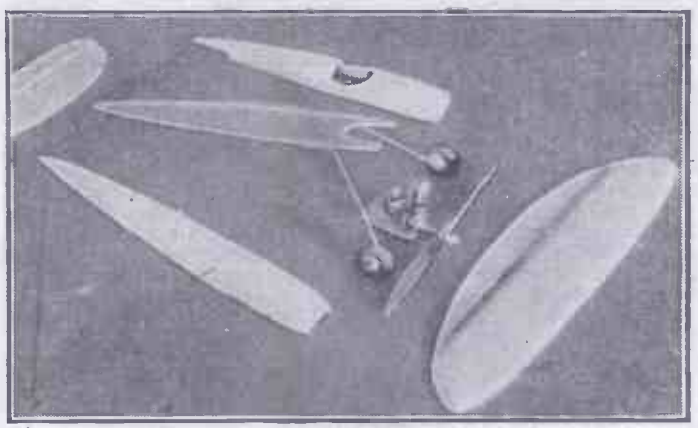


Fig. 5.—The baby model seen in Fig. 4 is here seen in its component parts when under construction. All parts are of solid balsa. Little models like this can be made very rapidly and can be flown in restricted spaces with short lines of about 25ft.

Before we resume discussion on the larger sizes of model, it is as well to explain points in connection with control-line length, for this affects the size of the model. Naturally a larger model has more weight which affects centrifugal force problems and suits a longer line.

Control-line Length

Control-line lengths of 30ft. are useful for the small model, thus giving the operator a circle of 60ft. across. Longer lines of 55 to 60ft. are best for stunt work when larger models are used, because it gives the pilot greater space in a skyward direction in which to manoeuvre. Lines of this greater length require a more powerful motor to overcome drag. People unused to control-line models do not realise how great the effect of line drag is. It has a very large bearing on the ultimate speed of a racing model. Thus for the longer line a 5 c.c. diesel or a 9 c.c. petrol or glow-plug motor is the minimum for efficiency. A small model finds difficulty in carrying the weight and drag of the longer lines, and so keeping them taut. Lines that are not taut lose control of the model and are quite useless. On the other hand too short lines make the operator dizzy and fail to give a sense of flying. The whole affair degenerates to the lump of lead on the end of a string status.

Speed models with large motors and jet models such as those using American Dynajet, which travel at speeds in excess of 100 m.p.h. should use wire-lines of 70 feet in length.

Provided a small model is built light it is quite possible to stunt it on the smaller lines of 30ft., although it means the operator has to do some smart stepping back on occasion to keep control.

Full Throttle

The best way to ensure that the model does not come in on the pilot is to fly with plenty of power at full throttle, when centrifugal force will do its work, and also matters can be assisted by offsetting the fin about 10 degrees outward against the circle. It is more effective and creates less drag to offset the entire fin than to have a trim tab which bends the air into undesirable eddies. In addition, it is advisable to have the motor looking slightly outwards. The latter can be altered so that there is just a nice steady pull on the lines. *The pull should not be overdone.*

(To be continued.)

Atomic Energy Research

Particulars of the New Research Establishment at Harwell

Atomic Energy Research Establishment. View showing two ex-R.A.F. hangars. A corner of the Chilton pre-fab site is on the right. (Crown copyright reserved.)

THE Ministry of Supply Atomic Energy Research Establishment was founded by a decision of the Government in November, 1945, and Professor Sir John D. Cockcroft was appointed director in January, 1946.

In order to provide a nucleus of accommodation and a prepared site, the permanent R.A.F. airfield of Harwell was allocated to the Establishment, and the building work began in April, 1946.

Harwell was chosen because of its convenient geographical location, combining reasonable access to London with nearness to a large university (Oxford), for it was considered to be important that staff should have good opportunities for discussions with university colleagues.

Workshop and Laboratories

The permanent buildings of the airfield are being very fully used. The four hangars house large machines and piles and a central workshop. All save two of the barrack blocks have been converted into laboratories for physics, chemistry and biology. The navigational trainers house a high-voltage generator, diffusion columns for the separation of isotopes, and chemical engineering work.

The "Link Trainer" houses the glass blowers; the airfield workshop is used for machining graphite to high precision, the water tower houses long columns for the production of "heavy carbon" for biological research.

In addition to this conversion of existing buildings, much new building has been done. Laboratories have been built along the sides of the great hangars. A large and very complex new laboratory is being built for work on the chemistry of radio-active materials. In addition, brick hutting of a semi-permanent character is being erected to provide early accommodation for metallurgical, health and medical work.

A good deal of living accommodation existed on the airfield. The Officers' and Sergeants' Messes and two converted barrack blocks house single staff. The 80 or so permanent houses have been supplemented by two colonies of 100 prefabs., whilst permanent houses are being built in the nearby towns of Abingdon and Wantage.

General view of the A.E.R.E. workshops, for which one of the hangars is used. The machine-shop is in the foreground. (Crown copyright reserved.)

The Establishment was designed to carry out fundamental research and development in atomic energy. It is responsible also for providing scientific and technical information to the Controller of Production of Atomic Energy, Lord Portal of Hungerford, and his engineering organisation at Risley, which is engaged in the construction of higher-powered piles in Cumberland for the production of plutonium.

Atomic Piles

The first requirement for an atomic energy programme of this nature is to build piles. The first pile, GLEEP (Graphite Low Energy Experimental Pile), a simple unit designed to develop about 100 kilowatts of heat, was completed in August, 1947. It is being used for measurement of the properties of atomic nuclei, for testing the nuclear properties of materials used in the construction of piles and for the production of radioactive isotopes for biological, medical, scientific and industrial research.

The second pile, BEPO (British Experimental Pile), was designed to develop 6,000 kilowatts of heat in its uranium metal bars. It is a slightly larger unit than Gleep but is a much more complex engineering structure. Owing to its 60 times larger power, the intensity of radiations inside is correspondingly higher and greater precautions have to be taken in its operation to prevent the escape of these radiations.

The large amount of heat developed is removed by swiftly moving air, which is sucked through the pile by a battery of fans and discharged through a high chimney stack. This pile will be used for testing the effect of pile radiations on the structural and physical properties of materials which will be used in future piles. It will be the main source of radioactive isotopes for this country, and will make it possible to extend the supply of isotopes to members of the British Commonwealth and other overseas countries.

Its higher intensity will make possible many investigations in nuclear physics and chemistry which are beyond the capacity of Gleep.

The work of the establishment also includes fundamental research in nuclear physics. For this work, several machines are being built for the acceleration of nuclear particles. A tower used by the R.A.F. for navigational training houses a "Van de Graaff" generator. This machine consists of a high pressure vessel housing a moving belt machine which can generate 5 million volts. Inside the vessel are vacuum tubes through which hydrogen nuclei are shot and speeded up. They emerge into a pit below, where they are used to study the properties of atomic nuclei. A cyclotron is being built in one of the larger hangars.

Production of Isotopes

In addition to radioactive isotopes, the Establishment will produce separated stable isotopes of many of the elements. An element, such as carbon, consists of two varieties,

having atomic weights of 12 and 13. The separate varieties, or "isotopes," have different nuclear properties, and it is often desirable to separate them for study. The separated isotopes are also of great use in biological and medical research since they are effectively labelled atoms, and the labels enable their life history in the body to be determined.

The Establishment is already producing separated isotopes of oxygen and carbon.

A small scale electro-magnetic separator for other elements has been built and a much larger instrument, capable of separating the isotopes of any elements, is being erected in one of the hangars.

The chemical and chemical engineering problems are amongst the most difficult in the atomic energy programme. When uranium metal is placed in a pile, the new element plutonium is produced, together with radioactive forms of at least 30 elements, the fission products. The plutonium has to be separated from uranium, and the intensely radioactive fission products.

This radioactivity, together with the toxicity of the plutonium, requires great precautions to be taken to protect the health of the chemists. For this work, a new radiochemical laboratory, locally known as the "hot laboratory," is being built. This provides methods of shielding the chemist from radiations whilst intense ventilation sweeps away any radioactive dusts, and prevents their inhalation.

Buildings are also being erected for chemical engineers who have to translate the work of the chemists into semi-scale work leading to full scale engineering plant. The chemical engineers have also to study methods of extraction of uranium from the many kinds of ores in which it is found in different parts of the world, and suitable equipment is being provided.

Electronic Instruments

An atomic energy project requires a great many electronic instruments. They are used for control of piles; for helping the work of radiochemists who follow their operations by measuring the radioactivity of their samples; for experiments in nuclear physics, and for the protection of health.

Portable instruments are at the hand of experimenters to check the radiation intensity they are exposed to; fixed instruments in laboratories record the total dose obtained by operators in a day and ring alarms if the dose rises to too high a value; instruments in wash rooms record the radioactivity on hands, shoes and coat, whilst long recording tubes by doors record any undue radioactivity as a chemist leaves a building.

A Health Physics Group is responsible for the monitoring of scientists and their laboratories for radioactivity and radiations. The group also measures the radioactivity in the effluent from the Establishment, and sees that it complies with the rigid specifications laid down by the Medical Research Council.

A Medical Division is responsible for the health of all workers in the Establishment. All are given a thorough medical examination on joining and this is repeated periodically. Workers exposed to radiation have their blood examined from time to time to see whether any change occurs in the number of cells due to undue exposure to radiation.

The Medical Research Council has established a radiobiological research unit at Harwell to carry out fundamental investigations into the effect of radiations on living matter. This group is now building up its facilities and staff. It will carry out researches on the possible effects on staff of continuous exposures to weak radiation as well as on the effects of large doses of radiation and possible countermeasures.

The work of the establishment is carried out by research divisions in theoretical physics, nuclear physics, general physics, chemistry, chemical engineering, engineering and metallurgy. Each of these is about the size of a large University research department and is directed by a scientist of the general standing of a University professor.

The problems of atomic energy are characterised by requiring the work of many sciences so that interdivisional working groups are formed for all major projects.

In addition to the technological problems of the establishment, a good deal of basic research is carried out which is non-secret. This work is discussed at non-secret scientific meetings and published freely. A weekly colloquium is held at Harwell, and about half of these are non-secret, and are attended by outside scientists.

The establishment has very close links with the universities and industry. Many senior members of the project during the war returned to take charge of university departments. These scientists are now consultants to Harwell and some of them serve on the technical committee which advises the Department of Atomic Energy.

300 Million Volt Synchrotrons

A group at Malvern is directing the development of synchrotrons producing electrons of energies up to 300 million volts. It has recently completed the construction of a linear accelerator which produces electrons of four million volt energy by pushing them along on the crest of a travelling electron wave.

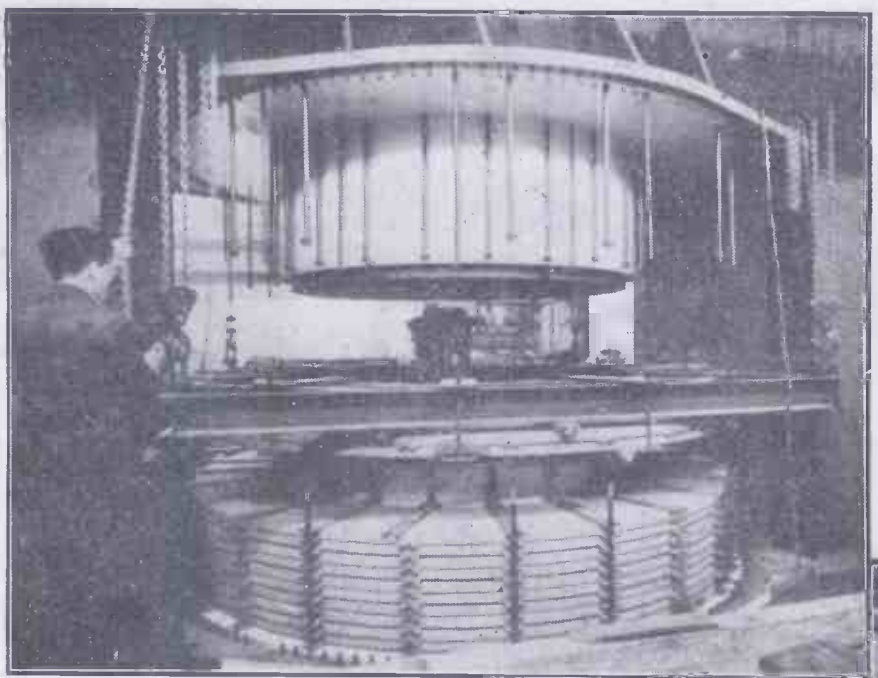
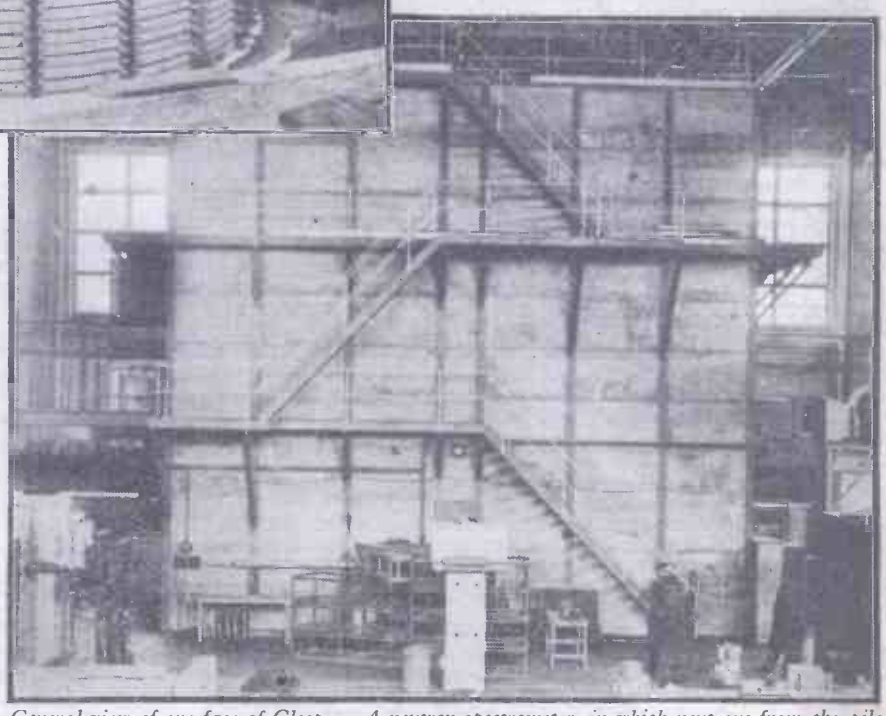


Fig. 3.—General view of the 110in. cyclotron magnet during erection. The magnet contains 700 tons of steel. Some of the copper windings have been installed on the lower pole. There will be six pairs on each pole when the magnet is completed, containing a total of 70 tons of copper. At maximum power, a current of 600 amps. at 500 volts is passed through the coils. The gap between the pole faces is 40in. and it is in this gap that protons or deuterons are accelerated. (Crown copyright reserved.)



General view of one face of Gleep. A neutron spectrometer, in which neutrons from the pile are diffracted by a crystal, can be seen in the foreground. (Crown copyright reserved.)

The Elements of Mechanics and Mechanisms—11

The Lever—Wheel and Axle—The Gear—Pulleys

By F. J. CAMM

TONGS and shears are double levers of the third order. In digging with a spade the latter is used as a lever of the first order, the back of the spade forming the fulcrum, the load of earth on its upper surface the weight, and the power being applied to the handle. A pair of pincers forms a double lever of the first order, the pin on which the two handles turn being the common fulcrum. The resistance is produced by the cohesion of the nails. When the nail is dragged out by pressing the pincers sideways the latter acts as a single lever, the resistance being caused by the friction of the wood against the nail, and the fulcrum being the point where the jaws rest upon the wood.

A good example of a lever of the first order is a pair of scales, which consist of a beam having equal arms. If weights of equal mass are suspended in each pan of the balance they will balance each other and the beam will assume a truly horizontal position. Most balances consist of a beam, a knife-edge fulcrum and, of course, the two pans suspended by means of chains. An index hand or pointer is sometimes secured to the centre of the beam, so that one may visually know when the two pans are equally balanced, or in equilibrium.

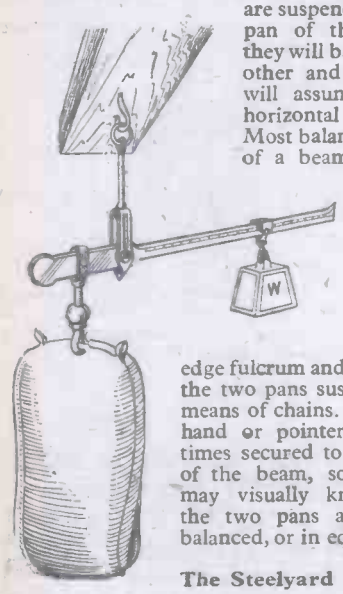


Fig. 1.—Beam scales—an example of a lever of the first order.

The Steelyard

Another example of a lever of the first order is the steelyard, in which the arms vary in length according to the mass of the substance which is being weighed. The ordinary steelyard, invented by the Romans, consists of a steel bar, suspended by a steel ring or hook, while a second steel ring carrying a hook is attached, as shown in Fig. 1. A weight slides along the steel bar and the distances between the weight suspended and the fulcrum, and the fulcrum and the balance weight varies according to the weight suspended. These two distances virtually form the two arms of the lever, and the length of the power arm can be increased by sliding the weight farther from the fulcrum.

The steelyard is, of course, graduated by experiment. There are many other forms of the steelyard, including the Danish, in which the weight or counterpoise is fixed at one end of the lever, while the fulcrum slides along the bar. The object to be weighed is suspended from the end and the fulcrum is moved along the bar until it produces equilibrium. The weight is indicated by the mark or line on the bar where the fulcrum is then situated.

Wheel and Axle

It should be obvious from what has been said that the lever is only practicable for moving a load through a comparatively small distance. If, however, we require to raise the same load from the ground to the top of a high building, the lever would not provide a suitable means of doing it. There are many other examples where the lever in the form in which it has been dealt with would be unsuitable. For example, we should not raise an anchor from the bottom of the ocean by means of a simple lever. So devices have been produced which are really adaptations of the lever, or *multiplying levers*. We could, for example, use a rope to connect the bucket at the bottom of a well with a lever resting on the top of a well, but with any simple lever, say 5ft. or 6ft. long, we should only be able to raise the bucket a few inches from the bottom. We have, therefore, to arrange matters so that when one lever has raised the bucket a few inches a second lever begins to operate, then a third and so on. From this simple explanation it will be seen that the spoked wheel provides the answer. Moreover, by the use of two wheels, one large and one small, we should be able to gain all the advantage obtained from using a large number of separate levers. In Fig. 2 will be seen a grooved wheel mounted upon an axle running in bearings or *plummer blocks*. A rope passes round the large wheel and another rope passes in the opposite direction round the small wheel or shaft. When power is applied to the large wheel it will cause it to rotate, thus carrying with it the axle on which is wound the second rope. It will be found that whatever weight is suspended from the large wheel will raise a much greater weight attached to the smaller. The lever in this case will be provided by the distance from the centre of the large pulley to the centre of the shaft, and the radius of the shaft, in other words, the leverage ratio will be the radii of the two shafts. The axis of rotation is, of course, the fulcrum. If we consider that the ratio of diameters is 3 : 1 we shall find that a weight of 1lb. applied at the circumference of the larger wheel will exactly balance a weight of 3lb. at the circumference of the smaller. If the weight at the circumference of the larger wheel is slightly increased it will cause the wheel to move round and the rope to uncoil, and in doing so it will cause the other rope to be coiled on the shaft and thus the larger weight will be raised. It will be clear, therefore, that a wheel and axle acts entirely as a lever of the first order. Once the wheel starts to move the action will continue until every part of the wheel and the axle has played its part as a lever, until, in fact, the weight is raised it touches the axle.

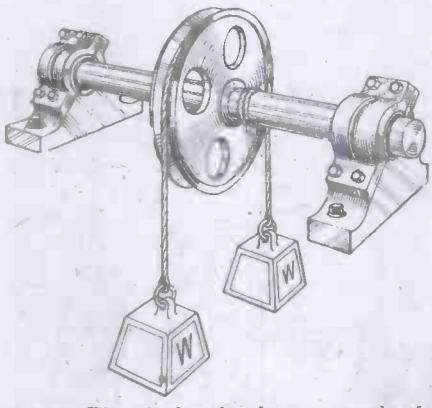


Fig. 2.—The wheel and axle, an example of a small weight lifting a larger.

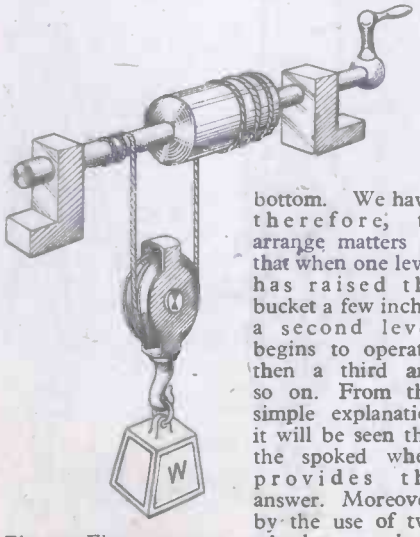


Fig. 3.—Elementary example of the differential wheel and axle.

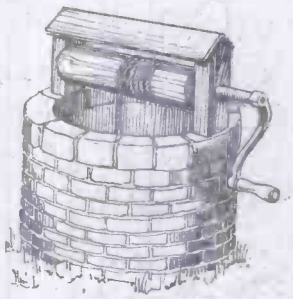


Fig. 4.—An example of the windlass, a form of the wheel and axle used for raising weights.

A windlass is a good example of the use of the wheel and axle. Such a device is used for raising water from a well (Fig. 4). The crank represents the radius of the large wheel, and when this is turned by muscular force it causes the rope to unwind or to wind up on the cylinder. The ratio of leverage, as before, is the ratio of the radii.

The capstan used on board ship for raising the anchor is a further example.

The Differential Wheel and Axle

Fig. 3 shows an elementary example of the differential wheel and axle. Now we can increase the power of the wheel and axle in two ways—by increasing the size of the wheel or by diminishing the diameter of the axle. Finally, of course, the wheel would become too large for practical application, or the axle would become too thin to carry the weight; so that if we require a small power to raise a

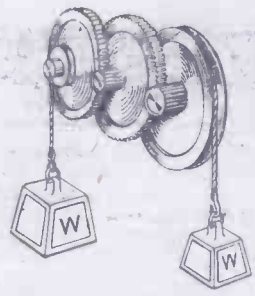


Fig. 5.—A train of wheels, showing how a small power or weight will balance a much larger weight.

great weight a *differential windlass or gear* must be used. An inspection of the diagram shows that the axle is of two diameters, the rope being coiled round the two parts in opposite directions, so that as it is uncoiled from one it is coiled on to the other.

The weight is suspended from a pulley, and when power is applied to the handle or crank (which represents the radius of the wheel) and the bar is revolved one complete revolution the weight will be raised by an amount equal to the difference between the radius of the large part of the axle and the radius of the small.

The Fusee

In all watches and clocks, except those of the cheaper variety, the mainspring is coiled within a barrel. In some of the earlier watches, before the compensating balance was produced, the barrel was connected by a chain with the fusee (Fig. 6), which has a grooved conical body. The fusee is really a number of wheels of different sizes laid one upon the other, the largest being at the bottom. When the watch is wound up, the chain is wound on the fusee and the spring is closely wound within the barrel. As the spring uncoils it pulls on the chain, so revolving the fusee. The effect is the same as that due to a small force applied to the rim of a small wheel. As the spring uncoils, its strength diminishes, but the fusee moves round at the same speed, for although the actual force exerted by the spring is less, yet it has more leverage because it acts on the rim of the larger wheels as the spring unwinds. In this way the fusee is made to revolve with uniform speed, although the actual force applied to it by the mainspring gradually becomes less. The gear at the bottom of the fusee, of course, drives the works of the watch or clock.

The fusee is still fitted today to certain high-grade chronometer watches and clocks.

Fig. 6.—The mainspring balance and fusee as used in some watches and clocks to provide a varying leverage.

The Toothed Wheel

A large variety of mechanisms today make use of gears or toothed wheels for transmitting power from one shaft to another shaft. It is not necessary, however, in all cases for the wheels to have teeth. If the load is very light the wheels can be in the form of flat-faced pulleys, the circumferences of which are pressed into contact with one another and drive by means of friction. Indeed, one or two of the early motor-cars had friction gears instead of the toothed gearbox as we know it to-day.

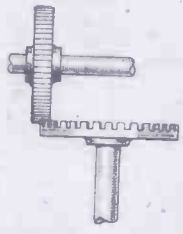


Fig. 8.—A crown and spur wheel gearing with one another.

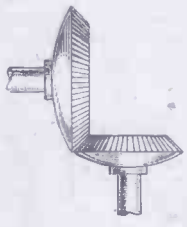


Fig. 9.—Bevel gears.

In factories machinery is driven by means of belted pulleys—a further example of gearing by means of friction drive (Fig. 7).

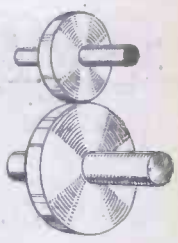


Fig. 7.—Friction pulleys.

The more usual method, however, of transmitting power from one wheel to another is by cutting teeth on the circumference of each wheel. Let us examine Fig. 5. It will be seen that this is a train of wheels with weight applied to the grooved pulley on the right. The power is transmitted by the first pinion to the first gearwheel which carries another pinion meshing with another gearwheel. If the first pinion has five teeth, and the first gear 25 teeth, it will be obvious that the first gear will turn round once for every five turns of the first pinion. If the second pinion has five teeth, this will revolve five times for every one revolution of the final gear.

Now, as the formula for calculating the ratio of gear trains is :

$$\frac{\text{Drivers multiplied together}}{\text{Driven multiplied together}},$$

it is obvious in this case the ratio it $\frac{1}{25}$

Such an arrangement would be called a compound train of gears, since it consists of more than one pinion and one gear; the smaller gear of two meshing gears is always called the *pinion*. Compound trains are always employed when a single pair of gears would be too unwieldy to accommodate in a given space. For example, if we required a reduction ratio of 25 : 1 and calculation showed that a pinion of 1in. in diameter would be necessary, we should require a gearwheel 25in. in diameter to obtain the correct ratio. So we should use two pinions and two gears having a 5 : 1 ratio, and as

$$\frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$$

we have obtained the desired reduction ratio by the use of smaller gears.

The wheel and axle, as we have seen, is an example of a continuous lever, and applying what we have learned about the lever we can see that a force of 1lb. applied in the case cited would exert a force of 25lb. on the axle on the final drive. The power may be still further increased by letting it

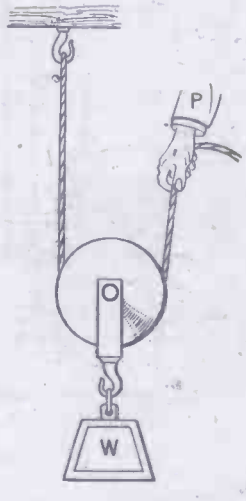


Fig. 10.—Movable pulley.

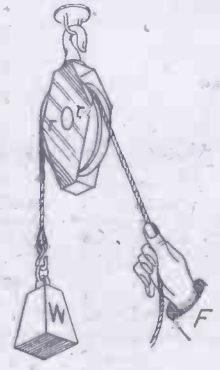


Fig. 11.—Single fixed pulley.

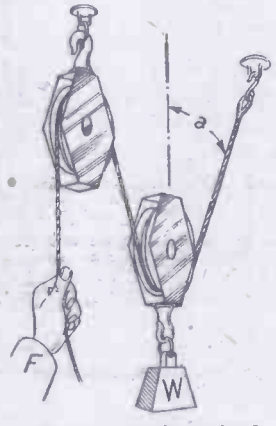


Fig. 12.—Oblique fixed pulleys used together.

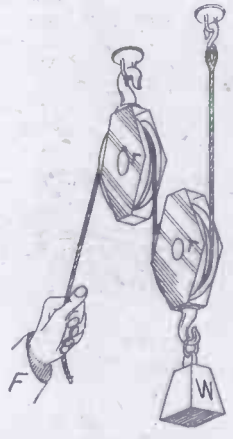


Fig. 13.—Fixed and movable pulleys used together.

Fig. 14.—Double movable pulley.

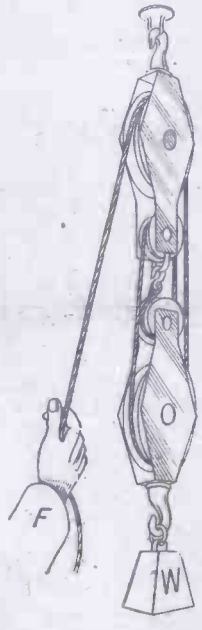


Fig. 15.—Another double movable pulley.

act on the circumference of a pulley attached to the first driving pinion, and if this pulley is five times the diameter of the pinion, the final force exerted will be 125 lb., ignoring frictional losses, of course.

Now there is a rule for finding the relation between the power and the weight in a train of wheels. Since in any train of wheels the number of teeth on any wheel is proportional to its radius, we can find out the relation between the power and the weight when there is equilibrium *by multiplying together the number of teeth on the wheels and also those on the pinions, and then dividing the former by the latter.*

When the teeth are at right angles to the axle the wheel is called a *spur wheel.* If they are placed parallel to the axle it is called a *crown wheel* (see Fig. 8). By the use of two such wheels force can be transmitted at right angles, but by the use of bevel gears (Fig. 9) in which the teeth are inclined to the axis the force may be transmitted at any angle.

Rack and Pinion

In some scientific instruments, such as cameras and microscopes, the tubes are moved in and out by means of a rack and pinion. The rack is a toothed bar, and it may be considered as part of a gear of infinite radius, since a part of the circumference of a gear of infinite radius would be for all practical purposes a straight line. Some jacks, as used for hoisting weights, make use of a rack and pinion.

There are many forms of gears which will be dealt with later on.

The Pulley

We have already seen that by means of a rope we can alter the point of application of a force. Usually a rope is employed to change the direction of the force and its magnitude. It is often necessary, for example, to raise weights from the ground to a considerable height. We could tie the end of the rope to the weight and throw the other end over a beam and then pull on the end of the rope, thus changing the point of application of the force as well as its direction. But there would be considerable loss of power due to friction over the beam, and that is why pulleys are employed. The wheel is called a *sheave*, whilst the framework in which the sheave revolves is called a *block.*

When the pulley as a whole remains in the same position (Fig. 11), while the weight is being moved, it is called a fixed pulley, for the sheave revolves but the block does not move up or down. There is no mechanical advantage in using a fixed pulley; it is purely a contrivance of convenience, for there is neither a gain of power nor speed.

When a weight is suspended by a single rope the tension of the rope is proportional to the weight, the weight pulling downwards with a certain force while the rope pulls upwards with an equal but opposite force. If we double the weight we shall double the tension of the rope.

Presume, however, that we hang the pulley up with two ropes or, what is tantamount, pass the lower end of a single rope round a pulley (Fig. 10) and suspend the rope from the pulley, then, if the two ropes hang parallel to each other, the tension of each will be equal to one-half of the weight. If we take hold of the free end of the rope and pull upwards, we shall thus be able to support a weight of 200lb. with a power of 100lb., and when the weight rises the pulley will rise with it. Hence, by using a movable pulley we have gained power. This gain is accompanied by a loss in space, because to raise the weight 1ft. we must shorten each side of the rope 1ft., and to do this the power applied must move upwards through a space of 2ft. Thus, what is gained in power is lost in space or speed, as we saw earlier

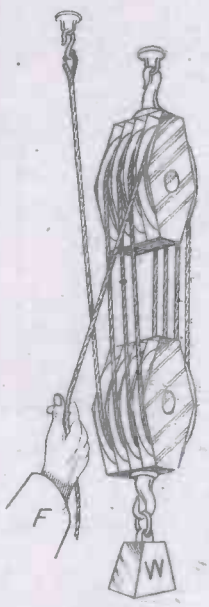


Fig. 16.—Multiple movable pulley.

Fig. 17.—First system of pulleys.

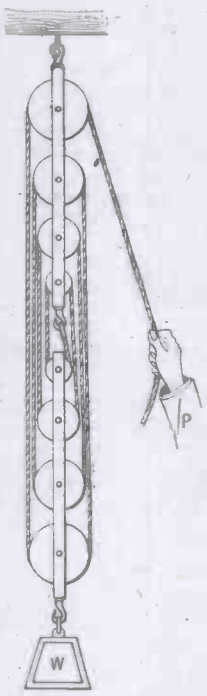


Fig. 18. — Second system of pulleys.

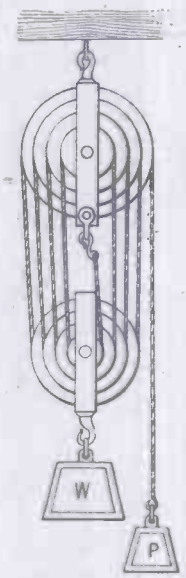


Fig. 19. — Another arrangement of the second system of pulleys.

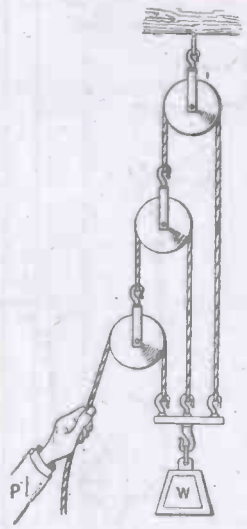


Fig. 20.—Third system of pulleys.

First System of Pulleys

We have already considered the three orders of levers and it is now necessary to study the three systems or combinations of pulleys. In the first system (Fig. 17) there are several movable pulleys with separate ropes, one end of each rope being attached to the supporting beam and the other to the next pulley. The topmost or fixed pulley can be ignored, since it does nothing more than to change the direction of the force. In such an arrangement, when there is equilibrium, the power need be only one-eighth of the weight, as will be seen from the following rule.

Let n represent the number of pulleys. Then:

$$W = P \times 2^n$$

Let the number of movable pulleys be three, then:

$$W = P \times 2^3$$
$$W = P \times 2 \times 2 \times 2$$
$$W = P \times 8$$

Hence, with three movable pulleys, any given power or force is able to support eight times as great a weight or resistance, ignoring friction. If the number of pulleys be increased to six, a given force or power would be able to support a weight 64 times as great—that is, 2 raised to the sixth power.

Second System of Movable Pulleys

This is shown in Fig. 18, from which it will be observed that the same rope passes round all the pulleys. As the tension of the rope is the same in every part, it will be noted that the weight is supported by eight ropes, so that each rope will only have to bear one-eighth of the weight and, consequently, the power applied need only be one-eighth of the weight in order to produce equilibrium. If n equals the number of ropes supporting the weight:

$$W = P \times n$$

In this diagram the pulleys for the sake of clarity are shown spaced apart. In actual practice, however, it is far more convenient to dispose them side by side as in Fig. 19, because it permits the weight to be raised through a considerable distance before it is stopped by the pulleys coming in contact with one another.

Third System of Movable Pulleys

Fig. 20 shows another way in which several movable pulleys may be employed to raise a weight. It will be seen that all the ropes are fastened to the weight by any convenient means. The other end of each rope passes over a pulley and is fastened to the pulley next to it. The weight is supported by the three ropes, but not equally by each one. If the power be 1lb., then the tension of the rope on each side of the lowest pulley is 1lb., but the tension of the next rope will be 2lb. on each side, and similarly the tension on the parts of the rope which passes round the high pulley will be 4lb.

Gas Water Heaters—2

Their Construction, Operation and Installation

By C. LANGFORD

(*Continued from page 363, August issue*)

IN a previous article we considered construction and operation of instantaneous gas water heaters in a very general way. It is the intention to delve rather more deeply into the intricacies of design in this article. Firstly, let us consider the automatic valve, which is divided into two sections: (1) the water section, and (2) the gas section. The water section offers a means of accepting water from the house supply (whether it be town's water or tank water), doing useful work with some of the water pressure and forcing the water through the body with most of the remaining pressure. The useful work which is done is correlating the flow of water and gas when a water-tap is turned on. Other objects which can be achieved in the water section are: adjustment of the water rate by means of a water throttle or water governor; a means of ensuring slow ignition of the gas supplied to the burner, thereby preventing rather disturbing minor explosions or "bangs." Another effect which can be obtained by means of using a water section is variation of temperature of the water whilst the heater is working. This occurs only in designs which incorporate a temperature selector.

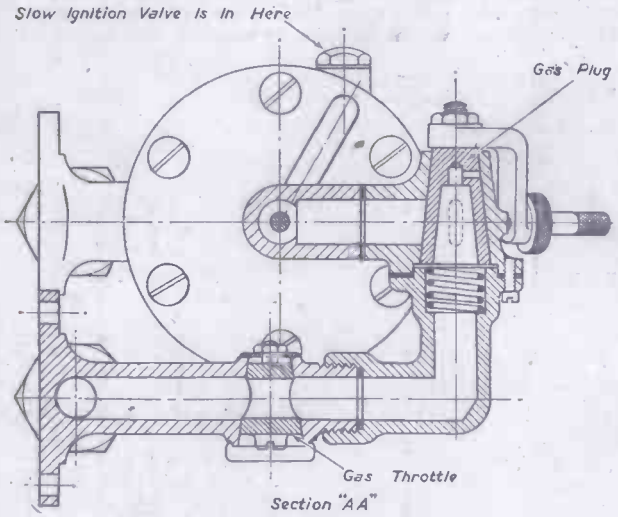


Fig. 6.—Section on line AA. (Fig. 7.)

Let us now pass to consideration of the gas section. This offers a means of accepting town's gas, ensuring that gas flows at the same time as water, and passing the gas on to the burner for ignition. Other objects achieved by the gas section are: adjustment of gas rate by means of a gas throttle or gas governor; also supply of by-pass gas to feed a pilot-light, which enables the burner to light immediately the main gas flow commences. The burner is considered as part of the gas section. Burners are generally of the luminous flame type, i.e., there is no primary air supply as, for instance, in the case of a bunsen burner. In the best designs of heater, the pilot is made to play on a bimetallic strip which, in turn, controls a safety valve. The effect is, of course, to cut off a supply of gas to the burner if the pilot flame should be extinguished.

Operational Details

It would be as well at this stage if we related the foregoing remarks to a particular design. This is shown in Fig. 7. Water enters the inlet and passes through a filter. It proceeds through a venturi along to a water throttle and so out via a union to the body. The slow-ignition valve is inserted in a passageway connecting the throat of the venturi with the water space above the diaphragm. The diaphragm is best made from a soft rubber. A plate on the top half of the diaphragm ensures that any movement is transmitted to the plunger, which passes through a stuffing box and then operates the gas valve. The principle of operation is this: water under pressure passes through the venturi; by Bernoulli's theorem, increase of velocity in the throat causes a decrease of pressure at that position. This decrease of pressure is transmitted to the space above the diaphragm, with the result that a pressure difference is set up between the bottom and top of the diaphragm. As the diaphragm is free to move, this causes an upward movement of the plate and of the plunger. The speed of this movement is controlled by the slow-ignition valve. A more detailed construction of the slow-ignition valve is shown in Fig. 7. It will be seen that a small ball is free to move in a closed tube, which has a hole at one end and some more holes on the periphery. When water is pushed from the top of the diaphragm, pressure and velocity cause the ball to seat on the hole in the end of the tube. Water is then forced past the small aperture left between the tapered portion on the outside of the tube and the step in the water section body. This aperture can be adjusted by means of a screw thread on the front portion of the valve. Adjustment is usually effected by screwdriver. When water flow ceases, i.e., when the tap is turned off, pressures on the top and bottom of the diaphragm become equalised. The gas valve spring then forces the diaphragm to assume its original position. This sucks back water into the space above the diaphragm. This action has to be accomplished as quickly as possible, and so the little ball is permitted to roll away from its seat and thus allow a greater volume of water to flow per second.

The water throttle can be incorporated in a number of ways, but its principle must be either that of the plug tap or the screw down tap. It is, therefore, not proposed to say any more about this component.

Gas Section

That brings us to the gas section. We have seen that when the hot water tap is turned on and water flows through the heater, a plunger in the water section operating through a stuffing box imparts motion to a spring-loaded gas valve. If we assume that the pilot light had previously been lit and that the main gas had been turned on, then gas is able to flow from the inlet through the filter and gas throttle, through the main gas plug past the gas valve, past the safety valve into the burner, then through the very small pin-holes in the burner (about 100 in a sink heater), whence it is ignited by the pilot flame. Some form of interlocking device between main gas and pilot gas is advisable. In the illustration this takes the form of a combined handle and spring-loaded plunger, which, when moved, rotates the gas plug and at the

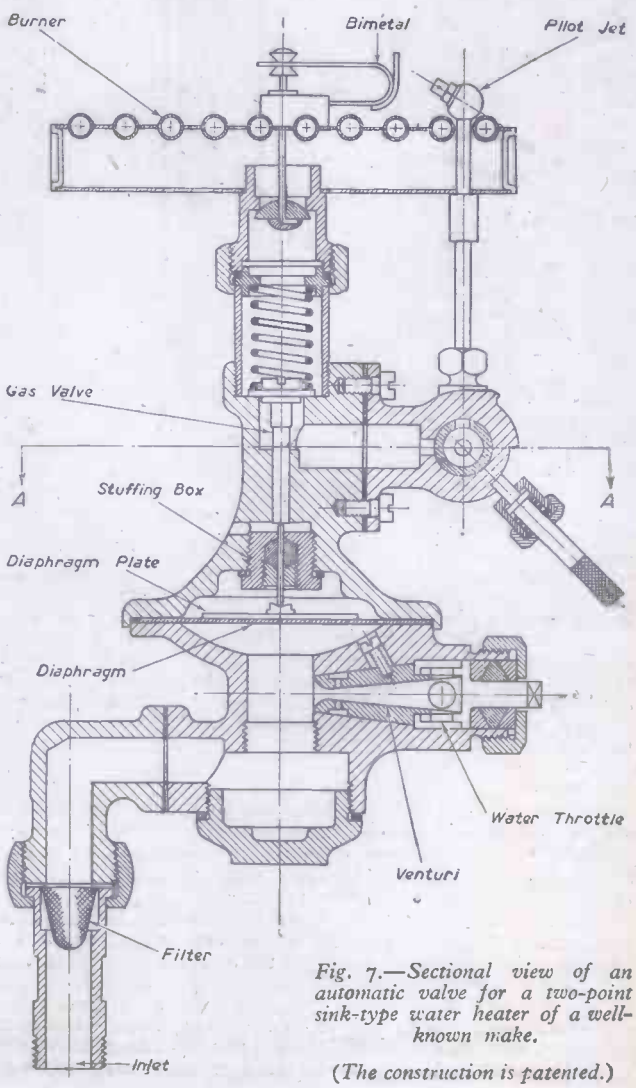


Fig. 7.—Sectional view of an automatic valve for a two-point sink-type water heater of a well-known make.

(The construction is patented.)

appropriate positions comes up against stops. At the "pilot on" position the handle needs to be pulled outwards when further angular movement is possible, thus permitting the main gas to be turned on.

When the pilot is lit it plays on a hairpin bimetal, the ends of which gradually close as the bimetal becomes hot. A valve spindle is connected to the top end whilst the bottom end is firmly secured to the burner. The effect, as the ends close, is to open the safety valve in the burner. This heating up process takes about half a minute and until the safety valve has opened the burner cannot function. The gas throttle consists of a tapered plug in a tapered housing. Through the plug is a hole equal to the bore of the inlet pipe. The plug can be rotated to effect adjustment in the gas rate. A screwdriver is needed to adjust the throttle (see Fig. 6). A cap ensures that after setting it is not easily interfered with. The gas plug supplies both main and pilot gas (it must be pointed out that this is not usual on all water heaters; most types embody separate main gas and pilot plugs, although one well-known make does incorporate a combined gas valve and main gas plug, as in Fig. 8). This gas plug should be spring-loaded and greased so as to prevent seizing.

There are one or two points of interest about this part of the gas section which should be mentioned before passing to consideration of the burner. One is that some means must be found for preventing water from entering the gas section if a leak should occur in the stuffing box above the gas section. For instance, a drilled hole can be used for this purpose. Another point is the rather accurate strength of spring required for the gas valve; too strong a spring means increased force to open the valve which, in turn, means increased head pressure to operate; too weak a spring means that the valve may not be returned to its seat.

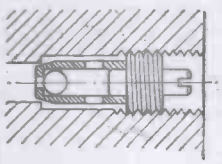


Fig. 8.—Section of the slow ignition valve.

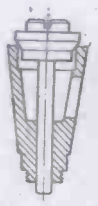


Fig. 9.—Combined gas valve and gas plug. (An "Ascot" patent.)

Consider another point. On the underside of the valve head is an enlarged diameter which almost coincides with the diameter of the gas passageway. This is made use of, together with the slow ignition valve in the water section, to ensure that no bang occurs when the burner lights up. There is, in fact, quite a distinct "two-stage" ignition.

The Burner

Now let us turn to the burner. This consists of a number of small pipes brazed together on to a horizontal main supply pipe. In the centre of this main supply pipe is an adaptor which enables the burner to be attached to the gas section by means of a union nut. This adaptor also contains the seating for the safety valve. As mentioned earlier in the article this safety valve is controlled by the movements of a hairpin bimetal and whether or not the bimetal moves depends upon the pilot light; if the pilot is alight the bimetal opens the valve; if it is out the bimetal closes the valve. The small tubes are drilled with very small holes (about .025in. diameter) whose spacing must be carefully determined with respect to air supply. The best way of doing this is by experiment.

The relative position of pilot and bimetal is of great importance because of the need easily to light it up. The pilot, shown in Fig. 7, is fixed to the burner because of the need for accurate positioning and also because of the reduced chance of damage when the burner is removed from the gas section. This can be done by unscrewing the large union nut on the main supply pipe, and also the small union nut on the pilot pipe. The observant reader may have wondered why the pilot head is tilted at an angle. The answer is that products of combustion falling from the body in the form of powder and small flakes tend in time to block up the very small hole in the pilot jet.

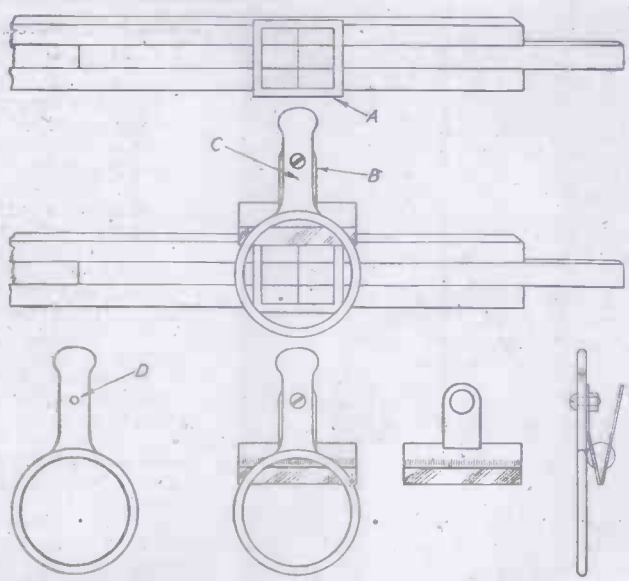
Consideration of the body must be left to a future article.

(To be continued)

A Slide Rule Magnifier

By H. D. SMITH

MOST slide rules on the market to-day have a noticeable fault, viz., the glass of the cursor slide (A) is not too clear, and some magnification of the same is needed if a slide rule is used a great deal. The gadget shown in the accompanying illustration remedies the defect. All that is needed is a small Perspex hand magnifying glass (C) about 1½in. diameter, and a paper clip (B) about 1½in. long. Most chain stores stock these commodities, and they are very cheap. Having procured the paper clip, place it on the cursor of the slide rule, then lay the magnifying glass on the slide rule and paper clip, note the position and drill the hole (D) to take a 4 B.A. screw and nut. The idea is so simple that, after a test is made, one finds that this gadget can be used for attaching to vernier calipers and other instruments where great accuracy in measurement is required.



Details of a simple magnifier attachment for a slide rule.

Aviation Notes

"Bristol" New Type 170

FIRST of three "Bristol" New Type 170 Mk. XXIA "mixed" version aircraft to be put into passenger and freight services with the Societe Indo-chinoise de Transports Aeriens, recently made its delivery flight to Saigon, Indo-China. The flight of 7,100 miles, with night halts at Athens, Baghdad, Bahrein, Sharjah, Karachi, Calcutta and Bangkok, was completed in 46 flying hours. Indo-China is another addition to the ever-growing list of countries where Type 170 aircraft are operating.

The need for an aircraft capable of carrying a mixed cargo of passengers and freight, yet convertible for a full payload of either, is admirably met by the Mk. XXIA which can be changed in a few minutes from a 32-seater air-liner to a freighter capable of lifting a payload of five tons.

The Handley Page Hastings

THE "Bristol" Hercules-engined Handley Page Hastings, which left England on March 11th last on a demonstration tour of Australia and New Zealand, has returned after approximately 160 flying hours, during which the aircraft covered more than 35,000 miles.

An outstanding feature of the flight was the consistently high cruising speed of the Hastings which, on the outbound flight, bettered by some hours the best time previously recorded by any aircraft operating the route on a regular air-line schedule.

An example of high-speed cruising was logged on the stage between Karachi and Ceylon when the aircraft, flying at an all-up weight of 77-78,000lb., covered the 1,790 miles in five hours ten minutes. This represented an average of 347 m.p.h. at 20,000ft. on an engine power of 1,000 to 1,050 b.h.p.

Other performance figures obtained during the flight reveal that at 10,000ft. a horse-power output of 800 per engine gave the aircraft—while loaded to the all-up weight—a true air speed of 249 m.p.h. or 185 knots.

An Ingenious Puzzle

THE puzzle described below became a world craze during the latter part of the last century. It was invented by Sam Loyd, who, like the late Henry Dudeney, was a self-taught mathematician with a kink for creating problems, puzzles and posers.

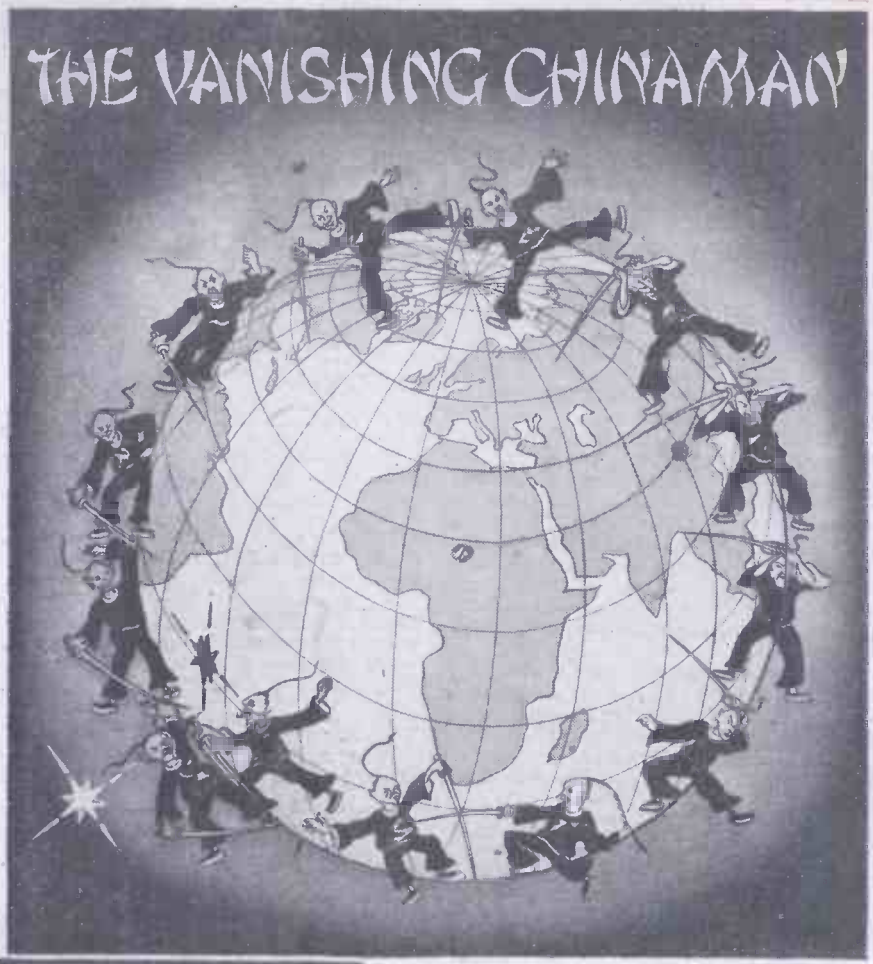
He contributed extensively to the magazines on the subject of puzzles, which were sometimes mechanical and sometimes mathematical. It was in 1896 that Loyd, who was then on the staff of the Brooklyn *Daily Eagle*, evolved, under the title of "Get Off the Earth Puzzle Mystery," the puzzle here shown.

A large prize was offered for the correct solution, but no one won it!

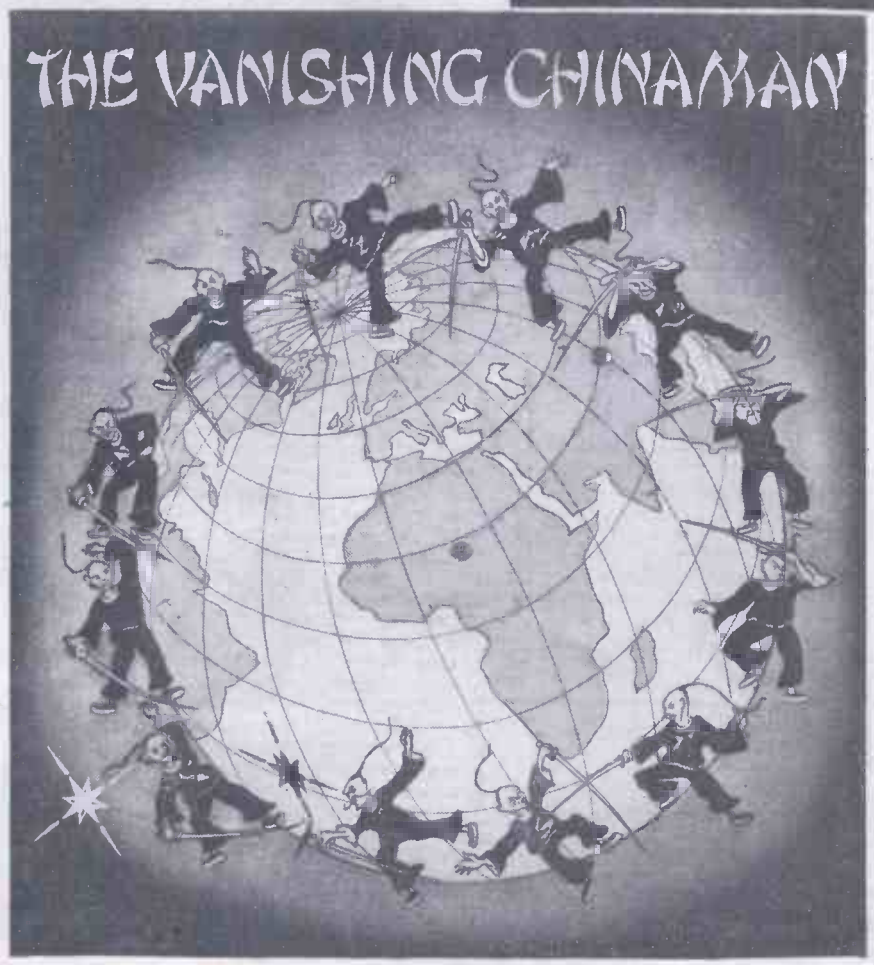
It will be seen that there is a disc of card eyeletted to a rectangular piece of card, and printed eccentrically around the disc are some Chinamen, part of each Chinaman appearing on the outer card and another part on the disc. In one position there are 12 Chinamen. When the disc is revolved around one-twelfth of a turn there are 13! Study their faces, their postures, their swords, pigtails, ears, or any other feature.

In one position there are 12 pairs of eyes, 12 pigtails, etc., and in the other 13. The puzzle is, where does the extra Chinaman come from!

The puzzle was launched at a time when there was great hostility towards the Chinese, and Loyd evolved the idea of his puzzle with the dual purpose of providing entertainment and drawing public attention to what was then termed the Yellow Peril. Many hundreds of thousands of these puzzles were sold, and Loyd must have made a good thing out of it. People could be seen in trams, buses and trains endeavouring to find the solution, and indulging in fierce arguments, often ending in blows. It was not until some years later that Loyd gave away the solution.



Thirteen Chinamen are here seen.



A slight turn of the disc and there are only twelve Chinamen.

Another of his puzzles was the famous "Fifteen Block Puzzle." A shallow tray about 4in. by 4in. contained 15 blocks each 1in. square, and numbered 1 to 15, leaving one vacant space so that the blocks could be shifted around. The puzzle was to place the blocks in higgledy-piggledy, and by sliding them around to get them into their correct numerical order in four rows: 1, 2, 3, 4; 5, 6, 7, 8; 9, 10, 11, 12; 13, 14, 15. Almost invariably, after a lot of juggling with the blocks, the first three rows could be got into order, but the last three would be in the order 15, 13, 14. Loyd offered a big prize to anyone who could solve that position. He was, of course, perfectly safe in doing so, since two transpositions are necessary in order to get the blocks in their correct order, and there is only one space in which to do it. Loyd had announced that the puzzle could be solved, and so it can by means of a trick. All the competitors had presumed that the figures in the blocks had to be arranged in their numerical order horizontally. When Loyd published the solution of the 15, 13, 14 position, it was found that they could be placed in their correct numerical order vertically!

But the puzzle here shown beat the "Fifteen Block Puzzle" in popularity, and it was helped on its way, as stated earlier, by the intense world hatred of the Chinese at that

time. Readers may care to make up one of these puzzles.

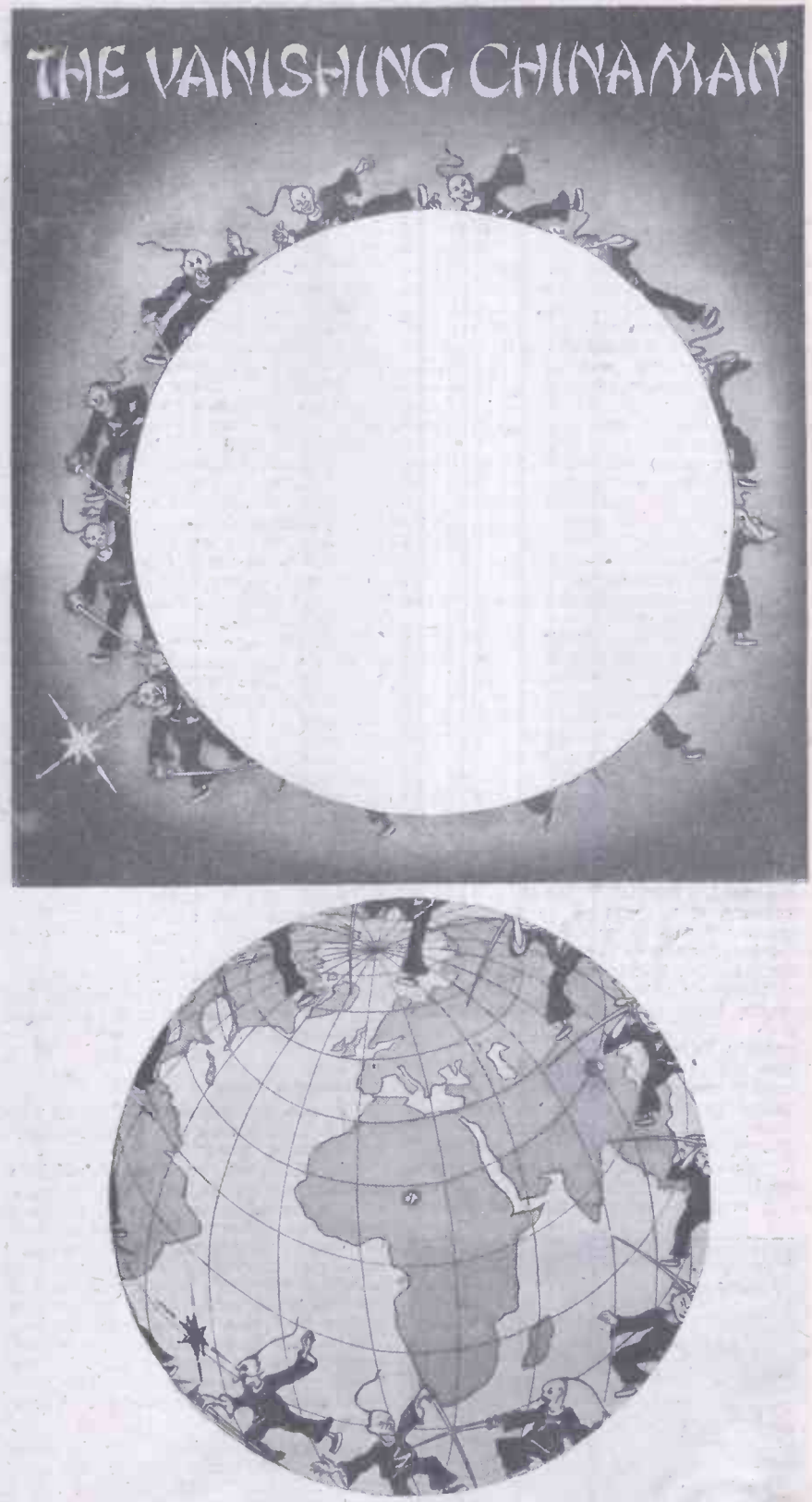
Construction

Cut out the two parts on this page and carefully stick them down on a piece of stout cardboard. Place them under pressure until the glue is quite dry, and then punch a hole suitable for a small shoe eyelet in the centre of the circular disc. Punch another hole in the centre of the white space and eyelet the two together. Adjust the positions according to the asterisk on the left-hand side. If necessary, a simple stop can be fitted to restrict the movement between the limits of the 12 and 13 positions.

How many readers can find the solution to this puzzle? I shall not give it away this month, but I offer book prizes to the senders of the first six correct solutions opened.

Envelopes containing the solution should be addressed to "Chinese Puzzle," c/o The Editor, PRACTICAL MECHANICS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

The solution does not necessitate readers sending in the complete puzzle. F. J. C.



The two parts forming the "Get off the Earth" Puzzle.

Automatic Telephony for the Blind

Details of St. Dunstan's Novel Device

THE increased number of men of the Second World War who have been maimed, that is, the loss of one or both hands, as well as being blinded, received at St. Dunstan's has imposed an interesting and at the same time difficult task upon the Technical and Research Department of that organisation in order to give the sufferers an objective in life. Artificial limbs have in many ways supplied substitutes for hands and have enabled the war-blind-maimed to perform many normal operations.

St. Dunstan's has recently developed an ingenious telephone arrangement which enables the blinded-handless man to be entirely independent of help in the use of the instrument.

The basic principle is that instead of raising the portable receiver to the ear, the ear is placed to a fixed receiver, whilst the operation of making contact, when the bell rings, and of ringing-off on the conclusion of a conversation, is done by means of a foot unit, containing two pedals, one for each of the above operations.

The new telephone is supplementary—an extension if you like—to the ordinary G.P.O. instrument, being connected with a flex. It consists of a firm wooden base into which is fixed a perpendicular steel rod about 2ft. high. To this is attached the ordinary telephone receiver fixed in a carrier which can be raised or lowered to any point vertically or laterally at will. A flex connects this unit with the ordinary telephone. On the floor is the foot lever unit connected with the table unit by a flex.

Thus, when the blind-handless person hears the bell ring announcing an incoming call, he places his ear to the fixed receiver and simultaneously he presses one of the pedals with his foot and carries on conversation. Pressure on the second foot pedal restores the whole mechanism to normal when the conversation is finished.

If he wishes to initiate a call he depresses one of the pedals and also a plunger inserted in the wooden base which dials "O," thus calling the exchange operator whom he invites to get his number for him, which, being done, the caller carries on his conversation, depressing the second pedal when he has finished.

But he can be independent of the exchange operator entirely by the use of a mechanical key sender, which is connected with the wooden base and performs the functions of "dialling." The "sender" is a miniature typewriter with ten keys. This is worked by the artificial metal "finger" with which every handless man is supplied for the purpose of typewriting. He has memorised the ordinary dialling apparatus and adapts it to the numbers on his key sender.

This apparatus has proved most successful for the blinded amputees who carry on business which involve frequent telephoning.

A number of St. Dunstaners, blind-maimed men, are conducting successful businesses as motor haulage and motor hire transport.

As stated above this telephone apparatus is supplementary to the ordinary telephone, and does not impede the sighted person using the standard telephone installed in the normal way.

Practical Pottery Repairing

Some Hints on the Materials and Methods Used

By J. F. STIRLING

IN times past, no one ever bothered greatly about the repair of articles of china, pottery and other ceramic objects unless, of course, they were of an antique description or in some other way, sentimental or otherwise, particularly valuable. The common cup, the dish, the basin, plate or saucer when it "came apart" was usually discarded with very great promptitude into the ever-waiting dustbin. For pottery and china in those days were commendably cheap and easy to obtain.

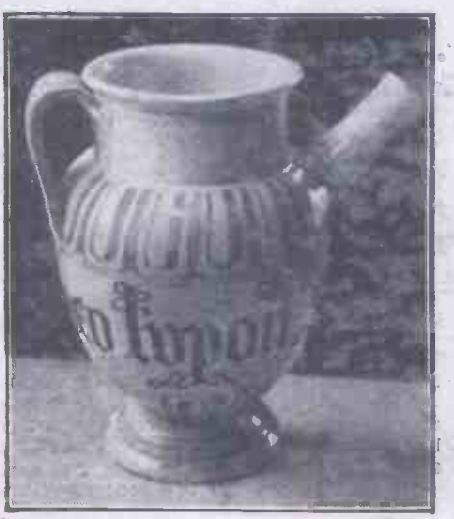
But now things have changed. Pottery—for the home market, at any rate—is no longer plentiful. Neither can it be obtained at a low price. Furthermore, the pleasing colours and designs in which domestic china and crockery used to be turned out by the manufacturers are denied to us at home, although such articles are showered on to the overseas markets.

That is why good crockery is at a premium these days. That is why it is now being looked after and cared for more than ever it was before. For a good and a pleasing article of pottery, no matter whether it be of the best and the most decorative china or merely a well-formed but more utilitarian household dish or jug is, to all intents and purposes, when broken, a thing which is "lost and gone forever." It cannot be replaced.

A pottery object which has been dropped and smashed into a hundred or more pieces is, indeed, beyond redemption, unless, perchance, it happens to be an article of extreme value, such as an ancient Chinese vase, in which case the fragments may be collected and sent off to an expert for "invisible mending," the cost, in this instance, being only of small consequence.

Ceramic Surgery

But there are many ceramic articles of everyday use, to say nothing of those more valuable pieces which have an antique or decorative value which, in the course of time, succumb to the effect of "wear and tear." They develop cracks, become badly chipped, have large pieces knocked out of them and suffer other and varying types of injuries.



A decorative Italian jug which was accidentally damaged.

Sometimes a cup or bowl will be broken cleanly into two halves, or a vase may have a hole knocked in its side. A decorative pottery figure may be unfortunate enough to have one of its arms or legs knocked off. The more humble domestic teapot may suffer spout-fracture or some similar trouble. Even your best china store jar, a Victorian product of doubtful beauty and utility which, for sentimental reasons, has long lain on the top shelf of the kitchen store cupboard, may, in one way or another, accidentally suffer mechanical damage.

Well, all these everyday injuries which are apt to occur to the domestic crocks can, provided they are not too extensive, generally be remedied by one process or another of what we may term "ceramic surgery," whereby pottery pieces are carefully prepared and cemented together, bits are wired or riveted on, missing pieces are skilfully filled in with a sort of artificial porcelain, surface defects are painted over and other injuries made good. Of course, it all takes time and care, but handy, deft and skilful fingers can often work wonders in the technique of ceramic surgery.

A close-up view of the upper edge of the damaged Italian jug, showing a bad gap.

The same jug edge neatly repaired by moulding and awaiting skilful repainting of the moulded portion to match the surrounding area.

Mending a Plate

The easiest task in the art of pottery surgery is to mend a plate, a cup or dish which has been broken cleanly in two.

First of all, the two pieces should be very carefully washed in soap and water, great care being taken to avoid all grease contamination. When the pieces are quite dry (and not before) they should be fitted together to make sure they will join up correctly when cemented together. This having been done, the contacting surfaces are lightly smeared with a very thin film of cellulose cement. The cement is rubbed into the contacting surfaces with the finger-tip and it is then left to dry—preferably overnight. This provides each surface with an effective "keying" layer.

To join up the pieces, give the prepared surfaces a light smearing over with cellulose cement. Then fit them together and hold them together under slight but effective pressure for a few hours. In applying this necessary pressure, be very careful to see that the two pieces are not pushed out of position. Often enough, a strong elastic band round the two articles is all that is required. A very light press may sometimes be used instead, and, with care, the two pieces forming the complete article may merely be wrapped round with damp string—damp, because when the string dries it contracts and thus tightens up, thereby keeping a firm pressure.

No Animal Glue

Do not use any type of animal glue for pottery cementing. It is messy stuff for this job. It stains—often indelibly. Its holding powers are not very great in these circumstances and, worst of all, it is not waterproof. A casein glue can be used, but generally it is more trouble, in these instances, than it is worth. Ordinary cellulose cement is the best. It can be purchased in tubes almost anywhere, and a little of it goes a long way when used in the manner described above.

If you wish to make this cement for yourself, you can do so by dissolving clear scrap celluloid in a mixture (about equal parts) of amyl (or butyl) acetate and acetone. Alternatively, you can dissolve the celluloid in the liquid which is known as "cellusolve," this being a clear, water-white liquid of high solvent powers.

The solution of the celluloid must not be made by heating the solvents. Cut the celluloid up into thin shreds. Place it in a bottle, and half fill the bottle with the solvent. Cork the bottle and leave it to stand overnight. During the next day shake the bottle frequently. The celluloid will dissolve to a thickish liquid. For cementing purposes, the solution should be about as thick as glycerine, if not a little thicker.

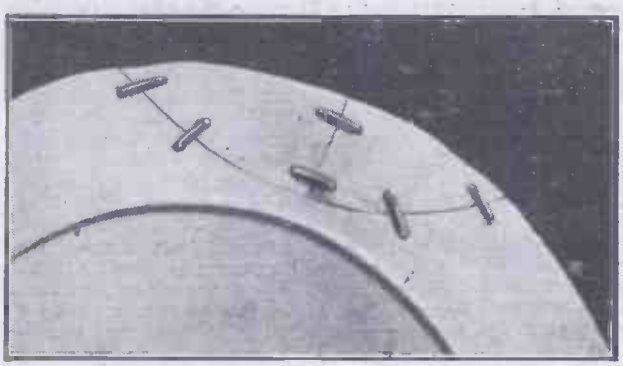
There are two other cements which can be used for pottery repairs. The first is a comparatively new and unknown one, consisting, as it does, of a simple solution of clear Perspex in trichlorethylene. This is made up in just the same way as above, and it forms a thick, almost rubbery solution.

The other cement is Canada balsam, long

the favourite of microscopists and all optical workers. Canada balsam is a natural crystal resin. It is soluble in benzene, chloroform, naphtha and other liquids. It forms a highly viscous solution which will stick glass, pottery and other smooth objects. Its joints are strong, but it has the disadvantage of taking about a month to set and to harden, during the whole of which time the contacted fragments must be under continual pressure in a warm atmosphere.

All the above cements are waterproof and have good adhesive strengths, even when used on an edge-to-edge joint. They are, also, non-poisonous after setting.

A decorative Willow-pattern plate, to all appearances whole and undamaged.



Rear side of the plate shown above, giving a close-up view of the extensive riveting procedure.

Treating a Crack

Sometimes an ominous crack may develop in a piece of china or pottery. Even if such an article does not come to pieces within a few days the crack will grow. It will gather dirt and will become unsightly. The best way to deal with such an occurrence is to adopt prompt measures. With the tip of the little finger, work a little precipitated chalk, or, better still, magnesium carbonate (which is "the whitest thing on earth") into the crack, and afterwards, with the same finger-tip, work some of the clear cellulose cement along the line of the crack. Most of the cement will remain on the surface, but a little of it will seep down into the crack and will seal up the white filling which you have placed therein.

Decorative china and other ceramic articles which become cleanly fractured are usually riveted together in addition to being cemented up. The rivets give additional strength, and, being fitted at the back of the plate or dish, they do not show. A good example of pottery riveting will be seen in one of the photographs accompanying this article. In this particular instance, by the way, the rivets were put in about 30 years ago, and they have lasted ever since. The cement used in addition to the rivets was a "natural" one. Its formula sounds rather extravagant in these food-shortage days of ours, the composition of this cement being stated to have comprised: 1oz. finely grated cheese, ½oz. finely-powdered quicklime, these two ingredients being made into a paste with the white of an egg. There is no doubt that this composition would be effective, since it combines in the one formula albumen and casein, together with lime, which induces a setting and hardening action, but, as you will see from the photograph, the actual cementing of the pieces was badly done—most probably owing to the thickness of the cement—leaving an objectionable and dirt-gathering line between the joined-up pieces.

Riveting Pottery

Expert china repairers use a diamond-tipped drill for making rivet holes in pottery. With care, however, the necessary rivet holes can be drilled with a small Archimedian drill, using a very fine tip. Again, a small three-cornered file can be hardened by heating it in a fire to red heat and then by plunging it in cold water. The file is then ground to a fine point on a grindstone. Such an article is of great use for making a tiny scratch on the pot surface for the purpose of "starting" the drill, but, with great care, the file-point itself can be used as a drill. In this instance much care is necessary to guard against undue hand pressure, which would only result in an irregular hole being made and its edges splintering, or the article breaking altogether.

Generally, the drilling can be done "dry," but, if a lubricant is necessary, use turpentine — the genuine stuff, not the nowadays ubiquitous "turps. sub.," which is merely a fancy name for thin white spirit and, often enough, for paraffin oil.

When drilling a china plate, dish or saucer from its underside, take care not to let the drill go right through. It is sufficient to stop when the drill is about three-quarters way through. This will prevent unsightly protrusions of the rivet-ends on the "face" of the plate or dish.

Having made all the necessary rivet holes, pack them loosely with a suitable rivet cement (to be described afterwards), and gently insert and push down the rivets, which, ordinarily comprise merely U-shaped pieces of wire—either iron or copper, the latter being the best.

Although no one has ever done it, it ought to be possible to use rivets of a transparent plastic, such as Perspex, cementing these in their holes with the special Perspex cement described above. Metal rivets, in the course of time, often tend to stain their surrounding parts, but plastic rivets would not be liable to this disadvantage.

Sometimes when a dish, plate or other vessel, ornamental or otherwise, is riveted-up, some of its parts may be missing. Such gaps, however, provided they are not too extensive, can usually be filled in by the process to be described later in this article.

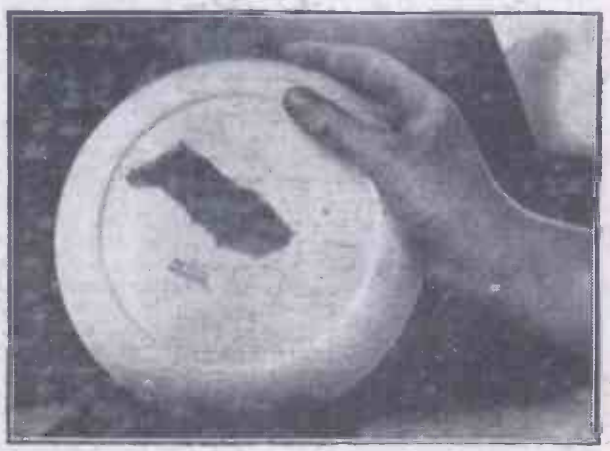
Missing Handles and Spouts

When a handle is knocked off a jug or when a spout unfortunately comes apart from its teapot, the extent and the success of a possible repair must be governed by the extent of the damage. With care a handle may be riveted to a jug or other container, but, in this case, it is always advisable for the rivets to go right through the walls of the vessel so as to give maximum strength. It is usually possible to rivet a spout to a teapot, the edges being joined up in the usual manner and two or three rivets being inserted in the sides of the spout. In this case, the rivet holes should not go right through the spout owing to the difficulty of cementing them up afterwards and of making them liquid-tight. Additional strength could be given to this assembly of the spout by tightly binding the outside with fine wire and carefully painting over the wire turns with a suitable cellulose paint, which, when put on in two or three coats, would withstand a lot of washing before it began to wear.

"Crazed" Crockery

Many readers will have noticed that pottery articles, although they manage to remain whole and unbroken, gradually become "dirty" or, at least, discoloured. Very little can be done about this. The whole effect is due to a surface-crazing of the pottery, the enamel, owing to its brittleness, breaking up into an immense number of small pieces.

(*To be continued.*)



A rough method of lengthening the life of a plate. A strong piece of calico has been cemented over a bad crack. Subsequently several coats of paint are laid over the fabric.

Defeating the Dark

A Review of the "Darkness Into Daylight" Exhibition at the Science Museum, South Kensington

By THE MARQUIS OF DONEGALL

WHILE not wishing to take away anything from such human benefactors as Davy, Holmes, Sprengel, Swan and Edison, the first section of this Exhibition, which was opened by the King, was to me even more romantic than the unbelievably rapid progress of lighting in the last hundred years.

I like to picture the first Caveman to get the idea that the sun's going down every night was an infernal nuisance. Infuriated to a degree by the fact that after sunset he could neither admire the beauty of his wife or gauge the temper of his guest in his cave, he presumably decided that something had to be done about it, and thus joined the ranks of the anonymous immortal inventors alongside the man who first thought of the wheel and Kipling's Tegumai who (according to the "Just So Stories") was the first man to have the idea that thought could be conveyed by other means than speech.

So as we enter the Exhibition we see various forms of this cave-dwelling gentleman's attempts to beat the sunset. In fact, we see his first attempt—a hollow stone with fibre burning in animal fat.

There are various other very early forms of lighting, and I was interested to see that two stormy petrels are exhibited. Until comparatively recent times the Shetland Islanders inserted a wick through the body, thus using the natural fat of the dead bird for lighting purposes.

We need not dwell longer on this section of primitive lighting. Let us pass to the Middle Ages, when the real quest for better lighting began.

Here we get in reconstructed scenes rush-light of peeled, dried rushes dipped in tallow. These, presumably, gave the inventor of the candle his inspiration, and the candle gave rise to the need of protection. Hence the first lanterns which are on view in the Exhibition.

At this point let me say that it will be quite profitless to quote me Exodus, chapter 25, verse 31, about the seven-branched candlestick. As far as is known this was a float-wick lamp burning olive-oil. But I suppose that I must allow you a mysterious object in the British Museum which is dated 5th century B.C. (Etruscan), and certainly does look like a candlestick. You can also argue about Phœnician candles in the 4th century A.D. if you are that way minded.

Nothing really happened very much until Leonardo da Vinci, in the 15th century, discovered, in intervals of inventing the aeroplane and a few other trifles, that if you placed a metal chimney above a flame the upward draught considerably improved matters.

Argand Tubular Wick

In the 18th century there was only one really important development. Argand discovered, in 1774, that with a tubular wick and a glass chimney, air could be drawn up through a tube inside the wick to aerate the flame. On a par with this, although quite different, a certain Mr. Spedding found out that by piping coal-gas to his offices at Lord Lonsdale's Whitehaven coal mines, he could use it for illumination. That was in 1765, and the magistrates of Whitehaven refused his offer of street-lighting.

The next section of the Exhibition deals with the development of gas-lighting which made big news in the early part of the last century, but the oil-lamp and the candle remained for many years the means by which the great majority of humanity fought the darkness.

While oil-lamps and candles were being improved gas-lighting caught the imagination of the public out of all proportion to its efficiency. We see a diorama of the exterior of a house with the gas-lighting of 1860. Also primitive burners and the Steatite orifice, which invention really made gas-lighting a practical proposition. As early as 1805 Samuel Clegg had installed gas-lighting in some cotton mills near Halifax, in Yorkshire. For many years gas remained one of the favourite subjects of the cartoonists and the happy hunting ground of mushroom financiers.

Meanwhile, in 1810, Sir Humphry Davy managed to demonstrate the electric arc between carbons at the Royal Institution. For this purpose he used 2,000 voltaic batteries to light his arc for a mere matter of minutes. Even in 1846, two years after the first industrial electric machine had been produced by Woolrich in Birmingham, the Paris Opera House still preferred the old method of lighting scenes with power obtained from Bunsen cells.

Electric Filament Lamp

Thus we come into the section of the Exhibition that deals with the development of the electric filament lamp. But before doing so an inspection of the lighting fittings in a series of six showcases and designed to illustrate the fittings used in the dioramas of the previous section is well worth while.

In chronological order there are three main categories of electric light. First, the light from an arc-discharge between carbon electrodes; secondly, filament lamps in which a carbon or metal filament glows in a vacuum or in gas; and, thirdly, lamps in which the light comes from electronic activity resulting from an electric discharge in gas or vapour. As far as I can make out it was Hawksbee, in 1709, who first noticed that a frictional electric machine would produce a glow in the nearest he could get to a vacuum. In 1751 a Dr. Watson made an arc inside a mercury barometer. But even when, as we have mentioned, Sir Humphry Davy demonstrated it, the whole thing was far from being a practical proposition owing to the lack of proper means of generating electric power. It is said that de Moleyns of Cheltenham took out the first patent for a filament lamp in 1840. It didn't work, but in the same year Grove is said to have been able to read with a contraption powered by Bunsen cells which he made with a platinum wire covered by a glass tumbler upside down in a saucer of water.

Next comes an American gentleman, Mr. Starr, who patented in England the idea of a carbon filament inside a vacuum. This idea was demonstrated by Staite and is said to have inspired Swan to begin his researches culminating 30 years later, in 1878, in practical electric lamps. Edison worked independently and patented his lamp in 1879.

In the meantime we must not forget pioneers, such as Holmes, whose arc lamp began to radiate a thousand candle-power from the South-Foreland Lighthouse in 1858.

In the section we are now dealing with we can see a modern 10,000 watt lighthouse lamp and the smallest existing lamp for medical use. Swan's original carbon-filament lamp is also on view.

In America Edison imported Ludwig Boehm, a German glass-blower, and, in England, Swan found C. H. Stearn, whom he employed in the same capacity. So closely were Swan and Edison running neck and neck that the outcome might have resulted in one of the greatest legal battles of all time. But fortunately they decided to pool their benefactions instead of squabbling, with resulting benefit to us all. Now, of course, the filament lamp is on its way out and will eventually devolve into the obscurity into which it pushed the arc lamp, in favour of the discharge lamp.

So we leave behind the diorama of Sir William Armstrong's staircase at Craigside, which was electric-lit by Swan in 1880, and pass to the sections dealing with fluorescent lighting and the lighting of the future.

Fluorescent Lighting

I read somewhere that the Japanese discovered that by mixing calcined oyster shells with their pigments they could obtain luminescence visible only at night. Somebody told the Chinese Emperor, Taitsung, of this in about A.D. 1,000. After that everybody seems to have forgotten about it for some 800 years; although Goethe added something to the field of human knowledge in this branch, it was Dr. Watson's creation of a discharge in a mercury barometer tube in 1751 that really marks the birth of fluorescent lighting.

A panel on which the visitor can push buttons shows the effects produced by various gases: Neon, a red glow; helium, whitish; carbon-dioxide, near-daylight; argon, blueish; krypton, purplish; xenon, whitish; and mercury-vapour, blue.

Probably the first practical application of the new methods was neon lighting used for advertising purposes shortly after the 1914-18 war. Apart from testing the colour value of fluorescent as compared with filament lamps, the visitor can test the difference in heat of the two types giving out the same amount of light. Fluorescent is palpably cooler. You can make laboratory colour tests by blending the different colours to your fancy.

There is a diorama of the fluorescent street lighting in Kingsway and the xenon arc lamp of 5,000 watts and water-cooled. It is claimed for it that it is the nearest to daylight yet achieved by science.

The lighting of to-morrow section has as its main exhibits the living-room of the future and application to coal-mines. In the set piece of the living-room the application of light to architecture is demonstrated. Lighting from invisible sources gives the effect of daylight.

The final diorama is a full-size model of the face of a coal-mine, fluorescently lit. The miner is seen working 1,600 feet below the surface in what appears to be brilliant sunlight. Other exhibits in this section are the Davy safety-lamp of 1815, Joseph Swan's electric hand-lamp of 1883 and the electric head-lamp of 1923. The new fluorescent lighting for mines is operated by an air generator so that the lamp provides its own light by compressed air with the result that wiring and protective switch-gear are eliminated.

Fortunately this most interesting exhibition is continuing until September. It is well worth a visit.

Letters from Readers

Moulds for Plaster Ornaments

SIR,—I would like to inform your reader, F. Gortside (Guernsey, C.I.), whose enquiry (June issue) concerned plaster and wall plaque modelling, that he would most likely obtain materials for moulding from Homecrafts, Albion St., Broadstairs, Kent. This firm advertises a material called Vinamould hot-melt compound, which they claim can be melted and used to cast plaster objects by dipping the master object to be reproduced, and consequently forming a flexible mould which when no longer required can be used again simply by remelting the material.—R. EVANS (East Kirby).

The Tickless Clock

SIR,—I offer the following criticism of the above-named article in your June issue, based principally on information from back numbers of your paper.

(1) The statement that a pendulum oscillating at constant amplitude is an almost perfect time-keeper is at variance with your article on the battery-operated clock in which the amplitude is permitted to decrease to a predetermined amount; what matters is that the time of a given cycle of swings shall be constant.

(2) In your articles by Mr. Bowell and Mr. Leechman it is made quite clear that impulses should be given only at or near the centre of motion of the pendulum, to avoid "forced oscillations," so that the pendulum (or balance wheel in a watch) is quite free to swing as far as it "wants" each way, to ensure "free oscillations." The magnetic escapement described is not only "forced" but appears to be also magnetically "damped."

(3) It is not possible to measure the efficiency of an escapement by the time-keeping quality of the clock, because many other factors enter into good time-keeping; it appears that a fairly efficient magnetic escapement could be produced by having a soft iron, specially shaped toothed rim fixed to the escape wheel which would be rotatable by steps between the jaws of a permanent magnet secured to the pendulum, using the mainspring energy to rotate the wheel and also to separate the magnet from the soft iron at each side of the centre of pendulum-swing, to ensure "free oscillations" of the pendulum, and to lock the train magnetically while the pendulum was swinging freely each side of the impulse arc.—G. H. CHILD (Hove).

SIR,—I should like to congratulate both you and the Marquis of Donegall on the fine article in the June issue describing our magnetic escapement.

There is one small error which might confuse some readers if it is not corrected. Page 302, third column, six lines down, the word "increases" should read "decreases." I saw a proof of the article, so I share the blame for this error.—C. F. CLIFFORD, (Horstmann Clifford Magnetics, Ltd., Bath).

Testing Petrol Engine Exhaust: Space Flight

SIR,—The exhaust gas analyser to which Mr. S. Byatt refers in his letter in the July issue, was known as the Cambridge Fuel/Air Ratio Indicator, and was, I believe, fitted to Harvard and Hudson aircraft and possibly others.

It was as Mr. Byatt says operated on the Wheatstone bridge principle, but the method of creating an unbalance was slightly different. The four platinum wires were heated by the current passing through them and their temperature depending on the rate of conduction of heat away from them.

One leg of the bridge was enclosed in a chamber, to which the "sample" flow of exhaust was conducted through a small diameter tube, this being formed into a coil and exposed to air to cool the gases and then through a filter to remove carbon.

Now the chemical composition of the exhaust gases varied with the richness of the mixture from the carburettor, and contained more oxygen with rich mixture than with weak.

This increased the conduction rate of the medium surrounding the analysis cell resistance wire, so reducing its temperature, changing the resistance, and upsetting the bridge balance.

The "reference" arm of the bridge was contained in another chamber which contained cool, moistened air.

I hope the foregoing remarks will be of some interest to readers.

There is also one other point I would like to query. That is concerning Prof. A. M. Low's remark in his article on space flight.

Now the Professor states: "To overcome the gravity of the earth and 'escape,' the space-ship must still attain a speed of 12,000ft. a second." If I remember rightly, the escape velocity of Earth is something like 10 kms./sec. or roughly seven miles/sec., which is more like 35,000ft./sec. and likely to prove even more uncomfortable to the poor space traveller.

However, I seem to remember hearing of German experiments of acceleration on human beings, and one subject withstood an acceleration of 9 gs. for 12 mins., which, if true, indicates that man might be able to overcome that obstacle fairly easily.—R. F. WISEMAN (Norwich).

Electric Door Chimes

SIR,—Having completed the electric door chimes as described in the May issue of PRACTICAL MECHANICS, I feel compelled to write in appreciation of same.

They work splendidly and the construction has given me many pleasant hours of interesting work.—A. MORRIS (Tottenham).

Telescope Lenses

SIR,—I am interested in the article on an Inexpensive Telescope, in the May issue, but I feel that anyone making a refractor to the instructions given will be disappointed, unless he is extremely lucky in his pick of lenses.

I have tried several objectives, using one-half of old R.R. lenses, and in nearly every case under the shadow (Foucault) test they looked more like dog biscuits, etc.

However, picking out one, half a 20in. R.R., gave me a fair achromat which, with a ¼in. E.P., gave a star like a bluebird with red wings.

I uncemented the pair and found one surface astigmatic, so I repolished and also retouched the others, recemented (and centred) and retouched again. Now I have a really fine f16, 39in. objective, possibly not quite corrected for colour, but giving beautiful diffraction patterns as Taylor's "Telescope Objectives" describes.—W. E. CLULOW (Gatley).

Electrically-operated Garage Doors

SIR,—For the benefit of interested readers, the official specification of the motor used in my article is as follows: 5U/3287 gear assembly oil cooler; Klaxon type L.R.D. Spec. 1155. These motors may be obtained from Messrs. Franks, of Oxford Street, W.1, and C. J. Emms, Ltd., 26A, Coleherne Mews, Earls Court, London, S.W.10.—A. R. TURPIN (Banstead).

Club Notes

Talbot House Model Engineering and Crafts Club

THE first Annual Model Engineering and Crafts Club Exhibition, which was held from June 19th to 28th, 1948, was quite a success, both financially and in that it aroused a good deal of interest in the public, also gaining for the club several new members. A list of the prizewinners is given below. The prizes were presented by Col. R. S. Chipchase, C.B.E., M.I.N.A.

Owing to pressure of work Mr. V. G. Pearson has had to resign, and the new secretary is Mr. Cyril Johnson, of 37, Highfield Drive, South Shields.

LIST OF PRIZEWINNERS

Marine Models—Power Driven.

1st Prize and Silver Cup.—Awarded to Mr. J. W. Pattison, of T.H.M.E.C.C., for motor-yacht "Elizabeth" I.C. engine.

Marine Models—Sail.

1st Prize.—Awarded to Mr. D. Leith, T.H.M.E.C.C., for sailing yacht, Marble Head class.

Locomotive Models—Road and Rail.

1st Prize.—Awarded to Mr. R. F. Carlin, S.M.B.E.C., for unfinished American "Austerity," 2½in. gauge.

Tools.

1st Prize.—Awarded to Mr. J. W. Charlton, of Newcastle, for precision drilling machine.

Aeroplanes.

1st Prize.—Awarded to Mr. W. Cooper, of Newcastle, for freelance biplane, 1.24 c.c. C.I. engine.

General

1st Prize.—Awarded to Mr. C. Raeburn, T.H.M.E.C.C., for his 15 c.c. four-stroke petrol engine.

N.B.—The Silver Cup, which was donated to the club by an anonymous well-wisher, is to be presented annually for the best workmanship of the year.

The Northwich and District Models and Handicrafts Club

THE first exhibition of the above club, staged for the Northwich Hospital Saturday Gala Day on June 26th, was very successful. There were over 30 models entered for the competitions and also a number of exhibition models, the most notable of these being three very kindly lent us by Mr. E. Wilcox, of Northwich, including his 1946 Stevens Cup winner.

The prizewinners were as follows:

Handicrafts

Mr. N. Eachus, of Northwich, with a beautiful leather handbag.

Engineering Models

Mr. Melville, of Northwich, with a horizontal mill engine.

Concours D'elegance

Mr. K. Sutton, of Northwich, with an A. S. R. launch made from matchsticks.

Model Aircraft

Mr. J. Bowser, of Sandbach, with his high-wing cabin plane "Black Magic.

The first-class award of a Silver Cup was taken by Mr. G. Barber, of Northwich, with his magnificent model of "Westward," ocean-cruising yacht.

Altogether nearly 900 people saw our show, and we handed over £6 10s. to the hospital.

Further particulars of this club can be obtained from David Hughes (Publicity Officer), 73, Chester Road, Castle, Northwich, Cheshire.

THE WORLD OF MODELS

The Activities of Swiss Model Railway Clubs

By "MOTILUS"

MY occupation necessitates a fairly regular annual visit to Switzerland and, as even a business tour must have its moments of relaxation, I took the opportunity this year of spending any spare time I had in visiting as many of the Swiss Model Railway Clubs as I could. As readers probably know, I already had several friends among modelmakers in that prosperous and industrious country, but this year I made many more, and was pleased to find that interest in models, especially model railways, was increasing by leaps and bounds. Leisure for these visits was, of course, strictly limited, but the officers of the various clubs were most kind in arranging to meet me in such time as I was able to spare. I was sorry I was unable to get in touch with any of the members of the two prominent clubs at Bern and Winterthur, but hope I will remedy this unavoidable omission on a later occasion.

Fig. 1.—A portion of the permanent model railway in the headquarters of the Basel Model Railway Club: the layout includes tracks for gauges 00, 0 and 1.

Fig. 2.—Left, Mr. P. Werthemann, president of the Basel Model Railway Club, and right, Mr. E. Nussbaum the club's "steam expert."

My first visit was to the Model Railway Club, Basel, where members have the advantage of an excellent clubhouse, at one time a canteen for the Swiss Federal Railway employees at the Güterbahnhof on the outskirts of the city. The scenic railway built by the members here is quite unique, not only for the variety of mountain scenery and lineside buildings, but also because it incorporates three different tracks—gauges 1, 0 and 00 (Fig. 1.). The whole room is some 700 sq. ft., so there is plenty of scope for the ambitious display. The gauge 1 track is, as may be expected, on the outside, with gauge 0 describing a smaller circuit and gauge 00 in the centre, close to the "mountains," where they are now building a model 00 gauge mountain rack railway. The gauge 1 track has electric siderail and also overhead electric contact, while the smaller gauge 0 track has overhead contact only, and all points are mechanically operated.

The mountain scenery, built chiefly from cork and plaster, practically fills the central space and is enhanced by a fine railway bridge, engine sheds with a transport bridge, an avalanche shelter and other realistic additions that are to be seen on a railway ride in Switzerland. This is a great asset to the model railway, and evidence of the unfailing enterprise of Swiss modelmakers.

Among the members I was privileged to meet were Mr. P. Werthemann (Fig. 2), President of the club and a gauge 1 fan, Mr. O. Muff (club Secretary), Mr. Schneider, Mr. Nussbaum (who was introduced as the "steam expert," an unusual claim for a Swiss model railway enthusiast!), and Mr. von

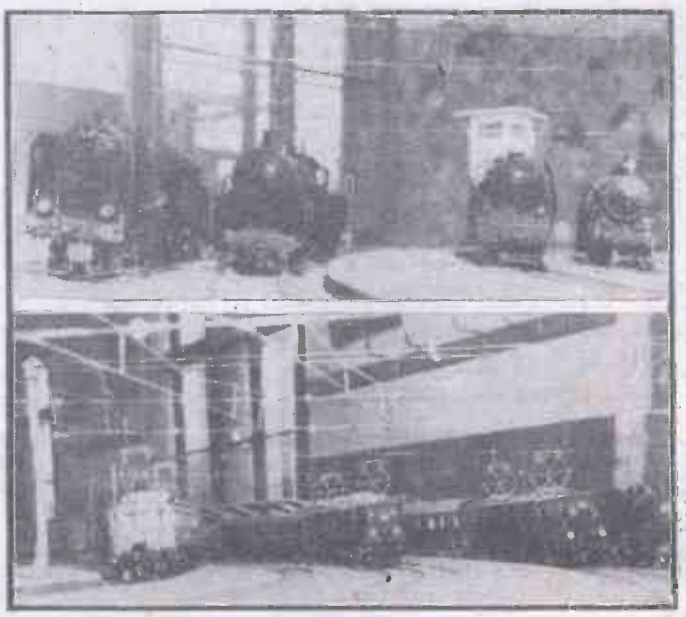


Fig. 3 (Top).—A group of electrically driven gauge 1 locomotives with steam outline. (Below) A group of gauge 1 Swiss electric locomotives of the latest types. Photos kindly supplied by the Basel Model Railway Club. All models made by their members.

Alfred Moser, a retired locomotive engineer who has written a book on the "Steam Operation of the Swiss Railways, 1847-1936." All these gentlemen and their comrades in the club had made some contribution to the locomotives and rolling stock for the various gauges, as well as helping to build the track, lineside equipment and scenery. The locomotives included a gauge 0 working steam locomotive, as well as two steam models constructed for electrical operation (Fig. 3), and a fine gauge 1 electric model—the work of Mr. Werthemann—of a locomotive such as is used on the famous Swiss Lötschberg Railway.

between them all. At Schaffhausen the members have, for the past two years, had at their disposal a fairly large room on the top storey of an old building, which enables them to keep a few tools and a table for communal use, as well as installing a "round the room," 2-rail layout for gauges 0 and 1. The club President, Mr. H. Knill and the secretary, Mr. Lüthi, demonstrated for me the performance of some of their electrically-driven models, which included one steam-type locomotive (Fig. 4), made in 120 hours by a Mr. Lehmann, with a permanent magnet motor and a device for bringing smoke to the chimney by means of a pipe-bowl

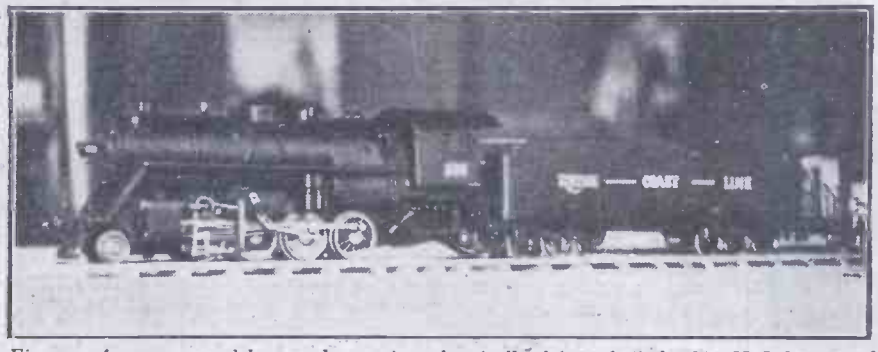


Fig. 4.—A gauge 0 model steam locomotive, electrically driven, built by Mr. H. Lehmann, of the Schaffhausen Model Railway Club. Realistic smoke issues from the chimney when the locomotive is in action, the "smoke" being provided by an ordinary pipe, fitted into the tender.

Altogether I found the visit to the Basel Model Railway Club most stimulating, and the enthusiasm of these people certainly made me determine to see as many other clubs as I possibly could during my brief stay.

Railway Amateur Club

My next visit was to the "Railway Amateur Club" at Schaffhausen, when I had the pleasure of being accompanied by Mr. W. Siegwart, President of the Schweizerische Eisenbahn Amateur Klub, Zürich, and who assists in the publishing of the "Eisenbahn Amateur," a monthly magazine recording the notes and news of all the Swiss Model Railway Clubs, and which does a great deal towards strengthening the unity with a short stem being concealed in the tender, tobacco being burnt in the pipe and the smoke being compressed through to the chimney. For the lighting of passenger coaches, they had used an old but effective device: press-studs attached to the electric wire carrying current to the coaches. The goods rolling stock included some excellent wood wagons made by Mr. A. Hofer: these were without springs, but irregularities in the track were allowed for by the use of a compensation frame constructed on a central bar.

On the gauge 1 track were displayed some beautifully-made models of locomotives and coaches, made by Mr. Lüthi. One represented the "Mammut" (Mammoth), the largest locomotive in Switzerland, and was made of sheet iron. There was also a wooden model of an early Swiss locomotive, "Sargans," used on the Winterthur-Schaffhausen railway opened in 1857, and as a contrast one of the latest goods engines, 2-10-0, of the Swiss Federal Railways, electrically-driven.

Model Making in Lucerne

I could not resist calling at Lucerne, which as well as being an attractive tourist centre, is also the home of two of the Brast brothers, those enthusiastic and diligent garage proprietors, who have built the largest number of working steam model locomotives in Switzerland. As I was in Lucerne on a Sunday, I was able to go to Horw in the afternoon, where the brothers are still running their 7¼ in. gauge railway, on Sundays and holidays, for the entertainment of young and old. The track has had to be shortened slightly and its path altered owing to nearby building operations, but this has not lessened the appeal of the model railway, or the vast number of visitors.

When in Lucerne, I was also pleased to renew my acquaintance with Dr. A. Oswald, at Dietschiberg. Here I found Dr. Oswald still improving, altering and adding to his large electric model railway that runs round his estate. This has been described fully in previous issues of PRACTICAL MECHANICS, but I must mention one special feature about which Dr. Oswald is becoming increasingly enthusiastic: that is the plans for north and south "loop lines" with "loop" tunnels. One of these tunnels is now finished, is 325ft. long and runs right underneath the lovely chateau where Dr. Oswald lives with his mother. Despite impatience to be "on with the job," Dr. Oswald diplomatically waited until his mother had gone to Spain to visit another son before he started work on the tunnelling under the house; when Mrs. Oswald returned the tunnel was complete and it was too late for protest regarding this deviation in the track of the model railway!

Fig. 5.—An unusual view of Dr. A. Oswald, emerging from one end of the new tunnel he has added to his electric model railway at Dietschiberg: he is lying full length on one of the model timber wagons. The new loop tunnel is 325ft. long and part of it runs underneath Dr. Oswald's home on the estate.

Fig. 6.—Mr. A. Güdel, president of the recently formed model railway club at Biel, known as the "Biel Railway Friends." Mr. Güdel is holding his partly finished gauge 1, 4-6-0, Swiss steam locomotive.

The illustration, reproduced in Fig. 5, shows Dr. Oswald emerging from one end of this loop tunnel, lying full length on one of the timber wagons—a unique experience in the history of this railway, which is not usually at the disposal of "passenger-traffic." The railway can now be controlled from two points, on either side of the extensive track, and plans are going forward for a further loop tunnel near the second control panel.

The "Railway and Model Building Friends" at Lucerne are not twelve months old, and as yet have no club room of their own, so I visited their President, Mr. R. Haffner, at his home in Lucerne. The "Friends" meet regularly at a local cafe to discuss news and exchange notes on their modelmaking progress and difficulties. Mr. Haffner told me that they are an enthusiastic group of young men and he is sorry that this autumn he will have to leave Lucerne to go to Olten. However, Olten is a manufacturing and engineering town, where there should be a good chance for Mr. Haffner to start another model railway club.

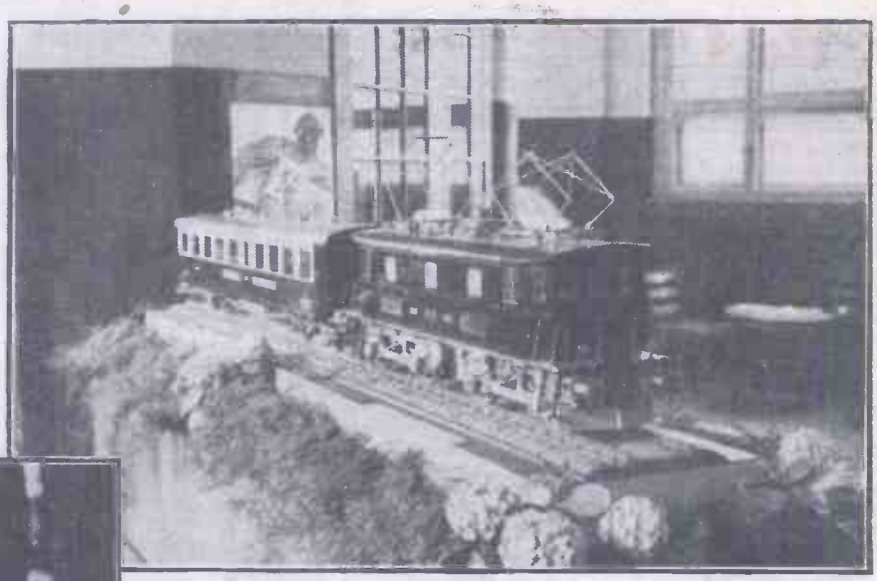


Fig. 8.—Two models in the tourist office at St. Gallen. One is a model Swiss coach, built by a member of the St. Gallen Model Club, and alongside is a model 1,600 h.p. locomotive built by a member of the Swiss Federal Railway staff. Both models are to a scale of one-tenth full size.

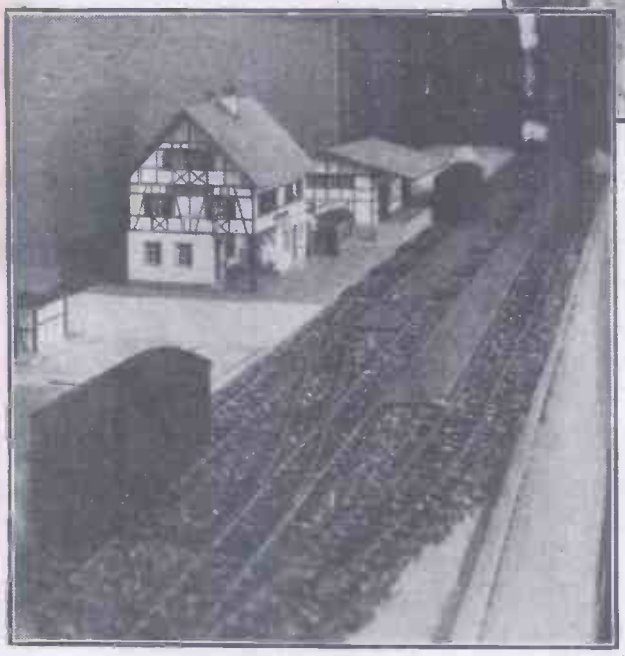


Fig. 7.—The gauge 0 model railway that Dr. O. Werder has built in his home at St. Gallen. A portion of this railway was exhibited at Bern in 1943. Dr. Werder is President of the St. Gallen Model Railway Club.

"Biel Railway Friends"

One of the Swiss towns I always admire is Biel, a small town near Bern and one of the centres of watch making and light engineering in Switzerland. In Biel this year I met Mr. A. Güdel, President of the "Biel Railway Friends," who at present are some thirty strong. Mr. Güdel is an electrical engineer and in him I found another gauge 1 worker. He is at present building a gauge 1, 4-6-0, steam locomotive, to his own designs, of which only the framework and cylinders were finished when I was there. (Fig. 6). This was sufficient, however, to indicate what an excellent piece of workmanship the finished model would be.

My last visit before leaving Switzerland was to St. Gallen where I met Dr. Otto Werder, President of the "Railway and Modelbuilding Friends," and two other members of the club, Mr. V. öppel and Mr. G. Egli. This is one of the older clubs, having been established nine years ago, and the members are of all ages, the youngest being seventeen. Most of the members are clerical workers, not engineers or technicians, and are only interested in the model railway for their hobby activities. They have no communal workshop, but meet twice a month for discussions.

What impressed me most at St. Gallen was my visit to the Technical College for Postal, Customs and Railway Services where Dr. Werder showed me some excellent work that has been carried out by 12 members of the "Model-building Friends." A large room in the College has been set aside for a comprehensive layout in gauge 0 (Fig. 7) of an electrical system incorporating all the various problems relating to railway operations, for use in training railwaymen. The structural work had been done by the College, but all the model railway equipment was planned by Dr. Werder and built by members of the club, with the help of students in the College. As a recognition of their services, they were all paid at a flat rate of 1.50 fr. an hour for their work, in whatever branch of the work they were engaged. The total length of track is 37 metres (nearly 118ft.), with 4,194 sleepers, 104 overhead supports, one complete goods and one complete passenger train, and all the semaphore and colour light signals. The system is run on 20 volts D.C. with 36 volts A.C. for points.

Full-size Instruments

All the operations on this railway are controlled by full-size instruments, supplied by the Swiss Federal Railways. These represent the three most important stages of progress in railway controls. First a large, heavy, signalling gear of 1900; next an improved and simplified mechanism such as was used between 1915 and 1935, and last but most important, the new electrical system, consisting of a neat cabinet where all operations are effected by the pressing of buttons. This latter system is now being installed in all railway stations and has been in use in many districts since 1936.

I was most intrigued with this admirable use of amateur modelmakers' work, but at last had to make a reluctant departure. Before I left the town I just had time to see some of Dr. Werder's own models in the workshop at his home, and also the gauge 0 model railway built by Mr. Köppel in a spare room of his house, for his young son. In the Tourist Office at St. Gallen, I was shown some more work of two of the "Model-building Friends," a model coach to a scale of 1/10th full size. Alongside was a model of a Swiss 1,600 h.p. locomotive of the Bodensee-Toggenburg railway, a private line near St. Gallen: this was a "museum" model, and had been built by a member of the railway staff (Fig. 8).

Although I was not able to meet my many friends of the "Swiss Railway Amateur Club" at Zürich, I had the pleasure of the company of Mr. W. Siegwart, their President, several times and I did see one or two of the other members during my stay. I was pleased to hear that the club is as prosperous and flourishing as ever. Judging from the displays in the model shops in Zürich, such as Messrs. Weber's and Mr. Feucht's shops in the Bahnhofstrasse, there seems to be a more comprehensive supply of model railway equipment, both for gauges 0 and 00, than we have in this country. Nowhere else have I seen shops with such an excellent variety of electrical "bits and pieces" for the modelmaker. This is probably because there is no restriction on the importation of goods into Switzerland. As a result, the Swiss can examine and purchase models and parts of Swiss, British, American, French, German, Belgian and Italian model railways, mostly in 0 and 00 gauges. Nearly all of them, of course, are for electrical operation, steam only having a limited appeal to those interested in gauge 1 and the larger gauges.

I would like to record my personal thanks to Mr. W. Siegwart who, as well as his "model" responsibilities, is Public Relations Officer to Messrs. Brown-Boveri, the large, well-known engineering firm at Baden. Despite heavy engagements, Mr. Siegwart always seems to be able to find time to meet model railway enthusiasts who visit Switzerland and who are anxious to know what Swiss clubs are doing.

Trade Notes

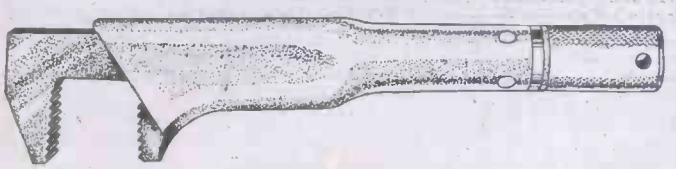
Exhaust Gas Analyser

THE Crypton exhaust gas analyser has been introduced to provide a speedy and accurate method of testing and adjusting all types of carburetters for maximum efficiency and lowest fuel consumption. The instrument is a self-contained test set, built to laboratory standards, and can be used with any petrol-driven vehicle, either in the service shop or on the road. Extremely simple in use, it is connected to the exhaust pipe by means of a rubber hose and special attachment. Only two simple adjustments are needed when the analyser will give an immediate indication of the air/fuel ratio and efficiency of combustion on a specially calibrated scale. This shows at a glance if the mixture is too rich or too lean, and whether adjustments are needed. The results of any adjustments made are immediately indicated. Special features of the instrument are portability, glass sealed analysing cells, new type totally enclosed rheostats and moving-coil type galvanometer with jewelled movement. Further particulars are obtainable from Crypton Equipment, Ltd., Bridgwater, Somerset.

The Crypton exhaust gas analyser.

I.E.C. Grip-wrench

THE new grip-wrench marketed by International Engineering Concessionaires, Ltd., 25a, Kensington High Street, London, W.8, represents a new principle in wrench design.



The I.E.C. grip-wrench.

Provided with ratchet action, it grips instantly and retains its grip without being held. Other features include tommy-bar tightening for extra grip, fine screw adjustment in the handle, and hardened steel jaws. Although slim in outline, the new tool is particularly strong in use. The 11in. size sells at 14s. in blued steel finish and 15s. 6d. in rustless bright chromium finish. Larger sizes of the grip-wrench are in preparation, and further particulars can be obtained from the address given.

New "00" Gauge Model Railway Catalogue

THE well-known firm of model engineers, Bassett-Lowke, Ltd., of St. Andrew's Street, Northampton, have recently introduced a new catalogue dealing entirely with model "00" gauge model railways and accessories. It includes a comprehensive selection of the best makes of equipment in this gauge, thus presenting a survey of current production.

Permanent-way materials are made to uniform dimensions, and the important measurements of wheel treads and flanges have been similarly standardised. In addition to locomotive building kits and motors and mechanisms, the catalogue also includes a range of locomotive wheels, permanent-way track parts, rectifiers and controllers, signals and accessories, waggon construction parts, and stations and lineside buildings. As is usual with Bassett-Lowke publications, this new catalogue is profusely illustrated with line-drawings and half-tones.

Plessey Fluorescent Lighting Control Units

FLUORESCENT lighting units designed and developed by The Plessey Co., Ltd., Ilford, which are now available to manufacturers, represent the first of a wide range of fluorescent lighting accessories which the company is developing.

The complete range of control units cover all standard tubes from 20w. to 80w., while provision has been made for series twin and single lamp installation for use on A.C. 50 cycle electricity supplies.

Since it is important that lamps operate at the makers' rating, special attention has been paid to the design of the choke coils. High silicon electrical steel has been used for the cores while the coils are wound from high conductivity copper wire with paper interleaving between each layer. The coils are finally vacuum impregnated.

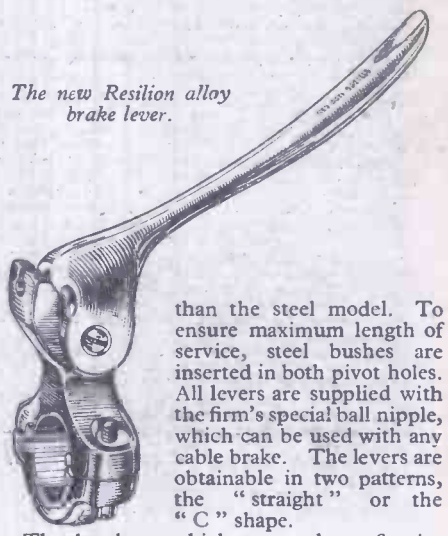
Each coil, after being assembled to the iron core, is carefully adjusted before impregnation and is not only checked at each stage of assembly but also as a complete unit. Power factor and phase changing condensers are provided with leak resistances to obviate the possibility of shock, while an earthing terminal is provided on the metal case. Extensive research has also been carried out to reduce noise and stray magnetic flux, resulting in a remarkable freedom from both. All components are housed in a pressed aluminium case filled with a bitumen compound and shaped for inclusion in most patterns of fluorescent fittings.

To obviate potential handling damage, loose leads have been eliminated and all connections are made to a compact terminal block conveniently mounted to give easy access. The cases are normally sprayed black or grey and are clearly marked with all necessary details and the relevant wiring diagram.

The range of units now available is suitable for supply voltages from 200v. to 250v., and in order to provide a high operating efficiency this is covered in three steps, 200-210v., 220-230v. and 240-250v.

New Resilion Alloy Brake Lever

THE "Resilion" Co., Ltd., of 200, Liverpool Road, London, N.1, have recently marketed a new alloy brake lever of improved design and approximately 50 per cent. lighter than the steel model. To ensure maximum length of service, steel bushes are inserted in both pivot holes. All levers are supplied with the firm's special ball nipple, which can be used with any cable brake. The levers are obtainable in two patterns, the "straight" or the "C" shape.



The new Resilion alloy brake lever.

The brackets, which are made to fit 1in. handlebars, will be supplied with liners to fit ⅞in. handlebars. Liners for 15/16in. handlebars are obtainable on request. The retail price of the new lever is 10s. 6d.

NEW SMOKE ELIMINATOR

A SMOKE eliminator, designed and developed at the Fuel Research Station of the Department of Scientific and Industrial Research, was on show at the Engineering and Industrial Equipment Exhibition held recently at the Royal Horticultural Hall, Westminster. Fitted to an ordinary boiler, it has been found to save at least 10 per cent. of the fuel consumed, at the same time eliminating much of the smoke which pollutes the atmosphere and wastes fuel.

The smoke eliminator is a simple furnace door which regulates the flow of air over the fuel bed. By allowing the usage of the maximum amount of combustible gas the eliminator is making a great contribution to the fuel saving campaign, still a vital factor in national economy.

WATCH YOUR DUSTBIN.

Waste paper, cartons, cardboard should be kept separate, dry and clean for salvage.

QUERIES and ENQUIRIES

A stamped addressed envelope, three penny stamps, and the query coupon from the current issue, which appears on page 96 (THE CYCLIST), must be enclosed with every letter contalning a query. Every query and drawing which is sent must bear the name and address of the reader. Send your queries to the Editor, PRACTICAL MECHANICS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Puncture-sealing Preparations

I UNDERSTAND that there is a liquid compound which is injected into pneumatic tyres and which has the property of effectively sealing small punctures as they occur.

Would you please let me know the formula, method of manufacture on a small scale, quantities to use and method of filling, etc. ?

Would the use of such a compound be effective over a long period of time, and would it be safe to use with all types of valve ?—B. J. Jackson (Coventry).

PUNCTURE-SEALING preparations have been marketed for many years, and many varieties have been advertised. We cannot, of course, initiate you into the manufacture of these compounds, nor can we, in common fairness, reveal proprietary formulæ in respect of these compounds. For such purposes you will have to make your own trials and experiments.

In general, however, a puncture-sealing compound is injected into the inner tube (through the air valve), and it acts by providing a temporary filler for any *small* puncture which may afterwards occur. Note our emphasis on the word "small." There is no puncture-sealer which was ever intended to prevent or rather, to seal up a really bad puncture.

A characteristic formula for a puncture-sealing preparation is :

Bentonite (or China clay)	100 parts (by weight)
Magnesium oxide	2 " "
Fine asbestos powder	50 " "

The above to be made into a thin cream with water, and injected into the inner tube.

Another type of puncture-sealing compound has the composition :

Castor oil	½lb.
Talc	1½oz.
Wood flour	1½oz.
Water	½lb.
Gum arabic	½oz.
Benzene	½oz.
Clove oil	1/16 oz.

Dissolve the gum arabic in the water. Mix the castor oil, clove oil and benzene. Add the gum arabic solution to this mixture. Then work in the remainder of the ingredients.

These puncture-sealers may be used with all types of valves, but it cannot be said that they can be guaranteed to remain effective over long periods.

Restoring Finish of Brass Plaque

WILL you kindly inform me how to restore the original finish of a brass plaque that has become tarnished due to age ?—W. J. Barker (Prestwich).

WE take it that the brass was bright-lacquered, in which case you will have to remove the old and deteriorated lacquer coat on the plaque by boiling the whole article in a solution made by dissolving 1 part of caustic soda in 4 or 5 parts of water. The plaque will be effectively stripped and degreased by this treatment.

It will now have to be polished with a fine abrasive—metal polish will do—and placed in an oven so as to become just perceptibly warm—*not* hot.

In this condition, the transparent or golden lacquer is thinly applied with a brush. It dries very quickly.

You can purchase these transparent and coloured lacquers from the jewellers' and clockmakers' shops in the Shudehill district of Manchester. Alternatively, you can make up the following transparent lacquer for yourself, obtaining the necessary materials from Messrs. J. W. Towers & Co., Ltd., 44, Chapel Street, Salford (near to Victoria Bridge) :

Transparent celluloid (film scrap)	15 grams.
Ethyl acetate	17 c.cs.
Amyl acetate	25 "
Xylene	60 "
Benzene	40 "
Boiled linseed oil	8 "
Tricresyl phosphate (or dibutyl phthalate)	3 "
Ethyl alcohol (Industrial or meth. spirit)	26 "

Removing Green Stains from a Bath

COULD you please suggest any methods of removing green stains from a bath ? These stains are directly underneath the geyser, and I presume that they are copper oxide stains—the underneath parts of the geyser were quite thick with corrosion, due, I think, to the fact that the tap was incorrectly adjusted and the geyser continuously overflowing during use.—A. Austin (Northampton).

YOU do not tell us what type of surface finish your bath has, whether it is a painted or porcelain surface. On the type of surface depends to some extent the treatment which should be applied for the removal of the green stains.

The stains in question are not due to copper oxide, but to a copper salt of variable composition. It is just possible that the copper compound may be soluble in petrol or paraffin, in which case a cloth saturated with either of these liquids will remove them.

If not, you should make up a solution of ammonia by diluting 2 parts of strong ammonia with one part of water. Apply this with a clean cloth repeatedly to the stained areas, and, if possible, keep the ammonia-charged cloth in contact with the stains for some time. The ammonia will turn the stains blue, but the blue compound will be soluble, so that a good application of hot water will bring much of the colouration away. Repeated application of this method should clear the stain entirely, although ammonia will soften a painted or paint-enamelled surface.

If the bath surface is of porcelain, and if, owing to a roughness or undue porosity of the surface the stains have formed below the porcelain or in it, they will be very difficult to eradicate. In this event, use strong ammonia and apply it repeatedly, day after day, subsequently washing it away with plenty of water.

Readers are asked to note that we have discontinued our electrical query service. Replies that appear in these pages from time to time are old ones, and are published as being of general interest. Will readers requiring information on other subjects please be as brief as possible with their enquiries.

Only in this manner can the stains be removed, or, at least, very much lessened.

Re-silvering a Mirror

I WISH to re-silver a mirror that has become clouded with patches of damp. Can you give particulars of a method for removing the old coating and putting on a new one ?—R. Hughes (Watford).

GLASS silvering is no easy job, and it should not be tackled lightly. It calls for care in working skill and experience. However, for your information, here is the process :

The old silver is removed from the mirror by means of strong ammonia or water dilute nitric acid. After the silver has been removed the glass should be cleaned with a paste of chalk and water, rinsed in water and then completely immersed in water until the silvering mixture is ready.

The silver solution is made up in two separate liquids :

(*a*) Silver nitrate, 6 grams.
Distilled water, 75 c.cs.

To the above solution add ammonia drop by drop. A copious precipitate will be formed. On continuing to add ammonia this precipitate will re-dissolve, and the ammonia addition (drop by drop) should continue until the precipitate has *just* re-dissolved (but no more than this).

(*b*) Glucose, 10 grams.
Distilled water, 100 c.cs.

Mix equal parts of (*a*) and (*b*). The mixed liquid is poured into a tray large enough to hold the mirror to be silvered or, alternatively, it can be poured directly on to the back of the glass.

Just before silvering, the glass is flooded over with a 10 per cent. solution of tin chloride (stannous chloride) (i.e., 10 parts of tin chloride dissolved in 100 parts of water). The tin chloride solution is drained away and, without further rinsing, the glass is immersed in the silvering liquid or the latter is poured directly on to the glass. The tray (or the glass) is heated by the steam from a vessel of boiling water. Care must be taken to see that an equal heating is obtained. Within a minute or two the silvering begins and it is usually complete in about six minutes. The mirror is then carefully rinsed in water and allowed to dry in the air. Heat must not be used for this drying.

It is of the *utmost importance* that at all stages the most scrupulous cleanliness of hands, liquids and dishes is observed. The slightest trace of grease, dirt or oil will ruin the silvering operation or will give rise to silvering which is not adherent to the glass. The tin chloride treatment can be omitted if desired, but it aids the good adhesion of the silver film to the glass and it improves the whiteness and brilliancy of the mirror.

Polished Surface on Cement work

CAN you advise me on how to get a good polished surface on cement plaster work ?

I want to leave the surface of the cement work without the use of a finishing coat of Keene's cement, but with as good a surface finish.—G. E. Simper (Beccles).

IT is very difficult to get a really good polish on cement plaster work. In fact, it is next to impossible. Your best plan is to rely on the gentle abrasive properties of a paste of Portland cement and water. Rub this well on to the surface of the plaster work with a smooth pad, rubbing in straight lines only—either up or down or sideways. A little finely-powdered brick may be added to the cement paste and, finally, a paste of whitening may be used for giving the maximum smoothness to the surface.

Hypersensitising a Film

COULD you please furnish me with answers to the following queries :

(1) Is it possible to hypersensitise a film after exposure, and before development, using mercury or mercury vapour ? If so, under what conditions and in what quantity ?

(2) Is it possible to hypersensitise a film before exposure by any method, and how ?

(3) I possess several negatives which are unsuitable for enlargement, due to harsh grain, caused by using an M.Q. "Universal" developer. Is it possible to process the negative in any way, in order to obtain a fair degree of "fine grain" ?—E. A. P. Swainsbury (Dulverton).

SOME workers have stated that they have obtained hypersensitisation of plates and films after exposure and before development by treatment with mercury vapour, but we consider that the degree of hypersensitisation thus obtained is more imaginary than real.

However, for what it is worth, the treatment recommended is to expose the plates (after light exposure in the camera) to the vapour of mercury for from four to six hours, the plates being secured to the inside lid of a light-tight wooden box on the bottom of which is a porcelain dish containing a little mercury. The entire box should be maintained at a temperature of about 30 deg. C. to permit of the appreciable volatilisation of some of the mercury.

The post-exposure hypersensitisation is considered to be brought about by the preferential adherence of particles of mercury to the light-struck areas of the emulsion.

(2) A similar treatment has been recommended for the hypersensitisation of a plate or film before exposure in the camera. Alternatively, treatment with very dilute ammonia has been recommended for the same purpose. In this case, the unexposed plate or film is bathed for 10 minutes in a very weak solution of ammonia—say, 1 part ammonia in 200 parts of water. It is dried slowly in total darkness and then exposed within a day.

The speed of plates can be increased about 25 times

by bathing the plate or film in a dye solution containing silver. At the same time, the plate or film, if it is non-orthochromatic, becomes partially colour-sensitive (but not to red).

The stock silver solution is made up as follows:

Silver nitrate, 25 grains.
Distilled water, 1 oz.
Hydrochloric acid, to minims (or drops).
Strong ammonia, 2½ oz.

Mix in the order named. The addition of the hydrochloric acid will create a copious precipitate of silver chloride which will re-dissolve on the addition of the ammonia.

For use, prepare the following bath:

Distilled water, 18 oz.
Stock silver solution (as above), 5 minims (or drops).
Pinacyanol solution (1 in 1,000), 18 minims (or drops).

The plates or films are bathed in this solution for five minutes (in complete darkness), after which they are dried. After this treatment, the material must be exposed within a fortnight.

Pinacyanol solution (or pure pinacyanol) can be obtained from Ilford, Ltd., Ilford, London, or from Kodak, Ltd. (Wratten Division), Kingsway, London, W.C.2.

(3) It is not possible to decrease the grain size of an existing negative. You may, however, minimise it in an enlargement, either by using a condenserless enlarger or by placing a sheet of ground glass behind the negative in the enlarger. Use a light of low intensity (with correspondingly increased exposure) and a lens of maximum aperture. These conditions will all tend to decrease the graininess of the enlargement.

Another way is to copy the enlargement on a reduced scale and then enlarge the copy negative.

Cleaning Tiles

I HAVE a multi-coloured, mosaic-patterned, tiled porch which has become badly soiled and discoloured due to workmen engaged on rebuilding on the premises treading cement, plaster, etc., in and out of the house.

I would be greatly obliged if you could tell me of some method whereby these tiles could be cleaned and restored to their original state. I have tried scrubbing with soap and hot water, various proprietary brands of soap powders and scouring powders, but all to no avail.

The majority of the tiles still retain their original smooth surface though others seem to be scratched.—K. C. Thomas (Upper Eastville).

YOUR best plan is to brush over the tiles a mixture of equal parts of hydrochloric acid and water. This will remove mineral matter, and if the action is too slow you can use the acid undiluted. If possible, do not let the acid make contact with the cement between the tiles, and after a few minutes remove the acid from the tiles by swabbing off with a wet rag. This treatment together with a little abrasive treatment by means of a medium fine glass paper will remove the mineral matter.

The paint may be removed by repeatedly rubbing over it a rag soaked in benzene. Distemper will not respond to this benzene treatment, but may be removed by abrasion.

Soaps and powders are worse than useless for the job. If the tiles have been badly scored and scratched we are afraid that there is nothing you can do about them—other than replacement. You will probably find that the mineral matter has been ground into the surface of the tiles and it is precisely here that the careful hydrochloric acid treatment should be successful.

Casein Glues

CAN you inform me of any books giving information on the manufacture of casein glues? Also, is there any way of preventing the softening which takes place when such glues are immersed in water?—A. Thomas (Trowbridge).

LITERATURE on the practical aspects of casein products is very sparse. The only books which we can trace on this subject are the following: Sutermeister and Browne: Casein and its Industrial Applications. 1939 (32s. 6d.); C. H. Teesdale, Modern Glues and Glue Testing (6s.). (Figures in brackets represent pre-war net prices.)

It is just possible that Messrs. Wm. Bryce, 54, Lothian Street, Edinburgh, might be able to obtain an American book on this subject for you.

To some extent, surface softening of a casein product when placed in water may be prevented (or lessened) by treatment of the material with formalin. Dilute 1 volume of commercial formalin solution with 3 volumes of water. Brush this solution on to the casein surface and allow it to dry.

Electrolyte for Iron Plating

I SHALL be glad if you will give me some information concerning the solutions required for iron plating.—F. R. Cannon (Coningsby).

THERE are several solutions which can be used for iron plating. One of the simplest and the most popular is the following:

Ferrous ammonium sulphate	.. 2¾lb.
Water	1 gallon

The solution is used cold with a voltage of between 2 and 6. A current-density of from 6 to 10 amps. per square foot of plating surface is used. The anode can be wrought iron or stainless steel.

This solution deposits pure iron on the cathode. It has been much used for building up the dimensions of worn machine parts.

You will be able to obtain all requirements for this plating process from Messrs. Wm. Canning and Co., Ltd., Great Hampton Street, Birmingham.

A useful book dealing with this topic is "Electroplating," by S. Field and A. D. Weill (Pitman, 15s. net).

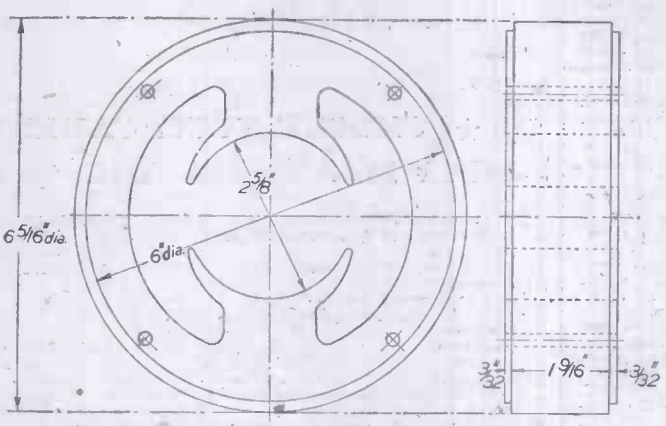
Rewinding a ¼ h.p. Motor

I HAVE a ¼ h.p. motor, originally intended for 230 volts D.C.; it is built up of laminations, all except the end plates. There are no windings on it at present and I wish to rewind it to run on A.C. 230 volts 50 cycles.

The length of the armature is 1¼in.; diameter of the armature, 2⅜in.

There are 15 slots (½in. deep) and 30 commutator segments. I enclose a sketch of the field magnet. The amperage on the D.C. 230 volts was 1.2 amps. I would be much obliged for the winding data as I have met with no success after two or three attempts at rewinding.—G. Roughley (St. Helens).

WE suggest each field coil be wound with 115 turns of 22 s.w.g. S.S.C. enamelled wire, the two coils being connected in series so as to create poles of opposite polarity, and in series with the armature. The armature should have 15 coils, each with 112 turns of 29 s.w.g. D.S.C. wire, a loop being brought out from the centre of each coil for connecting to the commutator. Use a coil span from slots 1 to 8, etc.



Field magnet for a ¼ h.p. motor (G. Roughley).

With the armature placed so that slots 1 and 8 are equi-distant from the centre of one pole face, number the commutator segment on which the nearest brush lies, number 2. Clockwise numbering at the commutator end. For reversible operation connect the start of the coil in slots 1 and 8 to segment 1, the loop to segment 2, and finish of the coil to segment 3. Connect the start of the next coil in slots 2 and 9 to segment 3, the loop to segment 4, finish of the coil to segment 5, and so on. For fixed clockwise rotation at the commutator end add 2 to the numbers given above for the coil connections, and for fixed counter-clockwise rotation subtract 2.

Parchmentising Paper

CAN you supply me with details for making imitation parchment of a light shade, and also the darker buff shade as used for lampshades, etc. ?—H. J. Watts (Bristol).

THERE are two ways of parchmentising paper:

(a) *The Sulphuric Acid Method.* With this method, the paper is immersed for 10 seconds in pure sulphuric acid of 77 per cent. strength (specific gravity 1.7) at a temperature not exceeding 17 deg. C. The paper is afterwards well washed and allowed to dry without heat.

This is a cheap method of parchmentising paper, but it will work satisfactorily only with good quality paper. If the paper is of poor quality, it will become blackened or browned.

(b) *The Thiocyanate Method.*—This is an excellent method which is well under control and which can be applied to all types of paper.

Equal parts of calcium thiocyanate and calcium chloride are dissolved in water in amounts sufficient to make up a solution having a boiling-point of 155-157 deg. C.

The paper is immersed for 30 seconds in this solution at a temperature of 130 deg. C. It is then washed, dried slowly and ironed with a hot iron or hot rollers.

Please note that all the temperatures and solution concentrations detailed in the above methods must be adhered to rigorously, otherwise the results will suffer.

Calcium thiocyanate is manufactured by The Manchester Oxide Co., Ltd., Miles Platting, Manchester, 10. These people were interested in the application of calcium thiocyanate to the parchmentising of paper, and some years ago they published a booklet entitled "Practical Effects of Calcium Thiocyanate on Cellulose." If you can get a copy of this it would be of great help to you.

Possibly the above firm might be willing to supply you with the mixed calcium thiocyanate-chloride solution ready for use.

Colouring Teazel Heads

COULD you please tell me how to colour teazels red, green and purple ?—D. Potter (Chesham).

TEAZEL heads are usually painted for decorative purposes, a cellulose paint applied very thinly being the most suitable for this purpose. With care, however, they can also be dyed. For this purpose, the teazels are slowly dried until they are of a light-brownish colour. They are then dyed in a strong dye bath. Any household dye can be used for this purpose, but the dye solution should be double the usual strength. The teazels should be immersed in the dye bath cold. The bath should be slowly warmed to a temperature at which the fingers cannot comfortably be held in the bath. After this the bath should be allowed to cool and the teazels removed and well rinsed.

Even if the teazels are to be painted with a celulose paint they must be slowly dried before treatment. Freshly gathered teazels are not suitable for painting or dyeing.

Polished Concrete Floor

I HAVE a small concrete floor which has a good smooth surface and is practically dust free. How can I treat it in order to give it a perfectly smooth surface which would take a non-slip wax polish ?

Can you give me the recipe for a suitable polish, and details of where to obtain the ingredients?—J. F. Gooding (Loughborough).

IF your concrete floor is, as you say, smooth and flat, it will not require any treatment previous to applying a wax polish, although, if you wish, you can give it an application of size water (size 5 parts, water 95 parts) in order to fill up the pores and to prevent the wax from seeping therein. After drying, the polish can be applied.

A wax paste polish can be made by dissolving 15 per cent. paraffin wax and 15 per cent. of beeswax in 70 per cent. of white spirit. Waxes are not easy to get hold of at the present time and the usual wholesalers will not sell them in small amounts. We suggest that your inquiry should be made to a good chemical supply house such as Messrs. W. & J. George & Becker, Ltd., 157, Great Charles Street, Birmingham, 3, or to Messrs. Vicsons, Ltd., Pinner Road, Harrow.

White spirit, too, is difficult to obtain. If you cannot get it from your local garage, you can use ordinary paraffin in its place.

We think in your case that you would get better and easier results if you applied to your concrete floor a wax colloidal preparation, such as Autogloss, which is manufactured by British Asphalt & Bitumen, Ltd., The Docks, Preston, Lancs. Another preparation of a like kind is Sposs, which is prepared by Simmons Products, Ltd., Trading Estate, Slough.

"Tawing" and "Currying" a Sheepskin

I SHALL be glad of any information you can give on the following subject:

I wish to use a sheepskin as a rug, but so far I have not been able to soften the skin to the texture of the commercially-sold article. I would be grateful if you could tell me of any process by which I can achieve this condition.

I have already scraped and washed the sheepskin —A. Macdonald (Epsom).

SINCE you have already scraped the skin, we presume that you have got it in a perfectly clean condition, free from flesh, fat, loose tissue and so on.

What you have now to do is to "taw" it. This is done by immersing the skin in a solution containing 1lb. common alum and ½lb. salt per gallon. Place in the solution about quarter peck of bran, and immerse the skin, allowing it to remain therein for a day or two, during which time the bran will swell considerably. This preserves and cures the skin, the "tawing" being completed when a clean white line is seen when a part of the skin is sharply folded over and pinched between the fingers.

The skin is now removed from the liquid, allowed to drain and stretched on a wooden frame or over a door, and "curried." This operation is effected by scraping the skin in every direction with a blunt knife, the purpose of currying being to ensure the removal of all remaining dead tissue.

Finally, after the skin has been allowed to dry slowly (slow drying is important), every square inch of the skin is taken between the fingers and rubbed, kneaded or otherwise worked until it becomes soft and pliable. This is a job requiring much patience, but it is essential if a good skin is required. It is advisable to rub a little neatsfoot oil into the skin at this stage in order to help in its softening. Do not, however, overdo the oiling so as to make the skin actually sticky. Castor oil may be used instead of neatsfoot oil, and so, also, may olive oil.

THE Cyclist
Editor: F. J. CAMM

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Comments of the Month

By F. J. C.

The Affairs of the B.L.R.C.

OUR disclosure last month that the chairman of the B.L.R.C. had, according to Mr. H. R. Lintern, of the Ministry of Transport, stated in an interview with him that "the highway was not the right place for massed start cycle racing . . . and that in his view the members of the League could find what they wanted if closed circuits off the highway could be made available to them," has caused concern and consternation amongst members of the League.

We at once wrote for confirmation or denial to Mr. Durman, chairman of the B.L.R.C., but we have not received a reply to our letter, which was dated June 17th.

Our Plebiscite

We have, therefore, conducted a plebiscite among B.L.R.C. Clubs. We wrote to every secretary asking him to place our letter before his committee and to let us know the result. Our letter asked whether there had been any change in League policy, and whether the members were aware of the facts as set forth in this journal last month.

Many clubs have already considered the matter and we give below a summary of the result.

Dawley Velo Club.—The matter was put before a meeting of our club and the result was a unanimous vote in favour of road racing.

Stonbridge Coureurs.—Total agreement that the policy of the B.L.R.C. remains as already stated in the 1947 Handbook. Re changes made in the officials of the League and League N.E.C. we are not in full agreement with these, as until a national ballot is conducted a true perspective of what the average club wants cannot be obtained. Delegates have not attended the A.G.M. and the S.G.M. and the voting was therefore swayed by the extremists.

East Dorset Coureurs.—We stick by the original policy and we feel strongly with regards to the dismissal of Mr. J. Kain who has done great work for the League. We believe that the recent turmoil in the League has been caused by an anti-B.L.R.C. element that has been allowed to enter our ranks.

Notts Olympic R.C.C.—Our policy is as it has always been with the exception that we no longer desire to affiliate to the U.C.I.

B.L.R.C. Western Section.—I express surprise at the contents of your letter. To the best of my knowledge no change is contemplated in League policy, and certainly no change has been discussed at any N.E.C. meeting I have attended. It will be interesting to know the official concerned as he would be acting in an unconstitutional manner. To-day the League is suffering from a surfeit of such officials [*sic*], and they are all in the London section. The salvation of the League lies in getting all national officials away from London. This almost happened at the last S.G.M.

Chiltern R.C.—I placed your letter before our committee and it was unanimously agreed that the League adhere to its original policy.

Rhos-on-Sea C.C.—I placed your letter before my club and a 100 per cent. vote was passed in favour of the continuation of the League's original aim. Our club seceded from the N.C.U. because I was able to present to them a good picture of its bankrupt policy. Please make it clear to your readers that we do not support, and have no knowledge of the statement which Mr. Lintern makes concerning a change of policy.

Birmingham Premier R.C.—All members of our club insist that massed start racing is quite safe if run under our rules. We do not wish the League to alter its policy.

Leicester Pegasus R.C.—You are, of course, entitled to conduct a plebiscite. The policy of the League has not changed.

Ealing C.C.—We thank you for your interest and the matter is under close investigation.

B.L.R.C. National Executive. — The original policy in regard to Road Racing under B.L.R.C. rules is being very zealously perpetuated In this our resolve has never been stronger than it is at present, and we have never deviated from it. In support of this I refer you to our open letter to Mr. Lintern, of the Ministry of Transport.

Our attitude to N.C.U., U.C.I., and the Ligue Internationale de Cyclisme is clearly defined in our letter of 14.6.48, to Mr. Rene Chesal.

The change of officials was considered necessary and was confirmed constitutionally by the majority vote of the Special General Meeting held in Birmingham on 30.5.48.

Confirmation

We shall publish further replies as soon as received. We have received confirmation from Mr. Lintern of the statements made to him and which we reproduced in last month's issue. We received one splenetic letter only, and that came from the Hon. Gen. Sec. of the London Section.

In the meantime the dissension within the League continues.

Cycle Exports

IN the first half of the year almost thrice the number of British bicycles (855,156) were exported as during the corresponding period before the war (288,230). The increase in the number of motor cycles sold abroad is even more striking, 36,988 as against 9,886. The value of these bicycles and motor cycle exports for the six months was £9,311,950 as against £1,243,086 in 1938.

The greatest increase was shown by British Malaya which bought 113,723 bicycles, compared with 8,994 for the corresponding period in 1938. Other striking increases in countries where foreign currencies are desired were Switzerland (751 to 4,525); Egypt (613 to 15,427); Iran (1,965 to 15,079); Mexico (1,220 to 18,865); and Venzuela (1,628 to 18,995).

U.S.A. bought only 57 British motor cycles in the 1938 half-year. This year the number was 6,122. Even Australia, always a good customer of Great Britain's, had increased from 3,172 to 9,583. Switzerland took 53 in 1938, and 3,533 in 1948. South Africa, India, British Malaya, Canada, Sweden, Belgium and the Argentine all increased their orders.

"The contribution which these sister industries are making to the country's economic recovery," said Mr. George Wilson, O.B.E., president of the Manufacturers' Union, "can best be measured by recalling what Sir Stafford Cripps told us at the Guildhall on July 9th. If by 1952, he declared, the balance of our exports and imports was to be at a level that would provide a better standard of living than we had to-day, we should have to sell nearly double the volume of exports sold before the war.

"We are still four years from 1952, and already the bicycle and motor cycle industries have practically trebled the volume of their pre-war exports; in value the increase is seven times the 1938 figure. What better proof could there be that the whole world appreciates the value of British craftsmanship?"

Harris, the N.C.U. and the Olympics

THE deplorable dispute between Harris and the N.C.U. over the location of his training, resulting in the suspension of Harris from the Olympic team, the reinstatement of Harris and the resignation of the team manager, W. J. Bailey, provided a further example of N.C.U. incompetence. The matter should have been discussed and a solution reached without the matter appearing in the press. The incident provided adverse publicity for British cycling as well as for the N.C.U. Apparently one N.C.U. committee can suspend a rider and another committee can override the first!

A study of the history of the N.C.U. for the past 50 years shows that it has consistently adopted a dictatorial and autocratic attitude, finally ending in its giving way after having made a mess of things.

It is high time that club cyclists got together and put this "controlling" body in order or abolished it and formed a fresh one. This has been done before in cycling circles. The N.C.U. is quite out of touch with the times and, in our view, has not the support of the majority of sporting cyclists. It is also our considered view that fresh blood is needed in the cycling movement.

Whether the dispute affected Harris's riding only Harris knows, but the fact is that a race which he regarded as a certainty provided him with second place to Mario Ghella, a 20-year-old Italian.

Paragrams.

For Investigation

WHEN reference was made at a meeting of Grimsby Road Safety Committee to the fact that examiners will now carry out inspections of children's cycles in the local schools, the chairman said he had received a number of reports from parents regarding a certain Grimsby man who hires out unsafe cycles to children at a charge of 9d. each. The chairman said enquiries were being made into the man's activities.

Humbler Members

A GRIMSBY town councillor, speaking at the July council meeting, asked that arrangements should be made for the benefit of "the humbler members of the Council who own cycles and not cars," to provide a special parking place near the Town Hall where councillors could leave their cycles while attending meetings. It was agreed that arrangements should be made to provide such a parking place.

Crashed in Flames

A PETERBOROUGH cyclist the other day gave an unexpected demonstration in the street when he went round a corner too fast. He collided with a pedestrian who was just crossing the road, nose-dived over his handlebars and landed in a heap with smoke and flames coming from his jacket and trousers. He leaped to his feet and beat out the flames, making a mental vow that if he ever carried matches in his trousers pocket again they would be safety matches.

Training Grantham Children

POLICE SGT. T. N. LEDGER, a traffic officer in the Grantham division, has prepared and presented to Grantham Road Safety Committee a scheme which he considers will train local schoolchildren in road safety. The scheme is based on the rule: "A child shall do no foolish, foolhardy, thoughtless or selfish thing in any street or highway which might cause injury to himself or others." Children who observe the rule will receive badges and other rewards, while the child and his school will be penalised by any breaches. It is suggested that the penalties and awards should be under the control of a "schools street-safety sense committee."

£20 for Not Halting

KETTERING magistrates have decided to get extremely tough with cyclists who disregard halt signs in future. After hearing four cases the other day the chairman said: "Unless there is an improvement in this respect we must seriously consider increasing the fines. Penalties can go up to £20 for this offence. These signs must be obeyed, and it is high time cyclists realised it." Three of the cyclists were fined £1 each and the fourth, with a previous conviction for a similar offence, was fined £1 10s.

That Humber Bridge

THE report of the Ministry of Transport's Committee on Ferries, just published, suggests various improvements to the Hull-New Holland ferry crossing, but emphasises that a permanent bridge is needed because of present and potential traffic across the Humber. The committee state: "We regard the ferry service as only a temporary means of cross-river communication, which should be improved in the meantime." The Ministry of Transport put into cold storage over a year ago plans for building a £6,000,000 bridge over the Humber, and permission was not even granted for the preliminary experimental work to be done.

Pedalling Through Europe

THE American Young Friends' Fellowship has organised cycling trips for young American students through England and Ireland and across to the Continent, as an extension of the normal curriculum. Each party spends about six weeks on the trip and there are 18 or so members in each party. One of the ideas of the organisers of the scheme is to give the students some idea of the ways of life in other countries and the difficulties Britain and other countries are now struggling against.

Tired of Pedalling?

AN American firm has put on the market a small power unit to be attached to any bicycle, with a single pedal control for starting, accelerating and stopping. The engine, which drives through a roller chain to a sprocket on the rear wheel, develops 3 h.p. It is a 4-cycle aircooled petrol engine, giving a top speed of 45 m.p.h., and doing some 125 miles to the gallon. A 5in. diameter internal expanding brake for fitting to the rear wheel is also supplied with the unit. The makers say they hope to have 100,000 of these power units on the market before the end of this year.

Speed Up North

THE open "25" just run off by Thorne Paragon Cycling Club at Thorne, Yorks, is claimed to have been the fastest trial in the north this year. The winner was Jack Simpson, of Hemsworth Wheelers, with a time of 59 minutes 57 seconds, and Hemsworth Wheelers won the team prize with an aggregate of 3 hours, 4 minutes, 22 seconds, which was the best time ever recorded in a Yorkshire "25."

Please Fine Me!

HUNTINGDON Borough magistrates smiled a legal smile when their clerk read to them a letter received from a European volunteer land-worker who had been caught cycling without a rear lamp. The cyclist wrote: "As it is my wedding day I am unable to be at the Court. Please fine me, for I am guilty." The magistrates imposed a 10s. fine.

Old Cycling Blue

MR. GEORGE DENNIS DAY, who has just died at his home at St. Ives, Hunts, aged 88, was a well-known cyclist in his younger days. He was a pioneer of cycle racing at St. John's College, Cambridge, and gained his Blue. He rode for Cambridge in events against Oxford from 1880 to 1884 and became noted for his riding in races of 25 miles or over. He once rode in an event at the Crystal Palace to see if a cyclist could reach a speed of 20 miles an hour and although he crashed he broke a world's record for 13 miles. Mr. Day was admitted a solicitor in 1885 and practised in St. Ives, where he held many public offices.

On the Grand Scale

TWO Loughborough brothers, charged with cycle stealing, appeared, according to the evidence given at the Magistrates' Court, to have joined the ranks of big business. One brother was alleged to have said in a statement to a police constable: "I have been pinching bikes for four years but have only been pinching them for my brother for about two or three months." On a police search the brothers' home appeared like a graveyard of missing cycles. Hundreds of parts from all kinds of machines were found and the method appeared to be to make up new hybrid machines from the various parts, repaint them and sell them at auction sales and elsewhere.

Not Enough Training

LOCAL residents who watched an old crocks cycle race at St. Neots, Hunts, were surprised at the short distance ridden by the winner of the penny-farthing cycle race before he came off. The night before the race two youths had been taking it in turns to ride a similar machine and they put up a far better show. The winner of the old crocks race, open to all types of old machines, was the rider of an 80 years old boneshaker. It was an improvement on the type that had pedals working direct on the front wheel as it had a pedal arrangement driving the rear wheel by means of two cranks, but it was just as uncomfortable and heavy to ride.

Another Slander

"CYCLISTS are people you can never guess right about," the chairman of Peterborough Bench told a London lorry driver who was fined £5 with 7s. 6d. costs for driving without due care, following a collision with a cyclist. The driver said he saw the cyclist, "a steady old plodder," riding in front of him, and he had the impression that he was going to pull in behind a stationary car. The cyclist, however, turned to pass the car and the following lorry caught him and knocked him under the car bumper.

In a Big Way

A GERMAN prisoner agricultural worker, who was fined £1 10s. at Loughborough Police Court for cycling without a rear light, admitted that he had ridden 75 miles without lights and had been stopped altogether by seven policemen, but had ridden away from them all. He was finally caught at the sleepy hour of three o'clock in the morning by a not-so-sleepy constable.

The Living Sign

IF all goes well, travellers through Grantham on the Great North Road will soon once again be seeing the town's famous "living sign" at the Beehive Inn. In a tree outside the inn there is a beehive which forms the sign, and this is to be restocked by the secretary of the local Beekeepers' Association. For many years there was always a swarm of bees in the hive, but one year they were all killed off by the Isle of Wight disease. An attempt was made to restock the hive two years ago, but the bees took rather a poor view of their new home and refused to stay. A sign outside the Beehive bears the words: "Grantham, two rarities are thine; a lofty steeple and a living sign."

Cycling to Stardom

BARRY LETTS, 23 years old Leicester film aspirant, is being given a chance to show what he can do in the new J. Arthur Rank comedy, "A Boy, a Girl and a Bike," which is being made at the Gainsborough studios. He takes the part of a crack cyclist, a member of a Yorkshire club, and the cycling scenes are being shot in the Halifax district. He has previously appeared in films, including "San Demetrio, London," "Frieda," "Scott of the Antarctic," and several others, and has been under contract with the Rank Organisation since he was released from the Royal Navy.

Full-time Job

NORTHAMPTONSHIRE County Council have appointed a full-time district organiser for road safety at a salary of £405 a year, rising to £435. The appointment of a full-time worker had previously been opposed, but the objection was withdrawn when it was found that in six divisions of the county there were no volunteers willing to work as part-time organisers, and without the present appointment there would have been no safety organisation in these districts.

Blasting Back!

A LOS ANGELES man, tired of being chased about the road by the raucous horns of ill-tempered motorists, is now using a horn of his own invention. From war surplus materials and two long horns he has built himself a portable "blaster" worked from a compressed air cylinder fitted at the top which has a range of a mile. Motorists hearing this reply to their hooting nearly jump out of their skins, but, unfortunately for this method of hitting back, it is possible that the police will soon step in with a ban.

Hold My Bike!

A GRIMSBY woman cyclist, wishing to visit a fish shop in a one-way street in the town, got off her machine and started to wheel it towards the shop. "Hi!" shouted a large policeman. "You can't do that!" But the constable should have known better than to interfere with a wild housewife in pursuit of food, for she thrust the cycle into his hands, said, "I've got to get the fish so you had better hold this for me," and vanished down the street and into the shop. And the policeman had to keep an eye on the cycle until she reappeared.

Keeping Them Amused

A KENSINGTON borough councillor, Mrs. Helen Newhouse, suggests that if only children are kept well occupied they will not get into mischief, and she wants her borough to organise a miniature speedway track. Cycle races would be arranged for the younger children, while the older ones would ride motor-cycles. She has prepared a detailed scheme for submission to the Council, and she considers the Council could quite easily afford to provide a track and even supply a few machines, too, if necessary, for those children who cannot afford their own.

Peterborough By-pass?

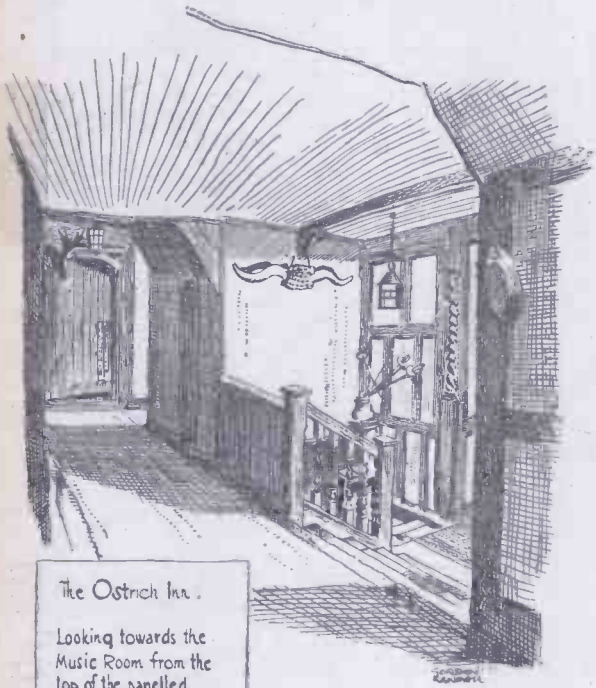
ARRANGEMENTS have been made by Peterborough City Council for the holding in the city during August of a traffic census in an attempt to discover whether there is a need for a by-pass road to be built to avoid busy streets. Road users will be stopped at various points and asked where they have come from, where they are going, what route are they taking through the city, and would they avoid the city if they could. The census will last for 24 hours, and it is hoped that it will provide useful data for the City Council to work upon.

Cycling Chimp that Wasn't

WITH the death of Tarzan, a cycling "chimpanzee" who toured the country with circuses for nearly 50 years, it has been disclosed that this trick cyclist was not a monkey at all but a Lambeth-born dwarf, Leonard Jackman. Jackman, who died at Ayr at the age of 62, made up so convincingly before each performance in a chimpanzee skin, with special make-up, monkey-like false teeth and outsize ears, that not a single member of his many audiences ever realised they were watching a man.

Around the Wheelworld

By ICARUS



The Ostrich Inn.

Looking towards the Music Room from the top of the panelled staircase.

The Harris-N.C.U. Dispute

IT is deplorable that with so many foreign sportsmen in this country and foreign correspondents, the N.C.U.-Harris dispute should have got into the press. It is typical of the N.C.U. Surely if Harris wished to train in a manner which suited him better than that prescribed by the N.C.U. a concession could have been made? Instead of that the N.C.U. determined to wield the big stick and air its authority and once again it made a mess of things.

Diamond Jubilee of the Pneumatic Tyre

JOHN BOYD DUNLOP patented the pneumatic tyre on the 23rd of July, 1888. The Diamond Jubilee was celebrated at Fort Dunlop and elsewhere. The cycle, motor-cycle and motor industries would not have existed without the pneumatic tyre as its foundation. Tyres now use 70 per cent. of the world's rubber, the consumption of which has increased from 30,000 tons to 1,000,000 tons a year, and it is still rising.

Mr. E. F. Mitchell, Dunlop's Regional Manager for the Midlands, disclosed these facts at a meeting of the Solihull Rotary Club, when Bob Carlisle, who saw Dunlop test his first pneumatic tyre in Belfast in 1888, was present.

"The Roadfarer"

THE Roadfarers' Club has just published the first issue of its official organ—"The Roadfarer." The first number contains a summary of all of the highway legislation from 1285 to date. The Editor of "The Roadfarer" is Mr. F. J. Camm, one of the founder members of the club.

Regarding the summary of Highway Legislation, it is often stated that the Locomotives on Highways Act, 1896 repealed, so far as "Light Locomotives" were concerned, the requirement in the Locomotives Act, 1865, with regard to red flags, and I see that this statement is repeated in the summary of road vehicle legislation in the first issue.

Actually, the red flag requirement was abolished as regards all locomotives in England and Wales by Section 29 of the Highways and Locomotives (Amendment) Act, 1878, and in Scotland by Section 4 of the Locomotives (Amendment) (Scotland) Act of the same year.

Clubmen

THE present-day clubman is very much a slave to fashion; his bicycle has to conform to the accepted type laid down by current thought.

His bicycle has an upright frame in order to bring him farther over the bracket. I fail to understand why, as he, in most cases, has never learned to pedal correctly—he fixes toe-clips and straps, and by sheer brute strength forces himself over the ground.

A Bidlake or Artaud would turn in their graves to see such sights as are presented on any main road at the week-end.

To be a really pukka clubman these days you must have a French gear; never mind whether it works or not, so long as its French you're in the fashion; the change lever is always fitted on the down tube, as this looks very smart and necessitates an acrobatic feat to reach it; the brake cables—yards of them—should preferably be silver coloured, to assume the appearance of twin fountains, and will guarantee you being stamped as a clubman by the cognoscenti. The levers should be "hooded," and of course you must have sprints or at least "Pressures." If you don't have these things there's always the danger of being mistaken for a "Tuggo," and that would never do, as it's been my experience that the average so-called "Tuggo" covers far more miles and appears to enjoy himself more than the sheep-like folds one sees on the roads to-day.

Having arrived at the tea place the fashion is to talk as loudly as possible in the current slang irrespective of whether there are any other members of the public present; ignorance being the handmaiden of the braggart, they regale all and sundry with the adventures of the day.

I wonder if any of these chaps have ever thought what the general public think of them; no wonder so many tea places are closing their doors to cyclists, and if we want them to welcome us again we must all improve our manners.

The public are not interested if you did a 1-1 in the day's "25," it just doesn't mean a thing to them and they don't want it thrust down their throats by a noisy and sweaty mob who invade the premises and proceed to make everyone else uncomfortable. After all, the clubman and his organisations have not a lot to be proud of. The nation has produced a Harris in spite of the N.C.U. and not because of them. It doesn't look to me as if the current clubman's brand of roadmanship will ever produce a world champion roadman, so save your bragging until you do.

"Accessories"

THE quality of some present-day accessories leaves a lot to be desired. It is said that a nation always gets a Government it deserves. Acting on that assumption, perhaps we cyclists are getting the accessories we deserve. We must be more discriminating in our demands.

Take lamps as an instance. The modern battery lamp which should show the results of over fifty years' progress from the old "Arabian" of 1895 fails to do so in several directions. The bodies of modern lamps are far too flimsy, the contacts are crude and inefficient, the "black spot" which all these lamps show on the road should not be there and, above all, the method of attachment to the lamp bracket is barbarous and stupid; most cyclists strap their lamps on, otherwise they would fall off over rough ground.

I am convinced that there is a demand for a really good battery lamp made to a standard and not down to a price. We want the body of stainless steel or brass, the contacts substantial, rustless and positive in their action, the reflector and bulb to be scientifically designed to show a good light without black spots or shadows, the attachment to the bracket to be by means of a spring lock, as was used successfully for years on the best grade oil lamps.

The price of such a lamp would probably be 25s. or so, and I am sure if it were really well made it would sell well; the same remarks apply to rear lamps. I have spent hours trying to get these crude productions to light and stay alight, and surely in this day and age of progress something could be done; the cyclist should be able to fit and forget his lamp.

Similarly, some modern calliper brakes could be improved. The welded-on type are the worst offenders; to get them to "take off" is almost an engineer's job; also, some of them chatter, due to the whip which occurs. The arches are—with one exception—unsupported.

I am in favour of a brake which is attached to the stays by substantial clips as well as being bolted through the crown and bridge respectively. The arched spring should be assisted by two tension springs on the forks and stays, and in this way we would have a brake which would leave the rim when the lever was released, instead of rubbing on one side as is so often the case now.

Above all, we want a return of old-time quality which existed when a bicycle by a leading maker was made by men who took a pride in their work and were jealous of the reputation they created.

It should not be forgotten that many of the leaders in the motor and aircraft industries were once cycle makers whose productions were bought by the discriminating cyclist and ridden without trouble for years. The only outlet for these men's brains today is in the motor and aircraft industries; the latter, in particular, calls for a very high degree of skill, yet it may surprise the present-day cyclist to know that such firms as Lea-Francis, Centaur, Rover, etc., used an equal degree of skill at the turn of the century on their cycle productions.

If we cyclists want a return of such productions we must demand them and show by our knowledge what we want; let's raise the standard of cycles, accessories, and our conduct so that our machines and ourselves will command the respect of the general public and make us a force to be reckoned with in any future legislation which may affect us.

Wayside Thoughts

By F. J. URRY

Canterbury/The lovely cathedral from Christchurch Gate (1517)

A Lost Summer

FATE has intervened at last, and I'm due for a long rest. I've no complaints, because 69 years of active healthiness has been a benediction, and it would be churlish to make a fuss now. Besides, I am promised a new lease of activity once the alterations and repairs are finished, so to that period I'm looking forward at the cost of a lost summer in order that the coming ones shall be gay for the welcome of a grizzled lad along the road. Yet it is no use pretending I am not annoyed, for at the very moment when I was due to join three other friends on a rediscovery of northernmost Scotland, the probability is I shall be staring at the blank wall of a bedroom and wondering—I hope—how the trio are faring. But it will be worth the changed circumstances when the jewel of health is restored to me, and in the process of recovery I can trace again the gallant days along the road under the spinning joy of a couple of dainty wheels. There is great compensation in that thought, for it projects the mind forward to the gold of autumn when, mayhap, in a quiet way I'll be trickling through the bronzing lanes of Warwickshire, a very sedate cyclist in the process of acquiring touring fitness once again. Of coufse, my friends glibly throw at me that panacea of health, "ride a bicycle," the phrase that so often came from my tongue when men complained of their aches and pains. They but pay me in my own coin, and in so doing make it the more easy for me to prove my own recipe for health once this present trouble is removed. For this halting business in the run of life has nothing to do with cycling; it is just one of those disabilities that occur, for what reason not even the experts know.

In Jersey

I AM writing these lines in Jersey, whither I've been despatched to fill myself with ozone, and never in my life have I spent so idle a holiday. And I don't like it, for a touring cyclist is a restless being who wants to see what is around the corner, to change his vision with his miles and take with him always that splendidly illuminating phrase, "the luck of the road." It does not suit me to stay put for a couple of days together when there are visions to be gathered, which is one reason why we hired a car to get away from the scattered suburbia of St. Helier and go trickling in slow metier around the innumerable bays of this island. Candidly, I don't like St. Helier or its immediate environs. It has slopped itself along the beaches in a manner that is often disorderly, and while the sea, the clean beauty of the green and violet Channel, is always a restful satisfaction, a glance inland anywhere within five miles of the sea-bordered capital gives me a feeling that here is a land the confines of which have been misused and its beauty smirched. But shake yourself free of Gorey to the west, and St. Aubin to the east, and you have a coastline of great beauty and often a hinterland reminiscent of Devon lanes in miniature, with tiny verdant valleys and coombs where the earth is luxuriant. You can circle the island in some 40 miles, as we did, but if you delve to the sea from the higher cliffs where the big roads run, maybe the mileage is almost doubled, but so is the beauty, and therefore the seeing cyclist can find great joy in this green and golden jewel. It is astonishing how many roads and lanes there are on this small mound of earth, and the wide differences between them and the districts they serve. Lovers of the island may not bless me, yet it is true from my angle that the place is too small to hold a cyclist with an easy 200 miles of travel within his week's dalliance; he would be over-running himself too often, and the spirit of cycle touring—always an expedition—would languish.

The Sense of Cycling

THE older I grow the greater becomes my liking for the straight tour, the day along the road and its adventure of food, and at the setting of the sun the homeliness of a welcome lodge. We have had so little of it these late years, spending so much time in arranging and discovering that our hours along the way have always been slightly troubled regarding the needful hospitality. And here was a summer when this same possibility of accommodation may have been resolved for me because the flow of petrol will be too meagre to take great crowds of holiday-makers into the remote places; or so I imagine. That was why we chose northernmost Scotland for our playground; and now I cannot go, indeed, I could not make the journey under my own power if the urgent cure could be postponed; I know that now, yet a few weeks ago I would have laughed had anyone so prophesied. But Scotland will still be there next year, and perhaps the waiting will make the visit all the more delightful and act as a prelude, I hope, to many a season along the road. I have known and loved so many beautiful journeys awheel, from my first venture into Wales in 1893, that I can say with confidence to every youngster, and, indeed, to anyone who can ride a bicycle with grace and ease, there is no way of life to match this virile travel that keeps the mind alive and the body fit. These last weeks I have been motoring because I must, or lie still and dormant in the spring sunshine. To me the journeys are not comparable; cycling is alive, muscularly and mentally; motoring—except for the driver—is somnolescent, stiff with a sense of idleness, and always too fast to gather the diminutive wayside delights. Doubtless most folk will count me a heretic on the ground that the new travel religion is not to be denied, and perhaps they are right; but the older ones of walking, and specially of cycling, which, after all, is geared walking from a restful posture, will retain my affection to the end. I ride a bicycle because I must, the call cannot be denied, and the reward has been, and will be yet, a life of simple joyousness always within my reach to fill a leisure hour or a holiday.

Cure This Ignorance

RECENTLY, a schoolmaster of my acquaintance rang me up for advice on saddles, and the conversation resulted in lending him a first-class leather seat for trial. Within a week he came along to say he was totally ignorant that saddle choice could make so much difference to the comfort of cycling. He is one of millions sitting on perches unsuitable for anything more than a few miles' journey, and even in that distance creating a sense of discomfort. During our talk he asked me to tell him the difference between the hack bicycle and the best of its type, and my reply was to examine his machine. As hacks go it wasn't a bad machine for all its 45lb., but the posture of the rider aboard it was genuinely distressful, as indeed you may expect of a schoolmaster. So we had a long talk on the subject of cycling and the bicycle, and I confess amazement that an erudite man should have been so utterly ignorant of the very rudiments of the pastime. The industry has much to answer for in so neglecting to teach the public the art of cycling. It has reduced the game to merchandise and neglected to make cyclists as well as bicycles, and had it not been for the club and sporting side of cycling I believe the industry could have suffered a severe decline. The upshot of the matter resulted in the loan of one of my machines, and a revelation of what position, gearing and quality can mean to an active man with a keen sense of country lore and a real desire to achieve freedom from the little irritations that must repel the carelessly mounted rider. He wanted to buy the bicycle, which is about the highest compliment a man can pay to a machine.

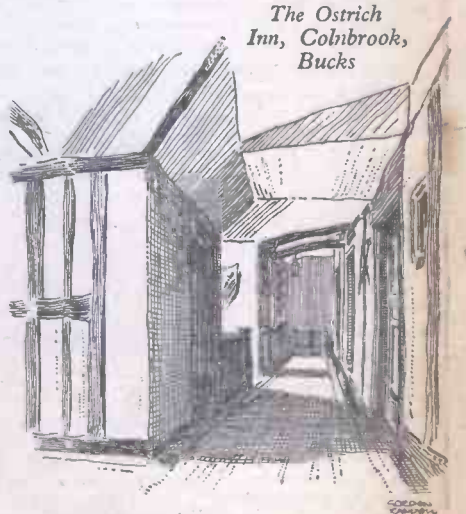
With the Trade

IT was during the latter part of April that, together with 30 members of the cycle industry, I saw spring smooth the contours and paint the rugged little lanes in the shire of Montgomery. Four days of golden sunshine bathed the party on their journeys around that famed land of Powis, in the centre of which is the model factory where J. A. Phillips and Co. make bicycles for the world, and whose guests we were under the hospitable leadership of T. J. Boulstridge, the firm's managing director. These rather ancient lads of the trade ride bicycles far better than the average citizen and seemingly enjoy "time off" for the purpose, and when men in their middle years, turning the scales at 16 stones, batter their way up the long rises from Newtown to Llangurig, returning over the long hill from Llanidloes under Oakley Park to gain the view of the silver Severn in its young lustiness, there is nothing mean or little in their performances. True our hosts did a generous thing by sending out the works wagon with liquid refreshment to replace the lost moisture consequent on climbing; and in the afternoon, a few miles short of Caersws staged a picnic tea the like of which I have not tasted for a decade. How it was accomplished I do not know, but the receipt of it was very gratifying to a considerable company. Primrose and violet, wood anemones, ground ivy garlanded our lanes and woods, the cuckoo bade us welcome and the gorse embossed the hillsides with gold. One glorious morning we went to the summit of the Kerry Hills to see "the coloured counties" rolling away to the blue hills, and at the end of that 10 miles of climbing I counted 22 warm cyclists gathered round the Phillips refreshment van in active praise of this thoughtful fulfilment of a comforting requirement.

The Greatest Joy

IT was after that jolly week-end that I knew of the verdict touching the cancellation of my Scottish tour. I went on riding and enjoyed my short spins, but knew as the small miles collected, that a long tour at the moment was out of the reckoning. But the next best thing will happen, my latest bicycle will go on the journey under the pilotage of one of my oldest cycling friends, and with its low gear of 40in. and 50 years of riding experience in the saddle, I shall still have some little share in the enjoyment. And it comes to me that if this war-weary world could only gain once more the spiritual pleasures of simple things like cycling and a decent day's work, how happy we could be. I know it is the easiest thing in the world to dogmatise on these questions, but if we had no faith in the things that really matter—nature and the love of beauty in any form—life would be a very dull passage. Well, I have found my own little niche in this great pastime, its variety, freedom, fine beauty and virility, and have preached that material gospel in season and out. What I cannot understand now is why so many people have missed it and all that its worship connotes. Perhaps the world is too much with us, and we have tangled ourselves with its problems to such an extent that excitement is our only cure—or so we think. I have discovered the balm that eases the wrack of living, brings to you the intimacy of the seasons and leaves in your nostrils the faint perfume of the field and the forest. If you ride, never allow the accomplishment to grow stale in you; if you don't, try it, but try it properly, and give to yourself a new country, a country you call your own but have never yet known with the intimacy of a thing beloved.

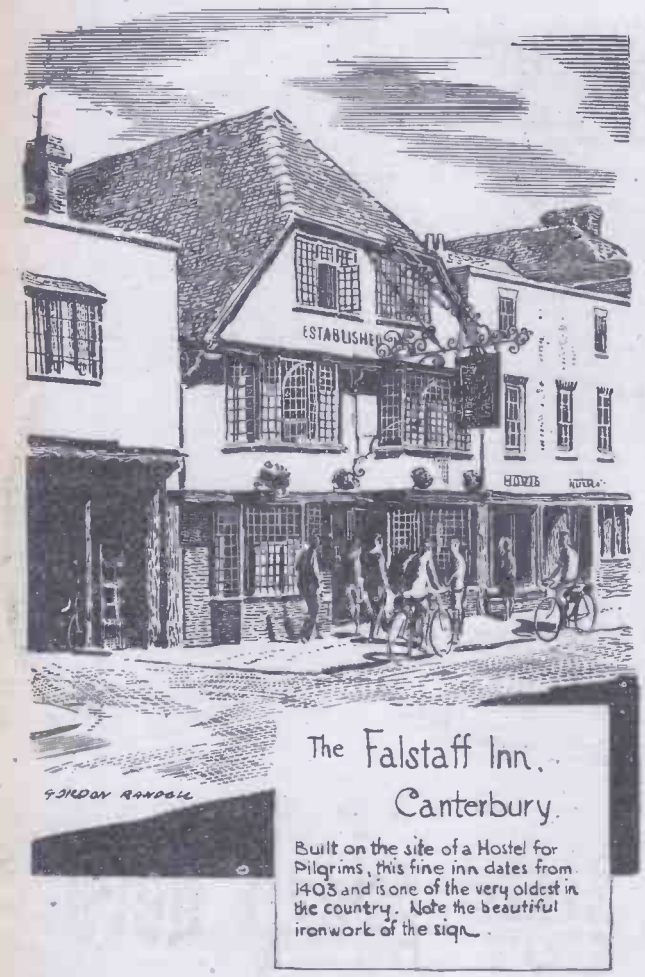
The Ostrich Inn, Colnbrook, Bucks



~A corner of the upstair passage~
The last door on the right leads to Dick Turpin's Room.

CYCLORAMA

By H. W. ELEY



The Falstaff Inn, Canterbury.

Built on the site of a Hostel for Pilgrims, this fine inn dates from 1403 and is one of the very oldest in the country. Note the beautiful ironwork of the sign.

The Late A. J. Wilson ("Faed")

MY recent references to "Faed" brought me one or two letters from old friends of that gallant and noteworthy cyclist and advertising man. One of my correspondents did not know that "Faed" has passed over, and I was able to give some information about his later years, and also was glad to be able to record that Mrs. Wilson, once renowned in the advertising world as Miss Sayer, was still with us. . . . I met her at a function some months ago, and it was good indeed to chat about the old days . . . and recall some of the achievements of her late husband. Nobody who knew him will ever forget "Faed"—his memory is enshrined for all time wherever cyclists gather.

"Season of Mellow Fruitfulness"

ON an early September morning, when the mist rolls over the stubble fields, and the lanes and highways are starred with scarlet berries, and the fruit hangs heavily on the gnarled old trees in the orchard, how readily the words of Keats come to the mind! It is a joyous, mellow month indeed, and there is no better time of the year for a ride into the English countryside. See those changing tints of the trees . . . the rich golds, and browns, and russets; in the silent wood, gaze at those brightly coloured fungi—some edible, but some deadly poisonous; lean over a gate, and watch the partridge foraging over the fields; and down the tangled lane where, despite the fact that bird-song is almost stilled, the linnet still lingers; enjoy the beauty of the blackberries gleaming in the sun. It is a quiet month, with summer just preparing to depart; not yet is there the decay of autumn, and we should do well to revel in these September days. . . .

Another Good Advertising Idea

SOMEHOW, the Dunlop people always seem to hit upon happy ideas in connection with their cycle tyre publicity, and I like particularly that present series which features "signs" from the ordnance-survey maps. The sign of a ford, the sign of a toll, the sign of a bridge, the sign of a church—all these familiar indications shown on ordnance-survey maps have been featured with quite captivating illustrations, and the Dunlop advertising note comes in at the bottom . . . "Dunlop—the sign of a good cycle tyre." I believe I am not by any means alone in regarding some of the present-day advertising in connection with the cycle and allied industries as most interesting — and instructive. How far we have advanced from the old days of advertising, when it appeared to be considered necessary to be blatant and crude! The technique is more subtle now, with benefit to the reader, and to the advertiser.

Page From the Past

THE other day, whilst I was rummaging among some old papers and documents, I came across some old cycle catalogues, and among them was one featuring "Royal Ruby" cycles: the name was once famous; the machine was made in Manchester, and although I never possessed a bike of this old make, I knew it well . . . and the sight of that old catalogue, designed in a way which now looked distinctly old-fashioned, brought back memories of other makes famous in the old days . . . the Premier, the Monopole, the Dursley-Pederson . . . and the one American bike which never made a really bold bid for popularity over here—the Mead. Many of these names have disappeared, but they are not easily forgotten by "the old brigade."

I Ride in Rural Essex

ESSEX—the county which, I always think, receives quite inadequate praise from writers who dwell upon the beauties of the English countryside. To most people Essex means flatness; and rarely have I heard any eulogies about this county so near to London. And yet, if one will but explore and search out its places and scenes, one will find that it has much charm. Recently, I rode around the Hanningfields, some nine miles from Chelmsford, and revelled in the picturesque landscape, enjoyed a peep at one or two typically Essex churches, and found peace and contentment in some fine old inns. Not a bad plan, if you seek new pastures, to put the bike on the train at Liverpool Street, and do a bit of touring around the places I have mentioned. Life in those little Essex villages seems to have stood still, and they spell welcome escape from the noise, and bustle, and frets of the city. . . .

The Great "Get Together"

I AM thinking of the forthcoming Cycle Show which, from all I hear, will be as good and successful as any of the past. Every cycle-manufacturer, and the tyres and accessories' makers, too, will soon be busy with plans for exhibits and stands, and I personally look forward to the Show as an occasion when one meets many old friends, renews many good "contacts"—and sees, under one roof, the magnitude and splendour of an industry which is deservedly proud of its post-war record. It is certain that there will be a wonderful array of bikes, and I believe that colour will be one of the dominant notes. Nothing drab about the modern bike! Colour—and lightness—these are the watchwords of the manufacturer to-day.

Nature in September

FOR the naturalist, the man who loves the ways of animals and birds, and who takes delight in watching the ever-changing pageant of the year, September is a good month: how 'full of' interest those ponds where the frogs and toads now begin to hibernate; how thrilling to watch a badger leave its lair under the old sandy bank, and go forth in search of supper; what interest there is in watching the birds get together, as if in council assembled, to make their plans for the long journey to sunnier climes. The rabbits are now getting sizable and ready for sport with the gun; I watch them at feeding-time near the plantation, and promise myself a good day with my 16-bore—some quiet week-end when I can slip away from town and enjoy my favourite bit of countryside. Yes! September is truly the crown of the year, and I shall be out on my bike on every possible occasion. . .

My Point of View

By "WAYFARER"

The pretty downland village of FINDON Sussex.

That Little Knowledge

ONE of the motoring organisations recently reported that "the road between Tremadoc and Pen-y-gwryd" was flooded. How could it be, I thought, seeing that Tremadoc is at sea-level, while Pen-y-gwryd (14 miles away) stands at an altitude of about 900 feet. A case of a little knowledge being a dangerous—or an unsatisfactory—thing! Similarly, or thereabouts, the evidence printed in the newspapers in connection with a recent railway accident recorded that, on reaching the summit of Shap, the train was 15 minutes late. The driver "applied the brakes fully as soon as he saw a man waving a red lamp." You are led to believe that the accident occurred on Shap. Actually, it took place in Cheshire, about 100 miles farther on. How useful to be an observant cyclist, and to know something of localities!

Traffic Discovered

I MADE a kind of vow some years ago that never again would I go to bed in a house fronting on to a main road, I having had a "benefit" from such an experience, 30 miles out of London. The vow has not been scrupulously kept. I booked accommodation the other night at a small private hotel which had been commended to me, and I was dismayed to find that it stood on one of our busiest main roads. I have often wondered as to the whereabouts of the heavy traffic concerning which people in the know (perhaps) continually prate. I wonder no longer! Underneath my window at that hotel were two continuous streams of traffic all night long. Lorry after lorry sped by, and, although I did secure some sleep, the experience caused me to revive and refurbish that old-time vow about putting up at main-road houses.

Two Conversations

TWO recent talks with motorists are worth recording. I told the first man, in the course of a friendly yarn, that in my view the hazards of the road were greatly exaggerated, and that the only danger which I, personally, feared was in connection with the opening of the offside door by thoughtless motorists—a careless habit which, I felt, was tending to diminish. I expressed the view that a cyclist could meet with an extremely unpleasant accident through this cause. Then my friend made a remark which I thought was curious. "I expect," he said, "that you approach with considerable care stationary motor-cars on the nearside of the road." I do that, but there is no reason why this need for extra precautions should be thrust upon me. I quite agree that, generally speaking, the avoidance of accidents is a matter of co-operation; but the flinging open of offside doors is so manifestly hazardous that it ought never to be done. The danger which it involves should not be created, through want of thought or otherwise.

The second motorist is one who has done a certain amount of cycling, and he dilated on the extreme freedom which is always associated with the touring aspect of our great game. Indeed, it might have been I, and not he, who was doing the talking. He spoke with conviction, too, and although he has never done cycle-touring on the basis which I adopt, and probably (as and when the petrol position eases) will never tour again, he was obviously quite satisfied that the real road to freedom on holidays lay through the medium of cycle-touring. Which is what I have always preached.

Correct Interpretation

I FOUND a curious police case reported in a Shropshire newspaper a few days ago. This is it in brief: A cyclist, having paused at a "Halt" sign, apparently dismounted and proceeded to push his cycle along a street "which was closed to traffic going in that direction." A policeman pointed out that this was irregular, but the cyclist proceeded on his way, saying that he did not see why he should not do so. The case was dismissed on payment of costs. A great many people, including cyclists, think that it is in order to wheel a cycle against the traffic in a one-way street. Such is not the case, as a perusal of the relative order will prove. Admittedly the police as a rule take no action, but it is obvious that to ignore the rule on anything like a large scale would dislocate traffic and would provoke the police into getting busy. We are all prone to commit this "offence" and I expect that the cyclist above referred to was "crimed" because he insisted on carrying on after he had been spoken to by the policeman. I have not previously come across a prosecution such as this. The policeman correctly interpreted the law. The position is the same in connection with automatic signals.

The Restful Change

I HAVE always insisted that the best method of resting after taking exercise is to take exercise in some other form. After cycling, walking; after walking, cycling. At the end of a long ride I almost invariably go for a brisk walk and, while I walk to business most mornings, I make a special point of doing so on Monday mornings, having regard to the journey I have achieved on two wheels on the previous day. Conversely, on those occasions when I used to cross the Berwyn Mountains pretty frequently, what a joy it was, after stamping the moors for a couple of hours, to mount the bicycle and ride away!

In these latter days my business causes me to do a tremendous amount of walking, and when Saturday mid-day comes, I sometimes wonder whether I am not too tired to go on a bicycle. Experience shows that such is not the case. I set forth and thoroughly enjoy my 50-mile Saturday afternoon jaunt, followed by my 70- or 75-mile Sunday run. I am undoubtedly weary at the commencement of the ride, but the change of exercise quickly puts me right.

Isolated Figure

ACCORDING to my newspaper, more than one in every three casualties on the roads in the Metropolitan Police District during last May was what is known (officially) as a "pedal" cyclist. Considered by itself, that isolated figure might be a cause for concern. When, however, it is related to the vast number of cyclists using the roads in question, it is not so alarming. Moreover, one has to bear in mind that the bicycle is the frailest and most vulnerable vehicle on the road, and that other people very often fail to give cyclists a square deal.

Buying Experience

WE cyclists know perfectly well that it is folly to go for our meals to establishments which obviously cater for the motoring fraternity. The amount of fuel provided for motorists, who are not getting any exercise, is hopelessly inadequate for the cyclist, who is providing his own power. Despite this knowledge, which is constantly in the forefront of my mind, I went the other day to a motoring establishment and asked for a plain tea which, it was advertised, would cost me 1s. 6d. There was really no need for me, of all persons, to be buying experience in this respect. However, I wanted to sample this particular place and I now feel that "I've had it." The meal, in its origin, consisted of two small pieces of bread and "butter," a small portion of jam, two small scones, two small cakes and a pot of tea, which yielded just two-and-a-half cups. When I saw the spread, I at once asked if I might have some more bread and "butter," the quantity not being sufficient (as I told the waitress) "for a growing lad." A further lot, consisting of four small pieces, was at once (and quite willingly) brought. On paying the bill, was I asked for 1s. 6d.?—Oh! no: "you had more bread and butter hadn't you? Two shillings, please." There is no lesson here to be stressed; it merely needs remembering! In my case, it will be borne in mind, and I shall not attempt to buy any more of that sort of experience.

Protest

ONE day recently, when I was quietly meandering along the deserted road between Knighton and Pen-y-bont, a voice out of the blue suddenly said, "'Morning!" and a brother cyclist, gaily attired, flashed by, almost scraping my elbow. I have previously condemned this ill-mannered habit, adopted by certain folk, of overtaking other cyclists with as little margin of space as possible, and I now reiterate my condemnation. On wide, unpeopled roads there is not the slightest need for us practically to brush against one another as we pass, and I do wish that a stop could be put to this. Let us cyclists act towards one another—and, indeed, towards all other road-users—as we would wish others to act towards us. That way lies comfort and safety for all.

Discouraging

THAT Sunday (June 6th), which was the first Sunday on which our motoring friends exchanged "basic" for "standard" was certainly not one of the better days, and I, for one, found not the slightest inconvenience arising through the return to the road (in theory) of many motorists. In my part of the world "flaming June" let us down badly, and, as the day wore on, conditions worsened. I had on woollen gloves and heavy pullover most of the day, and in the evening I found that many of the roads were ornamented with twigs and branches which rude Boreas had violently removed from the trees, while here and there small floods across the road gave me aquatic exercise. A poor day from the motoring point of view, but I was perfectly satisfied with the 64 miles recorded by my cyclometer.

The Answer

AT the moment of going to press I am being "chivvied" in the home circle because of my refusal to take what is known as a "proper" holiday. It is thought that at my present rate of work, with its very long hours, I ought to take at least a fortnight, whereas I am trying to make do with a week. The answer I return to the "chivvying" is that as I am proposing to take a cycling holiday (not unusual with me!) my projected week is much superior to the other man's fortnight. Indeed, I make bold to assert that a cyclist, using an ordinary week-end intelligently, can enjoy himself more fully (and extract much more benefit) than the non-cyclist in the course of a week's holiday.

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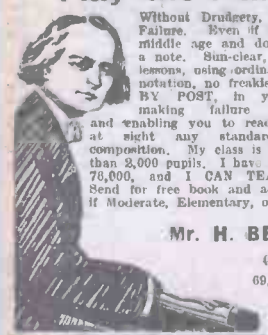

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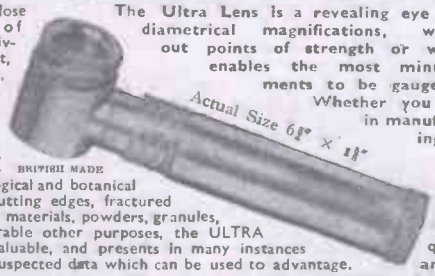

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