PARACHUTE TROOPS

NEWNES

PRACTICAL MECHANICS

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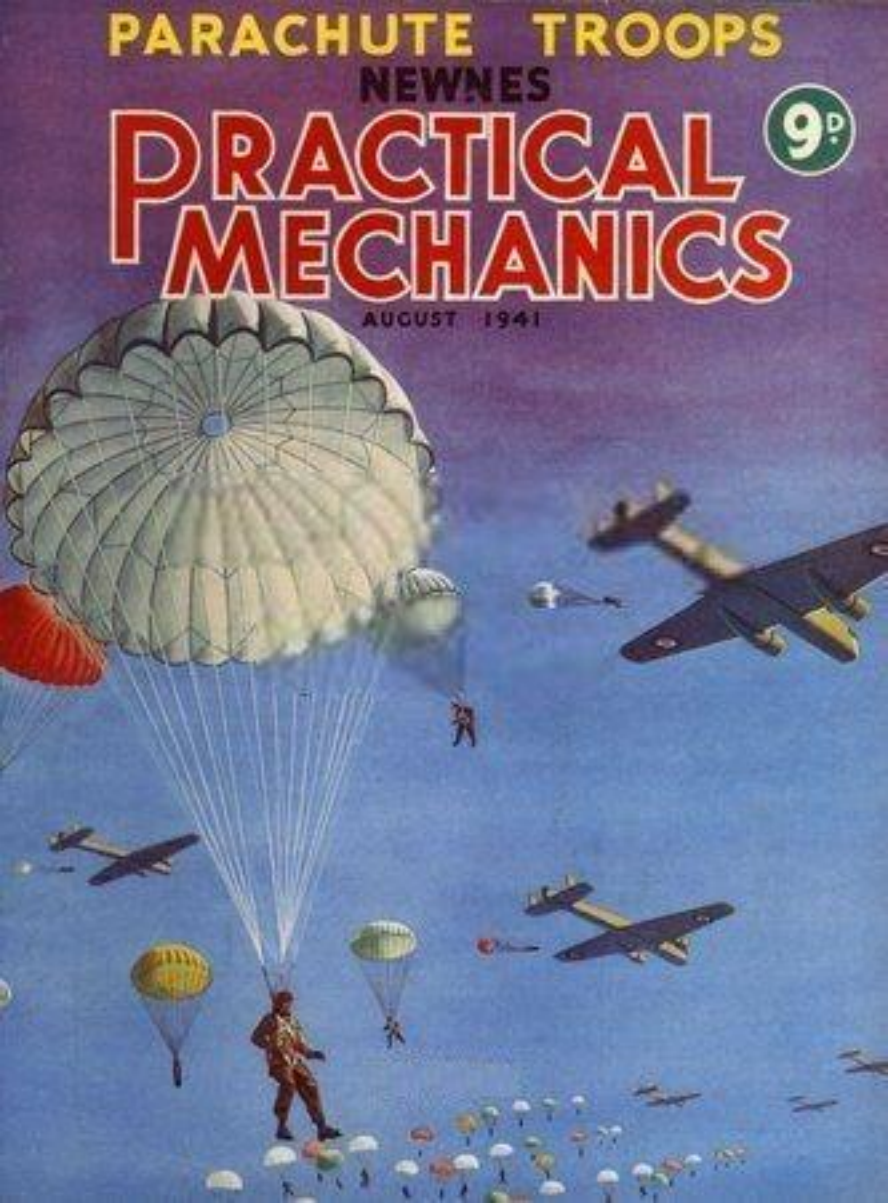
AUGUST 1941



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PRACTICAL MECHANICS

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FAIR COMMENT — BY THE EDITOR

Post-War Plans

IF the presumption is correct that the war, according to Mr. Chamberlain's estimate, would last three years, it is comforting to reflect that we are over half way through it. It is not too early, therefore, to think about post-war conditions and, if possible, to lay plans for that period. Victory must be ours, and whilst it is impossible to predict with any degree of accuracy what post-war conditions will be like, we can at least be sure that one of the post-war conditions will not be that of a vanquished people. We can also use, as a post-war yardstick, our knowledge of what conditions followed the war of 1914-18. The Government of that time had not made plans for the post-war period. It was, as Mr. Churchill has said, sated with victory and in our folly we threw it away. The plans we now make must ensure that we do not throw it away again. Looking back on the past twenty years we now know that the first mistake we made was to disarm, for the sanest means of preventing war is to prepare for it. As it was, munitions factories closed down for lack of orders, shipyards closed and aircraft factories had to rely upon the few foreign orders which trickled through and upon the nebulous requirements of civil aviation. Had a modest armaments programme been carried out we should not only have been prepared for this war, even perhaps have prevented it (for Germany took advantage of our unpreparedness), but we should have gone a long way to solving the unemployment problem instead of bolstering it up by keeping it in funds by the artifice of Treasury loans.

After the War

IT is reasonable, also, therefore to assume that we shall not disarm after the present war and it follows that engineering, building and aircraft industries will offer excellent scope for those mechanically inclined. It usually follows that when these industries are busy others are equally so, and hence we may also conclude that all branches of industry will provide opportunities for various careers.

But individual anticipation of peace will be rendered nugatory unless some encouragement is given by the State. We cannot tell what Post-war Government will be in power and it would seem to be the duty of the present Government to be laying its plans now. Lord Reith has been given the task of Replanning Britain, and he will be assisted by a staff of experts. The task is enormous, and it would seem, also, almost impossible of solution. No Committee could be sufficiently omniscient to successfully carry through so gigantic a task. Where would it begin? What does replanning mean? Are we merely to replan our towns and cities? Are we only to build new roads? Or are we to repair, to remodel or renovate the whole of our social system and habilitate ourselves to some new order which Lord Reith will create?

These are pregnant questions. Before the war we had planned our transport system and our railways and our roads apparently in order to convey people to the seaside by the shortest possible route. Jerry builders were permitted to destroy the objects of arterial roads by ribbon development. There was not sufficient work to go round. In the wealth of opportunity which will follow the war there will be work for all, but the effort needs national co-ordination. We suggest, therefore, that the Government does not, as so often is the case, pass off awkward problems to some select Committee, but creates a special Ministry—a Replanning Ministry—instead of leaving it to one man and a few experts.

Radiolocation

SCIENTIFIC developments eventually become harnessed to war. Wireless communication, originally developed as an aid to commerce and for life-saving at sea is a powerful war weapon, enabling armies to have immediate communication with Headquarters. It has given birth to a young but promising science christened at the Church of Progress with the name of Radiolocation. War which is largely destructive also has a constructive side. The last war enhanced the development of aviation by a period which it would have taken 50 years of private endeavour to attain and similarly this war is developing wireless telegraphy and telephony. Radiolocation is not a new departure in Radio Science, however, but the application of existing knowledge and principles. We are not permitted to disclose the precise nature of the invention for obvious reasons, but obviously one of the advantages of the new invention is that it is now unnecessary to maintain a large patrol of fighters, which will save the country expense on petrol and engine replacements. Additionally, it will release personnel for other duties. It is not the invention of one man, for like so many other important inventions, it is a joint effort where the work of independent experimentors has been co-ordinated.

Technical Books

A NEW 16-page catalogue giving details of our practical reference books for electrical engineers, radio mechanics, aero-engineers, mechanical engineers, motor mechanics, instructors, and students, is available free to any reader addressing a postcard to the Publisher, Book Department, George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2.

A new book which is finding favour is "Practical Leatherwork and Allied Crafts," selling at only 1s. It contains 96 pages, 179 illustrations, and the contents include: Leather; tools and materials; modelling and transferring designs; embossing, monograms, plating, weaving and piercing; tooling; lining, thonging and sewing; a tooled handbag; applique; raffia work; wool rug making; painting on leather, fabrics and parchment; gesso decoration; batik dyeing; stencilling; beadwork, lampshades and candleshades.

Those engaged in the various services, as well as munition workers, are reminded of our recently published books:—"Diesel Vehicles: Operation, Maintenance and Repair," 5s., by post 5s. 6d.; "Motor Car Principles and Practice," 6s., by post 6s. 6d.; "Gears and Gear Cutting," 5s., by post 5s. 6d.; Newnes' "Engineers' Manual," 8s. 6d., by post 9s.; "Watches: Adjustment and Repair," 6s., by post 6s. 6d.; "The Practical Motorist's Encyclopaedia," 10s. 6d., by post 11s.; the new editions of "Workshop Calculations, Tables and Formulae," 5s., by post 5s. 6d.; and the "Practical Mechanics' Handbook," 10s. 6d., by post 11s.; "The Dictionary of Metals and their Alloys," 6s., by post 6s. 6d.; "The Superhet Manual," 6s., by post 6s. 6d.; "Practical Wireless Service Manual," 8s. 6d., by post 9s.; "Wireless Transmission," 5s., by post 5s. 6d.; "Newnes' Short Wave Manual," 6s., by post 6s. 6d.; "Practical Wireless Circuits" (new edition), 5s., by post 5s. 6d.; "Practical Wireless Encyclopaedia" (new edition), 10s. 6d., by post 11s.; "Radio Training Manual," 6s., by post 6s. 6d.; and the "Radio Engineers' Vest Pocket Book," 3s. 6d., by post 3s. 9d.; "Wire and Wire Gauge Vest Pocket Book," 3s. 6d., by post 3s. 9d.

PARACHUTE TROOPS

How They are Trained and Equipped

THE extensive use by the Germans of parachute troops in the present campaign has proved that, provided they can be suitably reinforced and lines of communication can be established, this form of warfare is highly successful. No longer is it necessary for an invading army to rely on ships for the transport of troops across water in the event of an attack on an island: they are simply dropped on the scene of operations from the air. Although Germany was successful in their invasion of Crete by means of parachute troops, it does not follow that they would meet with the same success in an attempted invasion of our own highly fortified island. Firstly, they would have to obtain mastery of the air and, secondly, they would have to establish lines of communication from the sea. As they can do neither it follows that they have little chance of success.

The First Attempt

It is generally assumed that it was the Russian Red Army which first had the idea of the military use of parachute jumpers, and first put the idea into practice. This is not so, however, as military actions in the rear of the enemy by landing men from the sky was attempted during the last war. Major Evrard, a Frenchman, made the attempt with a pioneer detachment of eight men. They were landed far behind the German Front in the Argonne, with the object of blowing up certain objectives. Later, in 1918, the first military plan for a mass-action by parachute jumpers was laid before the Allies by General William Mitchell, who was in command of the American air striking force. Instead of trying to break through the German lines, he suggested that 2,000 aircraft should fly over them and land a complete division, by means of parachutes, at a straetgic point. The world war concluded, however, before this amazing plan could be put into operation.

It was not until 1935, seventeen years later, that the Russians began to carry out extensive manoeuvres with air-borne troops. First of all they considered the problem in this fashion. Suppose that 20 men jump out at half-second intervals from a troop-carrying transport plane travelling at a speed of 360 kilometres (225 miles) an hour. Then, if circumstances were favourable, the men would be distributed in the form of a line, each man a kilometre (five-eighths of a mile) from his neighbour. So far, so good, but it was then realised that they had overlooked a very important point. This was that in every inhabited area it is easier for a superior defensive force to be warned and ready for action, than for parachute troops

A fully equipped parachutist soon after leaving the plane. The parachute is fully opened.

strewn over so long a line, to concentrate. They, therefore, discarded this idea for a fresh one.

Aimed Like Bombs

Instead of carrying the picked shock troops in transport planes, they found it more effective to carry them in fast military aircraft. With a smaller and faster type of aircraft, however, there was less space available for the shock troops, so instead of being seated as in the large transport plane, they had to lie in rows, next to one another, in both the lower wings of the aeroplane In this way it is possible for the parachute jumpers to make a simultaneous jump. At a given signal flaps open beneath the feet of the crew, and their fall directed with the precision of bombs. As the parachutes open according to a predetermined plan, and the flaps for releasing the troops are mechanically delayed in action, the tactically most suitable falling formation is achieved. The speed of fall can be regulated by the pilot of the machine by a diving and climbing movement carried out at the time the men are being dropped. Also, owing to the parachutes lying beside the soldiers, and not being packed on their backs, a mass parachute jump can be carried out even in a dangerous area, with sufficient of the surprise element to give it a chance of success.

The Parachute Descent

England and America also have their own parachute troops, but as most of the training is done in secret, it is not possible to give very many details. We can, however, describe what happens when the parachutist leaves the plane and drops to earth. The technique of the parachute descent is not a difficult one for anyone to master, although, naturally enough, the first descent calls for a certain amount of confidence and courage. Assuming that the parachute is strapped to the back, the user either jumps or steps into space from the travelling 'plane. After, and not before, the decisive jump or step into space has been made, the parachutist pulls the rip cord. In one method this rip cord release is normally made within a second or two of leaving the aeroplane. Within

Part of the training of parachute troops consists of a special course of instruction in the care and upkeep of the parachute.

Parachute troops just after being released from a troop carrying plane.

from 3 to 5 seconds of this action being carried out, the parachute opens fully, allowing the user of it to descend gently to the ground. As a precaution against bad weather, when, in such conditions, the parachutist, after reaching the ground, might possibly be picked up again by a gust of wind and dragged violently along the ground, a quick-release device is usually incorporated in the harness whereby he may instantly detach himself from the main body of the parachute.

The type of equipment carried by an English invader from the air.
A. Sub-machine gun.
B. Hand grenades.
C. Water bottle.
D. Leather boots.
E. Camouflage.
F. Food ration, first aid, and maps
G. Field glasses.
H. Revolver.

Type of Parachute

The average Irvin type of parachute has an opened-out diameter of about 24 ft., and it weighs with the harness some 18 lb. Its rate of falling (with a passenger of about 12 stones) is of the order of 16 ft. per second. Military type parachutes are often smaller and they permit of more rapid descents. Provided that the rip cord is pulled a second or two after leaving the 'plane, the average "dead drop" of the parachutist is only about 60 to 80 feet before the parachute fully opens out. From this instant the parachutist drifts gently to the ground, and, for the greater part, the sensation o doing so is much akin to that of floating upon a perfectly calm sea. What of the parachute itself? This contains within its compacted assembly a small or auxiliary parachute which is released immediately upon the pulling of the rip cord of the pack. This auxiliary or pilot parachute shoots out and, instantly unfolding itself, serves to pull out the main body of the parachute, from whose edges are suspended the rigging lines attached to the man-carrying harness of the device.

Kit for Parachute Troops

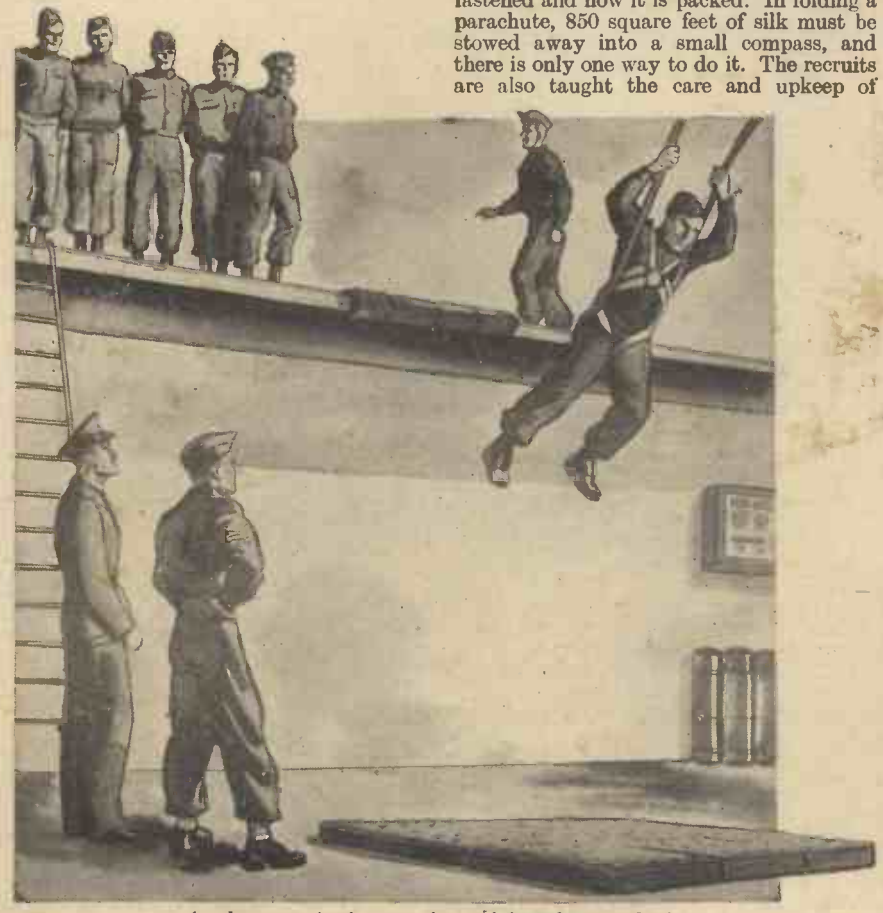
Although little is known of the equipment carried by American parachute troops, details have been published of the English and German equipment. The German equipment consists of a folding-bicycle, a gas mask, binoculars, a radio set, a water bottle, a tent and in his hands he carries a machine gun ready for immediate use. As will be seen from the sketch on this page, the English equipment consists of a sub-machine gun, hand grenades, water bottle, leather boots, camouflage, food ration, first aid kit, maps, field glasses, and a revolver.

Reverting back to the training of parachute jumpers. Although little is known of the English and American method it is no doubt similar to the German, which is roughly as follows. The first thing that they have to learn is how to protect themselves in the event of the parachute being dragged along the ground after landing. This is done by tucking the head well in and rolling up the body in much the same method as a hedgehog. Next they have to learn to fall forward from a kneeling

In order to get the sensation of flying through the air, the recruit is suspended from a lofty hangar by means of special tackle. Note the padding on the floor to safeguard the parachutist when he drops.

U.S.A. Army transport planes disgorging parachute troops over Fort Benning, Georgia, where America's 501st (Parachute) Battalion is in intensive training.

position. This may save the jumper from a broken leg when making an actual descent. We now come to the "bone-saving roll." In England we call it the "forward roll," and perform it over the vaulting horse. After the parachute jumper has successfully mastered those exercises he then learns to jump by stages.



Another stage in the extensive training of a parachutist.

Practice Jumping

This is carried out on a special framework from which the parachutist is made to jump until he is able to jump from a considerable height without suffering any ill effects. Meanwhile, the recruits attend special classes in which they are taught by diagrams how the parachute is constructed, how it is fastened and how it is packed. In folding a parachute, 850 square feet of silk must be stowed away into a small compass, and there is only one way to do it. The recruits are also taught the care and upkeep of parachutes in a hall alongside the hangars Once the parachutist has learned to fall correctly, it only remains for him to get the feeling of flying through the air. So, in a lofty hangar, suspended by special tackle, he swings about and comes bumping down on comfortably padded flooring. Finally to complete his training, the recruit is instructed in bone-saving gymnastics, and how to avoid getting entangled up in the strings of the parachute.

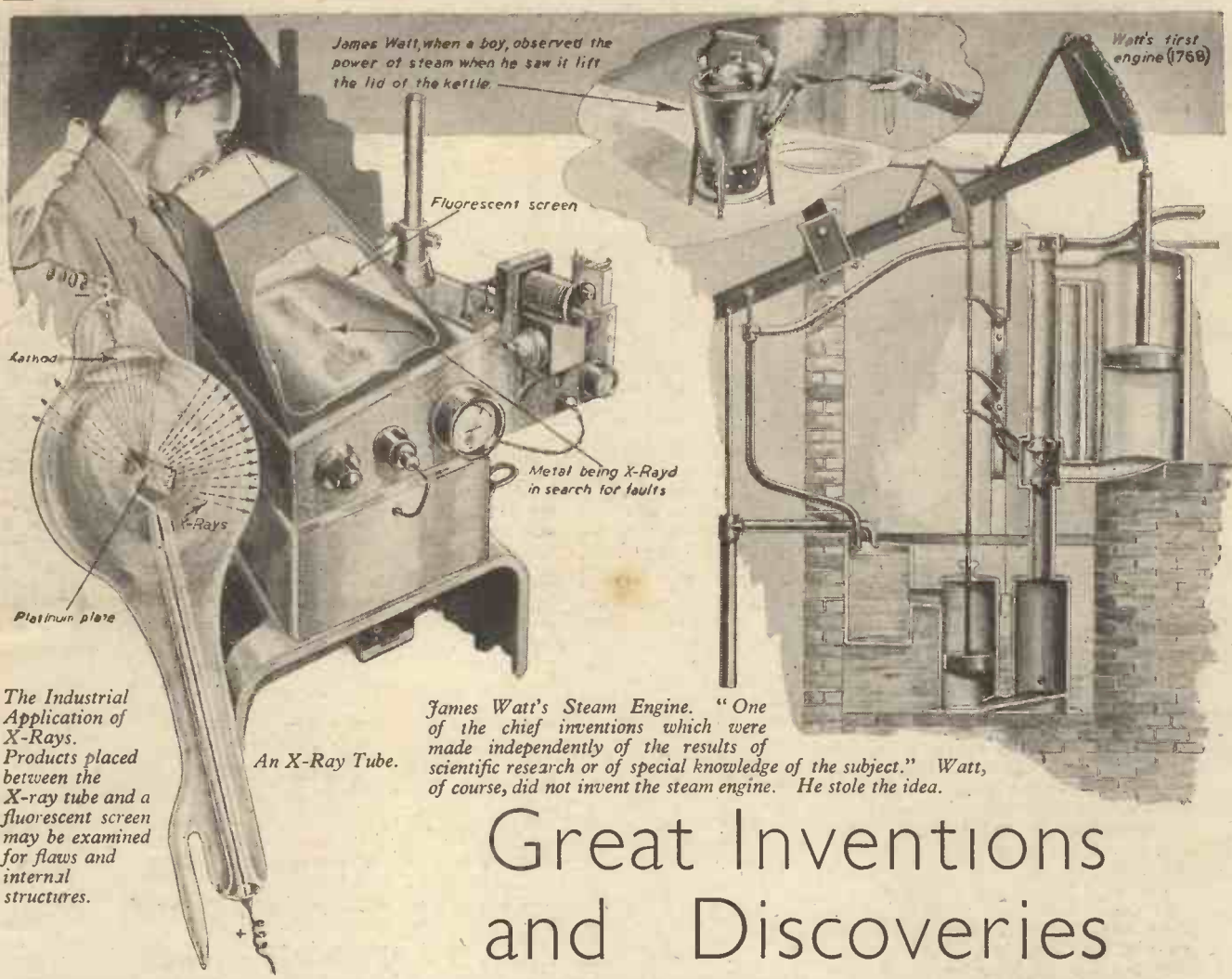
Dealing with Air-invaders

It has been considered by many people that whilst the parachutist is in the air he is at the mercy of the defending force, and many of them would be killed before they ever reached the ground. Therefore, the element of surprise is of great importance for parachute jumping, and, secondly, only a weakly defended or quite undefended district could be attacked with any chance of success.

It is quite probable, however, that as the technique of attacking with troops from the air is improved, strongly protected areas can be successfully attacked. What these improvements will be remains to be seen, but undoubtedly the parachute will have to be so designed that bullets entering the silk will only make a small hole, and not cause the 'chute to rip. Light armour plating would also prove a useful protection for the parachute jumper during the descent.

Dive-Bomber Improvements

THE Germans are now using new types of dive-bombers which are faster and stronger. One of these is the Junkers 88 which is said to have a speed of 310 m.p.h. One of the improvements to these machines is a new form of diving-brake. It is an expanding ring of slats at the tail which look something like a pigeon's tail when half extended. Diving-brakes keep the diving speed constant to enable the pilot to take steady aim before the bomb is released.



The Industrial Application of X-Rays. Products placed between the X-ray tube and a fluorescent screen may be examined for flaws and internal structures.

An X-Ray Tube.

James Watt's Steam Engine. "One of the chief inventions which were made independently of the results of scientific research or of special knowledge of the subject." Watt, of course, did not invent the steam engine. He stole the idea.

Great Inventions and Discoveries

Extracts from a Paper Read Before the Royal Society of Arts Recently. By Sir Richard Gregory, Bt. F.R.S.

THOUGH it is often difficult and sometimes undesirable to draw a clear distinction between a discovery and an invention, different meanings are now generally attached to the two words. Science may be said to be concerned with discovery, and the arts with invention, but imaginative insight and constructive capacity are characteristic of both. Every invention involves acquaintance with the properties of the things used in it, and all such ascertained natural knowledge comes within the realm of science.

Scientific Research

Scientific research may conveniently be divided into two classes—one in which the main motive is the discovery of new knowledge, while in the other the special purpose is to obtain results which have a direct bearing upon problems of manufacture and construction. To the original scientific explorer discoveries are ends in themselves, while to the inventor and engineer they represent knowledge to be used for practical purposes. The characteristic of the present age is the utilisation in industry of principles, properties and products revealed by scientific research, whether carried out solely in the pursuit of knowledge, or with the view of meeting what is believed to be human need. The result is that the combined work of scientific discoverers and mechanical inventors has now invaded every craft, every art, and every industry, and has changed the social conditions of the whole civilised world.

Some of the chief inventions upon which modern industrial developments are based, such as the steam engine, the power-loom, and printing, were made independently of the results of scientific research, or of special knowledge of the subjects involved in them. James Watt's alleged work on the steam engine began when he was given a workshop as a mathematical instrument maker. (Watt did *not* invent the steam engine.—Ed.)

Benjamin Huntsman was a clockmaker who wanted to obtain better steel for the springs of clocks, and was thus led to invent crucible steel. Henry Cort was a Navy agent when he invented the puddling process for converting pig-iron into malleable iron, and Richard Arkwright was a barber before he invented the spinning frame. All these achievements represent the exercise of constructive mechanical ingenuity rather than the spirit of inquiry which is the motive of scientific research.

Value of Old Knowledge

The discoveries of science have immensely extended the field of invention, and the use of scientific methods in the acquisition and application of new knowledge is now essential for industrial progress. The discovery of the value of old knowledge ascertained by scientific investigation has led to even greater material advances than applications of new. Unfortunately, the moral sense of civilised communities has not kept pace with these advances, so that the most profitable discoveries and inventions have become those which can be used for the destruction of human life and property as well as for human welfare.

Two examples of this dehumanising use of old knowledge are afforded by chlorine and glycerine, both of which were discovered by the Swedish apothecary, Scheele, in the last quarter of the eighteenth century. The use of chlorine in the manufacture of bleaching powder was patented about a quarter of a century later, but it was not until 1915 that the Germans first used it as a poison gas at Ypres. Similarly, mustard gas, which was first used on the battlefield by Germany in 1917, was discovered in a scientific laboratory nearly a century earlier. Scheele's glycerine did not become of any industrial value until many years after its discovery, when a patent was granted for a process of making it. It was the discovery of nitro-glycerine by Nobel in 1883 that enormously increased the importance of glycerine as an industrial product.

Producing X-Rays

The means of producing X-rays existed many years before Rontgen observed their effects and investigated their properties in 1895. Hittorf described in 1869, fluores-

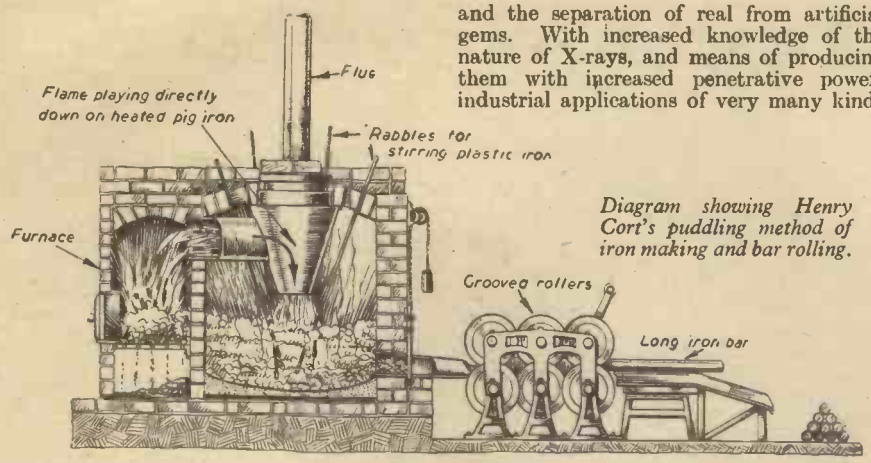


Diagram showing Henry Cort's puddling method of iron making and bar rolling.

cence produced on the glass walls of a vacuum tube through which an electric discharge was passing, by rays proceeding from the negative electrode, or cathode. Sir William Crookes spent ten years in the investigation of the nature and properties of these rays inside vacuum tubes, and every one of these tubes was producing X-rays before Rontgen discovered these rays. He covered a Crookes' tube with a shield of black paper in a completely darkened room, and proved that when an electric discharge was passing through the very highly attenuated gas in the tube, fluorescent substances outside the tube glowed brightly. Further investigations showed that the rays could penetrate many materials opaque to ordinary rays of light, and also affect photographic plates or films.

From this discovery, not accidental, but incidental, all the valuable medical and industrial applications of X-rays have been developed. The primary object of the experiments made by Crookes, Lenard, Rontgen and others was not the invention of something of practical value, but to inquire into the nature of the electric discharge in gases, and of the rays emitted from electrodes in vacuum tubes. Crookes showed that the cathode rays sent out from the negative electrode of an electrified vacuum tube consist of streams of material molecules moving at very great speed.

The practical value of X-rays in surgery and medicine was recognised as soon as their discovery was announced. Pullen and Wiltshire, in their history of "X-rays: Past and Present," give me the credit of first showing how the rays would reveal internal flaws in an article of everyday use. A few days after the announcement of Rontgen's discovery I went with two or three friends to Sir Herbert Jackson's laboratory in King's College, London, to see a demonstration of the effects of the rays emitted by a type of vacuum tube which he had been using for several years in his experiments on fluorescence. On my way I bought an umbrella, in which I was assured by the shopman that the crook and the stick were all in one natural piece, and not joined. Upon holding the handle between the X-ray tube and a fluorescent screen, an internal metal screw could be clearly seen connecting the handle to the stick, thus exposing a deception in a manufactured article of commerce.

Industrial Applications

The industrial use of shadow pictures of this kind, shown on fluorescent screens or photographed, for examining internal structures and detecting flaws, developed very rapidly. Among early applications of this kind were the examination of parcel-post packages, welded metal, interior of bombs, and the separation of real from artificial gems. With increased knowledge of the nature of X-rays, and means of producing them with increased penetrative power, industrial applications of very many kinds have since been introduced. The welding of parts of aeroplanes, testing the contents of cartridges, inspection of shell fuses, and examination of foreign ammunition of unknown construction, are examples of uses of X-rays in ordnance industries.

Refrigeration

The principles of expansion, compression and evaporation of fluids used in refrigerating machines were established by laboratory experiments on the nature of heat before they were applied to industry. The action of a refrigerating machine is the reverse of that of a heat engine, but the laws of thermodynamics determine the performance of both. By a series of experiments carried out by Joule and Thompson (Lord Kelvin) in the 'fifties of the nineteenth century, it was shown that when gas under high pressure is allowed to escape through a small orifice or porous plug, the result was a lowering of temperature of the gas. Air at a pressure of eight atmospheres, thus allowed to escape, undergoes a reduction of temperature of about 24 deg. F. This is known as the Joule-Thompson effect, and it is the basis of many commercial processes for cooling gases, and in some cases for liquefying them.

For nearly half a century before the Joule-Thompson effect was used in the construction of refrigerating machines and the liquefaction of gases, a method of cooling by mechanical means had been invented. The earliest type of refrigerating machine which produced cold by causing compressed and cooled air to expand by working a piston in a cylinder, was patented in the United States in 1850. It was not, however, until twenty years later that the mechanical production of cold began to have commercial value. In 1879, the S.S. Strathleven was fitted with a cold air machine of this type, and a cargo of frozen meat was successfully brought from Australia to England. At the end of the century, about two million carcasses of beef and mutton were brought to England annually in ships fitted with these refrigerating machines. Compressed air machines then began to be replaced by machines using other gases, such as carbon dioxide and ammonia, and it became possible to preserve many other food products from deterioration during transport or over a long period.

Towards the end of the nineteenth century, the Joule-Thompson effect, whereby the molecules of gas allowed to expand from high pressure results in the gas being lowered in temperature, was given industrial importance by the invention of refrigerating machines based upon it. The cooling effect produced by the escape of a compressed gas from a nozzle or valve is used to cool the inflowing gas, and thus introduce a regenerative process, which can be continued until the gas is liquefied. Most modern refrigerating machines depend upon this principle, and the regenerative process is used to produce the very low temperatures required for the liquefaction of atmospheric air and its components, oxygen and nitrogen. The separation of oxygen and nitrogen from air is carried out by allowing liquid air to drop slowly into oxygen. The neon gas present in air, and familiar in the neon tubes used for illuminated advertisements is a by-product of this process.

The mechanical production of cold is now an essential part of every-day life, not only in its application to the transport and storage of perishable foodstuffs, but also in many of the industries upon which Britain's trade and commerce depend. Mechanical methods of refrigeration are widely used in such varied industries as the making of bread, biscuits, chocolate, margarine, artificial silk and cinematograph films, the brewing of beer, curing of bacon, refining of oil, and the sinking of wells and mine shafts.

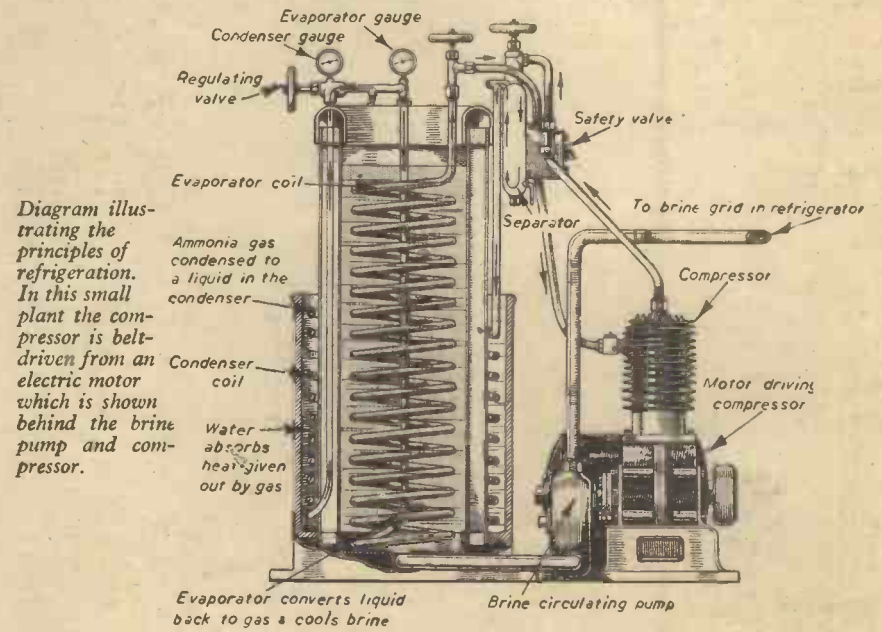


Diagram illustrating the principles of refrigeration. In this small plant the compressor is belt-driven from an electric motor which is shown behind the brine pump and compressor.

New Curtiss Dive-Bomber

Particulars of the Powerful All-metal Monoplane Built for the U.S. Navy.

The new Curtiss dive-bomber in flight during high-altitude tests.

RECENTLY completed for the U.S. Navy, the newly designed Curtiss dive-bomber transports a larger bomb load at higher speed for greater distances than any dive-bomber ever developed in America, or abroad. The machine will greatly extend the striking power of the U.S. Navy's battle fleet, according to Burdette S. Wright, vice-president of Curtiss-Wright Corporation, in charge of all U.S. aircraft manufacturing.

The new dive-bomber, designated the Curtiss XSB2C-1, is a two-seater, all-metal, low-mid-wing monoplane designed by Curtiss-Wright Corporation's Airplane Division, of Buffalo, N.Y.—America's largest producer of combat planes for the National Defence—in response to the U.S. Navy's demand for a diving Scout-Bomber which will out-perform any other plane of its type in existence.

Designed to operate from aircraft carriers on extended scouting and bombing missions, it has a 1700 h.p. Wright Cyclone engine which marks it as the most powerful dive-bomber ever built in America, or abroad, and which assures it exceptional reserve of power and range. It is equipped with a three-bladed Curtiss electric "full-feathering" propeller.

Heavy Bomb Load

While unable to reveal details of its armament or performance, Mr. Wright said the U.S. Navy wanted a "Super" dive-bomber that could carry twice as many heavy bombs as any existing dive-bomber, fly twice as far as present models to protect America and its fleet 600 miles farther than previously, remain in flight 4½ hours longer than previously, attain a maximum speed of 100 m.p.h. faster than current types, and double existing armament, thus achieving greater fire power than any other single-engined Naval plane, and also to incorporate many mechanical improvements.

The Curtiss XSB2C-1, he admitted, incorporates numerous new features in naval aircraft design. These include unusually heavy armament, provisions for carrying the bomb load inside instead of outside the fuselage, thus eliminating drag, wings that fold upward to better facilitate storage on shipboard, wing "slots" that make the plane highly manoeuvrable even at the low speeds used in landing on an aircraft carrier deck, and major controls that operate hydraulically instead of mechanically.

Curtiss-Wright engineers in charge of the flight tests of the new Curtiss XSB2C-1 describe it as being much larger than existing single-engine combat types, including the present Curtiss-SBC-4 dive-bomber type widely operated by the U.S. Navy, say it has a faster take-off than a pursuit plane, and indicate it is unusually fast and manoeuvrable in flight.

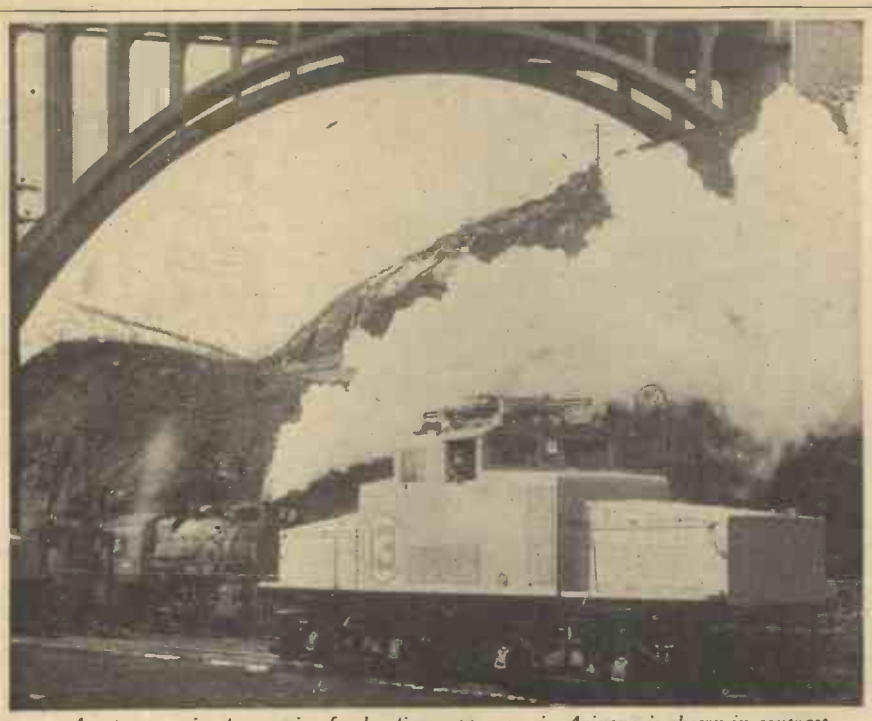
Mass Production

Like all Curtiss aircraft types recently developed for the U.S. Navy or U.S. Army Air Corps, as part of the National Defence programme, the new Curtiss XSB2C-1 is designed for rapid mass production. This type, however, is scheduled for production in the organisation's mammoth plant of 1,156,000 square feet now being erected at Port Columbus, Columbus, O., and to employ 12,000 workers. Two other Curtiss-Wright airplane factories are being constructed at Buffalo and St. Louis.

Aircraft designers of Curtiss-Wright Corporation—which, incidentally, developed for the U.S. Navy its first dive-bomber type known as the Curtiss Hell-diver as early as 1930—point out that the Navy pioneered the technique of dive-bombing now practised abroad—and believe that this nation's wide use of planes of the advanced Curtiss XSB2C-1 type would make invasion of the United States difficult, if not impossible.

As America's largest producer of combat planes for the National Defence, Curtiss-Wright Corporation's Airplane Division at Buffalo, N.Y., is already engaged in turning out 10 planes daily including Curtiss P-40 pursuit planes for the U.S. Army Air Corps, and Curtiss Tomahawk fighters for the R.A.F.

Lloyd Child, chief test pilot of Curtiss-Wright Corporation's Airplane Division of Buffalo, N.Y., inspecting the machine's 1700 h.p. Wright-Cyclone engine.
(Left) Side view of the new dive-bomber on the ground.



An electric mine locomotive for hauling copper ore in Arizona is shown in contrast with the conventional steam locomotive beneath an arch of the Westinghouse Bridge in East Pittsburgh, Pa. This is one of nine identical locomotives built by the Westinghouse Electric & Manufacturing Company for the Phelps Dodge Corporation. They will haul 25,000 tons of ore a day, from which about 500,000 pounds of copper will be recovered.

Fire Bomb Detection

THE Institution of Electrical Engineers has prepared for the Ministry of Home Security a Memorandum dealing with the subject of the automatic detection of fire bombs. Impact, sound, light, products of combustion, and heat are the five main categories into which the principles of detection fall. Science has discovered many ways of making each effect raise an alarm, particularly light and heat. Light from a burning 1-kilo incendiary bomb is equal to about 6,000 candle-power, heat output is 3,800 calories, or 15,000 British thermal units. When it falls from the sky it strikes with an impact of 4,200 ft. lb.

The main difficulty about impact detectors is the quantity of material required, and though simple, they are expensive if they have to cover large areas. Some buildings have electrically connected wire nets and crash boards. Light detectors depending on the action of photo-electric or selenium cells are more practical. Detection by this means operates when there is a sudden illumination increase of 0.5 foot candle from darkness. If the bomb flames within 100 feet, the alarm rings, but gradual illumination increase fails to change the current sufficiently to ring the alarm.

Increasing the sensitivity brings certain disadvantages through the greater risk of false alarms due to daylight or changes in the night light. There is a gas-filled bulb variety which is commercially available, and which will operate an alarm on sudden illumination of 0.2 foot-candle from light given by a 6,000 candle-power bomb at a distance of 173 feet. Photo-electric apparatus has been devised which will operate alarms from a distance of 300 feet.

Many detectors operated by heat have also been devised. They work by means of thermostat-temperature-operated electrical contacts. Though they can be arranged to operate at any temperature, they are usually adjusted to work between 130 and 160 degrees F.

New Fire Bomb Extinguisher

A FIRE bomb extinguisher which can be operated single-handed has been invented by a South Staffordshire policeman. It can either be carried on the back of the operator or be carried like an attache case, and weighs only a few pounds. Once charged it is capable of extinguishing three or four bombs in a few seconds. Air pressure sends out a jet of special fluid which can be thrown 30 feet with considerable accuracy. The whole apparatus is very easy to manipulate, and refilling takes only quite a short time.

Jacob Baker, an American, with a model of a new raid shelter which he has invented. Details are given on the opposite page.

The Science

New Self-locking Nut

THE day of the washer and nut seems to be doomed, judging from the numerous ingenious self-locking nuts which are coming on to the market. A good example is that in which the locking device is made up of an arched steel spring with integral prongs, the latter sitting into the threads as the nut is tightened up. The spring action of the stamping serves to lock the nut, while the prongs also grip the threads.

A New Synthetic Rubber

A NEW synthetic rubber, which is amber in colour and has a density of 1.06, has been developed by the Goodyear Tyre and Rubber Co. The advantages claimed for it include resistance to oil, petrol, petrol vapour and other organic solvents, which attack the natural product. For that reason it is finding uses as a protection for natural rubber, as for example in automobile parts, such as the hose on the water cooling system. It has a faint but aromatic smell, and it has been found that one of the best plasticisers for it is pine tar oil. Chemigum, as it is called, is rather difficult to process, but can be readily mixed with natural rubber. This fact, together with its tendency to resemble chewing gum when warm, does not encourage its use as a competitor to the natural product, or to synthetics, as Neoprene, Buna and Thiokol, but rather as a chemically suitable protection for its cousins.

A Radio Distance-Meter

A DEVICE known as a radio distance-meter has been invented by the Soviet scientists, Professors N. Papalexi and L. Mandelstam. It employs radio waves to measure distances. The radio distance-meter consists of two special receiving and transmitting sets situated at two points, the distance between which is to be measured. Radio waves of exactly known wave-lengths are remitted from one set and received by the other, from which they are relayed back to their source. This is done to determine how many wave-lengths fit into the distance being measured. But the difficulty lies in the fact that this cannot be done directly. However, if this procedure is repeated, employing a radio wave of slightly different length the second time (by changing the wave-length on which the set is operated) it then becomes possible to determine the number of waves that fit into the distance by comparing the results of both measurements. With the aid of some simple measurements and calculations based on the knowledge of the velocity of radio waves, the distance is determined precisely.

Employing such a radio distance-meter, a captain of a vessel can always determine his position without using a compass or any other navigation instruments. Two radio relaying stations are located at fixed points on land and the ship's position is found as the point of intersection of two arcs whose radii are the distances from the ship to the aforementioned stations.

Ultra-Short Wave Defectoscope

AN apparatus to " X-ray " opaque objects with ultra-short radio waves, 3-4 cm. in length, has been developed at the

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Institute of Physics of the University of Moscow. By employing this apparatus it is possible to disclose defects in articles made of wood, porcelain, glass and leather, as well as in bodies which are poor conductors of electricity. Analogous to the X-ray method, the ultra-short wave method is said to have the advantage of being able to disclose bodies which are usually opaque to X-rays—the presence of water in oil or pitch, for instance. A closed box containing articles like photographic films which usually suffer from the action of X-rays, may now be examined with ultra-short waves, without its contents being affected.

By a special device it is also possible to "radiograph" articles with the ultra-short wave apparatus.

A New Electrical Instrument

THE problem of developing musical instruments capable of producing powerful yet clear and undistorted sound, audible to audiences of many thousands, has engaged the attention of Soviet scientists for some years. The Acoustics Laboratory of the Conservatory of Music, headed by Professor N. Garbuzov, has been working on the development of new, electrical instruments, a task in which designers and musicians working in close co-operation, are opening up new paths for the development of music.

In the Laboratory stands a highly-polished black instrument outwardly resembling a miniature organ. When the musician raises the lid and strikes the keys, just as with a dummy piano, no audible sound is produced. The various sounds, resembling those produced by a flute, an oboe, or even an organ, issue from the loudspeaker of the receiving set as the keys are pressed. This new electrical instrument, called a companola by its inventor, Igor Simonov, works on the same principle as a piano. Unlike a piano, however, each key is not attached to a hammer which strikes a string, but to a switch resembling a telephone relay. When the keys are pressed they throw in contacts, switching in a system of resistances.

Frequency Range

EACH of the usual musical instruments, such as the 'cello and trumpet, has a limited range of frequencies. The frequency range of this electrical instrument, on the other hand, is very broad, including that of many musical instruments. By simply changing the resistances, the performer instantaneously changes the pitch. The companola may produce a staccato sound like that of a guitar and a drum, or the legato sound of a trombone. In the high registers the sounds produced by the instrument resemble that of an oboe or a flute.

The performer plays only the basic melody; all the remaining effects conceived by the composer, all the colour, are achieved electrically, with the aid of an ordinary audio-frequency oscillator (producing electrical vibrations which, upon passing through the loudspeaker, are transformed into sound), electrical resonators, filters, resistances.

Moreover, to play the companola does not require as much effort or as complex a technique as to play a piano. Without its amplifier it is no heavier than an average radio set, yet it can produce a sound that can drown a symphony or jazz orchestra. The musician, without exerting himself in the least, can make the instrument sound a "fortissimo" which, for power, is beyond anything so far known in instruments.

New Type of Compressed Wood

A NEW kind of compressed wood has been invented in America, which may bring about a rapid increase in aircraft production, both in this country and the United States. Tests have shown that this wood is as hard as glass, and only one-fourth as heavy as aluminium. Propeller blades, superior to those made of metal, can be made from the new material, which can readily be machined and tooled.

New Germ-Killer

RESEARCH which has been made by Dr. J. C. Hoogerheide, of the Biochemical Research Foundation of the Philadelphia Franklin Institute, has led to the discovery of one of the most powerful antiseptics yet known. It comes from ordinary soil and the germs of pneumonia, gangrene, and many infectious diseases are killed by the most minute quantities of the substance. It has been scientifically named H.I.

Car Life-saving Invention

A NEW device consisting of shields, a transverse bumper, and flexible curtain, which are practically invisible when out of action, has been patented by Mr. W. H. Linn, of Southfields. He claims that even if a pedestrian is knocked down, it is impossible for a car, fitted with his invention, to run over him.

New Type of Furnace

WITH the aid of a new furnace for melting metals, new alloys of platinum, tungsten and other metals have been discovered. Inside a small tantalum cup is placed the crucible containing the metals to be melted, and the cup is placed into a vacuum vessel in which there is also a red-hot filament. The cup, charged with positive electricity, attracts the electrons streaming off the filament, and their bombardment simply results in heating it up. The new furnace is proving of great service to engineering science, and although there seems to be no limit to the heat to which the pot can be raised, there are limits to the materials of which the crucible can be made.

A Ball-bearing Air-raid Shelter

JACOB BAKER, an inventor from U.S.A., has produced an air-raid shelter which he claims is shockproof. Made of heavy steel, the shelter will house four persons. The top is conical and the bottom round. The shelter rests upon a foundation in the centre of which is a slight dimple. In this dimple is a 3 in. steel ball. A corresponding concavity on the outside bottom of the floor of the shelter cups about the ball. In a bombardment the shelter would not be rigid, but would ride with the shocks in much the same manner as a boxer lets his head ride with a punch.

Enamel Baking with Infra-Red

IT is well known that the long waves in the infra-red region are the main source of radiant heat in the sun's rays. Such waves can be produced in special lamps, much like ordinary light from an electric lamp, and this fact is being utilised by manufacturers of automobiles in the States. The advance of infra-red waves is that they only produce heat when they fall on a surface, and so it is possible to bake a coating without heating the surroundings, as would be the case with a furnace. It is pointed out, however, that clear finishes cannot be baked in this way, because they allow the radiations to pass through On the other hand, the technique seems to lend itself to plastics, which have a dense surface, from the point of view of colour or transparency. Apparently, the new process can be more economical than the older one of furnace baking.

High above the fastest natural flowing water in the world, bridge workers carry on their trade on narrow beams, as they add section after section to the new Rainbow Bridge, now nearing completion at Niagara Falls. Note the safety nets beneath.

The R.A.F.

A Short History of its Notes on its Chief

(*Continued from page* 367.

MEANWHILE, in 1935, the free gun version of the G. 22 had been brought into use. It imitated closely the Lewis gun in shape, balance and weight, and was cocked and fired in exactly the same way as the real gun. It fitted in the same manner as the gun on to the mounting provided in the aircraft. Distant controls were not, of course, necessary. The mechanism was that of the G.22 adapted to fit the altered body shape (Fig. 6). A dummy pannier fitted over the camera body, and either side of this were provided two storage spaces in which spare loaded film holders could be carried in the air. One loaded holder was carried in position in the camera, a second in one of the storage accommodations. When exposed, the first could be placed in the second empty space and the unexposed holder placed in the camera. Thirty-two, or, at a pinch, forty-eight, exposures could be made in one flight. The paper leader was, of course, pulled over, after loading the film holder into the focal plane, simply by operating

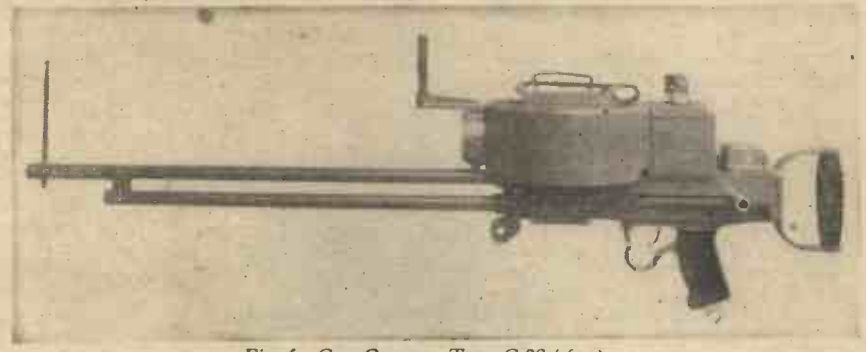

Fig. 6. Gun Camera, Type G.28 (free).

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and firing the gun the correct number of times. Similarly, after ten or sixteen exposures had been made, the trailer was pulled over to render the film light-tight before removal. Later spring-loaded flaps were provided around the film to prevent the natural springiness from unwinding the film and fogging the edges. This camera was sighted with a ground glass screen in contact with the graticule in exactly the same way as the G.22. The same criticisms, of course apply to this free gun as to the fixed model

Decision to Use 16 mm.

In 1932 the use of cinematography in connection with camera guns had again been suggested. In this connection it should be mentioned that 1924 saw the introduction of 16 mm. safety film in this country, and this led gradually to the popularising of amateur cinematography and to the development of reliable and improved sub-standard apparatus employing both 16 mm. and 9.5 mm. film. Of these two, 16 mm. attracted the support of those workers and users who wished for precision akin to that previously enjoyed solely by the users of 35 mm. apparatus, and it is generally acknowledged that 16 mm. apparatus does give highly satisfactory results for serious users of sub-standard cinematography. This development of the sub-standard size followed after the production of the G.9 and G.10 cameras, and hence the delay in adopting the cine technique is directly attributable to the development of these types being some eight or so years ahead of their time—otherwise there might originally have been 16 mm. gun cameras as far back as 1928.

As a result of some preliminary experiments and an examination of all the factors likely to influence the working of the new method, the 16 mm. size was finally approved in 1934 and work went ahead on the production of small numbers of cine camera guns both of the fixed type GX 37 and free type GX 38. The decision in favour of 16 mm. film has proved to be a wise one. The size is small enough to permit the satisfactory design of a compact yet robust camera without requiring excessively dainty work in loading or maintaining the camera. The first designs embodied the following points: A watch record was to be recorded at the end of each burst; a reloadable magazine was required; a graticule engraved with suitable deflection rings should be provided in the focal plane. As doubts were entertained as to the capability of a 16 mm. mechanism to start without a time lag, the camera was to be started just before the gun was fired, and on firing the gun a solenoid or magnet actuated pointer was to indicate on the film the start of a burst. This, unfortunately, meant a first and second pressure on the gun trigger such as is familiar in the army service rifle. Distance-operated controls were to be provided for controlling the taking speed and the aperture. The new feature was the running of the mechanism at speeds giving from about 16-20 frames a second, so that the single frames (for the idea of projection or viewing each frame as a still shot was still considered essential) could be considered to be the separate records of each single bullet fired, if the picture-taking rate was adjusted to correspond closely to the firing rate of the gun (or guns).

The preliminary experiments modified these original requirements somewhat. A 16 mm. *negative* was decided upon as suitable for assessing purposes in view of the need for speed in processing. A reversal record, besides requiring much more critical exposure, would have required more skill, more time, more apparatus, and was in general not so pleasing or easy to view as the negative record. It was not considered as necessary at that time to make positive prints for any particular purposes, and after a single projection for assessment the negative would not in general be required again. It was realised too, that the provision of a watch unit complicated the design, and the accuracy of the synchronised watch method was at this time called into doubt.

GX 37 and GX 38

Small numbers of these two cameras (Fig. 7) were produced between 1934 and 1935, and were extensively tested. They were modified models of the commercial "Simplex Pochette" camera, using the familiar magazine for film and provided with a streamlined protective housing. The mechanism would operate 1,000 frames (25 feet) at one wind, and the magazine contained 2,000 frames (50 feet) of film. The shutter was altered to a sector type, with a narrower aperture, and the lens, a two-inch f/3.5 Dallmeyer, was provided with a Bowden diaphragm control which was adjustable during flight. An electrically-operated solenoid release was provided. The method of starting the camera before the gun was not found necessary, as the mechanism showed a lag of only 1/50th second before it came into operation. A graticule was added in the camera gate. A footage indicator was provided on the back of the streamlined cover or housing in which the camera was mounted, visible from the pilot's cockpit when the camera was on the wing. An electrical flashing indicator was provided in the pilot's cockpit, but this was abandoned as unsuitable, although it was the forerunner of our present

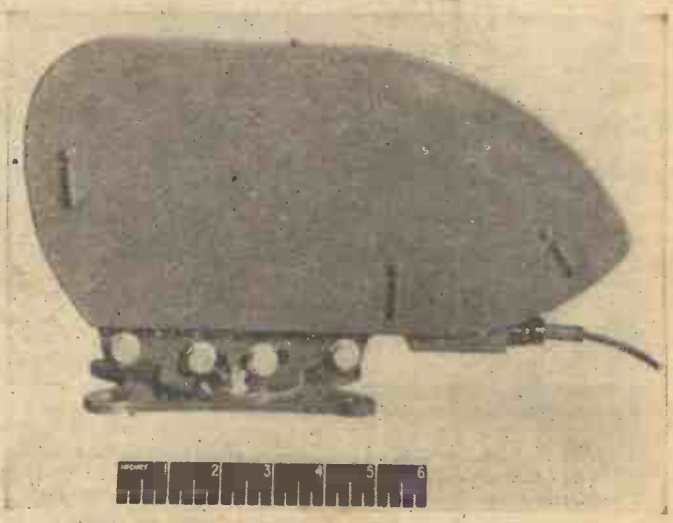

Fig. 7. Cine Camera, Type GX 37 (fixed) with streamlined protection housing. Produced between 1934 and 1935, and extensively tested, it is a modified model of the commercial "Simplex Pochette" camera.

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Cine Camera Gun

Development and Design Features.

July, 1941 issue)

By C. J. DUNCAN, B.A.

(*Technical Publications Department, Royal Aircraft Establishment, Ministry of Aircraft Production*).

indicators. It is apparent that these cameras were only a temporary measure, and the design of an improved type was now under way. You will perceive that this period is one of continual development and improvement, and that the requirements were continually changed in the light of the experience gained in the use of these, the first 16 mm. cine camera guns to be used in the R.A.F.

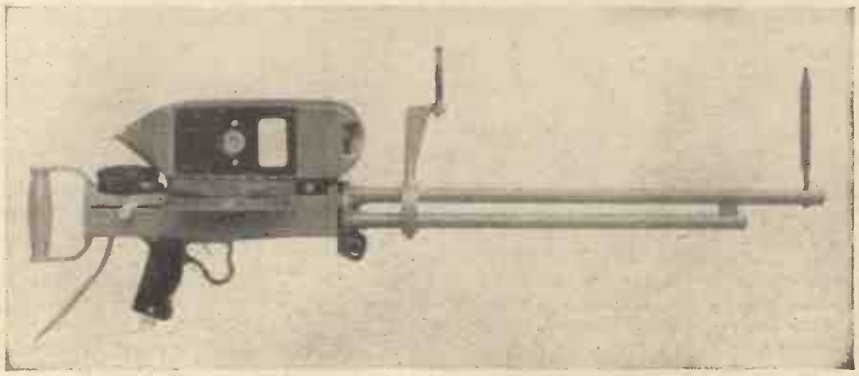

Fig. 9. Cine Camera Gun, GX 43 (free).
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Accessories Under Development

Simultaneously with the provision of 16 mm. cine camera guns, a method of projecting these for marking was developed. Back projection was chosen to a size of about 8½ by 6½ inches. It was considered essential to have facilities for slow or single projection and counters to count back the frames. Several types of processing equipment were tried, and eventually frame-type apparatus was adopted as most suitable for the amount of film to be processed. The usual accessories were needed, spools, splicers, bins, rewinds, storage tins, etc., etc.

Types GX 42 and GX 43

Between 1935 and 1938, the Williamson Manufacturing Company produced, to an Air Ministry specification drawn up by the R.A.E., two improved types of cine camera guns. These were the first two cine camera guns specifically designed throughout for this particular purpose. The big step forward was that they were all electrically-operated. The GX 42 (Fig. 8) was the fixed gun, the free type, GX 43 (Fig. 9), being practically the same except for the method of mounting, firing control and position of the indicator. These two types were similar to the G.42B, and so will not be considered very fully here. The following points of difference are, however, interesting. The body and magazine were made of rag bakelite and the electrical connections were made to the camera through a six-pin socket and a plug on the mounting. On the rear end of the body was a ring which controlled a rheostat setting and could be adjusted to take 16, 18 or 20 frames per second. An illuminated watch unit was provided on one side and an image of this was printed through the back of the film on a single frame at the end of each burst, by means of a prism optical system. The intensity of light required was difficult to obtain with the short interval available, and a high replacement rate of bulbs was found to be necessary. Mounted in a spring frame was a glass graticule engraved with the focal length and concentric deflection rings. This was held closely against the film emulsion surface when the magazine was inserted in the camera. A footage indicator,

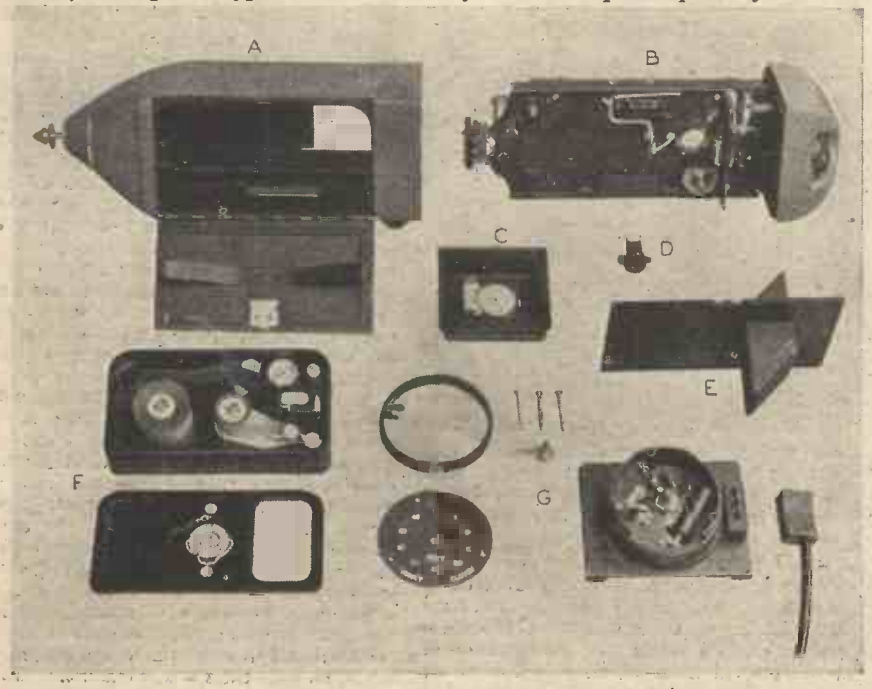

Fig. 8. Cine Camera, GX 42 (fixed), showing mechanism and auxiliary equipment. (A) Outer case; (B) Mechanism, lens and nosepiece; (C) Watch and data unit; (D) Watch optical system; (E) Sighting prism; (F) Magazine, loaded with lid removed; (G) Indicator, dismantled.
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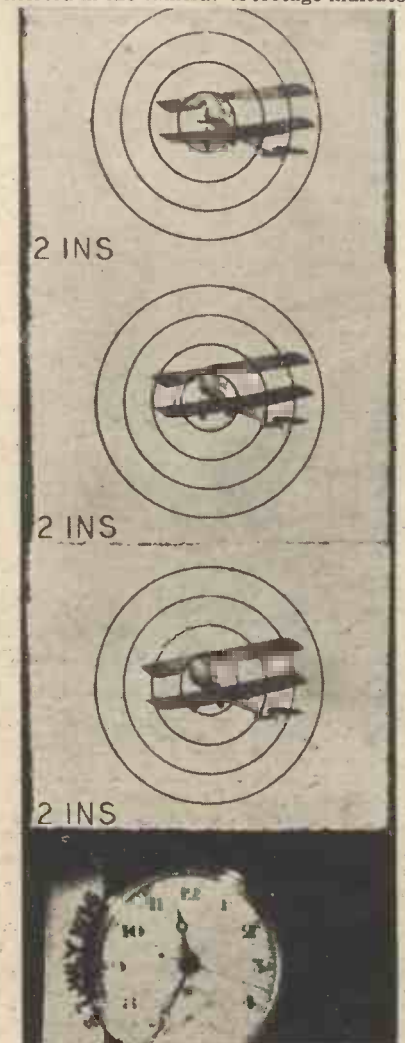

Fig. 10. Record made with GX 42 cine camera.
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operated from the idler sprocket in the magazine, and a rigid adjustable mounting were provided.

The free gun, type GX 43, consisted of the fixed camera placed upon a dummy gun mounting, within which was contained the wiring and release switches so that on depressing the trigger, having cocked the dummy gun, the camera was operated as long as the trigger was held depressed. An indicator was mounted behind the camera in view of the gunner. Only a two-way lead is needed from the mounting to the aircraft supply. Fig. 10 shows a typical result taken with this gun.

It is not proposed to discuss these two types at any greater length, as they did not go into service in this form, but as the G.42B, for the following reasons:—

(*a*) The bakelite body warped, was not sufficiently weatherproof and could not stand up to the strains imposed on it. Metal bodies and magazines were therefore required.

(*b*) The watch unit, about which doubts had been expressed many years before, was finally abandoned, as no unit could be obtained which would operate reliably under the strains, accelerations, and vibrations to which it was now subjected.

(*c*) As far back as 1934 doubts had been expressed as to the desirability of a graticule in contact with the rapidly-moving film. It was first made readily removable for cleaning, but every piece of grit or dust or corns of film adversely affected the projected result. The alternative method was the use of collimating marks on the frame, which could be lined up on the screen on which rings were painted for a standard magnification. The graticule was retained as long as possible until it had to be abandoned. In addition, constant variation in the graticule engraving was required to suit the changing tactics of air fighting; and the production of these finely-engraved graticules was not easy. So they were eliminated in favour of the mask, being inserted only for sighting purposes, and are later replaced by a different type more easily handled, which are supplied with the sighting unit.

(*d*) The method of projection had by 1938 undergone considerable change. Time did not permit the leisurely assessment frame by frame, and 16 mm. cine projectors provided with a single frame crank were put into regular use. This again was before its time, because the Geneva movement that the type G.42B's were fitted with was never designed for continuous projection, as the results only too plainly showed.

Fig. 11. *Cine camera gun G.42B, on type* 29 *mounting (fixed).*
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The G.42B Cine Camera Gun

This camera gun (Fig. 11) came into service in 1939. It was the modified form of the GX 42 and GX 43, but was a recognised interim measure only, because it was not designed to take pictures suitable for continuous projection. The camera mechanism is mounted on a web piece, to which is fastened the nose piece of rag bakelite. This fits into the outer metal casing and is retained by the clamp ring at the back. The electrical connections are made through a standardised seven-pin plug at the rear. The magazine, also, is of metal, is loaded from the right-hand side, while a spring panel on the left-hand side permits access to the mechanism for setting the shutter for sighting purposes. The illustration on p. 364 (July issue) shows the mechanism removed from the body. At the rear is the driving motor, to which is fitted a centrifugal cut-out so that a resistance is brought into circuit to limit the speed to 16, 18 or 20 frames a second as soon as this speed is reached. Adjustment can be made to the motor resistance to set the speed. The motor drives a shaft through a spring friction slip device, which allows the motor to over-run slightly when the burst is finished and the film stopped. The main shaft drives the geneva movement, which drives the film through a spring-loaded dog which engages with a four-toothed driving sprocket in the magazine. The film shift is allotted three-quarters of the cycle and a quarter for the exposure. The cycle of operations (see illustration on p. 365 (July issue) is as follows:—

On depressing the gun-firing control, the circuit of the main operating solenoid is completed, and this turns the auxiliary shaft, lifting the roller arm out of the drum and making the motor contacts by means of a short fixed arm, which lifts the motor lever. The motor circuit is completed through these contacts and the film shift and sector shutter are hence set in operation. The movement of the auxiliary shaft also pivots a shutter flap from in front of the aperture in the baffle plate and allows the successive exposures to be made. As long as the firing button is depressed, the cine mechanism operates, providing a continuous record of the aim during the whole of the burst. As the film passes through the magazine, it rotates a single-sided eight-tooth idler sprocket, which brings a striker pin on the outside of the magazine up against the footage indicator contacts on the other side of the camera body. As the pin strikes, once for each eight frames or one-fifth foot, it completes a circuit, through the firing control, of course, which operates a solenoid in the footage indicator and moves the pointer on 1/125th of the circumference of a dial engraved from 0-25 feet. Besides indicating the footage exposed, it also provides a reliable check that the film is actually moving since the film itself drives the idler sprocket.

Fig. 12. *Cine Camera Gun, Type G.42B, on type mounting,* 29 *(free).*
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When the firing button is released, the main operating solenoid circuit is broken which releases the auxiliary shaft which is pulled round by the return spring. The motor contacts are not broken as the motor lever bears on the cam profile. The shutter flap comes up in front of the gate and no exposure can result. The roller arm drops so that the roller runs in contact with the outside of the drum, which is still rotating. The end of the roller arm, when it drops through the gap in the drum's circumference, strikes against a short lever stop, which is free to rotate about the auxiliary shaft. This stop is held by the roller arm as the drum turns a complete revolution during which operation a blank frame of film has been drawn past the gate to mark the end of the burst. This was originally, on the G.42, the frame on which the watch image was recorded. A flash is observed on the screen when the results are projected, a little more noticeable than the reel change-over marks used in the commercial cinema, and this proves quite suitable for marking the end of each burst and the beginning of the next.

At the end of this revolution the small moving stop arrests the rotation of the drum, a protrusion in which comes up against the stop and roller arm. The motor lever is at this point disengaged from the contacts as the arm and roller are in the dip of the cam profile so that the motor current is switched off simultaneously. The inertia of the motor is expended in the friction slip drive, which needs critical adjustment for efficient working. When the next burst starts, the solenoid is re-operated and lifts the roller arm out of the drum, releases the spring-loaded stop lever, which flies back to its original position and resets the over-run frame device ready to operate at the end of the burst. Some of the spring tension, besides resetting the stop

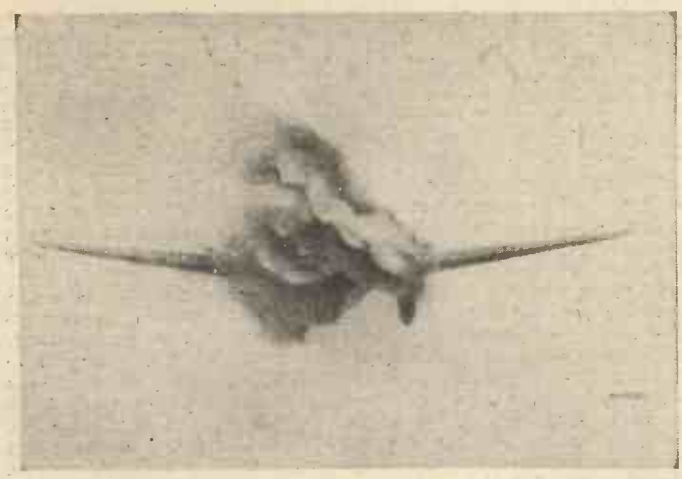

Fig. 13. Combat record taken with a G.42B cine camera mounted as a fixed gun in the wing of the aircraft, and is, therefore, subject to vibrations due to conditions of flight.

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lever, is transmitted to the shutter and helps to overcome the original inertia and so help the mechanism to gain speed while the motor is starting up. I think you will agree that this is an ingenious arrangement.

So much for the stop and start mechanism. On this side of the body web is also the thermostat, a bimetallic strip set to cut-in the 50-watt body heater pad placed on the side of the main frame at 50° F., and so to keep the camera mechanism up to this temperature. On the magazine side are the footage indicator contacts referred to above. The drive from the Maltese cross protrudes through the main frame and the magazine is held firmly against locating studs and on the dowel at the rear by a bow spring fastened to the inside of the door in the outer case. The door is held firmly in the closed position by a spring catch. There is no possibility of magazine chatter, a defect which did occur in earlier models, due to the excessive vibration encountered. On this side also is the mask unit. The mask, although removable for cleaning and examination, will only fit in one way. The baffle plate and shutter flap together prevent stray light from entering the magazine compartment. On the right-hand side of the nose piece is mounted the lens, an anastigmatic triplet of f:3/5 fixed aperture of two-inch focal length. It is locked at infinity focus. In front of the lens is fitted a heater cell, comprising two type B optical flats, with a porcelain ring in between, around the periphery of which, in grooves, runs a fine resistance wire. This heater, which consumes about five watts, is on the whole time that the aircraft is in the air, and it is necessary to prevent formation of mist by condensation on the front glass surface, a trouble which has taken some overcoming under modern flight conditions.

Control of the amount of exposure reaching the film is provided by means of an auxiliary loose shutter blade. This rotates normally with the main shutter gear, resting against the opaque sectors and leaving the 45° aperture in the main shutter gear clear. This is for cloudy weather. Under sunny conditions the pilot or gunner operates a switch mounted at the side of the footage indicator which energises a solenoid, through the firing control, which rotates the loose shutter blade to obscure all but 10° of the clear sectors in the main blade. The loose blade is rotated by pulling it forward on a shaft to which it is anchored by pins engaging in helical slots in the shaft. The exposure control is thus approximately 4:1. This proves to be, with the film in use, the most satisfactory form of exposure control. The film used is an unbacked ortho type, so that developing by inspection is possible. Any errors in the exposure factor may be compensated to some degree in the development. The film is a low type of reasonable grain, with fairly high inherent contrast, quick developing. It is appreciated that considerable latitude is required if only a 4:1 exposure control is provided, and, in fact, a compromise of properties is necessary in the film. This is one reason why the reversal process is avoided, but the best possible quality negative for positive printing cannot always be obtained. In general, flying conditions under which gunnery practice, as distinct from combat, is carried out, do not vary so enormously as might at first be imagined, and this method does give, in the preponderance of exercises, an *assessable negative*, which, it is emphasised again, is the most important criterion.

A sighting unit, consisting of two 45° mirrors and a lens, is provided, with which the camera and the aircraft gunsights may be harmonised to each other. A graticule of improved type is also provided with the sighting unit. There is also a clockwork-driven titler, in which the loaded magazine may be placed to record the image of details written on a matt celluloid tablet. The tablet is pointed towards the sky, and, on depressing a plunger, the first fourteen frames or so of the film in the magazine are exposed in turn to record the desired details. This title is therefore attached permanently to the record to which it refers, and no confusion in editing is possible.

The camera is generally mounted inside the wing by means of dovetail wedges machined on the underside of the body which are clamped between jaws on the fixed type mounting. The lens is positioned behind a small aperture left in the leading edge, and a flange on the camera front is bedded against a sorbo rubber pad fitted around this hole, so forming a wind and moisture-proof joint. It is an essential feature of this mounting, which is shown attached to the camera in Fig. 9, that once adjusted, the camera may be removed and replaced without interfering with the initial harmonisation of the camera gun and gunsights. A high degree of precision in manufacture is necessary to meet this requirement. The type 27 mounting is adjustable in the vertical and horizontal directions to 3° either side of a central axis, so that the camera, when mounted, can be suitably aligned for harmonisation.

Alternatively, the camera may be used as a free gun on the mounting, type 29 (Fig. 11). This simulates the Vickers gun and is fired by first pulling the cocking handle to the rear and then depressing the trigger. The camera operates as long as the trigger is held depressed. This mounting contains all the wiring usually provided in the wing and pilot's cockpit of the single-seater fighter, and an indicator and exposure control is mounted on one side within view of the operator. A double lead runs to the aircraft supply system to provide necessary current.

Figs. 13 and 14 show typical combat records taken with the G.42B. Before the quality and definition are criticised, it should be remembered that the camera is mounted as a fixed gun in the wing, it is therefore subject to vibrations due to conditions of flight and to the guns which are firing at the same time.

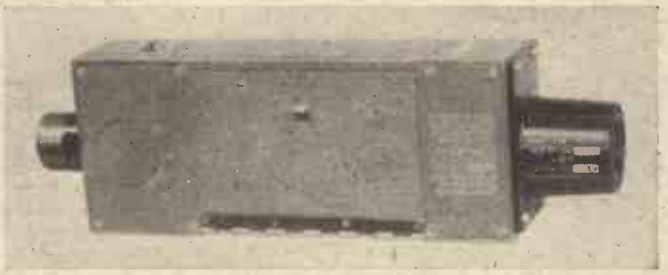

Fig. 15. Cine Camera, Type G 45 (fixed or free).

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The G.45

The chief drawbacks of the G.42B are that its extruded form Maltese cross was not designed to give pictures suitable for continuous projection and that its bulk could be reduced with advantage and the mechanism made more accessible and more easily replaceable. An improved type of cine camera gun, the G.45 (Fig. 15) has now been designed, in which many of the difficulties encountered in the G.42B have been largely overcome.

Fig. 14. Another combat record taken with a G.42B cine camera. It is interesting to note that the camera photographs through the arc of the airscrew.

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The Near Tragedy of Paper

How Publishing Firms and Newspaper Offices Overcome the Paper Shortage.

MAN'S search through the ages for suitable and plentiful material on which to draw, write, paint or print has culminated now in this country in an intensification resulting from the Nazi stranglehold on Norway, whereby supplies of wood-pulp—the raw material of paper manufacture—are no longer available to us from the Scandinavian countries. Alternative supplies from Canada are held up by reason of shipping difficulties.

Paper Shortage

The Nazis have thrown a big monkey-wrench into the works of the paper-making, printing and allied industries, and until that obstruction has been removed and the

Writing on papyrus.

machinery of civilisation is again running smoothly, Britain will have less and less paper available. Reduction in the number of pages of newspapers and periodicals, and the occasional use of a smaller type are obvious war-time measures. Should the paper shortage continue for any length of time, ingenious minds will be diverted to other means of saving newsprint and space.

Before the outbreak of this war, a paper-and-space saving method largely adopted by the big insurance companies consisted in the photographic reproduction on a smaller scale of documents which otherwise would have bulked large. These small-scale reproductions, known as photostats, indicate an economy drive which may be developed in several directions. There is in vogue in the United States a method of reducing books to a fraction of their original size. The pages are photographed on ordinary 35 mm. film, and it is claimed that 1,000 of these microfilm books can be put in a box measuring 12 inches by 5 inches by 4. These are not, of course, intended for the ordinary reader, but for reference purposes. Those who consult the midget volumes do so with the aid of a "reading machine."

Papyrus and Parchment

In the days when the news which we now know as history was recorded on rock, or stone, there was never any lack of either material. But the method had obvious drawbacks, chief of which was the immobility of the records. Something easily transportable was required, and out of that need arose the use by the Egyptians, Greeks and Romans of the papyrus reed. This grows in profusion in Egypt, Abyssinia and Nubia. Stems of the reed were unrolled and flattened out as wet strips, and pressed together to form sheets of writing material. It is from papyrus that the word "paper" has been derived. In Babylon and Assyria they wrote on tablets and cylinders made of wet clay. This was then dried in the sun and baked hard. There was nothing fugitive about this method, for some of the tablets and cylinders have survived the ravages of Time, and now form show-pieces in some of our museums.

Then parchment and vellum came into use. These were—and still are—prepared from the dried skins of sheep, goats and calves. Vellum is the fine, thin type of parchment made from the skin of the youngest animals (originally only calves' skin was used). These were the chief writing materials between the 10th and 14th centuries. To economise in their use, and in that of papyrus, a record which was no longer required would be rubbed out, and the cleaned sheet would be available again for writing. But the rubbing-out was not always thorough, with the result that the ghost of the first writing was visible between the new lines. A manuscript of that description is known as a palimpsest.

The making of parchment and vellum being a slow and costly process, inventors looked about for a substitute material. A genius then succeeded in making paper from fibrous pulp. History is not definite on the point, but it seems that the laurels must be handed to a Chinaman, one Tsai-Lun, for this achievement. His idea was that vegetable fibre could be beaten to a pulp, and made into sheets, the whole being held together by the interlocking of the fibres. His raw material is said to have been bark, tow and old fishing-nets.

Paper Pulp of Cotton Rags

About the eighth century it was discovered that the Arabs were making paper pulp of cotton and linen rags. This method was introduced into Europe by the Moors and Crusaders, and the materials were very largely used until the middle of the 19th century, in spite of the fact that in 1801 a Matthias Koops had taken out a patent for manufacturing paper from hay, straw, thistles, and hemp and flax refuse, and various kinds of wood and bark.

Paper was being made from linen and cotton rags in Valencia and Toledo in the 11th century, and Italy, France and Germany borrowed the method from Spain. Flax and rags were being employed in Italy in 1297, and in 1390 a paper-mill was in full production in Nuremberg. This latter process was a secret one, and the workers in the Nuremberg mill were sworn by their employer to secrecy under penalty of death.

The English manufacture of paper is first mentioned in a book printed in 1495 at Caxton's Press, the mill being at Stevenage, Herts. Dartford, in Kent, came into prominence in 1588, when Queen Elizabeth granted a ten years licence for paper to be made there. This district is still famous, after more than 350 years, for its paper mills. When the war is over, freighters from Canada and perhaps the Scandinavian countries will again be delivering there scores of thousands of tons of spruce, pine and other logs to be ground up and pulped and so enter into the complicated processes which result in paper ready for the printing presses. Not the least of the mechanical wonders at those Kent mills are huge Fourdrinier machines, the largest being 300 feet long; it is said to have cost more than £1,000,000.

Fourdrinier's First Machine

Fourdrinier set up his first machine for producing paper in bulk rapidly and cheaply in England at Boxmoor, Herts., early in the 19th century. The repeal of the paper duty in 1860 gave the trade a tremendous fillip, and other substances for making paper were sought. One of the most important of these was esparto grass, which grows wild in Spain and North Africa. For centuries it has been used for making baskets, mats and similar articles, and now it is used in vast quantities for paper making. A patent for manufacturing paper from esparto grass was taken out in 1856 by a Mr. Thomas Routledge. So great did the demand for esparto become, and so destructive was the method of collecting it—they just tore it away from the roots—that sources of supply began to diminish. It was feared a substitute would have to be found; as a writer of 1890 stated, "paper-makers are as much alive as ever to new materials."

A scholar writing on parchment.

Routledge also suggested the use of the young stems of bamboo. The West African baobab had been brought to the notice of paper-makers in 1876, but on account of the tree's slow growth nothing seems to have resulted from the suggestion. The paper mulberry (a relative of the mulberry tree used for feeding silkworms), cultivated in Japan for paper-making, was considered in

1879, and three years later attention was turned to banana stems. The banana plants (after the fruit had been gathered) had everything in their favour so far as fibre was concerned, but the difficulty of dealing with the 90 per cent. of water contained in the stems could not be surmounted.

Fifty years ago the writer previously quoted (John R. Jackson, then Curator of the Museums, Kew Gardens) observed, "The reduction of the trunks of certain coniferous trees, as well as of the poplar, in the preparation of wood pulp, is a well-known industry of Norway and Sweden . . . whence a large portion of the products finds its way to this country. It is a comparatively new industry, and one capable of almost unlimited extension." He did not visualise wars that would turn the world upside-down and put most peaceful human activities out of gear.

Save Your Waste Paper !

To-day the Government, through the Paper Controller, has applied a brake that is affecting all branches of the industry. Not only is paper severely rationed, but the cost of both the raw material and the finished article has soared to crippling heights. On the outbreak of war it went up by 16 per cent. A further increase of 31 per cent. was made effective after a while and a leap of 38 per cent. took place later. So it has gone on. Do you wonder now why you have been asked so frequently to save all your waste paper and clean rags? These, which are useless to you, are wanted urgently by the British paper mills. Bear that very real need in mind, and you will be helping to ease the position, and obviate the waste of precious material if you give your newsagent *now* a definite, standing order for *Practical Mechanics* to be delivered to, or reserved for you each month.

Meanwhile, those of an inventive turn of mind might direct their thoughts to some hitherto untried substitute that might well revolutionise the whole British industry of paper-making.

Radiolocation

The New Wireless Means of Locating the Presence and Position of an Approaching Enemy Aircraft.

AT a conference held recently at the Air Ministry, Air Chief Marshal Sir Philip Joubert revealed that one of the "mysterious" devices which is countering the night bomber is radiolocation. Although its development began years before the present war, it has remained a secret until now; in fact, it largely contributed towards the success of the R.A.F. during the Battle of Britain last September.

Mr. R. A. W. Watt.

Radiolocation is not a new departure in radio science but the application of existing knowledge. The urgent need of the R.A.F. to have early knowledge of impending air attack resulted in the conversion of a laboratory experiment into a vital weapon of war. One man, Mr. R. A. Watson Watt, visualised the great possibilities of the new device. He is now scientific adviser on telecommunications at the Ministry of Aircraft Production, and in 1935 he headed a team of brilliant scientists who worked with him on the problem from the start. They got together a team of clever young men and worked for months in absolute secrecy until they were able to show that radiolocation was a proved reality. Experiments went on continuously for four years.

As war became imminent their efforts were intensified, and so urgent did the need for radiolocation become that they made themselves the first series of radiolocators to give warning of the approach of German aircraft.

How It Works

Briefly, this is how the radiolocator works: Wireless waves, which are unaffected by darkness or fog, are constantly radiated to act as a scouting medium far beyond the limits of our shores.

If a solid object such as a ship or aircraft is encountered it sends back a reflection. Day and night distant outposts of the air are "manned" by wireless electronic watchmen, ready to flash tidings of the enemy's approach with the speed of light.

This system makes it largely unnecessary to maintain standing patrols of fighters saving the country immense expenditure on petrol, engines, wear and tear on aircraft, and also has relieved the tremendous strain on personnel which otherwise would have been unavoidable.

Trained Personnel Wanted

Under the impetus of war the system has developed rapidly, and the experiment that started six years ago is now a huge organisation constantly growing. The scientists are making improvements and the manufacturers are keeping pace, but there is a shortage of trained personnel to service the growing number of locators. The three Services have been combed for suitable men and women.

Dealing with the call for men to operate the device, Sir Philip said it was a marvellous opportunity for young men to "get in on the ground floor" of one of the most remarkable developments of modern times.

Technical Civilian Corps

It has been announced by Sir Archibald Sinclair, Air Minister, that a new technical civilian corps is being formed to operate and maintain the radiolocators. Skilled men from overseas will be enrolled for work here in the repair and maintenance departments of the Navy, Army and Air Force, in a non-combatant capacity. Schoolgirls and boys are to be trained for the radiolocator organisation. They must be good at physics and mathematics, and have reached the school certificate standard.

Air Ministry Photograph. Crown Copyright Reserved

In an R.A.F. operations room, where radiolocator messages are plotted on large table maps.

NEW SERIES

Making a Success of Your Photography

By JOHN J. CURTIS, A.R.P.S

Making the First Print.

IN order to keep to a progressive course in these lessons, I must deal with those relating to printing this month.

Some of you may have heard of a printing process which was popular during the latter part of the last century, and the first part of the present century; it was generally spoken of as P.O.P.—which initials stand for Printing Out Paper. It was a process that depended on daylight for the printing, after which the prints were toned and fixed in chemical solutions which made them permanent. The drawback was, of course, this question of daylight, for everyone knows how very changeable the light is in this beautiful country of ours, and how difficult it is to calculate the power of the light at various times of the year. P.O.P. was a most delightful process, and the results were well worth the extra efforts, but with the always present difficulties it was only natural that our sensitised material manufacturers should be eagerly striving to find something different to serve as a printing medium, and eventually they succeeded in producing bromide paper, and later on, a slower emulsion which was termed gaslight paper.

Printing Papers

These papers very quickly reduced the popularity of P.O.P. and professional photographers found it to their advantage to adopt the new processes, and to drop the old with the result that, so far as Great Britain was concerned, in a few years it was discontinued; but it is interesting to note that it is still very largely used in countries where daylight is fairly constant, such as India, and other sunny countries. The paper can still be obtained in this country if any would like to try it; a few years ago there was an effort made to revive it, and I believe there are many amateurs who would be very delighted with the results.

There is, however, one process that is very much akin to P.O.P., and that is self-toning paper, and I strongly recommend all those who have never done any printing to start with this, even if they do not keep to it.

There are several makes of self-toning papers, and most of the makers supply it in various grades and surfaces in packets at 6d. and 1/-, but you may find when you go to purchase a packet that these prices have slightly advanced owing to purchase tax, etc.

The class of negative which prints best is one of average density, but with negatives known as "soft," it is advisable to use the vigorous grade of paper.

You will, of course, require a printing frame, and these cost about 1/9 for one taking a 3¼ by 2½ negative; it is fitted with a piece of glass so that films can be used in it. The only other piece of apparatus required is a developing dish, and I would suggest a porcelain one; do not try to get one smaller than 4¼ by 3¼ (¼ plate size). The price for these is 2/3 (deep), or 2/- (semi-deep), but it is better to obtain the deep dish. The chemicals require a very small outlay, for 6d. will buy a 1 lb. carton of soda hypo, and this will be ample for about 4 gross pieces of paper 3¼ by 2¼.

The process of printing and toning is about the most simple part of the work connected with photography, and even if you have never done any printing before, you cannot go wrong for the directions given in each packet are as plain as possible, and the whole process can be accomplished in a few minutes. Briefly, the procedure is as follows :—

Printing Procedure

Place the negative in the frame with the matt surface upwards, place a piece of the paper on top of it, and see that the emulsion side of the paper is next to the film; close the frame, and then stand it in the daylight on a shady shelf, not in the direct sunlight. If the light is strong, you should examine the print after a few minutes by opening a portion of the frame—in the shade—and if the print is rather darker than you want it to be when finished, then it is ready for toning, but if it is only as dark as you want the finished print to be, then it requires a little more printing; I put it this way because so many amateurs make the mistake of printing too lightly; remember, most makes of self-toning papers lose a lot while in the toning bath, and therefore, it is necessary to always over-print.

Place the printed paper in your dish and allow it to wash in plain water for 5 to 10 minutes, according to the thickness of paper; while this is proceeding, dissolve one ounce of hypo in 10 ounces of water, put three or four ounces of this in the dish and place the print in it for ten minutes. Keep the prints moving about—you can do several at a time—but do not let them overlap each other too much; at the end of the ten minutes, wash them for an hour in running water, and place in a suitable place for drying. The finished print should have a sepia or brown tone.

"Cold Tones"

There are many who, when printing in this paper, prefer a "cold" tone to that produced by the foregoing formula. I do myself, because it always appears to me to be richer and more nearer that obtained with P.O.P., and I have always had the belief that if the cold tones were advocated, and given preference by the manufacturers of the paper, there would be much more used, and the process would become more popular. This means only one little addition to the work, and I would advise all beginners to make a print by it from the same negative, and then compare the two; anyway, here is the way to get cold tones.

The type of negative which prints particularly well on self-toning paper.

First, wash the print in running water for three minutes, and while this is taking place, dissolve ½ ounce of table salt in 5 ounces of water, place the washed print in this for three minutes, then take it out and wash it again for another three minutes in running water; now pass it into the hypo bath—the same one as mentioned for the warm or sepia tones above—and leave it in this for 8 or 10 minutes, then wash it again and hang it up to dry.

There is one great advantage in the use of self-toning papers, and also P.O.P., and for this reason I strongly advise all beginners to try them. They need no dark room, and it is not necessary to have much apparatus; you can get prints from your negatives while you are still on your holidays, or away from home for a week-end. If you are hiking, it is possible to carry the printing frame in such a way that a print can be made while you are walking, or having a few minutes' rest by the wayside,

and then in the evening the washing and fixing of all the prints so made can be done.

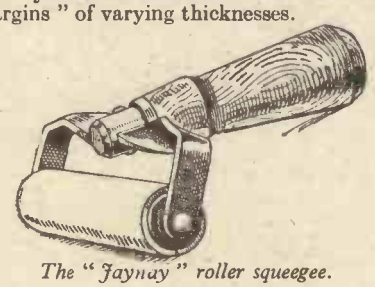
Washing the Prints

Here are one or two hints for you to note so as to avoid failures. When the prints are being washed first, they are inclined to curl, so do not be in a hurry to get too many in the bath at one time; wait for each print to flatten itself out, and give it a little help by lightly pressing it to the bottom of the dish. When there are several prints in the bath there is a tendency for them to overlap, and this means that some will be insufficiently washed in parts, thus causing all kinds of markings to appear on the print when it is dry. Most of the errors that occur in this process might be put down to insufficient washing, but this does not mean that you have got to give prolonged washing; keep to the time required, but avoid putting too many prints in the bath at a time, and keep them always on the move.

While on the subject of printing, I want to give some information on one or two minor processes connected with prints, irrespective of whether they are made on self-toning, gaslight or bromide papers.

White Margins

The most satisfactory method is to buy some black binding and stick strips of this to the piece of glass that is in the printing frame; this must, however, be very carefully done to ensure a perfect rectangle, otherwise the white margin will lack straight edges and perfect corners. It has been possible to purchase masks cut to shape, and if your dealer can supply them it is worth your while getting a set of various widths, then, if you can cut or purchase say, four pieces of glass, it would be possible to stick one of the masks to each, and thus make yourself a useful collection of " white margins " of varying thicknesses.



The " Jaynay " roller squeegee.

Glazing

I think most amateurs, especially beginners, like to have their prints made on glossy paper, and to have them finished with a high glaze on them. When you purchase your paper you will have to ask for glossy surface, if you require the high glaze, or semi-matt if you only want a slight glaze. When the prints have been fixed and washed they are passed into a bath of glazing solution—a 4-ounce bottle of Johnsons costs 1/3, and makes 40 ounces, sufficient to glaze a considerable number of prints.

The print remains in the bath for about 5 minutes, and is then squeegeed on to a piece of polished glass or a ferrotype plate, or better still, a stainless metal plate, if it can be obtained from your local dealer; after the squeegeeing it will dry, and then peel away from the support with a high glaze.

Some papers have particularly hardened emulsions, and these papers will have to be allowed to soak in the glazing solution for about 10 or 15 minutes. Sometimes the prints stick so hard that they tear rather than peel away, and there are two or three reasons for this; they may have been pressed too hard when squeegeeing, they may not have been soaked sufficiently, or there may have been some markings on the surface of the polished glass, or other material, from some previous prints. It is necessary to see that this surface is perfectly clean before placing the new prints on it. A plan which I have found very good is to allow the prints to dry first, and to make the glazing a job for another evening. The dry print is then placed straight into the glazing solution, and then on to the polished surface.

If small spots appear on the surface they indicate that there was some dust on the glass or small airbells remained after squeegeeing.

All-Metal Building Construction

Details of the New Arc-Welded Steel Building Panels

THE accompanying photographs illustrate a new type of building construction which is likely to be of immense importance when reconstruction schemes are under consideration in this country.

The conventional structural framework is entirely eliminated, and buildings are assembled by using pre-fabricated arc-welded steel " building blocks " or panels. The photographs were provided by The Lincoln Electric Company Limited, Welwyn Garden City, Herts., whose welding electrodes and equipment were used on this work.

These panels are mass produced in a number of standard sizes, and practically any design of dwelling or industrial building can be erected—the panels forming framework and wall unit in one member. Any style and type of finish can be obtained, and the simplicity of this type of structure reduces construction time by as much as 50 per cent.

A view of a dwelling house constructed in this way, is shown in Fig. 1, and one of the " building blocks " is shown in Fig. 2. Each block consists of two panels, 7 ft. 8 in. long, and 3 ft. 10 in. wide, pressed from 12-gauge steel sheets. The two panels are arc-welded together with interior spacers set at intervals of not more than 24 in. to form a stout box-like double panel member. The finished box sections are 6 in. thick for walls, and 18 in. thick for roofs.

Fig. 2 (below). One of the "building blocks," or panels, showing the interior spacers.

Fig. 1 (above). A dwelling house constructed with the new welded steel panels.

Eliminates Framework

In home construction, the use of these box sections eliminates stud and joint framework. In industrial buildings, they do away with columns and roof beams.

The panels can be formed to give any design, as can be seen from the wall shown in the background of Fig. 2. The box sections are welded together and form a rigid fireproof construction.

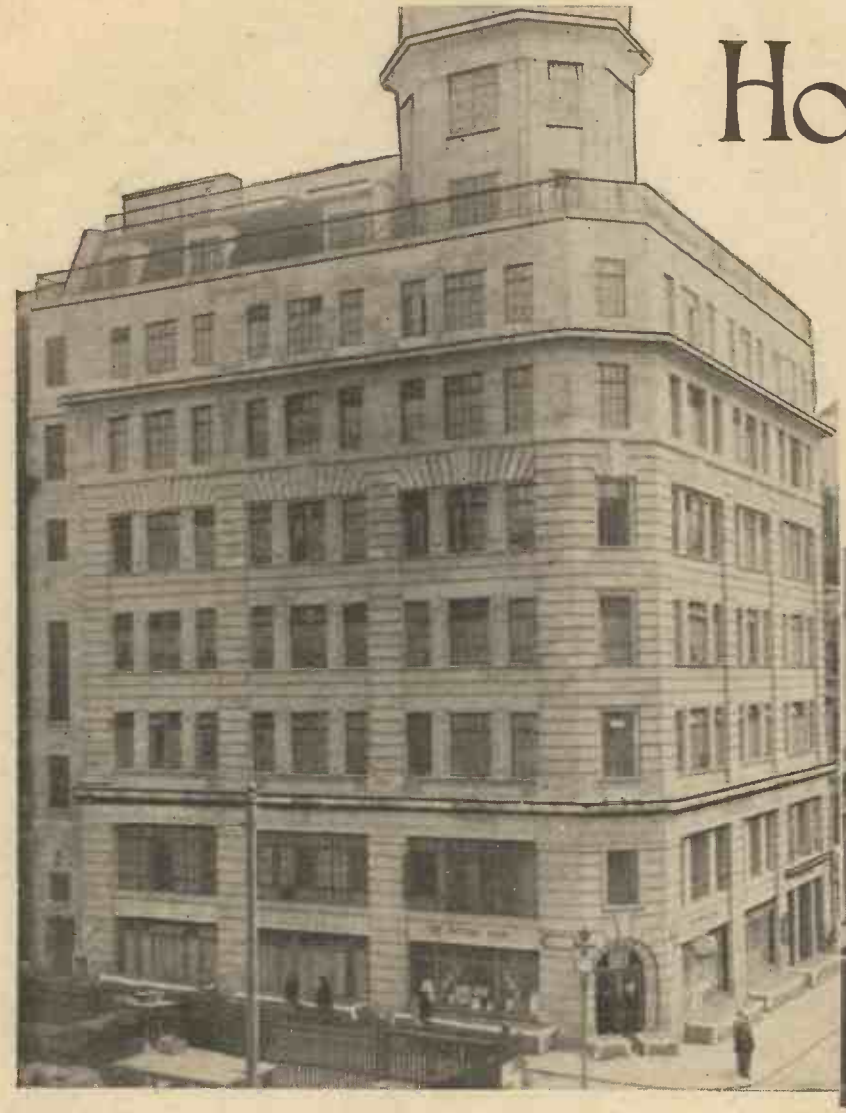
Heating and wiring, etc., are conducted through the box sections, which can then be filled with insulating compound.

The particular house illustrated is 43 ft. 8 ins. wide by 70 ft. deep, and has four bedrooms, three reception rooms, and two bathrooms. Glass brick is used in the alcove of the living room. Total construction time for this house was less than two months.

How "PRACTICAL

A Brief Account of the Work and Processes Involved in Preparing this Journal for the Press.

By A CONTRIBUTOR



Tower House, the home of "Practical Mechanics." This fine modern building is situated in Southampton Street, just off the Strand.

I NOW know why readers who write to an editor indignantly, or pityingly, or cleverly, calling him to task about some small error of fact, or punctuation, or typography which they believe they have discovered in his journal, should be pitied and not censured. For I have been privileged to see how this enterprising monthly, *Practical Mechanics*, is produced —how each issue gradually takes form and comes into being from a collection of more or less nebulous ideas—and how this modern miracle of organisation and mechanical production manages to maintain the extremely high standard which the editor has set.

Top speed, from first to last, is the keynote, linked with that accuracy of statement and skill in "lively" presentation that come only with long and arduous experience. In such circumstances the ire of the occasional error-spotting reader (by whom all publications are afflicted) can be assigned to simple ignorance of the fundamental facts which govern the working conditions of editor and staff and their "opposite number"—that much-maligned craftsman, the printer.

The Editor

The editor is bound by an inflexible, unalterable time schedule. The printing presses wait for no man. Always before his mental eye is the next issue—and the next—and the one after. He goes through the latest issue immediately he receives the first copy arriving hot and damp from the machines. Page by page he criticises it, as though it were the work of his bitter enemy and not primarily of himself. Only thus is the highest possible standard attained and maintained. Where does the inspiration come from—the continual flow of ideas and schemes out of which are born, eventually, the essential "copy" for which compositors always crave? How is it that the magazine is always "fresh"? Well, the editor lives, eats, and sleeps with his journal. It is his dream-child, and he exacts similar keenness from his staff. They submit ideas. News items suggest articles, features, illustrations, cover designs. Expert contributors call and discuss their forthcoming work. Readers' letters sometimes contain the germ of a bright notion. So far as lies within his power and time, the editor harvests all the world—and sifts the results of his garnering.

Manuscripts

In the heterogeneous mass of unsolicited manuscripts which arrives at his desk the editor ofttimes encounters embarrassing rolls of paper which, suddenly uncoiling like snakes, slither exasperatingly here and there. The sender has not learned that all written matter should be sent flat—folded if you like, but essentially flat, and fastened in the top left corner with a paper-clip or fastener (never a finger-puncturing pin), with the sender's full name and address written plainly somewhere thereon. Contributions take many another freakish form to which not even the passage of years can accustom some highly-strung and time-pressed editors. But it eases their bitterness if the formality of enclosing a stamped and self-addressed envelope (large enough to swallow the rejected masterpiece) is complied with.

The "Next" Issue

Always a "next" issue is taking form in his notebook, on his desk-pad, on a corner of his evening newspaper, and on the table-cloth of the establishment where, like a time-robbed whirlwind, he wines and dines. He considers a notion, and either

L MECHANICS" Is Produced

discards it or commissions the necessary "copy" from one of a band of writers who are experts in their own particular line. He demands that "copy" shall be in his hands at the appointed hour. He deals with it ruthlessly, for accuracy, style, and so on, then passes it to his sub-editors for the final licking into shape. Phrases may need to be rewritten, or deleted, or matter may need to be added. The article must be sized up so that it shall fit its appointed space in the issue.

Dealt with faithfully, to the last comma and full stop, adjusted as to length, marked plainly with size and style of type in which it is to be set, the copy goes to the "works." There it is divided among monotype operators who sit at work tapping the keys of what at first sight appear to be outsize typewriters. These monotype machines do not print or type the letters, the keyboard simply makes perforations in a paper strip wound on a spool, which act as symbols for the letters. The operator then takes off the perforated spool and it is transferred to an independent casting machine. The perforations in the paper cause the mechanism of the casting machine to produce lines of newly cast and perfectly finished type.

The editor receives the result in the form of lengthy galley-pulls—strips of paper each bearing what amounts to perhaps a column and a half of type. But before those "pulls" are despatched to his office they have been through the mill—the inspection chamber manned by expert professional readers, whose official title is Correctors of the Press. These hard-working and skilled readers go through the printed matter with eyes equalled in keenness only by the proverbial hawk's. Any errors of typesetting (or sometimes fact) which they may discover they indicate in the margin of the galley-pull. These corrected slips are then dealt with by compositors who hand-set with loose type wherever adjustments are to be made. The resulting "clean" pulls then journey on to the editor.

The sub-editor's room, where manuscripts are corrected, and make-up prepared.

A corrected sheet of typescript, and a printers' galley proof.

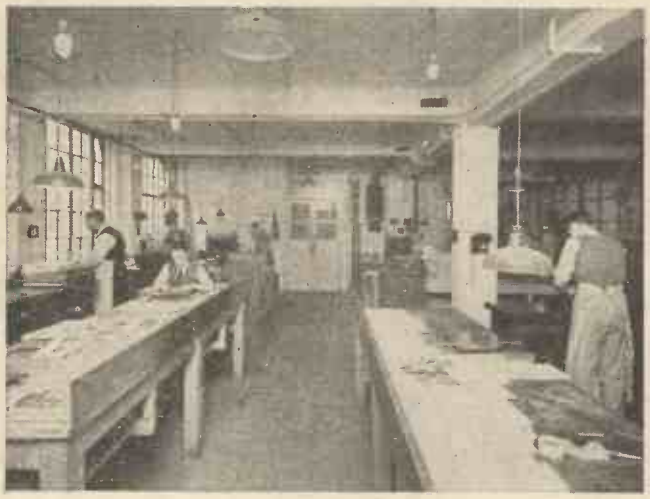
Artists and Photographers

Meanwhile he has been interviewing artists and photographers, with the object of commissioning or buying photographs, drawings and diagrams. It may be necessary to send a photographer to the other end of the country to secure just what is required; or one of the several photographic agencies may have the very picture. After the selected pictures have been cleverly retouched (this is the work of a specialist) and sized up, each to fit its allotted space, they are sent to the blockmaker, who follows written instructions as to dimensions, etc. Drawings and diagrams, after being closely checked for technical accuracy, travel to the same destination. The cover original will follow, after the subject has been decided upon and executed to the editor's entire satisfaction; the lettering going on last. At the blockmakers' the line drawings and prints are photographed with special cameras mounted on steel runners, the resulting negatives being the same size as the required blocks. After the metal plates forming the blocks have been sensitised, they are placed in contact with their respective negatives, and printed, after which the plates go to special acid baths to be etched. In this

The Editor checks up on a drawing.

One of our artists at work in his studio preparing a cover design for Practical Mechanics.

The raw materials!



(*Above*)
A corner of the sub-editor's desk, showing galley proofs, make-up paper, and blocks

(*Right*)
Proofing department at our blockmakers. Articles explaining how half-tone, colour and line blocks are made have appeared in previous issues.

process those parts of the metal not required are eaten away, leaving the line forming the drawing, etc., "proud," and ready for printing the diagram or photograph, as the case may be. From the blockmaker the editor receives pulls or impressions of these various blocks, and then begins the labour of make-up.

Already the editor has visualised the make-up—where such-and-such features shall be placed—how the issue will look when completed. He has supervised the rough make-up of a "dummy," consisting of the same number of pages as the forthcoming issue. Now the long strips of galley-pulls are cut up and pasted down on loose sheets of make-up paper (corresponding in dimensions with the page you are now reading), with pulls of the illustrations in their proper place. Captions (descriptive lines) are written below these pictures, headings are filled in, and introductions are typed out and their positions in the pages indicated. Fighting against time, the member of the editorial staff entrusted with the make-up strives to offer to his readers a thoroughly well-tailored and attractive page every time. Which is not so easy when the remorseless clock is steadily beating you to it.

Advertisements

It is not only strictly editorial matter which has to be accommodated in a strictly limited space. The advertisement manager is firm in his demands. Advertisements being the life-blood of every magazine, journal or paper, they must receive full consideration. The revenue obtained therefrom goes to offset the cost of production. In other words, every advertisement that appears helps to lessen the cost that would otherwise be charged for the journal. The placing of advertisements is, therefore, a simple matter of finance. Some advertisers stipulate for a certain position and pay highly for the privilege of having their demands granted. Whenever possible these requests, made through the advertisement manager, are complied with, though the editor reserves to himself the right of refusal. Now you understand (if you did not before) why it is not possible to lump all advertisements together at, say, the back.

Our make-up man has completed his job by this time and the editor has received pulls of the advertisements to be included. At last the full tally of pages has been dealt with, each has been numbered and—with the editor's blessing—the whole collection is despatched by special messenger it necessary, to the printers. There, everything has been assembled in readiness for the rush of work. Pages are made up in accordance with the editorial desires, and pulls taken, the latter being sent to the editor post-haste—for the generally joyless routine called Press Day. On this day of trials the sub-editors read through the pages as though their lives depended upon their speed and accuracy, making corrections where these are called for, making "cuts" if a page falls over-long, filling with odd items any spaces there may be.

One of the half-tone etching rooms at our blockmakers, where all the illustrations appearing in this journal are preparing.

(*Below*)
Sub-editing copy.

The Critical Eye

The editor reads most of them, too. Especially is he critical when he sees them in page form, of his own contributions, under the headings of "Fair Comment" and (in the "Cyclist" section of the journal) "Comments of the Month." In these sections he offers his considered opinions, views and suggestions on current and other topics and endeavours to maintain personal contact with his readers; therefore, being part of himself, those pages come in frequently for severe handling on Press Day!

As each page of the issue is finished with the editor formally O.K.'s it, actually marking the page "O.K." and signing with his initials in one corner. In this intensive scrutiny and word-for-word reading to which the pages have been subjected, nothing is left to chance. Here let it be recorded that odd paragraphs are not put in haphazard just to fill odd corners. Their subject-matter justifies the presence of every one. Some must be found room for at the last moment, on account of their news value. That is just one of the recognised Press Day troubles. News "breaks" which the editor decides must be included, though the clock-hands are hastening to the minute when the journal must definitely "close for press." Matter which is crowded out is either held over for use in the next issue or is "killed." It may happen that the advertisement manager suddenly expresses a desire to change the position of a certain announcement or to increase the space which it occupies. And people persist in "dropping in" or phoning in even greater numbers, for no other reason apparently than that the whole of the editorial staff is engaged up to its collective eyebrows; this being one of the unsolved mysteries of every Press Day.

The "Foundry Proof"

At length the entire issue has been dealt with, including, of course, the coloured

cover, or wrapper. Examining his pull of this, the editor may decide that colour-tones would be improved if they were lightened or deepened. Each page, O.K.'d, is at last back on its way to the works for the final clean-up. Craftsmen seize them, note and act upon every mark which the editorial people have made in the page-margins, and next day the editor receives what is known as a foundry proof of the completed issue. Vital, last instant alterations may be made, but it is expensive to fiddle with the journal at this late stage. Whilst the issue is being run off the machines, the staff back at the office fill in "spare" time—between preparing the next number—by answering readers' letters, a very heavy mail needing the services of "outside" experts to handle the overflow.

By the way, don't ever wish an editor "Happy Returns." There's no such thing as "happy" returns in *his* world. Returns are just what he doesn't want. All concerned in the journal's production and distribution hate the word. But there are no odd copies for any newsagent to return now to the publisher, because of the paper shortage and the official rationing of supplies.

Nerve-wracking work, all this, and physically arduous, but surmounted with tremendous enthusiasm. I gathered there was an all-compelling attraction about this "servitude" which keeps an editor in thrall. He is shackled to his job and :

"No later love, no larger fame
Will lure him long away."

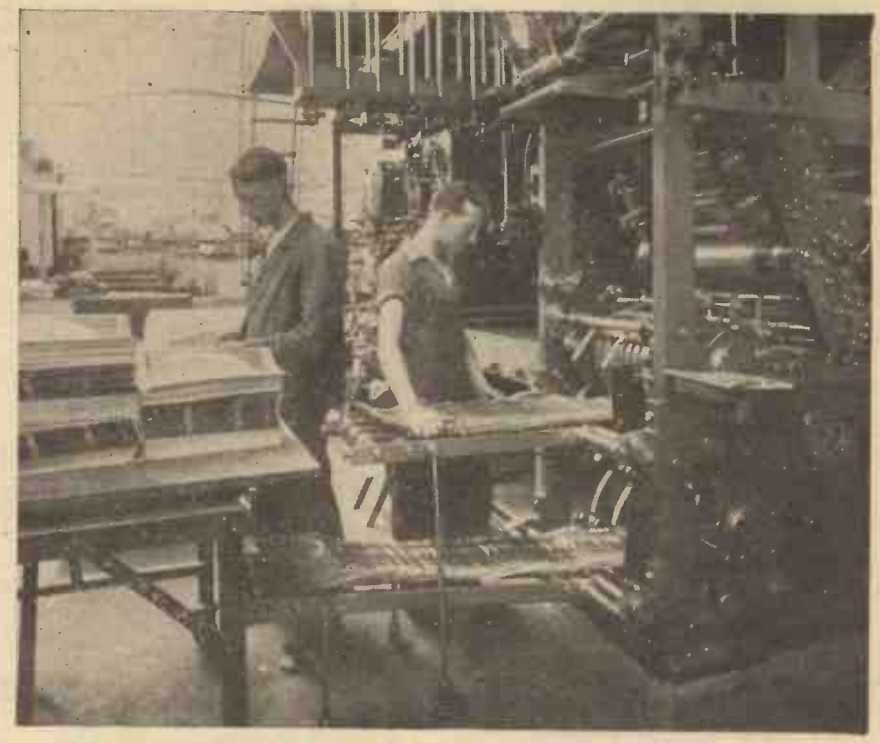
as Kipling expressed it in his lines to "The Press." One verse of that we may be pardoned for quoting in full :

"The Soldier may forget his sword,
The Sailorman the sea,
The Mason may forget the Word
And the Priest his litany :
The maid may forget both jewel and gem
And the bride her wedding dress—
But the Jew shall forget Jerusalem
Ere we forget the Press ! "

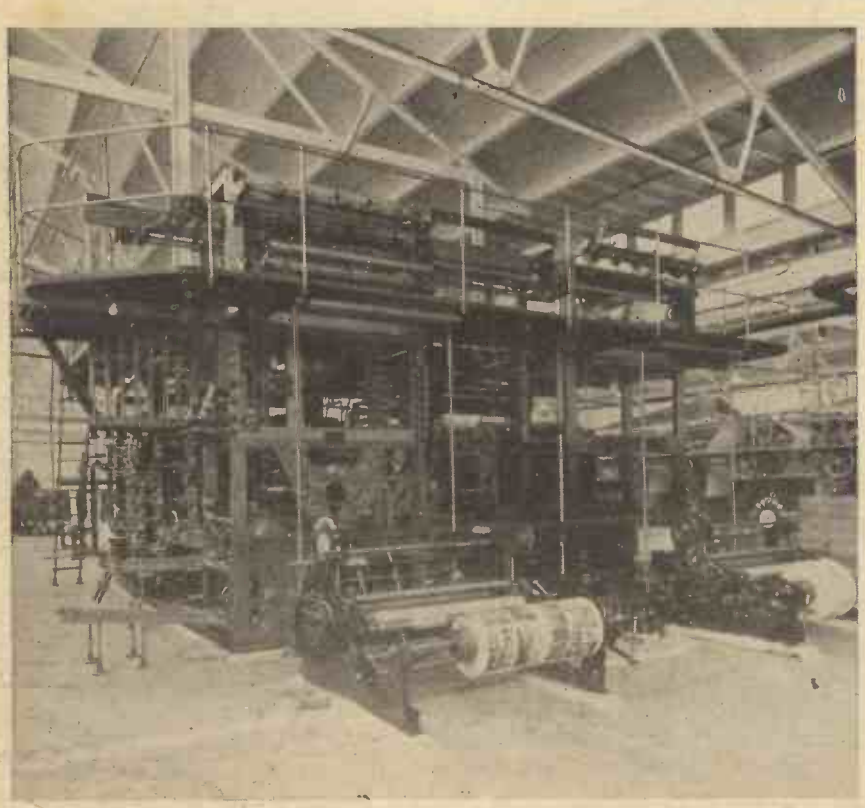
All the editor's problems are not associated with the work of providing a diversity of interest and subject matter in his journal. He is constantly on the look out for new ideas. He must investigate new processes and inventions and promptly place before his readers the latest details of them. His opinion is sought by manufacturers, inventors and advertisers; apparatus is submitted to him for test and opinion. He is asked daily as to the practicability of schemes and ideas. An enormous post bag confronts him every morning, containing letters from contributors, intending contributors, manufacturers, and readers. It is his constant endeavour to reply promptly to readers' questions, which range over a great diversity of subjects. Parents consult him about careers for their sons. He must devote much of his spare time to visiting trade shows and demonstrations, to visiting exhibitions and, quite often, he is expected to speak at public luncheons and dinners.

His work does not cease when he leaves the office, for clock watchers are not employed in journalism. There are no hours in journalism. Contributors and experts deserve a special mention, for it is their job to interpret the ideas of the editor, to deliver the goods on time and to render advice on their special subjects. There is real reader service behind *Practical Mechanics*. Yet in spite of the mountain of labour which goes into every issue and the enormous expense involved, you may purchase the result for a few pence per month. Surely there is no other branch of industry where the value obtained is so high per unit of money spent. A doctor charges, like a lawyer, a considerable sum for his advice and whereas, if we may repeat the old joke, a doctor can bury his mistakes, should an editor make one there is a great row !

The job is always with him, in the office and out of it, week-ends and holidays. These are thoughts worth bearing in mind when you open your copy of *Practical Mechanics*. It is a case where familiarity should not breed contempt—where, to apostrophise Shakespeare, the desire is got with content !



Printed copies of "Practical Mechanics," folded and stitched, being delivered from the printing press.



This Albert rotary press is the actual machine on which "Practical Mechanics" is printed.

Our Busy Inventors

By "Dynamo"

Pigeons Are Gulls

THE wood pigeon is an enemy of our noble band of home gardeners who dig for victory. To defend crops from this marauder, a mechanical pigeon has been formed to deceive and attract the devastating bird. The decoy has a movable body to which are hinged flaps representing wings. When movement is imparted to the body, the motion is accompanied by the flapping of the wings.

The object is to entice wood pigeons to the neighbourhood of the sham bird and within range of guns concealed in the vicinity. A cable enables the decoy to be operated some distance away.

Not only is the decoy shaped like the bird it represents, but it is also appropriately coloured.

Headlight

WHAT promises to be a very useful invention is a steel helmet fitted with an electric torch. A carrier for a small lamp is mounted on the outer surface of the shaped band inside the helmet. This carrier is so arranged that the light from the bulb is emitted only below the plane of the rim of the dished steel portion, when the helmet is worn. With such a helmet the wearer will be able to read and have light thrown upon his work. It will be possible for him to attend to injured persons in the darkness without producing light helpful to the enemy. The brim of the helmet will be an efficient guard against any light being thrown upwards.

Another advantage of this helmet is that both hands of the wearer will be free. And an additional favourable feature is that, owing to the position of the lamp being above and generally slightly to the rear of the brow, no direct light can fall into the eyes of the wearer.

Suspended Shelter

ONE of the latest things in air raid shelters is characterised by a suspended safety chamber within an outer chamber. The walls of the latter are rigid and are protected externally by spring-mounted vertical plates and, in addition, by sloping walls calculated to deflect hostile missiles.

The construction of this shelter requires an excavation of moderate depth, according to the nature of the ground. Supporting pillars are erected in the corners and the whole base is concreted. A well, flush with the inside of the pillars, is requisite. This should be drained to the main, if possible, or to a sump a short distance away.

There is a pyramid roof of steel and reinforced concrete. The space between the concrete and the steel is filled with sand.

It will be observed that resilience is a chief characteristic of this shelter.

Blocks versus Bombs

ANOTHER method of protecting buildings against the effects of shell or bomb bursts has made its appearance.

Hitherto the usual method of shielding buildings and windows has been to pile up bags of sand against walls, and before window openings. It is all too obvious that this expedient is not of the most desirable character. For instance, the ceaseless attrition of the weather causes the bags to rot, necessitating new bags and, therefore, additional labour and expense.

To obviate this drawback there has been devised a wall of protection, which can be quickly and easily erected. In fact, the unskilled amateur bricklayer can build the structure, which is of such a nature that, when no longer required, for protective purposes, it can be dismantled and used in other directions.

The inventor proposes to provide, adjacent to the outer wall of a building, an erection made with hollow blocks with vertical spaces between their inner and outer faces. These spaces can be filled with sand or other suitable material.

The end walls of these blocks are formed

A new type of American boring and drilling machine now in use in the British Army, and used for drilling wells, and sinking mineshafts.

with projections on their upper surfaces, and on their under surfaces there are recesses of a depth corresponding to that of the projections. As a consequence, one block can be fixed on another.

The projections and recesses do not extend the full width of the blocks, so that the side walls of one block will rest upon those of the block beneath it.

Concrete or other suitable material may be employed in the manufacture of the blocks.

Neat Names

THE inventive brain of the American in christening his wares is demonstrated by some recent examples of trade names registered in the United States.

"Show Coat" relates to pads impregnated with a solvent used to clean the coats of dogs, cats and other animals.

"Opal Tone" is the title given to a dentifrice, while "Ember," suggestive of an incandescent fire, is applied to lipstick, rouge and face powder.

A term used in connection with heating fuel is "Climate Master."

Folding Ambulance

DURING the last hundred years the ambulance has evolved from a crude method of conveyance to one which ministers to the comfort of the sick and wounded. At the same time, it is a boon to those whose duty it is to push and carry it.

As far as I am aware, a pocket ambulance has not yet made its advent; but there has just appeared on the scene one which can conveniently be transported and stored.

This new ambulance has foldable bearers in the form of side rails consisting of sections hinged in such a manner that some of them may be housed within neighbouring sections, when the bearers are folded. Cross-members extend between the bearers and releasable connections are provided between the cross-members and bearers, and between the latter and a hammock. This arrangement enables the cross-members and hammock readily to be detached from the bearers.

Safety Bombs

THE title of the specification of a new invention informs us that it relates to safety devices for aerial bombs. The word "safety" appears to be somewhat ironical. The invention does not emanate from a society for the prevention of cruelty to mankind generally. It is intended to safeguard the bomb from exploding too soon; in which case it should protect the man who releases it. But another definite object is to guarantee that, by exploding at the right moment, its deadly work may effectively be performed.

This bomb has in its nose two detonating devices. One of these is arranged to operate on the release of the bomb. This causes the explosion of a propellant charge to position the striking means of the second detonating device, in readiness to explode the main bursting charge on the impact of the bomb with an objective.

Writing in the Dark

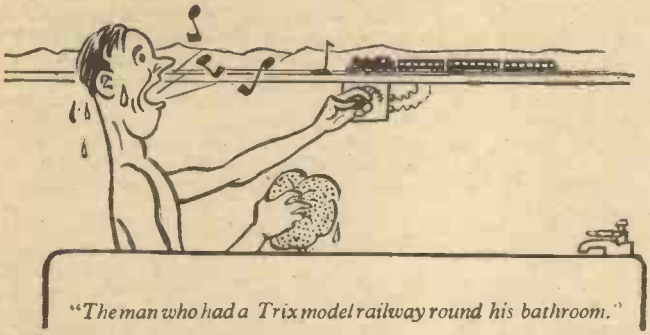
AN illuminated writing case is the subject of an application made to the British Patent office. This article is a small portable writing case with a table of frosted glass or transparent substance which can be lighted from below by a dry battery. The case can be made in light metal, wood, or other appropriate composition and in various sizes. And it is suggested that these sizes might even include one small enough for the pocket.

The appliance is designed in book form, hinged at the top instead of at the side. The reason for this shape is that, while the case is in use with the light on, the top cover will screen the light during the black out.

There are two parallel wood rollers with wire clips to grip the paper, one at the top and the other at the bottom end of the case. Between these lies a glass writing table, over which the strip of paper traverses from one roller to the other. Beneath the writing table is a dry-cell battery connected to a bulb.

"MOTILUS" PEEPS INTO THE MODEL WORLD

And, as it's Holiday Time, he looks on the Funny Side of Things.



"The man who had a Trix model railway round his bathroom."

THERE is humour in every business and every hobby, and I often wonder if models and model making provide more fun than many other walks of life.

This particular hobby has provided Punch, on more than one occasion, with material for a good laugh. I was only looking the other day at a whole-page cartoon they devoted a few years ago to the subject of Father and the Model Railway. The scene is a smart drawing room ruthlessly cleared for a model railway layout. Fond mother sits quietly by the fireside with her wee baby, and father in the middle of the room (surrounded by stations, tunnels, and other model railway paraphernalia) looks up from the floor to say, "You know, Elsie, I'm awfully glad it's a boy!"

Then there is the well worn chestnut of the man who chose himself some cigars as a Christmas present, and bought his son and heir a model railway. On Christmas Day the lad, fed up because he can't get anywhere near the railway as father is playing with it, has to smoke the cigars!

Well, here are a few more which spring to my memory or have been brought to my notice recently. I do not think they are so widely known, and my friend and co-model enthusiast, Mr. Ernest Noble, who is better known for his humorous sketches and cartoons, has drawn the illustrations for me.

Model Railway Round a Bathroom

There was a man who built a Trix Twin layout round his bathroom. He was also a member of the local amateur operatic company. He combined the joys of model train operation and operatic practice with his morning ablutions, proving the accepted theory that a man can do two or even three things at once. I understand that his wife took a very poor view of this habit, as he refused to get out of his bath or go down to breakfast before the 10 a.m. Scotsman had finished its run!

On real railway topics staid technical journalists who attended the official inspection of new portable canteens for troops at Euston were a little startled to find the following lighthearted legend adorning the C.M.E. official drawing which illustrated the official technical brochure—"Buffet Extemporised in 3rd. class Corr. Compt., for Troops, Sketch of."

This discovery prompts speculations as to whether other departments will not soon be adopting this well-known War Office style for their official correspondence, so that before long the District Controller at Blank may be reporting a delay of minutes, twenty, to the Such-and-Such train account attaching wagon, mineral with box, hot to the discomfiture, guard of!

To return to models, there is the sad story of the little boy who went with his mamma to see the model railway display at a big London store. As often is the case, the railway was a day late before the model engineers had got it running, and to keep the "rabble" at a reasonable distance there was a slope painted green between enthusiast and railway. But no slope was going to keep little Robert from a close and critical view of the railway. In his spotless sailor suit he ran down the slope and fell spread-eagled on the ground. When he arose,

"Playing with your little trains?"

covered in sticky green paint, mamma nearly blew the roof off.

There once was a music hall comedian—and music hall comedians used to make a lot of money in those days! Anyway, this man used to think nothing of spending fifty or sixty pounds on 2½-inch gauge steam locomotives for his son. But he never bought any rails, and the model railway shop scenting that perhaps they might be able to sell him something more, put a few tactful questions. They soon found out he didn't need any rails. His son just drew the engines around the house on a piece of string!

"Story of an Engine"

Some customers have been known to break out into verse, and Mr. Noble has drawn three sketches to tell us "The Story of an Engine."

Little Boy, Grandpa loving,
Into Holborn gently shoving.

. . . .

Yes sir, this is very nice,
Can't be beaten at the price.

. . . .

Who is that, midst the smoke?
Grandpa with his Bassett-Lowke.

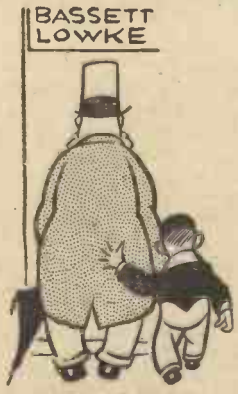
People of all types and ages come up as butts for the wit of the model railway hobby—not only fond mammas, grandpas and fathers, but aviators, seamen and soldiers.

Over the Garden Wall

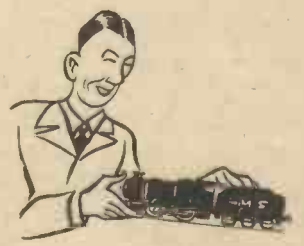
A retired colonel who ran two and a half inch steam locomotives round the kitchen garden of his Cotswold residence, was having rather a gruelling time with one of the locomotives. He had been trying for half an hour to raise steam, without success, when over the garden wall floated a feminine voice, "Playing with your little trains?" A Birmingham girl hiker was "snooping" over the garden wall! We understand that the colonel got up steam so rapidly that the young woman hastily retired with her fingers to her ears!

An Old Timer

I always think there are two humorous opposites, the small boy who starts his

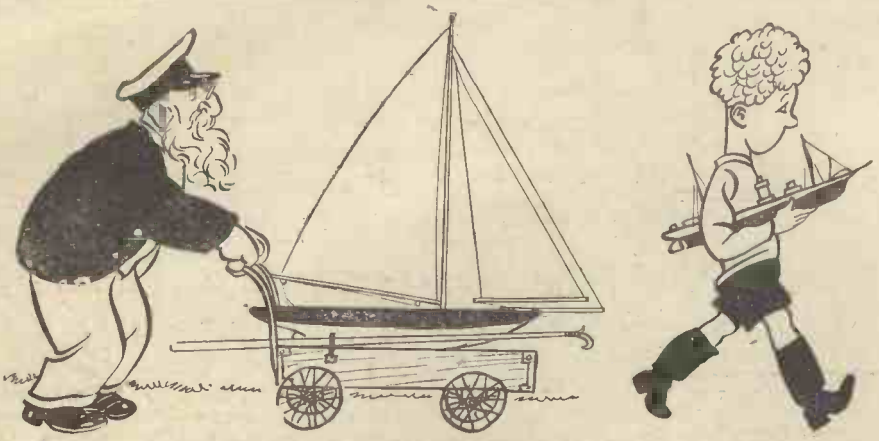


"Little boy, Grandpa loving,
"Into toy shop gently shoving."



"Yes, sir, this is very nice
Can't be beaten at the price."

"Who is that 'midst the smoke?
"Grandpa with his model loco."



The old timer, and small boy "with shining morning face."

model career with a home-made boat, constructed out of skewers and cotton reels, "With shining morning face." wending his way to the local village pond, and later "The lean and slipper'd pantaloon" wheeling his yacht to do battle with other old gentlemen of his own age!

A London boy actually sent the following letter to Bassett-Lowke's at Holborn. Repair No. N422. "Dear Sir, My engine is faster but doesn't go any longer. Will it come better later. Yours truly." It reminds me, too, of a man who bought his boy a steam engine, and the water made a mess on the dining room carpet. He made the lad put a cork in the chimney, and then took it back to the makers to find out why it would not work!

"It won't go."

American Humour

American model railroaders bring humour into their papers on the hobby. The "Model Railroader" always runs a comic strip, "The Silver Plate Railroad," by John Kalbach, and I received a small card the other day. On one side is a crazy picture of a train—with the legend "Visit our 'Model Railroad' shop. Trains run 8 to 9 p.m. Bring your friends." On the other side is a strictly business-like address and 'phone number.

Some American model railway enthusiasts correspond on funny subjects. Here is one from a reader in Spokane, Wash.

"Railroads are too pretty. It seems to me that model railroad layouts are altogether too pretty. All the railroads I ever saw came in the back way and not through the best section of the city Why not rough up the layouts a bit; apply some dull paint; plant weeds along the tracks; place a dilapidated snow shed on the side of the mountain, and some messy-looking yards around the section house. Have the trains come through Shanty Town and Shack Alley before they pass the packing house and the unsightly goods yards! Here's to realism!" Well, if the cap fits our English railways as well, it must be worn!

A Big Snag!

But whether English, American, Chinese or Russian, there is always the man who can never see any further than the end of his nose. The man who's in such a hurry to complete his railway and get the whole thing running, that he inevitably trips up against a big *snag*. For just one example look at our last illustration!

Where's the snag?

New L.N.E.R. Steam and Electric Locomotives

THREE new locomotives, two steam and the other electric, the designs for which were prepared before the outbreak of war, have recently been completed by the L.N.E.R. at its Doncaster works.

The new steam locomotives, the first of which is named "Bantam Cock," are the direct result of the success obtained with the "Green Arrow" 2-6-2 Mixed Traffic type of engine. "Bantam Cock" is, in fact, a light version of the "Green Arrow" design, weighing with its tender 113 tons 3 cwts., as against the 145 tons 2 cwts. of the "Green Arrow" type of locomotive and tender.

Eliminating Weight

The various methods adopted to effect this reduction in weight include the use of 2 per cent. nickel steel for the boiler barrel, the extensive substitution of fabricated construction in the case of steel castings for such parts as main frame stays and boiler supports, and lighter construction of the footplate and its supports.

As a result, the "Bantam Cock" locomotive will be able to travel on secondary lines, over which the heavier "Green Arrow" and "Pacific" locomotives cannot be run owing to their weight. In fact, whereas the two latter types of engines are restricted to 2,752 route miles of the L.N.E.R., the "Bantam Cock" design can work over 5,000 route miles of the system.

The "Bantam Cock" design, together with the "Green Arrow" type of locomotive, will greatly facilitate the standardisation of locomotive design on the L.N.E.R., as their all-round usefulness will dispense with the need for the construction of any further tender locomotives of 0-6-0 and 2-6-0 wheel arrangements, of which the L.N.E.R. possesses over 2,000 of many different designs.

Electric Locomotive for Mixed Traffic

The new electric locomotive is the first of seventy mixed traffic engines planned for the Manchester-Sheffield Electrification Scheme, upon which work was well in hand before the war. In September 1939 it was decided that only the first of the electric locomotives should be proceeded with so that work of national importance could be taken in hand.

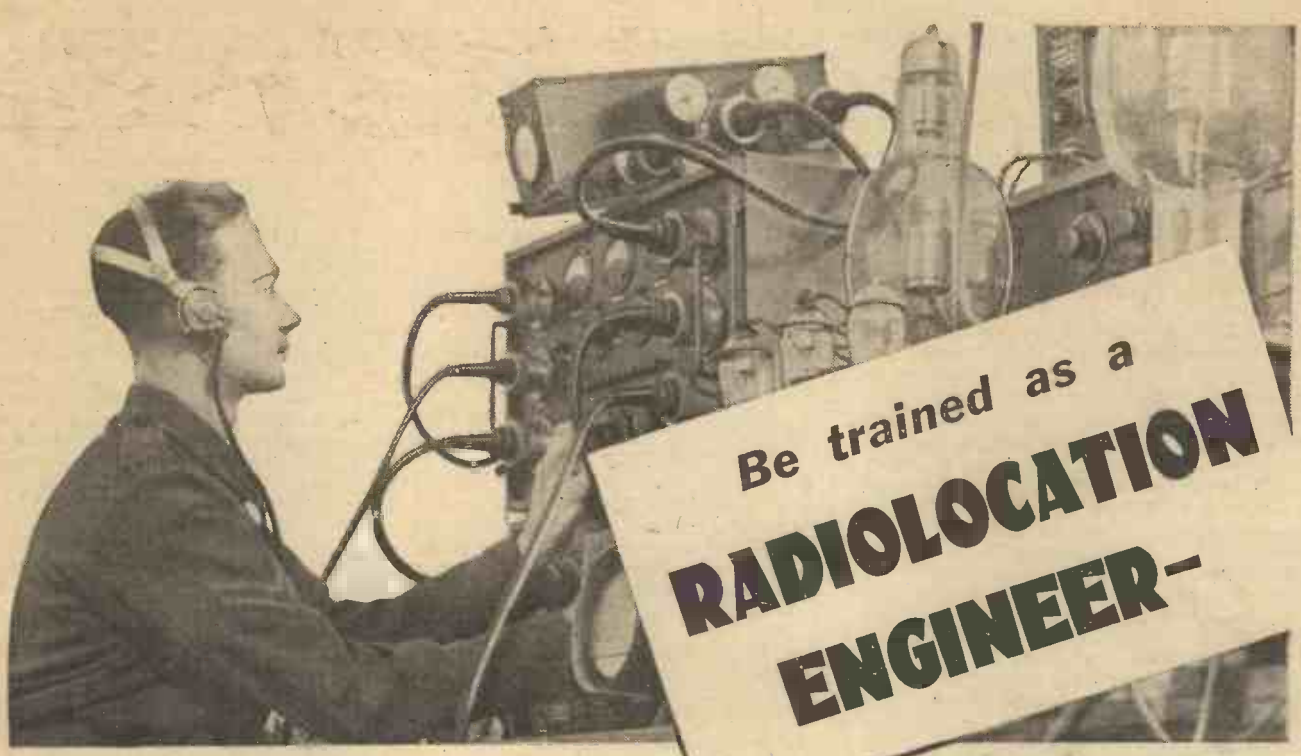
The new engine is designed to handle main line passenger and express goods trains up to speeds of 65 m.p.h., to haul 1,000 ton mineral trains across the Pennines, and to carry out local passenger and goods train duties.

It is carried on two bogies measuring 50 ft. 4 ins. in length over buffers, and picks up electric current of 1,500 volts D.C. from an overhead wire by means of either of two pantographs (collectors) mounted on the roof.

Electrically Heated Boiler

An interesting feature of the equipment is the electrically heated boiler producing 750 lbs. of steam per hour to provide all the steam heating required for the longest trains operating between Manchester and Sheffield.

Electric locomotive 6701, as she is numbered, is painted L.N.E.R. green like "Bantam Cock," and will soon be given tests on a section of line equipped with suitable overhead transmission wires.



...get a good job in the Army!

Interesting work — good conditions — *good pay* — they're all waiting for you if you have a knowledge of radio, or aptitude for training. The Royal Army Ordnance Corps wants men, and wants them urgently, for the installation, maintenance and repair of Radio and Radiolocation Equipment. There are good opportunities for promotion from the ranks. And there is this further advantage — if in civil life you are a radio expert, you can return to your job after the war with a first-hand knowledge of all the very latest developments in radio. (*N.B.* Even though you are unskilled, this is still your opportunity. You will be given a thorough training at a Civilian Institute on full pay.) Britain's Radio defences must be kept in 100% working order. That's why you must volunteer TODAY. These are the vacancies :—

	Approximate Pay and Allowances SINGLE	MARRIED
Ordnance Mechanical Engineers (Wireless)	£435 p.a.	£506 p.a.
Radio Maintenance Officers - -	£337 p.a.	£409 p.a.
Armament Artificers (Radio) - -	10/3 per day	
(plus clothing, rations, accommodation and family allowance)		
Radio Mechanics (commencing at) -	3/9 per day	
(plus clothing, rations, accommodation and family allowance)		

POST THIS COUPON AT ONCE

To the Assistant Director of Mechanical Maintenance, The War Office (MMI), Room 206, Golden Cross House, Duncannon Street, London, W.C.2.

Please send full details of Wireless Positions in the R.A.O.C.

NAME

ADDRESS

AO3/8/41

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.

Making Hydraulic Cup Leathers

CAN you please supply me with datails of the process employed in the manufacture of hydraulic cup leathers and packings?—C. E. Bullimor (Chile, S. America).

LEATHER for packings must be of the best quality, cut from middles, soft and free from pin pricks and knots. The flesh side, or soft part has to be pared off, leaving a thickness of from 3/16 in. to 5/16 in., according to the size of leather. Before pressing the leather should be softened in warm water, working it between the thumb and fingers, and then rubbing tallow over it. After pressing in the dies, these, with the leather in place, are left for a while to dry in a warm room or boiler house. Leathers must also be softened by tallow or oil before putting into use. They are easily depreciated by using scored or corroded rams or gritty water.

A cup leather is shown pressed in a hand-worked die in Fig. 1, the head of the bolt being squared to grip in the bench vice. Or the same effect may be obtained in a power press. In Fig. 2 dies for mounting in a press are shown. The upper set illustrated first produce a cup shape, after which other dies are inserted in the outer one to finish the leather to the U-shape. A hat-leather is squeezed by an annular top die pressing the leather over a boss die. After making a hat, or U-leather, the centre is cut out, and can be utilised for a smaller leather, it being difficult to press a leather from a ring in the first place. Leathers are chamfered with a knife after removal from the dies.

Purifying Salicylic Acid

COULD you please tell me if there is any substance that will bleach or take out the brown coloration from technical salicylic acid, without affecting its chemical composition?—J. Gatley (Woolston).

TO purify technical salicylic acid which has a brown coloration is an *exceptionally difficult* proposition. Technical salicylic acid is sometimes manufactured for the purposes of dyestuff production and organic synthesis, and, for this purpose, the brown-coloured acid manufactured from impure materials suffices. The salicylic acid, however, tenaciously retains its brown coloration, despite all recrystallisation treatments.

Apart from chemical methods of purification, such as conversion of the salicylic acid into one of its esters, say, methyl salicylate, and hydrolysis of the latter with caustic soda solution so as to regain the free acid, the only thing you can do is to repeatedly recrystallise the salicylic acid from boiling water (in which it is fairly soluble). If this simple recrystallisation does not suffice to remove the brown coloration, you should boil up the acid with fairly large amounts of animal charcoal (decolourising charcoal) and when recrystallised from such solutions, the acid may be fairly free from colour. It is only possible, however, to employ the acid for medicinal purposes when it is snow white.

Torpedo Gyroscope

I AM interested in the form of gyroscope used in directing or keeping the modern torpedo on its course when fired from the tube. What I want to know is—how is the gyroscope set, and how does it perform when the torpedo is travelling through the water?

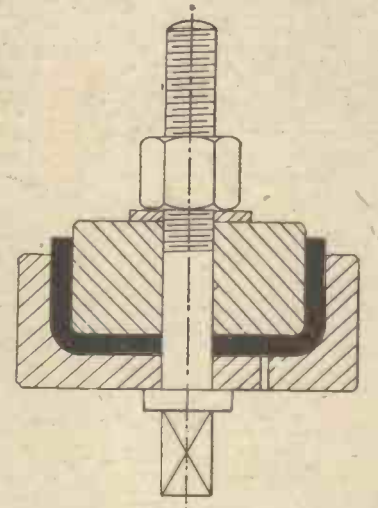


Fig. 1. Wrench operated dies for cup leathers

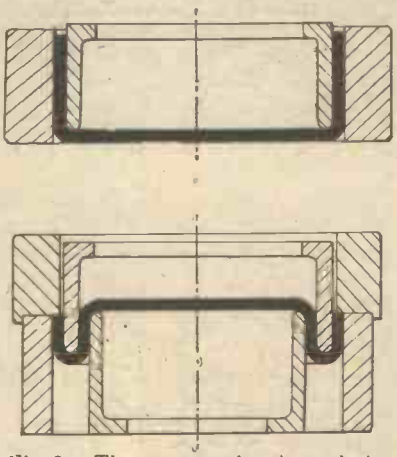


Fig. 2. The two operations in producing U-leathers

Is it worked on the compass principle, or by a balancing system such as weights?—Cormac O'Hagan (Dundalk).

THE gyro-wheel is suspended inside two gimbals, an inner gimbal and an outer gimbal, the outer one being fixed in relation to the body of the torpedo. The axle of the gyro-wheel is serrated on one side of the wheel, the serrations taking in the serrations of a "driving sector," actuated by means of a powerful spring. The outer rim of the gyro-wheel has a row of bucket-like holes into which compressed air is played from holes on the inside of the outer gimbal.

Before firing the torpedo, the gyro-wheel and its gimbals are "centred" in relation to each other by means of a "rectifying clutch." At the same time the "driving section" is cocked, by means of a "cocking spanner," its serrations taking in those on the axle of the gyro-wheel, and is held in that state by a "trigger." When the torpedo is fired, as it passes along the torpedo tube, an "air lever" projecting out of it is caught by a "trigger bolt" inside the torpedo tube, and is forced back flush with the outside of the torpedo. This movement of the "air lever" does two things :—

(1) It presses aft a "gyro push rod," which releases the trigger of the "driving sector," thus setting the gyro-wheel in rotation and freeing it and its gimbals.

(2) It admits compressed air from the air-chamber to the engine and to the gyro—in the latter case, it keeps the gyro-wheel in rotation by turbine motion after the initial impulse given by the "driving sector" has died away.

The controlling effect of the gyro-wheel is transmitted to the rudders by a "servo-motor," worked by compressed air. Any deviation of the torpedo from its course causes the gyro-wheel, through an "actuating fork," to turn a "rotary valve," which admits compressed air to one side or the other of a "relay valve" in the "servomotor." This action moves the "relay valve" in such a way as to admit compressed air to one side or the other of a piston in the "servomotor," causing the latter to move in such a way as will apply the helm necessary to bring the torpedo back on its correct course.

Extracting Sugar from Peat

I UNDERSTAND that is has been shown that some 25-30 gallons of industrial alcohol can be obtained from peat in the following way:—Peat is boiled in dilute H_2804 for half an hour at low pressure, the acid converting the Hydro-Cellulose in the peat into sugar, which can be fermented to alcohol. Is there any way in which this large percentage of cellulose in the peat could be utilised in this way ; i.e. *cellulose* as apart from the small percentage of *hydro-cellulose*, which I believe may be as small as 1½ to 2 per cent. Also can solid alcohol or "Meta" fuel be made from liquid alcohol, and how is this fuel manufactured commercially?—S. C. Storry (Walcot).

COLD concentrated sulphuric acid completely disinregrates pure cellulose, forming hydro-cellulose, which retains the original form of the material, but which is very brittle when touched. When this solution is largely diluted with water and boiled for some hours (particularly under slight pressure) the hydr-ocellulose is converted into glucose, $C_6H_{12}O_6$. Hence, if you can purify your peat sufficiently from all soluble and extraneous matter, it would seem to be a relatively simple matter for you to dissolve the purified residue in cold concentrated sulphuric acid and, after diluting the solution with water, to boil it for several hours, and, after filtering, to extract the sugar, glucose, as a fermentable syrup. Such a process has not been attempted commercially in this country, mainly in view of the cheapness of imported

sugar, but there is no reason why it should not work, provided that the necessary experimental data is acquired.

The so-called "solid alcohol" cannot be made from liquid alcohol. It is entirely different in composition from alcohol and usually consists of a compound known as "hexamethylenetetraamine" admixed with camphor, naphthalene or some other adulterant. It is manufactured by allowing ammonia to act on formalin, but it is very difficult to make on a small scale.

Slow-speed Generator

CAN you please give me data and details of the winding and gauge of wire for a 12-volt generator with a cutting-in speed of 150 revolutions per min., or the lowest cutting-in speed you can suggest? I would require generator not to be heavier than 24 lbs. I require the data for armature, field coils, brush gear and any other essential information.—John O'Donnell (Burtonport).

THE weight limit you impose for this generator, together with the exceptionally low cutting-in speed of 150 revs. per minute, can only be obtained by adopting a design with a 4-pole laminated field, separately excited from the 12-volt accumulator. The following dimensions are recommended :—Armature, 4 inches diameter by 2 inches long with 25-slots, wound with 75 former-wound coils, each consisting of 50 turns of No. 24 SWG double silk covered copper. The coils to be wave-connected to a 75-part commutator 3 inches diameter by ¾ in. long, with a coil span of 1 to 6, grouped three per slot. The field coils for separate excitation from 12 volts will require each to contain one pound of No. 20 SWG s.c.c. copper connected in series to give alternate north and south polarity. The brushes must be of high conductivity copper-carbon, such as Morgan Crucible "C/M3" grade.

Using 3 in. Lens for Telephoto Purposes

I HAVE a Reflex camera with a 3-inch F. lens covering a 2¼ in. by 2¼ in. negative. Can I use this lens as a telephoto lens by having an extension between the camera and lens? If so, how much (approx.) will I need?—Daniel Lewis (Peterborough).

WITHOUT knowing the exact make and type of your 3 in. lens, we cannot answer your query with exactitude. It is usually, however, not possible, in the case of modern wide-aperture anastigmat lenses to use them in any way other than that for which they were designed. In any case, a 3 in. lens cannot be given a new focal length merely by altering the camera extension.

In practice, your 3 in. lens will, when focused on distant objects, only give a sharp picture on the camera screen when it is approximately three inches from the camera plate. If you increased the camera extension the lens would not focus the view at all.

If you employed a 6 in. or a 7 in. lens (and, by so doing you would require to increase your camera extension by at least 7 or 8 inches) you would get a telephoto effect. The longer the focal length of the lens, the longer the extension required for a given size of plate and the greater the telephoto effect.

Some of the cheaper "doublet" or "R.R." lenses are made in two portions, a front lens (or combination of lenses) and a back lens. Usually, in these cases, if the back lens is removed and the front lens used alone, the latter will be found to have double the focal length of the original R.R. lens. This front lens (provided that it is well stopped down) can be used to produce telephoto effects, and usually, in such cases, the camera extension will require, in practice, to be increased nearly three times. You should note, however, the fact mentioned above, that many modern anastigmat lenses will not permit of their back or front lenses being used alone.

Speed Regulator for Small Motor

I HAVE a small A.C. motor (230 volts) formerly used in a vacuum cleaner. I desire to construct a watch-cleaning machine for which a variable speed is necessary. The commercial article has incorporated a small knob-controlled resistance. I have experimented with several gauges of resistance wire but have so far been unable to slow the motor sufficiently (from full speed to nil). I have found by connecting a 100-watt lamp in series that this passes sufficient current to drive the motor at full speed, and correspondingly lower wattage lamps vary the speed as desired. I should, however, be glad if you could assist me in making a resistance of small size. I may mention I have used as much as 10 yards of wire with very little effect.—E. Jones (Manchester).

VERY wide speed regulation with motors of the "Universal" type such as you are employing, is very difficult to obtain by a plain series resistance when the load on the motor is not constant. What you appear to require is a potentiometer-connected resistance, by means of which the applied terminal voltage on the motor can be varied from zero to full value.

At the maximum the motor would probably not require more than half an ampere, so that if you design the potentiometer resistance to carry one ampere, there will be a safe margin. This necessitates a sliding type resistance of 230 ohms, 1 ampere carrying capacity, which you can obtain from the British Resistor Co., Queensway, Ponders End, Middlesex.

THE Cyclist
Editor: F. J. CAMM

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'Phone: Temple Bar 4363

Telegrams: Newnes, Rand, London

Comments of the Month By F. J. C.

Wanted – A Post-War Plan

ENDEAVOURS to popularise the pastime of cycling have never met with an appreciable degree of success. This fact requires investigation because England was the home of the bicycle. It is true that in France the hobby-horse or velocipede enjoyed a short-lived popularity among the dandies of the time. It was in England that the crude idea was perfected and developed. If the stained glass window in Stoke Poges Church in which a cherub is shown astride a hobby-horse is authentic, and there is no reason to doubt it, the designer of that window in the year 1642 was imbued with a prophetic idea and so we are entitled to claim that even the hobby horse had its genesis in this country.

Poster Campaign

OTHER industries have found that a general advertising campaign has succeeded. Thus we had posters advising us that Beer is Best, Eat More Fruit, Drink More Milk, and if in the generality they tended to contradict one another and to provide a humorous veneer to what was intended to be a serious appeal, they none the less succeeded in making the public Beer, Fruit or Milk conscious. Logically, therefore, it would seem that the idea of general bicycle publicity was right, but the methods were wrong. Replanning is in the air.

It should not, however, be in the air when the war is over. Our overseas markets at the present time are absorbing nearly everything we can make, but chiefly because so many other sources of supply have dried up. Competition for those overseas markets will recommence after the war, and it would seem that our first concern should be to hold those markets we have now secured. That is part of the price of victory. The home market is in a different category. Tens of thousands of people are perforce cyclists today, though still motorists at heart. Efforts should be made to retain them as cyclists, to replace those who will not return to our ranks. An inordinate amount of attention has in the past been given in the press and elsewhere to the sport of cycling and insufficient to the pastime. Whilst the sport is an essential part, it can never be greater than the whole. We suggest that the limelight of publicity should be turned to the pastime; the sporting side can never be of sufficient magnitude to support an industry. The B.B.C. could perform useful work here, and it should remember that only about 50,000 cyclists in this country are interested in cycling sport, whilst over ten millions are potentially interested in the pastime. We must also remember that cycling is a se asnal pastime, although not to the same extent as formerly. Yet the great proportion of cyclists are not all-the-year-round riders.

The trade and the Associations including the National Committee on Cycling should now be formulating their post-war policy.

National Organiser

MANY efforts have been made by the C.T.C., the N.C.U., and the trade to popularise cycling. Just before the war the trade appointed a national organiser with that object in view and some years before that we had the National Bicycle Week. Neither of these efforts appreciably added to the sales of bicycles. A possible answer is that cycling has reached the peak of its popularity or, as the statisticians would have it, the market has reached absorption point. Another possible explanation is that the methods adopted in both instances were wrong. You will remember that the trade embarked a couple of years or so ago on general advertising of cycling and all manufacturers through their Union contributed to the fund to pay for it. On those posters the Keep Fit Family were portrayed, but the campaign did not meet with success. It has been suggested that the manufacturers themselves were to blame in that having contributed to the Keep Fit Campaign, they sought to recover their expenditure on that score by reducing the amount of money they spent on advertisements for their own trade-marked product. It seems quite reasonable that that had something to do with it. Now, of course, we are compelled to spend our money popularising the bicycle abroad so that our exports can help to pay for the war. Whilst some wise manufacturers continue to advertise in the sound belief that they must keep their name before the public and maintain the goodwill they have built up over many decades (and which could easily be lost by failure to advertise), there are others who because the quantity they are able to supply to the home market is limited (manufacturers must export nearly everything they make) have reduced their advertisements in English periodicals and newspapers.

Time Trial Difficulties

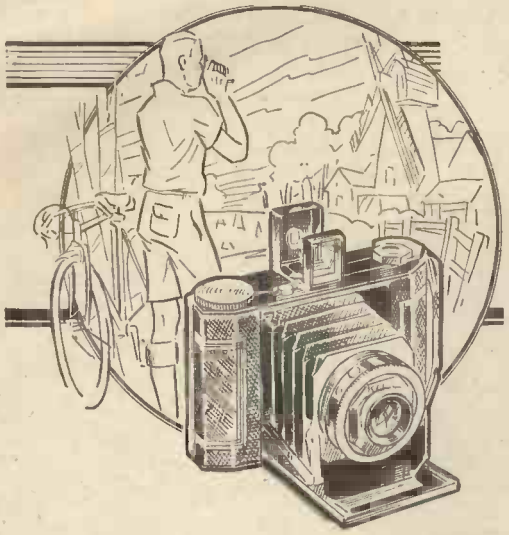
REPORTS from Time Trials Promoters indicate that they have met with an expected crop of difficulties in connection with catering and sleeping accommodation. They have not experienced lack of entries, and although help has in some cases been a problem, other clubs have generously come to the rescue. Some of the clubs have had greatly increased entries, no doubt owing to the cancellation by other clubs of their sporting programme. There are still those who believe that all sport should be abandoned for the duration of the war, but this does not find support in Government circles. A reasonable amount of sport is necessary, and now that Sunday work and Bank Holiday work is being reduced, greater opportunities are provided for the running of road events. We do not foresee, therefore, any difficulty in running a reasonable programme next year. Regarding catering, the N.C.U. would be grateful to hear from touring cyclists any details they may have of stopping places where the proprietors are able to cater in a war time manner for cyclists. Similarly, we shall be glad to have the names and addresses of such proprietors and pass them along to the various District Councils of the R.T.T.C. It should be stated whether bed and breakfast and/or sundry meals can be obtained.

Bicycle Train Excursions

THE New York, Newhaven and Hertford Railroads recently commenced their Cycle Train Excursions. Trains leave New York in the early morning and arrive at Falls Village, Connecticut, at about 10.30. The excursionists leave the train and cycle to Kent, where they pick up the train and return to New York in the early evening. This is a system worth following over here. It might, indeed, form part of the post-war plans of the Cycle Trade. We know that such a Cycle Excursion was tried experimentally some years ago and that more recently Frank Urry was in consultation with the railways about it. With the development of road transport, the railways will need such schemes as this when the war is over.

Sergeant Clague

THE many wheelfolk who recall the series of Isle of Man T.T. cycle races, held on the motor-cycle course, will regret to learn that one of the principal organisers, Sergt. J. Curwen Clague, is reported by the War Office as "missing." in the Middle East. Clague went out with an A.A. Battery, only 36 members of which could be evacuated from Crete, and it is sincerely hoped that news will shortly be received to the effect that he is a prisoner of war—a fate quite grim enough! Meanwhile, the sympathy of all cyclists will be with his wife—he married a few months ago when on embarkation leave—and widowed mother. Clague, who is "Wayfarer's" nephew, and who displayed exceptional organising ability in connection with the above-mentioned race (which attracted competitors from near and far and achieved a truly remarkable success), is on the reporting staff of the *Isle of Man Examiner*, and is Hon. Secretary of the Viking Wheelers, the promoting club.



Paragrams

George Fleming Rides Again

AFTER a year's absence from time-trials, George Fleming, Belle Vue C.C., is back again in open competitions and putting up outstanding rides.

Club Secretary in R.E.s

WELL-KNOWN racing secretary of the Port Talbot Wheelers C.C., R. Turner is now serving with the Royal Engineers. P. J. Harry, Water Street, Briton Ferry, Glam., takes over from him.

Well-Known Rider is Spitfire Pilot

RONALD STILLWELL, St. Martins C.C., is now a Sergeant Pilot in the Royal Air Force and flying a Spitfire.

Cyclists Joining R.A.F.

THE Royal Air Force seems especially to attract cyclists in the West Country, and many members of the Western District R.T.T.C. and the Bristol Road Club are qualifying as pilots.

Veteran Member of N.C.U.

ALTHOUGH not an active cycling member, Mr. W. R. Britton, of Bristol, has just renewed his N.C.U. membership. He is eighty years of age, and has been a member of the Union since 1882.

Birchfield C.C. "25" Award

THANKS to the generosity of the president, Mr. L. Camillis, the fastest time award in the recent Birchfield C.C. "25" was value £5.

Club Member Out East

THE Ealing C.C. tricycle expert, Sid Parker, whose 12-hour and Bath and back R.R.A. records on three wheels were exceptionally fine rides, was among Troops successfully evacuated from Greece.

"Old" Century Road Crack

CHARLES F. BATCOCK, the "old" Century Road crack and former holder of the straight-away tricycle "50," won second handicap award in the Kent Road Club "25." He is 42 years of age and clocked 1.12.24 over a hard course.

Cyclists in H.G. Parade

WHEN the Paisley Home Guard paraded for review the cyclists' section had a prominent place.

Catford "50"

THE old-established Catford "50" had to be cancelled owing to lack of support. If the opportunity occurs the club may endeavour to run the event later in the year.

Cummock Rally

THE Cummock Rally arrangements suggest a bumper meeting. Robert Marshall, energetic secretary of the promoting West of Scotland Cyclists' Defence Committee, is thorough in his arrangements.

Club Champion in R.N.

W. J. CARTER, five times champion of Southgate Cycling Club, is serving with the Royal Navy.

Club's 24-hour Ride

DESPITE suggestions to the contrary, Southgate C.C. went ahead with their annual 24-hour ride over a Cotswolds route to Cheltenham and back, all riders qualifying for certificates.

Club Member's Death

H. IRVINE, brother of the Northern C.C. secretary, has been killed as the result of enemy action.

Glasgow C.C.'s Open "50"

ALTHOUGH the war reduced the ranks of the Glasgow United C.C., remaining members subscribed sufficient funds to guarantee awards in the club's open "50."

Cyclist Killed in Road T.T.

FATAL accidents in road time trials are rare. There was, unfortunately, one at the end of the Rotherham "25," when D. Thompson, Staveley Wheelers, collided with a stationary vehicle and sustained injuries from which he died.

Prisoner of War

CHARLIE LANE, Wessex Road Club, now a prisoner of war in Germany, opposed a motion—in a German prison camp—that cyclists should be taxed!

Bristol's Activities

BRISTOL is still the nerve centre of road and track work in the West, and the Bristol South C.C. and the Western Time Trials Association are firm and strong.

Stolen Cycles

NEARLY 1,000 cycles were stolen in Hull last year, the Recorder was told at Hull Quarter Sessions.

Popular Rider Dies on Duty

BUDDY WAREHAM, one of the most popular members of the Hants C.C., lost his life while doing duty as a full-time member of the A.F.S. His station suffered a direct hit.

Another Cyclist in R.N.

ALAN DOBSON, formerly of the Broad Oak C.C., and a prominent massed-start rider, is in the Royal Navy.

Club's First War Casualty

THE Wolverhampton Wheelers C.C. regret to report their first war casualty. Pilot Officer Vernon Dewhurst, R.A.F., crashed while landing. Before joining the Wheelers he was a member of the Golden Arrow Road Club.

Big Entry in Midland "30"

ROAD sport flourishes in the Midlands. A 30-mile event promoted by Birmingham Time Trial League received an entry of 121.

Club Cyclists Get Commissions

P. D. MORRIS, Oval C.C., has been selected for a commission in the Royal Navy, as has Brian Erlebach, Southgate C.C.

Sprinter Serving as Armourer

H. MAXFIELD, famous sprinter, is now serving as an armourer in the Royal Air Force.

Famous Women Riders on War Work

MRS. "BILLIE" DOVEY, the utility girl rider, has returned to work in an aircraft factory which she left four years ago. A similarly famous rider, Mrs. Lilian Dredge, is now with the A.T.S.

Cyclists' Wedding

MEMBERS of the St. Neots C.C. formed an arch-way with wheels following the wedding of two of their members, Mr. C. F. Slingo and Miss J. Gillet.

Killed on Active Service

SAM CLARKE, Glasgow Wheelers, has been killed on active service.

R.A.P.C. Club Affiliated to R.T.T.C.

A CLUB consisting of members of the Royal Army Pay Corps has been formed and is affiliated to the R.T.T.C.

Old Bicycles Safe

IN a Clydeside air raid, the Glasgow Art Galleries were damaged. Fortunately, the collection of old bicycles housed in the Galleries was not affected. The machines date back to an 1819 hobby horse.

Cyclists Oppose Destruction of Hedges

THE suggestion by the Ministry of Agriculture that hedges should be sacrificed is being opposed by cyclists and other country lovers. If large-scale removal of hedges were to be general, much of the charm of the countryside would go.

Scotland's Sole Cycle Factory

SCOTLAND'S only large-scale cycle-making firm, the Glasgow Cycle Company, has been made into a limited company. It was founded in 1906 by a son of James Robertson, known as "the father of the Scottish Cycle Trade," who started business in 1885, and founded Scotland's first cycling paper, "The Cycling Mercury."

Queen Writes Cyclist's Mother

THE Queen has sent a message to the widowed mother of Bernard Arthur Brown, a young messenger cyclist who was killed while on duty in a raid on the Manchester area.

Dutch Use Wooden Tyres

THE Dutch people, under the Nazi occupation, have been reduced to using wooden bicycle "tyres." Holland formerly produced many covers and tubes of rubber.

Oldest Scots Cycle Depot

KIRKCALDY, Fifeshire, claims to have the oldest cycle depot in Scotland. It was founded in 1872 by James Neilson, and is still in the hands of his sons, James and Andrew Neilson, as Neilson Brothers.

James Neilson, the original founder, made ordinaries for both trade and retail customers, and the present depot still stands on the site of the original shop.

One-Man Dominance in Scotland

A FEATURE of 1941 road sport in Scotland this season has been the dominance of one rider in the various districts. The only exception to this has been in the important Clydeside area, where honours have been more even.

J. Topp (Aberdeen), A. Lowson (Dundee), J. Armour (Fife), G. Turner (Mid-Scotland), and J. Tudhope (Dumfriesshire) are already virtual champions of their districts.

Open Dates Filled

THE Glasgow Eastern C.C. has been reduced to an active membership of two, and has had to ask the West of Scotland T.T.A. to take over its two "open" dates, in July and September. The dates have been allocated to the Lancia C.C. and the Douglas C.C., which are to promote "25's" on these relinquished dates.

Scots "100" and "12" Going On

AT its June meeting, the West of Scotland T.T.A. decided to go ahead with the arrangements for its open "100" and open "12" on dates in August. The events will be in the capable hands of Harry Price, time-trials secretary of the Association. His address is 42 Clyde Place, Halfway, Cambuslang, near Glasgow.

Carlisle Rider Prepares

W. POLLOCK, Border City Road Club, who finished fourth with 215½ miles in last year's Manchester T.T.A. "12," is training, and hopes to ride in the event again this year. Pollock is an Edinburgh Road Club man now living in Carlisle, and working in a reserved occupation.

Westhorn Track Re-Opens

WESTHORN cycle track, in the south-east district of Glasgow, has re-opened for summer use, and is again a favourite evening resort of Clydeside clubmen.

Fastest Scots "25"

THE fastest Scots "25" of 1941, up to the end of May, was put up by J. Armour, Auchterderran Wheelers, riding in the Lancia C.C. "25" over Renfrewshire roads. He beat local stars J. Brinkins, Glasgow Wheelers, and J. Conner, St. Christopher's C.C., and clocked 1 hr. 2 mins. 59 secs.

Club Guarantees Prizes

ALTHOUGH the Glasgow United C.C. had only 15 entries for its open "50," which was won by G. Hannah, West of Scotland Clarion C. & A.C., with 2 hrs. 15 mins. 24 secs., prizewinners will receive their awards, as the club subscribed the total value in advance.

C. A. (Bath Road) Smith with Percy Beardwood and E. Coles Webb, at the B.R.C. Jubilee "50"

AROUND THE WHEELWORLD—By Icarus

Movement

ONE often hears in connection with the somewhat disorganised pastime of cycling the term "cycling movement." This connotes something really big and important, something with definite aims and objects, with large club premises, London and district offices, Parliamentary representation, in fact, a body acting as athletic evangelists. I do not like the term *movement* applied to anything. It savours of fanaticism, like the Teetotalers' Association or the League of Anti-Smokers. There is no such thing as a Cycling Movement any more than there is a Boot Movement or a Fountain Pen Movement or a Motor Car Movement or Ladies' Hat Movement, or a Movement for the Suppression of Critics. Cycling is a natural development and it is not subject to any movement. Movements, so-called, are always a corollary. No one suddenly decided that there should be a development of the use of two-wheelers. It was a more or less accidental development of hobby-horse days. MacMillan, without knowing the importance of his invention, thought he would improve upon a hobby-horse by driving the rear wheel, instead of paddling his feet on the ground. Dunlop sought to ameliorate the sufferings of his son, who complained of the vibration when riding over the stone setts of Dublin. Like all good things, the public were not slow to appreciate its merits and public demand followed appreciation. There was no movement towards rear-driven bicycles and no movement towards the use of pneumatic tyres. Similarly, there is no such thing as a Cycling Movement; when thousands of people without prompting suddenly take to the use of a bicycle it is inevitable that clubs will be formed, and when clubs are formed, it is equally inevitable that some large club shall act as parent to direct their energies and to represent them on larger questions where individually their voices would not be heard. Hence, the formation, after the accidental formation of the pastime of cycling, of the Bicycle Touring Club (now the C.T.C.) and the National Cyclists' Union. Cycling is still not a movement. There are over ten million cyclists in this country, whilst the total membership of the two largest clubs does not exceed one hundred thousand. The fact that the pastime goes on and that every year many thousands more join its ranks, surely indicates that the bicycle has become an essential part of civilisation. It does not need any movement to ensure its popularity. I hope that such a state of affairs will continue, because once any pastime requires the artificial and sometimes interested goad of a Movement, it is beginning to fail. A Movement is only necessary to push an unworthy product; and so, will writers, broadcast talkers and announcers please drop the word *movement* when dealing with cycling matters? The B.B.C. should be particularly careful in the choice of words permitted to those who use the microphone, for it has set itself up as the authority on pronunciation and the use of words. It is true that members of this Committee include a Scot and a Welshman who advise us on how to use English, but some of the announcers, I notice, do not observe their recommendations. Some months ago a B.B.C. talker said that "nothing is more annoying than to have a puncture late at night when it is raining." I can think of 10,000 things that are more annoying. For example, two punctures late at night when it is raining, or a kick in the ribs from a horse, or to have one's bicycle stolen late at night when it is raining. Each day everyone of us mis-uses phrases—cliches which are supposed to provide the condiments of conversation, to flavour the bare fact we wish to express.

Movement connotes action and the only action in the pastime of cycling worth considering is the action of twiddling the pedals.

The Bath Road Hundred

THE Bath Road Hundred, which was cancelled last year, is this year to take place. I understand that the promoters are experiencing the difficulty which so many other clubs have met, with the catering problem and with finding accommodation for competitors and helpers. Competitors in this case are advised to make their own arrangement regarding catering. I understand that this issue will be published before the event, therefore, intending entrants should apply for Entry Forms to The Hon. Time Trial Secretary, W. Hinds, 261 Goldhawk Road, London, W.12. Tel. No. Riverside 2851.

New C.T.C. Councillor

IT is with great pleasure that I record that Rex Coley has been elected to fill the vacancy as C.T.C. Councillor in Division Five (East Midlands) of the C.T.C. He is a keen cyclist of many years' standing and has been closely associated wtih the sport and the pastime for very many years. He will thus be an asset to his Division.

Cavalcade of Cycling

I CONGRATULATE the Dunlop Company on their series of advertisements entitled "Cavalcade of Cycling." These have educational value and are worth keeping because of their accurate portrayal of the development of cycling from hobby-horse days. They are not just blatant advertisements for a product which does not need advertisement, but they are in keeping with the quality of the product which figures in the advertisements in so dignified a manner. The illustrations and facts are most accurate.

Bafflers

THE B.S.A. advertisements are similarly worthy of praise, for space is devoted to questions and facts of interest to all cyclists. This style of advertisement has far greater advertising value than a recitation of the virtues of a product.

The Fellowship of Old-Time Cyclists.

THE Fellowship of Old-Time Cyclists is a body constituted in such a manner that it has few set rules beyond that relating to qualification for membership. It has a Committee which is elected annually. It may meet when it likes and where it likes, and its decisions are apparently binding on the members. It is not, therefore, a democratic body, for the members have little say in the proceedings or conduct of the Club. I have felt for many years that the Club needed putting on a sound footing and, apparently, a lot of the members think so, too, for on a recent Sunday morning, over 25 of them turned up at Esher and cycled along to the Angel at Ripley for lunch, where a resolution was passed concerning the future of the Club.

Its membership must always be a diminishing one, for the qualification that a member must have ridden an Ordinary bicycle before 1890 and have been born not later than 1873 in itself provides it with a membership of old timers whose ranks must lessen in accord with the expectation of life. Thus, under the present rules it must eventually fade out, and the time must come when only one member remains. Gloomy thought!

Why not now forestall that unhappy day by changing the rules of membership to include those who rode a bicycle irrespective of type, say, forty years before date of application for membership. Each year this would bring in a fresh crop of members. Some of these old timers, however, are jealous of the fact that they once rode an Ordinary. Some, indeed, are most conceited about it, and regard themselves as existing on a plane apart. Many of them you may see at meetings adopting the conceited air of the braggart, talking about the very ordinary doings of their day, and imagining that they have taken part in history. Some of them need to snap out of their stupidity and should remember that they have, in many cases, merely lived and indulged in the pastime of their day. They have not performed any marvellous feat worthy of the importance they give it. Second childishness and mere oblivion, as Shakespeare had it, is an apt phrase to apply to them.

They will sidle up to you (as a younger man) and ask whether you remember who broke the Brighton and Back Record in 1893, or if you remember what Lacy Hillier thought of pneumatics. Quite an artificial glory attaches to these so-called Old Timers in lots of cases and as I have said, they are basking in an undeserved adulation merely because they happen to have owned an Ordinary bicycle to satisfy the vanity of their youth. They like to be considered as pioneers when they are nothing of the sort.

Famous Club Headquarters—The "Lamb" at Theale

St Mary the Virgin. Adderbury (Oxon)
For Strength

My Point of View

BY "WAYFARER"

Conversation Piece

TALK the other day with a doctor whom I was meeting for the first time turned upon travel. We were soon on common ground, and his marked accent took us right away to the Scottish Highlands—his native heath—where I, too, felt very much at home. In the end, he asked what sort of a car I used, and his ears visibly receded on hearing the reply that I was a cyclist; that I did not own, and was devoid of any desire to own, a motor-car. He then opined that the bicycle represented the best way of seeing the country, and you may be sure there was not the slightest disagreement on my part! But, he said, what about the weather when you go cycling: what about luggage: what about finding accommodation?

As to the weather, I replied, we cyclists took our chance. We were at the mercy of the climate, but most of us were prepared to accept, philosophically, the rough with the smooth, and we were seldom the worse for a day's exposure to rough conditions. We were so hardened to the weather that, as a rule, we did not catch cold. Of course, I added, touring was better on fine days, but wet and stormy days were not without their compensations. As to luggage—well, I said, aren't we (most of us) too luxurious in our home habits? In the nature of things, a cyclist can't carry a lot of freight: it's rather fun to travel light, and to do without this, that, and the other—all of which are looked upon as being pretty well indispensable for 50 out of 52 weeks. My own plan, I added, was to manage with just about a handful of luggage, my going-away list reading something like this: pyjamas, handkerchiefs, tooth-brush, shaving tackle, sponge, and a pair of folding slippers. I would also take an extra pair of stockings and possibly an extra shirt. Literally, I reiterated, a handful of luggage! Every item could be justified, and was the fruit of long experience. The omission of everything else, even brush and comb (rendered unnecessary by a last-minute visit to the barber!) could also be justified. Yes! I took a cape, this being part of the daily equipment of a cyclist.

As to accommodation—well, I said, you had the cycling handbooks containing several thousands of addresses. You went to farm, cottage, boarding-house, or hotel, and you rarely experienced much difficulty. There were establishments to suit all purses, and, as a rule, country folk were very helpful. If they couldn't put you up, they would try to find somebody who could. In any case, it was from encountering, and solving, these little problems that piquancy was added to the abiding delight of cycle touring.

The doctor got up to go, the wiser (I hope) for our talk. "There's nothing like cycle touring," I concluded, "for seeing the country. I've been a the pastime for many years, and I hope to continue at it—with my present intense and growing enthusiasm—for at least several more years, until I reach the bath-chair stage. And, added to all the obvious advantages of this form of holiday—the utter freedom, the glut of fresh air, the infinite change of scene, the constant exercise, the joyous encounters along the road, the enrichment of the mind—added to these, I say, there is the extraordinary low cost of cycle touring. If you should be a Youth Hosteller, you crash that cost: if you are a camper, you get practically a free holiday, because you have to live somewhere."

Those "Coupongs"

JUST after the rationing of clothing had been announced, with the use of what the President of the Board of Trade and also the B.B.C. quite wrongly call "coupongs," an acquaintance enquired of me whether I had a cycle cape of which I would like to dispose. I replied in the negative, adding that I possessed only two capes, and that I could not very well do without a spare. The reason for my friend's enquiry was that, on the previous evening, he had sought to buy a cape, and had been asked to cough up nine "coupongs," which he thought excessive, and so the purchase fell through—and he was afterwards able to buy what he wanted at another shop in exchange for cash only! This incident turned my mind in the direction of clothing, purely from the cycling point of view, and I was glad to find myself in quite a good position, with three pairs of shoes, two pairs of fairly new corduroy "shorts" of fine quality, and five open-neck shirts. But, alas! I am well "down the course" as regards ice-cream jackets, which I wear summer and winter alike, my normal stock of three being reduced to one. Thirteen "coupongs" for a flimsy unlined coat sounds a bit steep, and for the time being I am lying low. But this much is certain: if my stock of "coupongs" tends to run short, then I shall see to it that my equipment as a cyclist is given preference. My clothing as a mere citizen can "go hang" so long as I have a sufficient supply of glad rags of the road.

Super-Important

AT tea the other Saturday I heard a young friend dilating on the importance, on the morrow of a "blitz," when public transport was deranged and roads were blocked, and it was difficult to get to one's work at the proper time, of possessing a bicycle, which triumphed over all such problems. It is a true word. The bicycle is useful on every occasion: it seems to me to pass into the indispensable class when the world is (literally) tumbling about our ears.

"Demoralization"

ON reading the official suggestions as to immobilizing (or "demoralizing," as a friend of mine calls it) our bicycles in the event of invasion, I am left wondering why the simplest method of all was omitted from the list by the cycling organizations. The removal of the tyre valves is quick and effective, and—another advantage—it can normally be done without the aid of tools. Some pedals I know—my own in particular!—would take some shifting: the detaching of the chain might be a dirty and a tiresome job (again I speak personally!): the removal of the back wheel is oft a spanner job. So I plump for immobilizing bicycles by abstracting the valves, and that will be the method employed at the factory where I have a considerable measure of responsibility in this respect. It may be argued that a bicycle with flat tyres can still be ridden. My retort is that if a heavily-laden soldier in a hurry can "get anywhere" on such a mount, he is "a better man than I am, Gunga Din"—and he deserves a pleasanter fate than the one which is surely awaiting him!

Moreton Hampstead.
(Moor-town homestead.)

ITEMS OF INTEREST

Cycles from the Bed of the Sea

A SHIP carrying complete sets of bicycle parts sent as part of B.S.A. Company's export drive was sunk by enemy action some months ago. But part of the cargo, including the cycles, was salvaged. A B.S.A. agent in Scotland purchased all the equipment as a speculation. The parts were found to be in such good condition despite their long immersion that, although almost the full trade price was paid for them, he feels he had a good bargain. The dealer has been selling the machines as fast as he could assemble them and many are now carrying war workers to their jobs each day.

Rising Cycle Exports

IT is reported by B.S.A. Cycles Ltd. that, compared with the total in January, export despatches of bicycles increased in February by 20 per cent., March 75 per cent., April 90 per cent., and May 160 per cent. The figures for June are not yet available but are expected to show a further increase. This is good news for home cyclists as, under the agreement between the cycle manufacturers and the Government, material is released to build one machine for the home market for every three machines sent abroad. Many war workers rely on cycles to enable them to reach new factories built well away from crowded towns

Centenary of Cook's Tours

AN interesting celebration which would have taken place on July 5th, had it not been for the war, is that of the Centenary of Thos. Cook & Son, Ltd., the world-famous travel agents. In a pamphlet just issued by the firm, entitled, "This is Cook's Centenary Year. 1841-1941," a brief history of the development of their travel service is given. The first excursion organised by Thomas Cook took place on July 5th, 1841, when railway travel was still an adventure. On this excursion 570 people climbed into a special train of open carriages, or "tubs," as they were called, for a trip from Leicester to Loughborough and back at a fare of a shilling a head for the double journey of 24 miles. The novelty of this first excursion made an instant appeal, and for the next year or two Mr. Cook was kept busy planning and conducting excursions in different parts of the Midlands. He developed his arrangements with the Midland Railway and organised his first tour proper to Liverpool and North Wales. Anyone interested may obtain a copy of this pamphlet on application to: Press Relations, Thos. Cook & Sons, Ltd., Berkeley Street, London, W.1.

Road Casualities

FIGURES, recently issued by the Director-General of War Transport show that the total road deaths during May, 1941, were 701, an increase of 252 over the corresponding month of 1940. Of this total, 150 were killed during the black-out. The total of 701 includes 305 pedestrians and 134 cyclists.

WAYSIDE THOUGHTS

By F. J. URRY

Pre-motor Ways

IT has often been printed and is frequently said, that the roads of this land were in a deplorable condition prior to the coming of the motor car, and we cyclists ought to be specially grateful for the fine smooth waterproof highways the coming of the car has given us. We are: but it is not true to say our pre-motor roads were in a deplorable condition. That statement is an invention, probably due to the fact that the early motorists (who are the people mainly writing and speaking on this subject) only knew our highways *after* they had been scarified by the passage of the first motor cars. Those of us who are old enough to remember the pre-motor times are growing fewer, and I think it as well that a statement should be made now on this subject by a man whose early youth was spent along the road before the advent of the car, whenever leisure or holiday gave him an opportunity. I started cycling in 1889, and by the time I was 19, in 1898, had ridden nearly a hundred thousand miles, mainly along the great roads of this land. Naturally, most of my riding was confined to the Midlands, but I had toured in the south-west, in Wales, Scotland and Ireland, and possessed a fair notion of the road conditions then pertaining. Our big main roads were marvellous examples of the old Macadam surfaces, as smooth as a race path in dry weather, slightly dusty during long dry spells, and slightly muddy in wet weather. It was only near the big towns where traffic was heavy that the mud was really thick and made riding uncomfortable and sometimes risky: but the risk then was confined to a tumble due to skiddings, with little fear that following traffic would add to the possibility of personal injury. A few of our big roads were much neglected and actually partly grass grown, notably A5—the London-Holyhead road, Telford's highway—between Brownhills and Oakengates, and again beyond Corwen to Pentre Voelas. The surface was good and smooth where the slow-moving farm carts and the occasional traps rolled the tracks, and this was the only traffic—plus the few cyclists—that passed along these ways.

Would Not Have Affected Cycling

THE Scottish roads were rough and storm worn north of Perth, but never so bad as the Fort William-Mallaig road to the Isles of five years ago, before the big scheme of improvement was put in hand and completed as far as Glenfinnan; but further sections of it still are in an awful state betwixt there and Mallaig—or so they were in 1939. North of the Great Glen most of the roads were rough, as they are to-day—or were a few years ago; but the pre-motor roughness usually left a fairly easy passage for the cyclist in the wheel tracks of the carts. In Ireland the majority of the main roads have improved by the application of tarmac in their make-up; but where this form of road making has not been undertaken—and there are many such ways—the surfaces are far worse than was the case before the advent of the car. The fact is that few of our motorists knew the roads before the coming of the car. The pioneers of motoring must remember, if they desire to, the fearful damage the steel-studded motor tyres did to road surfaces in conjunction with the crude clutches of those early days. It was after the spoliation of our smooth Macadam surfaces that most old time motorists knew our roads, and quite naturally thought such was their condition before they came to use them. Turn to the old controversies on road surfaces printed in the motoring journals about 1901 to 1905, and you will find the reason given for these appalling conditions was due to "horses' hooves." We all know different to-day, and can laugh at the old-time excuses, and look back on the first experiments in weather-proof and dustless roads with some measure of satisfaction. But the point I want to make here is that our pre-motor roads were good for cycling, and not the horrible things some of our motoring friends would have you believe. Cycling would not have suffered in popularity due to any road inferiority had the car never been invented—rather the reverse—and as cyclists we have paid, through our highway rates, very heavily indeed for the undoubted improvements. In 1905, the year I was married, my highway rate was 10d. in the £: to-day it is well over 4s. I am not complaining more than the next man; but I should like it clearly emphasised that the popularity of cycling owes nothing to the motor car, even though cyclists are grateful for the better road surfaces, improved, not for their benefit, but purely for that of the motoring community.

I Wonder?

I HAVE heard it whispered that the Government, or that portion of the Civil Service under the Government most nearly concerned with travel, has awakened to the possibility that the bicycle may be quite a useful possession to the individual with a few days' holiday. It has taken a long while for authority to recognise a fact known to millions of people: but even at this late hour, if they are prepared to pay a tribute to cycling as a holiday method involving no form of travel waste or congestion, then it will be a little triumph for the simplest vehicle on the road. The fact is that the average Civil Servant, particularly if he happens to occupy a secretarial position, is so apt to think of travel in the terms of a motor car that the obvious vehicle of economy and health although it is right under his nose, is completely overlooked. Still, I shall not complain if, even at this late hour, the bicycle is given a share of the publicity to which it is so justly entitled. For what other vehicle can meet the desire of the Government for travel economy; so comfortably? There is only one answer to that question, and it is just criticism of authority that they have not found it, and published it, long ago. Broadcast the facts; tell folk how cheaply and enjoyable they can take a cycling holiday, and let those talks be heard after the nine o'clock news when Broadcasting House has the greatest audience. Cycling is a fine pastime, better than motoring for health and well-being as it is the cheapest form of wheel travel.

The Gift of the Evenings

THESE long light nights suit me admirably, for I can take my rides abroad two or three times a week, and visit many of the old haunts of my early youth with ease, much pleasure, and in a few instances a regret that some of the spots have lost their rural air and are now sophisticated outskirts of a great city. Yet there are dozens of charming country scenes within easy reach of my work-place, to which I can wander in daylight and make the roof-tree before the sunset fires have faded. Not all my friends are so agreeably impressed with the extra hour of Summer Time, for apparently they find it a handicap on tired eyes to rise in the mornings according to the clock, because the retiral at night is delayed until the fall of darkness.

Notes of a Highwayman

By Leonard Ellis

Cyclists' Aubade

ONE of the easiest things to believe in cycle touring is that there is no time like the very early morning in spring and summer. Curiously enough, it is one of the joys we seem most reluctant to enjoy. There is, however, one consolation in this sad neglect; the joy can be re-captured over and over again. No matter how often we make an early start, we still discover the exquisite thrill on the next occasion. At no other time is the air so cool and fresh, the road so free from traffic, the surface so hard and clean; at no other time is it possible to call a halt for a smoke, to look back at thirty miles or so and to realise that we still have the day to enjoy. Quite recently, having no one else to consider, I set the alarm clock for 4.45, and by 5.45 I was out in the cool, sweet air of the very early morning en route for the Cotswolds. The sun had not risen, and a slight mist tarried over the landscape, offering great promise of things to come. The birds were awake, but not fully, as if they had not been informed of the two-hour summer time; it was, of course, only a quarter to four by the birds' time system. Later in the morning the yellowhammers were hedge-hopping along the road and seemed to be better informed as to war-time conditions. Their well-known song: "A little bit of bread and no ch-e-e-e-se," seemed to call unnecessary attention to my meagre war-time sandwiches. Coasting joyously down a long slope, I became conscious above the hiss of my tyres of an unusual commotion a little way ahead. To a bird-lover the sound could not be mistaken for anything but the alarm-note of a blackbird. I braked gently and approached the spot in silence, to find a blackbird raging furiously at a sleepy little brown owl who also did not seem to understand war-time clocks, and had failed to go to bed in time to escape the blackie's wrath. Peering over my right shoulder, I saw the red rim of the sun rise over London's distant smoke pall.

Over the Chilterns

IN twenty miles I was clear of High Wycombe's interminable street and was attacking the long slope over the Chilterns. Through Stokenchurch, across the plateau and then the glorious coast to the Lambert Arms and beyond. For two whole miles my feet were stationary, but my eyes streaming as I sped in perfect safety down a long, smooth slope. Pretty Tetsworth fell behind, and then at thirty-one miles I dived into the lanes in preference to the Oxford By-Pass and the Woodstock Road. This lane is like a by-pass that has never been developed and strides across country in practically a straight line to Enstone. In places the surface is indifferent, but it has many other compensations. For one thing, I discovered that which I had hitherto missed—miles and miles of yellow rock-roses in the hedges and fields. The queer, silent tract of marsh, known as Otmoor, lay in a hollow on the right, surrounded by the sluggish river Ray that scarcely flows. Although the Chilterns and the Cotswolds are entirely dissimilar in character, one does not notice the transition. The change is so gradual, and somewhere in the mid-way the places have elements of both. Islip is a good example. We are admittedly beyond the Chilterns, not yet in the Cotswolds, but the village is typically Cotswold; although the stone of the cottages is perhaps a trifle less mellow. It was here that Edward the Confessor is said to have first seen the light of day.

Cotswolds revisited

ON and on, through a riot of spring flowers, all the more beautiful because the spring had been so long delayed, through Bletchington and Glympton, until the Birmingham-Oxford Road was reached. A few miles of this through beautiful Enstone, and off to the westward towards the rolling hills of the Cotswolds spread out so invitingly ahead. Several miles still lay before me, but at this stage of the journey I always feel that I am nearly there. At any rate, the Cotswolds had been reached. A long avenue of trees borders the road to the busy little town of Chipping Norton, now, alas, full of reminders that the times are not normal. The wind had favoured me throughout the journey and the last few miles, up steep slopes and down long slopes, went by with delightful ease. The Four-Shire Stone, now obscured by boards, flashed by, and I was in Moreton-in-the-Marsh for lunch. The last stage of the outward journey was a mere five miles to Ebrington, where my camp was already waiting my coming.

Turpin's Inn at Aston Munslow.