

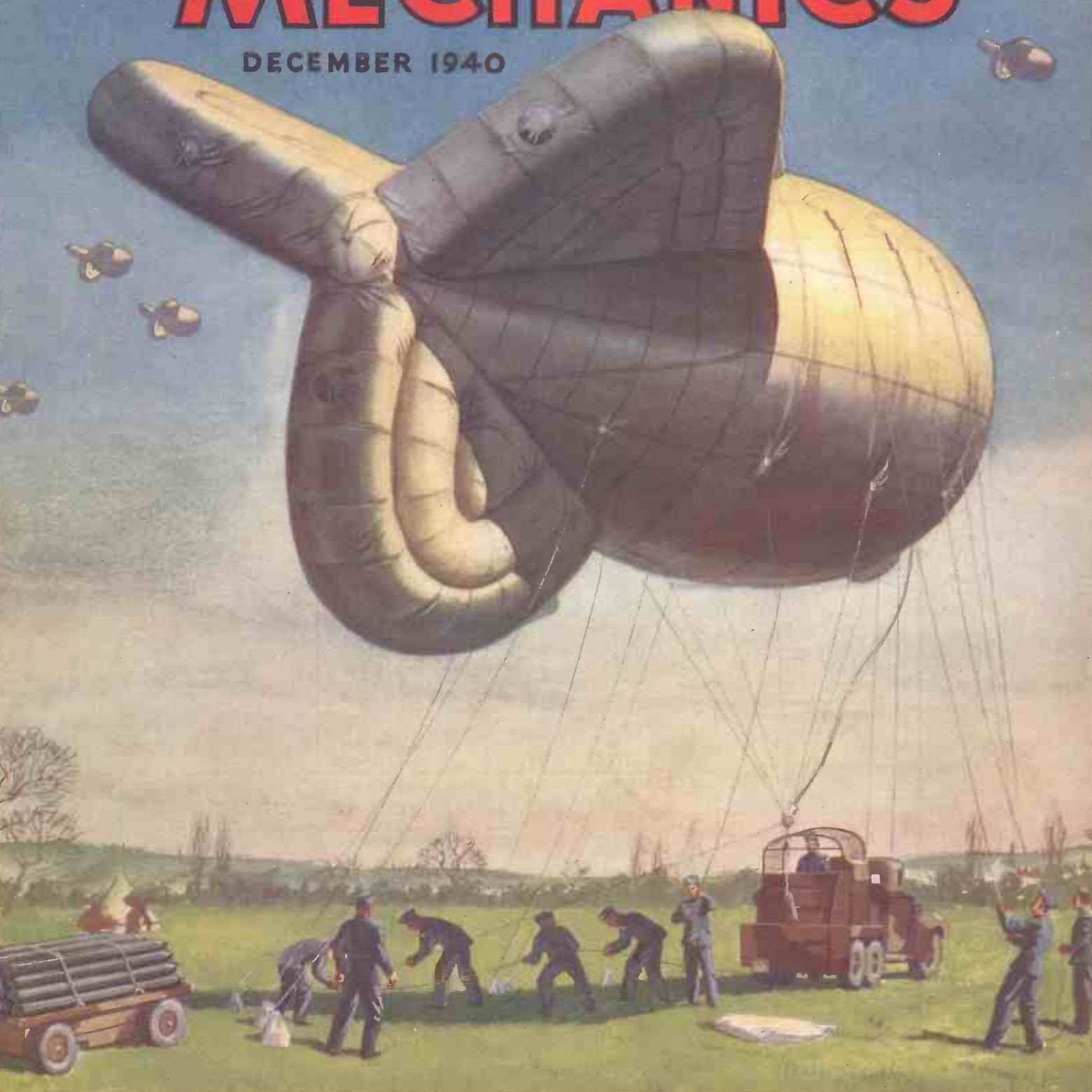
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NEWNES

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# PRACTICAL MECHANICS

DECEMBER 1940



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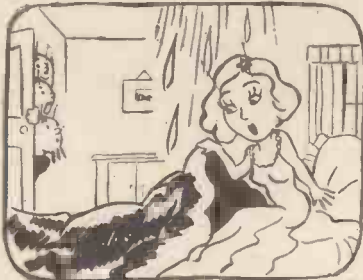
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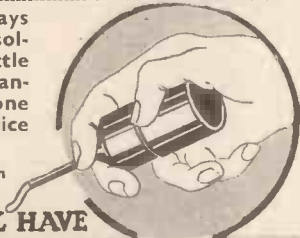
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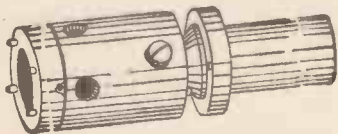
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# PRACTICAL MECHANICS

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

Editor: F. J. CAMM

VOL. VIII. DECEMBER, 1940. No 87

## Inventor and Employer

MY recent comments on inventors and inventions has brought me a large number of letters from inventors who seem doubtful of their position in relation to any invention which they make as a result of their work as employees. The position is quite clear. If an employee is engaged to work out the details of an invention or carry an invention into effect, any suggestions or improvements made by the employee are the property of the employer, who can validly apply for a patent for the whole of the invention in his own name. The position of the law as it affects master and servant in connection with patents is that, generally speaking, where the invention is that of the master, and the workman is asked to develop it and to put it into practice, the invention is the master's, but where the invention is evolved by the servant, there is nothing, in the absence of a special agreement with his master, to bar him from taking out a patent in his own name, and entirely for his own benefit, even though he may have made the invention in the master's time, and used the master's materials to aid him in completing his invention. Even where there is a Service Contract between the master and the employee, the rights in the invention made by the employee may still be those of the employee.

## A Case in Point

IN trying a case where the point was at issue, Lord Ormendale said: "As I understand the law on the matter, the mere existence of a contract of service in no way disqualifies a servant from taking out a patent in his own name, and entirely for his own benefit, notwithstanding that he has used his employer's time and materials to aid him in completing his invention, unless he has become bound by some agreement, either expressed or implied, to communicate the benefits of his invention to those in whose employment he is."

In this particular case, when the workman concerned asked his employers for recompense for their use of his invention, he received a letter pointing out that "Where, in the course of his employment, and relating to his employment, an employee brings out a patent, the patent is legally the property of the employer and, therefore, the employee has no legal claim against the company for royalty or bonus."

In dealing with this particular letter, it was described as an inaccurate statement of the law. It is clear, therefore, that where there is a definite contract to the effect that a person is specifically employed by another for the express purpose of improving a particular device or art, then any

## FAIR COMMENT

By the Editor

invention resulting from the work of the employee in connection with the work on which he is employed is the property of the employer.

Exactly to what extent the man who conceives an idea is entitled to improvements suggested by the person he employs to work out that idea is difficult to define, and must depend upon the facts of each case, but the guiding principle is involved in the question, "Is it the idea itself or is it merely the method of carrying the idea into effect that constitutes the pith of the invention?" (Terrell on Patents.)

## Improvements

IN another case, the judge directed the jury thus: "I take the law to be that, if a person has discovered an improved principle, and employs engineers, agents, or other persons to assist him in carrying out that principle, and they in the course of experiments arising from that employment make valuable discoveries accessory to the main principle, and tending to carry that out in a better manner, such improvements are the property of the inventor of the original improved principle, and may be embodied in his patent; and if so embodied the patent is not avoided by evidence that the servant or agent made the suggestion of the subordinate improvement of the primary and improved principle." This was confirmed by Tindal, who said: "... when we see that the principle and object of the invention are complete without it, I think it is too much that a suggestion of a workman, employed in the course of the experiments, of something calculated more easily to carry into effect the conceptions of the inventor, should render the whole patent void."

Terrell also says that it may be that the relations between master and servant are of such a close and confidential character that it would be inequitable to allow the servant to retain the benefit of a patent granted to him.

In another case, the servant had been requested to make the invention, and had, in fact, done so, but the patent was applied for by two directors of the company employing him. The patent was declared invalid. This case shows that the man who conceives the idea has no right to be granted a patent for the inventions of the man he employs to carry them out, unless those inventions are mere improvement in details.

## Ban on Petrol and Large Model Aeroplanes

UNDER an order issued by the Air Council, the Air Ministry has banned the flying of all types of petrol models, and the order also prohibits the flying of gliders and rubber-driven models having a wing span of 7 ft. or over. This leaves plenty of scope for ordinary models under 7 ft. and builders of model aircraft, therefore, will be thankful that the ban is not more severe.

The order is necessary when we remember the high altitudes and the long distances of which petrol models are capable. They would thus not only be a danger to our own aircraft (for a model weighing 7 or 8 lbs. and flying at 30 miles an hour could wreck a full-sized machine), but might be mistaken for enemy aircraft and might therefore engage the attention of our anti-aircraft defences. The S.M.A.E. had envisaged such a difficulty long before the war when they insisted that all petrol-driven models be fitted with an automatic time control switch, so that the ignition could be cut out and so keep the model within the flying limits of the aerodrome.

## New Books

A REMINDER that a catalogue of our technical publications for engineers, motor mechanics, aero engineers, electricians, radio mechanics, students, designers and draughtsmen is available free to all addressing a postcard to The Publisher, the Book Department, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Recent new books issued are "Gears and Gear Cutting" (5s., by post 5s. 6d.), "Watches: Adjustment and Repair" (6s., by post 6s. 6d.), "Radio Engineers Vest Pocket Book" (3s. 6d., by post 3s. 9d.), "Diesel Vehicles: Operation and Maintenance" (5s., by post 5s. 6d.), "Motor Car Principles and Practice," (3s. 6d., by post 4s.), "The Superhet Manual," (5s., by post 5s. 6d.), and the new edition of "Workshop Calculations Tables and Formulæ" (3s. 6d., by post 3s. 10d.)

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# The Balloon Barrage Explained



The curious, elephant-like appearance of barrage balloons as they are flown from lorries

**N**OW that this country is being subjected to continuous bombing raids by the Germans, the balloon barrage is proving its worth. The entire bombing squadron never succeeds in breaking the combination of balloon barrage and anti-aircraft fire. The balloons, in fact, which have so long been familiar and friendly figures above London and other cities, have done precisely the job which they were meant to do. The fact that they have brought down a number of the enemy is merely incidental. The object of the barrage is not to bring down the enemy, but to keep the enemy bombers at the height at which A.A. gunners and R.A.F. fighters like to see them, and to prevent dive-bombing. High-level bombing is not, of course, the concern of the A.A. gunners.

## Balloon Potting

The Germans have shown what they think of the barrage by deliberately attacking our balloons with machine-gun fire, and it is obvious that they would not waste their time and ammunition in potting them as an idle pastime. A likely explanation of these attacks is that the German Air Force is afraid of the balloon barrage, and that they look on it as an obstacle to be removed, if possible. So far they have been unsuccessful, as they have not been able to bring down enough balloons at the same place and at the same time to leave the way clear for the dive-bombers, which would no doubt have tried to follow if they could.

The British authorities have indicated their belief in the balloons by making a steady increase in the strength of the barrage. Both in balloons and personnel the numbers of the barrage have been more than doubled since the war began. Many new jobs have been found for the balloons. They have been used to help to protect convoys from

air attack, and as is well known to Germany, they have for a long time played an important part in the air defence of Scapa Flow.

## Height of the Barrage

No figures have been issued regarding the maximum height to which the barrage can ascend, but it is hoped that eventually we shall be able to send them up to a height of nearly five miles. There are very few bombers operating that can fly over 30,000 ft., and assuming that the balloons reach a height of 15,000 ft., then the amount of sky to be searched by the defenders is immediately halved. Even when visibility is good, the hundreds of steel cables which

## Protecting Special Objectives against German Dive-bombing Attacks

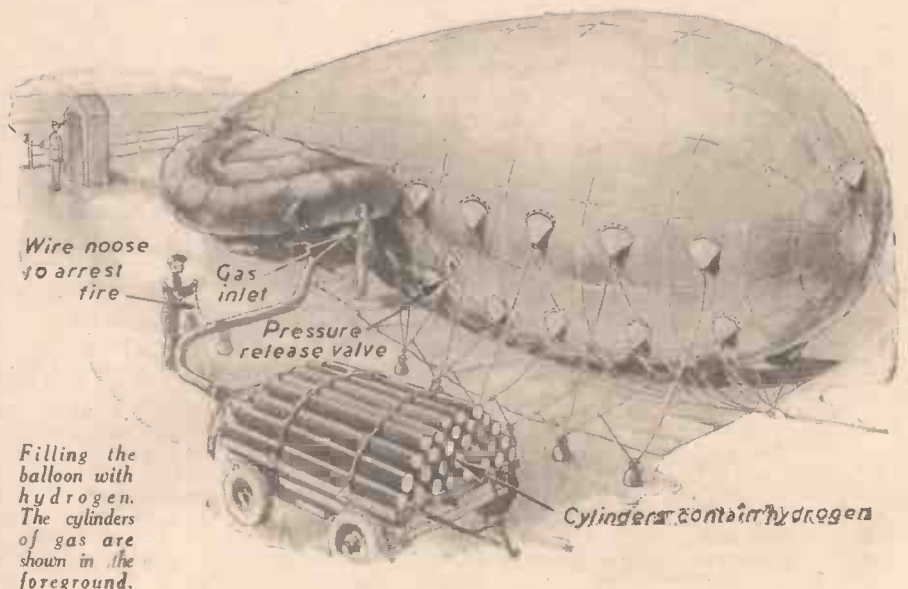
reach up into the sky are a source of dread to the bomber pilot, whilst in bad weather the danger to the pilot is increased three-fold. Another source of danger to the pilot is that the position of the balloons guarding a city is constantly changed, so that the exact location of these obstacles would never be known to the enemy in advance of a raid.

## Methods of Defence

There are two ways of protecting a given area with a barrage. The balloons can be arranged in the form of a "fence," or they



Testing for wind direction by means of a windsock.





can be spaced out in a regular pattern. The last method is the one most widely used in England, and it is known as the "field siting" of balloons. The Balloon Command of the Royal Air Force are the controlling body of all the balloon squadrons which are situated in various parts of Great Britain, and they are linked up by an elaborate and foolproof system of communication. The raising or lowering of every balloon in the country can be carried out in a matter of minutes.

**The Crew**

Each balloon is worked by a crew of twelve who are in control of a winch lorry and a gas trailer. The lorry, which is used for transporting the balloon, also carries

ascend very rapidly in an emergency, and can remain in the air for a considerable time.

When the balloon is in the air it flies like a kite so that the cable is at an angle and not directly below it. This makes it more difficult for an airman to avoid the cable.

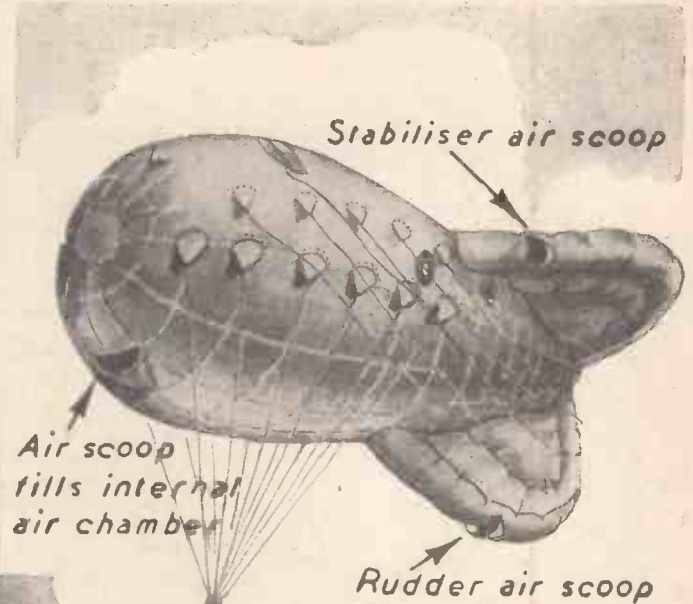


A floating balloon barrage station used in convoying ships

a second engine for operating the cable winch. Considerable skill is required to operate the motor for raising and lowering the balloon, as it is equipped with gears and clutches. A wire cage encloses the man with the winch to protect him from the danger of the cable snapping and whipping dangerously. The balloon can be made to

ascend very rapidly in an emergency, and can remain in the air for a considerable time.

Frequent inspection of the fabric of the balloon is necessary in order that leaks may be repaired, and the ropes and cordage must be given close attention. The balloon must also be lowered periodically for the injection



Details of the balloon showing the air scoops, stabiliser and rudder

The large fins at the rear of the balloon which hold it head on into the wind are not filled with hydrogen like the rest of the bal-

loon of fresh hydrogen, as the constant slight leak from the envelope causes a loss in lift.

Week by week more balloons take the air. It may look an easy matter to keep them flying, calmly as it seems, high above. But barrage balloons are temperamental. "Playful as kittens" is the description given by one officer to his charges. It is a skilled business keeping a family of balloons well on the job.

**More Effective Barrage**

Inventors are constantly seeking to improve on the effectiveness of the balloon barrage, and one inventor claims that it is now possible to have barrage balloons at negligible cost. His idea is to coat a very thin wire with chromium crystals so that it will cut into steel. One metre of hydrogen will be capable of holding up 1,000 ft. of the wire, and calculations have shown that its tensile strength is such that it will easily stand up to an aeroplane travelling at 200 m.p.h. In this way the barrage balloon can be reduced considerably in size and the barrage can be extended indefinitely at small cost.

**Sea Barrage Balloons**

One of the newest branches of the navy and sea-going section of the R.A.F. is the strange craft that have only a barrage balloon for their cargo. They are used in the convoying of ships and have proved their worth on many occasions in scaring off the dive bombers. These balloon craft carry a crew of three R.A.F. men and a number of hardy fishermen. Ferry barges are used to take the balloons from the shore to their floating stations and back again. At regular intervals, shore leave is granted to the crew in charge of barrages at sea, but, in rough weather, it is often impossible to arrange regular leave so each unit is supplied with emergency stores.

**Protection for operator**



Details of the lorry for carrying, raising and lowering the balloon

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**A**FTER the passage of thousands of years, millions of people are emulating at spasmodic intervals the troglodyte's example by taking to funk-holes—with sirens and bombs taking the place of the carnivorous wild animals which speeded our prehistoric forebears' steps. This temporary but urgently desired accommodation being short, builders are busy running up surface-shelters and excavating subterranean retreats.

Present conditions are swinging the world from the skyscraper—as the ultimate conception in building—to subterranean existence. The trend, at least in America, has been “the sky's the limit.” Perhaps unconscious of the change, we are becoming accustomed to spending much of our business and pleasure time below ground. Subterranean car parks are taken for granted and we travel extensively underground. Our cities are tunnelled intricately with vast sewers, with bricked caverns through which run water, gas, electricity and other essential public services.

## Steel and Concrete

Underground cities of steel and concrete have been constructed at the cost of scores of millions of pounds for the accommodation of armies, as witness the Maginot and Siegfried Lines. The use of steel and concrete, apart from warlike requirements, represents the greatest advance ever made in building construction. The steel girders, rods, etc., which form framework, backbone and ribs of the modern structure strengthen the concrete which in liquid form is poured around, over or into the skeleton; and the concrete, setting hard, strengthens the steelwork. Adhesion between the two is very great, and the covered steel is preserved by the concrete from corrosion. The “partner” substances are affected in equal degree by changes in temperature. Their expansion under the influence of heat and their contraction in cold water is uniform. The embedded steel bar will never again part company with the concrete, except to deliver itself up in fragments under extremely violent treatment.

Those who order the erection of big new buildings stipulate as a matter of course that these shall not only be fire-proof but bomb-proof. For these the old stereotyped method of brick upon brick has had of necessity to go by the board. Entirely new methods, with new materials, may have to be devised for the period of the war as a result of the ban on the use of steel except in the nation's war effort.

According to an order issued in July by Mr. Morrison, who was then Minister of Supply, contractors may neither obtain supplies of steel for private building enterprises nor use supplies which may already be in their possession, except under special licence. Work that was in progress with this material is suspended for the duration of the war

and Mesopotamia he used clay or mud, the sun baking this to brick-like hardness. He does it still, as in the days of the early Pharaohs, using palm branches criss-crossed for the walls and plastering these inside and out with mud or wet clay, with more palm branches for the roof and perhaps a final covering of firmed soil in lieu of slates, tiles or thatch.

It facilitated building operations considerably when it was discovered that wet clay or mud could be moulded into bricks instead of the material being plastered on to a framework. The Israelites found that chopped straw added to the wet clay bound their bricks firmly. And some of them builded better than they knew. Bricks unearthed from Babylonian ruins are in sound condition to-day. We have improved on methods of brick-making, but placing



Two of the earliest forms of house construction. The cave dwellers and the marsh dwelling.

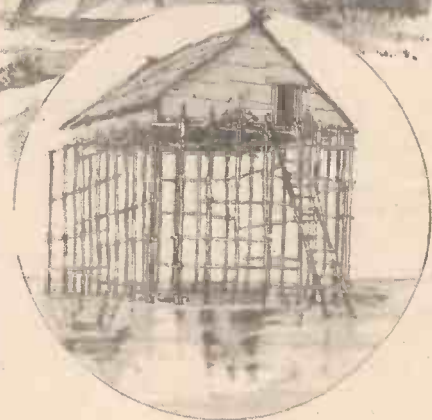
## Good Old Days

There are those who sigh in Britain for the Good Old Days when people were not unduly worried by building restrictions or mortgage societies and spirits were not crushed by rates and taxes and budgets terrifying in their astronomical proportions . . . when one shuffled about one's earthen floor in semi-darkness; when the rich had rushes instead of carpets; when the smoke of the fire went up through a hole in the roof and rain and snow came down the same way; when rich and poor alike knew nothing of sanitation and cared less.

Except where the spark of Life has flickered feeblest, always there has been the urge in mankind to secure some improvement in the home. Unsuccessfully disputing possession of his chosen cave with some undesirable animal seeking shelter on a stormy night, the savage contrived for himself a tree-top home; or he dug into the ground and roofed his excavation crudely with tree-branches and mud. Then Man took to real building. In considering the mechanics of house-building the layman is apt to think instinctively in terms of brick. But except in more or less highly civilised communities the rule has always been—according to environment so the building materials.

## Adapting Surroundings

Where stone and rock were plentiful, the builder used these. In timber country he made himself a wooden shack. In Egypt



brick upon laborious brick is still the customary way of building houses for “the masses.” Though after the 1914-1918 war the fashion was set of rushing up housing estates on the mass-production principle, some of them truly hideous structures of concrete and iron.

In this country ordinary bricks are moulded 10 ins. long, 5 ins. wide, and 3 ins. thick, these dimensions being reduced by shrinkage during the drying and burning to about 9 in. by 4½ in. by 3 ins. Many interesting experiments there must have been and many walls must have fallen down before it was discovered how to make bricks support each other, additional to the use of mortar. By trial and error it was found that no two joints should ever come immediately over each other. Also, it was found that additional strength was



# House Building

given when some of the bricks were laid as stretchers—that is, lengthwise with the wall—and others as headers, these running into the thickness of the wall.

Some of our ancient buildings are constructed of blocks of stone keyed together, with never a scrap of mortar to bind the whole in place.

## Clay Bricks

Red clay bricks in the shape of balls are employed in the construction of really substantial dwellings in some Nigerian towns. The wet clay is moulded by hand into balls and sun-dried. Clay plaster is then applied, by hand, inside and out. The

Lapps; Red Indian wigwams, formerly of bison hide, now largely constructed of canvas or cotton material; Hausa grass huts, consisting of a frame work of saplings secured together at the top and interlaced with tough grass—a two-hour job of work; and Eskimo dwellings of turfed stone, and igloos formed of blocks of frozen snow with a sheet of ice for a window.

In the matter of windows, early dwellings in our own country had none. They were represented by holes or slits, and they were designed to let in air rather than light. Glass windows were first fitted in England in 674, but even in the houses of the rich they did not at once displace the oil-doped linen

## How the Cave Dwelling of the Troglodyte Came to be Replaced by the Steel and Concrete Skyscraper of To-day

roof is of similar material or it may be thatched. From first to last no tools are used, the moulding of the clay balls being done with hands and feet. Good as this workmanship is, the buildings are inferior to the flat-roofed, two-storeyed houses of burnt brick and mud dating back to about 2,200 years B.C., as were built in the Sumerian city of Ur. In the days of Imperial Rome there were flats, or tenement houses, for the poor, brick built; shops and offices occupied the ground floor, with three floors of self-contained flats above.

The "long houses" of Borneo are built on the communal system, each being tenanted by any number of families up to about 60. Each family has its own quarters, with a long gallery running from end to end of the house for common use. Other houses in Borneo are built on piles driven into water, a system followed also in Malaya and New Guinea. Evidence of a similar collection of lake or marsh dwellings has been discovered in this country at Glastonbury, Somerset. The dwellings stood upon an artificial island occupying an area of about 3½ acres. This island, or vast platform, consisted of baulks of timber laid side by side and resting on brushwood which had as its foundation more timber and masses of peat.

## Mud-and-Wattle Houses

Further instances of the use of diverse materials in building are provided by the mud-and-wattle houses of Bolivia; the Cameroon mud houses; turf houses of the

with which the openings were covered to exclude draught when this became too overpowering. When at last all window-frames were glazed as a matter of course, this aid to comfort and well-being received a very serious set-back. This took the form of a window-tax, and the tax was so burdensome that many householders were obliged to remove the glass and brick-up the openings. A number of old buildings in which this was done are still standing, in London and elsewhere. As for chimneys, these did not appear until Norman times. Much skilled work has since been put into the design and building of large chimney-stacks, the brickwork constituting part of the ornamentation of the house.

## Siting of Houses

Not in all things connected with the use of bricks have we moved forward. All too frequently the siting of houses has been designed in the direction of the accommodation of the maximum number of people in the minimum space. Not so Queen Elizabeth's time, when the law decreed that no house—not even a cottage—should be built with less than four acres of ground attached. Whether this was strictly enforced is another matter. We do know that there was, and has been, considerable land-grabbing.

Most of us have lost the land, but we have a Building Research Board. Organised under the Department of Scientific and Industrial research, the Board's 200 research and laboratory workers keep their wits sharpened on the solving of building

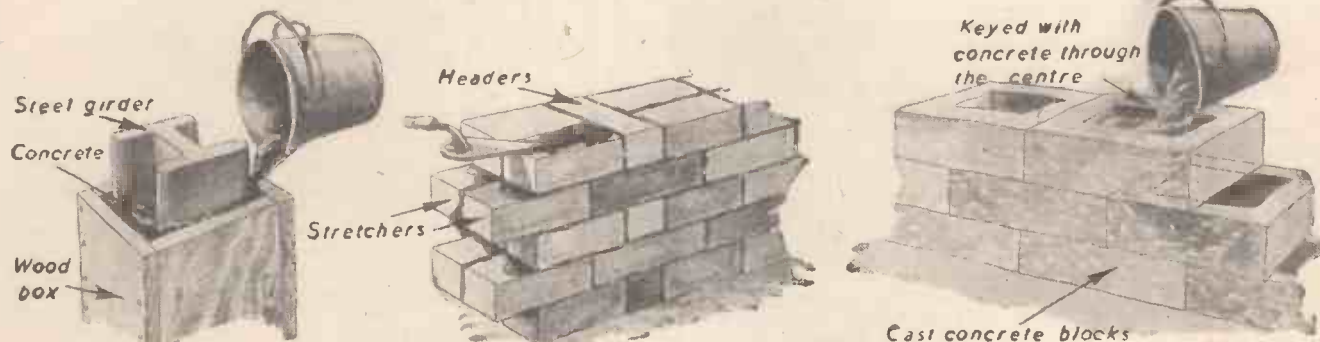


Steel and concrete developed the skyscraper. This building is 1,248 ft. high and houses 20,000 people.

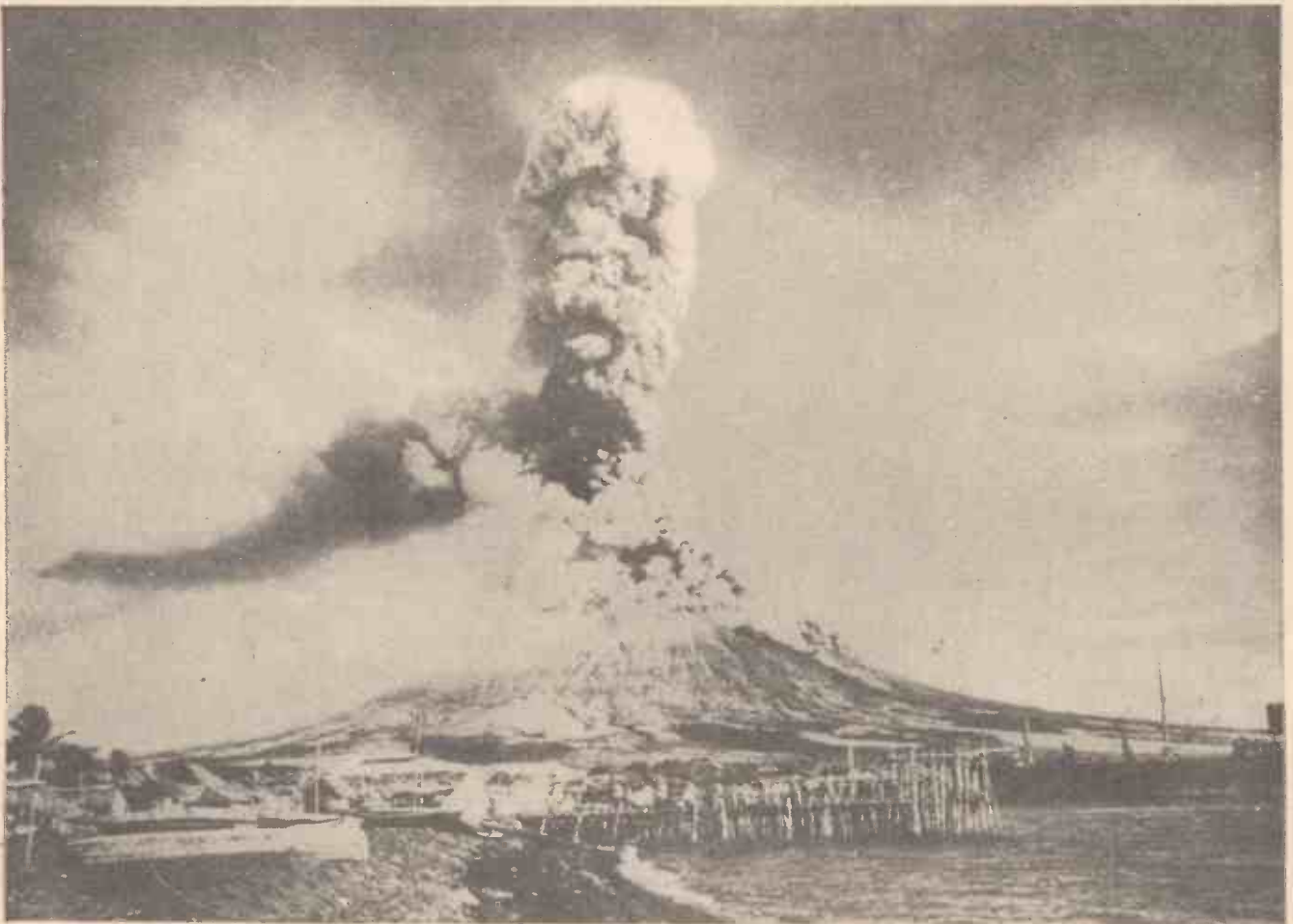
problems generally, in producing new materials and analysing old ones, experimenting in the realms of lighting, heating, acoustics and ventilation. They have put Science on a firm footing as the basis for that age-old operation of placing brick upon brick.

## New Building Developments

One of the latest developments in brick construction is moulded hollow bricks which can be filled with sand or gravel. They have alternating projections and recesses which enable them to fit together, so that no bonding is required. Another development deals with production of a synthetic material for building purposes, which will resist moisture and the deleterious effects of changing atmospheric conditions. This synthetic material may be used in the making of what are commonly termed artificial stone blocks, jointless floors, partition walls and other structures normally made from concrete tiles and plaster.



Three methods of modern building construction.



Mount Mayou, at Legaspi, Philippine Islands, in full eruption after remaining dormant for 10 years.

# Nature's Blitzkrieg

## Interesting Facts Concerning Volcanoes and Their Activities

**T**HE majority of us are apt to imagine that volcanoes are to be included among the world's rarities. We are told that many islands and stretches of land, including, indeed, portions of our own country, were originally put on the map as a result of violent volcanic action, but all such terrestrial outbursts we usually regard as belonging to a past epoch, the principal present-day survivals of these terrible earthly eruptions being manifested in the periodical activities of a few famous fiery mountains such as Etna and Vesuvius.

That such a notion is an entirely erroneous one is to be gathered from the fact that there are in our own times about 270 volcanoes scattered here and there over the surface of our globe and which are more or less in constant eruption. True, it is that the sum total of the earth's volcanic activity is considerably less than what it was in the past. Nevertheless, as we all know, Nature, upon occasion, shows herself to be capable of carrying out a terrible volcanic *blitzkrieg* or lightning war upon a far more deadly and destructive scale than any man-made weapons could achieve. Thousands upon thousands of lives have been lost in consequence of the earth's volcanic explosions and bombardments. Indeed, it was at one time widely believed that

volcanoes were expressly designed for the annihilation of the wicked and by way of a judgment on mankind in general, the Mediterranean volcanoes, Etna and Vesuvius, being in the Middle Ages especially regarded as regions of eternal punishment for religious heretics and political sinners

### Abode of Vulcan

In the early ages Mount Etna, in Sicily, was generally regarded as constituting the entrance to the nether world and as being the abode of Vulcan, the god of Fire. Etna, therefore, became the Mount of Vulcan, it being from this primitive notion that the term *vulcano*, and at a later date *volcano*, arose.

Mankind in the past is not to be blamed for placing its customary horrific interpretation upon the many manifestations of volcanic action which it is called upon to witness. For, after all, volcanic action, when it approaches anything like severity, is still in these times a terrifying and an awesome spectacle. With all the resources of modern science, there is still no arguing with an active volcano, and although certain courageous and enthusiastic scientists have, for the sake of knowledge, ventured almost within the craters of active volcanoes, the majority of

humans when suddenly confronted with the fact of volcanic eruption invariably remove themselves as far from the source of disturbance as their circumstances permit.

The basic cause of volcanic activity is, of course, well known at the present day. Volcanoes, when they have suddenly broken out into activity in populous regions, have proved themselves to be scourges of mankind. At the same time, however, such sudden and uncontrollable outbursts are, in the long run, beneficial to the world as a whole, for they represent so many safety-valve actions by which the pent-up heat-energy of the earth's interior finds its periodical escape. If there were no volcanoes, earthquakes would be of far more frequent occurrence and of far greater severity than they have been in the world's written history

### Earth's Origin

In order fully to realise the inner causation of a volcano's action we must have regard to the modern theory of the earth's origin, which theory postulates that our terrestrial globe was initially formed by the gradual condensation of a mass of whirling, incandescent gas. This gigantic fire-cloud floated more or less freely in space, subject only to the gravitational



control of the sun. Now, it is a universal law that when material particles are left free from outside influence they tend always to crowd together and thereby to assume a globular condition. Mercury or quicksilver, when dropped on to a smooth surface, breaks up into innumerable tiny globules. So, too, does water when allowed to fall in drops on to a greasy or a hot plate. Rain water, freed from the clouds, descends to the earth in globular form. In this case, however, the earth's gravitational force pulls each water drop out of its globular shape so that it acquires an elongated or pear-drop form. If, however, no gravity were present, any water drops existing in space would invariably assume a perfectly globular and spherical shape.

It was for precisely the same reason that the initial mass of flaming gas which was eventually to become the earth, upon which we live and have our being, rapidly assumed a spherical shape. As the outer layers of the gas globule cooled down, molten matter was formed. This molten matter gradually solidified, forming a surface skin, which skin, through the succession of long ages, became thicker and thicker until, eventually, after the elapse of many millions of years, a more or less durable crust shaped itself around the still super-heated molten core of the giant sphere or globule.

#### A Solidified Crust

It was in this manner that our earth originated. At the present time we do not know exactly how thick the solidified crust of our globe is. Geological evidence, however, seems to show that it is possibly about one hundred miles thick. Hence, presumably, below the hundred miles crust of rocks there still exists the greater bulk of the earth, a mass of seething, super-heated material among which gigantic and unknown forces make ceaseless endeavours to unleash themselves.

Exactly what state the earth's inner core exists in we do not know, nor have we any means of knowing. Such a subject, as a matter of fact, constitutes one of the great mysteries of Science. Owing, however, to the enormous pressure to which the earth's heated interior must be subjected, it would seem that the core of our globe must take the form of a plastic solid through which wave and pressure motions are readily transmitted. In such regions the prevailing pressure must be many thousands of times that of the most super-efficient steam boiler, and were it not for the fact that some of the earth's heat is continually escaping, such colossal internal pressures would sooner or later break through the earth's crust, obliterating a continent in so escaping.

The earth's crust consists for the greater part (so far as we are able to ascertain) of huge masses and conglomerations of rocks, irregularly compacted and existing in uneven layers. Sometimes, in consequence of one or more unusually strong internal pressure waves, large masses of rock simply shear through and then tend to slip together again. This slipping effect is, of course, the cause of earthquakes. Often enough, a severe earthquake will set up a train of internal pressure waves which give rise to volcanic activity in another part of the

#### Earthquakes

Earthquakes, therefore, and volcanic action have a common cause in the earth's super-heated, high-pressure interior. If all the world's volcanoes ceased to erupt, earthquakes would become more frequent

the moon's gravitational pull and that, too, of the planets. The motion of the tides, the unequal external heating of the earth by the sun's rays and the periodical "wobbles" which the earth experiences in its journeys around the sun. Here, however, Science finds itself among some many unknown influences that only the most tentative of theories can be put forward to await a clearer explanation at some future date.

Textbooks not infrequently refer to volcanoes as constituting "burning mountains." Strictly speaking, however, volcanoes themselves are not mountains, being rather mountains in the course of formation. A volcano is best described as a vent or an orifice in the earth's crust through which hot gases, liquids and solid matters are ejected, often with explosive force, from an unknown distance within the earth's interior. Normally, the debris from a volcano will collect around the orifice in the condition of a conical mound, thus forming the traditional crater of the volcano. Within this crater may exist several volcanic vents or orifices from which the upcoming matter from the earth's depths finds release.

#### Varieties of Volcano

There are at least three different varieties of volcanoes. In the first place, there are the so-called "mud volcanoes." These are comparatively innocuous and unimportant volcanoes which do not appear to be imbued with sufficient internal energy to throw their products high into the air. Instead, they seem to produce volumes of hot steam which condenses and mixes with the volcanic dust to form a species of mud which at times overflows the crater and runs down the slopes of the mountain and at other times falls back into the orifice of the volcano.

Mud volcanoes, clearly, are volcanoes which have had their fling. They are expiring volcanoes which have only sufficient energy to eject a little steam and dust and to mix it together to form mud.

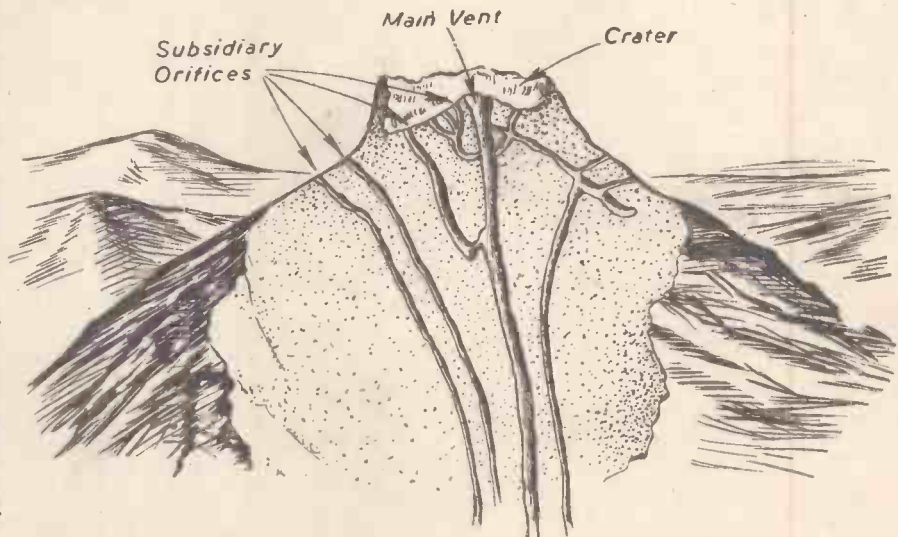
In the same class, too, must be included the various "geysers" or natural fountains of hot water, such as are to be found in



Vesuvius, the historic "fire mountain" shown in eruption.

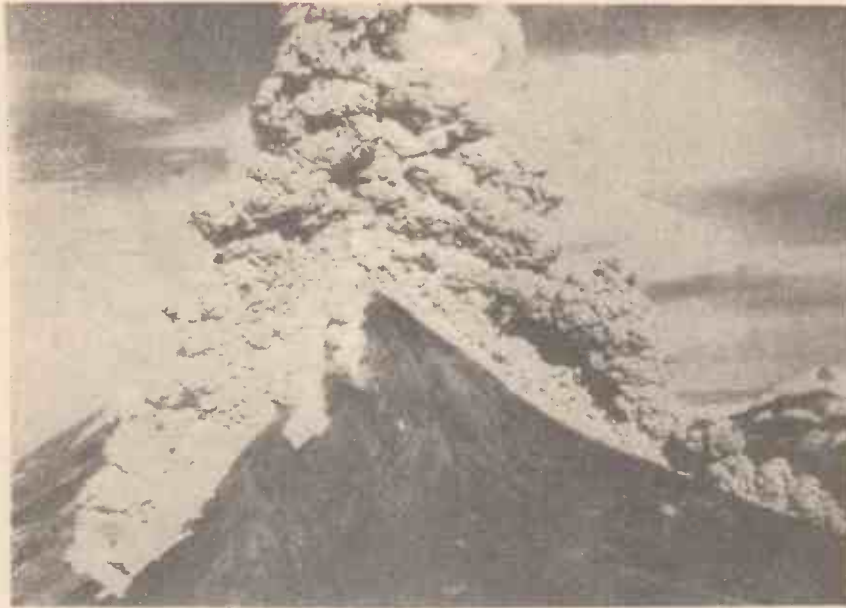
and more severe. In such a case, the world might even dissipate itself for ever by means of one gigantic internal explosion.

It has been supposed, also, that the many external influences which govern the earth's rotation on its axis and its annual progression around the sun are so delicately counterpoised that when any two of these attain an unusual condition of coincidence, violent volcanic outbreaks arise. Among such "external" forces may be mentioned



Diagrammatic section of a volcanic mountain, showing the main vent and the subsidiary orifices around it.





*A remarkable illustration of a volcano in violent eruption.*

Iceland and in other parts of the world. It is very probable that such nowadays economically useful manifestations constitute the last efforts of some previously powerful volcano.

Next in our classification of eruptive mountains come the "effusive" volcanoes. These volcanoes belch forth blasts of high-pressure, super-heated steam, together with torrents of ashes and lava which latter pour down the mountain side as white-hot masses, flooding fields, villages, blocking rivers and turning them into steam, and withal obliterating everything with which they make contact. For years after it has ceased to flow, a river of lava may exist as an ashy mass which is red hot within a few feet of its surface.

Finally, there are the "explosive" volcanoes. These are volcanoes which suddenly go off like gigantic land mines, hurling sometimes square miles of solid land into the clouds and desolating everything within a wide radius of their seat of activity.

#### "Fire Mountain"

Vesuvius, the historic "fire mountain," which in A.D. 79 suddenly and completely buried the Roman city of Pompeii, with all its wealth and riches, is an example of an explosive volcano. Often enough, volcanoes of the explosive type remain for very long periods in a state of complete inactivity, so much so that they are considered to have become extinct. Vesuvius, the destroyer of Pompeii, is a case in point.

Perhaps the most stupendous instance of explosive volcanic activity occurred in comparatively recent times. On August 26, 1883, the South Sea island of Krakatau, which represented the remnants of a huge volcanic crater rearing up from the sea bed, experienced four colossal subterranean explosions which completely blew away the greater part of the island and which cracked windows and even walls in places as much as 100 miles distant. One and a quarter cubic miles of fine ash were blown into the upper regions of the air, and for months and even years afterwards this finely divided matter circled around the earth, giving rise to superb and wonderful glowing, flaming-red sunsets.

The volcanic explosion at Krakatau caused the loss of some 36,000 lives and the tidal wave set up by the explosion was even felt at Port Elizabeth, 4,690 miles away.

In great contrast to the volcanic manifestation at Krakatau is the orderly behaviour of Cotopaxi, the world's highest active volcano and one of the world's best behaved ones. Cotopaxi rises to a height of nearly 20,000 feet, it being a mountain in the Andes, some 45 miles south-east of Quito, Ecuador. Cotopaxi rears its head amid a desolate region of perpetual snow, and it exhales its fiery discharges at regular intervals and in a harmless manner. At one time, Cotopaxi must have been a very violent, effusive volcano. Now, however, it is reaching old age and its activities are gentler.

#### On the Bed of the Ocean

Volcanoes occur at the bottom of the ocean as well as on dry land. Indeed, if the floor of the Pacific ocean could be seen it would show itself to be the theatre of almost constant volcanic activity. Almost all the Pacific islands are of volcanic origin, being thrown up from the sea bed by repeated volcanic discharges. Could the vast Pacific ocean be drained, an amazing spectacle would be presented to the eye, the Pacific islands rising up thousands of feet from

the ocean floor with almost straight, precipitous sides. No wonder it is, with volcanic activity being constantly present in the Pacific, that small islands in that region have a way of suddenly disappearing and reappearing almost at random!

The American island of Hawaii is entirely of volcanic origin and it contains a number of still energetic volcanoes, one of which, Kilauea, is frequently visited by tourists, despite its active condition. The crater of Kilauea has a circumference of about eight miles, and it is 600 feet in depth. At the bottom of it is a pit of molten lava known as "Halemanamau," or the "abode of everlasting fire." Kilauea and Halemanamau constitute, perhaps, the most scientifically studied areas of volcanic activity in the world. Yet their inner secrets have never been penetrated.

In ages past, volcanoes were active in Great Britain, as witness, for example, the great volcano which threw out the lava which crystallised in the well-known basaltic column, of the Giant's Causeway in Northern Ireland and the Island of Staffa, in Scotland. Numerous areas of Britain are of direct volcanic origin, but all such volcanoes have long been extinct (or so, at least, we fondly believe) nothing remaining of them but vestiges of their lava deposits and the contorted mountain ranges which their activities brought into being.

#### Lava

It is usually believed that the lava and other matter which is thrown out of a volcano ascends from the earth's inner layers. This, however, is seldom the case. Most of the ejected material comes from the upper portions of the volcanic vent or orifice, only the hot gases, steam and sulphurous material arising from greater depths. Up to the present time no one has been successful in laying a pipeline within the vent of a volcano, although some attempts have been made with this object in view. Volcanic gases and other ejected material has from time to time been chemically examined, but so far without the discovery of any material or elements which are not already known to Science.

From time to time suggestions have been put forward with the aim of obtaining power from volcanoes, mainly by the collection of the hot gases ejected therefrom. The average volcano, however—even the mildest one—is a highly formidable thing to deal with, and hence, for the present, at any rate, the herculean yet engrossing task of harnessing a volcano for the world's uses must still remain one of Science's probable future feats.

## A Transportable Armoured Cell

**A**N application to patent an improved transportable splinter-proof armoured cell has been accepted by the British Patent Office. This is a shelter for use by the personnel of anti-aircraft stations, police and firemen. It is of a size convenient for the accommodation of one, two, or at most four persons. The cell is of sheet steel, or a like splinter-proof steel metal, closed on all sides and at the bottom by a base integrally united to the side wall. The roof is cone-shaped. And there are means for speedily and temporarily fixing the cell to the ground.

The characteristic feature of the shelter

is its door. This, which opens outwardly, is so constructed as to enable the door to be lifted directly off the hinges, in the event of it being impossible to open it in the usual manner, owing to a collection of debris in front.

Further, on the inner side of the door are means by which it can be handled by a person within the cell, who can lift it off its hinges. There is also an arrangement which limits its opening movement and supports the handle against further opening during the lifting of the door off its hinges by an upward thrust applied to the door by means of the handle.



# Power From The Ocean



The white breakers which fling themselves continuously upon our shores represent thousands of horse power, which are allowed to go to waste. Some day this energy will usefully be directed to industrial ends.

In these hectic days of strife and struggle few of us have time to reflect upon the fact that by far the greater part of our modern mechanical energy and power is mineral-derived.

Coal and oil form the chief supplies of the world's present-day energy. It is true, of course, that in certain mountainous regions, the energy of falling water is used to drive great dynamo installations and thereby to supply electric current over a wide area. Nevertheless, a few countries are sufficiently favoured by Nature with sufficient water energy for large-scale use, and it is mainly for this reason, coupled, of course, with the ready availability of coal and oil supplies that such sources of energy are universally employed throughout the world.

Thinking and reflective scientists have, however, envisaged a time, not too far distant, when coal and oil supplies will have dwindled exceedingly, thereby making it vitally necessary for mankind to look round for fresh sources of energy.

## Coal and Oil

After all, present civilisations are very much analogous to a spendthrift who continually draws money from a bank with hardly a thought as to what is going to happen to him when his financial resources have all been expended. Nature's deposits of coal and oil are, indeed, vast, but they are not illimitable. True it is, that if petrol petered out, the supply of motor fuel could for some time be maintained by making synthetic spirit from acetylene, the acetylene being produced by the action of water upon calcium carbide, and the latter, in its turn being manufactured by fusing lime and coke in a high-temperature electric furnace. But to operate an electric furnace on the commercial scale you need large amounts of electrical energy, and in order to obtain such energy you must have fuel (or water power) to drive the dynamos.

Hence, it is that under the conditions of a world scarcity of fuel, such a scheme would hardly be universally feasible.

Mankind, in the above circumstances,

## Methods which are Available for Harnessing the Energy of the Waves

might, of course, grow large acreages of sugar-giving plants and ferment these to alcohol which, if properly undertaken, would be a fairly cheap process. However, it is doubtful whether the demands upon such fuel alcohol could be met by the space available for the necessary sugar-plant cultivation. The problem, perhaps, might be overcome, but it would certainly be a difficult one to deal with.

Many people of the present day appear to think that in the fairly near future we shall have conquered the secret of the atom and that we shall then be in a position to avail ourselves of unlimited amounts of atomic power. Alas, however, such designs are merely the results of wishful thinking. We

are still almost as far off the goal of the realisation of atomic power as ever we were, and in that respect we must necessarily leave the future to take care of itself.

## Unlimited Supply of Power

The world, however, has at hand in nearly every country an absolutely permanent and unlimited supply of power in the seas and oceans which ceaselessly move and swirl around the dry land. Such a fact has long been recognised and many have been the attempts to utilise the irresistible energy of the tides. The idea in all such cases has been to compel the incoming tide to raise weights or masses of water from a low level to a high level, useful energy being subsequently obtained by allowing such weights to fall or by causing the elevated masses of water to run out to lower levels.

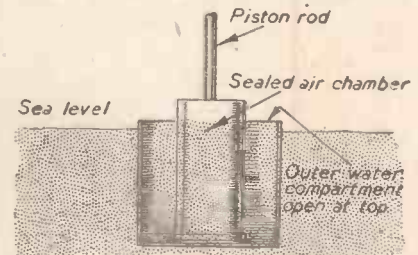
There is no doubt that such schemes could, in some respects, be made reasonably practicable. There have, of course, been many failures with attempts at constructing "tide motors," but frequently such failures have been less technical than economic, for it must be remembered that, at the present day, there is absolutely no demand for ocean derived energy. We are, as it were, content to live upon our inheritance taking little thought of the future, so far as our energy supplies are concerned.

Although public attention has been focussed from time to time upon the utilisation of tidal power, the subject of obtaining actual power from the waves has been given very little prominence. Yet it is more practicable to obtain power from the motion of the sea waves than it is to derive

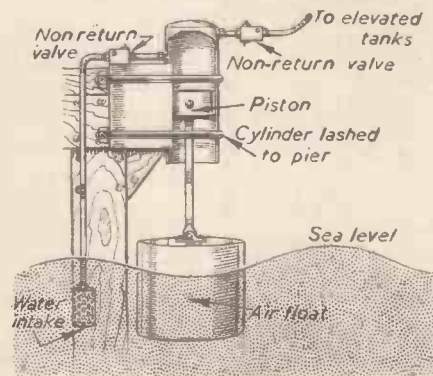
useful energy from the daily onrush of the tides and quite a number of suggestions have been put forward for "wave motors" operating upon this principle.

## A Tidal Motor

As in the case of a tidal motor, the direct object of any wave motor is to raise a quantity of water to an elevated position, so that by subsequently running to a



A special type of float used for wave-motors. It has the property of remaining almost completely submerged during the up strokes and down strokes of the piston.

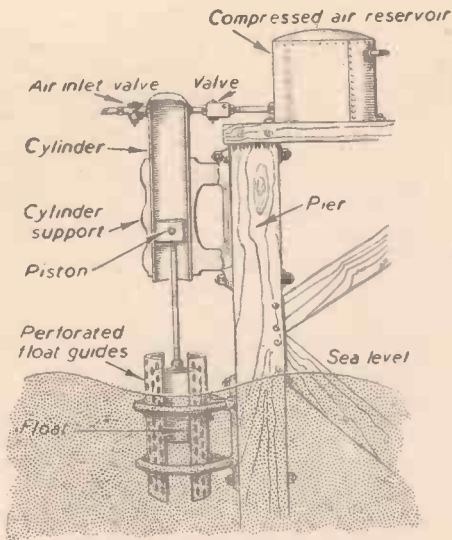


An early suggestion for obtaining energy from wave motions.

lower level the water may give up its energy of position. Other wave motors have been designed to compress air, thereby forming a reservoir of energy which can be applied to useful purposes.

Observations which have been made from time to time at various places along the British coastline indicate that the average rise and fall of an individual sea wave, that is to say, the average difference in height between the crest and the trough of the





A piston and cylinder arrangement for the compression of air. This proved a failure.

wave, is about one and a half feet. Similar observations have shown that the average frequency or number of wave oscillations per minute is about four. These are, of course, only tentative figures which are liable to vary enormously from area to area of the coastline and not only from day to day but also from season to season.

The waves, however, have a horizontal motion as well as an up and down or vertical movement. This horizontal movement of the waves is due mainly to the shelving beach, each individual wave tending to throw itself upon the sea shore. The energy contained in the horizontal movement of the waves, however, is not to be compared with that inherent in their vertical motion. For example, it is usually possible to stop a small raft from being washed on to the shore (provided the force of the waves is not too great), but even in the gentlest of weathers, it is absolutely impossible to prevent the up and down movement of the floating raft. Nevertheless, any really effective wave motor must take into account the lesser energy of the waves' horizontal motions in addition to the much more powerful vertical movements of the waves, for, by doing so, the total amount of useful energy extracted from the waves becomes considerably augmented.

**A Simple "Wave Motor"**

One simple "wave motor" which was projected some years ago took the form of a strong steel cylinder of large dimensions, which was securely and rigidly lashed to a pier. A piston operated within the cylinder and to the lower extremity of the piston rod was fastened a large air-float which floated on the waves and oscillated vertically in virtue of their motion, the float being contained within a suitable cage to prevent it from being washed away.

By means of this simple device it was proposed to suck water from the sea into the cylinder and then to force it upwards to an elevated cistern via a simple type of non-return valve.

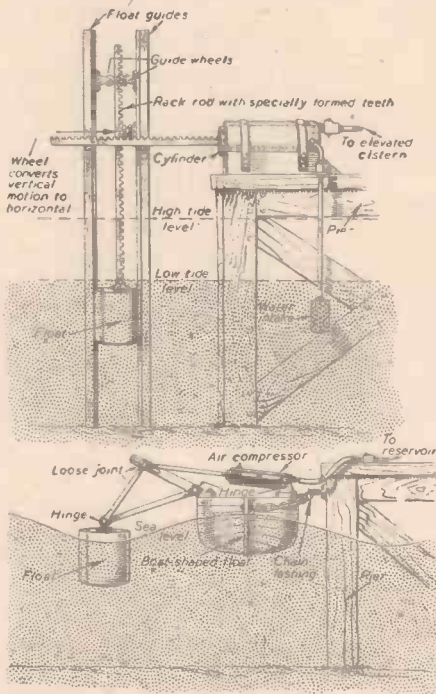
Such a device unfortunately was doomed to failure from the beginning, for the reason that it made absolutely no allowance for the varying heights of the tide. This lack of "tidal adjustment" clearly rendered the device unusable and made it little other than a novel toy.

A piston - and - cylinder arrangement operating upon the same principle, but compressing air instead of pumping water,

failed for the same reason. Additionally, this air-compression device was non-successful on account of the fact that in order to open the air valve to the compressed air reservoir it was necessary for the piston to be moved a maximum distance within the cylinder. Only the largest waves were capable of effecting this movement, so that, in actual practice, it was found that only one or two waves out of a score or more had sufficient energy to cause the air-inlet valve of the compressed air chamber to operate.

**Another Design**

In another "wave motor" which was designed, a vertical rack-rod attached to a float contained within vertical guides was made to engage with a large pinion wheel. Here, however, it was obvious that no uniform and continuous motion could be produced, and for this reason alone, the device failed significantly. Indeed, any such scheme for obtaining useful motion direct from wave motion seems to be impossible of attainment owing to the



(Above) One of the latest "Wave motors" which has been put forward. It is self adjusting for variations in tidal height.

(Below) An ingenious idea for utilising both the vertical and horizontal movements of the waves. The compressed air tank was supported on the large boat-shaped float, on which was mounted the compressor pump.

essential discontinuity of the source of power.

Quite an ingenious idea for utilising both the vertical and the horizontal motions of the waves was put forward in America some years ago. Essentially, the principle of this scheme comprised a suitably designed float which was connected by a series of hinged levers to a piston operating within a cylinder, the piston and cylinder being supported upon a larger floating vessel which also supported a strong compressed air tank. The whole arrangement was firmly moored to a wall or a pier.

By this arrangement it was certainly possible to operate the piston by both the vertical and the horizontal movements of the waves, but, as will be evident from a glance at the illustration, the device did not allow for the variation of distance

between the successive crests of the waves. Therefore it only utilised a portion of the energy of the waves, allowing the remainder to go to waste. Moreover, since the device and its attendant air-storage reservoir had to be supported entirely upon a large float of special design the complexities of the whole arrangement by far out-balanced any advantages which it held forth.

**Dr. L. M. Parsons**

Probably the most ingenious arrangement for abstracting energy continuously from the sea through the medium of wave motion is the one which was put forward some time ago by Dr. L. M. Parsons, the British scientist and engineer. Dr. Parsons made a scientific study of the entire subject of wave motors. He came to the conclusion that the maximum amount of wave power is exerted upon the piston in any wave motor device when the float itself is maintained submerged throughout the strokes of the piston. Indeed, as Dr. Parsons pointed out, the more submerged the actuating float, the greater the power imparted to the piston strokes. On the contrary, if, during its vertical movement, the greater part of the float rises above the water-level, that portion represents so much of the float which is not actually under the direct influence of the uprising water.

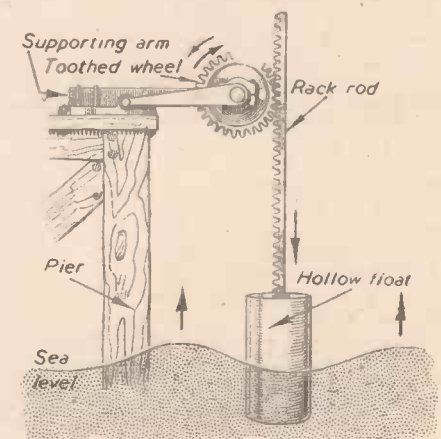
It was upon this principle that Parsons designed a special type of float consisting of an air vessel surrounded by a vessel of water, the water compartment being open at its upper end.

Such a float acts in the following manner :

When a large wave falls upon the outside water compartment, the whole of the float becomes submerged, the weight being automatically removed from the air chamber, so that the full power of the float can operate the pump piston. Normally, the float floats with only a few inches of its upper end above water level. Hence quite a small wave can submerge it and thereby exert its full power upon the piston up-stroke. The float also tends to remain completely submerged during its downward movement. This gives power in the down-stroke of the piston thereby enabling water to be pumped up from the sea into the cylinder.

**"Tidal Adjustment"**

In order to provide for "tidal adjustment," a device incorporating the Parsons' float was, some years ago, invented. It consisted of a long, vertical, toothed rack projecting upwards from the float, which latter object moved upwards and downwards



This suggested device for obtaining energy from the waves ended in failure. It is obvious that no continuous motion can be obtained directly from it.



within guide rods. The vertical rack-rod engaged a pinion wheel meshing with a corresponding rackwork cut upon a horizontally-extended piston rod. Teeth of special curvature and formation were provided for the purpose of such meshings.

The cylinder of this device was firmly secured to a pier or a jetty wall, the cylinder being provided with an inlet and an exit pipe for water.

Now it is obvious from the sketch of this device which is given on the previous page that this form of wave motor is self-adjusting for all heights of tide. The piston can be

operated as forcibly at low tides as it can be at a high tide. The slightest vertical motion of a wave induces a horizontal movement of the piston and since the float is constructed upon the scientific principles enunciated above, the maximum power is obtained from the wave motion. It must be admitted, of course, that this, which constitutes practically the latest form of wave motor to be devised, does not cater for the weaker horizontal "wash" of the waves. Admittedly, also, the device is, in itself, only capable of dealing with small amounts of wave energy.

#### Functioning Continuously

For all this, however, the above arrangement is capable of functioning *continuously*, and at all states of the tide. Hence, there is no reason to suppose that a battery of these wave motors or wave pumps should not be capable of directly multiplying the capacity of a single instrument.

It is upon the lines outlined above that the notion of the wave motor has proceeded during the last couple of decades. Exactly what future years will bring in this direction is uncertain. There is no reason, however, why such a device should not be perfected.

## New Inventions

### Preventing Perspiration: An Artificial Knee: Things to Come: A Ray Detector

#### To Prevent Perspiration

THE village blacksmith, whose brow was wet with honest sweat, might have been interested in what is termed a perspiration-inhibiting material, which has just been patented in America. It should keep the drops from blurring his vision. From the point of view of the beauty specialist, a method of preventing skin exhalation will undoubtedly be welcome. But, while excessive perspiration is sometimes a symptom of disease, it is a process which Nature adopts to relieve the system of impurity. Every one of the myriad pores of the skin is an exhaust helping to cleanse the body. This is naturally effected by that ancient invention called manual labour. In fact, a navy covered with grime may be cleaner than a company director, although the magnate occasionally cleanses his epidermis in a Turkish bath. But this artificial method is somewhat drastic. It is not so natural as that of the aforesaid village blacksmith or of a harrier, whose violent cross-country exercise acts as a peripatetic Turkish bath.

To return to the perspiration-inhibiting material, it contains an astringent substance comprising an acid-reacting salt and a corrosion of inhibiting proportion of basic aluminium formate. Such, in technical terms, is this anti-sweat recipe.

#### Artificial Knee

THE wooden peg which deputised for the missing member of the walking apparatus of Captain Cuttle, Silas Wegg, and Long John Silver, was a crude substitute compared with the highly developed artificial limb which is now available. I remember during a transport strike some years ago proceeding to London on the tail-board of a carrier's van. Alongside me sat a son of toil who was not only horny-handed, but wooden-legged. I noticed that, when he was in a sitting posture, his wooden leg stuck out horizontally. One never caught it bending. However, the modern artificial leg is duly jointed, so that it closely approaches the design which enables man to genuflect.

I observe that there has lately been patented in the United States another knee-joint for artificial legs. It includes a pair of links rotatably connected to the thigh section of the limb just below the knee. Though articulated artificial limbs are not novel, this variety may add to the suppleness of the leg substitute.

#### Things To Come

A GLANCE at the list of recent applications for patents in this country

reveals the fact that many of them relate to the war. Particulars of these inventions have not yet been published; one must, therefore, allow the imagination to conjure up pictures suggested by the subjects of the devices.

The titles include "Bullet-proof Windows," "Methods for Discharging Projectiles Containing Liquid," "Blast-resisting Window Construction," "Means for Locating Aircraft," "Devices for Removing Incendiary Bombs," and "Depth-charge Throwers."

I notice also that an inventor has named his device "Flexible Armour." Apparently he has attempted to solve the problem of equipping the soldier with body protection which is not only a shield, but is also not inconveniently rigid. The record of endeavours in this direction does not show that infallible armour has yet been devised.

In a pigeon-hole of my memory I find the story of an inventor who, during the last war, presented himself at the War Office with an alleged bullet-proof waistcoat. One of the retired colonels or other officials who examine proposed war devices told the inventor to put on his protective vest and

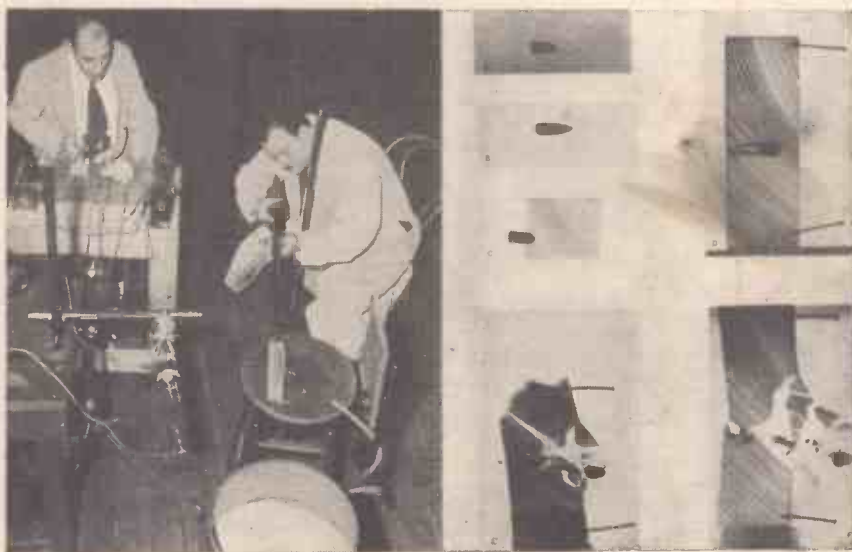
then pointed a revolver at it. But the inventor jibbed at such a test.

Nevertheless, an object has sometimes been found to deflect a bullet or to modify its impact. A book in one's pocket might prove a defence. I recall a conversation I had recently with a second-hand music seller in the Charing Cross Road, London. I asked him, "What do you do in an air raid?" He replied, "I sit in my shop, where I am surrounded by stacks of music." A barrage of music would certainly afford some protection against shrapnel or blast. Undoubtedly if one were in a dug-out surrounded by piles of "Practical Mechanics," the shelter would be reinforced by much solid matter.

#### Ray Detector

THE increasing effectiveness of London's anti-aircraft barrage has caused Washington Congressional circles to ask whether there has developed an infra-red ray detector like that perfected in the United States Army.

American experiments with the ray detector have been so successful that army officials have declared that it would lead to the ultimate abandonment of the sound detection method for locating aircraft. The device synchronised with anti-aircraft batteries is designed to locate aircraft by infra-red rays in their engine exhaust. This method is effective at night or in fog. One Congress representative said tests showed that it could spot approaching aircraft 14 miles away.



Dr. Charles M. Slack operating his apparatus, while his assistant, L. F. Ehrke, fires the bullet which Dr. Slack plans to photograph on its way through the block of wood that is Ehrke's target. At right are the photographs made by the Westinghouse ultra-high-speed X-ray tube used in the photographic experiment at the Westinghouse laboratories in Bloomfield. The photos, made at one millionth of a second, show various types of bullets going through the block. The two at bottom shattered the block at the points of exit.



### A New Diving Suit

ANOTHER chapter was added to the United States Navy's long record of pioneering developments of modern submarine and diving safety when the new electrically heated fibreglass-insulated diving suit for deep-sea divers was demonstrated at the Washington (D.C.) Navy Yard recently. The suits make possible use of new helium-oxygen diving gas, which does away with the danger of the "bends," so much dreaded by divers. The only drawback to the use of the helium-oxygen compound was the extreme cold it caused when dives were made to great depths. The new suit counteracts that. In the new suit the diver is encased in garments made of fibreglass material, pure glass in fabric form. Between layers of the fibreglass are sewn electric heating wires. They are sewn with glass thread. Use of the fibreglass eliminates the danger of short circuits. Now the navy divers can go down deeper and work more efficiently than before.

### Automatic Fishing Net

DR. JOHN WHEELER, director of the Bermuda Biological Institute, has successfully tried out a new type of fishing net which operates on the parachute principle and rises automatically.

The new kind of net is operated free of any connection with surface craft. It can descend to a depth of a mile and then rises automatically with the fish in a bucket. It rises when a piece of rock salt attached to the bottom of the net dissolves and sends the parachute to the surface on a petrol-filled buoy.

### Model Rotary Engine

MR. J. J. HILTON, of Tynemouth, has recently taken out a patent for a model rotary engine, the performance of which has interested some of the North's leading engineers. Mr. Hilton, in describing the engine, says: "In performance it far exceeds any turbine or engine, and has every

*A diver, encased in the new fibreglass-insulated, heated diving suit, entering the experimental tank at the Washington Naval Yard. (Below) Trying on the new diving suit.*

conceivable advantage over both in operation, control and adaptability, being a highly scientific model and working according to an entirely new theory. It is impossible for anyone to appreciate its virtues without actually seeing it running 'on load.' There are several observations which would astound any expert in steam theory, and there is every indication that I shall soon be able to demonstrate a new heat cycle. This would eliminate the familiar condenser and the boiler would be replaced by a superheater. The result would be a complete unit independent of constant water supply and extremely efficient in operation." We await a demonstration to satisfy ourselves as to these claims. A model is one thing—a full-size machine another.

### A "Brains Trust"

IN order to aid Britain's war effort, a "Brains Trust" has been formed composed of famous scientists and research workers. It was announced from Downing Street recently that the Lord President of the Council, after discussion with the Royal

Society, has, with the Premier's approval, appointed a scientific advisory committee.

Lord Hankey will act as chairman, and the other members include Sir William Bragg, president of the Royal Society, and Sir Edward Mellanby, secretary of the Medical Research Council. The committee will bring to the notice of the Lord President promising new scientific or technical developments likely to assist the war effort. They will also advise Government departments on questions of scientific research.

### New Gun-Carriers

CANADA is now using new gun-carriers which can move howitzers at 50 m.p.h. as compared with 10 previously. Batteries can take new positions, unload from the carriers and launch a barrage in seven minutes. The carriers are towed by huge trucks, each of which accommodates a gun-crew.

### New Tinplate Process

THE Standard Steel Spring Company, of Pennsylvania, are to introduce a new tinplate process to save tin for United States defence purposes. America imports nearly all her supplies of tin, and any stoppage would be a grave matter.

The company announces that its new plate, nickeltin, is composed half of tin, applied in layers by the corrionising process to steel sheets, and that it will cost no more than the ordinary tinplate.

### Coin-operated Shaving Machine

AMERICA seems to specialise in slot machines, and the latest type introduced in that country is a coin-operated shaving machine. By placing a coin in the slot you have ten minutes of shaving. After each use the razor is sterilised by an ultra-violet ray.

### Some Road

A RACE against time in the heart of Australia will begin soon when 500

# THE MONTH OF SCIENCE

workmen, including military engineers start the construction of a new strategic highway across the Dominion. The road, which will run between Tennant Creek, in Central Australia, and Birdum, in the Northern Territory, must be finished in 90 days—before the wet season begins.

The road will be 450 miles long.

### Radio-Controlled Motor Coupes

DETROIT STREET RAILWAYS have introduced radio for controlling their services. Thirty motor coupes have been equipped with receiving and transmitting radio sets, and a main transmitter and receiver control the working of the services from a central building. This system has already proved of value in the case of accidents, fires and other emergencies.

### A Surge Tower

A SURGE tower is to be constructed at Poulaphouca, which, when completed, will be the only one of its kind in Ireland. It will be 90 ft. high and 65 ft. in diameter, and in appearance will resemble a tall and capacious gasometer. Its purpose will be



to act as a kind of buffer to take the impact of about 7,000 tons of water hurtling along at the rate of 13 ft. per second. This will take place on occasions when the water has to be stopped suddenly on its way down the 165 ft. drop from the main reservoir to the turbines. When that happens the water will be stopped in its course by a massive steel gate or by a valve—and the water will rise up within the steel-plated walls of the tower.

The tower is situated on a platform about one-third way down the 165-ft. drop, where the water comes out of the quarter-mile tunnel, cut through the rock from the reservoir above, and enters the two great conduit pipes which will take it down a further 100 ft. to the turbines. The tunnel, which has been completed, is almost wide enough to drive a lorry through, its diameter being 16 ft.

### Radio Cure for Colds

DR. J. P. P. STOCK, a Stoke-on-Trent consulting physician, has recently perfected a novel cure for the common cold. He claims to have perfected a short-wave wireless apparatus from which a high-frequency current passes through the head of the patient. The apparatus has been successfully demonstrated in a clinic in Manchester. A colleague of Dr. Stock, commenting on the apparatus, said: "In about 70 per cent of cases the cold improves while the patient is being treated, and he or she is much more comfortable afterwards. In about 50 per cent the cold is gone the next day, while the remaining 50 per cent need one more treatment."

We suspect, however, that the common winter cold will be just as prolific as ever. It is impossible to say whether a cold vanishes naturally, or as a result of the "cure."

### New Turbine Experiment

NEW turbine equipment installed in U.S.A. warships now gives them the advantage over other navies in the cruising range, economy and speed, Mr. Lewis

electric cell, the cell responded to the variable light waves, and by means of an amplifier converted them again into audible sound waves, that is into music. As an added fillip a flashlight was turned on to three "electric eyes," and caused a set of chimes to ring. Such musical virtuosity can be converted to-day into many variations of sound and can perform, for instance, important tasks of counting and sorting in numerous industrial processes.—*Armchair Science.*

### Fireproof Petrol

IT is claimed in America that the research laboratories of the National Advisory Committee for Aeronautics have produced a safety aviation fuel which is as efficient as the high-grade fuels now in use. It is further claimed that, provided the demand is big enough, this fuel can be commercially produced at about the same price as ordinary fuel.

In the American experiment the fuel was injected direct under pressure into the cylinder, where it was fired in the usual way. The carburettor was dispensed with. Characteristic of these new fuels is their high flashpoint. Where the vapour of most aviation petrols ignites or flashes at temperatures as low as 30 deg. below zero, the new safety fuels are so made that they will not ignite or flash until temperatures reach 100, 134, or even 164 deg. F.

### "Bomb Taxi"

NEW taxi, 10 miles from New York, is to have a "bomb taxi" to carry away packages suspected of being infernal machines. It will be a trailer, 6 ft. long, 4 ft. wide and 5 ft. high. The floor and the sides will be lined with sandbags, the top will be open, or of thin wood, so that in the event of an explosion the force will be upwards, and in the centre of the trailer will be a "tip platform" so that the bomb may be turned in any direction or at any angle by means of a lever outside the trailer.

### New Cure for 'Flu

THE Rockefeller Foundation Laboratories have discovered a new wonder serum, designed to conquer influenza. A million doses of the vaccine, which is something revolutionary in medical science, are being prepared for shipment from America.

The existence of the new "cure" was announced by Mr. Raymond Fosdick, president of the Foundation, who revealed that Britain is "very interested" in the vaccine and wants to "try it out."

### 10,000 Exposures on One Roll of Film

A COMPLETE photographic record of every birth, baptism, marriage, and death entry in England between 1538 and 1812 is being compiled. This monumental task has been undertaken by the Society of Genealogists, in case originals are destroyed by enemy action. The rolls of film—as many as 10,000 exposures are recorded on one roll 12 in. in diameter—are being stored in a safe place. Parishes which lose their registers will be supplied with prints.

### A Midget Portable Radio

IN a drive to make the Atlantic City, N.J., police department the most efficient in the nation, every officer in the force is being equipped with a tiny portable radio by means of which he will be in constant touch with headquarters. The illustration on this page shows a motorcycle officer carrying his radio, which is attached to his belt in a small leather case. The earphone is held in place by a head clamp that fits underneath the uniform cap. The radio weighs 29 oz., measures 3½ in. by 3½ in. by 1½ in., and costs about £7.



American policemen now carry tiny portable radio sets as shown.

# IN THE WORLD AND INVENTION

Compton, Assistant Secretary of the Navy, revealed in a speech at Philadelphia. "We shall no longer have to concede speed and superiority to foreign navies," he declared.

### "Pouring Out" Tunes

ONE of the latest "miracles," and certainly an interesting experiment, recently executed was that of "pouring out" a tune from a redesigned coffee percolator. The eyes and ears of the audience convinced them that the stream of water coming through the spout of the coffee percolator, was really producing music. The "mystery" was cleared up by explaining the operation of "modulated light," photo-electric cells—or "electric eyes" and amplifiers. The music was relayed from a record to an amplifier which in turn impressed the sound waves on the light from a small lamp. Consequently the light waves varied in intensity with that of the sound waves. By inserting the lamp in the handle of the percolator, the light waves were made to "pour" out of the spout in a stream of water. When the water struck a photo-

### A Magnetic Pencil

THE General Electric Company have recently developed a magnet similar in shape to a pencil which is suitable for removing fragments of metal and steel filings which may lodge in the eye. A new type of alloy is used in the construction of the magnet which enables the entire magnetic force to be concentrated at the extreme point of the instrument.

### Planes from Silver Foil

A FACTORY near a Northern town is busily engaged in changing 25 tons of silver paper a week into a new alloy used in warplane construction and armour-piercing shells. Though experts said that this could not be done, a young Yorkshire metallurgist, Mr. John E. Moore, has solved the problem of blending a metal with common "silver" foil. His factory deals with all the silver paper collected in this country, and he has personally organised a continuous system of supply.

# Our Busy Inventors

## Safe Seat

A CASHIER may now occupy a seat immediately above one of the office safes. Located unobtrusively beneath him, this huge money box has a slot which permits him to slip in notes and coins without unlocking the safe. Two keys are required to open the box—one for the manager and the other for the cashier.

Special channels are available for anchoring the chair to the floor. The chair slides in these channels, so that it can be adjusted to the most comfortable position for the occupant.

## Air Sandwich

IT is asserted that another step in the direction of better air conditioning has been made by the introduction of a combination window which consists of two panes of glass. Between them is a layer of dry captive air hermetically sealed. This aerial sandwich is claimed to reduce heat production by at least 50 per cent. Such an invention will be useful in this country next summer, assuming that the blast of the bomb will have ceased its fracturing campaign. In London, at the present juncture, it is almost the fashion to be without glass.

## Collapsible Lifeboat

THE rubber boat has saved many an airman from a watery grave. However, like the capricious coracle which Jim Hawkins steers in "Treasure Island," this portable lifeboat is a very awkward craft to manage. A flat-bottomed collapsible rubber boat without a keel is difficult to guide, owing to the fact that the little vessel is apt to turn at each stroke of the oars. The defect can be remedied by providing a keel strong enough to resist lateral pressure and of such a form that the boat is collapsible in spite of the keel.

The characteristics desired are claimed for an invention which has been submitted to the British Patent Office.

This improved inflatable rubber boat has a fin-like keel of rubber held taut at one or both ends by means of a rod secured in a vertical position. To ensure this position, the end of the keel is furnished with a rubber tube in which the rod is inserted. The rod is extended upwardly and this extension is supported by wings spreading forward obliquely on either side.

When the boat is inflated, the centre of the rod is thrust outwardly, while the wings and the keel pull the end of the rod inwardly. In this way the keel is held taut. The two wings afford protection against the waves. The lower end of the rod may be resilient so that it yields when travelling over stones or mud.

It is interesting to note that the inventor is a German citizen, of Prague, Czechoslovakia.

## Overalls for Shoes

THE wearing of spats will not now be limited to the city magnate and that ilk. These shoe overalls have a poor relation in the shape of a foot apron designed to be worn by work-people. To protect workers handling foods, liquids and chemicals, there has been devised a

cover which fits over the upper front of shoes. This cover is easily kept clean by washing with soap and water.

## Paper Saucepans

TO show that fire and water do not harm his specially prepared paper, an inventor has boiled water in a single sheet which he held over a burning candle. Being also resistant to oil and easy to disinfect, it is affirmed that the paper is admirably suited for use in Braille books, since perspiration from the fingers of the blind will not damage the embossed characters. Folding pots and pans formed from this non-inflammable paper are made possible by the invention. In peace time,

The information on this page is specially supplied to "Practical Mechanics" by Messrs. Hughes & Young (Est. 1829), Patent Agents, of 9 Warwick Court, High Holborn, London, W.C.1, who will be pleased to send readers mentioning this paper, free of charge, a copy of their handbook, "How to Patent an Invention."

when the supply of pulp is normal, this paper should have a large circulation.

## Slacks kept from Slacking

A TROUSER hanger which is likewise a trouser stretcher has made its debut. It is of the kind which holds fast the nether garments of man—and sometimes those of woman—at the lower edge by aid of a pair of resilient curved members expanded within the legs. It is differentiated from its predecessors by the fact that each of these members is in the form of a downward directed arched bow of equal curve, which, under the influence of the weight of the trousers, will tend to straighten out and thus increase the pressure against the trouser leg.

## Lasses without Ladders

THE ban on silk hosiery has caused a flutter in the boudoir and the beauty parlour. The vogue of the silk stocking and its imitations has held sway for many years and the fair sex will ruefully discontinue this fashion. It is not only the appearance of the hose which has appealed to the wearer but it is also its comfort, for sensitive skin is irritated by fabric such as wool. Since winter is approaching only women of Spartan temperament will bare their limbs to the chilly blast. Here then is scope for the inventor to discover some substitute for silk stockings, which will satisfy the ladies both from the aesthetic point of view and from that of comfort.

There was once a Nonconformist minister who toured the country with a lecture entitled, "The Advantages of Disadvantages." One advantage of the ban on silk stockings is that the ladies will be free from that *bête noire*, "laddering."

## Optical Lullaby

FROM time immemorial His Majesty the Baby has been lulled to sleep by dulcet strains. This method, however, does not cure insomnia in the case of children of larger growth.

My attention has been drawn to this subject by a new device entitled "Apparatus for use in connection with the Control

of Respiration and other Actions of the Human Body." It is stated that the chief object of the apparatus is to enable a person to perform certain physical or muscular exercises in order to induce sleep.

The contrivance comprises means whereby a spot of light is caused to travel to and fro with a regular motion. It moves alternately in opposite directions in a panel slot.

While observing the vacillation of the light spot, the patient inhales and exhales in rhythm with its movement. This, it is claimed, produces a correct respiratory action resulting in sleep besides imparting other benefits. Such a plan may supersede the traditional method of courting Morpheus by taking an inventory of sheep.

It is further declared that this spot-watching is a remedy for sea-sickness.

## Hang the Paper!

AN inventress is the contriver of the next device which claims my attention. This is a machine for pasting and trimming wall and ceiling paper. It is proposed to embody the invention in a portable form in which a box and lid will be adaptable as a stand for the machine and a table, when in use, and as a container for the machine and table, when stored or in transit.

The machine is of the type which prepares a folded pasted length with a long fold at one end and a short fold at the other end, and by which a rapid, efficient, turn-out of the pasted strips may be attained. As a secondary object it provides a simple but effective way of measuring off matched lengths of pasted paper.

According to the invention, the paper, after having been trimmed, passes between a paste-applying roller running in a trough, and a presser roller is urged towards it. Then it passes around the pressure roller to bring the pasted side uppermost.

Let us hope this machine will reduce the number of high explosive expletives which fulminate from the mouth of the amateur paper-hanger.

## Waste Not

THE bomb is no respecter of persons, neither has it any regard for works of art. Its mephitic blast beheads a saint in a stained glass window as remorselessly as it smashes the pane in the hut of a peasant. This fact has been vividly brought home to one by a picture in a London daily paper which portrays an expert doing a tragic jig-saw puzzle. He is sorting out coloured glass from fragments of the bomb-blasted window of an historic abbey.

My mind reverts to a story relating to one of our cathedrals. It is said that, when the stained glass was being put in the windows of the sacred fane, an aspiring, artistic youth saved the chips of glass which would otherwise have been thrown away. These fragments he pieced together to make the beautiful rose-window which is still a feature of the cathedral.

This incident illustrates a point the war has stressed. There is no such thing as rubbish. Everything can be put to some useful purpose. The maxim, "Waste not, want not" was very largely disregarded until necessity caused by war has proved the mother of invention.



# Television Transmission Over Telephone Cables

Development of High-Frequency Transmission



Fig. 1.—  
The two amplifiers with their equalisers and power supply are mounted in small portable cabinets as shown.

**M**OST radio broadcasts originate in the studios of the broadcasting companies, and are transmitted thence to the radio stations over high-quality programme circuits. There are many times, however, when the "pick up" point is at a distance from the studio, and circuits to the studio must be provided over telephone cable pairs not normally employed for broadcasting. With television broadcasts such remote pick-up points are also required, but the utilisation of ordinary telephone circuits to link them to the television studio is more difficult because of the much wider band of frequencies employed and certain exacting requirements for television transmission. Because of the experimental state of television broadcasting at the present time, no arrangements for transmitting from these remote pick-up points have as yet been standardised. An experimental circuit of this nature was, however, provided for the National Broadcasting Company in May, 1939, and a somewhat similar one was more recently provided for the Columbia Broadcasting System.

### Difficulties

The difficulties encountered in transmitting over such circuits are due largely to the very wide frequency band required. For ordinary telephone circuits a frequency band of about 3,000 cycles is sufficient, while for both of these recent experiments the band extended from 45 to over three million cycles—a range a thousand times greater than the voice band. The effect of the difference in frequency range on loss is

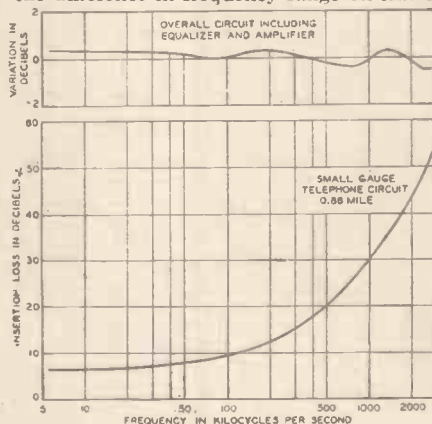


Fig. 3.—Overall loss over the television band for a cable circuit plus amplifiers and equalisers.

indicated in Fig. 2. This shows the energy loss in one mile of local telephone cable made up mostly of 22 and 26 gauge paper-insulated pairs. The loss in a coaxial for television transmission is shown in the same illustration for comparison. At three million cycles a mile of cable pair gives a

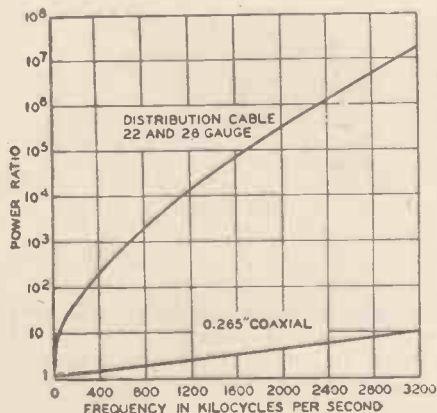


Fig. 2.—Losses in one mile of experimental telephone and coaxial-cable circuits over the television frequency range.

loss a million times greater than that of a coaxial conductor of similar length. For satisfactory television transmission equalisers must be provided to make the overall loss essentially the same for all frequencies. How effectively this is done is indicated in Fig. 3, which shows the losses of one of these experimental circuits of 0.86 mile length, both before and after the installation of the equalisers and amplifiers. The variation in loss over the equalised line is within plus or minus one-half db.

### Time of Transmission

Besides this variation in loss with frequency there is also a variation in the time of transmission. This variation is too small

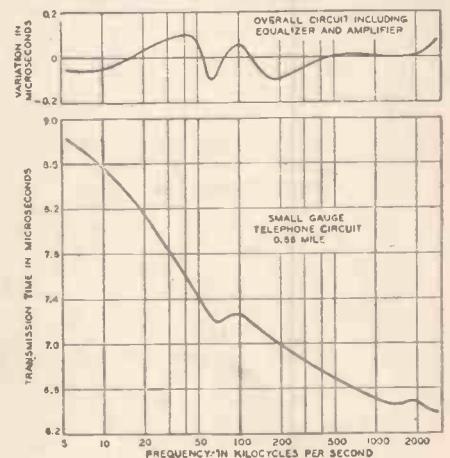


Fig. 4.—Time of transmission before and after equalisation for the same cable circuit.

over the voice range to require correction for ordinary telephone circuits. For television transmission, however, if it is not kept extremely small the detail of the picture will be blurred, and spurious transients and "ghosts" will appear. The transmission time for one of the circuits used in recent tests is shown in Fig. 4. Its variation amounts to about 2.5 microseconds—over ten times the allowable amount. Before a cable pair can be used for television, therefore, it is necessary to measure the transmission time, and then to provide phase equalisers to correct it. As shown in the upper part of Fig. 4, the equalised line maintains the same transmission time to within plus or minus 0.1 microsecond.

In addition to the phase and attenuation

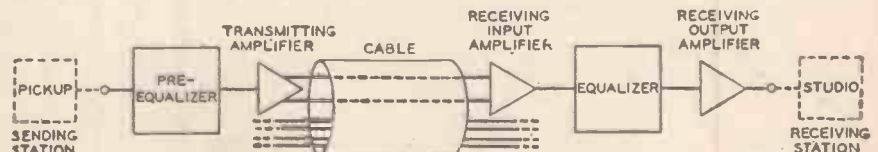


Fig. 5.—Schematic circuit layout for the recent television experiment.

equalisers required by such circuits, high-gain amplifiers are needed to overcome the very large loss encountered. These amplifiers provided a flat gain over the entire range of frequencies from 45 cycles to 3,000,000 cycles. Their design is complicated by the fact that the cable pairs are balanced, that is, each wire of the pair has the same impedance to ground, while the television apparatus—in common with most high-frequency apparatus—is grounded on one side. Relatively large currents are likely to be induced on both conductors of a cable pair from nearby 60-cycle power circuits and other noise sources. These currents flow equally over both conductors of a pair, which with the ground return comprise the longitudinal circuit. If the circuit, including its termination, is balanced throughout, these currents cannot affect the signal currents flowing in the metallic circuit. With an unbalanced amplifier terminating the circuit, the longitudinal currents would enter the metallic circuit, and appear as bar patterns on the received picture. The difficulty is avoided in this case not by the use of transformers but by applying negative feedback in the amplifier to the longitudinal circuit but not to the metallic circuit currents. This in conjunction with vacuum-tube balances results in a reduction of 75 db. in these induced currents. This feedback is applied both to the output stage of the transmitting amplifier and to the input stage of the receiving amplifier.

The arrangement of the apparatus for the

C.B.S. television experiment is indicated schematically in Fig. 5. Amplification and equalisation were provided at both ends of the circuit. The effect of the equaliser at



Fig. 6.—Rear view of amplifier-equaliser unit with door removed.

the transmitting end is to predistort the signals, sending out the high frequencies at a level much higher than if equalisation were not employed. This tends to decrease the effect of any high-frequency noise, since the induced currents become smaller relative to the higher level of the signal currents. At the receiving end, the equaliser is placed between two sections of the receiving amplifier. This results in a higher level at the input to the receiving amplifier and minimises the tube noise, the 60-cycle hum and the microphonic disturbances. The two amplifiers divided the total gain of about 75 db. They operate on 60-cycle power circuits, and with their equalisers and power supply are mounted in small portable cabinets as shown in Figs. 1 and 6.

#### Signal Currents

The possible length of such circuits between repeaters is closely limited. The signal currents cannot be allowed to drop too low or else noise and other disturbances will be induced from the adjacent pairs. On the other hand, they cannot be allowed to become excessive or they, in turn, will induce disturbances in the telephone circuits. These two levels fix the distance that may be satisfactorily spanned. For average pairs in local telephone plants this appears to be slightly under a mile, but it may be somewhat greater where relatively quiet circuits or larger-size wires are available. Further experiments to determine the possibilities of telephone pairs for television purposes are being conducted.



The life-light in service.

**T**HE Ministry of Shipping has just approved a new jacket life-light for use by officers and men of the Mercantile Marine. This life-light is complementary to the compulsory life-saving jacket forming part of their equipment to-day.

This life-light, made by the G.E.C., is in two parts, wired together by a rubber-covered twin flexible lanyard. The parts comprise a small life-light of cedar wood fitted with an Osram bulb protected by a red transparent moulded dome, complete with switch and covering cap, and a water-tight tubular metal battery container for housing a standard unit cell.

These units are compactly constructed, the life-light being 5½ in. long and 1½ in. in diameter and weighing 3½ oz., and the battery container 3 in. long by 1½ in. in diameter, and weighing 4½ oz. complete with battery.

The life-light is quite impervious to action by sea water and is not affected by immer-

sion even if the red dome is lost or broken, provided the bulb itself remains intact.

Each individual can decide the most convenient way of carrying the life-light, but a suggested method is to stow the life-light in the front of the jacket, while the battery container is put in the pocket. In these positions the device is ready for use in any emergency, the only action necessary on the part of the user being to break the seal by twisting and removing the metal covering cap. This cap is normally sealed in position to protect the life-light against misuse. The bulb and battery can be tested, by pushing a match or pencil point through a small hole in the cap provided for this purpose in order to operate the automatic switch. When this cap has been removed for action the life-light will float alongside the user at the end of the



Life-light and battery case, parts unassembled.

wire flex lanyard. Alternatively, it can be held in the hand when the switch can be used for signalling or to turn the light off permanently.

Summarised, the salient features of the jacket life-light are :

1. Approved by the Ministry of Shipping.
2. Exposure of light which may disclose position of ship impossible without breaking seal.

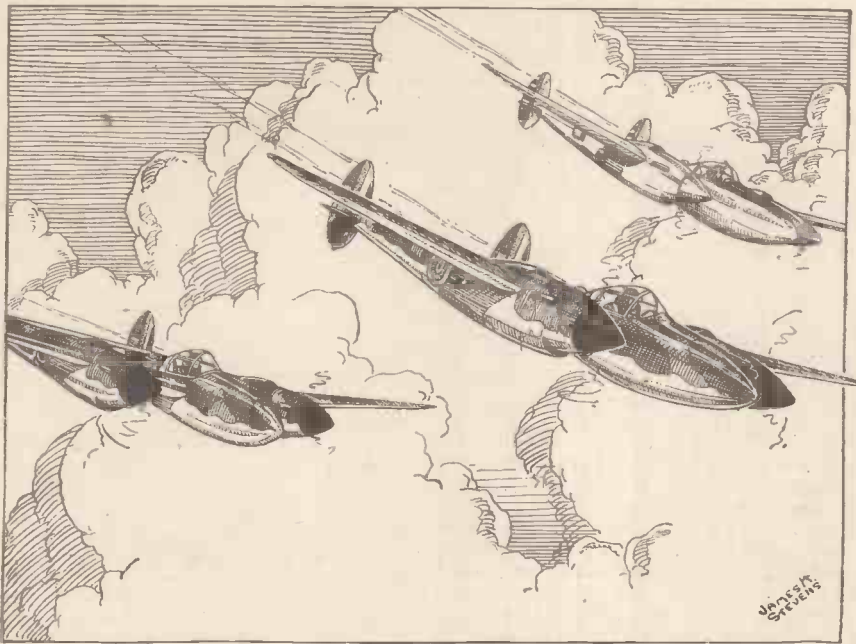


The two units connected by a flexible wire lanyard.

3. Facilities for testing provided.
4. Simple twisting action breaks seal for removing cap and switches on the light.
5. Access to battery is not required for subsequent switching or signalling.
6. Always floats above the surface of the water.
7. Supplied complete with standard long-life battery (15-20 hours' continuous burning) and robust filament bulb.

## An Ingenious Jacket Life-light for Mariners





## SCALE MODEL AIRCRAFT No. 8

same size as the Fairey Battle medium bomber. This large size, the high wing loading, the two large engines and comparatively light armament all combine to make the P.38 appear a rather wasteful aeroplane. Presumably the British version will be improved and the armament, at any rate, made at least comparable with that of our eight-gun fighters.

### All Metal Construction

The P.38 is of typical modern stressed-skin light-alloy construction. The main plane, as is the case with most Lockheed types, has a sharp taper and is comparatively thin in section. Split flaps extend along the whole of the trailing edge between the ailerons, nacelle and fuselages.

The pilot is accommodated in a large glazed cockpit well back in the nacelle where, despite the extensive windows, his view must be considerably obstructed by the bulky nose, the main plane and the two engines. The armament of the prototype for the U.S. Army Air Corps consists

# The Lockheed P.38

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

## An Unconventional American Twin-Engine Single-Seater Fighter for the Royal Air Force

It was announced in August that a large order had been placed by Great Britain for the Lockheed P.38—under the export pseudonym 322-61—twin-engine single-seater fighter. The prototype of this rather strange-looking aeroplane has been flying for some two years now. It received considerable publicity when it was flown across America from March Field, California, to Wright Field, Ohio, a distance of about 1,900 miles, at an average speed of 354 m.p.h., albeit the machine crashed on landing.

The Lockheed Company has a very good reputation, with many successes behind it. Readers who have followed the development of aviation will remember the Vega high-wing passenger monoplane and the famous Orion, the first successful low-wing transport aeroplane with a retractable undercarriage. These were followed by the Electra and the Lockheed 14. The latter was, of course, developed into the Hudson coastal-reconnaissance bomber which the R.A.F. has been using with such success against the German sea forces.

### Unusual Layout

Looked at as a whole, the P.38 is a weird sight, accustomed as one is to the conventional fuselage and a tail wheel, yet it is by no means without precedent. The twin fuselage arrangement was used with success by Antony Fokker for his G.21 two-seater fighter-bomber for the Netherlands Army Air Service. The idea was adopted by a Czechoslovakian firm and is also being tried out on prototypes in both Germany and Italy. The tricycle undercarriage also serves to add to the strangeness of the machine's appearance, but in this case it is a feature which is likely to become increasingly commonplace and may eventually replace the type now in general use.

Little information has been released about the P.38 (and it is unlikely that any will be until it has seen service for some time),

PRINCIPAL CHARACTERISTICS LOCKHEED P.38 (322-61)*	
Span	52 ft. 0 in.
Length	37 ft. 10 in.
Height	9 ft. 10 1/2 in.
Wing area	327.5 sq. ft.
Weight empty	11,171 lb.
Weight loaded (normal)	13,500 lb.
Weight loaded (maximum)	14,348 lb.
Wing loading	41.2 to 43.9 lb./sq. ft.
Max. speed	404 m.p.h. at 16,000 ft.
Cruising speed	350 m.p.h. at 16,000 ft.
Climb to 16,000 ft.	5.6 min.
Absolute ceiling	30,000 ft.
Range (normal)	600 miles at 350 m.p.h.
Range (maximum)	1,070 miles at 350 m.p.h.

\* These figures are those officially released for the prototype P.38 with two 1,000 h.p. Allison V-1710-C15 engines.

of one 23 mm. (approx. 1 in.) Madsen shell gun with 50 rounds; two 0.30 in. Colt M.G.-40 machine-guns with 1,000 rounds; and two 0.50 in. Colt M.G.-53 machine guns with 500 rounds. This is a much lighter concentration of fire than that of our own, eight 0.303 in. Browning guns in the Hurricane or Spitfire, or even the two 20 mm. shell guns and four rifle-calibre machine-guns of the Me110, but it is much heavier than is usual in American fighters.

### Exhaust-Driven Superchargers

The engines fitted to the prototype P.38 and to the first production machines, which are just being delivered, are the 1,000 h.p. Allison V-1710-C15. This is the only American liquid-cooled engine, and is a type which has been undergoing intensive development for the last five years or so. It is a 60 deg. V, like the Rolls-Royce Merlin, but is somewhat bulkier, though a trifle lighter and has the unique feature of an exhaust-driven supercharger. The

so that it is only possible to comment on it generally. For a single-seater fighter it is a large machine, being approximately the

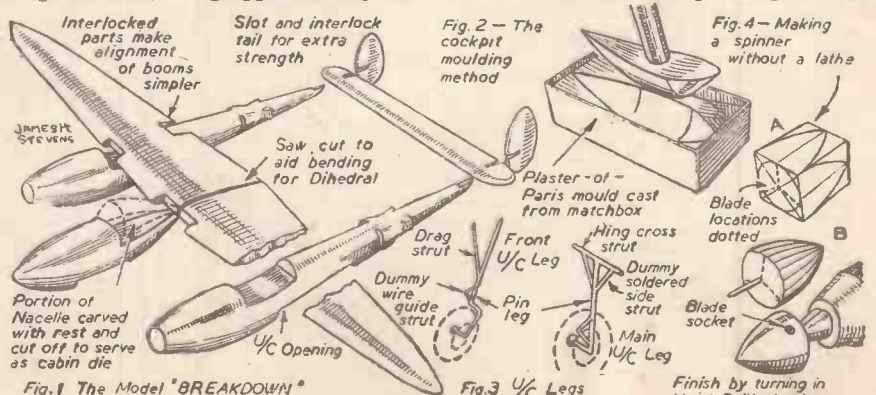


Fig. 1 The Model "BREAKDOWN"

Fig. 3 U/C Legs

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

dream of making use of the latent power in the waste exhaust gases has long troubled designers of internal-combustion engines. In this country it has been solved by turning them into a direct propulsive force with ejector exhaust pipes. The Americans have concentrated on the exhaust-driven supercharger. This is a development which was actually evolved and fitted to the Napier Lion in this country some fifteen years ago, but the risk of fire and the lack of suitably heat-resistant materials at the time led to its abandonment, although the results were very promising. The American unit (of which no details have been released) has been flying for some years, both on in-line and radial engines, and appears to be very successful.

The Allison engine has a compression ratio of 6 : 1; a bore and stroke of 5.5 in. and 6 in. respectively; an airscrew reduction gear ratio of 2:1 and has a dry weight of 1,280 lb.

**Oppositely Rotating Airscrews**

Another comparatively rare feature of the P.38 is the fitting of oppositely rotating airscrews. This gives a slightly improved performance and improves the handling qualities considerably. The main disadvantage is that interchangeability is impaired and stocks of spares increased: points which are very important in military aeroplanes. France, and to some extent Italy, have both gone in for opposite-hand airscrews, but neither Britain nor Germany considered the gain worth the complications involved. The engines on the prototype P.38 rotated downwards towards the fuselage, the generally accepted best arrangement, but those on the production model revolve in the opposite direction.

**Escort Duties**

As a machine the size of the Lockheed, and with so high a wing loading, can scarcely compare with a single-seater for manoeuvrability and also, as it is not very much faster than our machines (the Spitfire does nearly 390 m.p.h. on 100-Octane fuel, it seems likely that the P.38 is intended for escort duties. Using its overload of 300 gallons, the range of 1,070 miles at the high cruising speed of 350 m.p.h. then becomes very useful indeed.

**The Model**

Despite its strange shape this model presents no particular difficulties. The solid block method is again recommended as being the simplest and most effective. The main problem will resolve itself into making the two "fuselages" identical and assembling them in good alignment. In view of this, the splitting up of the machine into the units shown in Fig. 1 is recommended. By so doing the main plane is made into a solid datum to which the other parts can be fitted and trued.

With regard to materials, as has been said in previous articles, fretwood for the wing, washer fibre for the tail unit and blocks of any reasonably good white wood for the nacelle and fuselages are the best—that is, if a fairly small scale is to be used.

By making the main plane in one piece and obtaining the comparatively large dihedral angle by sawing, steam bending and setting with glue it is possible to make the wing rigid and accurate. The parts of the fuselage sections over the wing can either be built up from layers of plastic wood or a small block of wood can be glued on after the main structure has set and then carved to shape.

**The Cockpit Cover Moulding**

The usual method of moulding the cockpit cover is recommended for this model. The nacelle is first made complete in wood, then

the cabin section is carefully cut off with a fretsaw and mounted on a stick, Fig. 2. A plaster-of-Paris female mould is next cast from it. A piece of thin celluloid or the stoutest available Cellophane wrapper is used as material. The die and mould are heated in an oven and the material in very hot water. The job is then done as quickly as possible.

This particular cabin is a very deep draw and a two-part mould is essential—that is, it would not be satisfactory to press the male die into a "cushion" type of platen. Even with the two-piece mould one or two attempts may be necessary before a really good result can be obtained. The main points to watch are to get everything as hot as possible and not to use too large a piece of material as a large "frill" of waste tends to drag and distort the moulding.

**The Undercarriage**

The undercarriage on this machine is one such as to make modellers dream. Apart from one strut on the nose-wheel unit, there are no awkward folding or sliding struts. The legs can each be made from very heavy pins, with thin wire soldered on as dummy side struts. At the top they are soldered to cross struts which form the hinge pins. The details are shown in Fig. 3. The fairing plates can be made either from metal foil or paper. Hinges are made from thin silk or cotton cloth glued on the inside. This

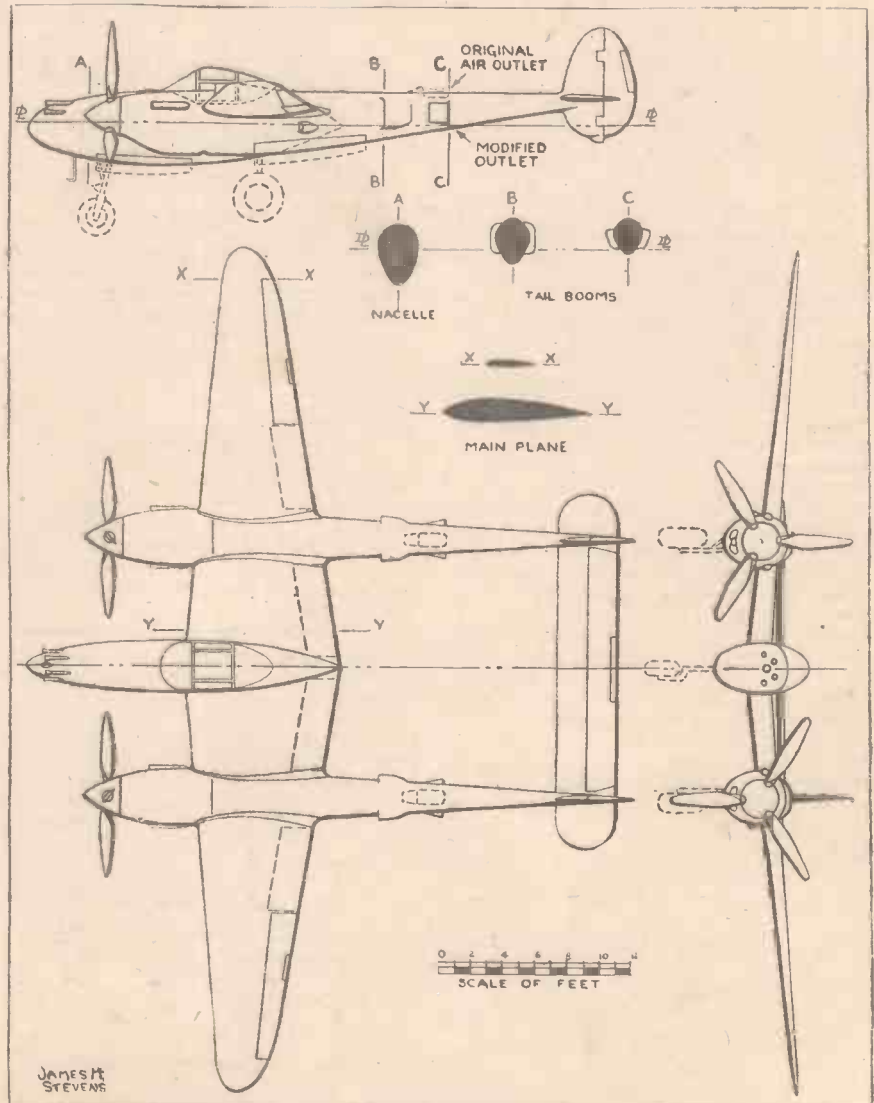
sounds rather crude, but it is the only successful way of making such a fine hinge.

A method for making an accurate spinner without a lathe was described last month. There is no need to detail the work here, but for those who did not see the previous description, it is shown in Fig. 4.

**Painting**

The American P.38's are at present left plain polished aluminium all over. Experiments have been made in the Air Corps with camouflage and the machines will probably soon be covered with irregular green and khaki patches. The problem of getting a really good representation of polished aluminium is a very difficult one. In the days of fabric-covered machines with only metal engine cowlings the writer used to fit actual panels of thin aluminium, but this is manifestly impossible in a completely metal-covered machine. It is possible to cover the whole machine with tinfoil, but again it is difficult to make a really neat job with this material. Thus it comes back to using the best (and finest ground) aluminium paint as being the most practical solution.

Apart from the silver, all the paints should be of the oil "art enamel" type, which can be bought in tiny 2d. or 3d. pots. A No. 5 camel-hair and a small liner's brush are most useful. On small models it is most essential that the paint should be put on thinly and evenly.



A side, plan and front view of the Lockheed P38 twin-engine single-seat fighter



# The Development of the Pen

## How the Fountain Pen Came to be Perfected



**T**HE Ten Commandments were engraved upon two stone slabs. This article was written with the aid of a typewriter. Between the two periods thus represented, Man has done considerable groping after writing instruments that would combine speed and legibility with the minimum effort on the part of the writer. A brush and ink formed one of the earliest combinations. A sharp-pointed stylus was used to scratch characters upon a clay or waxen tablet. Writing their personal letters in that manner, the ancient Romans used the flat end of the stylus for rubbing-out purposes, smoothing the error gently from the wax or clay. Someone experimented with a reed, sharpened and split at the end, for writing on parchment. Those who adopted it found it worked, but it was spluttery and no reed stood up long to its job. A bird's feather appealed to the next investigator, some time in the 14th century. It had distinct advantages over the reed. It was more resilient and did a trifle less scratching and splitting. Thus was born the quill pen (from the Latin *penna*, a feather or quill).

### "Nibbing" the Pen

Feathers were collected from the wings of swans, geese and turkeys. The lower part of the feather was heated in sand, the soft outer skin was then scraped off and the tip was sharpened and slightly split. In those days, when Time very nearly stood still and daily office hours accounted for the full half of twenty-four, clerks, and others of that trade, thought it no great hardship to suspend work frequently to nib their pens, for which process pen-knives were carried. Pocket machines were sold for repointing worn quills, but these were expensive. And so the quill pens continued to behave contrariwise. When they did not split for half their length they splintered, or the tips turned up. To correct these wilful tendencies, tips of horn or tortoiseshell were fitted; and gilding—to make them more durable—was tried. But these experiments were not successful. Inventors were searching for a complete breakaway from this unsatisfactory state of affairs, and the climax of their efforts was the metal pen.

Various patents were taken out, the most important of these being in the name of James Perry, who was really the inventor of the pen as we know it now. He founded the firm of Perry & Co., Ltd., whose pen

factory, standing on two acres of the ground in the centre of Birmingham, is the largest in the world. From there, as the result of the founder's patents taken out in the early part of the 19th century, comes half the English production of pens, and vast quantities are exported. The daily output is more than a ton, the factory employs 2,000 hands, and—perhaps most surprising of all—there are 14,000 different patterns of pens in their catalogue. Items of manufacturing equipment in daily use include nearly 1,500 stamps, lathes and presses.

### The Steel Blank

A pen (non-technically, a nib) starts its race to the pen-box as a very ordinary-looking piece of steel. From that raw material state to the finishing touch the processes include cutting out blanks, marking with the name, piercing, softening, raising, hardening, tempering, scouring, grinding, splitting, colouring and varnishing, and final scrutiny. Every single pen is examined before it is boxed. The blanks are cut, by a screw press, from strips of rolled steel, and then stamped with the firm's name. Then the blank is pierced, to give the pen elasticity and enable it to hold the ink—which otherwise would not attach itself to the smooth steel. Next, the pen has to be given its curved shape; this necessitates softening, so the blanks are heated to a dull red glow and allowed to cool gradually. The raising operation can then be carried out, this giving the blank the actual form or shape of a pen.

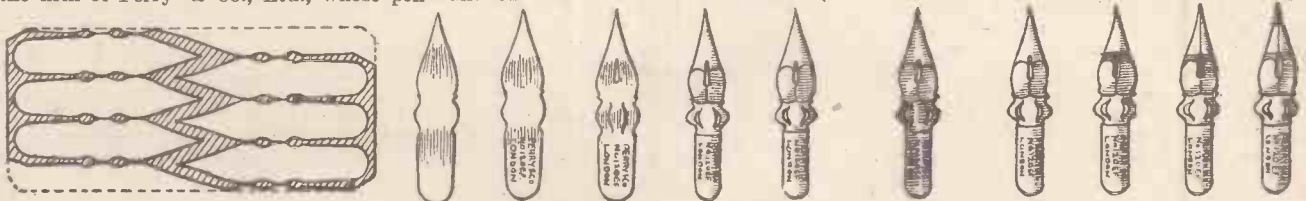
Next step is hardening. This is done by heating to a bright red glow and then immersing in oil. Removed greasy, and brittle as glass, from the oil the pens are cleaned by immersion in boiling caustic soda solution. Tempering follows, in an iron cylinder which revolves over a gas or charcoal fire. They have now become strong and pliable but still need to be made bright and smooth. For at the moment they are

black and the points scratch. So they are first scoured by soaking in dilute sulphuric acid and then shaken up for several hours in rotating iron cylinders containing fine stone and water, or fine sand; a final scouring is given with dry sawdust. The now bright and smooth pens are next due for grinding, a hand operation carried out on a high-speed revolving wheel covered with emery-dressed leather.

### Splitting the Pen

The pen has still to be slit. This is done with a hand-press and razor-sharp cutters. They then go once more into the rotating cylinders or barrels, for polishing. At the Perry factory there are several hundreds of these barrels, each capable of holding 120 gross of pens. Bright silver now in colour, the pens are revolved in a cylinder over a fire until they have assumed the tint desired. After immersion in a bath of shellac varnish they are dried and, finally, stored. There remains only individual inspection of each pen, and the boxing, or attachment to cards. In addition to the vast range of patterns of ordinary steel pens there come, from the same factory, pens manufactured from stainless steel. When they were first introduced, a few years ago, six patterns only were manufactured; there are now 35 different patterns of these non-corrosive pens.

The coming into general use of the steel pen—in schools and offices and the home—marked an important stage in the evolution of the world. It meant a throwing-off of shackles which had bound down the writer to a slowness (and probably an illegibility) which to a quick thinker must have been maddening. And there was no quick reaching out for blotting-paper; instead, a sand-sprinkler was grabbed. When the quill had spluttered to the end of the page and the writing (and the blots, of which quill pens were fecund) needed to be dried, the writer sprinkled the sheet with fine sand. That was the method in common use up to



Scrap

Blank Marking Piercing Raising Hardening Tempering Scouring Grinding Slitting Colouring

Various stages in the production of an ordinary pen nib.

the latter part of the 19th century. In the matter of writing-fluids, there have been interesting developments. A mixture of soot or lamp-black and varnish or gum suffices; a secretion of the cuttlefish has been used, and various concoctions with gallnuts as their base. One method of ink manufacture employed now embraces the use of tannic and gallic acids mixed with iron sulphates, water and dye.

#### Fountain Pens

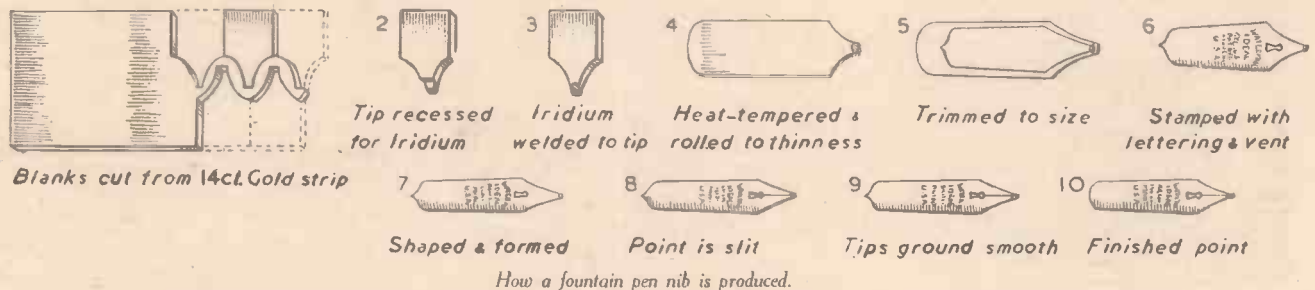
When reeds were used for writing, variously coloured fluids were contained in hollows in a palette. Then came the ink-horn (later made of brass). This gave place to the ink-bottle and the ink-pot. Seeking for further improvement it occurred to a genius in the middle of the 19th century to combine the ink and the pen as one instrument—and he gave us the fountain

pen. To write smoothly the point has to be ground and shaped and exact adjustment made between both sides of the slit. The grinding is done by means of a revolving copper wheel coated with a mixture of emery and oil, and the process is such a delicate one that the operator is equipped with a high-power magnifying glass. To apply the finishing touches the pens are then polished inside and out on buffers.

The next journey carries them to the assembling department, where they are to be joined up with the holders. The latter, and the rubber parts of a Waterman's are made at Seymour, Connecticut, and are finished, decorated and assembled with other parts at the Newark factory. The filling device is inserted in a narrow slit which runs down the fountain pen barrel, and the flexible rubber tube which is to hold the ink is slipped in, and the gold pen

operations a certain quantity of gold goes to waste as almost invisible particles, and in the interests of working economy as much as possible of this has to be reclaimed. All water that passes from the departments where gold is handled is filtered, so that gold particles that have been washed from the hands and faces of the workers shall be recovered; water in which working clothes have been washed is similarly dealt with. Floor-sweepings, cotton-waste, rag and paper scraps are collected and along with discarded overalls and jumpers burned in the reclaiming ovens. Few specks of gold escape this scientifically conducted "hunt." The result is the recovery in one year of "waste" gold to the value of 100,000 dollars.

Machines used in the Newark plant are built and serviced there. The machine shop employs 35 skilled mechanics. A central



pen. There are several famous makers of these, including the Waterman Company. Their factory at Newark, New Jersey, U.S.A., employs 1,000 men and women. The five-storey building covers five acres of land. In making a Waterman's there are 210 separate operations, the gold pen alone accounting for 80. Materials used include gold for the "nib," iridium for its point (this is the hardest metal known and rarer and more valuable than gold), rubber from the forests of Bolivia, and other items.

Pure gold has not the requisite strength, temper and endurance, so this is melted, in a temperature of 1,900 degrees, together with silver and copper, in the proportions of 6 parts copper, 4 parts silver and 14 parts of 24 carat gold. The resulting 14 carat gold is prepared in the form of ingots 2 inches wide by 7 inches long by  $\frac{1}{4}$  inch thick. These pass through the rolling mills and become strips 2 inches wide, 48 inches long and twenty-two one-thousandths of an inch thick. Cut into suitable lengths the strips go to the stamping machines where the blanks are punched out, the points of these then being prepared, in a burring machine, to receive the iridium tips which are to be fused on. After a point has been recessed a fluxing fluid is applied by means of a camel's hair brush, the fusing of the gold and the iridium being completed with a blow-torch.

#### The Iridium Point

A rolling machine next receives the iridium-pointed blanks for rolling (with the exception of the iridium point) to the necessary thickness. They are then stamped out to the correct size and fed into a machine which stamps the name and cuts a heart-shaped hole in the centre. After which the blanks are machined to the shape desired. Unless the blank were slit the ink would not flow from its point, so for the next operation it goes to a carborundum disc which revolves at a speed of 10,000 revolutions per minute. The pen point is placed against the revolving disc and in a few seconds is slit from the point down to the heart-shaped centre hole. To cause it

and the rubber feed inserted into the point section. The cap is placed over the pen and screwed to the barrel, and the job is finished—barring the severe inspection which it must pass before any pen is allowed to leave the factory. The several complicated processes have had to be glossed over here, but enough has been explained to indicate the intricacies of some of the operations which must be carried out before the fountain pen is ready to go into everyday action.

#### Cutting and Burnishing

During the cutting, burnishing and other

power house is equipped with dynamos which generate 500 horse-power, for supplying the individual motors which serve most of the machines.

So much for the mechanics of the pen, which is the power behind the written word. As Lord Lytton phrased it, in *Richieu* :

"Beneath the rule of men entirely great"

"The pen is mightier than the sword."

It is repeated here because only the second line is usually quoted, the first line qualifying the statement quite considerably!

## Welding Metal to Glass

### Britain Perfects a New Process

FOR the first time in history a method has been perfected in Britain for welding metal to glass. The glass used is of a specially toughened type and the metals are aluminium and certain alloys containing a high percentage of aluminium.

This process is at present used for making electric heaters. These are made by spraying aluminium which is in the form of wire and is sprayed by means of a "Schoop" gun, in a zig-zag pattern on to the specially heated glass. An electric current is then passed through the long conducting path so formed. This heats the aluminium pattern and so, by conduction, the glass. A heater is normally formed of two such plates mounted back to back in a framework, so that the live metallised strips are inside. This arrangement protects the user from shock. These "glass-heaters" have been tested over a long period and have emerged satisfactorily.

#### Soldering Metal Discs

This process is now also being used for soldering metal discs or bolts on to glass. Tests have shown that very great strength is obtained in such a joint. The metal sticks so firmly that any attempt to dis-

lodge it breaks the glass before the joint between the metal and the glass.

"The soldering of metal to glass," said an official of Pilkington Brothers of St. Helens, who have brought out the process, "has been the dream of glass technologists for years. By combining the use of toughened glass and aluminium and having overcome the technical difficulties of spraying, the process is now a practical one. The soldering of metals to glass can be used for furnishing and fittings and has been used instead of complicated mouldings for radio frequency condensers.

#### Sticking Glass to Glass

"It is also possible to stick glass to glass by the same process. This enables glass parts to be made of sizes and shapes otherwise impracticable. It is difficult to describe in specific terms the various applications of the process and it is, of course, obvious that materials will not be available for general purposes until the end of the war.

"When that time arrives, it is expected that the process will be adapted for use in some form or other in a large number of industries."





German bombers taking off for a raid on the enemy

# Aircraft Recognition

## Suggestions for Home Study—Part 2

**T**HE preceding article suggested as a first objective for home study twenty-four of the principal British Service monoplanes. If the reader feels that he has attained a reasonable degree of proficiency in recognising these, he may continue by studying either additional British types or their German counterparts. Theoretically, the study of British aircraft may be pursued until a point is reached when the student can say, "I am familiar with all British Service machines, and as I am unable to recognise this strange craft it may safely be classed as hostile."

In practice this point is rarely reached. Although considerable familiarity with British types will enable you to sense, almost instinctively, unusual outlines, the stranger may prove on closer examination to be an air liner of some formerly neutral State, now in British service; a recently imported U.S.A. type, or a new British machine of which no details have been released.

It follows that some detailed study of the distinguishing features of the most impor-

tant German types is essential. Fortunately most students of the subject are eager to reach this stage and can with difficulty be persuaded to concentrate their first efforts exclusively upon aircraft in service with the R.A.F.

### Important German Types

Twenty-four of the principal monoplanes

By R. A. Saville-Sneath

now in service in the German Air Arm are here set out in alphabetical order:—

Blohm & Voss 138	<u>Focke-Wulf</u>	<u>Junkers 88</u>
Blohm & Voss 139	<u>"Condor"</u>	Junkers 89
Blohm & Voss 140	<u>Heinkel 111</u>	Junkers 90
Blohm & Voss 142	<u>Heinkel 113</u>	<u>Messerschmitt 109</u>
<u>Dornier 17</u>	Heinkel 115	<u>Messerschmitt 110</u>
<u>Dornier 18</u>	Heinkel 116	<u>Messerschmitt 110</u>
<u>Dornier 24</u>	Henschel 126	<u>Messerschmitt 110</u>
<u>Dornier 26</u>	Junkers 52	<u>Messerschmitt 110</u>
<u>Dornier 215</u>	Junkers 86	<u>Messerschmitt 110</u>
	Junkers 87	<u>"Jaguar"</u>

Following the principle outlined in the preceding article, it is suggested that six of the most important of these should be taken as a first objective. These consist of the twin-engined heavy bombers and reconnaissance-fighter-bombers, shown in italics. The twelve machines recommended as a second stage are underlined. In addition to the six already mentioned, these include the principal fighters and troop carriers.

### The First Six

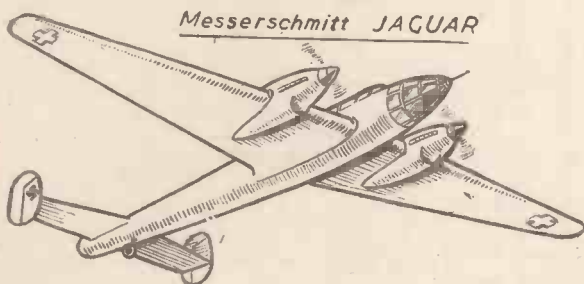
Excluding single-engined fighters, the six types suggested are those most frequently engaged over Great Britain. They provide examples of the three chief structural groups:—

*High Wing*: Dornier 17 and 215 (shoulder wing).

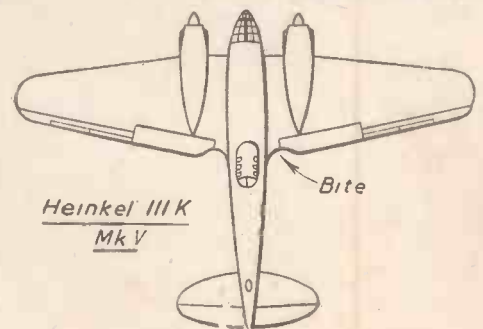
*Mid-Wing*: Junkers 88 (low mid-wing).

*Low Wing*: Heinkel 111, Messerschmitt 110, and "Jaguar."

It is not proposed here to give a detailed description of each machine, but to indicate those general features which are likely to prove most useful in assisting recognition

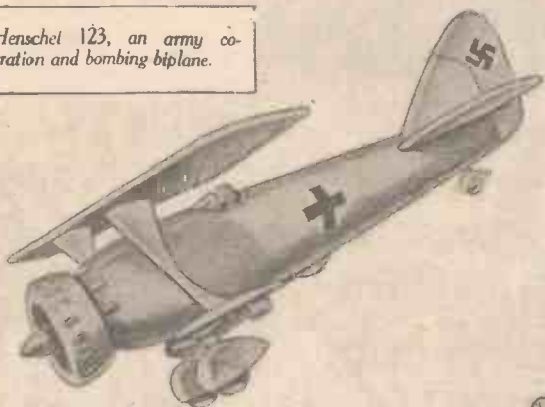


(Left) The Messerschmitt "Jaguar", a fast reconnaissance bomber. Relying on its speed it has carried out many daylight raids of the "tip and run" type. (Right) The Heinkel 111K, MK.V. A characteristic feature of this plane is that the trailing edge is swept forward where it joins the fuselage.

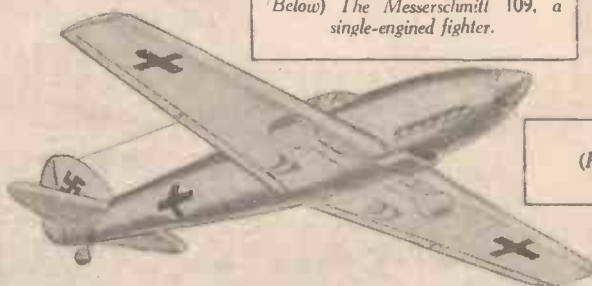


# SOME OF THE MANY INTERESTING TYPES OF AIRCRAFT HOW TO RECOGNISE THESE MACHINES

The Henschel 123, an army co-operation and bombing biplane.



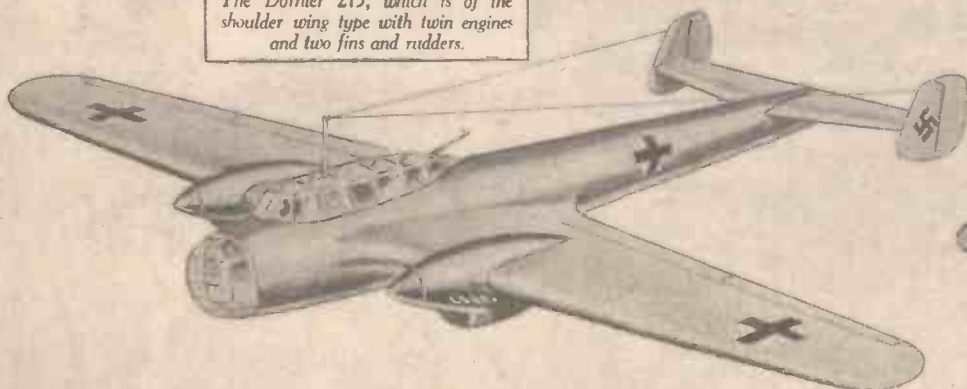
Below) The Messerschmitt 109, a single-engined fighter.



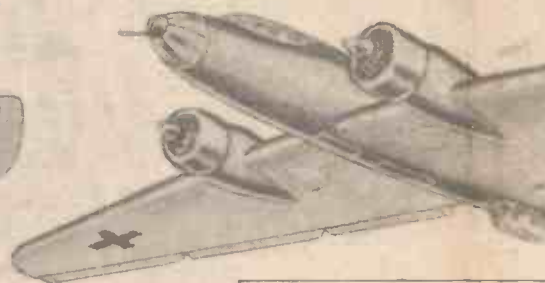
(Right) The Heinkel 113.



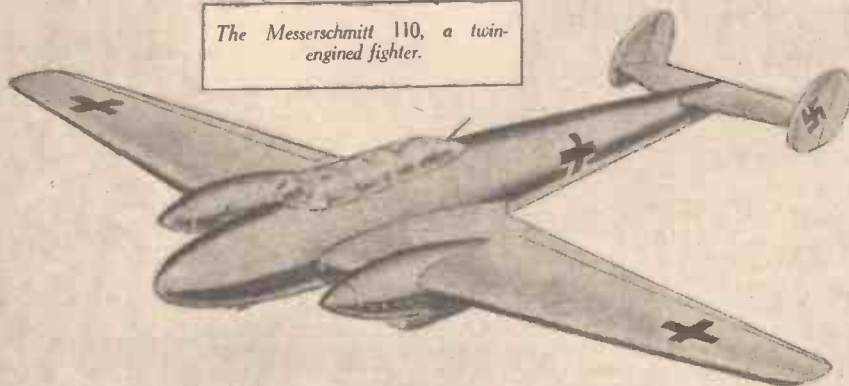
The Dornier 215, which is of the shoulder wing type with twin engines and two fins and rudders.



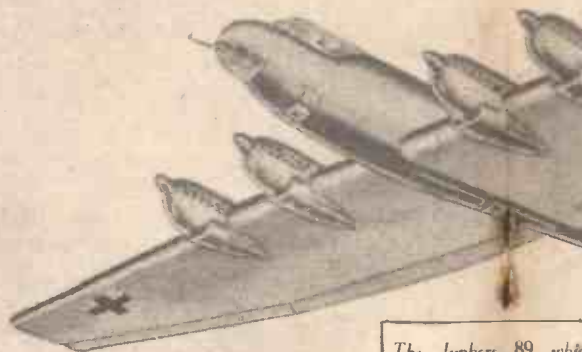
The Junkers 86K.



The Messerschmitt 110, a twin-engined fighter.

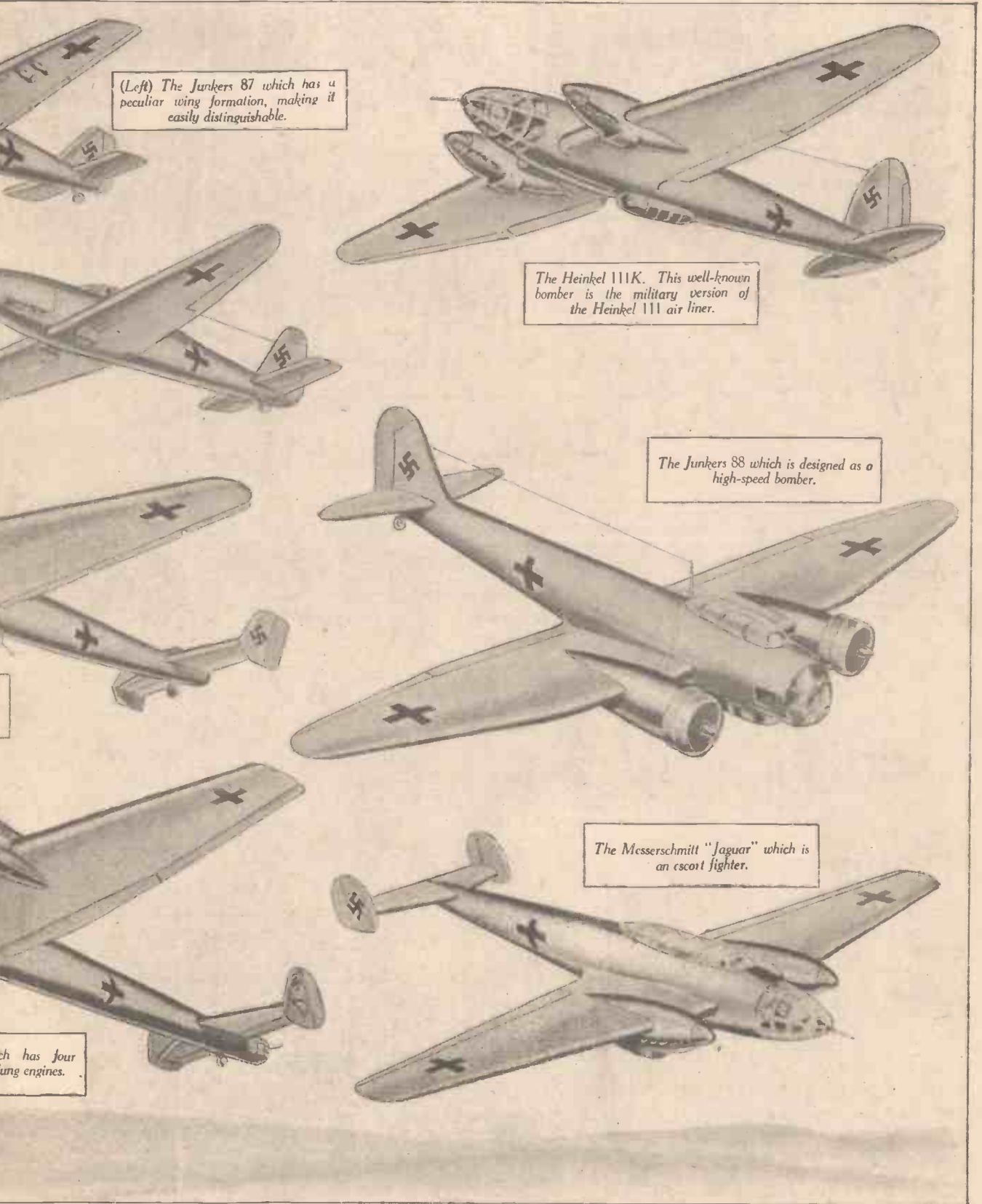


The Junkers 89 with unusually large undercarriage.





# AFT IN SERVICE WITH THE GERMAN AIR FORCE BY THEIR DISTINCTIVE FEATURES



(Left) The Junkers 87 which has a peculiar wing formation, making it easily distinguishable.

The Heinkel 111K. This well-known bomber is the military version of the Heinkel 111 air liner.

The Junkers 88 which is designed as a high-speed bomber.

The Messerschmitt "Jaguar" which is an escort fighter.

ch has four eng engines.

when the aircraft is first spotted, possibly several miles away. The most valuable points are those which the reader will, I hope, personally discover in following out the simple routine suggested in last month's issue. As the importance of methodical observation cannot be over-emphasised, the order recommended—in the case of *monoplanes*—is repeated below:—

1. Wing position (high, mid, or low).
2. Number of engines.
3. Tail unit (single or twin fin and rudders).
4. Fuselage.
5. Type of engines (radial or in-line) and position of engine nacelle.
6. Undercarriage (fixed or retractable).

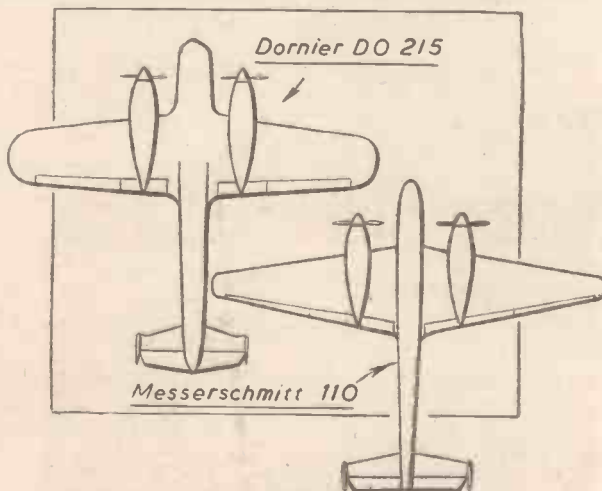
#### The Dorniers

The Dornier 215 should be studied in conjunction with the Dornier 17, from which it was developed. The latter, generally known as the "Flying Pencil" by reason of its extremely slender fuselage and long, somewhat pointed nose, may easily be recognised by those features. Both aircraft are of shoulder-wing type with twin engines and two fins and rudders. Note particularly the rather angular shape of these and their position at the extreme end of the tail-plane. Do 17 and Do 215 may be seen with either radial or in-line engines, the engine nacelles being almost fully *underslung*.

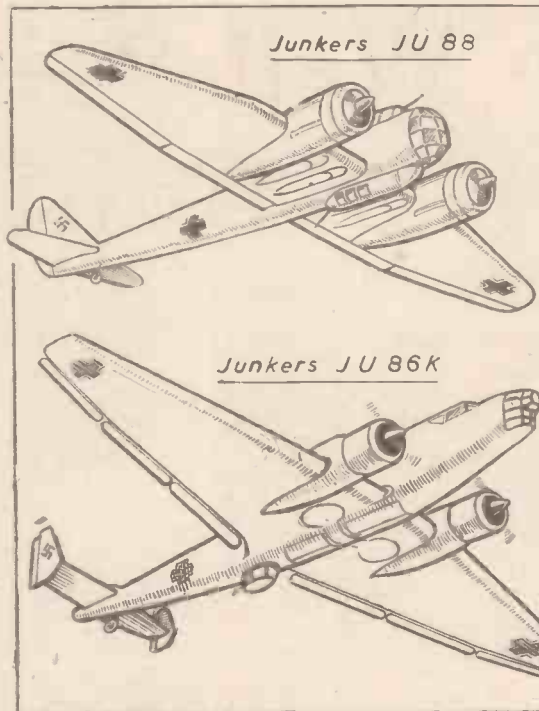
Compare these machines point by point with the De Havilland Flamingo, which is in the same structural group. If you have not forgotten your first twenty-four British planes you will quickly seize upon the points of *dissimilarity*. For example, the spacious lines of the deep streamlined fuselage of the former air liner—now chiefly used as a troop-transport—are in conspicuous contrast with the slim lines of the Do 17.

The Do 215 is built to the same general plan as the "Flying Pencil," but has improved armament, better provision for observation and normally carries a crew of four, against three carried in the Do 17. These modifications result in a fuselage of deeper section forward. The fully-glazed nose is shorter and more rounded than that of the Do 17.

The Dornier wing plan is normal but characteristic, with equal taper on the leading and trailing edge and broad, well-rounded tips. Its aspect ratio—i.e., the



(Left) A plan view of the Dornier 215. (Right) A plan view of the Messerschmitt 110



(Above) The Junkers 88, designed as a high-efficiency high-speed bomber. (Below) The Junkers 86K which has many distinguishable features.

ratio between the wing span and chord, is moderate, being noticeably less than that of either of the two twin-engined Messerschmitts, with which the Dorniers are sometimes confused.

#### Junkers 88

Many Junkers types were originally designed as civil air liners, rapidly convertible into bombers or military transports. Examples are the Junkers 52, 86 and 90, all of which may be easily recognised by the Junkers "double wing" or full-length flap.

The Junkers 88 is a notable exception to this general rule. Designed as a high efficiency, high-speed bomber, it has normal wings of clean lines,

which, however, retain something of the characteristic Junkers taper and angular form. It also reverts to earlier

Junkers practice in having a single large fin and rudder in contrast to the twin fin and rudders of the Ju 86, 89 and 90.

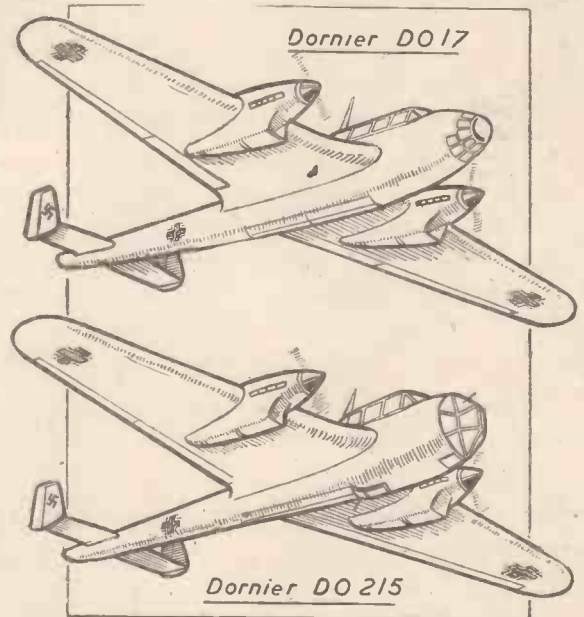
You will scarcely fail to notice the unusually large *underslung* engines. These project well forward of the leading edge in line with the nose. They have the appearance of air-cooled radial engines, but are, in fact, 1,200 h.p. Jumo in-

verted V liquid-cooled engines with radiators of circular section.

The Junkers 88 should be closely compared with the short-nosed Bristol Blenheim, which it most resembles. The differences in wing plan, fuselage and tail unit should be carefully noted. When confronted with a close resemblance between two different aircraft, one of which is hostile, it is a good plan to make a rough outline sketch of both. If possible, sketch a side elevation as well as the wing plan and compare these closely, marking on your sketch the points of difference which you distinguish most readily.

#### The Heinkel 111 K

The letter K (Krieg) indicates that this well-known bomber is the military version of the Heinkel 111 air liner. Since it first appeared in 1935, the maximum speed has been stepped up by successive stages from around 190 m.p.h. to slightly over 270 m.p.h. The earlier versions were easily recognisable by the elliptical shape of the wings. The wing plan of the current version, Mark V, follows the more usual tapered form. It retains, however, a very characteristic Heinkel feature. The trailing edge is swept forward where it joins the fuselage, suggesting a "bite" out of the wings at that point. This bite near the wing roots may almost be regarded as a Heinkel "trade



(Above) The Dornier 17, known as the "Flying Pencil" by reason of its extremely slender fuselage and long pointed nose. (Below) The Dornier 215 which is built on the same general plan as the Dornier 17, but has improved armament

mark," since it is also observed in the Heinkel 59, 60, 70, 116 and 118.

The Mark V version, with two in-line engines and single fin and rudder, is perhaps nearest in general appearance to the Merlin-engined version of the Wellington bomber, with which it should be compared.

Notice the shorter nose of the Heinkel, the rounded fin and tail-plane, the fuselage of nearly circular section, and the gun turret on the under side aft. The wings are of normal aspect ratio with a marked dihedral angle—in other words, they are inclined upwards from root to tips. In contrast, the



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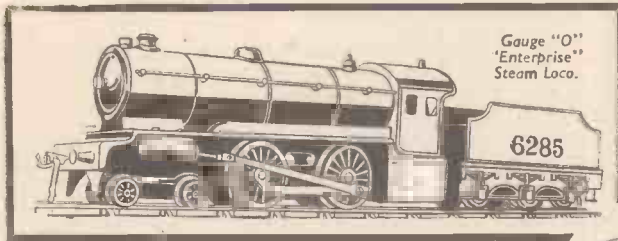
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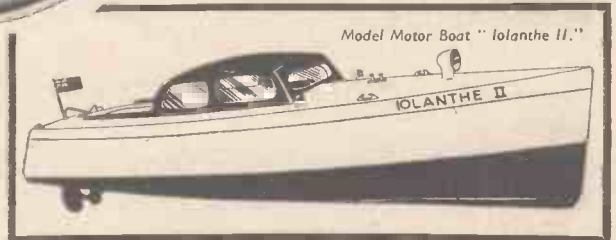


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Wellington wing has a high aspect ratio and only slight dihedral.

**The Twin-Engined Messerschmitts**

A specially stripped version of the single-engined Messerschmitt fighter pushed the international land-plane record up to 481 m.p.h. in April, 1939. The first appearance of the much-heralded twin-engined Messerschmitt fighter was therefore awaited with unusual interest. Publicised as a fighter "destroyer," the Me 110 proved no match for the greater manoeuvrability of the British fighters combined with the individual superiority of R.A.F. pilots.

The chief recognition points are:—  
 Low wing, of high aspect ratio with normal taper on leading and trailing edge, rounded tips.  
 Twin engines of in-line type mounted on their centre lines.

Deep radiator below engine nacelles.  
 Twin-tail unit, not unlike the Dornier, but on close comparison it will be observed that the Dornier fins and rudders are mounted higher on the tail-plane. They are also more angular than those of the Me 110. The fuselage is slender and the nose streamlined. A single large cockpit with glazed roof accommodates the crew.

From this not-so-successful escort fighter the Messerschmitt "Jaguar," a fast reconnaissance bomber, has been developed. Relying on its speed, the Jaguar has figured in many daylight raids of the "tip and run" type. It is chiefly distinguishable from the original Me 110 fighter by the fully-glazed nose and the somewhat deeper section of the fuselage forward.

**Silhouettes of Aircraft**

When you are satisfied with your ability

to recognise the principal types of aircraft from illustrations in which all details are clearly shown, you are ripe for the next stage; which is recognition from aircraft silhouettes.

Silhouettes provide the nearest practical equivalent to the distant view of an aircraft seen against a background of light cloud. This silhouetted image merely suggests structural features which you should have no difficulty in recognising if you are sound in the tests which you have already carried out with photographic illustrations.

If you are unable to beg, borrow or buy suitable silhouettes, simple outline drawings or tracings will serve much the same purpose.

There is probably no better way of memorising essential features than by making your own rough drawings.

# The "Gadget" Man

The Man Who is Always in Demand in the R.A.F.



The chief job of the "gadget" man or Armament Officer is to see that the bombs are loaded ready for Hitler's benefit

IN peace time the Armament Officer is somewhat of a Cinderella in the Royal Air Force, but in war he comes into his own with a vengeance. He is always in demand. He has just seen a raid off. He has given it his blessing, and is hoping that all his "toys" will be delivered accurately and with dispatch to their consumers. But the departure of a raid does not mean that his work is ended. It is just beginning again. He must get busy at once with his preparations for the next raid.

More bombs must be taken out of the stores, loaded on their specially designed trolleys and transported to the fusing-points. Here the bombs are prepared for

ever. Guns, gun-turrets, gun-sights and ammunition make up the other part of the aircraft side of his duties and help to keep him busy.

And there are still many other spheres in which the armament officer is the guiding influence. Training of bomb aimers, instruction in bomb sights and bombing gear and analysis of the results of bombing practice are some of them. He also supervises the training of air gunners.

**"Provisioning"**

"Provisioning" is a factor which requires constant attention, because it must neither be underdone or overdone. A sudden call for a particular type of bomb

use, an operation which requires skill and care, as well as a thorough knowledge of the anatomy of these temperamental projectiles.

**Bomb Trolleys**

From the fusing sheds the trains of bomb trolleys are delivered to points where the aircraft will be re-armed when they land. "Armament," as the armament officer is usually called, will be out on the tarmac to see the bombers come in. Each one will be rapidly checked to see that all is well, and before the aircraft are loaded up again, careful tests are carried out to ensure that all the equipment is in perfect working order. The armament officer is not solely concerned with the bombs and bomb-releasing gear, how-

ever, might reveal insufficient stocks for the operation planned, but no armament officer has yet been guilty of such an unforgivable crime.

Sometimes the C.O. will ring for "Armament" and ask him which is the best type of bomb to use for a particular job, and how it should be fused for that job. "Armament" is the technical adviser in these matters, for he not only knows how to handle and use his stock-in-trade, but he knows, too, the effects his bombs produce when they are dropped. Striking velocities, ballistics, trajectories, penetrative powers and terminal velocities are all within his ken. In all armament officers, it would seem, there remains a good deal of the small boy who likes "bangs" for their own sake, for "Armament" is usually something of a "gadget" man and he is frequently the originator of pieces of useful equipment, now in general use, but primarily invented by him in order to gratify his over-ruling passion for "bigger and better bangs."

**A Good Marksman**

Another characteristic of "Armament" is marksmanship. He is usually a good shot with rifle, revolver or machine gun, and frequently with all three. But the bombs invariably come in for the largest share of his care and affection. It is an affection that springs, possibly, from his belief that it is because of the bombs that the Royal Air Force exists. The fine aircraft with which the Air Force is equipped, the ability of the pilots and navigators to fly those aircraft to the target, all the technical knowledge and skill involved and the organisation and administration of the service are finally devoted to delivering the bomb on the target.

So that the armament officer, though he does not personally go into action against the enemy, is the man on whom the men of action rely for the means with which to destroy that enemy.

**THE LEADING WEEKLY FOR ENGINEERS**  
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**"Dry Batteries, How to Make Them,"** by G. Bernard Hughes. Published by Hutchinson's Scientific and Technical Publications. 160 pages. Price 6s. net.

**A**LTHOUGH the war-time black-out has greatly increased the demand for dry cells, published information regarding dry-battery manufacture is very scanty, but in this book will be found much information on the subject which has not appeared in print before. The book embodies the result of twenty-five years' practical experience in the world of dry batteries, and the potential manufacturer will find in its pages every necessary detail which will enable him to make torch and flash-lamp batteries, inert-cells and high-tension wireless batteries of high capacity, and all well adapted for storage. Written in straightforward language, the book is divided into twelve chapters, and deals in the first chapter with the evolution of the dry cell. Other chapters deal, amongst other subjects, with Polarisation and Depolarisation; Building a dry cell; and High-tension Batteries. There are sixteen illustrations, and a six-page index. Although primarily intended for the commercial manufacturer of dry batteries the amateur will find much helpful information within the covers of this useful book.

**"House Telephones, Bells and Signalling Systems,"** By J. R. Stuart. Published by George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. 184 pages. Price 6s. net.

**M**ANY types of communicating systems, including push-button telephones, doctor's night telephones, bells and bell-circuits, reservoir indicators and A.R.P. communication systems are described in this practical handbook, which is volume four in the Electrical Engineer Series. Specially prepared for installation engineers, contractors, and all engaged on the utilisation side of the electrical industry, this book will also appeal to all those interested in modern types of bells and indicator systems and house telephones for use in offices, works and hotels. The book is illustrated with 131 diagrams and photographs.

**"Wiring Circuits for Lighting, Power and Industrial Control,"** By J. R. Stuart. Published by George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. 208 pages. Price 6s. net.

**T**HIS book, which is volume five in the Electrical Engineer series, is a handy work of reference for installation engineers, contractors and works' electricians. The book contains a unique collection of circuit diagrams including lighting circuits, motor starters, transformer and rotary converter circuits, rectifier and battery charging systems, and photo-electric control and time switches. Each diagram has been carefully annotated to assist the reader to easily understand the operation of the various circuits described. The book is printed in clear-cut type of a suitable size to make it easily readable.

**"Factory Installation Work,"** By A. J. Coker. Published by George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. 240 pages. Price 6s. net.

**D**URING the past few years there has been a great increase in the use of electricity in industrial plant, largely owing to the convenience of Grid supplies, and the versatility of the electric motor. This book brings together, in a very convenient form, up-to-date and reliable information on the complete range of electrical installation work as applied to the electrical equipment



of works and factories. The main subjects dealt with are factory sub-stations, distribution switchgear and cables, motor control gear, and lighting and heating distribution circuits. Among the associated subjects also dealt with are power factor correction equipment, and earthing and protective devices. The book is well illustrated with diagrams and half-tones.

**"A.C. Motors and Control Gear,"** By A. J. Coker. Published by George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. 216 pages. Price 6s. net.

**T**HIS is a practical work for installation engineers, contractors, and works electricians, and deals chiefly with the starting and control of various types of A.C. motors, which are described in detail. The various systems explained range from the simple direct-on-line starters, to the more complicated types of starters and pole-changing control gear. There are many circuit diagrams showing the internal arrangements of the apparatus described, and also the appropriate connections between control gear and motor terminals. The book also includes many half-tone illustrations and a complete index.

**"Testing Electrical Installations and Machines,"** By J. R. Stuart. Published by George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. 200 pages. Price 6s. net.

**W**ITHIN the covers of this book will be found a mine of information covering present-day practice in all kinds of commercial electrical testing, as distinct from ordinary laboratory test work. Amongst the varied subjects dealt with are testing direct-current armatures; transformer testing; testing distribution cables; localisation of faults; and workshop testing methods. Throughout the book it has been the object of the author to convey practical information as to the exact methods to be employed in carrying out these tests. The book is volume six of the Electrical Engineer Series and, as is usual with these books, it is well illustrated, and clearly printed.

**"World Natural History,"** By E. G. Boulenger. Published by The Scientific Book Club. 268 pages. Over 175 illustrations. Price 2s. 6d. to members.

**R**EADERS of all ages interested in natural history will find a mine of information in this comprehensive book. The author is a well-known authority on the subject, and the text is scientifically accurate, and easy to read. The work is enhanced by several wonderful photographs, and clear cut diagrams. Its mode of presentation will appeal to all students of natural history, as a great improvement on the popular natural histories we have known in the past. As Mr. H. G. Wells states in his admirable preface. "It is a book to own. It is a book to give as a present. No young gentleman's library, at any rate, should be without it."

**"Marvels of the Air,"** Edited by T. Stanhope Sprigg. Published by George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. 152 pages. Price 5s. net.

**T**HIS book contains a wealth of information on modern aircraft, and airman's feats, for the young air-minded reader. Profusely illustrated with photographic

reproductions and diagrams the book deals with present-day flying in all its aspects, from the regular air services to the work of our fighter pilots over land and sea. The varied contents cover such subjects as Flying with the Fleet; Hurricanes of War; Air Fighting To-day; How to Fly an Aeroplane; Famous Flights and Fliers; and a Day in a Pilot's Life. There are also instructions for building a scale model Vickers Torpedo Bomber.

**"Round the World in Industry,"** By Gerald Collins. Published by George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. 180 pages. Price 5s. net.

**R**EADERS, young and old, who have a spirit of high adventure in their make-up will find much to interest them in this entertaining book. The author takes the reader on a stirring world tour to see how some of the most thrilling jobs in industry are carried out. You are travelling on the world's most luxurious train; with the seal hunters in Newfoundland; on the bridge of a great Atlantic liner; down under the sea with divers; and then up in an aeroplane with a test pilot. From one exciting industry to another the reader is whisked along on this graphic, breath-taking journey. The book is illustrated with numerous half-tone illustrations.

**"Speed,"** Edited by Captain G. E. T. Eyston. Written by R. S. Lyons. Published by George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. 142 pages. Price 5s. net.

**I**N this book the author has collected together the stirring stories of man's quest for speed, from simple athletics to the high-powered machines of the air, and on the sea and land. Successes, crashes, and great accomplishments are all illustrated and described in a manner that every reader will enjoy.

**"Ascaris: The Biologist's Story of Life,"** By Dr. Richard Goldschmidt. Published by The Scientific Book Club. Price 2s. 6d. net.

**I**N this book the author presents the gist of biology, the science of life, in a form which combines pleasant reading with accurate information. It is a story of life which presupposes no previous knowledge in the sciences. All who read the book may find just as much information about the living world as they need in order to walk through life with open eyes and to understand their own nature. They might even find the story as stirring as fiction, in spite of a strict avoidance of the sensational and the morbid. Nature after all, is so sensational that the plain truth, in addition to conveying essential knowledge, can carry all the thrill desired.

**"The Model Railway Handbook,"** By W. J. Bassett-Lowke. Published by Bassett-Lowke, Ltd. 148 pages. Price 3s. 6d. net.

**T**HIS book, which is a ninth edition, is a practical guide to the installation and working of model railways of all gauges. It has been completely revised and brought thoroughly up-to-date, and records the many advances made in model railway work since the previous edition was published, about ten years ago. A perusal of its pages brings home to the reader the fascination of railway modelling, in a very attractive manner. No matter whether it be a tiny "00" gauge layout for use on a table, or a passenger carrying train on a miniature railway, this book tells you all about them, and also explains the "thousand-and-one" details that go to make up the running of a model railway.



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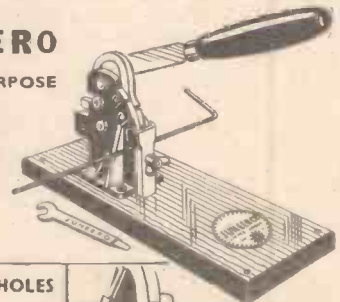
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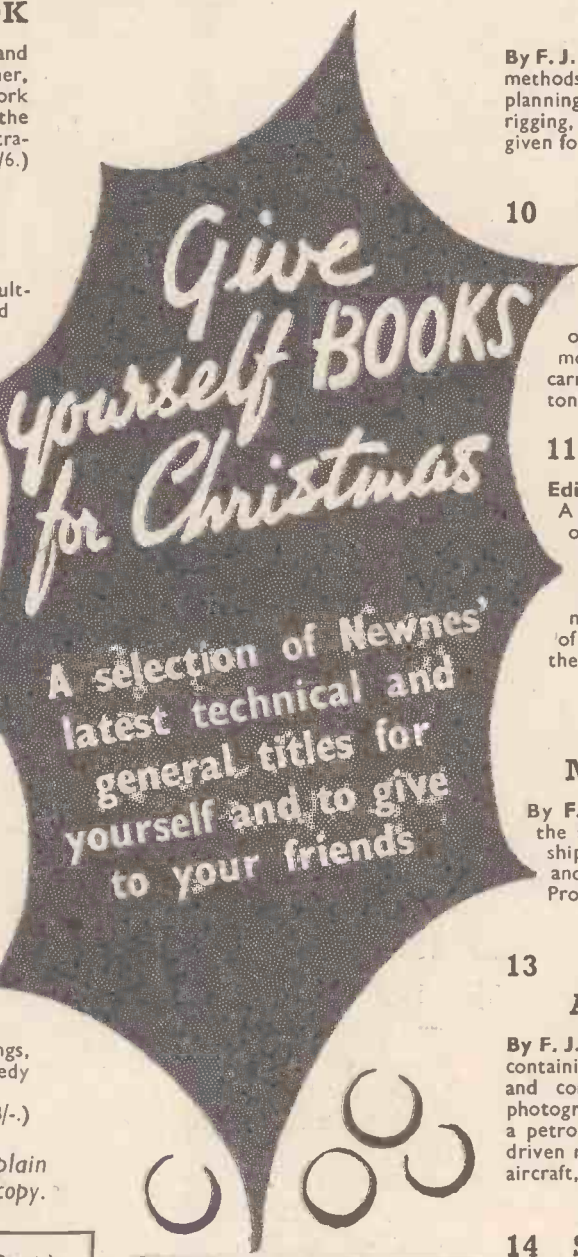
By F. J. Camm. An expert's book for boys, containing designs for modern model aircraft, and comprehensively illustrated with 237 photographs and diagrams. Contents include a petrol-driven model monoplane, a petrol-driven model biplane, power units for model aircraft, building a model autogiro, etc. 5/- net. (By post 5/6.)

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# HOME MOVIES

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

## NEWS AND COMMENTS

### Why We Are Here

THESE are difficult times for hobby papers, especially those dealing with a hobby like movie making and showing; costs go up, revenue goes down, and paper gets scarcer. Despite the faithful support of its readers, "HOME MOVIES" now finds itself unable to keep up a separate existence any longer, and so takes refuge here in a space offered by its sister magazine. Here old readers will continue to be kept in touch with developments in the movie field and to be provided with useful information about their hobby, until better times return. Here, too, we may hope to make new friends, for home cinematography is a hobby to appeal to all interested in mechanical matters.

### Surely a Record

THERE'S a member of the Toronto Amateur Movie Club who makes medical films, apparently with immense energy and toil. Dr. Willinsky, member in question, has just completed over 800 feet of film of animated graphs and charts, practically all done frame-by-frame—each single frame exposed as a separate operation. That must mean something like 30,000 separate exposures.

### Filter Gadget

JUST out in America is a new instrument for judging visually the effect of filters. On looking into the instrument's eye-piece and rotating a disc the user sees the effect, as it will appear on pan film, of a series of filters. On observing what he considers the right rendering, he refers to a dial and there sees the designation of the filter he should use. The device costs 4½ dollars in America.

### Amazing Field Depth

THE new 9-mm. focal length lens just introduced by Eastman Kodak for 8-mm. cameras provides opportunity for some extraordinary effects based on extreme depth of field. Even at its maximum aperture of f/2.7 it gives sharp focus on everything from 4 feet to infinity, while when stopped down to even a medium-small aperture like f/8 it covers all distances from 2 feet upwards. Naturally, with so great a depth of field no focusing adjustment is provided.

### TACTFUL HINT

SIR,—The season for giving shows to A.R.P. workers and others is here again, and I wonder if it would be taken in good part if I offered a hint?

I am myself a keen cine fan, though with little time for it now, and I was very interested when I heard my post was to be given a show by a certain very public-spirited club projection unit. On the evening I found to my dismay that the programme was two club photo-plays and one (library) "interest" film.

Those photo-plays interested me a lot, because I understood the game, but to the rest they were just not very good stories, amateurishly acted and indifferently filmed, in a medium ("silent") which seemed old-fashioned and hard to follow. They appreciated the trouble taken on their behalf, and tried to enjoy the show. Up to a point I think they did, but the effort was obvious.

Now, if clubs who so kindly try to lighten our long hours would just stop to think they could do far more for us. We do appreciate what is done and would hate to seem ungrateful, but as one who knows what is on both sides of the fence I urge caution in presenting too many amateur fiction films. I think any reasonably good record of

holiday or other travel in foreign lands would be far more certain of interesting people who want to be "taken out of themselves."—Yours, etc., "A.R.P.," Surrey.

## SCREEN FACTS

A GREAT deal of nonsense is talked about screens, often by persons who are not altogether disinterested parties. First take the question of "angle"—it is often claimed that some patent sort of screen surface gives uniform results from whatever angle it is seen; this is true to the fullest extent only of the plain white surface, all those who possess higher degrees of reflecting power being to a greater or lesser degree "directional," i.e. they appear brightest when looked at from a position somewhere along the line joining projector and screen.

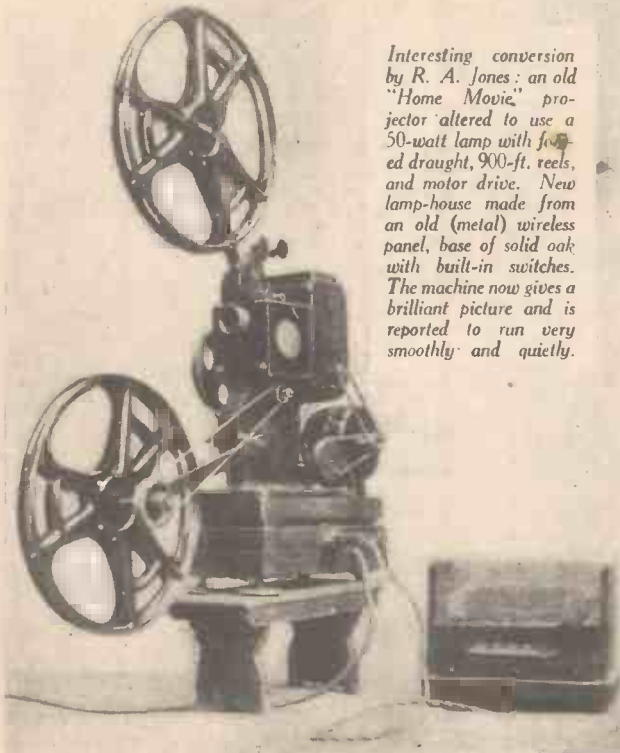
It is alleged, too, that some surfaces give "truer" results than others, with an implication of better definition in the picture or better gradation and contrast in its tones. Here again the fact is that the plain white surface sets the standard, provided that the projector has enough illuminating power to give a picture of optimum brightness on this kind of screen.

The only sound reason for using any surface other than plain white is that the projector in use lacks power to give a sufficiently bright picture on the "inefficient" plain sort. Not one of the special types possesses any inherent virtue other than the greater reflective efficiency which makes the picture look brighter for a given power of projector. That is, admittedly, a perfectly sound reason for using, say, a silver or a "bead" screen: a more reflective surface makes up for the lack of brilliance which, when judged by the standard set for projectors used in public theatres, is normal to the amateur machine.

If our projector, therefore, is of less than something of the order of 500 watts it is natural that we should seek the picture brilliance we desire with the aid of one of the more highly reflective surfaces. But let us beware of thinking that we have got thereby a picture better in any way than would have been obtained with a more powerful projector on a less "efficient" screen.

The contrast of the picture on the screen, that is, the brightness of its highlights in relation to its darks, depends in the first place, on the contrast in the film itself. It is affected also by the optical arrangements of the projector, and by less obvious factors such as the amount of stray light in the room. It is not directly affected by the nature of the screen surface, although when the projector is of low power, especially when there is over-much stray light in the room, a more reflective surface may appear to increase contrast and give a picture with more "sparkle."

Interesting conversion by R. A. Jones: an old "Home Movie" projector altered to use a 50-watt lamp with forced draught, 900-ft. reels, and motor drive. New lamp-house made from an old (metal) wireless panel, base of solid oak with built-in switches. The machine now gives a brilliant picture and is reported to run very smoothly and quietly.



## CINE QUERIES ANSWERED

### Charging For Admission

I am giving a number of shows this winter for various purposes, and should like to make a small admission charge just to cover the cost of hiring films. Is this in order, the object being definitely charitable?

Directly an admission charge is made all sorts of complications, legal and other, arise. For one thing, it is an express condition of film hire from sub-standard libraries that no such use be made of the reels, and for another stringent police and other regulations must be obeyed. We strongly advise some other method of covering expenses.

### What is a Wide Angle?

What is the real difference between a wide-angle and a normal lens? Is it in the construction of the objective?

It is purely a matter of the focal length in relation to the size of the film frame. A certain particular relation between these factors has been found to give results in perspective, image size, and so on, which are regarded as "normal." Lenses of focal length shorter than this agreed convention give a wider angle of view and so are described as "wide-angle." There need not necessarily be any difference in their construction as compared with the normal lens, although in extreme cases of ultra-short focal length there may be some alteration in the number and arrangement of the elements forming the complete objective assembly.

### The Depth Illusion

I notice in certain professional pictures a remarkable illusion of depth in some shots in which the camera was in movement. Why is this?

When the camera moves (on a "dolly" or other wheeled support) crosswise to its line of vision objects in the foreground are seen to be in constant apparent motion in relation to the farther distance, just as they are in the view from a railway train window, and this gives the illusion of stereoscopic vision.

### Equivalent Footages

I always understood that 300 feet of 9.5-mm. film was equivalent to 400 feet of 16-mm., but recently I saw a table of running times (it was in your useful little book, "Facts and Figures for the Amateur") in which it appeared that the running times for the two sizes was the same. Is this possible, when the films are of different gauge?

Although 9.5-mm. is narrower, the frames are spaced apart because the perforations are placed between them. In actual fact, the number of frames per foot is almost exactly the same in the two cases, and for practical purposes a table of running times for either gauge will serve also for the other.

### Against The Light

My exposure meter never seems to give me correct results "against the light." No matter how carefully I take the reading, the film turns out under-exposed. Does this indicate anything wrong with the meter?

Probably not; when taking a reading against the light the ordinary exposure meter gives a result that is apt to be unduly influenced by the extreme brilliance of the sky in that direction, and of course there is always the risk of direct rays of sunshine striking it.

Various tricks are used to obtain a more accurate indication. Some people take the reading in the opposite direction, i.e. "with" the light, and use one stop larger than is then indicated when they shoot against the light. That answers quite well very often, but we ourselves prefer to point the meter in the intended direction of the shot, tilt it well downwards, and shade it from the bright light of the sky with our hat.

### Three or Four Blades?

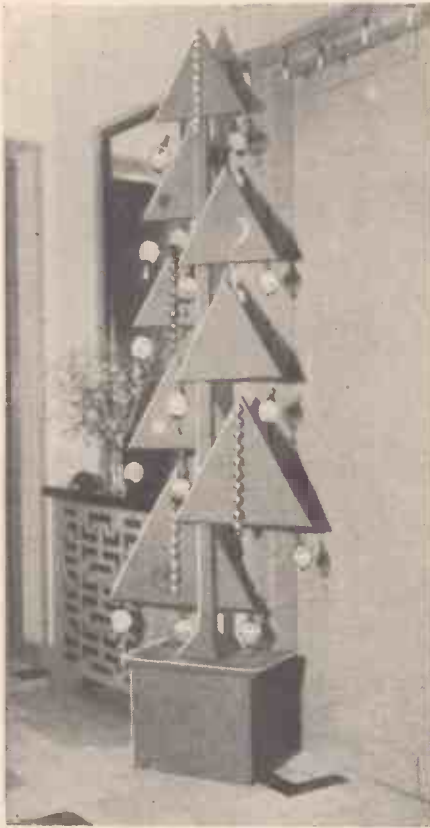
I have heard that a four-bladed shutter is a great advantage on a projector, but it seems to me that this must lead to a loss of light. Am I right?

The matter is not quite so simple. If the additional blade (we are comparing with the more usual triple-blade shutter) were of the same size as those customarily used, there would of course be a considerable sacrifice of light, but in practice a smaller-angle blade is generally used, and in this way flicker can be still further reduced without a proportionate loss of illumination. However, it is noteworthy that the amount of flicker with a well-designed three-blade machine is very slight indeed, and it would appear that one of the main advantages of the four-blade system is the opportunity it gives for running certain types of material at a slower rate than the standard 16 frames per second when desired. With a three-blade shutter this would of course result in perceptible flicker, but with four blades good projection is still obtained.

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The model-maker's modern Christmas tree. A simple and easy novelty to construct for the festive season.

## Novel Christmas Tree

**C**HIRSTMASTIDE will soon be with us, and though it is uncertain, as I write, whether this feast will be one of real rejoicing or not, I feel sure more readers will want some simple form of Christmas decoration. Here is an idea, worked out by myself, for those who can combine modernity with tradition—a design for the modern Christmas tree. It has the added attraction of being a Christmas tree, which the handyman of the house can make. You will notice there is a wooden base, and a square wood pole to which the triangles of various sizes, made of plywood, are fixed. If plywood is not obtainable, owing to war conditions, a good strong cardboard will do equally well. The finished production is painted bright green, and then decorated with stars and moons cut out

from tinfoil of various colours and patterns and stuck on with glue. The effect can be enhanced by strings of silver beads hung from the apexes of some of the triangles, while on Christmas Day, when the tree is loaded with presents, electrically illuminated magic lanterns and fairy lights will make it a most attractive novelty.

## Model L.M.S. Moguls

**V**ISITING various parts of the country and making contact with model makers here and there, I was amazed at the number who are making up L.M.S. Moguls from the sets of finished parts placed on the market by a well-known model-making company 12 months ago. On this page is shown a skilled worker in his workshop, who decided to undertake the assembly of the set of parts, more as a relaxation than anything else, during leisure hours. He has a young son who owns a gauge "O" railway, and who will be a model locomotive the richer in the near future. One can be confident,



Finishing the assembly of a L.M.S. steam "Mogul."

when one completes this set of parts, I am told, that it will, without difficulty, produce a successful working model. Very little has been left to chance with the set, and the

illustrated book of instructions on how to make it, which is included, is one of the most comprehensive I have yet seen on such a subject.

## "Trains"

**W**HICH brings me, by a converging trend of thought, to comment upon the new publications on models which are going so strongly in the U.S.A. The "Model

## WARTIME MODELS

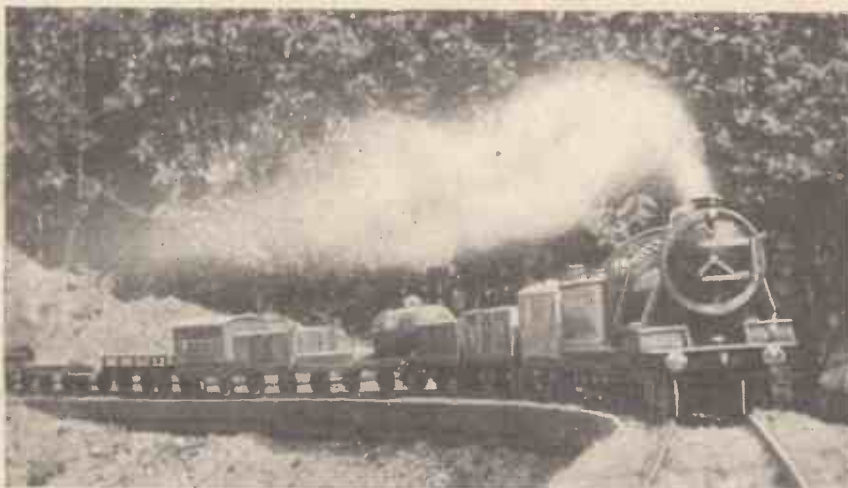
Railroaders' Digest," which started in 1936, is still increasing its circulation and size, and an entirely new publication, called "Trains," made its appearance in November this year. Although not actually dealing with models, it is sure to be eagerly perused by American model rail fans. The contents,

says the pamphlet, are exclusively fact articles, not fiction. In photos and words, "Trains" will tell you much about American locomotives, past and present, and will bring in useful information regarding other parts of the railroad mechanism, signals, track, bridges, tunnels, stations, cars, and the methods used to operate them. The layout of the magazine has also been the subject of special attention.

This new magazine is being published by the Kalmbach Publishing Company, of Milwaukee, Wisconsin (who also run the "Model Railroader"), and they have just issued a new edition of their "Book of Plans," entitled, the "Model Railroader Cyclopedia." These plans are of little use, of course, to the English rail fan, because they are based essentially on American layouts, but they might appeal to those who take an international outlook on railways.

## Model Railway Handbook

**A**ND, speaking of new publications, I am pleased to see that the long-promised reprint of the "Model Railway Handbook," by W. J. Bassett-Lowke, is now on the market. This book, which is the ninth edition, was commenced on the outbreak of



A typical illustration from the new edition of the "Model Railway Handbook." The gauge "1" outdoor model railway of Mr. C. W. Tozer, of Clifton Hampden.

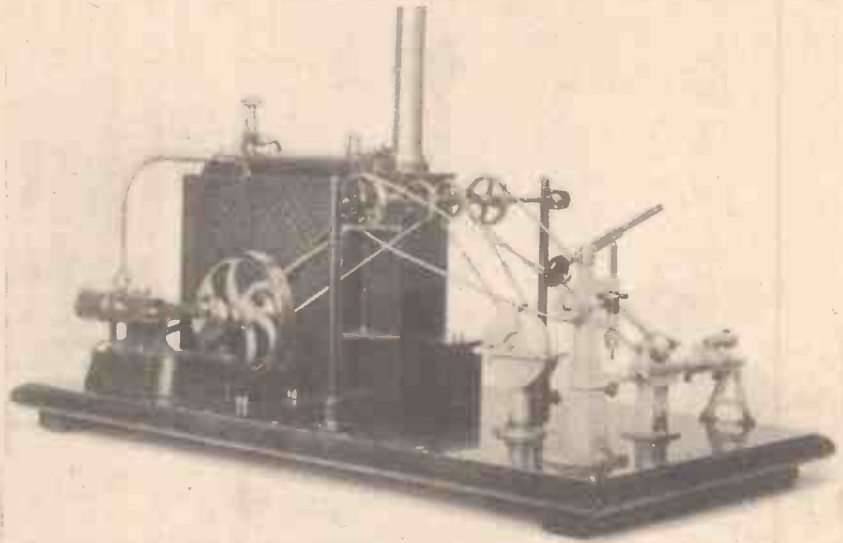


# INTO THE MODEL WORLD

war, but has been delayed by war conditions. It could hardly be called, strictly speaking, the ninth edition, except for the fact that it is the ninth publication of a book under this title. It has been entirely re-written, re-arranged in its chapter form, and practically all the illustrations and drawings are new and up to date. It contains 150 pages and 160 half-tone illustrations, as well as 40 line sketches and diagrams, and seems good value at 3s. 6d.

## Steam Engine and Boiler

**R**EADERS are no doubt familiar with the well-known lighting set by Bassett-Lowke, consisting of one of their Babcock type water tube boilers, "Tangye" type engine, and small lighting dynamo. This season, to add variety to the range, they have introduced a steam engine and boiler



The new steam-driven model workshop by Bassett-Lowke, Ltd.



Skilled girl workers in a Northampton factory working on the production of Trix train accessories.

combined with a length of shafting, with cast-iron standards and three machine tools. In the illustration these consist of a vertical drill, a hand lathe and grindstone, but other tools are obtainable. This makes a very substantial and hard-wearing outfit, which certainly shows up the rather flimsy pressed metal sets of foreign construction that flooded the market in pre-war days. The engine is of disc crank type with feed pump and displacement lubricator. The boiler is fitted with water gauge, steam pressure gauge, check valve, safety valve, and the steam is super-heated after leaving the starting valve. Altogether a useful and attractive set, which retails at about eleven guineas.

## "Trix" Railway

**F**ROM what I hear in the shops, the "Trix" trains are still running merrily in "model" homes throughout the country and demand for them is as great as ever. The factory in which they are made at Northampton is fortunately, still able to spare a percentage of labour for maintaining export and home trade in this unique railway novelty. As will be viewed in the photograph, skilled female labour is able to take care of all the painting and finishing of the models, even to the delicate lining up of locomotives and rolling stock, which, to many connoisseurs, is a feature of the railway.

## Model Railway Layout

**R**EADERS are already conversant with the enthusiasm of Mr. Gilbert Thomas the well-known author and book critic for Great Western locomotives, and on this page is shown a picture taken when I was down in the West Country, of his G.W.R. Pendennis Castle hanting a G.W.R. express

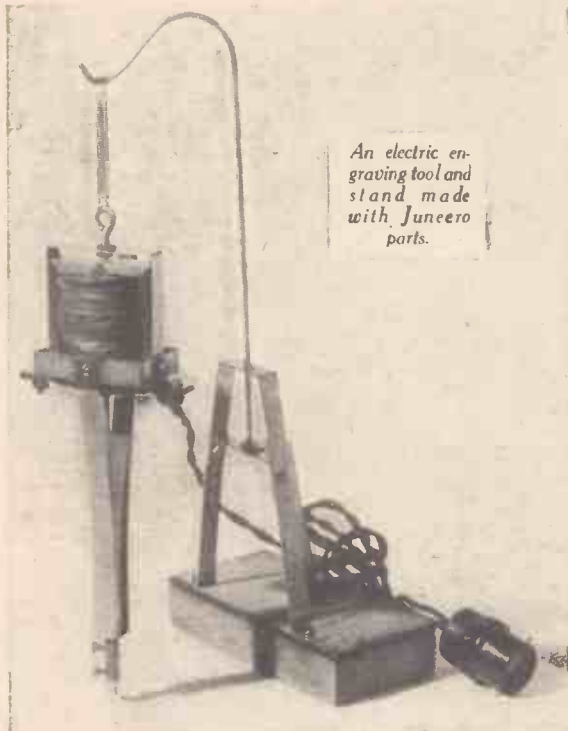
train in a most realistic setting. His new goods shed can also be seen, and two of the signal gantries he has recently acquired. His railway, which is now installed at his new home at Teignmouth, is splendidly laid out in what was originally a billiard room, and the overall dimensions, 26 ft. 6 in. by 19 ft. 6 in., provide space for an excellently marshalled and comprehensive layout. The railway is wonderfully clean and smart in appearance and only lacks one thing, in your humble scribe's opinion, for greater realism. The track is not ballasted. The owner does not favour ballast because of the difficulty in keeping the track clean, and also claims that the dust rises and gets into the locomotive mechanisms. One day, perhaps, he may be converted to ballast and electric control, but so far he much prefers clockwork traction. He makes this railway of his a wonderfully absorbing pastime, and he has spared no pains to make the surroundings true to life. From various sources he is collecting different road vehicles to correct scale, and you will notice the farm wagon and also the oil wagon on the road adjoining the main line.



A peep at a portion of the gauge "0" railway constructed by Mr. Gilbert Thomas at Teignmouth.

# An Electric Engraving Tool

## One of the Many Useful Devices that Can Be Made With Juneero



An electric engraving tool and stand made with Juneero parts.

**A**LTHOUGH it is possible to make hundreds of models with Juneero, serviceable devices such as the electric engraving tool shown on this page can also be made. A complete set of engraver parts together with instructions for making with a Juneero tool, can be obtained from Juneero, Ltd., 25, White Street, Moorfield, London, E.C.2, for 20s., or the tool can be obtained made up ready for use for 30s. To operate it, plug it into an ordinary electric light socket (A.C. 200-240) and the engraver is then ready for use.

### Useful Tools

The best instrument for marking distances on Juneero strip and rod is a "scriber," which scratches a fine line on the surface of the metal. Take a 4 in. to 6 in. length of round rod and file or grind one end to a sharp point to make a very satisfactory scriber.

A simple adjustable set-square which can be set up to any angle and will help you with the construction of Juneero models, can be made from strip. Bolt two 4 in. to 6 in. lengths of strip together as shown. To use, open the square out to the requisite angle, as shown.

A simple pair of compasses or dividers to enable you to mark out circles may be made by cutting off two exactly similar lengths of Juneero steel strip. These should have the lower ends pointed, as shown. Punch a hole in the upper end of each strip and bolt the two together. If the points are correctly made, they will be sufficiently sharp to scratch lines on the surface of the strip. In addition to marking out circles, this instrument can also be used for stepping-out distances.

### Locking Nuts

When making working models it is often desirable to lock the nuts into position to prevent vibrating loose when the model

is working. The best way to lock a nut on a screw is to tighten another down on top of it. Hold the lower nut with a spanner and tighten the upper one down on it until both are locked together. To unlock the nuts, hold the lower one and unscrew the upper one with a spanner. Where the screw is too short to allow two nuts to be fitted in this manner, the nut can be locked by burring the end of the screw over with a hammer. When this method of locking is used, it will be impossible to remove the nut without damaging it and the screw, unless the end of the latter is filed flush.

### Blue Prints

Juneero blue prints or design sheets are devised to enable you to make the Juneero models with as little trouble as possible. There is a plan of all the separate parts, showing the strips and rods in their flat form. On this plan all dimensions for cutting to length, punching the holes, and

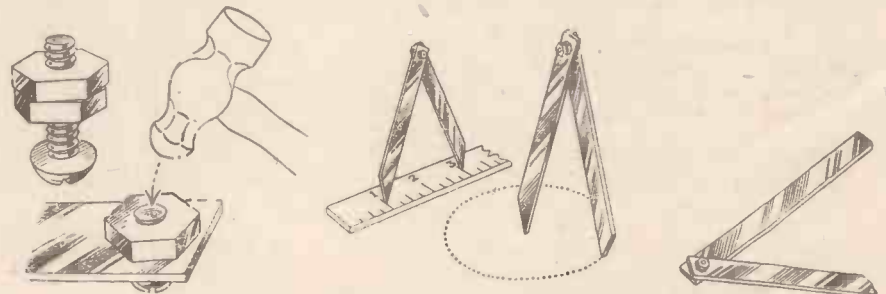
necessary, and in all drawings all parts are given similar identification letters.

### Juneero Metals

Juneero metals are supplied in various forms including flat strips and rods; also plain, ruled and corrugated sheets in various colours. It is inadvisable to use any but genuine Juneero metal, as metal that is thicker or of harder temper will damage the Juneero tool or the screw cutting dies. Some metals, too, tear in punching, or crack in bending. Do not attempt to cut, punch or bend more than one length of metal at a time. Juneero steel has a bright drawn finish and may be used for numerous repair jobs in the home, factory, etc. The steel strip and rod is of high strength and has a slight spring temper rendering it useful for such things as clips. It can be readily formed and bent in the manner previously described. The complete range of Juneero metals includes ruled and assorted metal for filling in the sides and exteriors of models, cut-out discs of various diameters, corrugated metal for roofs, glass-substitutes, etc., in various colours. Other suitable material will be added from time to time.

### Juneero Club

Users may join the Juneero Engineers' Club. Immediately upon enrolment they receive the Juneero Engineers' Club badge for the coat lapel and membership card.

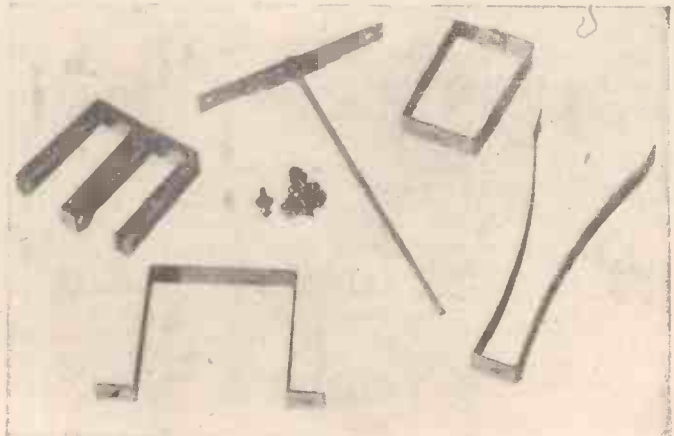


(Left to right) Method of locking nuts to prevent them vibrating loose. Simple dividers or compasses made from Juneero strip. An adjustable set-square also made from strip.

the positions of any bends or curves are clearly marked in the usual engineers' way. All parts are given identification letters. There are also perspective views of the models and details of separate parts where

The object of the club is to maintain touch with members and keep them informed of new developments of interest to them. There is no age limit. Membership application form enclosed with every Juneero Set.

The various parts of the engraving tool before assembly. A complete set of parts for making the engraving tool as shown at the top of the page, together with assembly details are obtainable from Juneero Ltd.







## 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.

### Earth Content

WHAT percentage of the following are contained in the earth:—calcium nitrate, magnesium sulphate, potassium phosphate and ferric tartrate; also the quantity to make one gallon of the solution?—G. L. (Yorks).

IT is, unfortunately, quite impossible for us to give you actual figures referring to the percentages of the chemical substances you mention in earths and soils, for the amounts of these materials vary enormously not only in different localities, but at different depths of soils and under different climatic conditions. Ferric tartrate is very seldom present in soils. Calcium nitrate and magnesium sulphate, being easily soluble, are usually washed away and quickly removed by rains from subsoils and potassium phosphate usually exists, even in fertile soils, only in slight traces.

The amount of the different salts which can be dissolved in a gallon of water depends entirely upon the required strength of the resulting solutions. Calcium nitrate is extremely soluble and will readily dissolve in less than its own weight of water. Magnesium sulphate will dissolve in about twice its weight of water. Potassium phosphate is similarly soluble. Ferric tartrate is less soluble. The amount of any of these salts which can be dissolved in any given quantity of water depends, also, upon the temperature of the water.

### Water-Repellent Solution

I HAVE heard of a water repellent solution which when applied to fabric prevents the same getting wet, as apparently the water fails to remain on it. Can you inform me where the solution can be obtained? Please state also, how I can tint the fabric, which is a fine material, such as is used for raincoats.—C. G. D. (Cardiff).

FOR your purpose, the best and the simplest water-repellent solution will be a solution of aluminium stearate in solvent naphtha.

Obtain from Messrs. A. Boake, Roberts and Co., Ltd., Stratford, London, E.15, about 1 lb. of the highest grade of aluminium stearate, costing about 2s. Dissolve 10 parts of this in 100 parts of water-white naphtha, which can be obtained from your local tar distillery, and soak the fabric in the solution for a few hours. Alternatively, brush the solution liberally on to the fabric. Finally, hang out the fabric to dry in a current of air, but do not dry it by heat. As a result of this treatment, the fabric will be cleaned and rendered waterproof.

The amount of aluminium stearate dissolved in the naphtha may be increased, but if it is very substantially increased above the figure given above the treated fabric may become sticky under the heat of the body or when exposed to a hot sun.

From Messrs. Boake, Roberts also you may obtain a small quantity of an oil-soluble red, yellow or orange dye (costing

about 1s. per ounce) which you can add to the naphtha solution in order to tint or to dye the fabric at the same time as it is being waterproofed.

### Battery-Operated Electric Clock

I AM making a battery-operated electric clock. Can you tell me the length and weight of the pendulum to operate an escape-ratchet wheel of fifteen teeth? An impulse is given by a gravity arm at every half of a minute. What is the suitable distance to place the lever for advancing the ratchet wheel measuring from the point of suspension of the pendulum?—L. L. C. (Penang).

THE length of the pendulum from the point of suspension to the centre of bob must be  $39\frac{1}{2}$  in.; and the wheel arrangement must be approximately 12 in. below the suspension. The bob should weigh 10 lbs., and the wheel diameter should be  $1\frac{1}{2}$  in.

### Windings for A.C. Induction Motor

I HAVE a Morris Dynamotor I wish to turn into an A.C. induction motor by rewinding the fields; I have some 36-gauge S.C.C. wire. Would this carry the current if I wound on as much as possible, and doped it with shellac?—W. P. (Kidderminster).

YES, 36-gauge wire will do quite well. Put on as much as possible and insulate as you suggest. With this machine you must short both commutators or remove the dynamo winding; the easiest way is to short both the commutators.

### Acid Bath for Cleaning Brass

CAN you advise me as to a method of cleaning brass (such as a clock movement) by dipping, without being detrimental to the steel parts?—V. H. A. L. (Norwich).

YOU can make a good "dipping acid" by mixing equal quantities of moderately strong sulphuric and hydrochloric acids. Commercial "dipping acid" is, also, cheaply obtainable from chemical supply houses, as for instance, Messrs. Harrington Bros., City Road, London, E.C.

We should, however, hesitate to immerse a clock movement which was of any value in such acids, although no doubt, if the movement were dipped for fifteen or twenty seconds and immediately afterwards plunged into a bucket of cold water and thoroughly washed, no harm would come to it.

Watchmakers employ "dipping fluids" consisting, mainly, of grease solvents, such as tetrachlorethane or carbon tetrachloride. These solvents, however, merely remove surface dirt and oil and do not revive corroded or rusted parts.

By far the safest procedure in the case of grandfather clock movements is the time-honoured one of paraffin immersion and

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subsequent cleaning and polishing with gentle abrasives. If, however, you wish to experiment with dipping acids, the one mentioned above will be found effective, although it is not good practice to immerse both steel and brass parts together into the same solution, for the reason that a portion of the copper dissolved by the acid out of the brass will tend to deposit itself upon the steel articles.

### Magnetic Separator

AM installing a very expensive mill, and it is imperative that nails, bits of iron, etc., shall not enter the mill with the feed of maize. Is it possible to make a set of electro-magnetic plates to act as an extractor?—A. O'R. (Cork).

IT would not be advisable to rely on a home-made magnetic separator, nor would it be possible to give detailed drawings and description in the compass of a brief reply. The complete article, properly designed and moderate in price, can be obtained from reliable firms, and its initial cost is well justified in comparison with possible injury to an expensive mill when fitted with an ineffective home-made appliance. Here are some addresses from which all information can be obtained: Christy Bros. & Co., Ltd., Chelmsford, Essex; Fraser & Chalmers Engineering Works, Erith, Kent; Mordey Mineral Separation Co., 17 Victoria Street, London, S.W.; H. G. Richardson & Co., Magnet Works, Walsall; J. Rolland & Co., 2, Victoria Street, London, S.W.1; Slag Reduction Co., Ltd., 296, Vauxhall Bridge Road, London, S.W.; Witton Kramer Electric Tool & Hoist Works, Witton, Birmingham.

### Transformer for Arc Lamp

CAN you tell me if it is possible to work an arc lamp on A.C. mains 250 volts 60 cycles using a transformer to step down voltage? If so, can you give me the winding specification of same transforming from 250 down to 50 volts at anything from 6 to 10 amperes.—M. B. W. (Berwick-on-Tweed).

WITH a transformer having a core of Stalloy, to step down the mains voltage of 250 volts 50 cycles to 50 volts 6 to 10 amperes, continuously rated, the winding specification will be:—

Primary: 660 turns of No. 19 SWG d.c.c. copper.

Secondary: 133 turns of No. 13 SWG d.c.c. copper.

Independent windings. Reactance factor 2.66 turns per volt.

Suitable carbons will be 12 millimetre diameter, solid.

### Testing Chemicals

CAN you tell me if there is any way of testing the chemicals, etc., as used in dry-battery production? I refer to such chemicals, compounds, or minerals as manganese, artificial manganese, graphite, sal-ammoniac, zinc-chloride, ammonium-chloride, mercuric-chloride, etc.—F. W. S. (Northampton).

WE cannot possibly answer your queries in the full detail which you desire, since, to do so would necessitate our writing a special textbook of chemical analysis! The detection of the many impurities which may exist in the battery ingredients which your name is a task for a skilled and experienced chemist, and, indeed, none but such an individual can possibly undertake such a task.

You may be assured that if you purchase your battery-making ingredients from any reputable firm, they will be up to standard.

However, as a rough guide for amateur testing, the various ingredients which your name should conform to the following tests:—

**Manganese Dioxide.**—This should be substantially soluble in warm concentrated hydrochloric acid.

**Carbon.**—This should be more or less completely insoluble in warm concentrated hydrochloric acid.

**Graphite.**—Test as above (for carbon).

**Sal-Ammoniac (Ammonium chloride).**—Warmed with caustic soda solution, this should give off ammonia abundantly. It should also be completely soluble in water.

**Zinc Chloride.**—Should be completely and easily soluble in water.

Despite the many published formula for batteries, dry-battery manufacture is more or less a secret process as far as the actual battery ingredients are concerned. There exist no published records of the precise ingredients used in commercial batteries, and hence we are afraid that we cannot give you the information which you require for turning out cells "of exceptionally high quality."

A book entitled "Dry Batteries, How to Make Them," is published by Hutchinsons, Paternoster Row, London, E.C.4. It costs 6/-. An article on this subject, also, appeared in the issue of "Practical Mechanics" dated February, 1940.

You can obtain battery materials and information concerning their usage from either of the following sources: Messrs. Penatro, 45, Dartford Road, South Shields; Messrs. Cook & Co., Acme Works, Caterham.

### Cine Screen Details

WITH reference to the Celfix cine screen which is used for the projection of cine-camera films. Can you give me the following details concerning this screen:

- (1). What kind of fabric is used?
- (2). With what substance is the said fabric impregnated, if at all?

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Complete set, 5s.
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- A LIGHTWEIGHT GLIDER  
Full-size blueprint, 2s.
- MODEL DURATION MONOPLANE  
Full-size blueprint, 2s.
- WAKEFIELD MODEL  
Full-size blueprint, 2s.
- "FLYING" LOW-WING PETROL MODEL PLANE  
Full-size blueprint of wing sections, 6d.
- LIGHTWEIGHT DURATION MODEL  
Full-size blueprint, 2s.
- P.M. TRAILER CARAVAN  
Complete set, 10s. 6d.

The above blueprints are obtainable post free from Messrs. G. Newnes Ltd., Tower House, Strand, W.C.2

(3). What is the crystal-like composition with which the projection face of the fabric is coated?

(4). Where can supplies of the composition be obtained?—M. J. R. (Manchester).

WHILST, as a general rule, we cannot undertake to disclose the composition or make-up of proprietary articles, we may remark that the cine screen to which you refer is composed of a fine-weave pure linen treated with a hardening agent, and then surface-silvered.

You may make a similar screen by impregnating linen with a 10 per cent. solution of cooking gelatine. After the fabric so treated has been allowed to dry, it should be placed for ten minutes in a two per cent. solution of formalin in order to harden the gelatine. The screen is then dried again, and it is ironed out flat with a warm iron. After being suitably mounted it is given a thin surface-coating of the very finest aluminium paint (obtainable from artists' materials shops), the aluminium paint being applied thinly on both sides of the fabric.

Some forms of the screen you mention are not surface-silvered. Instead, this variety of screen is surfaced with a cellulose lacquer (made, for instance, by dissolving scrap celluloid in a mixture of equal volumes of amyl (or butyl) acetate and acetone). This surface-treatment gives the screen a peculiar translucent appearance, but, in the opinion of many, it is debatable whether such a surface has any definite advantage over the finely silvered surface.

Both cellulose and silvered screen surfaces have the advantage of good reflectivity, and, by equalising the brilliancy of the projected picture, they enable the latter to be viewed comfortably from almost any angle.

Gelatine for the above treatment may be obtained from any chemist. Acetone and amyl acetate are also obtainable from most chemists, whilst, of course, fine linen fabric is universally procurable.

### Slow Speed Dynamo

CAN you give me winding particulars for a Lucas Dynamotor to excite at about 200 r.p.m., producing 15 volts, and to be driven by a propeller. The speed of the propeller, running light, is about 340 r.p.m. An output of 6 amps would be sufficient, with 2 amps for fields. Armature Dia. 3 9/16th in., length of stampings 2 1/2 in., Four pole 29 slot armature?—A. R. (Kirby-moorside).

IT is doubtful whether you will get a dynamo of the size stated to generate any useful output at such a slow speed as 200-340 r.p.m. except at the expense of an abnormally heavy excitation current. It might be better to separately excite the fields from an accumulator, leaving the armature free to generate current externally only, as it would then be able to do from the moment it began to revolve. It means a continual drain on the battery for excitation current, but about 1 1/2 to 2 amperes should be sufficient for that purpose. Assuming this to be done, the winding specification recommended will be:—

**Armature.**—29 coils, former-wound, spanning slots 1 to 8 inclusive, each coil consisting of 18 turns of No. 22 SWG copper double cotton covered with 6-mil covering.

**Fields.**—4 coils, each with 1 lb. of No. 20 SWG d.c.c. copper. All fields in series with one another, arranged to give alternate north and south polarity, and separately excited from a 12-volt battery. The brushes must be of high-conductivity carbon or copper-carbon mixture, such as "EG" or "CM/3" Morgan Crucible Co. grade.



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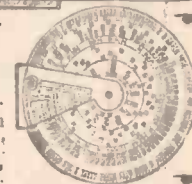
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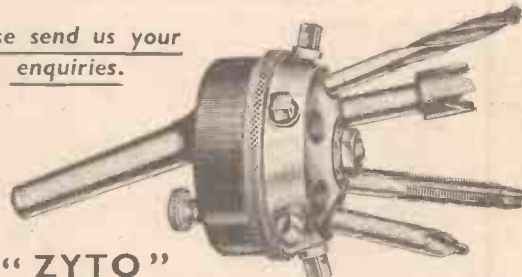
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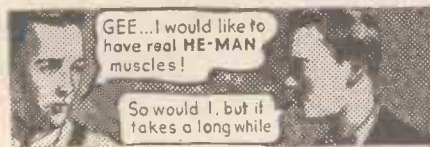


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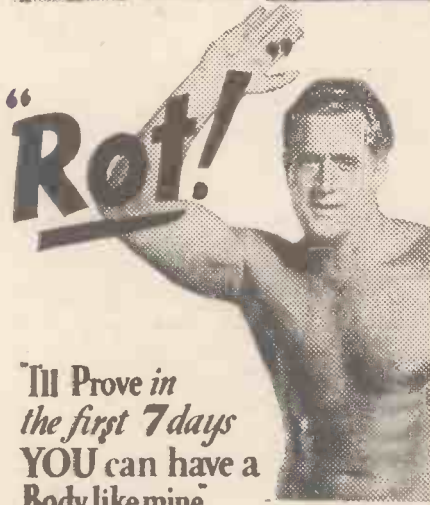
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VOL. IX

DECEMBER, 1940

No. 226

## Comments of the Month

By F. J. C.

### The New Lighting Order

THE C.T.C., in a memorandum to the Press, claim that cyclists are annoyed with Mr. Herbert Morrison, the Minister of Home Security, who, they say, has made hundreds of thousands of them choose between breaking the lighting law and buying a new rear lamp. They point out that until Mr. Morrison issued his new lighting order, cycle rear lamps could have apertures any size up to the area of a 2-inch circle. Most of them were considerably less, and one of the most popular types consisted of a small electric bulb behind a red glass measuring less than an inch across. Upon receipt of this communication, we immediately got into touch with the Ministry of Home Security, because we could not believe that the new lighting order had been made in ignorance of this fact. As we thought, the Ministry of Home Security had already considered the point, and they confirmed our view that the new lighting order, although ambiguously worded, was intended to restrict the maximum size of rear light. It is obviously necessary, within reasonable limits, to specify a size, otherwise rear lights might be fitted exhibiting a red light the size of a pin's head. The smaller-than-one-inch-diameter rear lamps to which the C.T.C. refer are still large enough for the purpose in view, and we understand that the police have been instructed not to prosecute in cases where the rear light is of reasonable size, as is, of course, the case with the lamps in question.

We agree with the C.T.C. that there is really no reason for limiting the size of rear lamps, because their visibility is already limited by law. No rear lamp can be used if it is visible from a distance of 300 yards, or not clearly visible at 30 yards, and therefore it does not matter whether the rear light is an inch or a foot in diameter. In view, however, of the statement of the Ministry of Home Security, it seems unwise to raise these quibbles, especially as we have not had any evidence that "cyclists are annoyed" about it. It may do the cyclists' cause a considerable amount of harm to adopt niggling tactics during the war.

### Cycling for the Blind

A MEMBER of the Vienna Blind Institute, now a refugee in this country, has written an article in the *National Institute for the Blind Journal* advocating cycling as a suitable recreation for the sightless. He claims that the practice stimulates physical agility, presence of mind and self-confidence. He suggests that the blind man should occupy the rear seat of a tandem, or that he and his sighted companion should ride abreast, each with a hand on the handlebar of the other's machine. Under suitable conditions such a scheme seems practicable provided that the excursions are made in quiet districts.

We quite fail to see, however, how self-confidence can be engendered when the scheme depends upon the assistance of another. Cycling does, of course, develop presence of mind and self-confidence in all, and not only the sightless.

### The Supply of Batteries

TO ensure adequate supplies of torch batteries, the Board of Trade has arranged to licence a certain quantity of imports to prevent such a shortage as occurred last year. Cyclists are reminded that there is now on the market a cycle lamp with a small rechargeable dry battery. It is somewhat heavier than the normal lamp, but it does make the cyclist independent of any possible battery shortage. Steps have been taken to ensure that imported batteries shall be of satisfactory quality, and the Torch Batteries Imports Advisory Committee has undertaken the distribution, through normal trade channels, of batteries of sound quality, to be sold at reasonable prices, and to prevent profiteering.

### Cycling During Air Raids

THE National Committee on Cycling has circulated a letter, which says: "There is a certain confusion, and not only among the new army of cyclists, about what to do with bicycle lights during air raids. . . . During an air raid a cyclist must continue to use the regulation front and rear lights, unless directed otherwise by a duly authorised policeman or the military authority. While on this subject of lighting, will your readers note in regard to the white patch, that the expression does not now include chromium or polished aluminium, as was originally laid down in the Road Vehicles Lighting Regulations, 1936." The letter is signed by Mr. H. R. Watling, Chairman of the National Committee on Cycling; Mr. A. P. Chamberlin, secretary of the N.C.U., and Mr. G. H. Stancer, of the C.T.C.

### Bicycles for Export

THE Bicycle War Export Group has laid plans to export during the next twelve months no less than 1,250,000 bicycles. They will be of the same quality as those made in peace-time, and the machines will be adapted to suit the American and Canadian markets. It is noteworthy that the American and Canadian cyclists like broader saddles, coaster hubs, cable brakes and 2-inch tyres, whereas British cyclists prefer medium or narrow saddles and tyres of 1½-inch section. Very few cycles in this country are fitted with coaster hub brakes. British machines are also about 25 per cent. lighter than those made by other countries. Lord Willingdon is now in South America as head of a trade mission which has as its object the expansion of our market in that country. It must be remembered that

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

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South America originally purchased its machines from Germany and Italy.

### Cyclist Messengers Wanted

CYCLISTS residing in the Greater London area, who are willing after an air raid to report to the hospital in their districts, are asked to send their names and addresses to the N.C.U. offices, 35 Balliol Avenue, Highams Park, London, E.4. Such volunteers will be required after an air raid, when they must report to the hospital for the purpose of carrying messages.

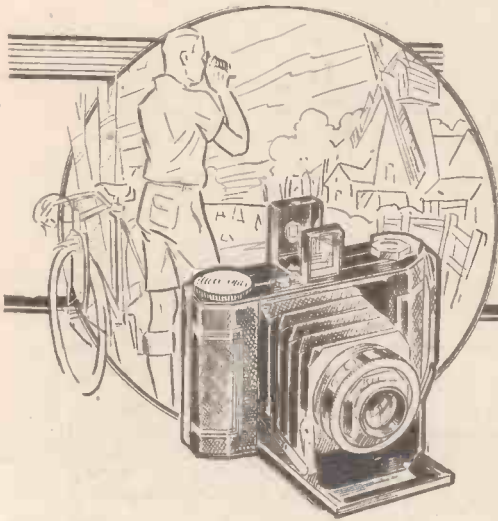
### R.R.A. Special General Meeting

WE have received a number of letters from secretaries of provincial clubs concerning the special general meeting to which we referred last month. Several of these inferred from a biased Press report that many important facts were not reported, and feel dissatisfied with the result of the meeting, and the attitude of the committee. They point out that it is possible to have the matter re-opened and have asked us for a full disclosure of what transpired at the meeting. Accordingly, we have prepared a report, which also includes all of the correspondence between the appellant and the R.R.A., and copies are available to secretaries of clubs affiliated to the R.R.A. It must be remembered that the present R.R.A. Committee has been elected for the duration of the war, and therefore it is not possible, until the war is over, for the matter to be raised at an Annual General Meeting. Club secretaries point out, however, that another Special General Meeting can be called on a requisition signed by 25 per cent. of the delegates of affiliated clubs and of the private members.

The requisition must set out the motion to be proposed which shall not be a matter voted upon at any *General Meeting* within the previous twelve months (Rule 19). As we have already pointed out, the committee at the Special General Meeting did not give their reasons for declining to make the appointment, but merely erected "reasons" it had formulated *after* the application for re-appointment was turned down. We labelled it as extraordinary R.R.A. procedure. Some of the club secretaries who have written to us describe the procedure in somewhat stronger terms. One says that the committee allowed itself to be used for the furthering of a vendetta.

Other delegates who have written to us suggest that timekeepers, whether delegates or committee men, should not be allowed to vote on matters relating to the appointment of a timekeeper. Others suggest that pressmen should not be allowed to serve on the committee so that they may maintain a strict impartiality of comment. These, of course, are all matters which quite properly should be raised at the next General Meeting. As at present constituted, anyone who is a delegate of an affiliated club can serve on the committee, and the R.R.A. has no power to prevent a timekeeper or a pressman serving or voting; in the latter connection it would, of course, be etiquette for timekeepers to refrain from voting, and for the chairman to suggest it.





### Girls in Shorts

THE REV. W. S. BROWNLESS, Vicar of St. John's, Chelmsford, has "the greatest respect for girls in shorts." He says so in his monthly magazine when he writes: "Some very curious reasons for this war have been put forward, but quite the strangest is the suggestion that the wearing of shorts and trousers by girls has something to do with it. My daughter wears them and so do many other girls and ladies for whom I have the greatest respect. My mind cannot trace any connection between shorts, trousers, bathing costumes and the war. The idea is too ridiculous."

### Canterbury Cathedral Damaged

THE windows of Canterbury Cathedral, known to thousands of cyclists, have been damaged in an air-raid. Before the war certain steps were taken to safeguard the ancient glass and treasures of the Cathedral. Much of the glass dates back to the 12th, 13th, 14th and 15th centuries, and is extremely valuable. Mainly early 19th century glass was undamaged and thousands of small panes were shattered by bomb blast.

### One Good Turn

CYCLISTS visiting eastern Essex may have passed through the quaint village of Woodham Ferrers on their way to Southminster or Burnham-on-Crouch. Few probably know that in 1743 the rector and people of Achurch, Peterborough, contributed towards the repair of the Essex church. The gift was entered in the books at the time and now 227 years later the rector and congregation of the Woodham Church are reciprocating by raising a fund towards the cost of restoring Achurch Parish Church whose spire was recently struck by lightning.

### Duke as Cyclist

H. R. H. THE DUKE OF WINDSOR has again taken to cycling and, as Governor of the Bahamas, now cycles the four miles from his residence to his temporary home at Cable Beach. But the former Prince of Wales is no stranger to cycling or to cyclists, and it will be recalled that when the movement was afoot to erect the "Cyclists' War Memorial" at Meriden, the then Prince of Wales gave one of his machines to the fund. It was purchased for £100 by the late Rev. R. B. Bouchier, of Hampstead.

### Mind My Bike!

"I DON'T mind the bombing, but I don't want to lose my 'bike,'" said eighteen-year-old James Martin to ambulance attendants after he had been blown from his machine by a bomb! He was thrown through a shop window and although severely cut, scrambled out the window and attempted to remount. His machine was taken in the ambulance with him to hospital.

### Ancient and Modern

MR. FREDERICK WHEATLAND, of Broadwater, Worthing, owns a 65-year-old Rotary tricycle. To raise money for the local "Spitfire" Fund, he gives rides on the machine, charging sixpence a time.

### An Envidable Reputation

BRANDON, Suffolk, the renowned village with many relics of the flint-making era, has earned the enviable reputation as Britain's model reception village for homeless mothers and their children.

### Bluemel's Help Spitfire Fund

THE staff of Messrs. Bluemel Bros., Ltd., are contributing to local Spitfire funds. That organised by Rugby and district has received a substantial contribution from them and a further collection is being made for the local fund.

### Behaviour of Motorists

"SINCE the war began, motorists have been driving at more reckless speeds and the behaviour of motorists on the roads has deteriorated," says Mr. T. C. Foley, secretary of the Pedestrian Association. We can endorse his statement.

### Roman Wall

LORD AND LADY HENLEY, of Askerton Castle, Cumberland, have offered the nation the whole of the remaining length of the Roman wall which is on their property. It runs eastward from Birdswald to Gilsland day school, a distance of over a mile.

### Cycling in Paris

OVER 300 cycle garages have been opened in Paris to cope with the increased number of cyclists.

# Paragrams

### Death of Clubman

A WELL-KNOWN member of the Actonia C.C. (Mr. Bert Avenall), and his wife were killed when their home was struck by a bomb.



### Never Too Old

DESPITE his 92 years, Mr. James Carpenter, of Cox's Green, Sussex, still goes for a daily trip on his tricycle. He learned to ride at the age of 78; just about the age when many are seriously thinking that they're too old for the game!

### A Prisoner of War

W. R. A. LANE, the well-known member of the Fountain C.C., is a prisoner of war. He was proficient at massed-start racing and on the road and the track.

### Club Luncheon

CROUCH HILL C.C., one of the oldest clubs in North London, will hold an informal lunch to celebrate its sixtieth year. It has produced many famous riders in the past.

### Killed in Action

SERGEANT-PILOT B. E. P. WHALL, younger son of Mr. Nevill Whall, deputy secretary of the C.T.C., has been killed in action. After shooting down seven German airmen, he was awarded the D.F.M.

### Champion Tricyclists

CURRENT champion of the Tricycle Association is George E. Lawrie (Viking C.C.), the 1,000-mile

tricycle record holder and Hon. Secretary of the Association. G. C. Edwards (Altrincham C.C.) has won the "Major Liles Memorial Trophy." Both were previously held by G. E. Thomas (Southgate C.C.), now in the H.A.C.

### Canadian Cycle Industry

PRODUCTION by the bicycle industry in Canada during 1939 was valued at \$2,054,659, an increase of 16.2 per cent. over the \$1,767,538 reputed for 1938, the Dominion Bureau of Statistics reports. Included in the output for the year under review were 70,567 bicycles with a factory selling value of \$1,398,213, bicycle parts and accessories worth \$287,424 and miscellaneous products such as ice skates, steel chairs, children's wagons, joy-cycles, etc.

### Cycling in Canada

BANNING of bicycles from the new divided highways of the province now under construction, is under study by the provincial Government, according to information received by the Royal Automobile Club of Canada.

Attention of the Government has been drawn to recent action of the Government in Ontario prohibiting bicycles on the Queen Elizabeth Way, the province's new highway between Hamilton and Niagara Falls. Cyclists were informed they could proceed at their leisure on the old road. When this arrangement, which has proved very popular with motorists, was drawn to the attention of the Quebec Government, a reply was received that the question was already under study.

These new highways are designed for rapid transit, and it is felt that bicycles would be not only a danger to the riders of them, but also to other vehicles on the road. Former roads are adjacent to the new highways and are regarded as more suitable and safer for the bicycles.

### N.C.U. Official Injured

READERS will learn with regret that Mr. Val Revett, of Ipswich, has been seriously injured

by enemy action. Mr. Revett is well-known in the Eastern Counties and elsewhere as a timekeeper and a cycling official of many years' standing. He is also the representative of the Eastern Counties Centre on the National Council of the N.C.U. and has been for several years. He is a tireless worker in club life and a great enthusiast for the game. We are sure that Mr. Revett's many friends will wish him a speedy recovery.

### N.C.U. Emergency Committee

AS a result of A. P. Chamberlain's appointment as Secretary of the National Cyclists' Union, a vacancy occurred on its Emergency Committee and this has been filled by Mr. E. C. Harding, Secretary of the London Centre, as a result of the recent ballot.

### N.C.U. Spitfire Fund

THE N.C.U. Headquarters' Fund has now reached the sum of £716 15s., and with the additional amount of approximately £118 collected by the "Motor Cycle and Cycle Trader," has reached the total of £834 15s. Therefore, only £165 5s. is now required to make the N.C.U. Fund reach the total of £1,000, which is the minimum aimed at by the Union. Will club secretaries and others who have amounts outstanding please be good enough to forward to the N.C.U. offices at their evacuated address, 35, Balliol Avenue, Highams Park, E.4, as quickly as possible.



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Tube 1/10. Cover 4/5



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Tube 2/4. Cover 6/1



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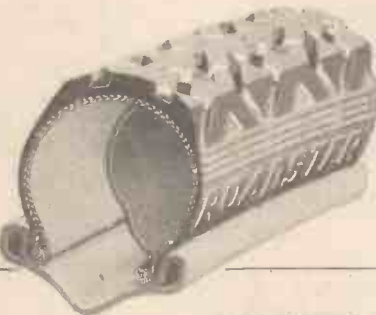
Tube 2/7. Cover 6/1



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# Keeping the Records of the Records

By LEONARD ELLIS

Hon. Secretary of the Road Records Association



Mr. Leonard Ellis at the R.R.A. Office

ONE of the minor consequences of the present war is the complete cessation of attempts on the cycle records accepted by the Road Records Association. This is not a condition laid down by the R.R.A.; in fact, anyone is still at liberty to give notice at any time, provided the rules and regulations are observed. The simple fact is that the scarcity of petrol rules out the possibility of car-following and modern record breaking has reached such a fine point that cars are more or less essential. Apart from the difficulty of providing cars, road conditions and lighting restrictions at night make uninterrupted fast cycling almost impossible. In case I am accused of being too sweeping in my assertions, I am aware, of course, that some records are being attacked. I am concerned, however, with the R.R.A. only, but admit that there is little to prevent attempts on short records if roads are chosen wisely and daylight is used.

The R.R.A. is not worried by lack of activity; it is not like a business that must have customers to make it solvent. If there were no attempts for twenty years, the Association would still be there to accept your notice, to receive your claim, and perhaps to issue your certificate. Their only function is to verify and certify the genuineness of claims to best performances on record by male cyclists on the road, and to prevent the publication of fictitious or uncertified records. It is no part of the Association's duty or policy to encourage or foster record breaking; at the same time, they are anxious to give any or every possible help and advice to aspirants.

#### A Lull in Activities

WHEN one considers the unprecedented activity from 1934 to 1939, it is easy to understand that the R.R.A. officials really welcome the lull caused by the war. For the first time in six years, they find themselves able to sit back and consider their busy time in the immediate past. The honorary secretary is able to look over the machinery which is destined perhaps to lie idle for a considerable period. That machinery, however, will not rust. It is a complicated but efficient system that has been conceived, improved, and strengthened by successive secretaries until now it is a joy to those who are privileged to see it in operation. Complicated, yes, but not by any means cluttered with red tape. In fact, the whole of the essential archives of the R.R.A. are contained in two upright steel safes, two steel index cabinets, and one handsome book.

The whole of the history of fifty-two years is thus contained in small compass, and the aim of Sidney Vanheems and those who followed him has been to place the vast amount of accumulated information at the finger tips.

#### Answering Questions

QUESTIONS relating to records can be asked in a variety of ways, and only by a system of elaborate cross-referencing can all questions be answered in a few seconds. It will be seen that if the only complete records consisted of a register, one could not say without plodding through those numerous pages just what any particular rider had accomplished during his career. It would be difficult indeed to find any particular record unless the date was known.

The card index, therefore, is divided into several sections, and each section comprises a set of cards of a distinctive colour. The blue cards contain the names and addresses of all the private members of the Association; the orange cards record the life members; the green cards the official observers, together with a note of the years when they held office. Buff cards contain the names and addresses of all affiliated club secretaries and pink cards contain details of their appointed delegates. Others refer to committee, checkers, and timekeepers.

So far, these indexes are purely administrative for office use. The other section contains the "records of the records." Firstly, there is a separate division for each of the fifteen recognised records. Each of these is again sub-divided into four groups, i.e., bicycle, tricycle, tandem-bicycle, and tandem-tricycle. The white cards in all these six divisions contain the full history of each successful attempt; that is, date, name or names, time or distance, and a numeral in red relating to the appropriate "dossier," of which more anon. From these cards one can learn at a glance exactly how many times any particular record has been broken, by whom, when, and in what time or distance. It still does not, however, offer an instantaneous survey of the exploits of the individual; so a second index is compiled.

This is the "personal" record and contains a card or cards for every man whose name has been inscribed



"Shake Earnshaw" who holds most of the men's R.R.A. records

on a R.R.A. certificate. From these cards one can see at a glance how many records any rider has broken, when, which, in what time or distance, and on what type of machine. Here again the red numeral relating to the dossier will be found.

#### Another Index

PURELY for internal office use, there is still another index. The leading lights of the cycling world move in quite a restricted circle, and it is inevitable that the same man should hold a variety of offices and even be connected with the R.R.A. in a number of ways. Hence he may be a club secretary, a delegate, a timekeeper, and a record breaker, all at the same time. Supposing, therefore, that such a man changed his address, it was necessary to know what his various connections were without going to the trouble of wading through eight or nine indexes. The "master" index, therefore, comprises a card for every person who has any connection with the Association, and on each card is marked a catalogue of his offices.

The dossiers contained in the two steel safes contain all the documents relating to the attempts, and there may be found much of the unknown history of the attempts. There are hidden away stories of enthusiastic but misguided helpers who saw things that never happened; riders taking shelter behind cars, being fed "on the run," and other mare's nests. Of course, such things may have happened, but in that case the dossier would never have found its way to the collection of "successful attempts." Unfortunately, a few of the very earliest documents have been lost in the passage of time and in the transference from one official to another, but for nearly fifty years the dossiers of all successful attempts are preserved complete. A distinctive coloured cover is used for each of the four types of machine.

Each dossier contains every document relating to the attempt. In some of the short records there are, of course, but few papers; but, as an example of the other extreme, Opperman's End to End and 1,000-mile bicycle records were responsible for a very bulky volume—in fact, there are more than 180 documents. The file contains the original notice, the claim form, copies of the schedule, all the correspondence relating to the attempt, timekeeper's and observers' reports, an imposing pile of checkers' reports, a vast wad of letters to and from county and town surveyors who supplied the measurements of the roads in their areas. As in most dossiers, there is a fine collection of press cuttings describing the journey.

#### The Record Register

THE Record Register is a handsome volume re-written specially for Jubilee Year, and was displayed for the first time at the Jubilee Banquet in 1938. It consists of a pig-skin loose-leaf book containing ruled sheets of goat-skin parchment. Each page contains the details of seven records in chronological order, and each sheet is enclosed in a stout cellophane jacket. A special new typewriter was hired for the task of copying out these details from the old book.

This, then, is the "machinery" of the R.R.A., now idle, but capable of being set in motion in a moment on the receipt of a notice of attempt. This will be accompanied by fifty copies of a schedule which will state the name of the rider, the record or records he proposes to attack, the type of machine he will use, and the exact route to be followed. The schedule will be scrutinised to see that it conforms to the rules, and it will then be stamped with a reference number which will be used throughout the attempt. A copy of the schedule will be sent to every member of the committee and to the previous holder of the record. The schedule is studied and the card index of checkers is consulted for names of helpers living on or near the route. Each of these also receives a copy of the schedule together with a printed form on which he will, in due course, report the progress of the ride at his point. At the conclusion of the ride all these checking sheets, together with the claim form, helpers' reports, timekeeper's reports, and other documents relating to the attempt, will be scrutinised by the committee. If and when the committee have measured the course by a variety of methods, and are fully satisfied that there is no shadow of doubt on any point, they will grant a certificate, and the aspirant is raised to the ranks of national record breakers. For twenty-nine of the thirty bicycle and tricycle records there is a silver shield, which will be engraved suitably and handed to the holder of the record for safe custody.

#### 52 Years of Work

IN quiet times the machinery having revolved will sink once more into immobility, but quiet times have not visited the R.R.A. for many years. Prior to 1934 it was usual to receive some thirty or forty notices in a year and to grant perhaps a dozen certificates. Opperman, the wiry little Australian, cast covetous eyes on the Land's End to John o' Groats Record. He broke it, and in so doing laid the spark to such a train of professional activity as had never before been witnessed.

During 52 years the R.R.A. have certified 636 records, an average of 12 a year. In the six years, 1934-1939, they passed 89, an average of 15 a year. It must be borne in mind, however, that records get tighter and tighter, and as a consequence there is a growing proportion of failures to successes. The real measure of the intensity of those six years may be understood when it is realised that no fewer than 888 notices of attempt were submitted, which means, of course, that there were 799 failures or non-starts.

It is fairly safe to say that there will never be another period of equal intensity—it took a world war to quench it.



# WAYSIDE THOUGHTS

By F. J. URRY



I HAVE been riding a bicycle much too long to ever allow my body to complain of overstrain. Such was not always the case, because youth must be served even though it sometimes hurts, and personal prowess has its sacrifices in the sporting world, or peradventure we should not be such a tough race.

These notes are not for the perusal of the vigorously youthful, they are intended more for the service of the folk who are anxious to enjoy cycling for the sake of its freedom of pleasure or its immediate convenience of travel, and to such I would say never ride when it hurts—just get off and walk, or rest awhile and refresh. And do it with regularity if you feel any suggestion of fatigue, and never mind what other people say. Remember you are riding for pleasure and not for the purpose of making a sacrifice of your energy; and I am afraid thousands of people taking to the pastime are apt to forget that fact, and arrive at the conclusion that cycling really is "hard work." Of course, it is if you struggle for mileage in an unfit condition; so is walking, or any game.

## Refreshment

IN a month of steady riding you will learn what I mean when I say there is no form of muscular travel so easy as cycling, always providing you do not try to strain the motive power. And there is another important thing the beginner should always keep in mind, the matter of refreshment. It is curious, but true, that a cyclist will be hungry without knowledge of the fact; his muscular power will diminish and become flabby, his attention and interest slacken, all because he is hungry, and not actually conscious of his condition. This is known in expert circles as "the hunger knock," is of quite common occurrence, and in club-running circles is probably the main reason for the institution of what is known as "the elevensies," a cup of tea and cakes at 11 o'clock on Sunday morning after fifteen or twenty miles has been ridden. That habit of the clubman is worth remembering in your own private or family wanderings.

We are well into winter, and I am still gaily riding to town every day, and on the wet ones find no untoward inconvenience, as so many people seem to imagine would be the case. How is it done? The answer is very simple. In the first place the bicycle must be sound in crank and wind, that is to say, lowly geared, well adjusted, with good tyres tightly inflated. Then you need waterproofs; good oil-skins with plenty of room inside the cape so that it can drape round you like a tent, leggings, and a sou'-wester, or as I prefer, a waterproof cap. One of the slight follies the cycling beginner is inclined to practice is the purchase of cheap, skimpy, and, of course, shoddy mackintoshes on the assumption that he is being economical. If you intend to do any wet weather riding—and obviously you will have to do a limited amount if you ride at all—you might just as well do it in comfort with a reasonable chance of keeping dry for the sake of the few extra shillings in the cost of equipment.

## A Good Cape

LET us presume for the sake of argument that you are equipped with a good cape of ample size, leggings and sou'-wester with which to face the storm. They will keep the rain out for hours; but if you do not cut the speed according to the temperature you will steadily grow uncomfortably sticky inside the protection. Condensation will take place inside the cape in any case, but the uncomfortable effect of it will be largely discounted if you are content to travel more slowly. On a short journey—like my office and home ride of six and a half miles—this reduction in speed does not matter greatly, for the time of travel is not long enough to set up inordinate condensation; but for a journey, say, of twenty miles, just take another quarter of an hour over normal riding time, and you will surely arrive quite happily with only the front tails of your coat slightly dampened. I enjoy riding in the rain so long as I am not hurried;

certainly I prefer fine weather, but I also prefer to be out and about when the clouds dissolve rather than remaining indoors and sorrowfully regretting the elements we cannot alter.

There is another thing about winter riding that makes for comfort and satisfaction, and that is the proper care of the bicycle. There is nothing so annoying in regard to the pastime as being held up by some trivial incident due to neglect. Punctures will occur, of course, but care of tyres—early replacement before the cover is completely worn out, will reduce this trouble to a minimum. Brakes always should be kept in perfect adjustment and lubricated frequently, for on their quality of retardation may depend your life. Bearing adjustments of wheels, head and bracket are simple matters, and with good construction seldom needed; but pedals want a little more attention, and so does the proper adjustment of the chain. But more than anything else, the main fault with the hack bicycle is lack of lubrication. I have never been able to understand why five minutes intelligent use of the oil-can has been held as a sort of penalty that can be, and therefore is, neglected by the regular home to work cyclist. Yet such is a fact, which any observer can confirm any day of the week, and the curious thing is this neglect seems to be most prevalent among folk who know most about machinery.

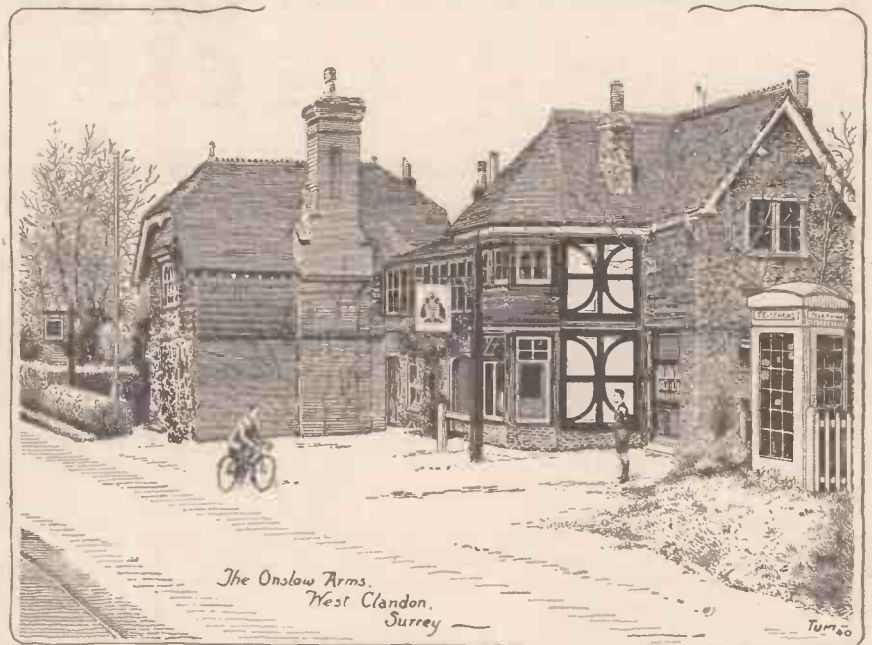
## A Squeaky Bicycle

A SQUEAKY bicycle is a horrible thing to ride, it is like an animal full of complaints of ill-being; to me it is a torture. Much of this squeakiness comes from loose cranks, usually curable by driving home the cotter and tightening the lock-nut, unless neglect to do so has gone so far that the key-way on the

in these days when exercise and fresh air are among the main tonics to keep our nerves and bodies fit to undertake the daily tasks.

## Fine Weather Riding

IF it happens you are among those folk who like fine weather riding and detest the rough winds and rains, then I ask you to keep your bicycle in sound running order to snatch the joy offered by those winter days which occasionally jewel the season. And also remember bicycles are valuable articles these days and from that point of view alone are worth the little trouble necessary for their care, when not on active service, so here are a few tips for the decent preservation of the ideal machine. In the first place hang it up by the top frame rail; that stops the damp from attacking it, and keeps the tyres in decent order, for I know if it takes its own weight on the wheels the tyres will deflate, tend to rot with damp, and you will have a complaint against the tyre manufacturer when spring arrives and the ill-used cover bursts, which will be totally unjustified. There should be no need to tell you to brush the plated parts with vaseline, that is elementary, but it is as effective in preserving their respectability as it is simple. There is little else you can do for the decent treatment of the ideal bicycle; but when you do put it into commission again, for the sake of the reputation its transfer has acquired and for your own ease, give the bearings, brake parts, and chain an oiling with a good-quality thin lubricant. A month's idleness is long enough to make most of the oil retained in the bearings gummy, so give them a chance to work freely. And never leave your waterproof equipment in the bag, but hang it loosely in a dry, cool place, and thus preserve its useful life.



bracket axle has been worn round by continual friction, when a new axle and cotter pin is the only method to make a proper repair. This is just one of those cases where neglect is costly.

If a spoke breaks, have it replaced as soon as possible, otherwise the tension of the wheel will be strained, and more spoke trouble be your portion. And a wobbly wheel means quicker wear of the tyre, and always a tendency to skid on a wet surface. Personally I take care of these things for my own comfortable satisfaction, with the result that I am seldom held up on my work journeys, though the home ride at night is occasionally a worry because of illumination. The electric lamp, battery or dynamo is not wholly reliable; its contacts, in my opinion, are too flimsy, and bulbs are too apt to fail. That is my experience, and so, while I have to rely on a battery rear lamp because of its convenience and lightness, for the head I use a well-designed oil lamp, clean it thoroughly once a week—a five minutes' job—and never have the slightest trouble with my glow. Always I carry a spare bulb for the back lamp, although I admit the fitting of a new bulb on a dirty night is a patience-testing job, it is better than walking.

So much, then, for the care of the daily-ridden machine; but we are not all in the position to acquire the habit of daily riding, and some of the cycling fraternity do not relish the notion of winter riding when the elements are unruly. I can understand such attitude although I think it is wrong, particularly

## Rucking Oilskins

NO action is so destructive of oilskins as tight folding or wrapping, and that is why I never strap my cape and leggings on the bag, but give them as much loose room as I can in the bag when I am carrying them. Because I ride most days of the year I have two sets and change them about, and the out of commission set hangs in the hall until their turn for service. If you use battery lamps take the battery out or it will corrode and probably cost you the price of a new lamp. Keep the extracted battery in a warm dry place, and you will get further service out of it in the spring, unless, of course, it is "spark out" when you remove it. But remove it in any case. Clean an oil lamp, empty the vessel, and it will be then ready for good, sound illumination any time you require it, with a new wick and a charge of burning oil. If your machine is fitted with a change speed, put the trigger in the position where the change cable is slackest; this preserves the proper spring tension. If you have a leather saddle give it a dose of preservative, followed by a hard polish, which should banish mould, that unkind destroyer of leather. And that, I think, ends the story of how best to care for bicycles. Sometimes I wish my doubting friends could see and examine my small collection of mounts, all five of which are in perfect running order, for then I am sure they would agree a trifle of care properly applied saves a lot of money, and what is more important, a lot of irritation.





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## AROUND THE WHEELWORLD—By Icarus

### The Bath Road Birthday Tea

THE fifty-fourth annual Birthday Tea of the Bath Road Club took place at the Angel, Thames Ditton, on Saturday, November 9. In recent years the "tea" had taken the form of a supper, but this year, owing to the black-out, it reverted to the five-o'clock function. The absence of many of the members on active service naturally reduced the attendance, but sixteen members kept alive the tradition and held aloft the torch of enthusiasm which has made the Bath Road Club the leader of cycling clubs. J. Dudley Daymond was in the chair, assisted by Coles-Webb and Beauchamp. The arrangements for the tea were admirably carried out. It is interesting to recall that the first announcement concerning the formation of the B.R.C. appeared in *Bicycling News* dated November 13, 1886. It stated that a new road club had just been formed by several well-known riders, of which Mr. W. Morris was the captain and Mr. A. J. Chapman hon. sec. The committee were Messrs. Ward, Webster, Pocock, Ellacourt, Atwood, Cumber, Salisbury and A. R. Salisbury. The colours of the club were red, white and blue neckerchiefs or handkerchiefs. The opening run was held on the following Sunday to the Peggy Bedford at Longford, starting from the headquarters of the club, The Queen's Head, Brook Green, W.

### Haberdashery!

THE Purchase Tax is giving rise to some anomalies. I hear from a friend in the trade who is associated with the manufacture of trouser bands and clips, that they are classified for purposes of the tax as haberdashery, since they are attached to the clothing and not to the bicycle. Accordingly they are subject to 33 per cent. tax. Yet they have always been sold as cycle accessories, and the rule of custom should apply. As, however, they have been officially designated haberdashery, it would be quite in order for shops which normally sell ladies' lingerie now to display trouser clips—for male trousers, of course!

### The N.C.U. Spitfire Fund

DONATIONS received to date have brought the N.C.U. Spitfire Fund to the £1,000 mark. £5,000 is needed to purchase a Spitfire, and donations should be sent at once to the N.C.U., 35 Balliol Avenue, Highams Park, London, E.4.

### Summertime Throughout Winter

M. MORRISON, the Home Secretary, has announced that summertime is to be retained throughout the winter. It was due to end on November 16, having been extended from October 6.

## My Point of View

By "WAYFARER"

WHEN paying a visit to my usual cycle dealer's shop a few weeks ago, I noticed that the proprietor was engaged on the specification of a new bicycle for an elderly customer—elderly, like myself!—and I took the liberty of listening-in with one ear, just to see what manner of mount was going to be purchased. When the customer specified a fixed gear, I allowed the other ear to listen-in: when he said that he wanted the brake to be fitted with an inverted lever, I nearly blurted out that he evidently knew a thing or two. (I ride the fixed gear exclusively and all my brakes have inverted levers.) Then, the details completed, the customer turned round and saw me. "Hello!" he said. "Still cycling?" I replied "RATHER!" in the largest possible type, whereat he confessed that he had gone over to motoring a few years ago. Having just received his income-tax assessment, however, he had decided to put his car away and to take to cycling again. Which, of course, is all to the good. I wonder how many other men are in like case—but why do they wait for crushing taxation to induce them to return to the cycling fold? Our pastime, with its thousand and one gifts can still be participated in and enjoyed even if one is a motorist. More than that, cycling is all the more necessary to a man who spends much of his time in motor cars.

### Seating Accommodation

THE old adage that "one man's meat is another man's poison," is probably as true of cycle saddles

as of anything else. I have my own particular fancy as to seating accommodation, but the fact is that I can ride practically any saddle. It has fallen to my lot, from time to time, to use many borrowed bicycles—mounts lent to me when I have been away from home in connection with lectures—and no difficulty has been experienced in piling up a goodly day's mileage, despite the strangeness of the bicycle, and of the saddle. Other cyclists feel—literally feel!—very differently and are at a great disadvantage if their own particular style of seating accommodation is not available. Some cyclists I know even go to the length of transferring an old saddle to a new machine, giving the purchaser of the cast-off bus the advantage of a brand-new seat. Here, again, my practice is entirely different, and it may be added that no saddle need ever pass through the breaking-in process with me: I can go straight away for a day's ride or a week's tour, and hardly know that I am riding the unfamiliar. All of which is, of course, a great advantage.

### A Miniature Saddle

THESE thoughts are provoked through my having encountered, on a recent Saturday, while awaiting my tea at a country cottage, a fragmentary saddle which has not previously come under my notice, as far as I can remember. If it had been allowed to grow up, it would have developed into a B.17, but it was cut down in its youth. What there was of it

### Cumnock Rally in 1941?

THE West of Scotland Clarion Union, one of the biggest supporting bodies, has decided to press the West of Scotland Cyclists' Defence Committee to hold its annual Cumnock rally in 1941 if at all possible.

Last June the rally attracted some 4,000 people in war-time conditions, and the sponsors of the proposal for next year believe that it should be possible to organise the rally once again.

### Short Scots 20 Course

AT the October meeting of the Scottish Amateur Cycling Association two officials were appointed to investigate the course used by the Ayrshire Clarion C. & A.C. for its 30-miles event on August 18, when J. McKay, Douglas Water Clarion, and the Crawick Wheelers were believed to have set up new Scots 30 records.

These officials, Messrs. Price and Urquhart, have now reported that on measuring the course they found it 1½ miles short. The course was not registered with the S.A.C.A., as it has been improvised at short notice owing to defence needs.

The Scots records for 30 miles, therefore, remains as follows: Individual, W. Scott, Crawick Wheelers, 1 hr. 13 mins. 59 secs. (1939), and Team, Glasgow Wheelers, 3 hrs. 52 mins. 2 secs. (1937).

### Scotland's Plans for 1941

SCOTLAND, not in the front line of the war and with many young men in reserved occupations, is likely to have a time trials season in 1941. The Scottish Amateur Cycling Association is to issue its annual handbook, including a list of Scots road events for the season, early in the New Year.

It is generally believed amongst clubmen north of the Border that there will be a restricted road programme next season.

### Scotswoman's Records Accepted

THE Scottish Women's Cycling Association, through its Executive Committee, has passed the Scottish 10, 15, 25 and 50 records set up by Ann Briercliffe, West of Scotland Clarion, on October 6. The new times for these distances are: 10 miles, 20 mins. 15 secs.; 15 miles, 31 mins. 58 secs.; 25 miles, 54 mins. 30 secs.; and 50 miles, 1 hr. 50 mins. 14 secs.

### Scots Records Passed

THE Scottish 25 miles Individual and team records put up by Will Scott, Crawick Wheelers, and Glasgow Wheelers, in the Greenock United C.C.'s event on July 28 have been accepted by the war-time executive of the Scottish Amateur Cycling Association.

The times were: Individual, 1 hr. 0 mins. 54 secs.; and team, 3 hrs. 0 mins. 59 secs.

### The N.C.U. Diary

THE N.C.U. have just issued their 1941 diary, copies of which are available from the N.C.U. offices, 35 Doughty Street, London, W.C.1, price 1s. 6d. a copy, including pencil.

The diary this year contains some 44 pages of special matter, together with some 16 pages of maps. Also included are outstanding track and road records, world's championships, etc.

constituted a smart bit of work, but—believe me—there wasn't much of it, and enquiry showed that the price was disproportionate to the amount of leather used. The owner, with whom I had a chat, was enthusiastic in his praise of the saddle. He had suffered a great deal from chafing, but the miniature saddle has set him free from that unpleasant trouble. I expected to find he was a fixed gear enthusiast, and, in those circumstances, could readily understand the use of so slight an amount of seating accommodation. But no! he was riding a free wheel. The result of this encounter is that I am now saving up to buy one of these saddles, which ought to suit a cyclist who can straddle anything and who is a convinced exponent of fixed gearing.

### Pestiferous

I AM free to confess that last winter, owing to the fact that I had all day and every day for cycling, I refrained from doing any night riding. To be quite frank, I didn't like the conditions imposed by the war, and it struck me that, if even one cyclist refrained from cluttering up the roads at night, there might be some slight gain to traffic as a whole. This abstention involved me in some little sacrifice because I have always been a whale on travelling through "the pool of darkness." No night could be too black for me (I revel in moonlight nights, of course), and it never mattered what mileage had to be done behind a lamp. I was in my element at night-time, and I cherish many gay memories of long thrusts under sable conditions. The loneliness of the Cotswolds (for example) always tended to intoxicate me, and one of my best night jaunts was over the Berwyns in February a year or two ago. Yes: one of the best ever



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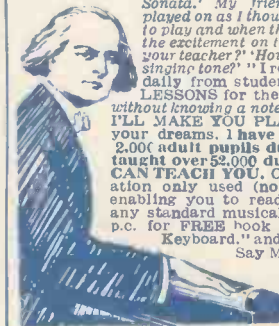
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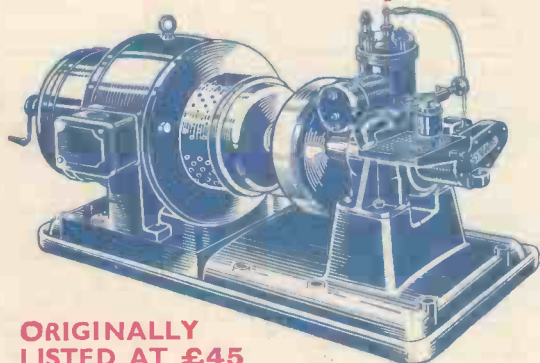
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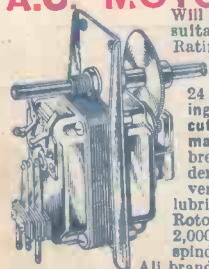
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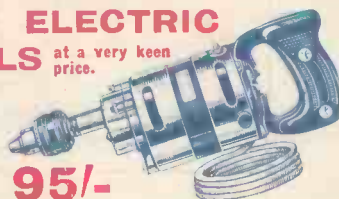
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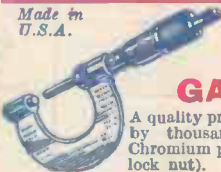
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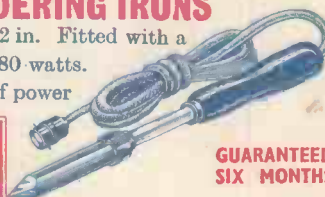
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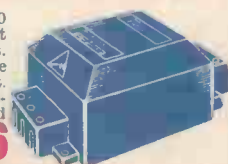
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