OUR SEARCHLIGHT SYSTEM

NEWNES

PRACTICAL MECHANICS

8D

JANUARY 1941

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PRACTICAL MECHANICS

Owing to the paper shortage "The Cyclist" and "Home Movies" are temporarily incorporated

Editor : F. J. CAMM

VOL. VIII. JANUARY, 1941 No. 88

FAIR COMMENT

By the Editor

Periodicals and the War Effort

THE important part which tecnhical journals play in the war effort has already been acknowledged by Cabinet Ministers, but the general public seldom realises the valuable work which editors of technical papers perform behind the scenes. An editor is the nerve centre of an active-thinking organism comprised of thousands of readers with diverse scientific interests, who are able to bring to bear independent thought on outstanding problems and, in most cases, to submit them to the editor for advice and consideration. When we feel that an idea is meritorious, we advise the reader to communicate with one of the various Ministries if the invention relates to the war effort. A technical journal is, in fact, a filter for ideas, and at the same time it performs a vital national service in disseminating technical knowledge and in helping readers to acquire skill, to improve their positions, and to make themselves useful and valuable citizens.

Reader Representation

THERE are matters not concerned with inventions which it is the duty of an editor to take up with one or other of the Ministries. There are often injustices which regulations and laws have not taken into account, and readers are not slow in writing letters of complaint to editors. A periodical does, indeed, claim the privilege of being able to express to Government departments the views of its thousands of readers, and it is a wise politician who frames his attitude to Government policy with one ear to the pavement of Fleet Street. Editors are thus able to have grievances and injustices aired and redressed.

Since the war I have been in constant touch with various Ministries on various problems, and Ministers have expressed their thanks for the help rendered, and which is cheerfully rendered because of our desire to do everything in our power to aid the Government to bring the war to successful fruition. Much of the work done behind the scenes in this way cannot be aired in print, but it is an aspect of technical journalism which is often overlooked, even by some politicians.

The Field of Interest

THE group of journals of which I am the editor covers a vast field, and collectively the British technical press covers every scientific, mechanical and trade interest. Those journals bring to their readers news from the world's laboratories and workshops, keep them informed of what inventors are doing, bring them news, instruct them in their trades and professions, teach them new ways of doing old jobs, and spread for a few pence a week the world's heritage of knowledge. The printed word is, indeed, the world's treasure chest into which all may dip.

Readers' Views

EACH journal represents a cross-section of the British public, and it is able, therefore, to sample the views of that cross-section on problems and policies, and to represent its readers' views in the right quarter. A journal, by its impartial criticisms and choice of fair words, is a powerful factor in moulding public opinion and in representing the right point of view to members of the public which, as individuals, cannot be expected to have the broad and experienced outlook which editors of newspapers and periodicals, with their thousands of reader contacts, must possess.

On Leaving a Job

IN one direction recently we have been able to clarify the position regarding leaving a job. It is now clear that under the Undertakings (Restriction on Engagement) Order, 1940, employers in the general engineering industry among others, may not engage, or seek to engage, workers for that industry except through an employment exchange or approved trade union. Similarly, workers seeking employment in that industry must register at an employment exchange or with an approved trade union. These arrangements make it possible to secure the distribution of workers among employers in accordance with their needs, account being taken of the importance of the work and economy in the use of skilled labour. It is important to note that *nothing is contained in the Order to prevent a workman from exercising his ordinary right to terminate his contract of service*, but in accordance with the foregoing arrangements, it may be necessary, after consideration of any representations he may wish to make, to require such a worker to remain in his present employment. This information has been supplied by the Ministry of Labour in reply to representations we made to them concerning many of our readers whose employers had refused to permit them to leave. It is necessary to remember, however, that the reasons for leaving must be adequate and not merely a desire to obtain a job at a higher salary.

Changing Jobs

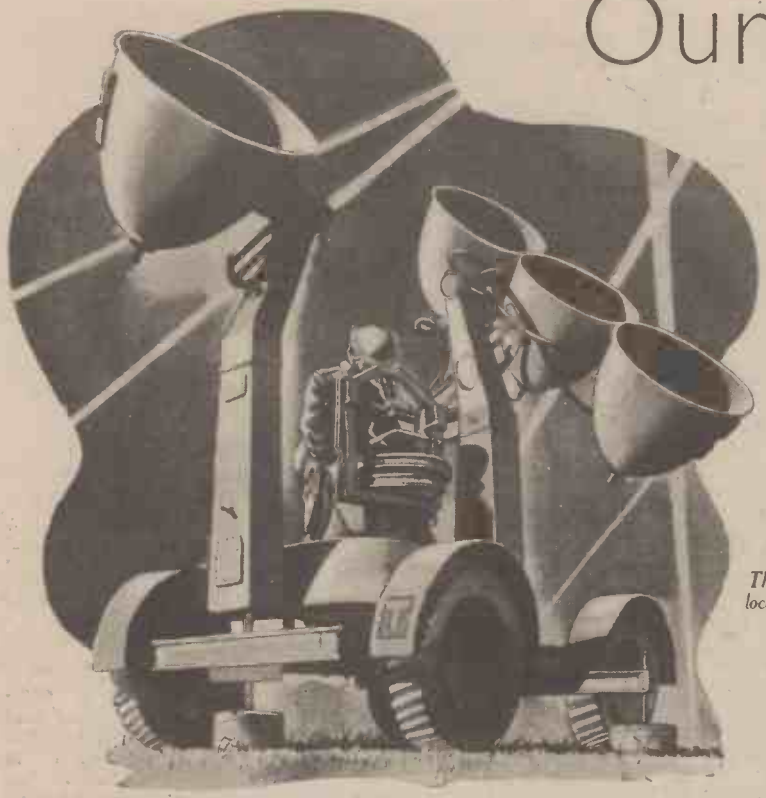
WE have received very many complaints from readers who, feeling that they are not employed according to their skill, desire to change their jobs. Some complain that they are not employed for the whole of the week, and others object that their case is not fairly reviewed by the local Labour Exchanges. In this connection we would advise them that they can insist upon their case being reviewed by the Conciliation Officer attached to the Labour Exchanges, and if they do not receive satisfaction they should communicate the facts to the Minister of Labour, Employment Department, Queen Anne's Chambers, Westminster, S.W.1.

It is only where there is a genuine grievance that the matter can be reviewed. It is not sufficient merely to desire to change one's employment for the purpose of obtaining a more highly paid job elsewhere. It is necessary to show first of all that you are not employed on work for which you were engaged, that the work is not according to your skill and experience, that you are not fully employed, or that there is no shortage of labour in the particular branch.

We know that in some cases the employers and the Labour Exchanges are working hand-in-glove, and that cases are not fairly reviewed. We also know that when a workman terminates his engagement the employers ring up the Local Labour Exchange asking them to order the workman to return to work, and to refuse to find him employment elsewhere. This is not in accord with the spirit of the Order. At the same time employees should understand that there may be special reasons why, for a few days, they are not kept fully employed. Raw materials may be delayed owing to traffic disruption, a ship may be sunk, or the employer may be expecting the completion of a contract, the delivery date of which has been based on his present personnel. Our main interest must be to win the war, and individual interests must be sacrificed to it. In this connection it is necessary for skilled labour of which there is a shortage to be employed to the fullest extent. We must not employ skilled workmen to do unskilled jobs, although in these days of labour shortage we can understand the reluctance of employers to release their men.

Our Searchlight System

How Instructors are Trained In the Anti-aircraft Units of the Forces.



The sound locator in action.

THE School of Anti-aircraft Defence, situated somewhere in Kent, is one of the most important instructional centres of the British Regular and Territorial Armies. Devoted to problems of defence against attacking aircraft, the searchlight wing of the school has the primary purpose to train instructors for the searchlight units of the Forces.

Owing to the rapid increase in the number of territorial anti-aircraft units, the school is primarily engaged at present in training the instructors for, and the personnel of, recently converted or re-equipped battalions. All regular officers and N.C.O.s posted as adjutants or permanent staff instructors to anti-aircraft battalions of the Territorial Army attend courses here before taking up their appointments.

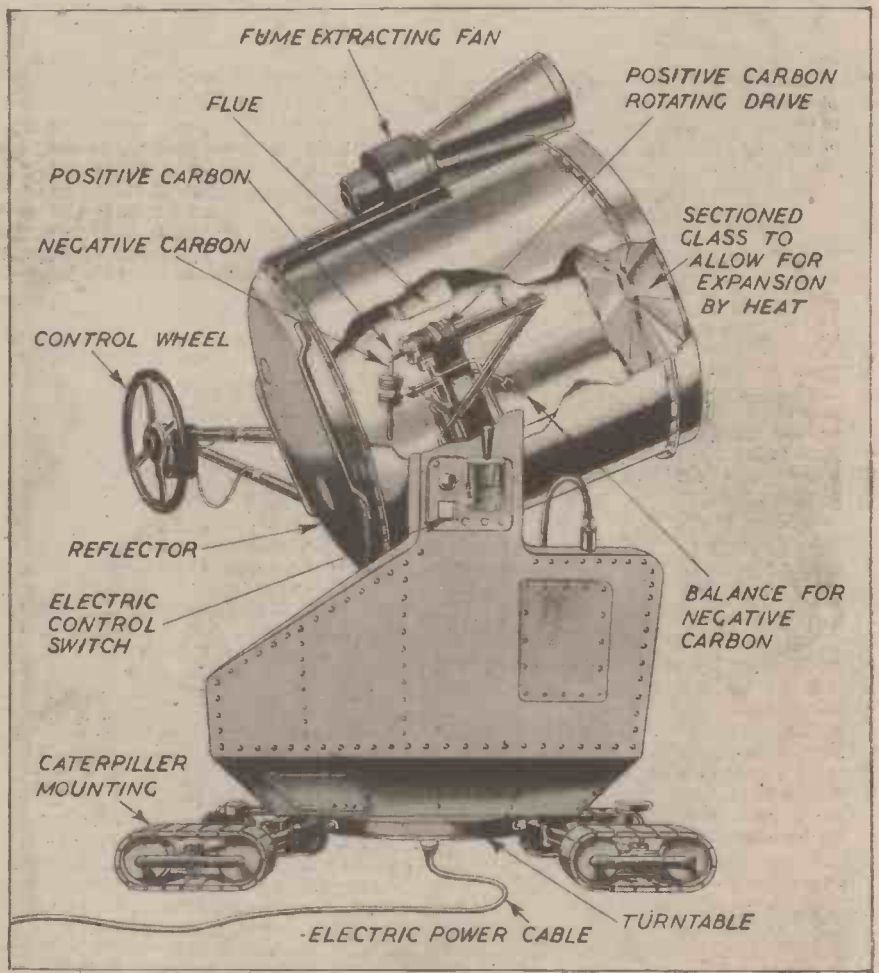
As the duties of the various members of the searchlight detachment are diverse, there are many different subjects. These include the running of the electric arc, and the care and attention of the searchlight lamp, the selection of listeners, the improvement of their binaural sense (that is the ability to hear and distinguish different sounds with both ears—and the use of the locator), the duties of the spotter (about the only man in the Army who is provided with an easy chair for his job) and of the projector controller, and, most important of all, the tactical and administrative responsibilities of the section officer and detachment commander.

As at least the initial stages of modern war will be decided by the success or failure of aerial attack, it is obvious how highly important the work of the school is in the interest of the community.

The Searchlight Crew

Each member of the searchlight crew is known by a number. No. 1, of course, is the C.O., and the others take their numbers according to the duties they have to perform. The "spotters" are Nos. 2 and 3, and it is their duty to watch the searchlight beam and the target. The man who drives the generator and who is responsible for its maintenance is No. 9, whilst the man who may be called on to relieve any of the other men in an emergency and who is also the cook, is No. 10. The men who man the light machine-gun in the event of enemy aircraft attacking the station, are Nos. 6, 7 and 8. With the coming of dusk the searchlight station becomes a hive of industry, each man going to his allotted post and reporting everything in order for the night. The beam is exposed after dark when "manning practice" takes place, and a number of exercises are performed.

It is obvious that the searchlight plays an important part in anti-aircraft defence at night as also do sound locators, in fact they might well be called the "eyes"



A modern military searchlight, part of the lamp casing being broken away to show the carbon controlling apparatus.

and "ears" of anti-aircraft units. The position of an aircraft that is invisible to the ground defence can still be indicated by searchlights and locator working in

A machine-gun post for dealing with low flying aircraft

conjunction with one another. The sound locator, as will be seen from the illustration on these pages, is a peculiar looking device mounted on four large wheels and having four cup-shaped objects which are the "ear trumpets" which pick up the sound of approaching aircraft. The operator who is in charge of the locator uses stethoscopes, and he and the "ears" operate round a common axis, the movement being under his control. With the approach of the enemy aircraft the operator rotates the "ears" of the locator until the sound of the engine or engines of the approaching plane are equally loud in both earpieces of the stethoscope. The height and direction of the aircraft can then be determined as the "ears" of the locator are then pointing directly towards the enemy aircraft. Before calculations are sent to the guns allowance must be made for "time lag" due to the fact that sound takes a considerable time to travel over a given distance. Further intricate calculations have to be made but it is not proposed to deal with them here, as it is the searchlight about which we are chiefly concerned.

Size and Type

The size and type of military searchlights vary according to conditions and requirements, but it is the 90-cm. type that is generally used. An electric arc is generally the source of light used, the flame of which consists of carbon vapour heated into incandescence at the high temperature of 5,400 F. The bright light that is emitted is then concentrated into a parallel beam by means of huge reflectors. In an electric arc the positive carbon pencil has a tendency to burn unevenly, and this difficulty is overcome by means of a small electric motor which keeps the carbon rotating inside the searchlight. Two other important items that have to be overcome when the searchlight is in operation are fumes and heat. Fumes are kept clear of the lamp by means of an electrically-driven fan, and in order to keep the searchlight cool enough to handle special methods of cooling are employed. Remarkably ingenious and intricate is the controlling mechanism of the mobile searchlight, and it is also an example of optical perfection. Owing to the speed of the target the beam of the searchlight must be able to swing rapidly, and this is accomplished by a quick touch on the controls. Considerable skill on the part of the crew is necessary in the operation of the searchlight. As soon as the target is exposed by a searchlight other searchlights concentrate on it. The aeroplane is then held in a pyramid of light, and its position can then be located by anti-aircraft units and interceptor fighters.

An officer receiving instruction in the directional control of a searchlight projector

When examining the arc, for instructional purposes, the searchlight lamp is mounted in a special cabinet. Unless viewed through darkened glass, the intense light causes a painful condition known as "arc eye"

Flying Searchlights

For some time now, the Germans have been experimenting with searchlights for aeroplanes, the idea being to illuminate a bombing area to assist aiming. It has

The "spotter" watches the searchlight beam and target.

also been suggested that a fighter fitted with a small searchlight would be able to locate the enemy in the dark, and then attack it. The obvious objection to this would be that the plane fitted with the searchlight would also be exposed to attack, but no doubt the beam would dazzle the enemy's gunner. It will be remembered that the Germans have for some time been experimenting with coloured searchlights which are supposed to penetrate clouds more easily than the ordinary white light, but so far they have not proved very successful.

R.A.F. FIGHTER COMMAND

Pilots of the R.A.F. Fighter Command are enthusiastic about the good work done by the searchlight crews on the ground. One pilot who recently brought down a Ju. 88 bomber said quite frankly that he could never have got his "bird" but for the assistance of the searchlights.

"It was a beautiful moonlit night, with little cloud when I got the Junkers," he said. "Suddenly, well ahead of me, a dozen searchlights shot slim pencils of light into the sky. For a few seconds they groped about, then concentrated on one particular spot. I looked hard, and then saw Jerry caught in the searchlight beams, looking for all the world like a silver moth. The searchlights continued to hold him, although he turned and twisted in an attempt to evade the inquisitive lights.

"He was a perfect target and I closed for the fight. It was over very quickly. I gave two short bursts, hitting the Junkers with the second. He just went up in a blinding white flash, like a huge firework.

"I saw nothing further of the enemy, but when I landed I found various bits and pieces of the Junkers attached to my aircraft. The searchlights were first-class. I take off my hat to them. After all, the sky's a pretty big place and it's none too easy to pick out one solitary aeroplane in miles and miles of night sky. I had a chat with the searchlight boys a day or two later. We talked over this particular combat and I'm sure we both learned a lot which will be useful on future occasions."

BIRTH OF THE EIGHT-GUN FIGHTER

". . . The decision to adopt the 8-gun fighter like the Hurricane and the Spitfire may well rank as one of the great decisions in the history of the war."—Sir Archibald Sinclair.

ABOUT five years ago a specialist of the R.A.F. visited an aircraft factory to discuss a secret specification drawn up by the Air Staff for a new type of single-seat fighter. It called for a speed and armament greatly in excess of anything then known. Six, or even eight, guns were the aim, and the speed around 350 m.p.h. It was to be a reply to the hordes of new fast bombers which Germany was known to be producing ready for her second attempt to dominate the world. The creation of a new type of modern aircraft is a long and complex business. To get this projected new design on the drawing board, and then to make it and fly it, would mean many long months. A year or more would necessarily pass before the new machine could get beyond the prototype stage. Production stage would not be reached perhaps for two years more. Meanwhile Britain's existing fighters were actually slower than the new German bombers already in production.

High-Speed Monoplane

At the works the Squadron Leader was shown a new high-speed monoplane fighter, developed and built as a private venture by the firm, the Supermarine Aviation Works; (Vickers) Ltd., as it was then. It was planned for only four guns, and had a lower performance than that called for by the new specification. But it had all the makings of a first-class fighter which would put the R.A.F. back where it ended the war in 1918—on top. Could it be modified, the Squadron Leader wondered? If so, precious months, perhaps years, would be saved. Together with the designer, the famous R. J. Mitchell, who died three years ago, the problem was worked out. Yes, said Mitchell, it could be done. Back to the Air Ministry went the Squadron Leader to urge the adoption and modification of the new aircraft.

A Great Decision

Then followed what Sir Archibald Sinclair has referred to as perhaps "one of the great decisions in the history of the war." The design was adopted and the first tentative order placed. The 8-gun Spitfire had been born.

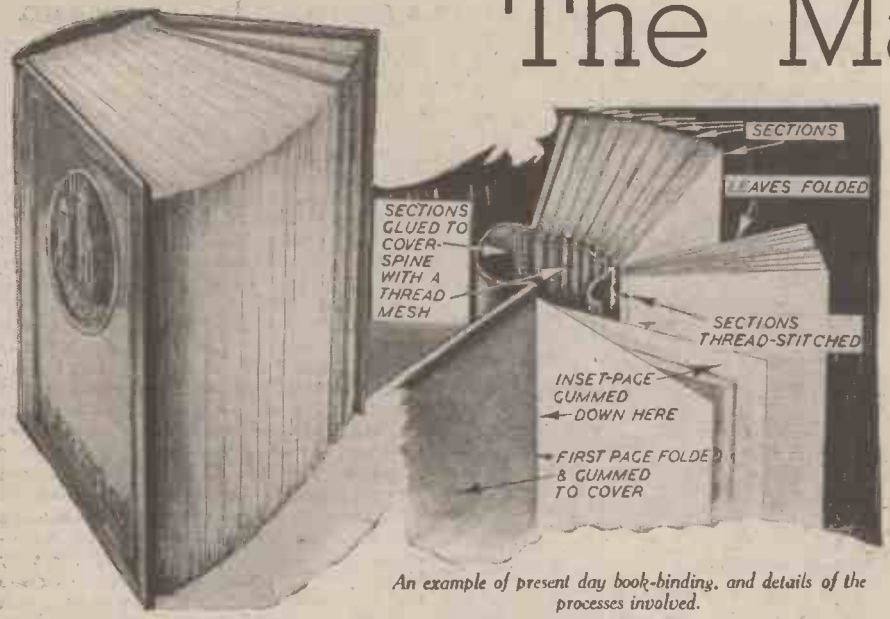
Simultaneously, the aircraft firm of Hawkers had been asked to produce a fighter to the same specification. Here again it was a case of close co-operation between the Royal Air Force and the aircraft industry. A privately produced design, the 4-gun Hawker "Fury Monoplane," was taken as the basic design. The armament was doubled and changed to wing position; a more powerful engine was specified and other modifications were made. To Mr. Sydney Camm, Chief Designer of Hawker Aircraft, Ltd., goes much of the credit of the job.

The result was the 8-gun Hurricane—a fine single-seat fighter which has shared with the Spitfire the honour of beating back the might of Goering's bombers.

A Hurricane patrolling the desert in the Middle East on the look-out for low-flying enemy aircraft

The Making of a Book

A Brief Account of the Development of Printing and Allied Crafts



An example of present day book-binding, and details of the processes involved.

THE first book printed in England was turned out by William Caxton. But he was no more the inventor of printing than was George Stephenson inventor of the steam-engine. Caxton introduced the art to this country from the Continent, where printing from movable type had been practised for years. A man of Kent, with the rare privilege of an education, he climbed from an apprenticeship to a silk mercer to be governor of the Company of Merchant Adventurers in Bruges, and commercial adviser to the wife of Charles the Bold of Burgundy. We don't know for certain exactly where he picked up his knowledge of printing, but according to Wynkyn de Worde (who became Caxton's assistant at Westminster, and his successor in 1491) it was at Cologne. Be that as it may, he was proficient in the craft before returning to this country. Indeed, he had printed two books, one a translation of a French romance, the other a translation entitled "The Game and Playe of Chesse."

First English Printed Book

He set up his press at Westminster, probably in the Almonry, and there he produced the first English printed book to bear a date—November 18, 1477. Its title was "Dictes or Sayengis of the Philosophres." Why or how his press came to be located in the Abbey, or the Abbey precincts, is by no means clear. But an association of compositors in a printing office is to this day known as a "chapel," and their head is referred to as the "Father of the Chapel." From his Westminster press. Caxton issued more than a hundred books. He made a notable advance in 1481, when he first made use of woodcut blocks.

To a large extent we have departed from the real art of book production. Commercialism has shackled the finer craftsmanship. Cheap reprints pour from the world's presses in an indiscriminate spate. The world is in a tremendous hurry, and there is a greater popular demand for pocket-size editions that are here to-day and gone to-morrow, than for enduringly bound volumes. But perhaps it is as well that the three-volume novels of last century are no longer "fashionable." Even they were modest in comparison with the vast weighty tomes of an earlier day, with wooden covers secured together with a clasp and chained to a reading-stand.

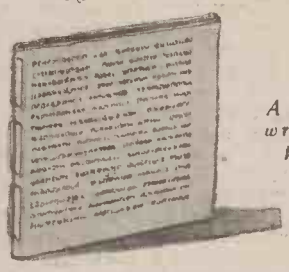
Egyptian "Roll Books"

Going back farther still, before books had their present form—that is, sheets bound together—they consisted of long strips of papyrus (used by the Greeks and Romans), or parchment (used by the Jews and Persians), with the writing on one side only, and with one end fastened to a roller of wood on which they could be wound and unwound. Some Egyptian "roll books" were 40 yards long, and such "books" would have each end secured to a roller so that during the reading the scroll could be rolled up at one end and unrolled at the other. The "bookcases" for these were jars, in which the rolls were stood on end. We get our word "volume" from the Latin *volumen*, a roll. "Book" is derived from the Anglo-Saxon *boc*, which originally signified a beech tree: the connection is founded on the rather uncertain idea that tablets of beech wood were probably used for writing upon by the Teutonic peoples.

The difficulty of rolling lengths of parchment (papyrus was less stiff) led to the use of square sheets instead of lengthy strips, fastened together by thongs, later folded down the middle and inserted one inside the other. During the Augustan period, there were in Rome organisations for importing manuscripts and distributing these by way of business—the beginning of the publishing trade. Skipping back a few centuries, books took the form of baked clay tablets and cylinders. The site of ancient Nineveh yielded thousands of these to modern explorers. It is believed they formed part of a library owned by Sennacherib, who died 681 B.C.

Clay cylinder book.

Book written on bark.



A stitched book written on parchment.

Movable Types

Before the invention of printing, every copy of a book or other piece of writing had, of course, to be transcribed by hand. The first printed books of which there is record were produced without the aid of movable type. They were printed from wooden blocks on each of which an entire page was carved. The earliest European example dates from 1423. The page was occupied almost entirely by a picture, or pictures, with only a few words of explanation. The Chinese are credited with leading the way with movable types, in the 13th century; block printing was practised in China and in Japan centuries earlier.

Wordy battles have been waged as to who first began to print from movable type in Europe, but the verdict seems to be on the side of Johann Gutenberg, of Mainz on the Rhine. This notable German printer did much to further the art of block-printing in Strasburg, about 1424, and later in Mainz. In 1450 a moneylender named Faust, or Fust, financed him in the business and five years later the lender wanted his money back. It was not forthcoming and the law was invoked; but the verdict was against the borrower. So Gutenberg's press

Writing on papyrus.

passed into the possession of Faust, and Gutenberg, smarting under the same financial fate as has afflicted many other pioneers, was forced to make another start, whilst his former business was continued by Johann Faust and Peter Schoeffer.

Scotland did not have its first press until 1507, when Walter Chapman and Andrew Myllar were licensed by James IV to print in Edinburgh. Even so, Scotland had a start of 43 years over Ireland. Humphrey Powell, a printer of Holborn, London, set up a press in Dublin in 1550. The following year he printed, in English, the Book of Common Prayer. Copies of this production are extremely rare and valuable. Many a scarce first edition, or other previous work, has been discovered by chance in a secondhand bookseller's shop, but never a copy of Humphrey Powell's prayer book.

The art found its way to the American colonies in 1639, an English printer, with English type, helping to set up America's first press at Harvard College, Cambridge, Massachusetts.

Inclusion of Title Pages

The beginning of the 16th century is noteworthy for an interesting innovation—the inclusion in books of title-pages, with the date of printing and the printer's name and address; hitherto the latter details, when they were given at all, had appeared at the end of the book. Smaller type also was introduced, this helping considerably to reduction in size and weight. For a long time, English printers were their own type-founders, and some were responsible for really beautiful work, originating types still extensively used to-day, and known by their originators' names—as Caslon (died 1766) and Baskerville (1775). The 19th century saw tremendous improvements so far as speed of production of books was concerned. Iron took the place of wood in the printing presses, and machinery, with steam and other power, supplanted much of the old handwork. Type-setting machines began to do in minutes what formerly took hours. Now Monotype and Linotype machines cast type faster than the old craftsmen, who set their loose type by hand, could think. Block-making methods have leaped from the clumsy woodcut to swift perfection. Colour printing is accepted by readers as a matter of routine. And further improvements in inks, printing presses and mechanical binding methods have placed books within the means of the poorest.

Early Bookbinding

Some of the finest examples of bookbinding date back to the end of the 15th and beginning of the 16th centuries, when time was of little account, and the quality of a craftsman's labour could stand out supreme. Morocco leather bindings were intricately and magnificently tooled, and gold leaf, introduced from the East, was employed lavishly in the decorations. In this the Venetians undoubtedly excelled. Between the 10th and 14th centuries the English monks had been recognized as the best binders in all Europe. Theirs was a leisured labour of love. As far back as the 6th century they had given very close attention to the preservation of manuscripts—beautifully written and embellished with complicated decorations. These they bound between thick wooden covers studded with jewels and metals, and not until the 10th century did they employ leather to mask the thick wood.

Nowadays many intricate and costly mechanical processes are gone through before pages are available for binding, commencing with the author's travail and progressively onwards to the final reading and correcting and printing of the written word. Several different pages are printed simultaneously on one large sheet, which then requires to be folded so that the pages follow on in numbered sequence. These sections are then assembled in book form, and the binder can go ahead. A book is described as crown 8vo or 4to, demy 16mo or 8vo or 4to, medium 8vo, etc., according to the number of times the sheet is folded.

A scholar writing on parchment.

Usually books are bound up in sheets of 16 or 32 pages, these being delivered by the printing press folded as well as printed—the folding resulting from the pages passing between sets of rollers at right angles to each other.

Bookbinding Processes

The sections (each identified by a number or letter) having been collected in correct order, the book is compressed, squared up, sewn, end-papered, and trimmed; then comes the glueing, rounding and backing and covering. These processes are dependent on the value of the binding required. Because of the cost very few volumes are bound now (as formerly) in either pigskin or sheepskin, or calf. But it is still quite common for the book edges (usually the top only) to be decorated, to prevent the soiling of the white edges. The decoration may consist of one, two or more colours, or of marbling, or gilding.

Books which feature coloured plates require an additional handling, these plates needing to be "tipped in"—that is, lightly pasted at the inner edge and stuck to the inner margin of the page of type which comes next in position. The highly coloured wrapper, or dust jacket, of the popular novel is a modern innovation, designed more to catch the eye of a potential purchaser than to serve any utilitarian purpose. Those whose eye cannot, unfortunately, be caught, are catered for very thoroughly by books printed in the Braille system, in which raised dots grouped in various combinations and to be read by touch alone, take the place of type. This was invented by a blind Frenchman, Louis Braille, who died in 1852, though the stamping of characters on paper in relief had been successfully carried out in 1784. We really owe the perfected system of to-day to a long line of experimenters, all of whom laboured right worthily in the Caxton tradition.

Patents in War Time

THE War has naturally stimulated the production of inventions relating to munitions and warlike supplies and also inventions relating to articles of public consumption which have come into special demand owing to war conditions or modifications of such articles to meet the new conditions.

The various Government departments are taking an interest in such inventions and they have a special organization for dealing with inventions. This we believe applies to the Ministry of Aircraft Productions, the War Office and the Ministry of Supply. These departments appear to take note of any patent applications filed which from their title appear as though they might be of some interest to the department. When this is the case a formal letter is sent to the applicant either direct or through his Patent Agent asking the applicant to submit to the department a copy of his specification together with any particulars and explanation of the invention which would enable the department to consider whether it could be used in the National War Effort.

The Government departments have power to prohibit the publication of the particulars of any invention which they consider might be of benefit to the enemy if it should come to their notice. The departments also have the right to take over and use an invention and they may in some circumstances arrange for the patent to be made secret or to delay acceptance of the application for the period of the war so as to avoid publication. These actions do not abrogate the inventor's rights in his inventions. Although the Government departments are entitled to use an invention for the national benefit and are not actually obliged by law to make any payment in respect of such use, they do in practice make a suitable payment where an invention has admittedly been used by them. If they are unable to agree with the inventor with regard to the amount of the payment then this may in some circumstances be settled by arbitration.

The Government is anxious to stimulate exports from this country and we believe that special facilities with regard to the supply of materials are available to firms in respect of manufactures for export.

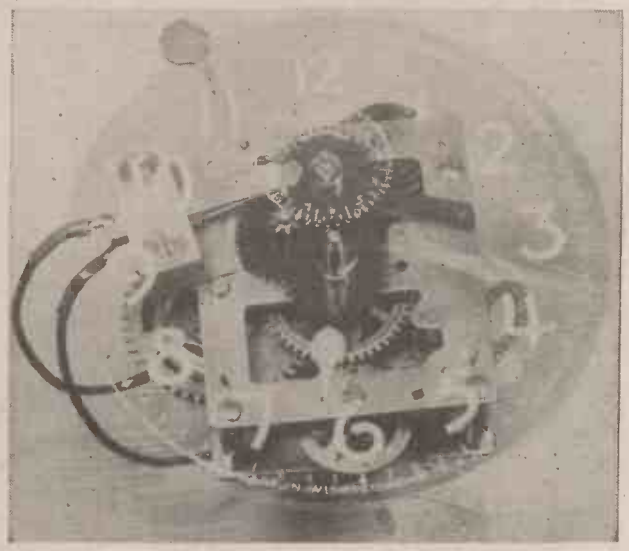
Trade Marks

Firms who are already engaged in the export of goods and also firms who are desirous of producing goods for export should, wherever possible, use distinctive trade marks in respect of those goods. It is also very desirable that such trade marks should be registered in the country to which the goods are to be exported. Firms who already have well-known trade marks in use in this country can apply at any time to have them registered in the countries to which they may be exporting their goods. Firms who are not already using trade marks would be well advised to select a suitable trade mark or trade marks for their goods and to register these both in this country and in the countries to which their goods will be exported.

The value of trade marks for use in this country and particularly abroad has not in the past been fully recognised by British manufacturers. There has been a greater tendency recently to utilise registered trade marks and in view of the possibility of opening up new markets for the export of goods this tendency is likely to be extended in the future.

A Continuous Electric Alarm

A Novel Adaptation which can be made to any Alarm Clock.



A view of an alarm clock adapted for use as an electric alarm. Note the position of the contact jack in the top left-hand corner.

IN these times of disturbed nights, it may happen that the alarm clock will ring itself out in the morning without rousing the sleeper. At least, it has happened to the writer, who was anxious to prevent such a recurrence.

An adaptation was made to a standard type alarm clock, which completed the circuit of an electric bell and battery, simultaneously with the ringing of the alarm bell of the clock. If the latter rang itself out without being heard, the electric bell would keep on ringing until switched off, which meant a thorough awakening, as the bell switch, together with the bell and battery unit is extended by a length of flex

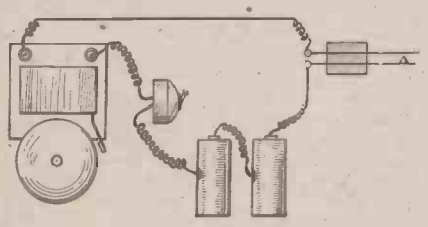


Fig. 1. Wiring diagram of the electric alarm device.

far enough away to make it necessary to leave the bed to switch off the alarm.

Circuit Details

The diagram of the wiring in Fig. 1, shows the simplicity of the circuit employed, the jack being made up to suit the interior of the clock under adaptation. In some clocks, the release of the alarm mechanism depends upon a wheel, which, by a leaf spring at the arranged time, is displaced axially along the spindle which carries the small alarm time-setting hand. The jack, shown in Fig. 2, which forms the major part of the adaptation, is placed between the clock dial and the movement, in order that the extended contact of the jack just bears against the side of the above-mentioned wheel, so that when this wheel is thrust suddenly along its spindle by the alarm timing movement, it closes the jack and completes the electric bell circuit at precisely the same time as the clock alarm rings.

The Jack

Fig. 3 shows the construction of the jack together with suggested measurements, which may have to be altered to meet individual requirements. The contacts should be cut from spring brass, sufficiently thin and flexible to allow the full displacement of the alarm release wheel. As a refinement, silver contacts can be fitted at the points of contact, but this is not a practical necessity, as the contact arms,

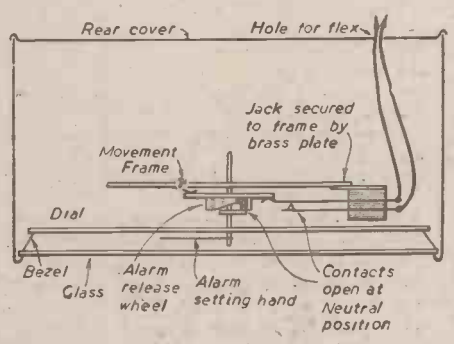
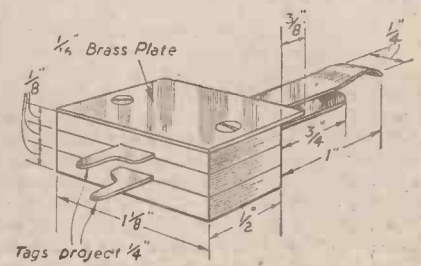


Fig. 2. Sectional view of an alarm clock, showing the position of the jack.

being parallel and close to each other, make a small sliding, and therefore self-cleaning action at the points of contact. The smaller contact arm may have at its extremity, an indent, made with a small centre-punch, to localise the contact with the longer arm. The insulations between the contact arms can be made from ebonite, paxolin, fibre, or even hard wood. The assembly of the insulators, and contacts, are clamped together with 6 B.A. screws and nuts, the heads of the screws holding the jack proper to a baseplate, which serves for the fixing of the jack to the frame of the clock movement. The screwing of the baseplate to the frame of the movement, would in some cases necessitate taking down the clock mechanism to work upon the frame, and to avoid this, the baseplate can be soldered instead of being screwed.



To ascertain the correct position of the jack, it should be held against the frame of the movement, so that the long contact is seen to be in the right place against the alarm release wheel, then scribe a line round the jack baseplate on the frame, which will indicate the correct position for fixing, either by soldering or screwing. If it is decided to fix by soldering, the jack is dismantled to prevent overheating of the insulators, especially if they are made from ebonite. The jack baseplate and the selected portion of the movement end frame is tinned in preparation for the soldering.

Connections

A suitable length of flex is passed through a hole drilled in the rear cover of the clock, to be soldered to the tags of the jack contact arms. This length of flex carries at its other extremity the remainder of the adaptation. e.g., the bell, battery, and the "on and off" switch, to the required distance from the sleeper. This latter part of the adaptation can be made up in any way to appeal to the constructor. Fig. 4 shows the unit compactly housed in a small box, with only the switch on the outside. If this idea is adopted, a few small holes, which can be arranged in a symmetrical pattern, must be bored in the lid to allow the sound of the bell to be heard distinctly. The inside measurements are 7 in. x 3¼ in. x 1½ in. deep. The battery is a large 2-cell cycle unit, with its cells taken apart to allow for accommodation in the box to save space.

In use, the unit may be hung conveniently upon a picture rail, by providing a suitable loop on the back of the box. When winding the alarm movement of the clock, do not fail to put the switch in the "on" position, if the electric alarm is wanted in the morning.

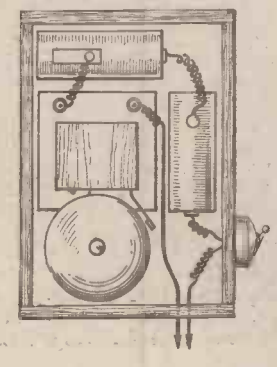
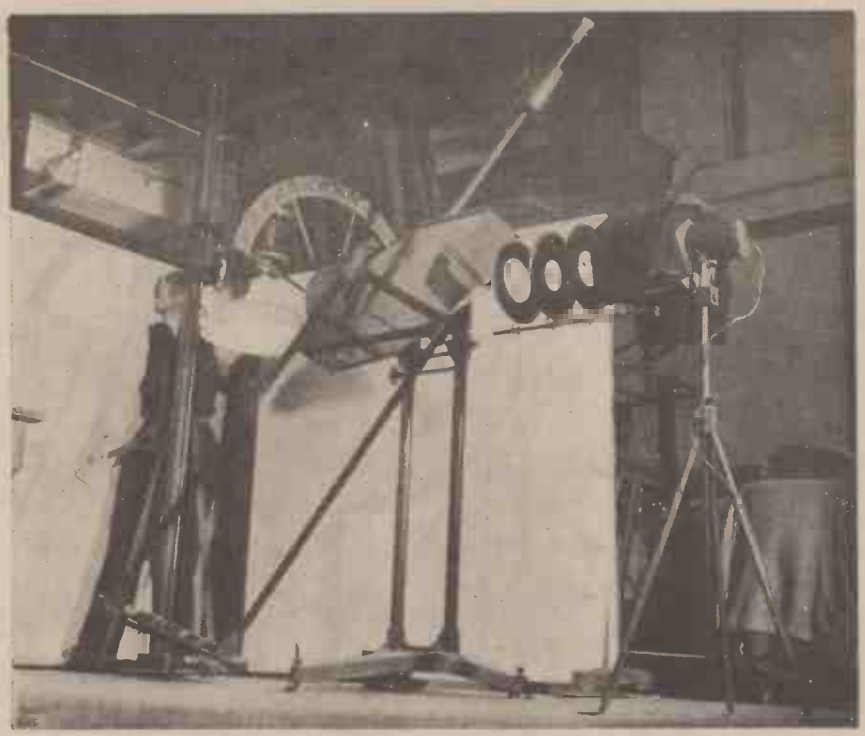


Fig. 3 (Left). Details of the jack. Fig. 4 (Right). Showing the electric bell and batteries housed in a small box.



A new industrial lamp being subjected to a final test in the laboratories where it was devised (see accompanying paragraph "Light Scientists.")

THE MONTH OF SCIENCE

A "Jumping" Boat

LARGE motor boats that can "jump" sand bars or logs and pull themselves off sandbanks or beaches in reverse, which were originally designed to meet the needs of trappers may make useful "invasion" boats. Mr. A. J. Higgins, the designer, has contracts for 335 of these boats for the U.S.A. Navy and 80 for the Army. They can carry 24 men normally at 18 miles an hour and can land parties on beaches without resort to wading. They are driven by a 250 h.p. engine and are 30 ft. long.

"Silks" From Seaweed

FIREPROOF fabric like silk will soon be manufactured from seaweed, claimed Dr. J. B. Speakman, inventor of the fabric, speaking before a meeting of textile experts recently. Both wood pulp and cotton, used extensively at present in the manufacture of rayon, are difficult to obtain in war time. Seaweed may replace them. When it was generally used for the manufacture of iodine, 400,000 tons were gathered in the Hebrides every year. By previously tried processes a rayon could be produced from seaweed, but it dissolved in soap and soda. Dr. J. B. Speakman's method of producing rayon is not only insoluble in soap and soda but is soft to the touch, lustrous, and fire resisting. Already the fabric has been dyed successfully in more than forty shades.

Light Scientists

LIGHT is an important weapon in this war. Just how important, has been brought home to all of us by the rigours of the black-out. But only a handful of people know that behind every wartime use of light stand scientists in their laboratories testing, measuring, deciding how much or little we use. The "light scientists" are a comparatively small band of men, some of them among the greatest authorities on the subject in the world. Co-ordinating their work is the Illumination Engineering Society, the recognised authoritative body in this country, of which they are all members. Helping them to work out their ideas in practice is the Association of Public Lighting Engineers, the practical men on the job whose suggestions are sometimes very valuable. But the chief war problems have been and are still being worked out in the laboratories. Much of the work for the Services is secret. But enough can be disclosed to show how much we owe to these men who have already given voluntarily at least 10,000 hours of their time for this branch of war work. The illustration on this page shows a new industrial lamp being subjected to a final test in the laboratories where it was devised. Scientists have perfected a tubular fluorescent "daylight" lamp which gives an almost perfect shadowless light which will save war workers from much possible eyestrain.

A Shell a Minute

A MACHINE capable of turning one shell forging every minute has been designed for the United States army by the machine tool industry, states Mr. Tell Berna, general manager of the National Machine Tool Builders Association. The machine was completed early last summer and has been in operation ever since.

A New Heat-Resisting Alloy

A TEMPERATURE of more than 1,100 degrees Fahrenheit can be withstood by a new heat-resisting alloy now being developed by research engineers in Schenectady, New York. The alloy, which is a columbium-iron combination, should prove of great value to the engineering world, especially when it is appreciated that steam turbines operate at a temperature around 1,000 degrees and that scientists considered that this was the limit of profitable operation. A great deal is due to E. R. Parker, a 27-year-old negro metallurgist who has been conducting extensive experiments with the columbium-iron combination.

It is interesting to note that columbium itself, is a steel-grey substance of little commercial value, and is used mainly in lamp filaments and in cheap jewellery. Its chief source of supply is Australia.

Fluidrive Gears

THE Chrysler engineers, after several years of hard work, based to a very great extent on the extensive experience of British engineers, have produced a simple fluidrive construction suitable for mass production. The system in its most up-to-date form, in conjunction with the simplest of gear-boxes, is now appearing on Chrysler, Dodge and De Soto American cars and it would seem that the radical change in transmission design will form the opening of a new era in U.S. motor car development. This will, of course, also have considerable influence on the design and production of British and foreign cars in the future.

Substitutes for Plane Metals

SCIENTISTS at Leeds are seeking chemical substitutes for the light metals used in aircraft construction in this country. Working under Dr. W. T. Astbury, and in conjunction with the Chemical Research Laboratory at Teddington, they are attempting to make synthetic resins that when painted on to the fabrics will reinforce them. This is announced in a report which adds that the investigation is similar to work now being done for Sir William Yarworth Jones.

Co-operating with Dr. Astbury in the work is Dr. J. B. Speakman, who, as mentioned in a previous paragraph, has discovered a new form of artificial silk made from seaweed instead of wood pulp.

A Fool-proof Chrysanthemum

AFTER five years of selection and controlled fertilisation, University of Chicago Workers have developed a chrysanthemum which blooms approximately two months earlier than is usual, and withstands temperatures far below zero. The work has been conducted by the department of botany of the University. With a magnifying glass and tweezers, each petal on the blooms was separately fertilised by hand during the cultivation of these unusual flowers. The smallest button type bloom has from fifty to sixty separate fertilisations. The largest has up to two thousand.

New Type of Plane

A NEW type of observation plane has recently been introduced by the United States Army. It is designed so that the pilot and observer have unlimited vision. The machine can take off from a 300-ft. circular runway, and can land within its own length. It is able to fly at very slow speeds, and can almost come to a halt in the air.

IN THE WORLD AND INVENTION

Besa Machine Gun

SPECIAL factories have been built in Britain for the mass production of the latest type of machine gun—the Besa. It can be mounted on tanks, or used by infantry, in aircraft, and for anti-aircraft defence. With the use of two barrels, 230 rounds a minute can be fired. The gun is made in two calibres, 7.92 and 15 millimetres.

Sydney Harbour Bridge

SOME interesting facts concerning this famous bridge were mentioned during a lecture recently given before the Belfast Association of Engineers. The bridge, which took eight years to build, crosses Sydney harbour in a single arch span of 1,650 feet, which rises to 440 feet. On the total width of 160 feet the bridge carries four railway tracks, a roadway 57 ft. wide, sufficient for six lines of traffic, and two 10 ft. footways. In its construction over 5,000,000 rivets were used.

A Radio Detective

THE fact that there are U.S. Radio Stations on the air without the proper authority has brought about the invention of an ingenious apparatus to aid the F.C.C. in putting them out of commission. A car carries the device around on its detection tour. The apparatus can, by directional methods of converging lines, worked by moving from place to place, locate any "pirate" station to within 100 yards. At the same time cylinders are used to record the broadcast. There are no identification marks on the car.

A Steam-driven Bomber?

IT is reported from Washington that a steam-power unit for aircraft will probably be submitted to the U.S. Army authorities in the near future. The engine, it is stated, is a turbine developing 3,000 h.p., and is noiseless. The steam aero engine, if it could be brought to a practical form, would have very definite advantages over the petrol engine for war purposes. A steam-engine bomber, flying at a great height, would be inaudible from the ground, for the power unit would have no external exhaust and problems of fuel supply would be solved. Furthermore, the steam engine is not seriously affected by conditions at high altitudes as in the petrol engine, which has to be supercharged in order to maintain power output. There are also cooling problems. The idea is not new, however, as engineers have already made several attempts to produce a steam engine for aeroplanes.

A New Radio Buoy

THE United States Coast and Geodetic Survey have developed a combination sound-and-radio buoy which will enable ships at sea accurately to locate their distance from the point marked by the buoy.

The buoy will respond to signals transmitted from a distance of 100 miles. It has a sound pick-up device, a radio amplifier, and a radio transmitter. Most of the mechanism is contained in a sealed 50-gallon steel drum. Suspended from the drum is a sound pick-up, which sends a small current to an amplifier filtered to accentuate low-pitch sounds. When the sound signal is received, the radio transmitter sends out a sharp signal.

In operation, a ship explodes a small T.N.T. bomb, and the current that explodes the bomb makes a mark on a rapidly moving tape. The sound of the explosion is picked up by the distant buoy, which instantly sends out its signal, which is received by the ship, and causes a second mark to be made on the moving tape. The distance between the two marks permits the distance between the ship and the buoy to be calculated.

Colour Television Development

ACCORDING to a recent report from New York, colour television is now possible by the addition of a simple mechanical device to the standard television receiving set. A demonstration of the new television was recently demonstrated by Dr. Peter Goldmark, of the Columbia Broadcasting System. In front of the present television tube, a wheel of coloured discs is rotated, so synchronised that the eye sees successive red, blue and green pictures through the transparent colour discs. The frames thus glimpsed have been similarly scanned through the corresponding colour filters. The eye combines the whole, and the result is to make the televised scene stand out with startling fidelity in brilliant natural colours.

Anti-gas Preparation

DR. RALPH H. BULLARD, Professor of Chemistry at Hobart College, Geneva, New York, has discovered a new chemical compound for virtually complete protection for soldiers and civilians against burns of mustard gas. The preparation sprayed on clothing will remain effective for several months. Neither water nor ordinary temperatures have any effect on the compound and clothing may be cleansed without destroying its effectiveness.

The "Stroboscope"

WITH the "Stroboscope" singers, musicians and crooners face the most critical of listeners. It is an instrument which has recently arrived from America where it is widely used in both the entertainment world and by doctors. It is an instrument which is a hundred times more sensitive than the human ear and its job is to detect when singers, instrumentalists and bands are out of tune. When you sing into the microphone a picture of the voice is shown going up and down the scale, and thirteen little windows lit by neon tubes and black circles spin round. When you are dead on the note the circle on the window corresponding becomes stationary. When you are flat it spins clockwise, when sharp, anti-clockwise.

Testing his equipment before leaping from a plane at an altitude of 35,000 ft. is A. H. Starnes, U.S. scientist. Wind is shot at his face, covered with a chamois bag, at a rate of 200 m.p.h. Liquid air has reduced the temperature in the cabinet to 67 degrees below zero. Observing him, in the cabinet, is Dr. Albert H. Andrews, of North Western University, while Dr. T. C. Poulter, of The Armour Foundation, tends to the cooling.

Suspended Matter in Water Supply

A Notable New Design of Clarifier

Clarifiers as built at Siouf, Alexandria

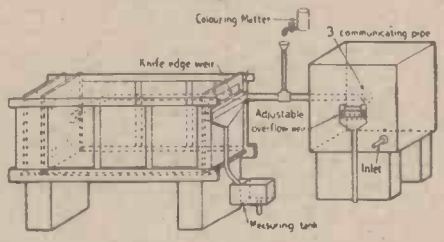
IN many cases industrial and town water supply contains a considerable amount of mud, as well as finely divided suspended particles and colouring matter, such as " peaty " acids, which necessitates the addition of a coagulent, usually aluminium sulphate.

The standard method of eliminating suspended matter is by sedimentation in large settling tanks or clarifiers, mostly of concrete, followed if necessary by filtration through open or closed pressure sand filters.

A remarkable advance has now been made in the design of clarifiers resulting from about 12 years' research and development work that has been undertaken by Robert Walton and Thomas D. Key, of the Alexandria Waterworks, Egypt. This is of outstanding importance and already such plants are at work or in course of erection at cement works, paper mills, and other establishments in Egypt and in India. Also the complete water supply of Alexandria, at both the Rond Point and the new Siouf Works, has been running on these lines for a number of years.

Details of the Clarifier

Essentially the new clarifier that has been evolved has a very large inlet and outlet and an arrangement of internal baffles with submerged apertures, so that the flow of the water is not only extremely slow but is also uniform, causing no eddies. Further, it was found that temperature variations in the air such as between day and night, affect the temperature of the water and tend to cause vertical currents which seriously reduce the sedimentation efficiency, a trouble also eliminated by correct design.



Small experimental rectangular clarifying tank used in research work at Alexandria.

With the ordinary types of sedimentation tank the circulation of the water is very irregular, small portions, for example, passing through very rapidly whilst other and larger portions remain stagnant for a long period. This was proved both in connection with the experimental tanks and actual large-scale tanks, by adding lime to the inlet water and taking samples repeatedly at different points so as to trace, by determination of the alkalinity, the flow of the lime in the water.

At the Siouf works there are two very large concrete clarifiers, circular in shape, 110 ft. diameter, each containing about 935,000 gallons of water. Experience with the 15 ft. diameter model showed that with such tanks of ordinary design, rated at 220,000 gallons per hour capacity, having a nominal retention period of three to four hours, part of the water would have travelled through in 15 minutes because of the extremely effective circulation, representing less than 60 per cent. efficiency.

Remarkable Figures

The two clarifiers at Siouf were constructed, therefore, according to the new design and started up in June, 1935, and results obtained during four years, running, show an efficiency of 93.3 per cent., a remarkable figure. That is 93.3 per cent. of the suspended material in the water from the River Nile, one of the worst in the world as regards turbidity, is removed by passage through the clarifier tanks at the rate of 220,000 gallons per hour, leaving only a small amount for final removal in sand filters. In addition the amount of sulphate of alumina required is much less.

As already indicated, the general principle is applicable to clarifier tanks of all sizes, and, for example, an installation at a cement works in Egypt, that of the Tourah Cement Company, has a capacity of 22,000 gallons of water per hour, and operates at slightly over 96 per cent. efficiency, in spite of the bad water.

A New Machine for Water-Boring

WHAT is believed to be the second machine of its kind in the world—a combined rotary and percussion drill for water-boring operations—has been designed and constructed in Salisbury, Rhodesia, for the Government Irrigation Department. It is a replica of the one previously supplied to the Rhodesian Government, in 1937, by Ruston-Bucyrus, Ltd., of Lincoln. This massive 13,700 lb. machine was constructed for the Government by Messrs. Clarson & Company, a Salisbury engineering firm.

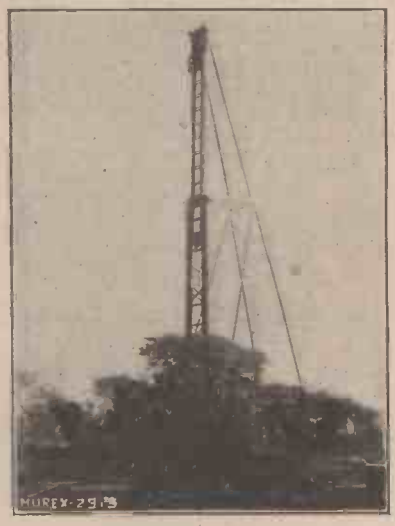
The new portable machine for water boring.

Every part of the machine, which is illustrated on this page, with the exception of the engine and certain cast steel gearwheels, was manufactured in Salisbury, and the work is a fine example of the high standard of engineering skill in Rhodesia.

The drill is electrically welded throughout, and " Fastex " electrodes, manufactured by Murex Welding Processes, Ltd., were successfully used for the job. It is capable of drilling to 600 ft. through any sort of formation. The overall height with the derrick hoisted is 43 ft., and the overall length 15 ft.

This new drill has the advantage that only one machine instead of two has to be transported, a feature of great importance when rough veldt tracks, often crossing boggy ground, have to be traversed. Considerable time is saved in erecting the drill, and once it has been erected the change-over from percussion to shot drilling and vice versa can be effected in a few minutes.

The combined machine has proved so satisfactory in test that the Irrigation Department of the Rhodesian Government has decided to use this type of machine for all future requirements.



The machine in operation.

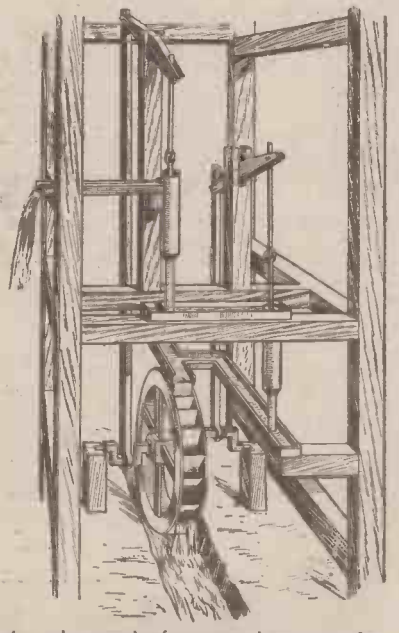
The Search for Perpetual Motion

Some Interesting Sidelights on an Age-Old Fallacy

THE quest for perpetual motion which, at one time, was undertaken with great assiduity by a large number of inventors, originated as an almost natural and inevitable consequence of mankind's innate desire to obtain something for nothing.

Probably the idea of a perpetual motion machine is not more than five or six hundred years old. It seems to have originated sometime during the early Middle Ages, at the period, perhaps, at which very simple and crudely-constructed machines, such as water-mills and elementary gear mechanisms first came into being in England.

A perpetual motion machine is one which, once started, will continue to run indefinitely without any outer assistance. Such is the device which has constituted the mythical ideal of many an ingenious yet woefully misguided inventor.



An early example of a perpetual motion machine on the water-wheel principle.

Were one to erect a water-motor at the bottom of a waterfall and, by means of a dynamo, to obtain electric power from the water's energy, that would not constitute perpetual motion in the sense of the term as it has been ordinarily accepted throughout the centuries. For if perpetual motion in this sense were accepted, then it must follow that such everlasting motion has been an accomplished feat for many years, since it is possible to operate mechanisms ceaselessly by marine tidal motions, by the barometric changes of the atmosphere, by the power of falling water, and by natural alterations of temperature.

The perpetual motion machine of the traditional inventor must, however, function ceaselessly of its own accord until it wears out completely. Once started, it must not have any outside energy imparted to it. But since the machine has to operate, it follows logically that it must use up energy in running. Hence, for a machine to run of itself perpetually, it would have to create its own energy.

Conservation of Energy

We now know from the great Law of the Conservation of Energy, first enunciated by the scientist, James Prescott Joule, in the last century, that it is impossible to create energy. Whilst energy still remains an extremely mysterious entity to us, we know that we can change it from one form to another almost at will, but we cannot originate this as yet unexplained "thing" which we call "energy."

Could we but create energy, the world's civilisation would be changed in a twinkling, for then the necessity of having to work would cease, and we should in actual reality be able to obtain something for nothing.

But because energy cannot be created, it follows that a machine which purports to make its own energy (and that is what any successful perpetual motion device must do) is obviously an impossibility.

Inventors during the present century have clearly grasped principles such as the above and, as a consequence, the perpetual motion craze has, in our time, come to its inevitable end. In the last century, however, the perpetual motion mania was rife among a certain section of inventors and mechanical constructors. Between the years 1617 and 1902, more than six hundred separate applications were made to the British Patent Office in respect of perpetual motion inventions, and of these, all save twenty-five dated from 1854 onwards.

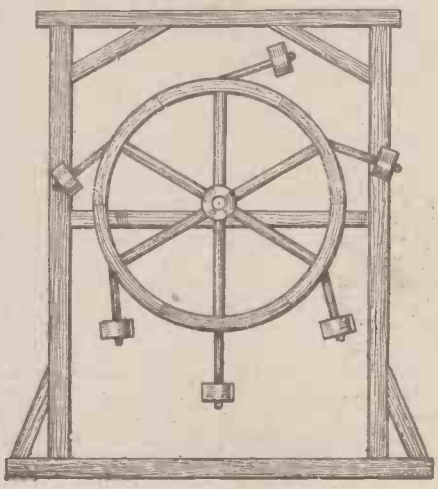
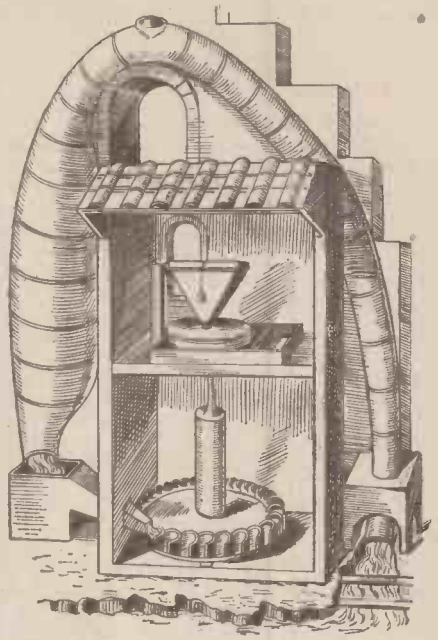


Fig. 1. The overbalanced wheel of Vilard de Honnecourt (13th century)—the first of a long line of perpetual motion inventions.



Another early form of perpetual motion machine incorporating a pelton-wheel device.

Most of these patent applications are concerned with mechanical devices of an admittedly ingenious nature. So confident were some of these inventors of the success of their projects that they actually included brake-mechanisms in their designs lest their perpetual motion mechanisms should run at excessive speed and become uncontrollable!

The "Overbalanced Wheel"

Perpetual motion devices fall into several distinct classes. The oldest of them, perhaps, is the water-raising machine, which is supposed to be kept going by the descent of the water which it has raised. Close upon this came the well-known fallacy of the overbalanced wheel, the earliest project for which is supposed to have been the work of one Vilard de Honnecourt, a 13th-century Gothic architect. De Honnecourt's overbalanced wheel, in the form projected by its inventor, comprised a wooden wheel having around its periphery a number of mallet-like weights secured in position by means of hinges at the ends of the handles, as shown in Fig. 1. It was considered that, once started, the wheel would continue to rotate indefinitely, the fall of each mallet on the rim of the wheel giving sufficient impulse to the wheel to keep it in a state of revolution.

Of this type of overbalanced wheel, there were many variations. The famous Marquis of Worcester, one of the earliest of the steam-power pioneers, considered that he had made a successful perpetual motion wheel on these lines, and he seems to have set up such a contraption in the Tower of London about 1648, and to have attempted a demonstration of it.

Marquis of Worcester's Wheel

Exactly what the Marquis of Worcester's Wheel was like is not known, but it is supposed to have operated in consequence of the continual fall of a number of balls within the partitioned segments of a wheel, as illustrated in Fig. 2.

In the reign of James I of England, one Cornelius Drebbel is supposed to have made

a watch for presentation to his Majesty in which the revolutions of the sun and moon were represented "and that without the help of either springs or weights." It is known that this Cornelius Drebbel was an ardent seeker after perpetual motion. Nevertheless, none of his designs ever soared above mediocrity.

Dr. Denis Papin, the steam engine inventor; Dr. Hopper, an 18th-century mathematician; and even the celebrated Sir Richard Arkwright, the textile industry projector, dallied with the idea of perpetual motion, but eventually threw up the idea in disgust.

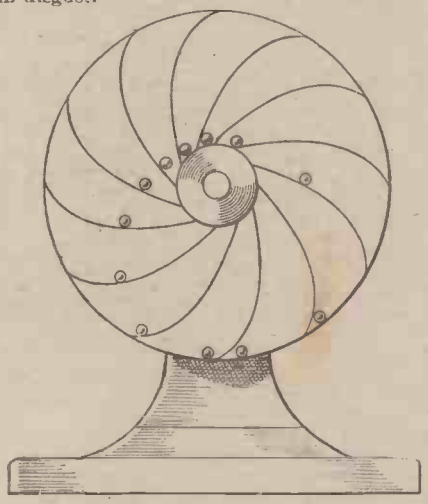


Fig. 2. The principle of the Marquis of Worcester's perpetual motion wheel.

It is recorded that, during the last century, John Spence, of Linlithgow, constructed a device consisting of a wooden beam balanced at its centre and having a piece of steel attached to one end of it. The end of the beam carrying the piece of steel was alternately drawn upwards by a powerful magnet placed above it and downwards by a like magnet situated below it. As the beam end approached the magnet, a material which was a non-conductor of magnetism, was interposed between the piece of steel and the magnet so that the adjacent magnet's attraction ceased, and the beam was at once attracted in the opposite direction by the opposing magnet. When the beam neared this magnet, the magnetic insulating material was again automatically interposed between the steel and the magnet, causing the beam at once to move away from the magnet and to be again attracted by the opposing one.

John Spencer's "magnetic" perpetual motion machine was, of course, never demonstrated other than on paper. For, as we are aware, there is no known insulator of either magnetism or gravity. If there were, it might find a useful application in eliminating the bomb-dropping of modern warfare!

Stephenson's P.M. Machine

Even George Stephenson was, at one period of his career, bitten by the perpetual motion bug. Stephenson's perpetual motion machine consisted of a wooden wheel, to the rim of which were attached glass tubes filled with mercury. As the wheel rotated, the mercury poured itself down the tubes, and so gave an impulse to the wheel. Stephenson's wheel was merely still another variation of the overbalanced wheel of the Marquis of Worcester and others, and subsequently, so Stephenson's biographer tells us, its inventor "used to lament the time he had lost in these futile attempts."

Another set of perpetual motion inventions relied upon the well-known "Principle of Archimedes," according to which a body immersed in a liquid is said to "lose weight" or to weigh less than it does in air. Thus it is that a force which will lift a load of one hundred pounds in air will lift an increased load in water.

Chain and Buckets Device

By way of supposed application of this principle, perpetual motion machines have been designed consisting of an endless chain passing round an upper wheel situated in air, and a lower wheel placed below water. The chain has buckets carrying balls secured to them, and as the buckets descend they enter the water and are carried round the lower immersed wheel. By their own buoyancy the balls rise upwards in the water, giving their respective buckets an uplift which is supposed to perpetuate the momentum of the machine. Needless to say, all such machines (and there were many of them) proposed by inventors are fallacious, as the slightest reflection on the parts of their would-be creators would have demonstrated.

When it first became possible to liquify air several inventors had hopes of being able to construct a perpetual motion device operating on liquid air. The idea was to have the very cold liquid air in the "boiler" of an engine, which substance would be vapourised, and then be given a high pressure under the heating effect of the external air. The air thus under pressure would drive an engine which, in its turn, would serve to operate a compressor for the purpose of again liquefying the air and returning it to the "cold boiler." A certain American, named Tripler, actually went so far as to construct a device on these lines, and to give demonstrations of it, but Tripler's experiments proved to be frauds, and subsequently nothing more was heard of the inventor.

Another American so-called perpetual motion inventor was John W. Keely, who, towards the end of the last century, claimed to have solved the problem of perpetual motion by means of a device based on the vibrations of atoms. It was Keely's idea that if one could impose upon matter, by sympathetic vibration, the extremely rapid oscillations which characterise atoms, then, by what he called the "resonance of atoms" a series of energy pulsations would be created which would manifest large quantities of usable energy.

Keely clothed his nonsensical ideas in a jumble of high-sounding terms, and he actually gave demonstrations of his "motor." The Keely motor certainly did run and its success gave rise to some doubt in the minds of serious workers as to whether there was not a good deal of truth in Keely's contentions. It was only after the death of the "inventor" that the fraudulent nature of the Keely motor was discovered. It was found that the motor was actuated by means of compressed air, which was led to it in a variety of ways from reservoirs in a cellar!

Strutt's Radium Clock

The nearest approach to true perpetual motion which has ever been obtained is to be seen in the device known as "Strutt's Radium Clock." This is illustrated in Fig. 3. It consists essentially of a tiny fragment of a radium salt enclosed in a glass or silica tube, which is coated with a conducting material and which has attached to its lower end a small brass cap from which hang a pair of gold leaves. This tube is fused into a larger glass container from which the air is exhausted. The lower half of the interior walls of the container are coated with strips of tinfoil, which area is earthed by means of a conducting wire.

Now the β-rays which are given off by radium have a negative charge. These pass through the glass of the apparatus and leave the central radium-containing tube with a positive charge. This charge gradually accumulates, and causes the gold leaves to diverge until eventually they touch the inner metallised walls of the container. Immediately they do this, the positive charge of the radium tube escapes to earth and the gold leaves instantly collapse. The positive charge accumulation again begins and the excess charge is again earthed by the contact of the diverged gold leaves with the tinfoil-covered walls of the container.

This process of charge and discharge goes on continuously, its rapidity being dependent upon the quantity of radium present in the central tube of the apparatus. Since radium can emit its rays for thousands of years, it follows that this motion of the gold leaves will continue uninterruptedly for such a period of time.

The cycle of charge and discharge of the gold leaves is constant and invariable. It is unalterable by any external factors, being, as we have just seen, governed in its frequency by the amount of radium contained in the central tube.

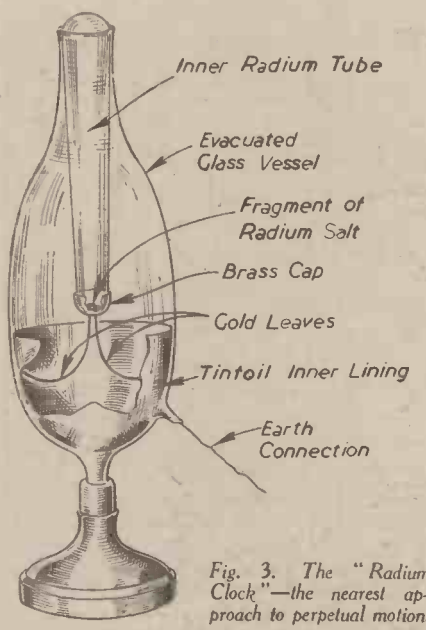
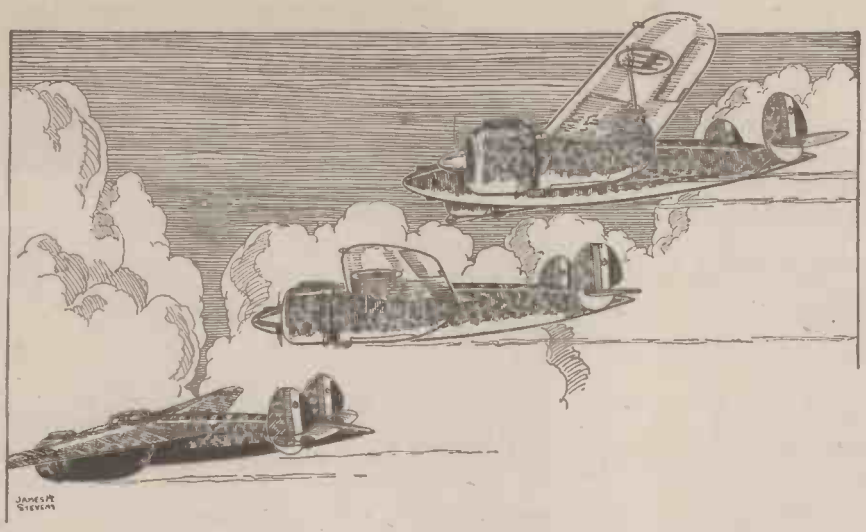


Fig. 3. The "Radium Clock"—the nearest approach to perpetual motion.

The "radium clock" constitutes not only a useful scientific toy, but it is also the sane answer of theoretical Science to the centuries-old bickerings of the army of perpetual-motionists.

Even at the present time, however, there are individuals who, realising the implications of the Law of the Conservation of Energy, appear to cherish a hope that one day it will be found possible, if not to surmount this implacable law, at least to find a way round it, and thus by some as yet unknown method to manufacture energy.

When, eventually, we know what Energy is, there may arise some hopes of the perpetual motion question being reopened. Very possibly we might at some dim future period be able to create atoms of Matter out of the more fundamental Energy. But to create energy itself is many times a more formidable problem.



SCALE MODEL AIRCRAFT No. 9

The Breda 88 Fighter Bomber

By J. H. Stevens, A.R.Ae.S.

The Fastest Aeroplane in the Regia Aeronautica

THE Breda 88 is the only Italian military aeroplane, of which any details have been released, with a really modern performance—it is certainly the only type in service that is on a par with the latest equipment of the other great air forces. Italian achievements in aeronautics, as in other spheres, tend to look their best on paper. In particular, the performances of their aeroplanes seldom live up to the extravagant claims made for them.

International Record Holder

However, the Breda 88 (which is not a very new machine, the prototype having flown as long ago as 1937) is a very good aeroplane, and has proved itself by establishing a number of international records. The production machine is a two-seater of the type called in the U.S.A. an "attack bomber," that is, it is intended for low-flying attacks on troops with its guns and bombs. But, in this aeroplane, the duties do not end there, and it is adaptable for use either as a high-speed escort fighter, a fast reconnaissance machine, or a light bomber. The prototype, which gained the speed records, was without military equipment and was flown as a single seater. The two best records set up were those for 1,000 km. (620 miles) with 1,000 kg. (2,200 lb.) load, and 100 km. (62 miles), which were flown, respectively, at 325.52 and 344.25 m.p.h. Even allowing for the cleaning up of the machine for these flights, the performances are very good indeed.

Although the proportions of the Breda 88 give the impression that it is a small machine, it is actually almost as large as our short-nosed Blenheim. The whole aeroplane is beautifully proportioned, great care having been taken in the avoidance of undue excrescences, and the fairing of one part into another. The sole exception to this is the tail unit, which is very much stuck together, as if the designer had lost interest when he reached that part. Despite the fact that both the main and tail wheels are fully retractable, the tail plane is strut braced.

Handley-Page Slots

It is a curious fact that, although they were invented and developed in this country, Handley-Page slots are hardly used on current British machines, while many Axis designers make the fullest use of them—both as anti-stalling and, particularly, as lift-increasing devices.

PRINCIPAL CHARACTERISTICS

Breda 88, two 1,000 h.p. Piaggio P XI R.C. 40:

Span...	50 ft. 10 in.
Length	37 ft. 9 in.
Bomb load (normal)	2,205 lb.
Rated power ...	2,000 h.p. at 13,100 ft.
*Maximum speed ...	325 m.p.h.
Landing speed ...	69 m.p.h.
Climb to 16,400 ft....	11 mins.
Ceiling	27,900 ft.
Cruising range (speed unstated) with 2,205 lb. bombs ...	1,120 miles.

* This figure is arbitrarily based on that set up by the single-seater record breaker over a 620-mile course with 2,200 lb. load.

The structure of the Breda 88 is unusual: both the wing and fuselage rely on chrome-molybdenum steel tubing to take the main loads, although both structures are covered with light-alloy sheet. The use of a light-metal covered structure for the fuselage is not unusual in Italian aeroplanes, but its extension to the wing is unique. The system is thought to be popular because Italy has been very short of aluminium supplies during recent years.

Crew Accommodation

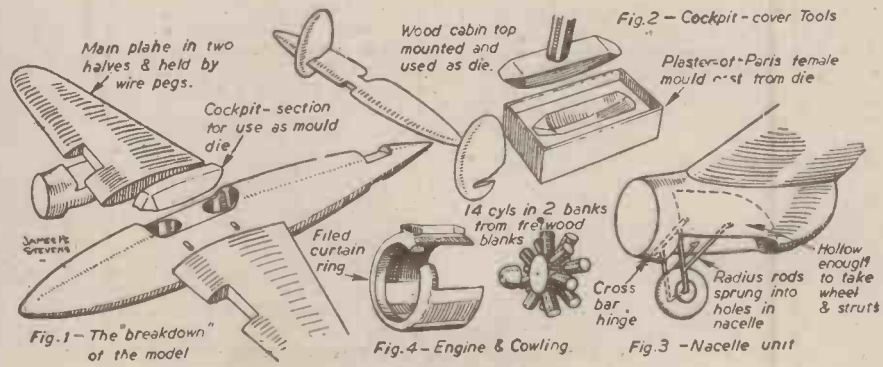
The crew of two are accommodated in a covered cockpit over the main plane, where neither pilot nor gunner can have much of a view. In particular, the latter has a very restricted field of fire with his single manually-operated gun. The prototype was fitted with a funny little Breda frustum-shaped power-operated turret; but in at least the first production machines, this has been discarded. The prototype also had observation windows and a lower gun position in the bottom of the fuselage. The pilot's armament is variable, and may consist of two or four large-bore machine-guns or shell guns mounted in the nose of the fuselage. The pilot's view in all but the forwards and upwards directions is poor, and the bulk of the two radial engines must make formation flying difficult.

The engines on the record-breaking prototype were two 1,000 h.p. small-diameter French Gnôme-Rhône radials, but the production machines have the Piaggio P.XI RC 40 radial engines of similar power. The most interesting feature of the installation is that, like the Lockheed P.38, described last month, the engines are of opposite rotation. With the compact design of the machine, this is probably necessary to ensure stability and manœuvrability but it is very bad from the point of view of war-time production.

The Model

There is nothing unusual or particularly difficult in the making of a solid scale model of the Breda 88. It is a very straightforward job which allows some opportunities for neat woodwork.

There are many ways of making a scale model aeroplane and, as it is manifestly impossible to describe more than one, the popular small-scale solid type has been



Figs. 1 to 4.—Constructional details for making the model.

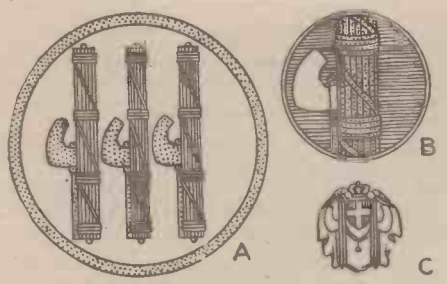


Fig. 3.—Italian insignia.
A: Mains plane; axe-heads outboard and top towards leading edge—yellow on white.
B: Fuselage; axe-head forward—brown and silver on grey background.
C: Rudder; white cross on red shield with fasces, crown and mantling in gold and white.

chosen as the subject for this article. Scales have been discussed before in this series, and it is only proposed here to recommend that of 1 : 72. In this the size is large enough to handle without making the finished job bulky, and there are plenty of useful accessories—guns, wheels, airscrews and even engines, and cowlings are available.

For those new to aeroplane modelling, it might be of use to suggest the best materials—particularly as the choice is likely to be somewhat restricted in these days. The wooden parts (fuselage, main planes and engine nacelles) are most satisfactorily made from a fairly close-grained wood—whether it is soft or hard does not matter much—such as American whitewood, plane, box, or holly. A good piece of white pine or deal will suffice, but such woods as oak, ash or mahogany are most unsatisfactory. Washer fibre is the best material for the tail surfaces, as it can usually be obtained in the right thickness, is easy to work, and does not split.

Splitting up the Model

Owing to the large fairings on this machine, some thought must be spent on the best way to split the model for easy working. The arrangement shown in Fig. 1 is the handiest. The two-piece main plane is fitted on with pins and is easy to align. The notches recessing the engine nacelles to the maximum wing depth assist both the accurate setting on of the nacelle, and the fairing of the parts. If the tail plane is recessed into the rear of the fuselage (the gap being filled by glueing in a small wooden block for carving down on top of it) the result will be both strong and accurate.

The Cockpit Cover

The hood which completely encloses the pilot and partially covers the observer, can be easily made by the method described in previous articles. For those who have not seen them, the tools are made as shown in Fig. 2. The male die is carved with the fuselage cut off and mounted on a stick, the female is cast from it in plaster of paris. The heaviest possible cellophane from a commercial wrapping is used as material. The tools are thoroughly heated in an oven and the material in very hot water. The job of pressing is then done as quickly as possible.

The undercarriage, too, is simple. The main legs should be soldered (Fig. 3) to a crosspiece to act as a hinge. The radius rods can be dummies used to lock the legs when down. The fairing plates can be made from thin aluminium, brass or even stout paper. Hinging is tricky on small scales, but the crude sounding strip of fine silk or cotton is surprisingly effective, and stands up to handling quite well.

The Engines and Cowlings

Anyone fortunate enough to possess a lathe does not need to be told how to make a radial-engine cowling. For those less lucky, the following method will be found to be effective. A brass or bone curtain ring of appropriate diameter should be filed, as shown in Fig. 4. The brass ring is preferable, as a brass foil cowling can then be made and soldered to the ring. If a bone ring is used the cowling must be of paper, fixed by glue. The dummy engine to go inside the cowling is also shown in Fig. 4.

Painting and Colour Scheme

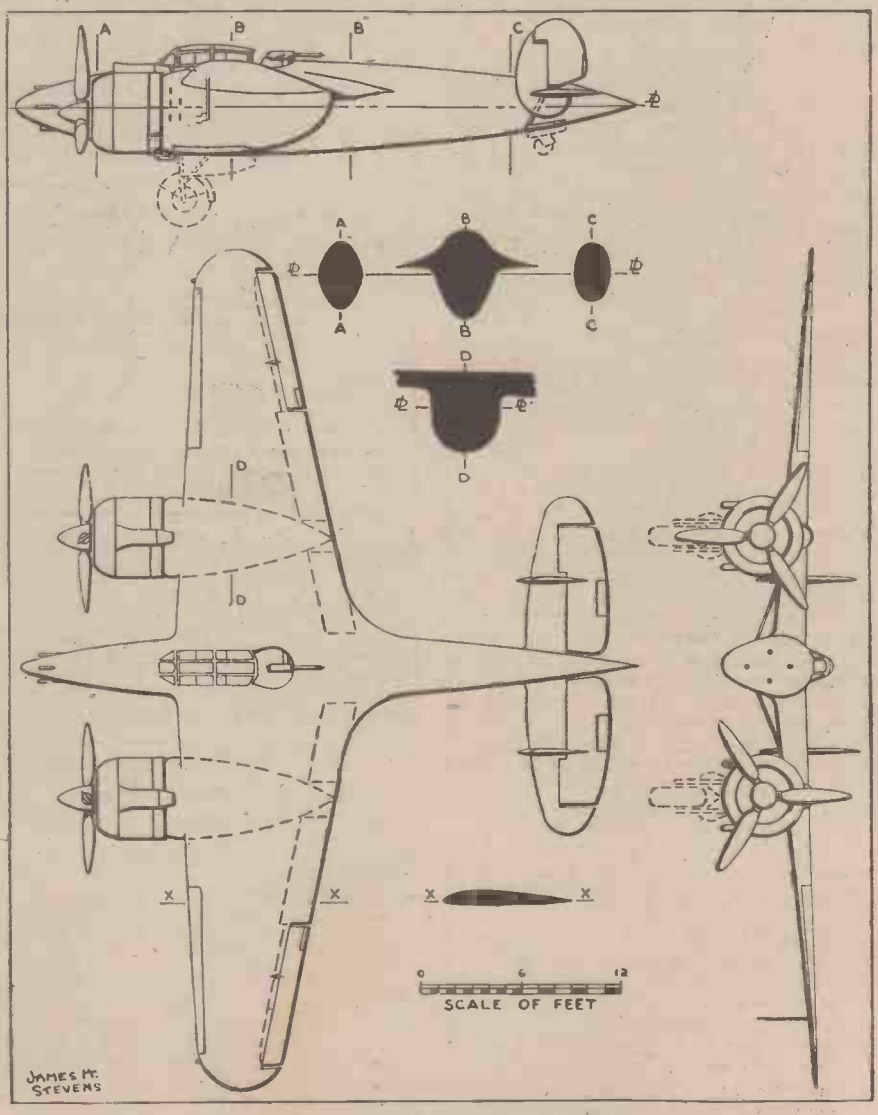
The best paints for this model are the small 2d. or 3d. pots of "art" enamel, because the finish on Italian machines is glossier than on British aeroplanes. The most useful brushes are a No. 5 camel hair and a very small liner's brush.

In model work it is important to put paint on in thin even coats, and to allow full time for "setting" (not just *drying*) between coats.

The Italian markings are shown in the heading and in Fig. 5. The ground colour is light fawn, which is applied all over. The camouflage on the side and upper surfaces is applied "freehand" by an air brush on the full-size machine. These secondary colours are bright grass green and terra-cotta—the former covers rather less than half the area in small irregular patches, while the latter is applied sparingly over perhaps 25 per cent. of the area.

The international markings are on the rudder only and consist of vertical red, white and green stripes with, on the centre stripe, a small red shield with a white cross surmounted by a gold crown. Many Italian machines now have camouflaged rudders on which large white crosses are painted—on machines so painted the royal arms are omitted.

The markings on the wings are not national, but those of the Fascist party. Each consists of a yellow bordered white disc on which are painted three fasces in yellow—the axe and faggots of the old Roman lictors, which is the Fascist emblem. On the side of the fuselage just ahead of the cockpit is painted another fasces; in this case it is a single light brown one, with a silver-bladed axe, a grey disc with a light brown edge.



Side, plan and front view of the Breda 88 Fighter-Bomber.

A Universal Film Processing Drum

Constructional Details Of A Simple But Efficient Unit

THE processing outfit to be described may be justifiably styled as universal in its application, as any type of processing may be carried out with its aid, using any kind of solutions. The outfit may be used for all sizes of cinematograph and roll film without alteration, and the drum may be turned either by hand, or by an electric or old gramophone motor. The dimensions given will be suitable for constructing a drum having a capacity of three 30-ft. lengths of 9.5 mm. film, for which it is only necessary to use 15 ozs. of solution. The secret of the low volume of solution required lies in having the film running close to the inside surfaces of the trough, and for this reason it will be appreciated that some degree of accuracy is required in the construction of the outfit, but the average amateur should find no difficulty in this respect. The capacity of the outfit may be varied for individual requirements by making the cage drum longer or shorter as desired. After the film has been wound on to the drum (to which it is attached at each end with the clips shown in Fig. 6), the lid is closed and the various solutions are then poured in through a pipe at one end, and drained off from the bottom of the trough through a rubber tube and a tap.

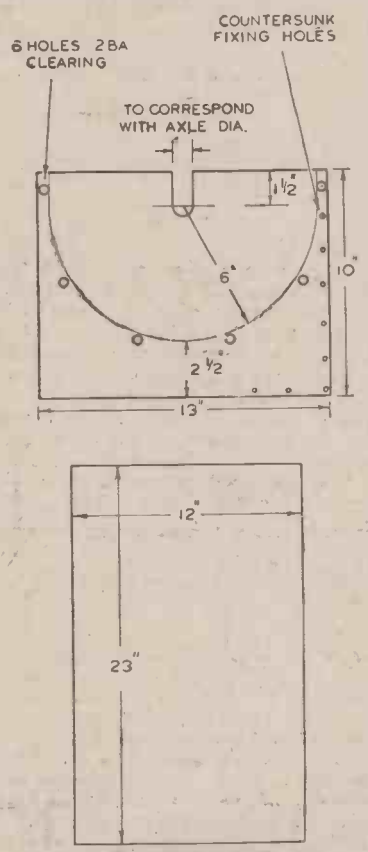


Fig. 1.—Details of the trough and end-piece.

The Trough

This is made of 18 s.w.g. sheet brass, soldered together and mounted in a wooden frame. Cut the two brass ends and the body to the sizes given in Fig. 1. Mark out the ends, but do not at this stage drill the six holes spaced round the semi-circle. These will be used during the construction of the trough, to accommodate six 2 B.A. threaded brass rods, having nuts and washers on the ends, and which will be used to hold the three parts together during soldering operations. Make sure that the semi-circles are marked plainly with dividers, clean the brass with fine emery cloth, and "tin" a strip about ¼ in. wide over the mark. Next "tin" both long edges of the third brass sheet for about ¼ in. deep on both faces. Bend this sheet up to form the trough, being careful to keep it square. A little extra care in bending at this stage will be rewarded by ease of soldering in the next. When the bending is complete, assemble the three pieces using the threaded rods to hold them in position. When the trough piece is in position, the brass should project about ¾ in. above the two ends, and will be bent over at right angles, when the complete trough is put in its frame. If a Bunsen burner is available, the easiest method of soldering is to stand the trough on its end on two tall wooden blocks, so that the Bunsen can be held underneath the brass. Move the Bunsen round and apply the solder from the top, wiping off afterwards with a clean rag. Should no Bunsen burner be available, however, the operation may easily be performed with a soldering iron. Having soldered the trough, remove the threaded rods, which will not be required any more. The trough should next be screwed in place in its wooden frame, shown in Fig. 2. Bend over the ends and screw to the rails of the frame, as shown. Next make the inlet and outlet pipes shown in Fig. 3, and solder them into place. Notice that the outlet pipe is flush with the inside of the trough so that all the solution can be drained out easily.

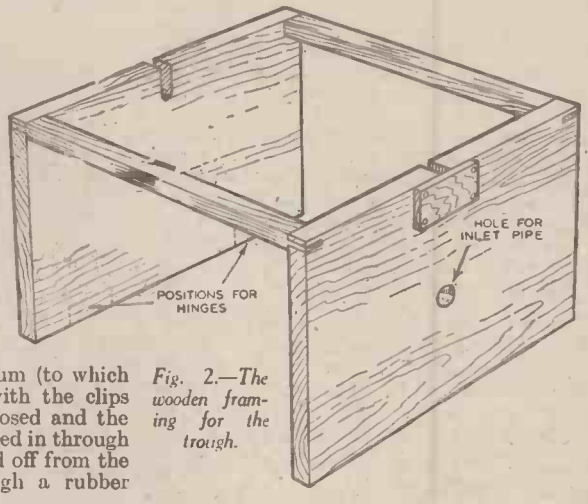


Fig. 2.—The wooden framing for the trough.

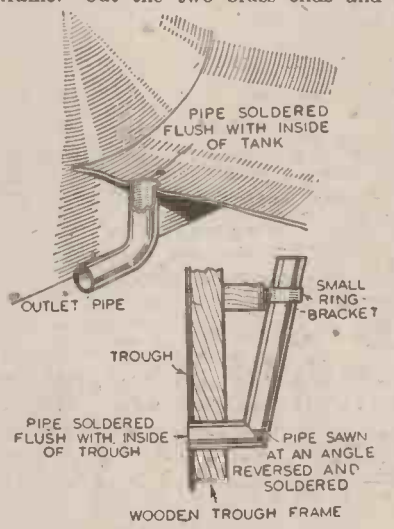


Fig. 3.—Details of the inlet and outlet pipes.

Inlet and Outlet Pipes

Each pipe is made from brass tube and may be of any convenient size. Brass gas piping, ½ in. outside diameter, answers the purpose well. The inlet pipe is made by sawing a short piece of piping at an angle and soldering to form a mitre joint elbow, as shown. Note that the entry hole in the end of the trough is set up about 1½ in. from the bottom. When the solutions are

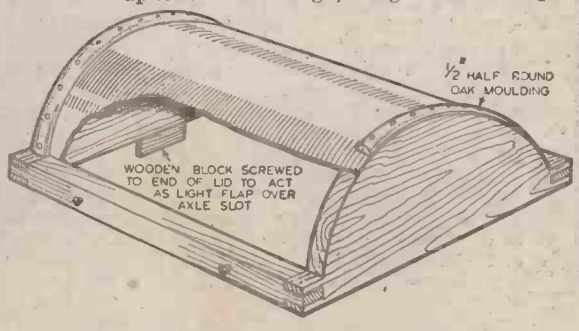


Fig. 4.—Cover and framing (part broken away).

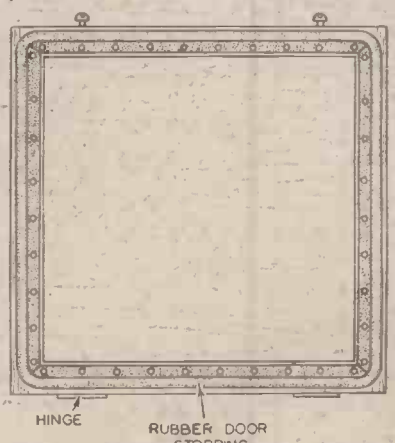


Fig. 5.—Method of making the lid light-tight.

poured in, the liquids strike the face of the drum and flow down to and along the bottom of the trough. When the solution rises in the trough the film is immersed along the whole length of the drum simultaneously.

The outlet pipe should be heated and bent, but be careful not to make it too hot, as brass will melt if allowed to reach a temperature too much over red heat. When bent and soldered in position, attach a length of rubber tube to the pipe, and an ebonite tap to the tube. The latter may be obtained for a few coppers from any firm making chemical laboratory equipment.

Cover

As no soldering is necessary in the construction of the lid, or cover, tinned iron sheet of about 18 s.w.g. may be used. First make the wooden ends and rails, the latter being tongued to the ends, as shown. The sheet is merely nailed to the wooden ends, using half-round oak moulding, slotted on the flat side, and soaked in water before bending, to hold the sheet close to the wooden ends. It is an excellent plan to run a little molten paraffin wax in between the tin and wood at this stage. The ends of the lid should be bent slightly inwards, as illustrated, so that the spray from the drum will drain back into the trough. The lid is made light-tight with a strip of door-stopping cut as shown in Fig. 5. When the lid is shut, the two catches are used to keep it closed.

Squirrel Cage Drum

The construction of the wooden ends and bars is apparent from Fig. 6. The axle may be made of brass or steel rod, and can be of any convenient diameter. The construction of the hubs should also be apparent, on referring to Fig. 8. Notice, however, that it is not necessary for the hub plates to be circular, as a square form will be quite suitable if found more convenient to make. One end of the axle should be fitted with either a handle or a pulley wheel, depending on whether the drum is to be rotated by hand or other means.

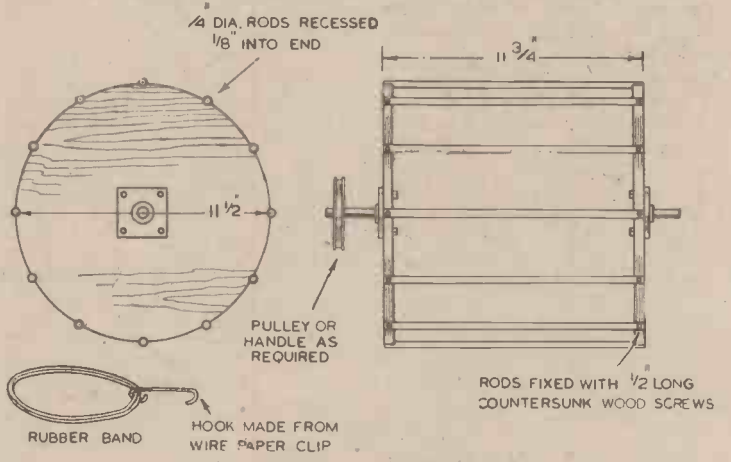


Fig. 6.—End and side views of the drum.

Base

This is made of wood and the actual dimensions will depend on whether the drum is to be hand or motor turned. The trough, however, is hinged to the base at the handle or pulley end, so that it may be tilted for drainage purposes.

Soldering

The first essential to soldering is cleanliness, and to this end the materials should be well cleaned with emery cloth. The soldering iron should be filed clean and "tinned" with solder. Do not use it too hot, the correct temperature being when a green flame surrounds the copper "bit." Use either soldering flux or "killed spirits," i.e., spirits of salts to which a few small pieces of zinc have been added. (Do this in the open air and add the pieces gradually.) To "tin" a surface, first clean with emery and apply soldering flux or spirits sparingly. Use a hot iron and ordinary strip solder, not the kind having a resin core. Hold the bit on the brass to warm it up, and then apply the solder. Whilst still molten, wipe quickly with a clean rag, and the result will be a brightly tinned surface.

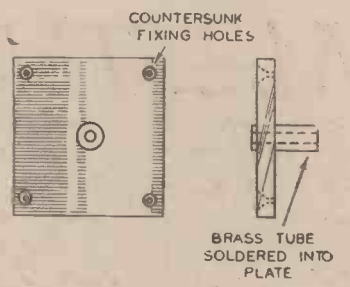


Fig. 8.—Showing construction of hubs for drum.

Enamelling

The interior of the trough, also the lid and the whole of the cage drum, should be given two coats of "Robbialac" black enamel, or acid-resisting paint. Make sure that the interior of the inlet and outlet pipes are well covered—a pipe cleaner will be found useful here.

Next give the whole outfit two coats of glossy white enamel on the outside, hinge on the lid, and fix the gramophone lid stay to the casing with a couple of screws, as shown in Fig. 7.

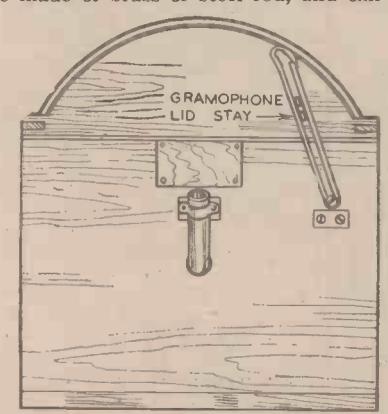


Fig. 7.—End view of the complete apparatus.

America's Big Bombers

Details of the Boeing B.17 and Douglas B.19

Size is a quality inevitably associated with trans-Atlantic productions and reports of new American bombers, either ordered by Britain or for the United States Air Services, feature their size as an outstanding point.

One type of big American bomber is the Boeing B.17, sometimes called the "Flying Fortress." Actually, as big four-motor aircraft go, it is not unusually large. Its general dimensions and range correspond to those of Britain's 20-ton four-engine flying-boat, the Short "Sunderland." Its wing span of 105 feet is 8 feet less than that of the "Sunderland."

As first produced some few years ago the original "Flying Fortress" had four 1,000-h.p. Wright "Cyclone" motors which gave it a maximum speed of about 250 m.p.h. The effective range claimed was around 3,000 miles—say from London to Tripoli and back—and the service ceiling just under 6 miles. Bomb load is a variable factor dependent, among other things, on the amount of fuel carried. But it is safe to assume that the B.17 could carry 4 to 5 tons of bombs and ammunition on a round trip of 2,000 miles.

A feature of the design is the number of protective gun positions. Four of these were originally located in "blisters" on the outside of the fuselage, but later examples show gun turrets, similar to the British practice. Even so, the total gun power is not likely to approach that possessed by the latest versions of Britain's famous bombers, such as the turreted Wellington.

An improved "Flying Fortress," produced just before the war, had a cleaned-up external design, and a special super-charging system for giving greater engine power at heights above 20,000 feet. The resulting performance figures were not made known, but it may be assumed that the maximum speed of 250 m.p.h. has been improved upon.

A new bomber now being built by America is in a different category, and, so far as is known, really is the "world's largest."

This is the Douglas B.19, a 60-ton monster with a wing span of 210 feet—three times that of the Handley-Page "Hampden."

Four Wright "Duplex-Cyclone" motors, each of 1,700 h.p., are calculated to give this new Douglas bomber a speed of "over 200 m.p.h." The estimated range is 6,000 miles, roughly the distance from New York to Southampton and back. A "useful load" of 28 tons is quoted, including about 18 tons of bombs.

MASTERS OF MECHANICS

No. 62—The Remarkable Record of James Starley, Britain's Pioneer Bicycle Builder

THE enormous popularity and convenience of the bicycle at the present day is self-evident. Bicycles are popular because they provide cheap, healthful, trouble-free transport for the average man or woman. They are utterly reliable vehicles also, because the modern two-wheeler is throughout an engineering job upon whose design and creation has been expended the garnered knowledge and the accumulated experience of numerous clever brains and hands.

For the most part, bicycle-making at the present time is necessarily a mass-production business. Despite this fact, however, much of the old craft of cycle creation remains with the trade and certainly many of the old traditions of bicycle making are still associated with the industry.

Home of Bicycle

Coventry is well-known as the home of British bicycle building, it being in that town in the late 'sixties of the last century that commercial cycle construction was first begun. But in addition to Coventry, there is another place on the map of England to which the British bicycle industry owes much, and that little-known spot constitutes the secluded hamlet of Albourne, some six and a half miles south-west of Cuckfield, in Sussex, it being in a low-built picturesque cottage in this still remote neighbourhood that James Starley was born on April 21, 1830.

Starley! The name, to the modern student of mechanics and invention, has a definite flavour of bicycles, tricycles and other mechanical creations, more particularly, perhaps, in consequence of the fact that more than one Starley has been prominently associated with the British bicycle industry and because each Starley has contrived to enrich the industry with the fruits of his individual mechanical ingenuity.

The most celebrated of the Starleys, the most resourceful and ingenious of them, was, without a doubt, the famous James Starley, whose birth at Albourne, Sussex, has just been referred to. To him has been given, by common consent, the title of "Father of the Cycle Industry," an honour which his inventive and creative work in the gradual establishment of the British bicycle trade well merited. True, of course, there were others who assisted in the building up of what was at one time a British monopoly—cycle making, but it was James Starley who, in numerous instances, led the way, and he it was whose fertile powers of invention created a standard of excellence which others ever endeavoured to follow.

His Early Life

The lot of James Starley during his earlier life was a low and a humble one. Daniel Starley, his father, and John Starley, his grandfather, were hard-working farming men, and, naturally enough, "old Dan," as he was called, grim, gruff and be-whiskered, determined to have his four sons put to the profession of the plough at the earliest possible age.

James Starley, the youngest son of "old Dan," and the subject of our present memoir, began life by being a very much conscripted farm labourer. At a little Sunday school nearby, he managed, by dint of his quiek perception, to pick up the ability to read and write, but that meagre and haphazard schooling was all the official education which James Starley ever received.

James Starley, who was given the title of "Father of the Cycle Industry"

Young Starley took badly to work on the land. Indeed, in many respects, he was something of a "queer" lad. He had a strange habit of putting bits of things together and, by so doing, of bringing into existence all sorts of new and improvised contrivances. Instance, for example, his earliest "invention," which consisted of a mechanical rat-catcher for farm use, which he made out of an umbrella frame and which, to the surprise of all, worked successfully and simply decimated the rodent population of the farm buildings and outhouses in double-quick time.

The young lad, of course, had been born with what is usually called a "mechanical mind." There was nothing connected with farm "machinery" which he could not tackle for himself. He mended broken-down carts, wagons, gates, tinkered with refractory clocks and set them going, and, in all, contrived, so to speak, to poke his amazingly active fingers into any sort of mechanism which he could lay his hands upon.

A very early tricycle of Starley's time

Perhaps, old Dan Starley little understood the out-of-the-ordinary character of his youngest son. There may, indeed, have been a good deal of friction between the two at times. On this matter, however, all we know for certain is that James Starley, the son, was, one morning in the early part of 1846, directed by his industrious parent to undertake in a certain field that highly necessary but unavoidably odiferous agricultural task known to the farming community at large as "muck-spreading."

Off to London

Such land-manuring operations were not at all to the liking of the mechanical and inventive James. He stuck to his task, however, until half the day was over. Then, returning home, he got together a few personal belongings and, with hardly a word to anyone, he strode up to the great high road which led in the direction of that assumed city of fame and fortune—London.

How James Starley tramped all the way to London from his sheltered Sussex farmstead home is a long story and one which cannot very well be related in detail here. Suffice it for us to note that he reached Lewisham, to the south-east of the Metropolis, a few days later, a tired, hungry and foot-worn youth. At Lewisham, which locality was almost entirely agricultural in those days, he managed to find a job on a small strawberry farm. But soon after, the fruit-grower, noticing that he walked lamely, in consequence of his foot-soreness, instantly turned him off, paying him the meagre sum of 2s. 3d. and exclaiming: "We want no cripples here!"

Starley was more fortunate in his next job at Lewisham, which was one of a similar kind in a rival nursery. Here he stayed for about three months, after which he succeeded in obtaining a more important post as assistant gardener to a certain John Penn, a well-known foundry owner, of London.

Studied Industriously

It was during this portion of his lifetime that Starley's eyes were opened to the possibility of making good for himself in the world of mechanics and engineering. To fit himself for such a career he studied industriously. In his spare time, too, he scraped together a few extra shillings by repairing clocks and watches. In a small workroom which he fitted up at his lodgings, Starley worked out several inventive ideas which occurred to him. Among these may be enumerated an adjustable candlestick, a new type of window-blind and a baby's carriage which conveniently rocked itself by the movements of the infant occupant thereof. He also took to mending pianos, knife-cleaning machines, and other appliances. It was also, about this period, that, like many another active inventor, Starley

found a little time in which to enter into the bonds of matrimony, a process which he underwent in a little chapel at Lewisham on March 22, 1853, at the age of 23 years.

The first big advance which Starley obtained occurred when he left the service of John Penn in 1859 and entered into the employ of Messrs. Newton, Wilson & Co., sewing-machine manufacturers, who had premises in Holborn, London. Here his inventive faculties were allowed a fairly free rein, with the result that he improved the then prevalent mechanism for chain-stitching, as well as bringing out a special sewing-machine for hemming and for similar operations.

Associated with Messrs. Newton, Wilson & Co., was one Mr. Josiah Turner, with whom Starley became very friendly. Turner held a high position in the firm and he was one of the few who were shrewd enough to form a just estimate of Starley's capabilities.

The outcome of this friendship between Starley and Josiah Turner was that the pair relinquished their connection with the firm of Newton, Wilson & Co., and, after being joined by a third individual named Salisbury, they proceeded to Coventry, there to start on their own as sewing-machine manufacturers.

A Failure

It was Starley's first commercial and industrial venture. Nevertheless, it was not a successful one. The enterprise failed. Fortunately, though, Starley and Turner were able to reconstruct their business by means of locally-obtained capital. They now found themselves employees of a new company styled the "European Sewing-Machine Company," an organisation which afterwards became "The Coventry Machinists' Company," and, finally, "Swift of Coventry, Ltd."

In his new capacity, Starley at once gave himself over to the production of cheap and serviceable sewing-machines, inventing many new mechanical devices for the furtherance of his aims.

It so happened that Josiah Turner, who had now become manager of the sewing-machine concern, had, in Paris, a young nephew, Rowley B. Turner, by name. The wooden "boneshaker" bicycles which appeared in Paris in 1867 at once took the younger Turner by storm. He acquired one and quickly became proficient in riding it. Then he brought it over to England—incidentally, this was the first true bicycle to be imported into this country—took it to Coventry with him, and lost no time in disporting himself upon it before his amazed uncle and the ever-watchful Starley.

The younger Turner wanted his uncle's Coventry factory to begin the manufacture of such "velocipedes," as the earliest bicycles were popularly termed, not only for sale in England, but for export to France as well. Josiah Turner saw money in the notion and Starley was attracted strongly by the many mechanical problems connected with the proposed manufacture of the new two-wheeled vehicles.

Starley and Turner

To cut a long tale short, it was quickly resolved that the manufacture of the new "velocipedes" should be begun in Coventry under the combined ægis of Starley and Turner, Senior, and, in 1869, the first Coventry-produced "boneshaker" bicycle was completed.

It was a heavy, cumbersome thing, with a thick wooden frame and massive wooden-spoked wheels. Starley, in his mind's eye, saw the many defects inherent in the vehicle and forthwith gave himself over to the production of a bicycle which would be more adapted for ordinary and sporting use.

Only by a long and patient series of inventive steps did Starley ultimately accomplish his aim. First of all, he reduced the size of the rear wheel of the then current bicycle, at the same time making the front wheel larger and lightening the entire frame of the vehicle. In this manner

The once enormously popular Ordinary which James Starley evolved

he gradually evolved the at-one-time extraordinarily popular "high," "ordinary," or "penny-farthing" bicycle, as it was nicknamed, having a diminutive rear wheel and a front wheel of some six or seven feet in diameter, directly steered and pedalled by the rider, who sat almost above it.

Starley, too, made the first attempts at coupling two of these bicycles together, thus setting up a "tandem" machine. This vehicle, however, constituted one of the very few unsuccessful Starley inventions.

One of the side-by-side tricycles invented by Starley

The Ordinary

No sooner had Starley evolved the ordinary bicycle and established its manufacture in Coventry, than he left his old firm and, in association with a William Hillman, started up again in a dual partnership as a sewing-machine and bicycle maker. For various reasons the Hillman-Starley partnership was not a fruitful one, and ultimately it was broken up. Finding another partner named Smith, Starley then took over a new factory in Coventry for the production of his then very famous "Ariel" bicycle. Here he manufactured his "Ariel" bicycles, which had a six (and afterwards a seven) feet diameter front wheel and a strengthened, but nevertheless much lightened frame.

It was at this time, also, that Starley introduced into bicycle construction an entirely new principle—that of the "tangent wheel."

Previously the spokes of bicycle and, indeed, of all wheels, had run directly from hub to rim, each individual spoke forming a sort of radius line joining the centre and the circumference of the wheel. There were limitations, Starley saw, in such a "direct" spoking system. Accordingly, he brought out his own particular spoking system in which the spokes ran off at a tangent from the hub flanges of the bicycle wheels and, by so doing, gave additional stability to the latter.

There were, of course, contemporary manufacturers who lost no time in condemning Starley's tangential spoking system and who refused to countenance it in any respect. Nevertheless, Starley persisted in it, the result being that nowadays all bicycles and other wire-wheeled vehicles, are tangentially spoked.

Another very popular invention of Starley was the "Coventry Lever" tricycle, a machine which was subsequently adapted into the highly-successful "Rudge Rotary" tricycle. Riding this vehicle, the tricyclist sat between two smaller wheels arranged one in front of the other and a larger wheel. The machine was at first lever-driven, but subsequently a chain-drive was incorporated into it.

Convertible Sociable

Subsequently came from the fertile mind of Starley the "Convertible Sociable," a four-wheeled machine made for two riders seated side by side. It was for this machine that Starley invented the highly important principle of the differential gear, by means of which a four-wheeled vehicle is enabled to turn corners readily and safely. The original differential gear patent of Starley was taken out in 1877. Unfortunately, its inventor did not live long enough to see the principle of his ingenious yet simple differential mechanism applied to the motor car and thus become of universal usage.

In 1880, Starley was at the height of his career. He had been experimenting with a type of folding tricycle which could be stored in a small space, and, in fact, his very last patent (granted in the spring of 1881) was for a vehicle of this nature. But towards the end of the former year, the inventor fell a victim to a malignant disease. It slowly but surely gained the better of him. When the following Easter arrived, Starley was bedridden, and a few weeks later—on June 17, 1881—Starley was no more, having died at the comparatively early age of 50 years.

There is an imposing memorial to James Starley in Coventry. It stands on the Green just outside the railway station, and it was unveiled by the Mayor of Coventry three years after the famous inventor's death. The City of the Three Spires has long acknowledged its abiding debt to Starley, and, it is said, the personal tradition of the man himself still lingers on within some of the older workshops and factory corners of Britain's celebrated "cycle-opolis."

"MOTILUS" PEEPS INTO THE MODEL WORLD

Some Fine Examples of Scale Models

Fig. 1. A fine model of a Dennis Dual-Purpose Fire Engine.

WITH this number we start on another year and your editor has again kindly asked me to continue my monthly feature, which, despite the war, I hope to make as interesting as possible.

Variety is said to be the spice of life, the model hobby having enormous variety, and I hope that you will find this characteristic maintained in future contributions.

Model makers claim, when speaking of the progress of the steam locomotive, that the first steam locomotive was a model one, built by William Murdoch, who invented gas lighting. The first recorded steam engine was Richard Trevithick's Penydarran tramway engine of 1803. Murdoch, who produced his locomotive in 1784, entered the service of Boulton and Watt, and this brilliant trio of engineers was largely responsible for the early developments of propulsion by steam. You will no doubt recall the story of Murdoch's locomotive, how the worthy vicar was frightened out of his wits, when the inventor tried his locomotive, one dark evening, on the church path at Redruth in Cornwall!

Murdoch's Road Locomotive

Here is an exact scale model of the Murdoch locomotive (Fig. 2) made by Mr. E. W. Twining, with an overall length of 18 in. It has one cylinder with a diameter of ¾ in. and a stroke of 2 in., and the driving wheels' diameter is 9½ in. One of the 9½ in. wheels is fixed on the cranked axle, and the other is loose, to facilitate taking curves. A small wheel (4¾ in. diameter) is swivelled, and is moved by a tiller for steering. The model, it must be remembered, was intended for running on the road, and *not* on rails. The boiler, of copper, was square and had an internal flue, and the fuel used was methylated spirit.

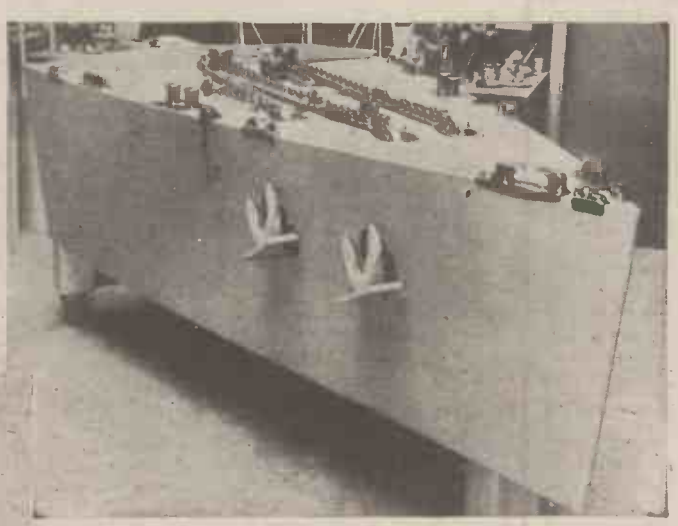


Fig. 2 (below) A scale model of Murdoch's locomotive.

Models for Training Purposes

The daily press is constantly referring to the use of models in the training of the Royal Navy, Army and the R.A.F., on manoeuvres, for "spotting," in transport, camouflage and A.R.P. work, and here is a training model made by Bassett-Lowke, Ltd., of the forecastle of a battleship (Fig. 3). Much of Britain's seafaring knowledge is imparted to her sailormen firstly on dry land, and these models, used at the various training establishments of the Royal Navy, teach several practical points, as, for instance, how anchor is dropped and weighed, how cables are laid out and stowed, the layout of the deck gear and its working, and in this manner a thorough knowledge of a vessel is built up, before going on board "the real thing." Other models of vital parts of a ship are made for this comprehensive training of the war-time Royal

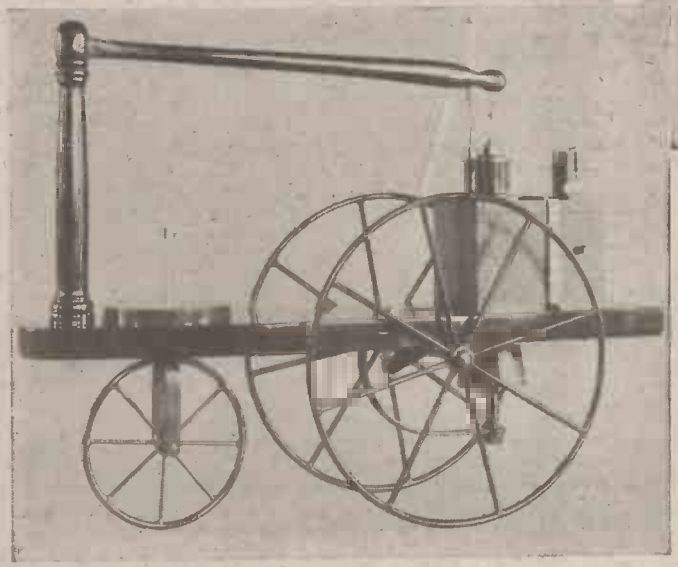


Fig. 3 (above) A model of the forecastle of a battleship, used for training purposes.

Fig. 4. A realistic "0" gauge model L.M.S. 2-6-2 tank loco.

Navy—the mast, for example, and the bridge and steering gear. At a Royal Naval Cadet College, besides their specialised naval training, cadets receive a full general education, stay for three years and two terms at the college, besides doing a further two terms on a training ship. This is a Navy "school" one might say, and the fine method of training our naval officers is even more apparent under war-time exigencies, and models of this type are a valuable aid to the instructors.

An Old Model Fire Engine

Visiting some friends at Charlbury in Oxfordshire the other week, I discovered that one of the sons, now grown up, was in his youth an ardent model fan, and knowing my interest in models, nothing would satisfy him until he had ascended to the lumber room—or, more politely, that room in all houses where relics of the past are stored—and fetched down several interesting old models. Firstly, there were some small steamboats made in tinplate, with a simple boiler and oscillating cylinder made of white metal, with a brass piston, for low pressure steam. These were quite interesting "fossils," but what took my fancy most was an old model fire engine, made by a Nuremberg firm of toymakers (now extinct), and I should think it is about 50 years old. It bears some resemblance to the steam fire engine of that period, the steam boiler with the two oscillating cylinders driving a pump which drew water from the body of the engine and an air vessel giving a steady jet from the hose.

It has not been possible yet to give a working demonstration of this model, but I am hoping to find or make some suitable parts soon, so that it can be kept as a museum piece.

Modern Fire Engine in Miniature

In contrast to this, we look at a model of a Dennis Dual Purpose Fire Engine (Fig. 1), finished in the vivid red of the L.C.C. London Fire Brigade, and one of the most modern types of fire engine and escape now in service. This is a very fine piece of machinery, as will be seen from the model, the prototypes of which are now very much in use in the fire-fighting of London and other bombed cities. This Bassett-Lowke model had the approval of the makers of the prototype, Messrs. Dennis Brothers. Wheels are hand-made in metal with special rubber tyres and seats are upholstered with leather spring cushions, and everything from the tiny detail of the intricate pumps to the large erecting wheels, is the "essence of realism," except that the model is, of course, a glass case exhibition model and not a full working one.

Gauge "O" L.M.S. Tank

Despite the war, I am very pleased to see that firms in the model trade are still "going strong," or as strong as the war will let them, which is approximately half their peace-time production. Not only this, but I have actually found a new model in gauge "0." Our readers are familiar with the popular 2-6-4 tank in L.M.S. colours, which has been available in clockwork and electric for some two to three years, but now comes the innovation of an L.M.S. 2-6-2 tank (Fig. 4).

A note on the prototype. Since 1930 a considerable number of tank locomotives of the 2-6-2 type have been in use on the L.M.S. system for the lighter suburban services. Nos. 1 to 70 have parallel boilers, and the remainder have the tapered boilers so familiar on this railway since the beginning of Mr. Stanier's regime. They are in use in London suburban areas, and also in the Midlands. A few of the engines have been fitted with condensing gear, and the brake tripcock for use in connection with the automatic signals over the Moorgate extension. These engines have outside cylinders with Walschaerts valve gear, which is reproduced in our model. A notable feature is also the design of the bunker which is carried up higher at the rear end to provide a clear look-out when the engine is running bunker first. Those who have gauge "0" railways, and especially those who are keen on L.M.S. types, will want to include this model in their locomotive stud.

Model N.Y. Central Locomotive

My incoming mail from overseas brought me an attractive set of photographs of a ¾ in. scale American Hudson type locomotive (Fig. 5), belonging to Mr. B. E. Shrive, of Hamilton, Ontario. A few of the details supplied to me. I am sure, will be of interest to readers. It is slightly over 6 ft. in length, and is exceedingly powerful, having quite easily hauled at high speed 15 adults. The engine is complete with working brakes and power reverse gear, duplex mechanical hand pump and injector for boiler feed, two mechanical lubricators, rotary type throttle in smokebox, four-unit superheater and combustion chamber, working electric head, marker and cab lights. Engine and tender in working order weigh nearly 300 lbs. Cylinders are bronze, pistons and piston valves are monel metal, and are all fitted with rings. The tubes, with the exception of the four superheater flues, are only ¾ in.

Fig. 5. A ¾-inch scale model of a N.Y. Central 4-6-4 loco.

outside diameter (32 of them) and the boiler is an excellent steamer under all conditions. With the use of good clean Welsh coal the owner has had no trouble with fouling of tubes, in fact, it has not been necessary to clean them yet, and at the time of writing the engine had been operated for about 150 hours under steam. Good going!

A Fine Model Air Liner

From various sources I have heard that the New Zealand centennial exhibition was a great success, and although the news of it has been overshadowed by the war, New Zealand was well pleased with the exhibition, and also the display in the British Government Pavilion. Models, as usual, played a large part in the exhibits, which included a history of the British locomotive, and also the history of British civil aircraft. Here is a model "Armstrong-Whitworth ENSIGN" (Fig. 6), one of the series on view at the exhibition. The Ensign was the first of 12 new Armstrong-Whitworth monoplanes ordered by the Imperial Airways for European and Empire service, before the war. The machine, an all-metal one, is a high-wing monoplane with a wing span of 123 ft. It weighs 20 tons fully laden, and has a very large retractable undercarriage. Forty-two passengers could be comfortably accommodated in the European class, and 27 passengers in the "Empire" design. Now, of course, the machine is camouflaged and has red, white and blue markings on the wings, fuselage and tail.

Fig. 6. A fine scale model of an Armstrong-Whitworth "Ensign" four-engined monoplane.

Our Busy Inventors

A Horse of Parts

A PALÆONTOLOGIST is a very learned gentleman who, from the fossil of a foot, can build up a dinosaur, a mastodon or some other prehistoric monster. The ingenuity of an inventor has now made it possible for even a common or garden person to take a toy waggon and thereupon to erect a rocking horse. A number of parts—each a separate toy—may be assembled by simply placing them together without the use of screws, nuts or hooks.

This conglomerate "gee-gee" is formed à la Meccano or on the principle of a jig-saw puzzle. The individual toys employed include, in addition to the waggon already mentioned, a table, a rocking chair, a motor car, a boat and a footstool. The toys are quite as useful as the final rocking-horse, and, in their separated condition, provide playthings for a number of youngsters. The parts can be bought separately and in any order desired.

Judging by the drawing of the completed horse, it is not a thing of beauty. Being fabulous in appearance, it is qualified for mythological rather than zoological gardens. It will, nevertheless, greatly intrigue the juvenile equestrian. And, assuming that it invariably preserves its integrity—that is to say that all its parts "stay put"—it will prove a decided acquisition in the nursery.

The creator of this extraordinary specimen of natural history is a subject of Denmark, from which one would expect to emanate not a rocking horse but a great Dane.

Duck and Douche

IN an old-world garden a lily pond may now have upon its grassy shore a mechanical relative of Donald Duck. This is an enamelled duck made of rustless steel which, when on active duty, rotates its head vigorously while it sprinkles the lawn from holes in its bill. Before it commences to sprinkle, the bird is filled with water by means of a standard hose connection in its side. The weight of water in its interior gives it sufficient gravity to keep it in its place. Apart from its utility, the duck is a novel ornament for the lawn.

Glow-Wall

THERE has recently been patented in the United States a luminous brick wall construction. The wall is composed of hollow sealed blocks of light-transmitting material. Enclosed within the bricks is a gaseous atmosphere adapted to be rendered luminous by the passing of an electric current through it. This is achieved by means of conductors entirely within the wall, so that the wall on both sides presents a smooth surface.

I have been in a room with walls completely coated with luminous paint. But the new illuminated bricks will constitute a glowing wall whose luminosity is continuous.

Folding Scaffold

IN the days of Queen Victoria it was a familiar sight to see the housemaid seated on the sill with her back to the public, industriously polishing the window panes. Then there appeared on the scene that peripatetic lapidary—the professional window cleaner. He carries a ladder but a new device may better serve his purpose. This is a variation of the suspended platform known as a travelling cradle, which is used when lofty buildings are cleaned and painted. Useful in glazing, painting, puttying, etc., this scaffold weighs only 23¼ lbs. It is claimed that with perfect safety it supports a workman and material up to a weight of 500 lbs. Rubber-padded sill-clamps fasten inside the room, while braces hold the scaffold against the outside wall. If desired, it can be converted into a sling to be suspended from the roof. And, in order conveniently to be carried, it can be folded.

Outstanding Pictures

A THREE-DIMENSION picture is the subject of an application accepted by the British Patent Office. The effect of the invention concerned is that optically produced by a stereoscope, which causes the figures in a picture to appear in relief.

The method employed comprises adhesively securing the picture to a back sheet of pulp, cardboard, plastic material, cork, etc. For the purpose of protection, the surface is covered with a transparent cellulose sheet. The back of the picture is then pressed in order to impart to the front permanent convexity in all directions. As a consequence the picture literally stands out.

Twin Thermometers

A REPRODUCTION of the Siamese twins has lately appeared on the chequered stage of this world. Simultaneously there have been introduced conjoint twin thermometers. Located inside the house, these thermometers record both the indoor and the outdoor temperature. A metal tube outside, connected with one of the thermometers by a piece of fine tubing, is the secret of indicating within the house the external temperature.

Accommodating Atlas

WHILE the war of 1914-1918 was in progress, a commercial house in London exhibited this slogan: "Business as usual during alterations to the map of Europe." Again the map of that unstable continent is subject to impending revision. To allow for variations, a firm in Geneva have published a loose-leaf atlas. This will permit the insertion of new maps necessitated by the vicissitudes of war. It is an irony of fate that such a publication should be issued in a city which is the headquarters of the League of Nations.

Remedy for Rheumatism

WHEN Pandora opened her box and allowed all the ills to which flesh is heir to escape, one of the most distressing and ubiquitous was rheumatism. The legion of alleged remedies for this complaint has gained another recruit. It is not new to give to the human body combined treatment with electric light rays and electro-magnetic radiations. An application to patent in this country an improved apparatus of this kind has been accepted. The inventor claims that treatment by means of the new apparatus has been proved more effective in the case of affections of the tissue and bones, such as rheumatism and rheumatoid-arthritis, than any treatment of a similar type.

According to this method, a light beam is passed first through an electrical field produced by passing current of an appropriate voltage through horizontal and suitably shaped conducting wires. The beam is then caused to traverse a grid member through which short-wave impulses are travelling, and is finally directed on to the part of the body requiring treatment.

For the Sheltered Life

YET another air-raid shelter has made its debut. The inventor has set before himself a construction adapted to be easily and quickly erected and to be considerably cheaper than shelters of metallic construction.

The newcomer consists of pre-cast reinforced concrete front, back and side sections and an arrangement for doors and ventilators. The shelter has a pyramid-shaped roof. In order to incline towards the roof, the front, back and side sections taper somewhat towards the upper end. They stand upon a pre-cast reinforced concrete base and they may be bolted together.

City of the Sea

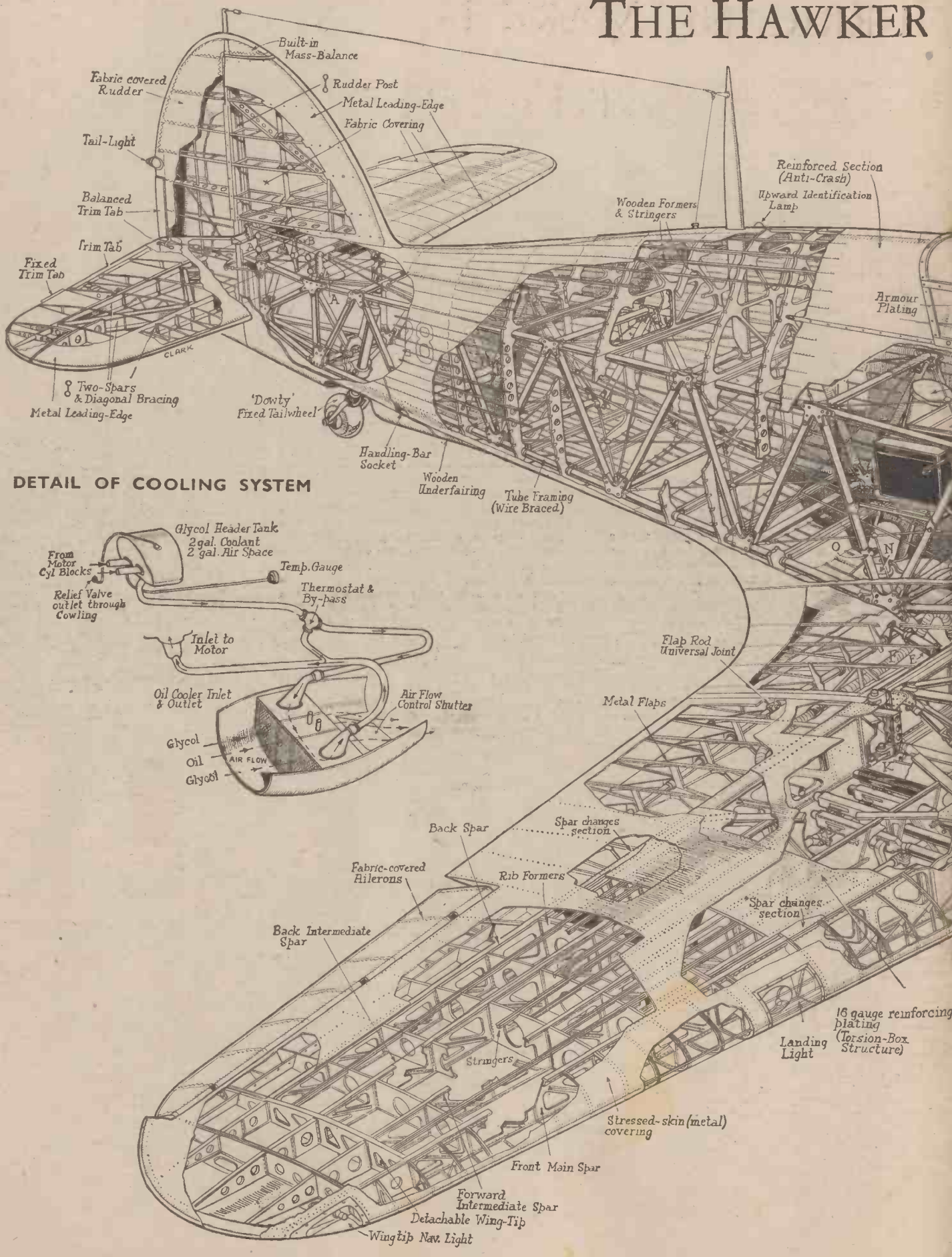
A SHORT film has been released showing the marvels of the "Queen Mary." It is called "The Floating City." This title is by no means new; it was given to the translation of a novel by Jules Verne—that prince of scientific story-tellers. The tale concerns the "Great Eastern," the huge steamer planned in 1852 by Sambard Brunel and Scott Russell. The original scheme was for a ship to accommodate 1,000 passengers, 5,000 tons of goods and 15,000 tons of coal. Eight engines were estimated to work up to 11,000 h.p. However, the plans for this leviathan were never fully carried out in all their details, owing to numerous alterations and re-fittings.

After a somewhat disastrous first voyage, the "Great Eastern" crossed the Atlantic from Southampton in 11 days. She made a number of other voyages but did not prove a success. Eventually she was utilised in laying the Atlantic, Mediterranean and Red Sea cables. Finally, she was sold by auction at Liverpool in 1888 to be broken up. The five days' auction realised £58,000.

Queering the 'Quake

TURKEY and Rumania during recent months have both suffered terribly from the ravages of earthquakes. It is affirmed that the ill effects of earthquakes can largely be guarded against by specially constructed houses. In view of these anti-earthquake dwellings, an American, referring to a region by no means immune from seismic wobbles, has sent out this invitation, "Come to California and enjoy an earthquake." Ensconced in one of these firm abodes—it might appropriately be styled a stable—the happy resident can smile placidly while Dame Nature appears to shake a cocktail.

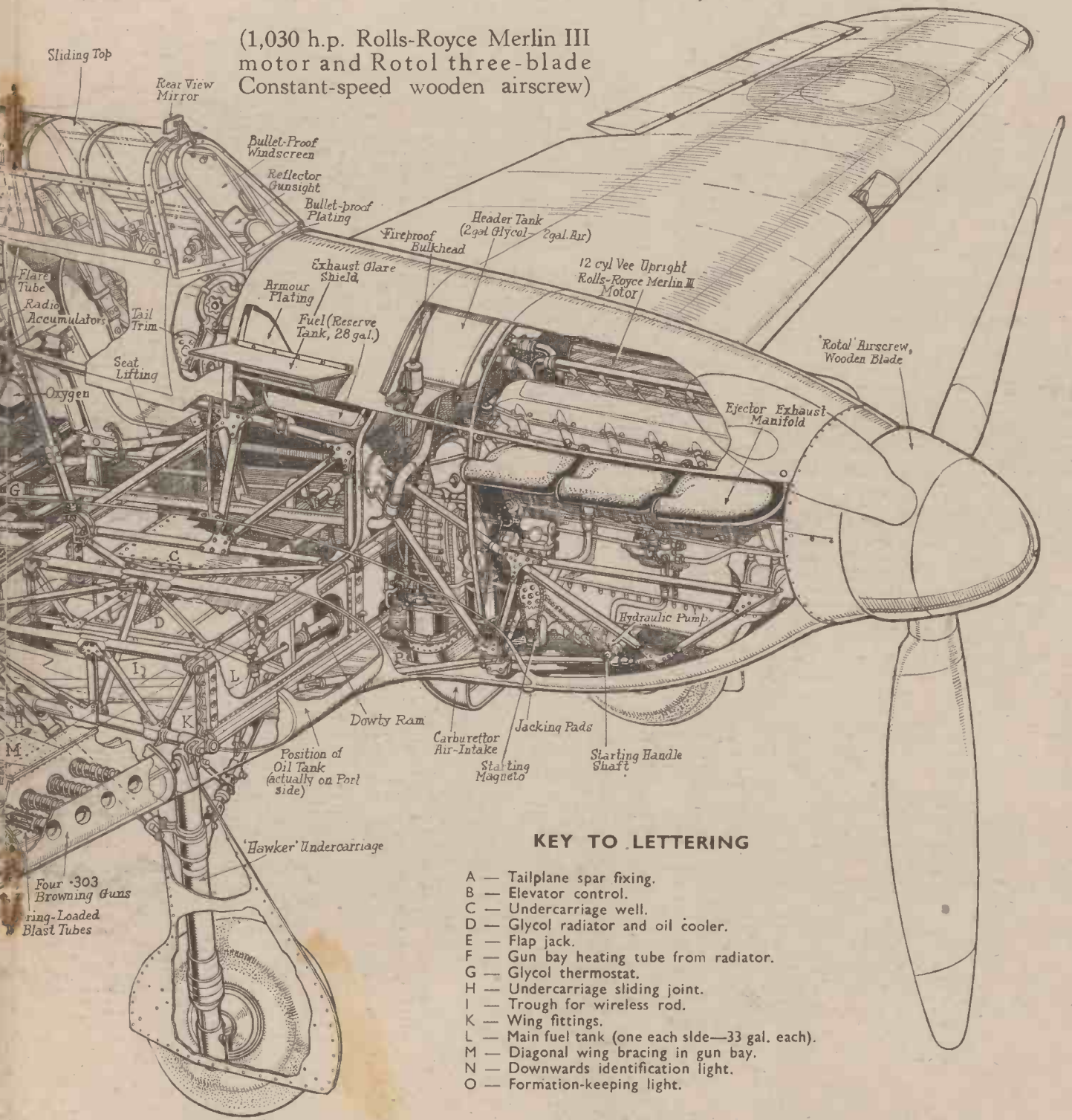
THE HAWKER


Built-in Mass-Balance
Fabric covered Rudder
Rudder Post
Metal Leading-Edge
Fabric Covering
Tail-Light
Balanced Trim Tab
Trim Tab
Fixed Trim Tab
Reinforced Section (Anti-Crash)
Upward Identification Lamp
Wooden Formers & Stringers
Armour Plating
Two-Spars & Diagonal Bracing
Metal Leading-Edge
'Dowty' Fixed Tailwheel
Handling-Bar Socket
Wooden Underfairing
Tube Framing (Wire Braced)
DETAIL OF COOLING SYSTEM
Glycol Header Tank 2 gal. Coolant 2 gal. Air Space
From Motor Cyl Blocks
Temp. Gauge
Relief Valve outlet through Cowling
Thermostat & By-pass
Inlet to Motor
Oil Cooler Inlet & Outlet
Air Flow Control Shutter
Glycol
Oil
Glycol
AIR FLOW
Flap Rod Universal Joint
Metal Flaps
Back Spar
Spar changes section
Fabric-covered Ailerons
Rib Formers
Spar changes section
Back Intermediate Spar
16 gauge reinforcing plating (Torsion-Box Structure)
Landing Light
Stringers
Stressed-skin (metal) covering
Front Main Spar
Forward Intermediate Spar
Detachable Wing-Tip
Wing-tip Nav. Light

HURRICANE MARK I

(SINGLE-SEAT FIGHTER)

(1,030 h.p. Rolls-Royce Merlin III motor and Rotol three-blade Constant-speed wooden airscrew)



KEY TO LETTERING

A — Tailplane spar fixing.
B — Elevator control.
C — Undercarriage well.
D — Glycol radiator and oil cooler.
E — Flap jack.
F — Gun bay heating tube from radiator.
G — Glycol thermostat.
H — Undercarriage sliding joint.
I — Trough for wireless rod.
K — Wing fittings.
L — Main fuel tank (one each side—33 gal. each).
M — Diagonal wing bracing in gun bay.
N — Downwards identification light.
O — Formation-keeping light.

HOME MOVIES

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

NEWS AND COMMENTS

New Gebescope Address

THE Gebescope library is now functioning from a new home—Tower House, Woodchester, near Stroud, Glos. Urgent orders for films may be telephoned at any hour of the day or night, to Amberley, Glos., 194.

Governor Speeds

THE mechanically minded owner of a cine camera often wishes the makers would tell him more about its "works," a wish that is gratified to a notable extent in a recent Filmo publication, wherein is described some of the precision test and calibration work done on the new B. & H. "Auto Master" turret-head camera. From this we glean one fact which interests us much—the speed at which the governor runs. This turns out to be the high rate of 10,000 r.p.m. It must be a beautifully balanced little device to turn so fast yet maintain the silence and smoothness characteristic of this camera.

Moscow Methods

ONE hears so much of the exact control, by densitometry, of the output of the bigger Hollywood laboratories, that it is quite refreshing to read that in the Moscow "printing factory" the sound and picture images are "inspected by projection" without determination of density or gamma.

Club Magazine Hint

"MOVIE NEWS," organ of the Australian Amateur Cine Society, is meeting problems of the day by charging sixpence for itself. Seems a lead worth considering—most members would rather pay a small charge like this than see their club paper disappear. (And higher costs now demand some such drastic remedy.)

B.F.I. Report

A SCARCELY expected result of the war is revealed in the latest annual report of the British Film Institute: there has been such a demand for film programmes for adult and juvenile evacuees, that some six hundred films a month are now dispatched.

The report also mentions an interesting discovery—of the only existing copy of the film record of Queen Victoria's Diamond Jubilee. This film, and many others of the greatest historical value, is now in the new temperature controlled storage vaults of the B.F.I. "somewhere in the country."

Another item which interested us was a mention of a new optical printer acquired by the Institute. This machine specially made for the work, enables old films with non-standard perforations or other departures from present practice to be copied on modern stock for library purposes.

Bedford Venture

CONGRATULATIONS to Mr. C. E. S. Robbs (Greenhill Cottage, Renhold, Bedford) on his pluck in undertaking the formation of a cine society for his district. Will anyone interested please get in touch with him? Such enterprise in these difficult times deserves every possible support.

PLACING THE "SECONDARY INTEREST"

IT is true that a well-arranged shot contains only one point of major interest, but that is not to say it should not contain any points of secondary interest. On the contrary, very often it *should*. Where the object of major interest is not such as to absorb the whole and undivided attention of the audience it is just as well to give them something else to glance at in the intervals of watching the actions of the principal subject.

The question then is, where to place the object of secondary interest in the frame, so that it may play its part and be seen without actually competing for attention with the main subject. The answer must depend on circumstances. Bear in mind that in general the nearer an object gets to the centre of the picture the more attention it attracts, and you will be on the track of some useful rules; if your secondary subject is a noticeable and prominent object, keep it well away from the centre, or it will steal the picture. On the other hand, if it is an inconspicuous object you had better bring it in a little nearer to the centre (by adjustment of camera angle), or the audience will scarcely notice it. If it is a really prominent object, which needs keeping well in check, not merely should the angle be chosen to put it well out towards the limits of the frame, but the camera position should be fixed to bring the main object nearer the lens than the secondary one.

If you have any time left after giving due consideration to these points, a little care for the compositional balance of major and minor objects will not be wasted. Audiences do not consciously assess these things, but they certainly appreciate a well-composed shot without quite knowing why.

Compositional balance is a thing you can learn to feel instinctively. Indeed, it is difficult to handle any other way; there are rules about it in the books, but in the end they are mostly of less help than a carefully cultivated *feeling* for balance. The great thing is to remember that there *is* such a condition as visual balance possible between items in the picture, and to try and reconcile this with the rules given above when it can be done.—L. J. Morton.

Point about composition: If your object of secondary interest is small and looks like being overlooked, put him or it nearer the centre than the object of primary interest.

LONG THROW OR SHORT?

GIVEN the choice, would you vote for projection in a long room with the screen a good way from the lens, or a smaller room and a shorter "throw"? (Assuming such a choice of projection lenses that in each case the picture appears the same size to the audience.)

There must be a good deal of "for and against" in any answer to that question. The long throw has the advantage that the audience can be grouped so that they all see very much the same size of picture, since their slight differences of position are negligible in comparison with the length of throw.

With the shorter throw it is usually impossible to avoid having some members of the audience so much closer to the screen (in proportion) than others that they have quite different viewing conditions. If conditions are right for them, they cannot be right for the others.

That is a point in favour of the long throw, in conjunction with a lens of one of the greater focal lengths to keep the size of the picture within bounds. Another is that under these conditions the focusing is less critical and hence needs less watching during the run of the film.

On the other side of the account must be set the fact that the longer focus projection lenses tend to be less efficient from several viewpoints. It is very much easier to make lenses of large aperture and good definition in the shorter focal lengths, and that means that as a general rule these lenses tend to give a better combination of picture brightness and crispness, though the difference, when comparing the best specimens of each type, is but slight.

A minor point in favour of the short throw is that it is less affected by smoke and dust in the air. Under really "fuggy" conditions there can be a perceptible dimming of the picture when the throw is long. Ventilation is the best cure for that, to be sure, but under black-out conditions is not always easy.

Then there is the question of light. There can be no disputing the fact that the smaller picture seen from a shorter distance will appear the brighter, and this must be an overriding consideration when the projector is of somewhat limited power. In those cases the best conditions will be provided by the shorter focus lens, and a modest throw to keep the picture size within bounds.

QUESTIONS ANSWERED

Where can I get movable letters for titling? So many of the familiar brands seem to have disappeared.

Subject to supplies holding out, felt letters of the usual sort can still be had from such firms as Camera Craft, Amateur Cine Service, and Dallmeyer. Some of the bigger dealers like Wallace Heaton, Westminster Photographic Exchange, etc., may also be expected to have in stock limited supplies of various types of letters whose manufacture or importation has now ceased.

An Iris for Making Fades

Can I alter an old "still" camera iris diaphragm for use as a fader in front of my cine lens?

Depends on the construction of the particular iris. In some it is safe and easy to remove a certain stop pin and thereby enable a complete closure to be effected when completing the fade, but examination alone will decide whether this is so in any particular case.

More Realism Wanted

I have made some "shipwreck" scenes with a small model, and although I took a deal of trouble, and shot in the approved manner at 64 frames a second, so as to make the small model appear to move ponderously, I want suggestions for adding a touch of realism.

Whenever models are used, the whole secret of plausibility lies in the artful inter-cutting of full-scale shots to suggest reality. Thus, if a shipwreck is the subject, the sequence can be given an entirely new atmosphere of convincing realism by the simple expedient of mixing in with the model shots of the vessel on the rocks a few "inserts" of, say, a dishevelled mariner clinging to some "rigging" or a spar. (This shot can be at an upward angle, hence can be done, with sky background, in one's own back garden.) Better still, if practical considerations do not forbid, let the inserts be of one or more "sailors" clinging to floating wreckage. That may be more difficult to manage at this time of year, of course.

Notched Films Dying Out?

I am told that the "notched" 9.5-mm. film is no longer being supplied. Why is this? I thought the notching idea was an excellent way of saving footage.

It is not strictly correct to say that the notched film is dead, but it appears to be dying. The idea of halting the film for a few seconds while a title is read certainly saves much film, and enables a longer projection time to be obtained from a given footage, but it is scarcely practical with the more modern and higher power projectors. The heat from these, even when suitable precautions are taken, is bound to have a harmful effect on the halted frame in time.

Getting a Moonlight Effect

I want to make a few short scenes to suggest a moonlight effect. Will it be enough to under-expose in daylight?

Only fair results will be obtained in this way, and it will be necessary to see that no sky is included in the picture. It is better to use also a red filter, choosing, if possible, a day with cloudless blue sky, then either stain or tone the film blue. Of the two methods, toning is best, because it results in a scene wherein the highlights are normal, but the shadows show a tinge of blue.

For blue toning, wash the film well, then immerse in a bath made up thus: Water, 10 oz.; ferric ammonium citrate, 24 grains; Pot. ferricyanide, 24 grains; glacial acetic acid, ½ oz.

Leave the film in this until the desired depth of blue tinge is produced (try a test strip first), then wash thoroughly, i.e., until there is no discolouration in the highlights.

Don't Clean Your Lens Roughly

Whatever I do now I always seem to get a greyish veil over my films and never obtain the bright, crisp results I had at first.

If the trouble is definitely chronic, and is always present in every shot, the likeliest cause is to be found in the lens. A very dusty condition can cause such effects, but few people would allow such an amount of dirt to remain on a cine lens. If proper cleaning with very soft material produces no improvement, it is to be feared that careless cleaning in the past has destroyed the finely polished surface of the lens. Correct methods in cleaning are vital. First remove all visible dust and dirt with the lightest possible dusting and wiping movements, then polish with a fresh surface of the cleaning material. Never polish with a soiled piece of cloth, bearing the dust which has just been wiped off, because almost any dust is sufficiently abrasive to damage the fine surface of optical glass. (It is softer than ordinary glass.)

Damping Out Projector Noise

My projector is rather noisy when standing on a hard surface like a table and is very unsteady if placed on a cushion. What do you recommend?

The remedy for this quite common state of affairs is a pad of some material which is sound-absorbing without being too soft; if too spongy it allows the vibration of the projector to "dither" the picture on the screen. A cork bath mat is one of the best dampers we know.

Figs. 1 and 4.—(Left) The Smoke Trick. The conjurer holds the cloth on his left arm, hiding the vase from view. The glass lid is held in his right hand. The vase contains a few drops of liquid ammonia, and the lid some acid. (Right) The secret move in a wine and water trick. The jug has a false bottom which holds a small quantity of acid

CHEMICAL MAGIC

Secrets of some Popular Conjuring Tricks Performed with Chemicals

By Norman Hunter
(The Well-known Conjurer of "Maskelyne's Mysteries")

Further Articles on the Secrets of Conjuring will appear Regularly and Exclusively in this journal

ONE of the most popular tricks in which chemicals form the secret means of performance is known as the smoke trick. The performer shows a clear glass vase with a lid. The vase and lid are entirely transparent and quite empty.

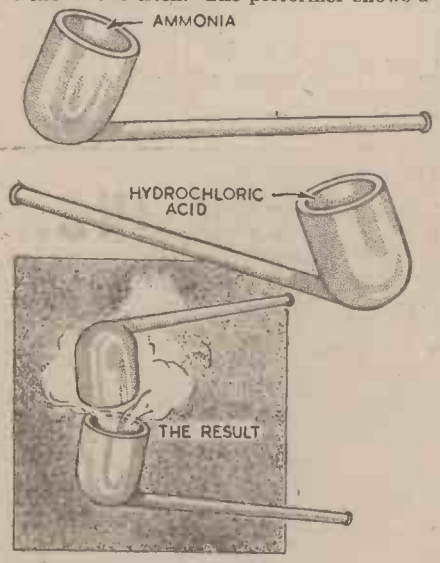


Fig. 2.—How a smoke trick is performed with two clay pipes

He puts the lid on the vase and throws a cloth over it. Going to the other side of the stage he then smokes a cigarette, puffing and fanning the smoke towards the vase. When the cloth is removed the vase is seen full of dense white smoke, which comes rolling out when the lid is lifted.

The smoke in the vase is not tobacco smoke. It is a white vapour produced by the mixture of two chemicals, ammonia and hydrochloric acid. To prepare for the trick, about half a teaspoonful of liquid ammonia is put into the vase and a similar quantity of the acid is put into the lid. The vase is put on one table and the lid on another at the opposite side of the stage, the lid, of course, being upside down. There is not sufficient liquid in either piece to be visible even at short notice, particularly as both chemicals are transparent and practically colourless.

Preparing the Trick

The vase is shown first and replaced on the table. The lid is now taken in one hand and the cloth in the other. The next movement is important. If the lid were put on the vase in the ordinary way the two chemicals would start producing the white vapour and it would be seen, thus giving the trick away. The conjurer stands with his left side to the audience, holding the cloth in his left hand and the lid in his right. As he brings up the lid to put it on the vase,

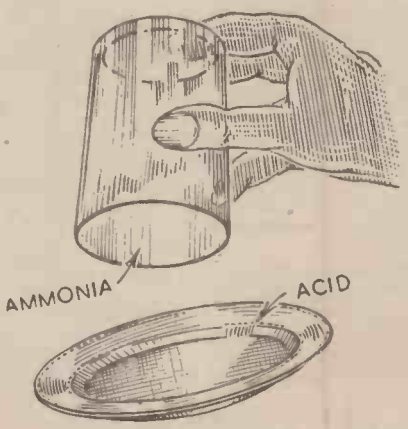


Fig. 3.—Another variation of the smoke trick for which a tumbler and saucer are used

he also brings up the cloth and the vase is covered at the same time as the lid is put on. This means, as shown in Fig. 1, that the cloth hides the vase from view as soon as the lid is near enough for the chemical action to begin. The rest of the trick is simply showmanship.

Another Version

Fig. 2 shows another version of the same trick. In this case two empty clay pipes

Fig 5.—How a false bottom is formed on a jug for a simple wine and water trick

are shown, placed bowl to bowl and smoke produced. The acid is in one pipe and the ammonia in the other, only a few drops of each being required so that the bowls of the pipes are merely moistened with it. Whenever the pipes are put bowl to bowl the white vapour will start to form. To give the impression that it is tobacco smoke, the conjurer works the trick by apparently smoking the pipes. He is careful, however, not to draw any of the vapour into his mouth but to blow through the pipes so that the smoke is gently expelled.

Yet another method is to use an ordinary tumbler to contain the ammonia and a saucer for the acid. The tumbler is inverted in the saucer and covered in the same way as described for the covering of the vase and again the smoke is formed. Or a china beaker may be used and the covering cloth dispensed with.

Wine and Water Tricks

Wine and water tricks are another favourite form of chemical magic, though this type of trick is frequently performed by methods that do not involve the use of chemicals.

Here is an easy chemical wine and water trick. You need a jug and six glasses. Fill the jug with water. And I had better mention now that whenever water is used for a chemical trick it is always safest to use distilled water. You can get a large bottle of it quite cheaply from any chemist and it is more reliable than tap water which itself usually contains chemicals that may upset the action of the trick. Into the jug put about a saltspoonful of tannin and stir until dissolved. Prepare the glasses as follows :—

Glass No. 1—No preparation.
„ „ 2—A drop or two of perchloride of iron.
„ „ 3—No preparation.
Glass No. 4—As No. 2.
„ „ 5—Twelve drops of oxalic acid solution.
„ „ 6—Ten drops of strong liquid ammonia.

Working at first with the first four glasses, you pour out clear water into the first but the second becomes apparently ink. The third is clear again and the fourth is ink. You then pour all four full glasses back into the jug and the result is a jug full of ink.

Now pour out another glass or two, using some of the first four glasses and the result will be ink each time. When, however, you pour into the glass containing the oxalic acid the ink in the jug turns back to water again. Pour out a glassful of the ink into glass number six, with the ammonia in it and you get red wine. Pour all the lot back into the jug and the contents appear deep red, like wine.

If you have another glass or glasses, in each of which has been placed an eggspoonful of sulphuric acid, you can convert the red liquid in the jug back to clear water again. Remember, however, that none of the liquids in the trick is drinkable, nor must any of them be even tasted.

A Weak Point

There is one weak spot in this trick, as there is with most feats of magic which depend solely upon chemicals for their effect. It is rather obvious that the results have been achieved by chemical means. This, for most professional conjurers rules out the entirely chemical trick and leads performers to introduce some feature which seems to preclude the possibility of chemicals having been responsible.

Fig. 4 shows the secret move in a wine and water trick which, although performed with the aid of chemicals, does not seem to be possible even with this explanation.

One glass and a jug of water are used. The performer pours water from the jug and it turns apparently to stout. He drinks some, or at least pretends to do so. He then pours the stout back into the jug and all the liquid turns to burgundy. He pours the liquid from jug to glass and back again several times. Then, saying that after all water is the best drink (good gag this for temperance concerts) he calmly pours out into the same glass, a glass of clear water.

The Secret

People who have concluded that chemicals are responsible will be well puzzled at the sudden final change of colour when no fresh glass has been used. Here is the secret.

The bottom of the jug is prepared so as to leave a cavity capable of holding a few drops of liquid. The opening of the cavity is immediately below the handle. Fig. 5 shows a simple way of faking the jug for this purpose. Two discs of celluloid or other transparent substance are cut to the same size as the base of the jug. One of these discs should be as thick as possible and from this disc a piece is cut as shown. The two discs are now cemented with waterproof cement to the bottom of the jug with the cut disc between the other disc and the jug. A small cavity is thus formed into which liquid can be put with a fountain pen filler. The cavity must be fairly wide otherwise the liquid will not run out easily, owing to pressure of air.

Coloured Liquids

To prepare for the trick, the secret cavity has inserted into it a little solution of tartaric acid. The jug is then stood on the table with the handle side of it resting on a small piece of wood so that the jug is slightly tipped forward and the liquid does not run out. The jug itself is filled with water in which has been dissolved a good amount of carbonate of soda. The tumbler contains about a teaspoonful of phenolphthalein.

Pick up the jug and the glass, one in each hand. Take care to keep the jug always slightly tilted towards the spout. Pour liquid into the glass. The result will be a liquid which is actually deep red, but it will be so dark, if the right amount of chemical has been put into the glass, as to appear black, like stout. When this is poured into the jug it becomes diluted and appears red. Pour the liquid backwards and forwards a few times, then while talking simply move the jug over the glass while the latter is empty and tilt the jug backwards so that the concealed acid runs into the glass. If you now pour out a glass of the liquid it will instantly become colourless again.

Most of the practical recipes for various changes of wine to water and ink to water and vice versa have already been published in various inexpensive handbooks so I do not propose to go into these at length here. But I should like to explain some of the ways in which the chemical nature of a trick may be disguised and tricks apparently not done by chemicals at all may be produced with their aid.

The Vanishing Ball

A black ball is shown and tapped to prove it solid. It is dropped into a tumbler of water and covered. When the cover is removed the ball has vanished.

The ball is of glass and hollow, having a hole in one side about half an inch in diameter. Glass balls of this kind can be bought at conjuring shops. Fill the ball with a black or dark red liquid made by a mixture of the chemicals described above. The water in the glass contains the right chemical for turning the black liquid clear. When you drop the ball into the glass and give the glass a shake the two chemicals combine, the ball becomes full of colourless liquid and the presence of the liquid so distorts the outline of the glass ball that it cannot be seen. (Fig. 6.)

In a somewhat similar manner a wand or

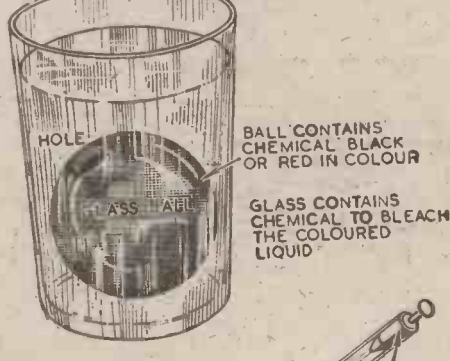


Fig. 6.—The dissolving ball. Another simple trick performed with chemicals

Fig. 7.—Showing how a wand can be made to change colour

stick may be made to change colour. The wand is in this case a length of clear glass tubing, closed at one end and filled with, say, a red liquid. A small glass syringe is inserted into a cork and used to seal the opposite end, this end being masked by being held in the hand (see Fig. 7). Pressure on the plunger of the syringe ejects the necessary chemical to cause the liquid to

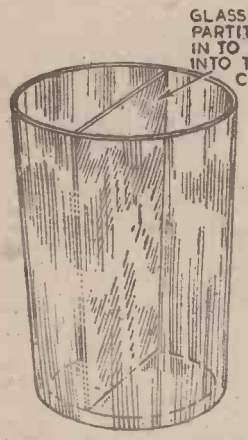


Fig. 8.—How to prepare a tumbler for the wine and water trick

become clear and so apparently change the colour of the wand.

Kettle On Ice

Boiling a kettle on a block of ice is another surprising chemical trick. There are two methods. One is to have a few pieces of lime in the kettle, pour water in and put the kettle on the ice. As the fumes from the lime fill the kettle and emerge from the spout they give the impression of the kettle coming to the boil. The second method is to use the chemicals described for the smoke trick at the beginning of this article. A small dish containing the acid is placed inside the kettle while a spoonful of ammonia is ready in the lid. The kettle is apparently filled with water from a can but as the can is empty no water enters the kettle. The lid is then put on and as soon as enough of the white vapour has been formed a stream of very good imitation steam will come pouring from the spout. If it is not convenient to use ice, the kettle can simply be suspended by a cord between two chairs and start merrily boiling in mid-air.

To produce a simple picture or message by chemical means is very easy. On the surface where the picture is to appear paint the necessary outline with a solution of potassium perrocyanide. The solution must be made in warm water and cooled before being applied. If a weak solution of iron sulphate is sprinkled or sprayed over the prepared surface the outline will become visible in a strong blue colour.

Such a trick presented in this bare form would have little mystery, but with the addition of one or two other conjuring secrets it becomes a first-class mystery.

First-class Mystery

Take a plain white handkerchief, pin it down on a board and paint with the potassium solution a simple outline drawing of some familiar object such as a teapot. Let it dry and roll the handkerchief into a bundle, placing it in a convenient pocket. Have the iron sulphate solution in one of those small metal sprays such as are used for insecticide.

In performing the trick, borrow a plain white handkerchief, roll it into a ball and perhaps perform some other small trick with it. At a convenient opportunity secretly exchange it for the prepared handkerchief, using one of the methods already explained in previous articles of this series. Now with drawing pins fasten the handkerchief, which the audience believe to be the borrowed one, in some prominent position. Ask members of the audience to call out the names of objects connected with a tea party. Whatever is called out you apparently write each item down on a separate slip of paper. Actually you write "teapot" on every slip. Fold the slips, drop them into a hat and have one chosen. Ask the chooser to keep the slip while you spray the handkerchief. As the outline of the teapot drawing appears on the handkerchief, ask the holder of the slip to read out what is written on it. Needless to say the handkerchief must then be passed off to the side of the stage, ostensibly to be cleaned, but really to be changed for the genuine borrowed article, which is then returned.

Picking pennies out of a basin of water without getting your hand wet is a simple matter. Sprinkle the surface of the water with lycopodium powder. This clings to the hand like an invisible glove and prevents the water from reaching it.

An addition to the wine and water trick is the use, instead of unprepared glasses, of glasses having vertical partitions of glass or celluloid cemented down the centre as shown in Fig. 8. The joint must be watertight. Such glasses, particularly if they have some sort of pattern on them, appear to be quite unprepared and can be freely

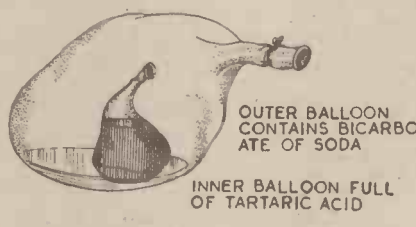


Fig. 9.—Showing how the toy balloon trick is performed

shown as long as the audience are not allowed to look down into them. The chemicals necessary for the change of colour of the liquid to be poured in are placed in one side of each glass, leaving the other half of the glass unprepared.

Taking up the jug of what looks like water, the conjurer pours some into the various glasses. In doing this he is careful to have the glasses arranged with the partitions facing squarely to the audience and with the unprepared sides of the glasses in front. The liquid goes in front of the partition and remains unaffected. The glasses are then emptied back into the jug and turned back to front in replacing them on the table. They are again filled and the chemicals in the now front part of each glass cause the changes to take place.

Toy Balloons

The production of large, inflated toy balloons from a hat is another trick which, though it does not look like a chemical trick, nevertheless owes its performance to chemical action. Each balloon contains another very small one. The inner balloons are filled with a solution of tartaric acid and then tied with thread. This must be done while the small balloons are inside the large ones, the neck of the small balloon being left projecting in each case until the operation is complete. Into the outer balloon is now placed a small quantity of bicarbonate of soda. (See Fig. 9.) The outer balloons are each then tied strongly at the mouth.

The balloons so prepared are made up into a neat parcel and loaded into the hat as described in previous articles, or one or two may be hidden in a crushed opera hat. The hat is sprung open and the small balloons are squeezed so that the tartaric acid flows out into the outer balloons. The hat is put aside while some other preparations are made, to allow the chemicals to inflate the balloons. Soon you will be able to produce from the hat quite large balloons, which will be too big to put back into it again.

Flash Paper

Finally here is a recipe for making flash paper. This is tissue paper so prepared that when lit it burns up in a second with a bright flash, leaving no ashes. It is useful in many tricks and can be obtained at conjuring shops. I give the recipe for the benefit of those who may like to experiment in making it.

Cut some fine white tissue paper into squares of about eight inches and soak them in a flat dish filled with four parts sulphuric acid and five parts nitric acid. Let the paper soak for ten or twelve minutes.

Now lift the soaked paper with glass rods and place it in a dish of warm distilled water. Let it remain for an hour, then transfer it to another dish of warm distilled water. Keep gently washing it in this way until all trace of the acid has vanished. This washing process is important because if it is omitted the paper will be apt to explode if handled roughly. When the sheets have been well washed, let them dry well away from any naked flame and they can be packed between sheets of ordinary tissue, ready for use when required.

HOW THE R.A.F. HUNTS THE U-BOATS

HUNTED unceasingly by aircraft of the Royal Air Force, German submarine commanders have developed a "bolt hole" technique. Whenever they break surface they maintain a constant crash-dive watch, using both visual and aural means to detect the approach of British aircraft. At the first indication of danger the alarm is sounded, the conning tower hatch is clamped down and the submarine immediately submerges.

One enemy submarine recently encountered was riding on the surface when it was sighted by a reconnaissance aircraft of the Coastal Command. The U-boat was too far off for the crew to hear the aircraft engines, and the pilot climbed into the clouds to keep the attack a surprise. During the approach the cloud was kept between the aircraft and the submarine. Before coming out of the screen the pilot throttled right back so that there would be less chance of being heard. Then having got into position the pilot pushed the control stick forward and dived to the attack.

But so vigilant was the Germans' crash-dive watch that the presence of the British aircraft had been detected. As the pilot dived the submarine was already submerging.

Less than thirty seconds after the conning tower had disappeared beneath the water the first bomb was dropped on the course of the submarine, from a low altitude.

The bomb entered the water about 30 yards ahead of the foaming trough left on the surface when the U-boat dived. The explosion caused a tremendous upheaval, and the sea was immediately blackened with thick oil.

The motor torpedo boat which is among the Navy's most modern small craft. The model is based on this vessel.

A Model Motor Torpedo Boat

Building a 30-in. Model Motor Torpedo Boat, constructed With the Co-operation and Assistance of the British Power Boat Company, Ltd., from the Design of Mr. Hubert Scott-Paine.

IN these days, when the British Navy is playing such a vital part in our effort for victory, every boy, and every man takes a great interest in the units of this world-renowned navy, from the massive aircraft carriers to the small minesweepers and coastguard vessels.

Among the Navy's most modern small craft comes the motor torpedo boat. The original type—the 60-ft. class—were first built in 1935, and it was written of them in the *Motor Boat* of July, 1936, that "as weapons of offence against enemy warships they should prove highly efficient, owing to the possibility of close approach and exact aim of the torpedoes, and they make difficult targets for gunfire. For defence, as a protection of our coasts and of large warships at sea, they are invaluable owing to their very large radius of action and their speed."

This model is based on the later development—the 70-ft. class—first built in 1938, with an armament of two 21-in. torpedoes and four 18-in. torpedoes, and two automatic guns in power-worked turrets and with a high cruising speed of over 40 knots with full war load. The development of suitable British high-speed light-weight machinery has placed Britain in the vanguard of world progress on high-speed craft and has armed the British Navy with a motor torpedo boat superior to any other in seaworthiness, cruising endurance, and speed—and this is the type of naval vessel we have endeavoured to model for you on this page.

The Hull

Obtain for the hull a block of well-seasoned wood of dimensions 2 ft. 7 in. by

The size of the model may be judged by the boy holding it.

The model under way. Note its attractive lines and the torpedo tubes either side.

(Left) An underneath view of the completed hull.

(Right) The inside of the hull with the power unit in position.

9 in. (breadth) by 4½ in. Recommended woods are yellow pine, deal, or, for lightness and toughness, red cedar. The variety of wood is not so important as the fineness and evenness of grain and condition.

Cutting the hull from the solid is more straightforward than by building up, and leaves a greater margin for minor errors which may creep in. The piece of timber should be carefully planed down to size 2 ft. 6¼ in. by 8¼ in. by 4½ in. Be sure that the edges are perfectly square and the surfaces smooth, and do not hurry the preliminaries of the work.

The first process in cutting out the hull is to shape the block to the sheer or elevation profile and cut this out with plane and chisel. A simple method of transferring this elevation profile from the plan is to place the appropriate drawing on the side of the block, pinning it in place with four drawing pins. Prick through the line, remove the drawing, and draw the line in with a sharp pencil. Assuming this profile has been cut, mark on it the fore and aft centre line right round the block. The deck outline can now be obtained, by placing the drawing plan on top of the block and fixing, as before, with drawing pins. Care should be taken to ensure that the centre line on the drawing is exactly over the one marked on the hull. Prick through the drawing, remove it, and draw in the line with a sharp pencil. This shape is now cut square through, and much laborious work may be avoided if you take the block to the local saw mill and have it roughly band-sawn, afterwards cleaning down to the correct line.

The Bassett-Lowke horizontal type "Marine" motor with permanent-magnet, which propels the model.

The hull can now be carved to the correct shape, using templates made from the body plan. A simple method of obtaining the chine line is shown on the sketch plan.

Hollowing Out the Hull

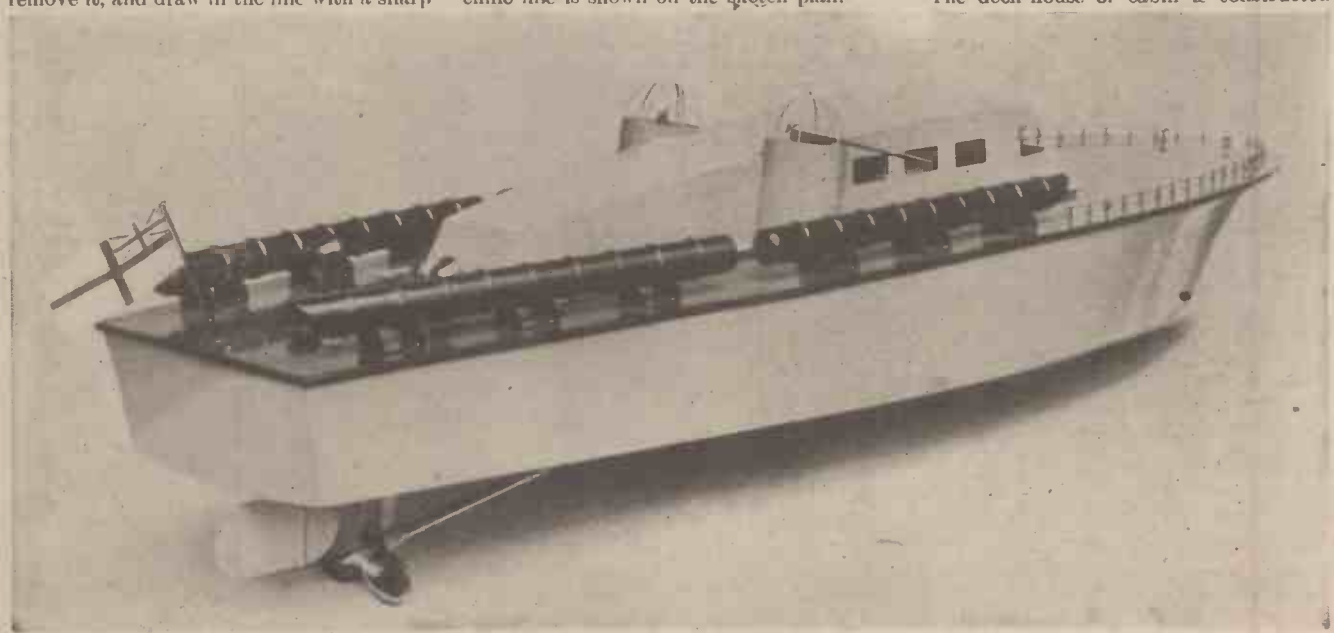
When hollowing out, allow a small margin of thickness all round—say ⅛ in. A good sturdy transom at the stem is an advantage but the stem should be as light as possible to give buoyancy forward.

Mark out a line according to the thickness of the hull, parallel to the deck outline, except the stern, which is left rather more solid, say 2 in. along the fore and aft line.

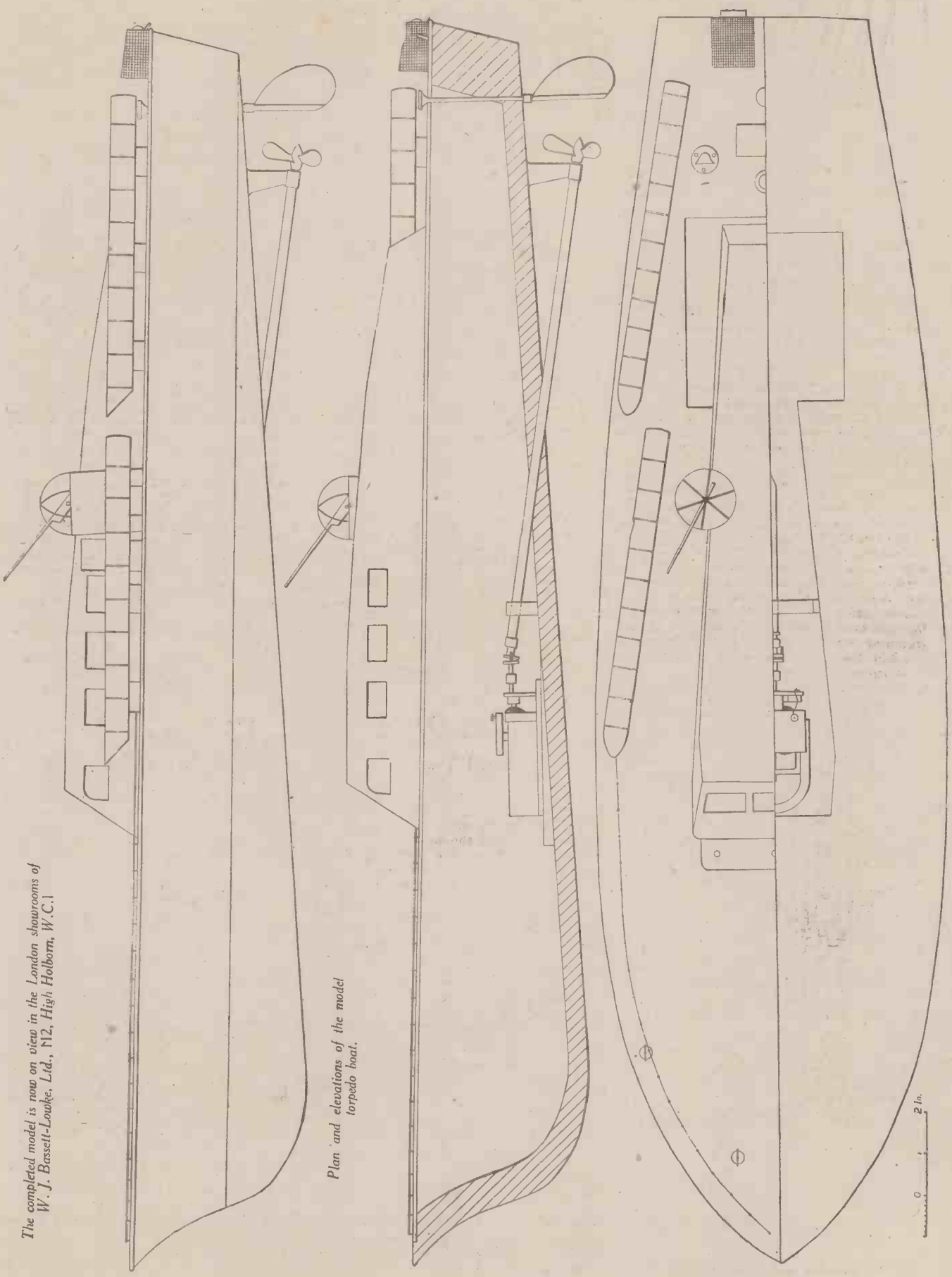
Exercise care to obtain a symmetrical outline at bow and stern and then, with pressure applied to a sharp, wide-edged chisel, cut round the outline of the inner wall of the hull. But don't in any circumstances use a hammer for this part of the work. Hollow out with a chisel in the thinnest of shavings till the deck is level all round. This part of the work is simply to guard against splitting the wall of the hull during subsequent operations, which are performed with gouges. The possible floor on which the plant will be mounted must be borne in mind. The neatest job will probably be to fit a new floor afterwards over the gouge-marked surface, which is difficult to get perfectly level. Finish all surfaces with glass paper and apply a coat of grey priming.

Deck-house

The deck-house or cabin is constructed

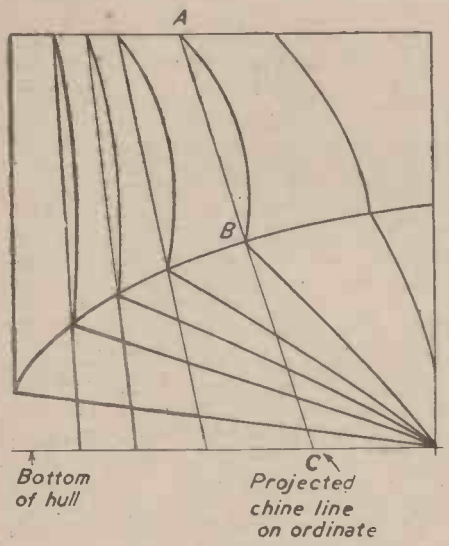


The completed model showing the deck-house, torpedo tubes, machine guns, etc.



The completed model is now on view in the London showrooms of W. J. Bassett-Lowke, Ltd., 112, High Holborn, W.C.1

Plan and elevations of the model torpedo boat.



A simple method of obtaining the chine line.

entirely of metal, which can be supplied complete from Bassett-Lowke, Ltd., with the two gun turrets with guns. The cabin hinges at the forward end to give complete access to the machinery and the batteries. The motor—a Bassett-Lowke horizontal type "Marine" motor with permanent magnet—is fitted under the forward portion of the cabin and is driven either by batteries or accumulator, as most convenient to the owner. In these times, when economy in batteries is necessary, the marine motor will go quite well on a single three-cell battery, but for speed two 4-volt dry cells are recommended or a 6-volt 10-amp. accumulator. A special rudder was made for this model, but it is possible to use a standard destroyer rudder. The propeller is a 2-in. Remod, fitted to an 8-in. shaft and stern tube.

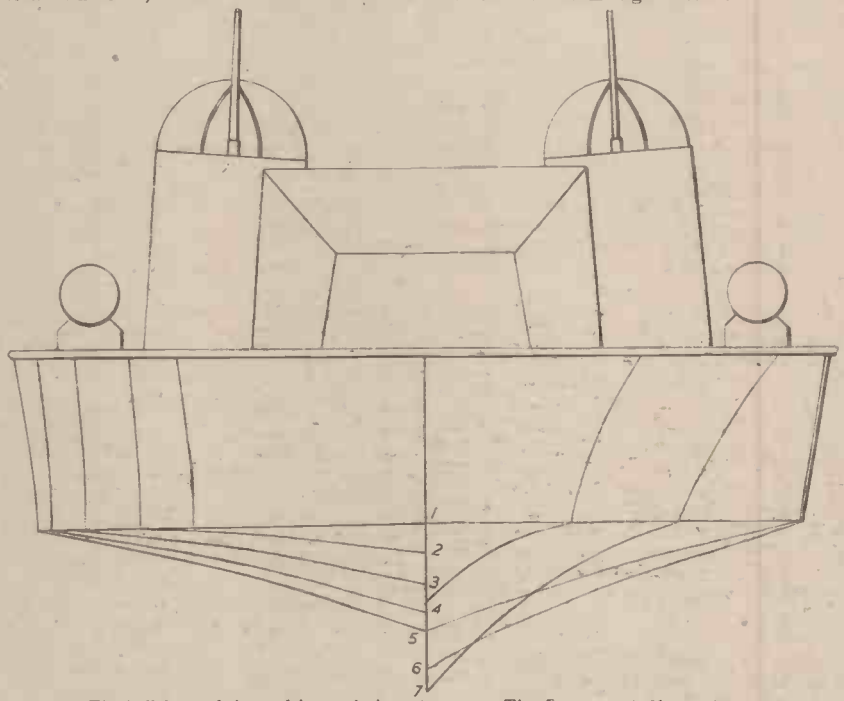
Torpedo Tubes

The torpedo tubes can be made in brass tube, with rings soldered at the positions shown on the drawing, or, alternatively, in dowell wood, with rings produced by gluing strips of paper or Bristol board around. These tubes are mounted towards the after end of the model and are so staggered to give a clear firing angle from each tube aft.

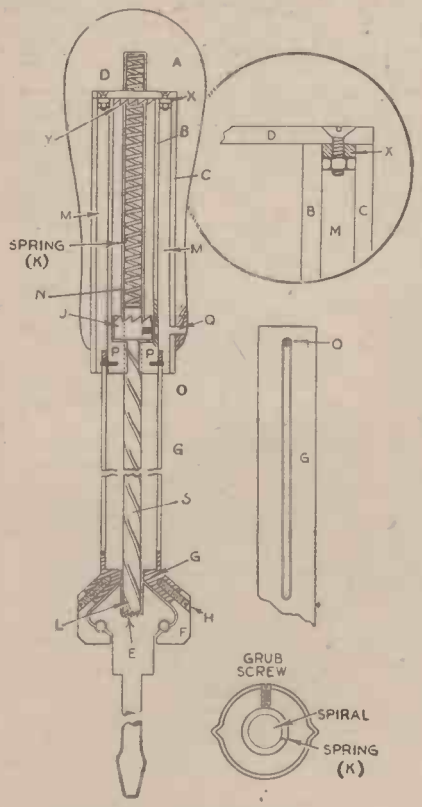
Although not shown in the photographs of the finished model, the drawings show that an addition, in the form of a modern pattern depth-charge-dropping apparatus, made of metal, can be supplied complete from Bassett-Lowke, Ltd., and makes a topical addition to the model. There are also two ventilators fitted aft.

The feature of the boat is its large forward deck. At first glance this may appear to the onlooker a very bare space, but it has been left clear with a purpose, because these boats are very often used for boarding parties.

The boat is finished in naval grey and flies the White Ensign astern.



The hull lines of the model torpedo boat destroyer. The drawing is half actual size.



Sectional view and details of a spiral screwdriver.

A Spiral Screwdriver

A Useful Tool for the Constructor or Serviceman

IT is often very difficult for the wireless enthusiast or serviceman to find a screwdriver to meet his requirements satisfactorily, and the tool illustrated was designed to solve the difficulty. This screwdriver is similar to the normal spiral screwdriver, but it has three main advantages over it. First, it is of a suitable size for the radio engineer; secondly, the spiral rod is interchangeable; and thirdly, it requires only one hand to operate.

Constructional Details

In Fig. 1 is shown the spiral rod S which is mounted inside a tube N, and is held against the ratchets L and E by the spring K, which is also housed in the tube N which projects up into the handle through a hole in the plate D. The object of the spring is to hold the spiral rod down on the bottom ratchets, and yet allow it to turn freely when the handle is withdrawn.

The pitch of the spiral depends on the force required to tighten up the screws.

The tubular part of G slides into the gap M between the two tubes B and C, which are joined by the ring X (Fig. 2), so that when the tool is compressed it is kept rigid.

Between the components E and F at the bottom end of the tool, ball bearings are provided, which take the pressure when the handle is depressed. This pressure is not direct, as the spiral E also moves round.

The part G is not free to move round, as will be seen by reference to Fig. 3. Small pins O are screwed into the part P, and project through long, narrow slots cut in either side of G, so keeping the component G from moving round when the handle is worked up and down.

It will be appreciated that by arranging the ratchets L and E, as shown, the spiral rod can be replaced very quickly, with one of a higher or lower (or reversed) pitch, as required.

A hole Q is drilled through the lower part of the handle and tube B so that a bradawl can be inserted through to the grub screw in J, making it easy to separate the handle and part J.

It will be understood that the grub screw in the component J must always be facing the hole Q, and in order to make this possible J is cut as shown in Fig. 4; a groove being filed in the inner tube B to accommodate J.

First, having compressed the screwdriver a number of times, and the screw is almost tight, one of the compressing actions may not be completed, and it would be inadvisable to try to finish the tightening by trying to compress the driver any more. In order to avoid this the screwdriver blade can be turned once or twice (by the handle) to allow the ratchets at Y on the disc D to come in contact with the ratchets on part J.

QUERIES and ENQUIRIES

A stamped addressed envelope, three penny stamps, and the query coupon from the current issue, which appears on page iii of cover, must be enclosed with every letter containing 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.

Direct Current from Ford Magneto

CAN you advise me on the following problem of obtaining D.C. for charging from an old Ford flywheel magneto. I propose to do this by rewinding the coils to a commutator, keeping the magneto stationary, and making the coils rotate, which is the opposite to the existing arrangement. Would the coils have to be wound in the same manner as a Gramme ring armature? —K. D. (Haddenham).

ASSUMING your inquiry refers to the old T. type Ford magneto, consisting of a number of circular bobbins wound with copper tape on a plate, in front of which is a set of revolving V-shaped permanent magnets, it is doubtful whether modifying this to give direct current would be worth the cost of conversion. If merely fitted with a 2-part commutator and the *present* earthed and insulated ends of the winding connected to it the rectified current would be only pulsating with two zero points in each revolution, and the cells would never charge properly. It would mean rewinding all the bobbins with wire of about No. 20 gauge, and fitting a commutator with the same number of segments as bobbins, and a pair of bushes spaced the same distance apart as any two field magnet poles of opposite polarity. Even then too much must not be expected in the way of output, as the age, and condition of the permanent magnets would not encourage hopes of anything but a small output, except at fairly high speeds. From the mass production point of view this type of generator left little to be desired when originally designed, but from the point of view of efficiency it could never make any great claim. For wind-driven lighting sets, however, the magneto type of generator having permanent magnet fields has always been strongly favoured.

Powerful Lifting Magnet

I WISH to make a powerful lifting magnet to work off the house mains, 200 volts D.C. Will you please inform me, the length of insulated wire, and gauge required to make a coil suitable for such a magnet?—D. T. H. B. S. (London, W.).

FOR a powerful magnet you will require 8 lbs. of No. 24 D.C.C. wire, which must be wound on a core 2 ins. diameter and about 11 ins. long. Start with a resistance in series, and control with a large switch because of the induced voltage.

Transformer Windings

I WISH to construct a transformer for use on a 4-inch spark coil. The voltage of the mains is 230, and the output required is 12 v. 6 amps. Could you inform me as to size of wire required for the primary and secondary, and also the amount of wire required. Is there any formula to determine these requirements?

Could you also advise me how to prevent interference with wireless from my spark coil?—D.W.W. (Croydon).

PRIMARY: 1,700 turns of No. 26 D.C.C. wire.

Secondary: 100 turns No. 14 D.C.C. wire.

Core section of at least one square inch.

You cannot prevent the spark coil interfering with wireless because it is acting as a very powerful transmitter.

Wind-driven Dynamo

I AM thinking of constructing a wind-driven dynamo to light a small country cottage. I have an old car dynamo I thought of using, but I am not sure if the propeller will give it enough speed, if mounted direct on the dynamo shaft, If this is not possible, could you tell me how to gear it to give sufficient speed for an output of about 5 amps?—James Byrne (Belfast).

USE a two-bladed propeller six feet in diameter with the blades at 45 degrees; if possible, make of aluminium, and of a maximum width of 8 ins. It must be geared up to give the dynamo a speed of at least 1,100 revs., and if your local winds are fairly high the sail can be mounted directly on the dynamo shaft; failing this, arrange a suitable gear.

Re-winding a Dynamotor

IS it possible to rewind a 12-volt Lucas dynamotor so that it can be used on 200-volt D.C. mains? If so, what gauge D.C.C. wire would I require, number of turns per slot, and turns in the field coils? The motor would be used to drive a small circular saw, and would be plugged in 5-am lighting circuits.—E.P. (Nottingham).

IT is possible to convert this machine to a series D.C. motor. The windings, as given, are only approximate as you give no measurements: armature, 70 turns per coil; two coils per slot; commutator to have twice the number of armature slots; gauge 28 D.C.C. Fields No. 27 wound to their maximum of similar wire. It is essential to put on all the wire possible as it may be necessary to run with a resistance in series.

Electric Welding

CAN you, please, tell me how to make a converter for light electric welding jobs, off 225 volt, D.C. or A.C. current; to say 6 or 12 volt, 80 to 200 amps? I mention this wide range to find out how much material would be required to construct a large or small converter. Do you think it's best to use this voltage for welding or would a bigger voltage be better?—A. M. F. (Brighton).

YOU require a much higher voltage for electric welding, at least 40 v., and your best plan is to make a transformer as mentioned previously in these pages. The cost of the converter would be at least £12. On D.C. it means that you will require a motor of approximately 7 h.p. in order to get the maximum power from the dynamo, hence we advise a transformer on A.C. since there are no moving parts, etc.

Electrifying Ebonite Rod

WILL you please inform me how to wind an ebonite rod with wire, in order to attract pieces of tinfoil? I intend to use an ebonite stem of a pipe for the purpose.—A. M. (Blantyre).

YOU cannot wind an ebonite rod to attract pieces of tinfoil, but you can obtain the same result by electrifying the rod by friction. A pipe-stem may be used, but rods can be obtained from firms advertising in this journal. To electrify a rod rub it smartly with a piece of clean dry silk, it will then attract the small pieces of foil, and paper, etc.

Field Magnet Windings

I AM constructing a "turntable-speed" synchronous gramophone motor designed to run on 230 volts 50 cycles A.C. mains. The rotor has, of course, 77 teeth, and is approximately 6 inches in diameter and ⅜-in. thick (soft iron). I should be much obliged if you would let me know the quantity and gauge of enamelled wire necessary to wind two field magnets powerful enough to drive the above rotor?—G. N. (Sunderland).

ASSUMING a well-designed stator of good stampings, fields to be of two coils each of one oz. of No. 38 D.C.C. wire. If this is not quite powerful enough some turns may be removed, but the motor will take about 40 watts with the above winding.

Electric Furnace Element

SOME time ago I made an electric furnace as described in the May, 1937, issue of "Practical Mechanics." The wire spiral was made of nickel-chromium wire and had a rating of 600 watts on 250 volts A.C. After

about two heatings at the melting point of brass (or over) the wire spiral fused. The furnace reached 1,050°c. in about ten minutes. The furnace had a fuse in each wire of the mains cable and they did not blow. Have you any idea why the spiral should fuse?—J. M. Y. (Larbert).

THIS element is quite suitable for a furnace, but the current must be limited. The wire as used is rated to run in air as "straight and free to radiate," but when insulated, the temperature rises considerably. It should take the furnace about 30 minutes to heat up, and we advise an element with a resistance of 100 ohms in series; cut some of the resistance out as the temperature rises.

Liquids for Experimental Use

I AM making some experiments and need a liquid (of about the same S.G. and viscosity as water) which will not vapourise in less than ⅛ second when in a high vacuum. As far as I know only oil will exist in a vacuum without vapourising, but will decompose. The time factor is very important, and if you could name a very thin oil which would undergo these conditions I would be much obliged.—K. W. L. (Stanmore).

THE following liquids will suit your purpose. We list them in order of suitability :—

	Spec. Gravity.
Iso-butyl Benzoate	1.006
Butyl Oxalate	0.995
Amyl Phthalate	1.026
Propylene Glycol	1.040
Camphor Oil	0.910
Benzyl Alcohol	1.048
Olive Oil (refined)	0.925

Any of these liquids may be procured from Messrs. A. Boake, Roberts & Co., Ltd., Carpenters Road, Stratford, London, E.15.

The viscosity of the above liquids varies a good deal with their temperature. We think, however, that you will find any of them approximately suited for your experimental needs.

Facts about the Sovereign

CAN you tell me the constituents and proportions of a sovereign?—H. J. (West Wickham).

THE minimum weight at which a sovereign is allowed to "remain current unchallenged" is 122½ grains, that of a half-sovereign, 61¼ grains. Any person to whom it is tendered may break, cut, or deface any gold coin below the "least current weight," but "light" gold coinage, which has not been illegally dealt with is accepted by the Bank of England on behalf of the mint at its current value.

Centrifugal Pump Problem

I HAVE an 8-in. centrifugal pump, belt-driven from a 150 h.p. A.C. 440v. motor, and lifting sand and water some 90 feet through a 9-in. pipe. At the pipe discharge there is a cast-iron bend of a thickness of ⅜ in. Occasionally the power cuts out, due to lightning, etc., and the sudden resultant downflow of material often seriously damages the pump runner, etc. I propose to hinge on the discharge bend a rubber-faced flap, normally held up electrically, which, on the current failing would fall, and seal the discharge mouth, thus causing the ascending column of material in the pipe, if not to remain completely still, at least to descend quietly into the pump. Will you please advise me as to what sort of simple electrical mechanism I could fit to operate this steel flap?—S. U. T. (Perak).

WE are afraid that your suggestion cannot be used, because if the top of the pipe were closed immediately, making a perfect seal, the column would fall to 34 feet or less, i.e., the atmospheric height of the water barometer at that point. This would, of course, smash the pump as before. Your simplest plan is to install a non-return valve close to the pump; these act automatically, and would save the pump in case the belt broke or flew off. Failing this, a motorised, electrically-operated valve would have to be fitted in the pipe just above the pump. This would require an independent electrical supply to operate the motor. You should consult Messrs. Royles of Irlam, Manchester, regarding the valves.

Cinematograph Motor

I HAVE a small electric motor working on 230-260 volts. A.C., and although it runs very fast, the power is not sufficient for driving a cinematograph. Could you inform me if there is any way in which I could rewind the motor to increase the power?—H. C. T. (Barnsbury).

SMALL series motors can give their rated output at high speeds only, and the only course open to you is that of employing a reduction drive, either belt or gearing.

Violet Ray Apparatus

COULD you inform me as to the makers of Heala Ray electrical apparatus. Also, I have two heater elements made by the same firm, and rated at 200 v., one taking 3 amps., the other 1.2 amp. The voltage here is 240, and one element would require a 13.3 ohm resistance. The other element requires resistance of 33.33 ohms. I want to introduce this resistance in the circuit to suit both types of element. Alternatively, being on A.C., could a choke apparatus do the job. If so, how? Could 3 12-v. car lamps be used for the purpose?

If the resistance method is most satisfactory, could you inform me as to what gauge of nickel-chrome wire, and length, would be necessary?—R. G. B. (Kingsbury).

WE believe that the makers of your electrical apparatus are The Medical Supply Association, Grays Inn Road, London, W.C.1.

As regards the resistances needed you require two with a common junction in the centre, on either side of which there will be 13.3 ohms capable of carrying 3 amperes, and 33.3 ohms capable of carrying 1.2 amperes. Both must be proportioned of such a gauge that the wire temperature keeps within reasonable limits, say 200 deg. c. Nickel-chrome is not the best material to use, owing to its positive temperature characteristic, the resistance varying considerably with temperature changes. "Eureka" is better and the specification for the two resistances will be : 13.3 ohms 3 amperes No. 20 SWG Eureka, 0.661 ohms per yard, or 20 yards total length. 33.3 ohms 1.2 amperes, No. 25 SWG Eureka, 2.14 ohms per yard, or 15½ yards total length. This wire is obtainable from The London Electric Wire Co. & Smiths Ltd., Playhouse Yard, Golden Lane, London, E.C.2.

"RAILWAYS"

THE current issue of this pictorial railway monthly contains, in addition to the usual locomotive causerie, a very interesting article on Early Midland Engines, by C. M. Doncaster. There is also an article on Fog Signalling, and a six-page section devoted to model railway matters.

THE Cyclist
Editor : F. J. CAMM

VOL. IX JANUARY, 1941 No. 227

All letters should be addressed to the Editor, "THE CYCLIST," George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

'Phone : Temple Bar 4363

Telegrams : Newnes, Rand, London.

Comments of the Month

By F. J. C.

The Gallup Survey

MR. G. H. STANCER, of the C.T.C., in a recent issue of a cycling periodical, criticises the recent survey conducted by the British Institute of Public Opinion on the question of whether cyclists should be taxed. This survey showed that a small majority were in favour. Every reader of this journal is aware of our views on cycle taxes, for we have expressed them many times indeed. The bald facts are that a tax on cycles would not produce any worth-while revenue, and the Treasury have found it easier to impose a tax on wholesale prices and the accessories which cyclists use rather than by means of a direct tax on cyclists themselves. Let us assume that estimates are correct and that at the present time there are approximately twelve million cyclists on the road. It is inconceivable that the Government would impose a greater tax than 5s., even if they, in their wisdom, considered it necessary to do so, for the simple reason that it is possible to get a licence to drive a motor vehicle for as little as 12s. 6d.; therefore the total revenue would be about three millions, and allowing for cost of collection, and the printing of licences, the net revenue to the State would be something approximating to two million pounds. There is, in fact, no case for a tax on bicycles, and the agitation usually comes from rival interests who, because they are taxed, are naturally jealous of those who are not. It never occurs to them to argue that because others are taxed they should have their burden eased.

However, successive Chancellors of the Exchequer have carefully considered imposing a cycling tax, and successively they have rejected it. It is true that the judgment of the late Neville Chamberlain was not particularly good as events have proved, and he does not go down to posterity as a particularly brilliant politician, but whilst he was Chancellor of the Exchequer he labelled the suggestion of a tax on bicycles as fantastic. Had his opinion not supported that of previous chancellors, some might have doubted the wisdom of it, but as it supported it we have formed the opinion that this was one of the few occasions on which his judgment was sound.

Logical Reasoning

THE point we wish to raise now, however, is the reasoning of this critic of the Gallup Survey. We hold no particular brief for Dr. Gallup, nor for the British Institute of Public Opinion, which is a fact-finding institution. It undertakes to find the real opinion of members of the public on topical problems. It is quite impartial and it obtains its views by means of what it cares to refer to as reference to a carefully balanced cross-section of the British public. The Gallup Survey was founded in America, and to date it has taken opinions on a vast number of diverse subjects, and has in every case been correct within a very narrow margin of inaccuracy. It has, for example, forecast the result of elections and never failed. In this country it forecast the fall of Mr. Chamberlain, and it has behind it a long history of successful analysis and prognostication and none whatever of failure. We cannot believe that the British Institute of Public Opinion is anxious to destroy faith in its services by exhibiting partiality, nor can we believe that it is anxious to see cyclists taxed. It set out to find the opinion of the public on the question of whether the public was in favour of a tax or not.

Untiring Efforts of C.T.C.

NOW the C.T.C., through its official mouthpiece, Mr. G. H. Stancer, is untiring in his efforts, and very tenacious efforts they are, to represent the opinion of twelve million cyclists, and this, reduced to simple terms, means that it represents the point of view of about one in two of the population, remembering that only about half of the total population of this country is of cycling age. It would be virtually impossible, therefore, for the British Institute of Public Opinion to take a survey without asking the opinions of cyclists. Mr. Stancer says that he has little faith in the Gallup Survey, but we feel that he should support his case with something a little more tangible than an inherent opposition to a tax on cyclists—an opposition which we share. It may be that the Gallup Survey has sounded public opinion at a time when cyclists are prepared to swallow their opposition (as they have done on the question of rear lights) and pay a tax. It is true that the survey showed that there was not a very large majority in favour of the tax, but this does not disprove its accuracy.

We believe that it does the cause of cycling immeasurable harm for illogical criticisms to be raised, for the case against the cycle tax is complete without them. We should not destroy our case by exhibiting an untenable point of view, namely, that we are against everything.

The Rear Light Controversy

WE hinted last month that the new lighting order which restricted the diameter of rear lights to 1 in. was not intended by the Ministry of Home Security to be literally interpreted by the police. They so informed us, and so it would appear that the various letters of opposition which have been circulated to the Press and to the Ministry were "much ado about nothing." In reply to Major H. R. Watling, the director of the British Cycle and Motor Cycle Manufacturers and Traders' Union, Ltd., the Minister of Home Security says : "It is the case that, strictly speaking, many existing bicycle rear lamps are so constructed as to make it impossible to comply with the new regulation which requires the aperture to be a circle of 1 in. in diameter. You may take it, however, that this provision will not be interpreted too literally by the police and that it will be read as meaning that an approximately equivalent area of illumination will be taken as sufficient compliance with such cases. There is no question of penalising, or even incommoding munition workers and others, who find themselves faced with this present difficulty. It is understood, of course, that in all such cases the light shown conforms in all other respects with the amendments, notably the provision regarding the field of visibility. An early opportunity is being taken of regularising the position by instruction to chief officers of police pending the modification of the regulation."

As on the question of the tax on cyclists, we feel it undesirable that those representing cyclists' interests should destroy their case by appearing too pernickety at a time when the nation is fighting for survival.

The N.C.U.

THE National Cyclists' Union Spitfire Fund has passed the £1,000 mark, and the Union has received a letter of thanks and congratulations from Lord Beaverbrook. At the moment of going to press, the fund has approached the £1,500 mark—still a long way from the £5,000 required. An appeal is made to every cyclist to contribute to this fund.

Cyclists and the Blackout

EVERY cyclist will agree that during the present blackout conditions a red rear-lamp is a help, and motorists cannot plead, as they formerly did, that it is impossible to see cyclists at night. The risk, of course, is that when a cyclist is knocked down by a motorist the latter may plead that the lamp was out, as it certainly will be after the bicycle has been hit. That is a point which needs to be watched, but up to the present we have not heard of any motorist so pleading. The number of accidents has risen, not, in our view, because of carelessness but because of the blackout conditions and the lack of a cohesive road lighting policy. It is our view that during the war the refuges in the middle of the road should be removed. At present some of them are marked with a white light and some with a red light. Others are without a light at all. The white line which is supposed to give some indication of their presence does not lead off to them at a point sufficiently distant. During a recent journey we noticed very many of them which had been knocked down during blackout hours. In narrow roads these refuges make a worse bottle-neck of a road which is in itself a bottle-neck. Buses should not be permitted to stop on the "wrong" side of traffic lights, as this causes congestion. They should be made to stop some distance beyond the traffic lights.

Paragrams

Timekeeper Wounded

VAL REVETT, well-known and appreciated Eastern Counties timekeeper and official, has been seriously wounded as the result of enemy action.

Fatal Accident

DR. GEO. COHEN, North London coroner, stated at an inquest which he conducted into the circumstances of the death of a pedestrian who was knocked down by a cyclist, that had the pedestrian looked and made sure the road was clear the accident might not have happened!

Duty of Pedestrians

THE fatality took place at night and the learned coroner also said: "Although it may not be the law, it is the duty of the pedestrian to see that there are no moving lights on the road before he crosses. It is well within the pedestrian's power although it may not be a duty."

Cycle Agent for 45 Years

MR. J. BOSWORTH, of Kettering, has been an agent for Rudge cycles for over 45 years. He competed in his first cycle race as far back as 1879 and, as promoter of Kettering Hospital Sports, has raised more than £2,000 for charity.

Club Members with Forces

SOUTHGATE CYCLING CLUB has over 40 members serving with the Forces. The number is equalled by the Norwood Paragon C.C. and bettered by the Kentish Wheelers, who have no fewer than 50 serving members.

'Yard' Man's Presentation

WHEN they asked ex-Chief Constable John Horwell of Scotland Yard what form a farewell presentation should take he said: "Make it a cycle." His colleagues did. Howell was a leader of the famous "Flying Squad" familiar with road speeds well over the 80's.

Club Secretary's Business Bombed

MR. S. M. VANHEEMS, well-known "Barfroader" and hon. sec. of the R.R.A. for a decade, has had his business which bears his name, bombed. Some of his staff were killed. "Van," who sometimes cycles from his home at Ealing to the West End, made the discovery when he arrived at his office.

Club Luncheon

AMONG the more noted clubs who have held informal lunches on a Sunday in place of the more formal dinners are: Poly. C.C., Crouch Hill C.C., Southgate C.C., Fountain C.C., Brentwood Road Club, Kentish Wheelers, Bedfordshire Road Club and the Pyramid R.C.

Annual Gathering

THE Crouch Hill C.C. held their 60th annual gathering in the same room as that occupied by the Tricycle Association and a wedding party!

Well-known Rider in R.A.F.

NIMBLE Sid Cozens is now with the R.A.F. This professional rider, who has competed in six-day races in this country, is stated to have finally retired from racing. We wonder!

Club's Diamond Jubilee

THE Upperthorpe C.C. recently celebrated its Diamond Jubilee with Mr. George Jowitt (president) in the chair. Over 50 members attended the gathering.

Scottish Rally

ARRANGEMENTS are being made to hold the famous Scottish Cumnock Rally next year. This decision was reached at the annual general meeting of the West of Scotland Union held in Glasgow.

Speedman's Marriage

ONE of the fastest 25-milers in the country, G. A. Nightingale (Charlotteville C.C.) who is now in the army, has married Miss Stephanie Beaton.

Mines Opened at Rheidol Valley

WELSH tourists will be interested to hear that new lead mines are being opened in the famous Rheidol Valley.

Death of Club President

A MEMBER of the famous Speedwell C.C. since 1893, and a former president of the Club, Mr. Arthur Cox, well-known to Midlanders, has died. He was 66 years of age.

Prize Distribution

OVER 300 members and friends attended the recent prize distribution and dance of the North Middlesex and Herts Cycling Association. It was held on a Sunday.

An impression of two fine old churches. (Left) St. Mary, Bloxham, Oxon. (Right) St. Peter and St. Paul, Kings Sutton, Northants.

Scottish Speedman Joins Royal Navy

SCOTLAND'S fastest novice last year, John C. Park, has entered the Royal Navy.

Carrying On

DESPITE a depleted membership, one of the oldest clubs in Lancashire, the Rochdale Section of the National Clarion Cycling Club, is carrying on.

Mushroom Clubs

ONE wonders what has become of the many "mushroom" clubs which sprouted before the war.

Cycle Left in Will

A FIFTEEN-YEAR-OLD boy, David Parker, of St. Ives, was remembered in the will of an elderly bachelor. He left the lad a cycle in recognition of his devotion in making daily calls to the lonely crippled gentleman.

Solid-Tyred Italians

ITALIANS on the Albanian front have been using solid-tyred bicycles. Some thousands of the Italians operating against our Greek allies are reported to have these machines. It is not known whether the solids are being used because of the lack of raw materials or because of the fear of punctures. In either case, solid tyres must be uncomfortable on the rough Albanian and Greek roads!

Scots Cycle Paths Dropped

SOME of the cycle paths on the Carse of Gowrie road scheme have been dropped. The total saving will amount to some £24,000, as footpaths and final surfacing have also been cut out. The scheme comprises part of the main Perth-Dundee road.

Bicycle in Fashion Parade

AT the first important fashion show to be held in Paris since the German occupation, the first mannequin to appear had a bicycle. She wore a short sports ensemble of dark greenish grey with a skirt split in the front only. The bicycle is now more than ever the most popular vehicle in Paris.

Bicycles Wanted

ALL motorists of the country have been asked and are responding well to the general appeal to give soldiers lifts here and there, but even so, there are many camps so isolated that the men are not able to go very far when they are off duty. I have been approached by a number of men in the Services, ex-club cyclists, who are appealing to me to urge the public who may have bicycles not in daily use, to make these available for the use of soldiers and airmen.

The N.C.U. is willing to keep a list of the names and addresses of the members of the public who have bicycles they would lend to the troops as and when required. If there are any of your readers who would be good enough to communicate with the N.C.U., we will forward the necessary particulars. There are at least 20,000 ex-N.C.U. members in the Forces at the moment who would be deeply grateful for an opportunity of doing a little cyclin in the difficult days they are now going through.

Messengers for Hospitals

HOSPITAL authorities are appealing to the National Cyclists' Union for Emergency Messengers on rather different lines from the already existing messenger service.

Will any cyclist in the Greater London Area who is willing AFTER AN AIR RAID TO REPORT TO THE HOSPITAL IN HIS DISTRICT, please send his name and address to the N.C.U. Offices at their evacuated address, 35, Balliol Avenue, Highams Park, E.4 (Telephone No. Larkswood 2490) immediately? It should be noted that these volunteers will only be required AFTER an air-raid and then all they are asked to do is to report to the hospital to see if there are any messages of an urgent nature to be taken. This is not only an interesting job, but something that will be doing the greatest possible amount of good. N.C.U. members who volunteer for this work will be supplied with an N.C.U. Messenger Armlet on application at the above address free of all charge.

When replying to Advertisers please mention The Cyclist

Classified Advertisements

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GroseSpur All British Cycles, 75s. Art List 100 models free.—Grose, Ludgate Circus, London.

BAINES Super Responsive Cycles. Ultra short W/Base, or standard design models. New catalogue free.—Idle Road, Bradford, Yorks.

ACCESSORIES

GEORGE GROSE, the best house for all cycle accessories. Write for beautiful art illustrated list, post free, 3d.—Ludgate Circus, London.

CLOTHING

WATERPROOF your coat (leather or cloth), gloves, shoes and saddle without stiffening them by brushing on Granger's Solution Grade 1212, colourless or coloured. 1/- bottles, 1/9, 3/- tins from Camping Outfitters, Stores and Halfords.

INSURANCE

ASK your dealer for one of our Insurance Certificates; or write direct Vehicle and General Insurance Co., Ltd., Royal Liver Buildings, Liverpool.

TYRES

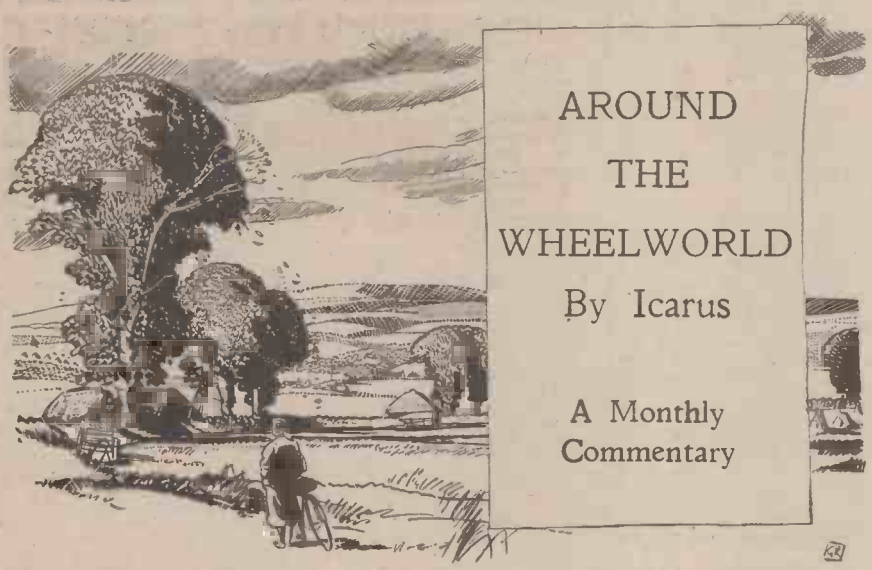
10,000 NEW TYRES. Clearance, best makes, 33⅓% off standard prices. Carriage paid. Price List on application.—Davies, Tyre Factory, Wednesbury.

SITUATIONS VACANT

ENVELOPE ADDRESSERS wanted; enclose envelope. Manager, 62 Belleville Road, London, S.W.11.

WANTED

DURSLEY PEDERSEN 3-speed Hub and front wheel Dynohub in 26 in. or 28 in. wheels.—Particulars J. M. Edwards, Burbank, The Drive, Northwood.



AROUND THE WHEELWORLD

By Icarus

A Monthly Commentary

Charlotteville C.C. Annual Dinner

THOSE critics who presume that the club movement is likely to fade out during the war would have had their doubts allayed by a visit to the Charlotteville C.C. Annual Dinner, which took place at Ye Abbot's Kitchen, Guildford, on Saturday, December 7th. Nearly one hundred members and guests (men and women) sat down to a splendid repast under the chairmanship of Vice-President F. J. Little, and the importance of the Charlotteville Club, which has done such an enormous amount of work to promote cycle sport of a high order, was reflected in the number of distinguished guests present.

The evening was most joyous and convivial, and the infectious enthusiasm of genial Vic Jenner permeated nearly three hours of excellent entertainment. There was a full toast list, and after the Loyal Toast, that of "Our members with the Forces" was proposed by the Chairman, with a brief reply by George Nightingale. The toast of "The Charlotteville Cycling Club" was proposed by Mr. W. Townsend, the President of the Westerley C.C., who, in the course of his speech. dealt with the achievements of the club and its members, with particular tribute to Vic Jenner, who continues to race and put up creditable times. He refuses to grow old. Mr. Townsend expressed the view that the sport should be purged of those who were merely in it for what they could get out of it—no doubt a subtle reference to those who draw fees and oppose the appointment of timekeepers who are anxious to help the sport along in these difficult times by providing their services free of charge. Mr. Townsend set on record the esteem with which the Charlotteville is held in clubdom, and recorded the high place it had attained in its thirty-seven years of existence. Witty replies came from D. E. Eldridge, the Hon. Sec., H. K. Evans, the Hon. Track Sec., and F. H. Sore, the Hon. Road Racing Sec. After the presentation of prizes by Mrs. F. J. Little, the toast of "Our Guests" was proposed by Vic Jenner, who handed out compliments interlarded with friendly badinage. There were four respondents to this well-received toast, and the first, Mr. J. C. Beauchamp, Hon. Sec. of the Bath Road Club, kept up the traditions of that democratic institution by appropriating the points which had been prepared by Mr. F. J. Camm (Editor of *The Cyclist* and the *Bath Road News*). It was, of course, well received! Mr. F. J. Camm also replied to the toast, whilst Mr. W. J. Mills, in a neatly contrived speech, wittily ragged the previous speakers. The toast of the Club President and Vice-Presidents was proposed by Mr. H. J. Brown, with the response by Mr. H. Johnson. Excellent entertainment was provided by Mr. Frank Woods, Mr. Reg Langfield, Arthur Rackman, and Master Don Baverstock. One of the best dinners we have attended this year, inside or outside of the cycling movement.

The Signing of Record Certificates

A CORRESPONDENT asks me whether records should be signed with a nom-de-plume. If custom of the sport is a guide, the certificate should be signed by the President, for a nom-de-plume could be anybody. I am not aware that record certificates are signed in any other way, and I suppose there is no reason why a certificate should not be signed by someone using a nom-de-plume. Equally, there is no good reason, even when the pseudonym is unmistakably associated with a particular person, why that person should not sign the certificate with the proper name. Perhaps my correspondent can be a little more explicit, when I shall be pleased to go into the matter again.

Silver Spoons for War-Time Record Breakers

MR. HENRY S. BILBE, the well-known inventor of the Endrick rim, the Kendrick tricycle and tandem-tricycle, who also is the founder of the R.R.A. of Scotland (of which body he is still the president), is making the friendly gesture of presenting engraved silver spoons to Miss Marguerite Wilson for her W.R.R.A. solo records, to Mrs. Billie Dovey for her W.R.R.A. tricycle records, and to Mrs. Annie Briercliffe for breaking Miss Wilson's 50-mile record inside the coveted two hours. John Waterson also receives one of the spoons for his Scottish place-to-place record. It will be remembered that Mr. Bilbe used to present engraved silver spoons to stimulate track racing in connection with the Palmer Park (Reading) Racing League, of which organisation he was chairman and later honorary secretary. Mr. Bilbe owns the business of K. H. Wilkins, the lightweight cycle specialist, of Reading. Mr. Bilbe and his two sons helped on two of Mrs. Billie Dovey's trike records, and he and a crew totalling over 80 summers followed her at 21 miles an hour for a third of the "50" to the finish. I understand that A. J. Wilson, founder of the R.R.A., well known for his contributions to the cycling press under the title of Faed, is in communication with Mr. Bilbe regarding the purchase of a Kendrick tricycle.

I should like here to express my great sympathy with Mr. Bilbe in the loss of his nephew, Ken G. Bilbe, who was a frequent contributor to this journal. He recently died as a result of a collision with a lorry, whilst acting as a special dispatch rider.

Over £1,000!

THE N.C.U. Spitfire Fund is well on the way to the £1,500 mark. Lord Beaverbrook, Minister of Aircraft Production, sent a letter to Mr. A. P. Chamberlin, the secretary of the N.C.U., congratulating them on passing the £1,000 mark.

The Purchase Tax and Inner Tubes

ALTHOUGH outer covers are subject to the Purchase Tax, it does not apply to inner tubes. In general, liability to the tax arises when the goods pass from the wholesaler to the retailer. Manufacturers and wholesale merchants dealing in chargeable goods are registered, and tax becomes chargeable when the goods are sold by the registered manufacturers or wholesaler to an unregistered person, generally the retailer, or direct to the user. There will not be a rebate of the Purchase Tax paid on goods which are lost or damaged on the premises of retail shopkeepers, no matter whether the damage is due to enemy action or otherwise. The Purchase Tax applies to cycle bags and trouser clips. Both of these items were thought to be exempt.

An Interesting N.C.U. Legal Case

A CHEQUE for £525 was sent to a member of a London cycling club on October 29th last in settlement of his claim following upon a road accident in which he was involved on December 7th, 1939.

An interesting feature of this case is the pertinacity with which the N.C.U. solicitors have pursued it, as is illustrated by the following:

The case was set down for hearing in the High Courts on September 26th, the sum of £278 5s. having been paid into court on the 14th of that month, but declined by the N.C.U. solicitors. Negotiations were resumed at court and the offer jumped to £400, thence to £450, and finally to £500 *inclusive* of hospital charges.

All the foregoing offers were refused by the N.C.U. solicitors, and so the case was commenced in court. Again the other side approached the solicitors, and the judge adjourned the matter for a quarter of an hour to see if terms could be reached. Terms were finally arranged at £525, *clear of hospital* charges and N.C.U. costs.

New National Team Record

THE Dukinfield C.C. are claiming the National Team Record for 30 miles with the time of 3 hours 52 mins. 1 sec., which they set up in the Oldham and District Cyclists' Union event, which was held on August 18th. The team was D. K. Hartley, T. M. Livingstone, H. Batty.

WAYSIDE THOUGHTS

By F. J. URRY

Good Value Now

IF you own a bicycle, take good care of it; make it last, for you are not going to find it the easiest thing in the world to replace. The number of new machines for the home market is limited to a percentage of those licensed for export, such percentage being one for home consumption to three for export. The reason for such restriction of the home trade is obvious. The steel position is difficult, the need for exports to provide exchange rates imperative. It is no use blaming the cycle trade, the dealer, or the Government; blame the Germans who made the war. The very obvious thing to do if you own a bicycle is to take greater care of it than ever. Possibly you have no time to do this, or dislike the job, and the latter fact I can understand in the case of a lady. Then take it to your cycle dealer, find him a little job of work, and do not begrudge the small charge he makes for putting and keeping your property in order.

It is useless taking the machine along for a general overhaul just once, and then riding it until it rattles like an old tin can and squeaks like a frightened rabbit; that method won't preserve your property. Make a little contract with your repairer, and if you are a regular rider have a monthly overhaul, and if but an occasional one make the lapse of time between visits three months. But take care of your property; it is valuable now, and may easily be much more valuable in a few months' time.

Overhauling

BEST of all is to do the overhauling yourself. Give a quarter of an hour a week to the job, and usually that is ample, particularly if, like me, you can buy a clean-up in exchange for a few coppers. Undertaken regularly, it is remarkable how little attention the modern machine requires to keep it in perfect running order. Brake adjustment seems to be the greatest claim on my attention, probably because I like to have my retarders instantly responding to a touch of my fingers. It is a wise precaution these days—or nights—when the black-out often calls for quick action. After brakes, the chain, then the pedals; and last, and very infrequently, the hub and bracket bearings. Two or three minutes suffice for lubrication, and about the same time for examination of the tyres; but if a cut needs attention, then the quarter of an hour allowance has to be doubled. Replacement of tyres, brake-blocks or chain, I leave to my friend the dealer, then call for the machine on my way home, and pay the modest charge cheerfully with the knowledge that not only is the replacement right, but a general overlooking has taken place, and the bicycle has been given a clean bill of health.

I know all that sounds very trim and spruce, and possibly some people wonder if the written word is true. It is, and I can bring the testimony of my dealer friend in evidence. If I did not practise some sort of method in the upkeep of my machine, one of them would not now be entering its twenty-fourth year, nor would the tandem still be running noiselessly after fourteen years of service.

Actually, one not only gets more value from the regular use of a bicycle, but such a machine lasts longer, provided, of course, it is respectfully treated. All idle machinery quickly deteriorates, and in the case of bicycle, tyres and tubes rot, and saddles sag, unless they are housed in a place of moderate temperature. I have heard a man criticise the tyre manufacturers, when the reason for that article failing has been the fault of neglect; generally leaving the tyre in a deflated condition in a damp shed.

Regular Riding

THE thing is to make yourself a regular rider. It will probably mean a real effort to start with, but in a fortnight's time you will have formed a habit for which you will be thankful dozens of times a week. Let me give you my recent personal experience: I ride to work every day six and a half miles, and my time for the journey—good or bad weather—does not vary three minutes. On the way I pass thousands of folk waiting for transport and feeling irritated at the delay, and more irritated still at the discomforts of overcrowding. That is the condition in the mornings, as I see it; but it is infinitely worse at night. The crowds are greater, the traffic more congested, the discomfort more pronounced. Yet able-bodied men and women accept these conditions when the cure for them can be had for the price of a bicycle, and they can arrange their own timetable with a more than reasonable chance of securing punctuality.

Why is it not more widely practised, this use of a bicycle for the daily commercial journey? Occasionally I ask my friends that question when I hear them complaining of traffic delays and irritations. Invariably the answers are, "Town riding is dangerous"; "It's such a messy job"; "I am too old"; or "Candidly, I don't feel I could ride a bicycle now." The latter excuse is really the true one, "I don't feel I could ride a bicycle now"; but most of these friends would be more truthful if they added, "I consider it beneath my dignity."

A Question of Dignity!

WHY it should be undignified to ride a bicycle I do not know, but that apparently is the considered opinion—I will not say judgment—of numerous folk. It is a state of mind that needs correcting, for in my opinion it is holding up the public utility of one of the finest bits of machinery in the world. In the middle of a great war we are neglecting the services of one of the most important and certainly the most economical forms of transport available. The remarkable thing is that the Government have not made the people more conscious of the fact by propagating cycling as the main solution of the present-day transport problems. Instead of which they have curtailed supplies in the home market, and put on the heaviest impost of the Purchase Tax. Such conduct in high places seems to me proof that authority is so motor-minded that it cannot, or will not, try to observe the economy it preaches.

But that is no reason why you and I should not use the sure advantage of cycling when we go on our lawful pursuits. This mode of travel is neither dirty, nor dangerous, nor undignified; such descriptions are mainly the excuses for lazy disinclinations, coupled with the average Briton's need for criticism as an excuse for escape from activity.

Independent Travel

I WOULD rather be an independent travel unit at less than bus fare cost, any day, than a grousing cypher in a weary crowd wasting my little leisure. I enjoy my daily riding, and hope to go on so doing until time ends for me. It keeps me fit, it makes me free, and perhaps more than anything, it gives me a purpose in life, to make a holiday of any odd hour or so when the day's work is done, or the week-end comes along.

I do not think I greatly differ from other people in my make-up or approach to life, and I say deliberately that the more riding I do the more I desire to do. It is the essence of freedom, this aptitude to cock your leg over a saddle any moment, and in half an hour slip into peace and beauty without noise, fuss, worry or expense.

For, however the towns may alter, the countryside remains, the seasons come and go each with their distinct loveliness, and nature keeps on smiling. No one can bomb that out of existence, it is only man and his words that suffer; the wild rose will still bloom in its season, and the harvest be gathered. And these are the things that count in the acquisition of sanity. How near you can get to them if you ride a bicycle, possess an observing eye, and a tuneful ear. Yes, the bicycle is the vehicle of freedom—the only one, the perfect one.

Friends of mine, who have yet to savour the full pleasures of cycling, say I am a fanatic. Perhaps I am, as every man must be who discovers a high pleasure in the performance of, and enjoyment in, a game or pastime. The point I would make to you is that cycling is within the economic orbit of most people possessing a medium of acitvity; it is not within the realms of the unobtainable like so many things we common folk yearn for.

Touring

NOW and again during life I have sipped at the cup of expensive pleasures, and while, as an ordinary human being I do not scorn them, I say deliberately they are not comparable to the constant and joyous changes of regular cycling, and especially touring. To be fit, is glorious; to be free, delightful; and to know something of your country, its loveliness, its history, the people, and birds and animals it feeds and shields, is a satisfaction that in essence is the high art of living.

That is within the reach of most of us, to fill our leisure and make life a lighter burden and a rural romance. When you have said everything possible for the value of the bicycle as the vehicle of the people, and paid to it the highest compliments of convenience, there is much more left to its favour than can ever be written, because it is individualistic, and the individual is a mystery possessing no precise pattern, taking his joy from the hills and the sea, from the orchard and the combe, the mountain torrent and the wide strath, the comely Cotswold village and the ancient burgh, bringing all of them within the orbit of his consciousness, and seeing them without haste or fuss or inordinate expense, but as a traveller should, simply and hopefully, with a mind attuned to learn and understand, nursed by a body that genial activity has made fit.

THE HOOPS INN, N. DEVON
A pretty and noted little old-world inn on the Bideford-Clovelly road close by Bucks Mills. A favourite pull-up in the olden days for many horsed vehicles taking visitors to far famed Clovelly.

Notes of a Highwayman

By L. Ellis

A Shropshire Antiquity

SHROPSHIRE, while not being entirely devoid of depressing industrialism, is a touring county of extraordinary beauty and interest. It is fairly safe to say that few other counties can offer such a wealth of varied charm. It has a generous share of high hills and lovely villages, more than one river, far-famed for its beauty, and a great number of historic old towns and buildings. It is difficult to choose any outstanding point, but with every regard for the claims of Ludlow and Shrewsbury, many people agree that Stokesay Castle calls for particular mention. There is something so appealing in this lovely old building that it easily stands the test of repeated visits. Although called a castle, it is more properly a fortified manor house. It was built in the thirteenth century and to-day, in excellent condition, it is regarded as one of the finest and one of the oldest examples of its type in the country. It is suggested that the house was built about 1270 by John de Verdon, and that it was fortified and embattled some seventy years later by a merchant of Ludlow named Lawrence, who then owned it. The exterior presents a curious but pleasing mixture of architectural styles.

Elizabethan Gatehouse

THE gatehouse is characteristically Elizabethan, with mellowed half-timbering, and it will be seen by the loopholes and by the strength of the timbers that it was not merely ornamental. The carvings on the posts represent Adam and Eve in the Garden of Eden. Some of the gables are in the same half-timber style, while the bulk of the building, if divorced from the softer Elizabethan, looks like a mixture of castle and abbey. Viewed as a whole, the structure looks somewhat unreal, almost like one of the grotesque dwellings in which the princess sleeps in a child's fairy book. The half-timbered storey of the northern tower, looking so oddly out of place, can be accounted for by the story that in 1647 orders were issued that the house should be "slighted." During the Civil War the owners were supporters of the King, but when threatened by the Parliamentarians they decided to surrender at the second summons; thereby succeeding in preserving the structure for posterity. The "slighting" seems only to have entailed the removal of some walls and the substitution of the domestic-looking gables in the place of the original battlements. There is a fine banqueting hall 53 feet long, and this is connected with the north tower by a solid oak staircase.

In the Plum Country

APART from its fine abbey, there is little else of interest in Pershore, an ordinary-looking little town on the banks of the Avon, in Worcestershire. It is said to be the capital of the local fruit district, and is certainly worth a visit in the spring when the countryside is spread like snow with fruit blossom. The Benedictine Abbey was founded in A.D., 689 and was dedicated to St. Eadburga, a granddaughter of Alfred the Great. The lantern tower is said to be the second finest in England. The Benedictines took possession about 984 and held it until the Dissolution of the Monasteries in 1539. The early Saxon building was probably completely demolished and rebuilt in the great Norman wave of church-building about 1090. There was partial rebuilding in 1200, and a great fire in 1223 necessitated rebuilding the main part of the presbytery. Another fire in 1288 partly destroyed the building and many years elapsed before the damage was repaired. The lantern tower is so much like the one at Salisbury that many experts think that the same designer was responsible for both. The north transept collapsed in the reign of Charles II and the tower was in danger of falling. This was shored up by a great stone buttress and as recently as 1913 two further great flying buttresses were erected against the base of the tower, as again this was in a precarious condition.

Elizabethan Gatehouse at Stokesay Castle.

My Point of View

By "WAYFARER"

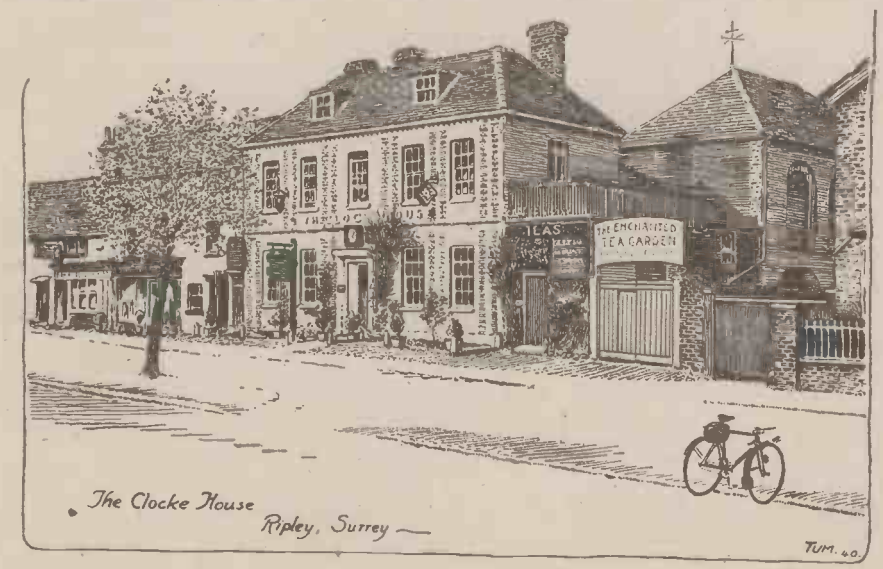
Cycling to Work

THE insistent (and rather plaintive) appeals, made by a large transport undertaking in the Midlands, that firms will stagger their working hours, and that shopping ladies will get themselves into town and out again before the morning and evening rush period, owing to the impossibility of providing accommodation for everybody who wishes to travel by motor bus, has intrigued me, and I have been wondering why more people do not make a point of cycling to and from their work—or "backwards and forwards to work," as careless writers and speakers are apt to put it. My mind also registered surprise that there are so many "butterflies" in the cycling ranks—those who do the to-and-fro act during the summer months or on really nice days, and then "throw in their hand" for the winter, or when "bad" weather arrives. I have long been an exponent of cycling to and from work, and now that I am again doing it, after a period of retirement from business, I wonder anew that this method of travel does not enjoy an even greater measure of popularity than it already possesses.

In my view, you do yourself and public transport a good turn by cycling those daily journeys in connection with the obtaining of your bread and butter. You make sure of securing a regular dose of exercise and fresh air, both commodities being in somewhat short supply during the winter months. You use an instrument of travel which is thoroughly reliable, and which is always there, and ready, when you want it. The bicycle is exclusive: it is punctual: it is speedy: it constitutes door-to-door transport. It keeps you out of crowds and out of congested vehicles, leaving room in the latter for people who, unfortunately, are too old or too infirm to cycle. The bicycle saves you money, too. How much, I don't know—but *you* will know something of the possibilities in this regard if you think it over for a moment and dwell on the cost of your railway season ticket or the weekly aggregate of your daily bus fares.

Of course, there are disadvantages about this cycling to and from work business. It wears out your clothes! Does it? Well, buy an extra pair of trousers—or an extra skirt, if you're a woman—with some of the money you save, and you'll still be in pocket. This regular cycling can be uncomfortable in what we call "bad" weather! Can it? Is it more uncomfortable to cycle home on a "bad" night than to walk to your bus, stand in a queue, elbow your way into the vehicle, and then have people treading on your feet, digging their elbows in your ribs, and blowing down your neck? And, when you get out of the bus, haven't you still to walk to your home? On consideration, which do you think is the less comfortable way of travel? I know the answer to this question! Again, you are afraid that you might have a puncture and be late for work. So you might, but it is worth remembering that cycling troubles are very few and far between. Moreover, public transport has been known to break down and make people late for their work. Yet again, you are afraid that you might catch cold in "bad" weather! Are you not much more likely to collect germs and things in crowded buses and trains, and is not constant exposure to "bad" weather—your word, not mine!—likely to make you immune from some of the minor ills to which flesh is heir? I think so. Indeed, on the latter point, I do a lot more than think.

In practice, it is surprising how few "bad" days there are—how seldom in the course of a twelve-month you will have to ride to and from business in your macs. Moreover, water-proof protection is so good nowadays that you need not fear a wetting. Let me add that a "bad" day in the winter is essentially the occasion for travelling by bicycle. When, on such a day, people raise their eyebrows and say that *surely* I'm not going to cycle home from the office in "this," I always want to know why not. For a "bad" day, when everybody else feels bound to inflict himself (or herself) on inelastic public transport, is just the day when I want to be "away from it all," ploughing my lonely furrow along the moist streets, keeping to my schedule, getting a packet of fresh air before settling down to a meal and an evening's work.



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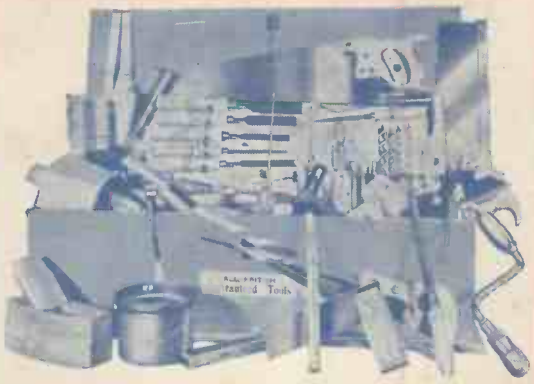

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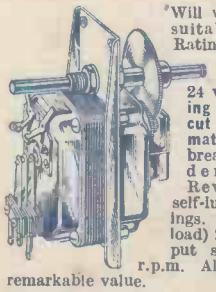

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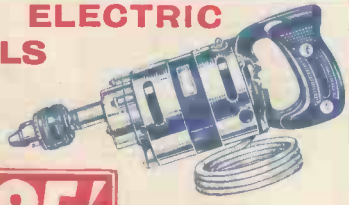

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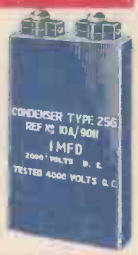

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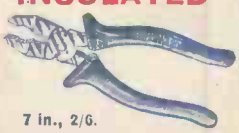

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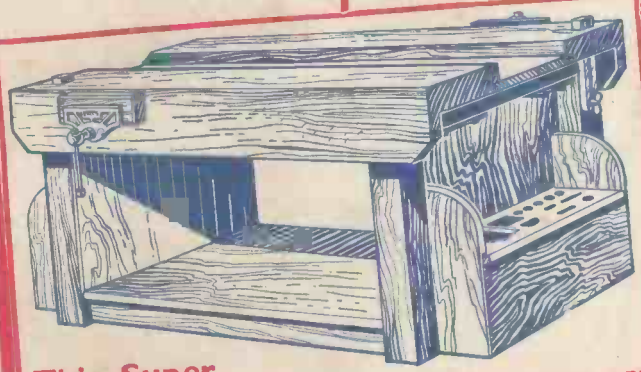

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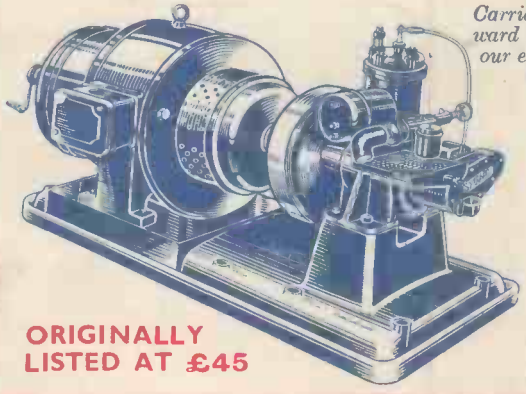

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