VOL. XXX. No. 2 FEBRUARY 1945

MECCANO MAGAZINE

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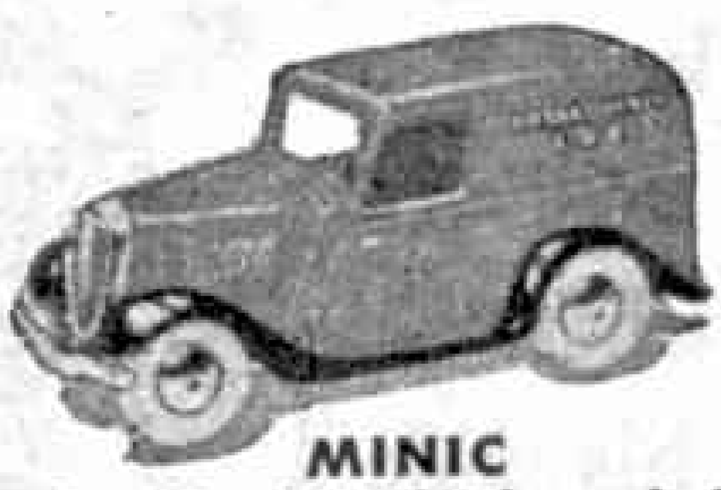

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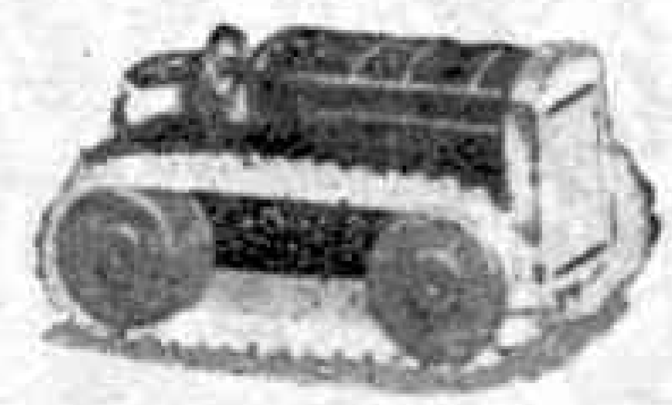

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Next Month: "FIGHTERS OF THE RED AIR FORCE." By J. W. R. Taylor

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With the Editor

The Amazing Mulberry Harbour

Last month on this page I referred to the part engineers had played in the war. One of their greatest achievements was the amazing Mulberry Harbour, designed and constructed in parts that were towed across the English Channel and placed in position off the Normandy coast after invasion started on D-Day. It was a stupendous job, in which thousands of skilled men were concerned. One of the most important tasks was the building of 146 giant concrete caissons, each in appearance like a gigantic Noah's Ark without a roof. The largest had a displacement of about 7,000 tons, and altogether 600,000 tons of concrete and 75,000 tons of steel were used in making them. Yet every one was safely manœuvred into position at great speed when the time came for assembling the harbour, and then sunk by opening special valves.

The caissons, with sunken blockships, form breakwaters enclosing the entire harbour area, which is larger than that of Dover, and has within it piers leading from the shore to a built-up wharf where large vessels can be unloaded. The piers are in effect floating steel bridges, sections of which at low tide rest on the beaches or on rock; and they are flexibly joined so that they give to the movement of the water. The wharf to which they lead is built up of pierhead sections each having a displacement of 1,500 tons, carried on pontoons with special arrangements to give solid support on the rock bottom when heavy equipment is being unloaded.

The whole of the work of building the parts was completed in a few months. Assembly on the coast of Normandy began immediately after the invasion, and in a few weeks there was in existence a huge port where, day after day, supplies of all kinds streamed over for the British and American armies. So well had everything been planned and done that even the furious gale of 19th July, the most severe summer storm there within living memory, did not put it completely out of action, although no stores could possibly be landed by any other means.

A Remarkable Bridge

Apart from their war work British engineers have done many notable things during 1944. There is for instance the bridge across the river at Hobart, Tasmania, officially opened last year. This is a really novel structure, for it consists largely of a floating concrete arch curving upstream. This part of the bridge comprises 24 concrete pontoons, each weighing about 1,000 tons, rigidly joined together to make two half arches, which are connected by a lift bridge.

This Month's Articles

The Vickers "Warwick"

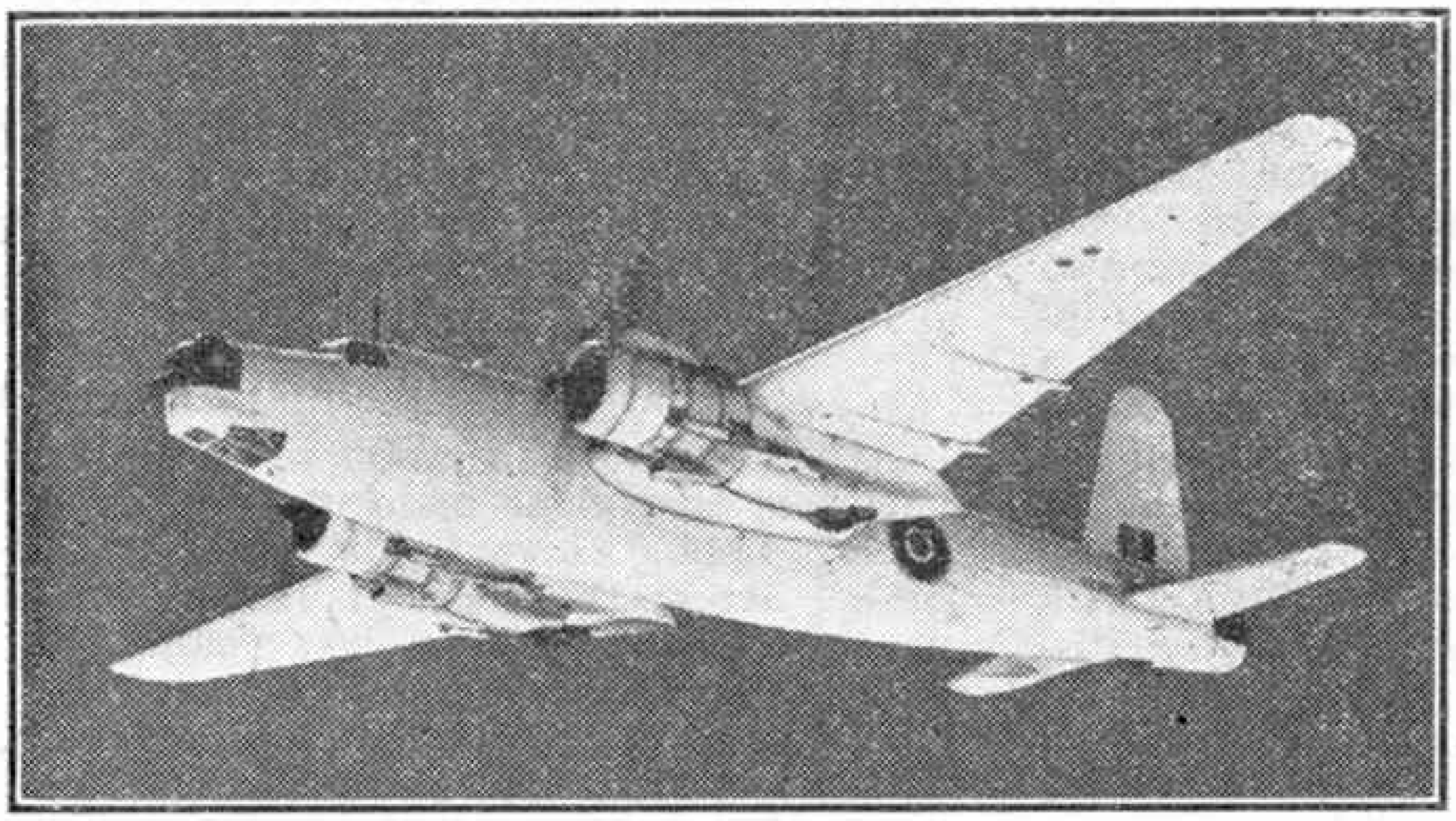
By John W. R. Taylor

"WHEN is a 'Wellington' not a 'Wellington'?" The answer is "When it's a 'Warwick'." From a distance it is almost impossible to tell the difference between these two Vickers aircraft. But a closer inspection reveals that not only is the "Warwick" much larger than the immortal "Wimpy," but also that it is intended for very different duties.

In order to learn more about the "Warwick" I recently visited a factory where it is in production for the Royal Air Force. The factory itself is impressive, with rows of huge camouflaged hangars, by the side of a large airfield. In peacetime it was one of the largest self-contained aircraft factories in the country, but many of its workshops were dispersed during the "blitz." Now they are being brought back, and after the war this factory should be ideally suited for construction of the air liners that Britain will need so desperately.

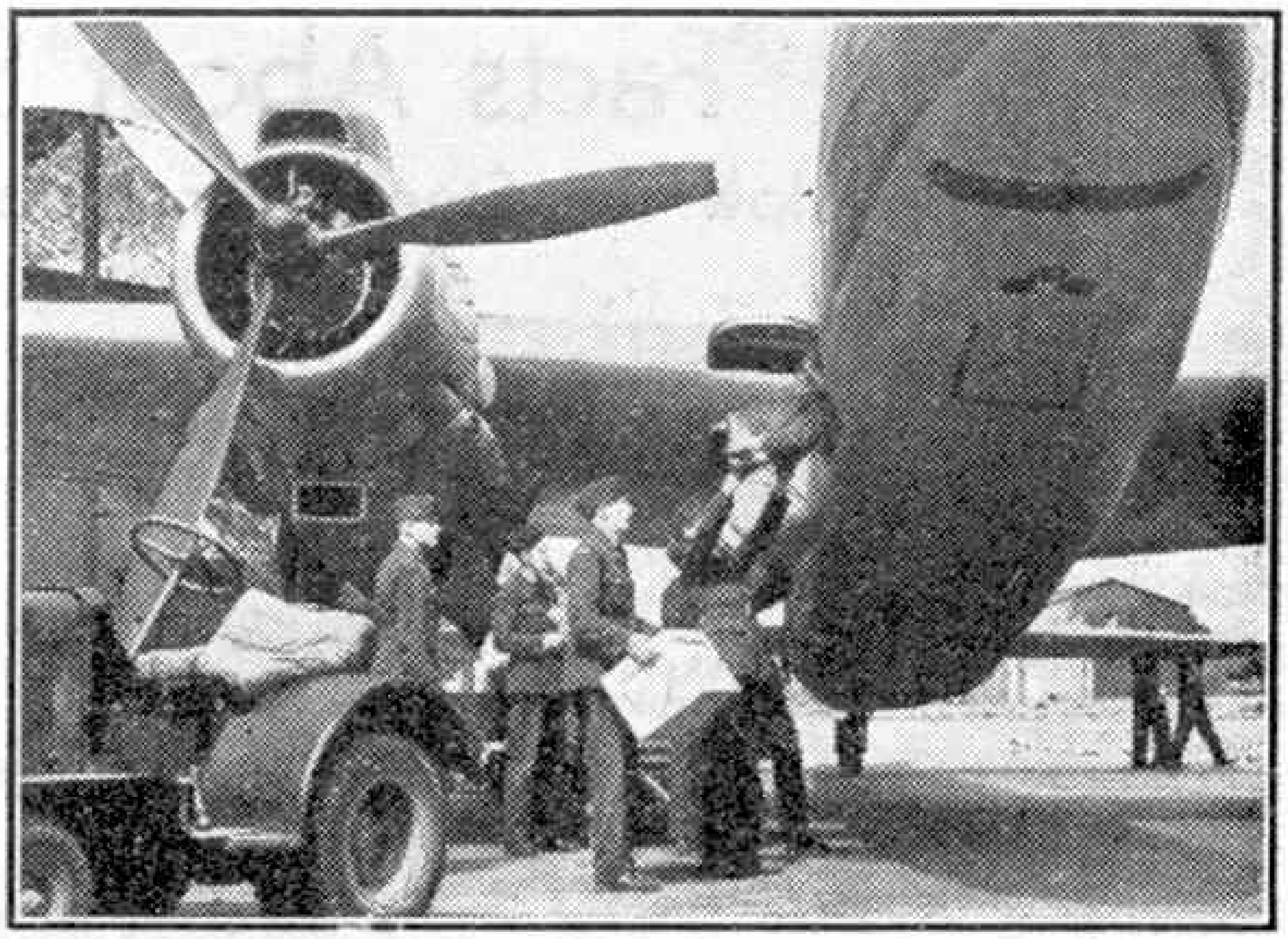
The very first "Wellington" was born in this factory in June 1936. The production "Wellingtons" formed the mainstay of Bomber Command during the first years of the war, paving the way for the 1,000-bomber raids that are now such a regular feature of the R.A.F.'s plan for the systematic destruction of Germany's industry. The "Wimpy" was, incidentally, the first bomber in the world capable of carrying a 4,000-lb. "Cookie"—a fact that Berlin, Bremen, Hamburg, and a score of other cities are hardly likely to forget.

But the advent of the four-motor bomber meant that the "Wellington" could no longer be regarded as a first-line bomber, and so Vickers set to work on a larger machine to supersede it. This was designed to Air Ministry Specification B1/35. Incidentally, the Handley-Page H.P.55, a twin-engined bomber from which the "Halifax" was developed, was also designed to that specification. As the general layout and construction of the "Wellington" had proved so efficient, Vickers decided not to create an entirely new design, but to produce instead a sort of scaled-up "Wimpy." The "Centaurus," "Vulture" and "Sabre" engines were being developed at the time, and so the Vickers design staff were able to obtain the 4,000 h.p. they needed for the "Warwick" by using two of these 2,000 h.p. engines instead of four smaller ones. The airframe was accordingly designed for the alternative use of any of these types of engine. When the first few aircraft were completed, however, the engines were still in the development stage, and so, as numbers of 1,850 h.p. Pratt and Whitney "Double-Wasps" were available, these were fitted instead.



Vickers "Warwick" in the white paint camouflage of Coastal Command, R.A.F.

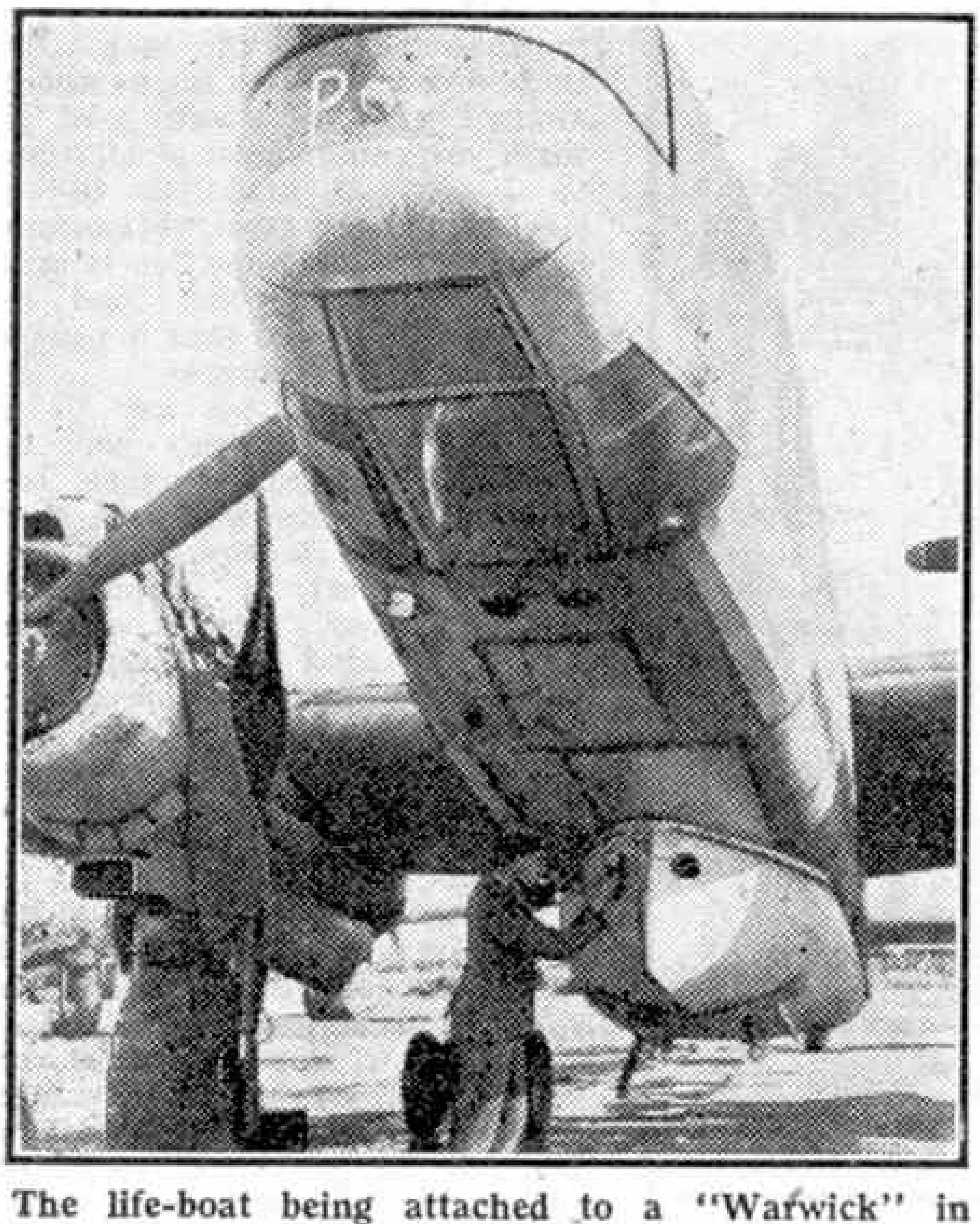
Because of the very satisfactory numbers of "Stirlings," "Halifaxes," and "Lancasters" coming into service at the time, it was decided to convert the "Warwick" into an Air-Sea Rescue machine. Its fine handling qualities and long range made it ideal for this less glamorous but no less vital role, and the "Warwick" soon had an impressive number of successful operations to its credit. At first, two sets of Lindholme gear were carried in the bomb-cells, which provided "ditched" aircrews with bigger dinghies and more rations than are carried by normal operational aircraft. But later it was found possible to carry a 27 ft. lifeboat under the "Warwick's" fuselage, slung from a standard bomb-rack. These airborne lifeboats, which have already been the means of saving many precious lives, are dropped by parachute, and are complete with two motors, sails, and rocket-lifelines which shoot out in all directions as the boat settles in the water. The defensive armament of these aircraft consists of eight .303 in. machine-guns, two in each of the nose and mid-upper turrets and four in the tail turret.



Loading a "Warwick" with small freight. The main freight door is aft of the wing.

At about the time when the first "Warwicks" went into service on Air-Sea Rescue duties, British Overseas Airways Corporation was in urgent need of a good transport aircraft, and so permission was granted for converting 14 "Warwicks" into transports, to deliver mail to British forces in North Africa. The successful completion of that campaign dispensed with the need for specialised mailplanes, and the "Warwicks" were released for general freight and passenger duties. They were so efficient that a considerable number was ordered for Transport Command of the R.A.F.; these aircraft have an enlarged cargo hold.

The unarmed "Warwick" passenger-transport is essentially a "utility" air liner, but this does not mean that it is second-rate or a makeshift. On the contrary, it has all those features most desired in an air liner—long range, good speed and load capacity and, above all, comfort and complete reliability. In addition it must be realised that the question of cost hardly enters into the matter where bomber production is concerned, and so every part of an adapted bomber such as the "Warwick" is the best that money can buy, a very important consideration.



The life-boat being attached to a "Warwick" in service on Air-Sea Rescue work.

The B.O.A.C. version can carry eight passengers in luxurious armchairs or four in armchairs and six in folding seats. Alternatively all the seats can be removed and some three tons of freight accommodated instead. The Vickers-Wallis geodetic construction, so well-proved in action by the "Wellesley" and "Wellington," is light but very sturdy, and easily repairable. It needs little internal structure, and this leaves plenty of space for the freight or passengers.

Some "Warwicks" are now in production for Coastal Command, but little may be written about these aircraft at the moment.

So, three types of "Warwick" are now passing down the assembly lines in those vast factory hangars, and the workers are obviously proud of the fine aeroplanes that they create. Although the "Warwick" has not been able to play a very glamorous part in this war, and probably will have to make way for the "York," "Tudor," "Hermes" and Bristol 167 on the post-war air routes, it should not be forgotten. It has done a first-rate job of work.

Facts About Steel

I—How the Steelmaker Tests his Products

By Eric N. Simons

IT does not matter how carefully a steelmaker has planned and produced his steel, he dare not risk sending it out of his works into the place of use until it has been tested. The reason is that a great responsibility rests upon him, since human lives may depend on the soundness of his work. In wartime this becomes more than usually evident. Every boy knows that if a gun bursts or a tank breaks down, a ship's rudder fails or a bomb explodes too soon, the fault may lie in some steel part of the mechanism, or the steel piece as a whole. But to concentrate on the wartime requirements only is to overlook other important responsibilities of the steel manufacturer present in both war and peace.

The boy travelling in a holiday train is rarely conscious that his life depends on the thoroughness with which the steel driving wheels of the engine pulling his train have been made and tested. One flaw in a wheel travelling at, perhaps, 60 miles an hour, may lead to a smash involving hundreds of lives. Such smashes have occurred. Failure in ball bearing steel may cause a bus or a car to swerve into the roadside and mount the pavement, killing civilians right and left. Failure in a steel section may bring a mighty new bridge toppling down into the river, and waste the work of years, as happened in Canada.

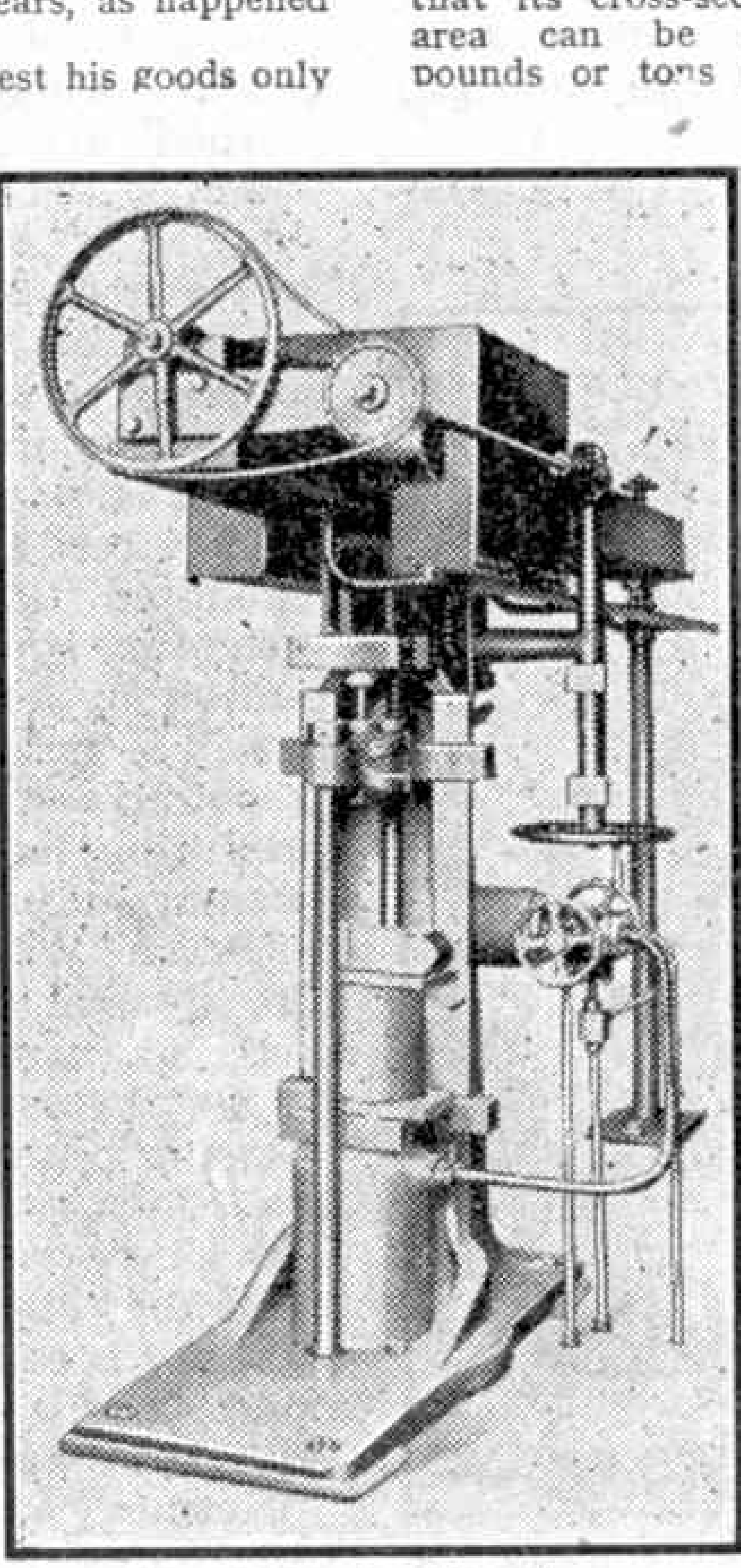
The steelmaker did not begin to test his goods only with the arrival of war. He had been testing them long before, and the methods he uses are so interesting and ingenious that it is seldom faulty material gets through. In this article I shall describe as simply as possible a few of the more important tests, and explain why they are used.

The first test with which we shall deal is known as the tensile test. This test is easy to grasp. Almost every use for which steel is designed in the modern world involves at some time or other a severe "pull" or tugging strain, and the tensile test is designed to see just how much of this type of strain the material will satisfactorily resist. The principle of the test is this. Take a bar of steel about 3 ft. long. Hold one end in each hand, and pull as if you were trying to break cotton or string. You won't move the steel a fraction of an inch; but a machine, specially designed for the purpose, will. It will move it sufficiently to break it, if enough power is exerted; and the force necessary to break the steel can be measured at the same time. That is the tensile test.

But in this test one does not use a steel bar. That would be too difficult and expensive. Instead, a small specially shaped testpiece is used, and its dimensions are carefully and exactly measured both before and after the test. The pull of the machine is called the "stress," and when eventually the testpiece breaks, a record is made of the force exerted to cause this fracture.

Testing steel in the laboratory.

The tensile test, however, teaches us much more about the steel than this. The testpiece has a certain diameter before the test begins, and this means that its cross-sectional area is known. From this area can be calculated precisely how many pounds or tons per square inch of load or stress the steel will resist before it gives way and breaks. The figure thus obtained is known as the tensile strength, or more accurately, the ultimate strength or maximum stress of the steel in tons per square inch. If, therefore, in reading books about aircraft and the steels used in them you come across a reference to a part as made of 40-ton steel or 100-ton steel, this means that the steel in question is able to resist an applied load or stress of 40 or 100 tons a square inch before it fractures.



Tensile Testing Machine.

It is most important to a designer to have this sort of information about a steel, because he then knows whether or not it is safe to use it for the particular part or purpose he has in mind. It is equally important that he should be able to rely upon the information, which he could not do if the steelmaker did not carry out this test at his own works before sending out the steel. The designer would then have to carry out the test himself, which would be a great nuisance, and would waste much time better spent in designing.

Even now, however, what the tensile test tells the steelmaker about his steel is not exhausted. Do not be surprised to learn that steel and elastic have something in common, namely, the property of elasticity. In fact, steel is slightly elastic, which means that up to a certain point it will, after being stretched, go back to its original dimensions when the pull is taken off. Suppose, instead, the pull is continued beyond this point. Then the steel loses its elasticity, and when the load is taken off it does not revert to its original size. In the language of the steel manufacturer, it has "passed its elastic limit."

The tensile testing machine records the precise load necessary to produce permanent loss of elasticity ("permanent set" it is termed) in the steel. Thus, one and the same test yields information about the tensile strength and the limit of elasticity of the steel. And it does something more. Imagine that instead of stopping the test when the steel has been stretched beyond the point at which it would normally spring back (if the load were removed), the "pull" is continued. Then the steel steadily gets longer under the stretching, and gets longer at a much faster rate than before. Steelmakers call this "the strain increasing faster than the stress." This continues until all at once there is a sudden, extremely great lengthening of the testpiece (increase of strain), caused by a comparatively small increase in the load. This point is termed the "yield point" of the steel, and it is not far removed from the point at which the material will break.

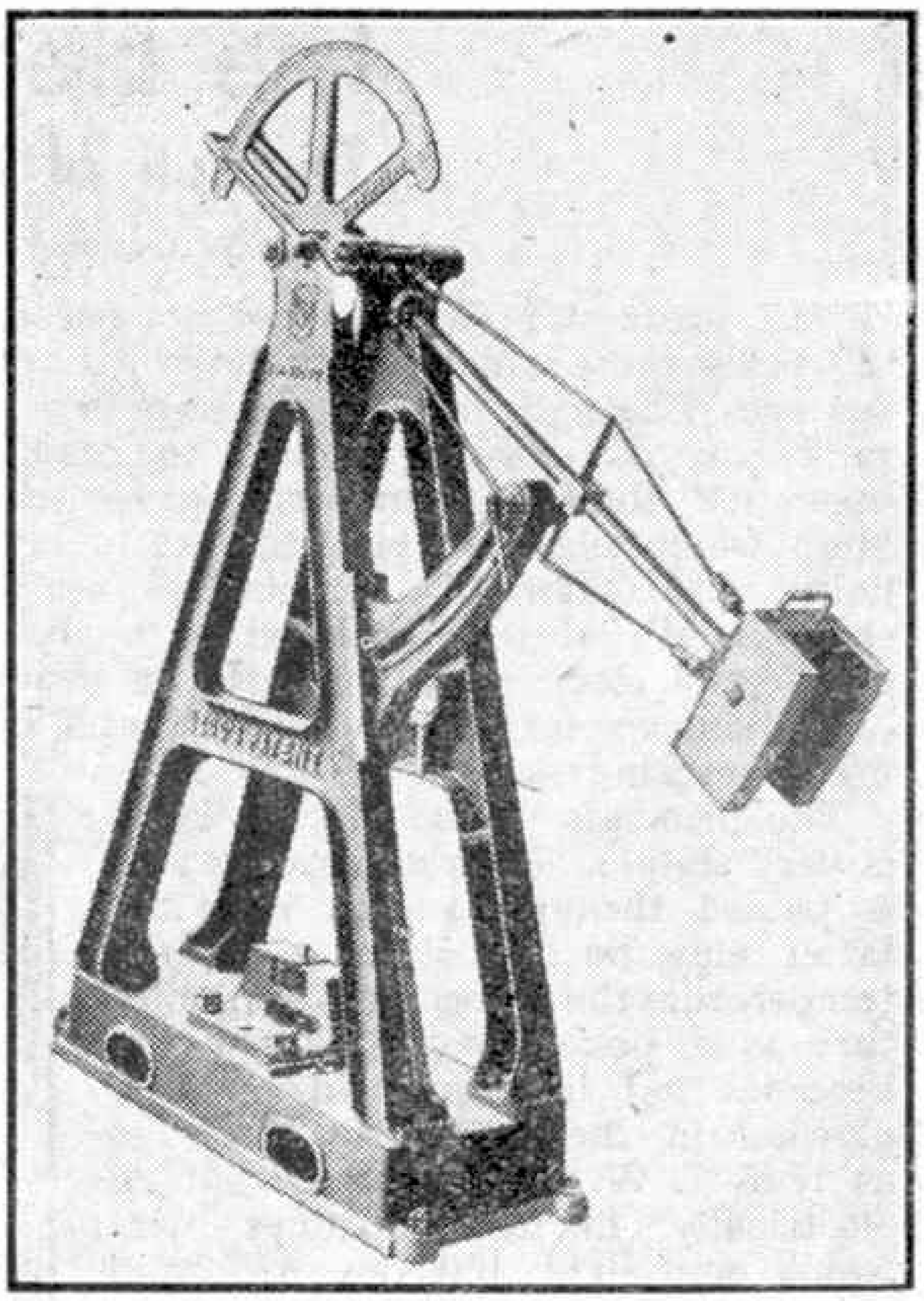
Having fractured the testpiece, the steelmaker now wishes to measure the "elongation," or the amount by which it has lengthened. The standard testpiece is 2 in. long. If, after being broken, it measures 2.2 in., then obviously the elongation is 10 per cent. Elongation is always expressed in per cent. of the original length of the testpiece.

Even now we have not reached the end of the valuable facts the tensile test yields. To lengthen a piece of steel by pulling it until it breaks not only makes for an increase in length, but also for a decrease in diameter, since to lengthen the steel is at the same time to make it thinner, or, in other words, to reduce the cross-sectional area. If the smallest cross-section is measured after the breakage, and compared with the original area, it is simple to calculate the reduction of area, and express this as a percentage of the original area. Here, then, is yet another set of data about a steel. The value of the elongation and reduction of area percentages is that they serve as a necessary indication of the steel's ductility.

The compression test is really the tensile test in reverse. It measures the ability of the steel to resist, not a pulling force, but a pushing or compressive force. A New York skyscraper, for example, is built up of a steel framework. This has to withstand the enormous weight of the structure, such as floors and roofs, pressing upon it. This compressive force is transferred to the rock on which the building is founded. The resistance of the rock exerts a counter-force, and if the steel could not resist the combined action of these two forces it would be so squeezed that it would collapse.

In building a skyscraper, therefore, an engineer must know what compressive force the steel for the main framework will resist. The tensile testing machine will carry out these compressive tests, the only difference being that instead of the testpiece being given a mechanical pull, it is given what amounts to a mechanical push until it collapses and will not recover. In other words, there are elastic limit and yield point for compressed steel as for elongated or pulled steel. The result is again expressed in tons per square inch. An interesting fact is that steel will stand more compression than it will tension, the proportion being between 1 to 1½ and 1 to 2. Nobody yet knows why.

Another test for steel is the bend test. The simple bend test comprises mechanically bending the steel to the desired angle without measuring the power required to achieve this. It is merely a way of ascertaining if a steel is ductile enough. The bend test proper, however, employs a testpiece of known dimensions, supported at each end, and subjected to a bending force applied to the centre. Alternatively



Izod impact testing machine.

the testpiece may be bent about a fixed radius. If the steel breaks before the specified degree of bending has occurred, it has failed. It may suffice to know that a steel can be bent through 90 or 180 degrees without breaking, but more often it is required to know exactly what force is necessary to bend a steel until it breaks, in which case the test goes on until fracture has actually taken place, and the testpiece is measured as in the tensile test.

A most useful test is the impact test, in which a quite different type of machine is used. This test is sometimes called the notched bar test. There are several forms of it, the most familiar in this country being known as the Izod impact test. The machine comprises a heavy base with two uprights bolted on and supporting the pivot of a pendulum The pendulum swings and carries a hardened steel knife edge. The energy developed by the swing of the pendulum is known (120 foot-pounds). The testpiece is given a notch of standard size, and is held in a vice at the base, with the notch facing the pendulum. The pendulum strikes it in its swing, and breaks it as a result of the impact. In breaking, the testpiece absorbs some of the energy of the pendulum. This is measured by making the pendulum, as it continues its diminished swing after breaking the testpiece, move a pointer across a scale marked in suitable divisions. The greater the resistance of the steel, the less the continued swing of the pendulum, and therefore the shorter the distance covered by the pointer. The desired figure is obtained in foot-pounds from the distance travelled by the pointer.

This test is employed to tell the designer how far a steel is capable of resisting a sudden shock. This makes it of the greatest value in testing steels for aircraft and automobiles, where inability to resist a sudden shock might be disastrous.

Hardness is another property of steel that must be tested. There is no absolute test of hardness, but various relative tests are used, and of these the best known is probably the Brinell (*Continued on page 70*)

The Electric Lamp

A Triumph of Manufacturing Skill

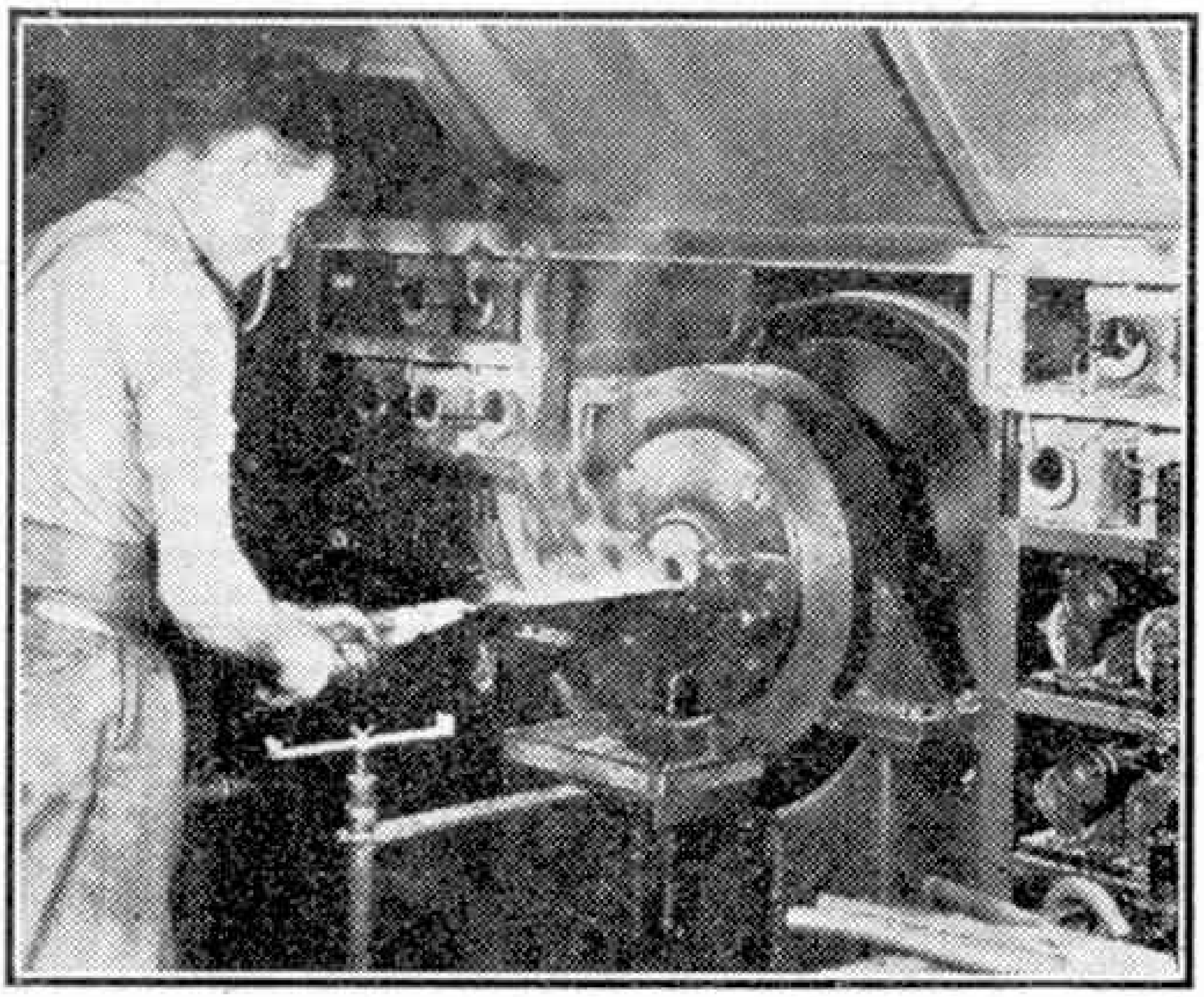
By Trevor Williams, B.A., B.Sc.

THE greatest inventions are not necessarily those which most readily attract the eye. The giant liner or the amphibious tank are no greater tribute to man's ingenuity than the unobtrusive electric lamp which plays so vital a part in our daily life. Outwardly so simple—just a short length of wire enclosed in a glass globe—the electric lamp represents years of patient experiment and a triumph of manufacturing skill.

The principle of the electric lamp is very simple. If an electric current is passed through a thin wire the latter may be heated to so high a temperature that it becomes luminous, just as a poker heated in the fire becomes red hot and can be seen glowing in the dark. As long ago as 1845 J. W. Starr showed that an electrically heated platinum wire would emit light, but the road from this first lamp to the millions now produced every year has been beset with difficulties. Starr's lamp gave too feeble a glow to be of any practical importance, but his work gave the lead to other experimenters. The first satisfactory lamp was not made until 1878, when Sir Joseph Swan, in this country, and T. A. Edison, in America, independently produced the first lamps to give a useful light. These brilliant inventors used lamps outwardly very similar to those in use to-day, save that in the place of a metal filament they used one made of carbon, a very remarkable substance familiar to us in a number of different forms, such as graphite, soot, charcoal and diamond.

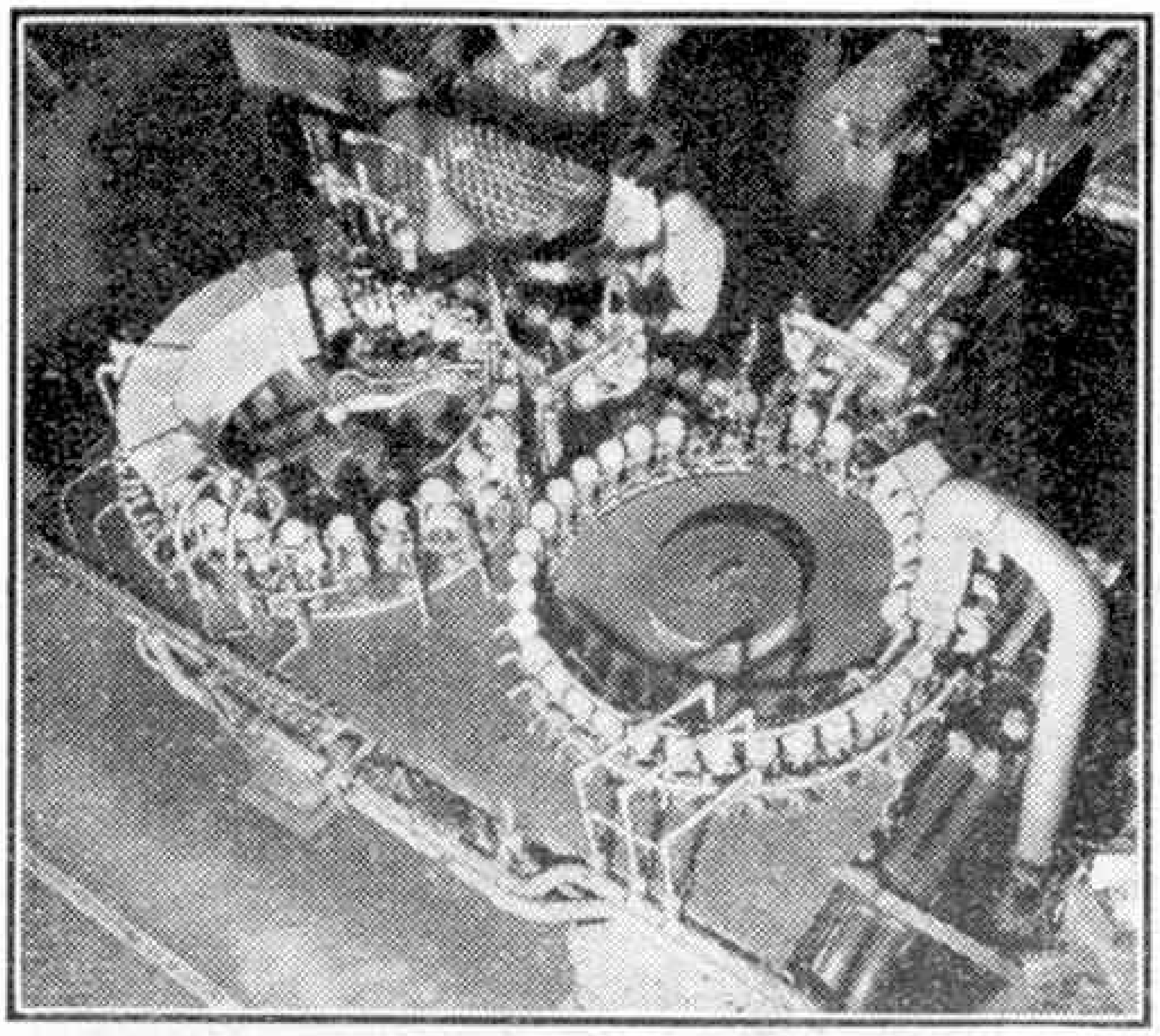
To prepare carbon in the form of a wire was a difficult problem which the two inventors solved in different ways. Edison searched the world for a natural fibre which would serve his purpose and eventually chose bamboo. He found that if bamboo fibres were roasted in a furnace everything except the carbon was driven off and he was left with a thin tough carbon filament. Swan prepared fibres similar to those of artificial silk, and he converted these also to carbon filaments by roasting. The rest of the process of lamp-making lay in mounting the carbon fibres within a glass globe from which all the air was extracted, to prevent the thin carbon thread burning away.

To-day the carbon-filament lamp is largely of historic interest, as other types have been devised that give more light with the consumption of less electrical current. Until quite recently they were being used on board battleships and in other places where it is necessary to have lamps capable of withstanding heavy shocks, but the modern lamp with its metallic filament is so robust that it is rapidly replacing the carbon type even for these purposes.



Withdrawing a tungsten rod from the electric furnace. The rod will later be drawn into the thin wire used for making lamp filaments. The illustrations to this article are reproduced by courtesy of The General Electric Co. Ltd.

Even at the time when the carbon filament lamp was coming into general use inventors were searching for more efficient types of filament made of metal. Platinum would have been better than carbon, but has the disadvantage of melting when hot enough to emit a really bright light. The lamp with a filament made of tantalum was the first to reach the commercial stage. To obtain a bright light a long thin filament of tantalum wire was used, draped over a set of wire supports. Osmium lamps also proved temporarily successful, but both osmium and tantalum have now been largely replaced by filaments made of tungsten. For many years this metal could be obtained only in the



The machine that seals and exhausts the bulbs in which the filament and their supports have been fitted.

form of a powder and the problem of converting this into a strong wire was not solved until 1907. The early tungsten lamps were very fragile and the number of breakages occurring between factory and consumer was high. Nevertheless the lamps were twice as efficient as the carbon lamps and after long perseverance much stronger filaments were prepared.

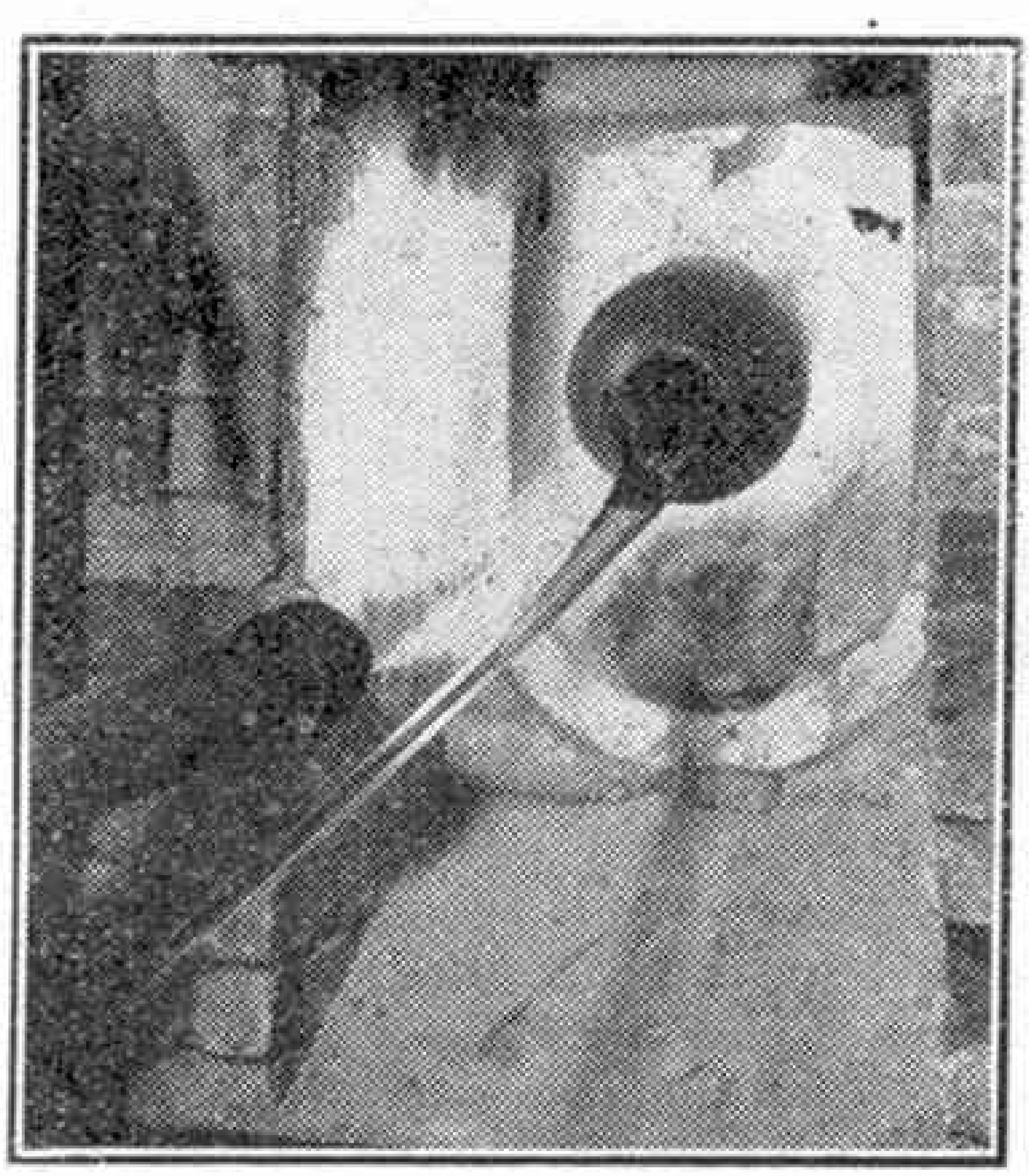
Most lamps in use to-day contain tungsten filaments. Just as water slowly evaporates if left to stand, so a white-hot tungsten filament also will slowly evaporate and a black film of tungsten is deposited on the top of the lamp. To overcome this difficulty many modern lamps are filled with a gas, usually argon or krypton. By using gas-filled lamps it is possible to heat the filament to a higher temperature and so obtain a brighter light.

A fascinating variety of ingenious machines is used in the manufacture of electric lamps. Until a few years ago the glass bulbs were blown by hand, an operation requiring a high degree of skill, but to-day much of this work is done by wonderful bulb-blowing machines. Iron arms flash into a pot of molten glass and transfer just the right amount to the blow-pipes. Compressed air is used to blow the liquid glass into a bubble, and the blow-pipes swing and revolve in uncanny imitation of the craftsman's action. The bubbles are automatically enclosed in moulds which fall apart in cooling baths, leaving the bulbs suspended. The suspended bulbs are picked up on an endless chain and the rough necks are knocked off by a special device.

If you glance at an ordinary electric lamp you will see that the glowing filament is carried on wire supports springing from a central glass stem or "foot," as it is called. To-day this foot is manufactured mechanically from glass tubing. The supports are made from short lengths of molybdenum wire, hooked at the end to prevent the filament slipping off. These supports were at one time put in by hand, but now yet another ingenious machine has been devised capable of inserting them all in one operation. The actual mounting of the filament however is still done by hand. Its ends are clamped to stout wires, sealed into the glass foot, through which wires the electric current is led to the filament. The foot with the assembled filament is then inserted in the bulb and joined to it by melting the glass at the points of contact, so making a permanent gas-tight weld.

The bulb is then exhausted in yet another automatic machine, the air being pumped out through a tube running through the centre of the foot, which is then sealed off. In the case of gas-filled lamps the gas to be used is introduced immediately after evacuating the bulb preparatory to its final sealing. Finally the metal cap is cemented on and the leading-in wires are soldered to its two brass terminals.

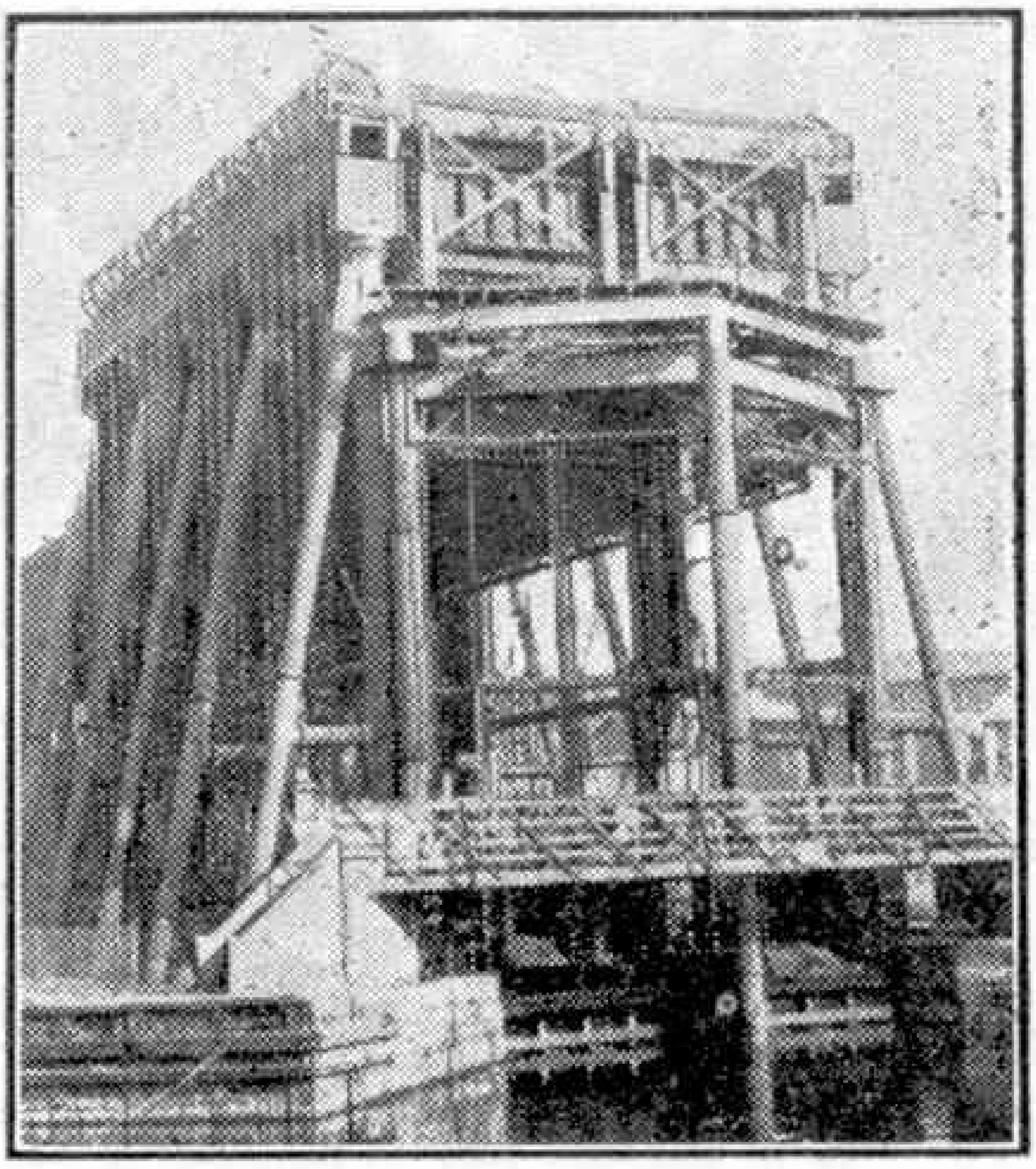
The process of manufacture is of course carefully checked at all stages, but as a final check samples from every batch undergo a rigorous test of life under standard conditions, while the light they emit is measured.



Drawing glass tubing from the furnace. This is used for making the central stem or "foot" of the lamp.

A Lift that is Used by Barges

By John Clifford

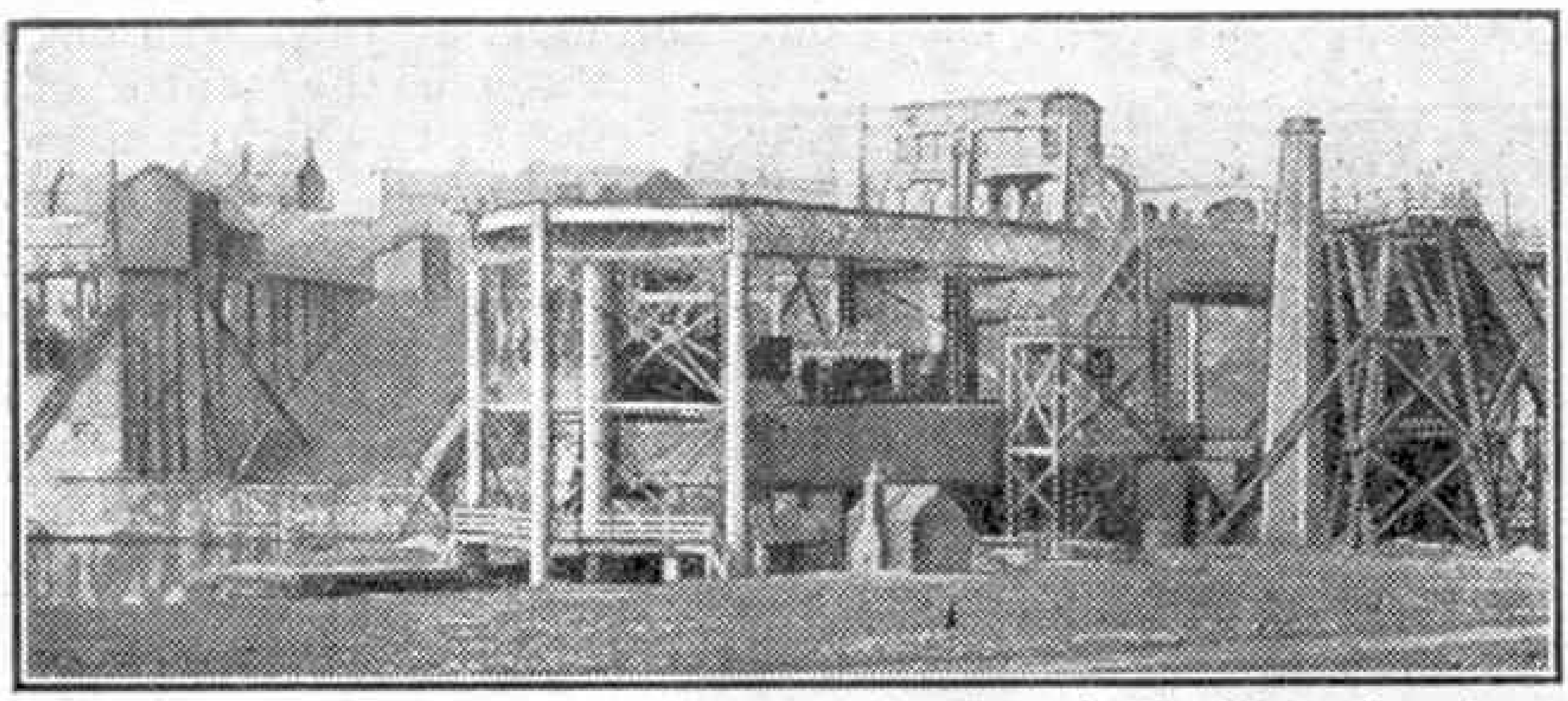


The Anderton lift, which connects the Trent and Mersey Canal with the River Weaver.

WHEN walking along the banks of the Trent and Mersey Canal I came to the lift that has made Anderton famous. The lift is unique in England, providing intercommunication between the canal and the River Weaver, which is 50 ft. below. A canal barge passed me and entered the "caisson" or "tank," and the gates closed behind it. Gently the tank was lowered to the bottom of the lift, the gates were opened, and the barge nosed its way into the waters of the River Weaver.

I was about to pass on when an old man asked me for a light, and as he puffed away at his briar pipe he told me that he remembered the original lift being built. "Isn't this the original lift?" I asked as he returned my matches. "Oh no," he replied, and leaning on the rails he told me the story, which ran something like this.

About the year 1870 it was thought desirable that there should be some communication between the towns on the river and the Potteries. Some people suggested that this could be done by a series of locks, but the late Mr. Edward Leader Williams conceived the idea of a hydraulic lift. This idea was acceptable, for by this method the loss of water by the canal was negligible, and in the year 1875 the hydraulic lift was officially opened. It was 257 ft. long and 45 ft. wide, and the total weight of the approach aqueduct, including the water, was 1,000 tons. There were two tanks, each supported on hydraulic rams, and one was always up when the other was down. Nine tenths of the work was done by the slight difference of weight between the two tanks, and the remaining tenth by a hydraulic pump.



When first built the Anderton lift was hydraulic and this illustration shows it before its conversion to electrical working.

For the first 10 years the lift worked without giving any serious trouble. Afterwards considerable difficulty was experienced in maintaining the hydraulic pressure, and in 1904, when major repairs were inevitable, it was decided to abandon hydraulic power in favour of electricity. The principle then adopted was to suspend the tanks by means of wire ropes passing over pulleys 6 ft. in diameter, and the pulleys were driven by an electric motor through a system of gearing. Heavy counterweights were fixed to the free ends of the ropes, and each rope was subjected to a stress of about 7 tons per sq. in. All the working parts were made easily accessible, and only two men are needed to operate it. The electrification of the lift made it possible to handle more traffic, and the man responsible for its reconstruction was Col. J. A. Saner, M.Inst.C.E.

It was growing dark when I took my leave of the old man, but the caissons, each 75 ft. long and 15 ft. wide and 250 tons in weight, could still be seen moving up and down like the pans of a gigantic scale.

Fire Fighting in Storm at Sea

The Epic Story of the *"Delius"*

By Denis Rebbeck, M.A. (Cantab.), M.I.N.A.

THE single screw motor vessel *"Delius"* was built and engined at Belfast in 1937 by Harland and Wolff Ltd. to the order of the Lamport and Holt Line Ltd. She is a cargo and passenger vessel, intended for the South American trade, sailing between Liverpool and the River Plate, and was the first of three sister ships, the other two being the *"Devis"* and the *"Delane."* The last of these ships was completed in January 1938.

The length of these vessels is 456 ft., the beam 62 ft. and the depth 37 ft. 9 in., while they have a gross tonnage of 6,000. The propelling machinery consists of a double-acting two-cycle Harland-Burmeister and Wain Diesel engine developing 4,000 b.h.p.; this gives the ship a speed of 15 knots, which is very creditable for a cargo vessel, especially when we remember that she is seven years old.

In design the *"Delius,"* together with her sister ships, was considered to be among the most striking of recent years, a notable feature being the combining of her superstructure with the streamlined funnel. This was done with the idea of saving space and of giving the best layout, and the funnel therefore becomes merely a carrier for the exhaust silencers from the main engine. At the same time it is also partly a chart-house and partly a cabin.

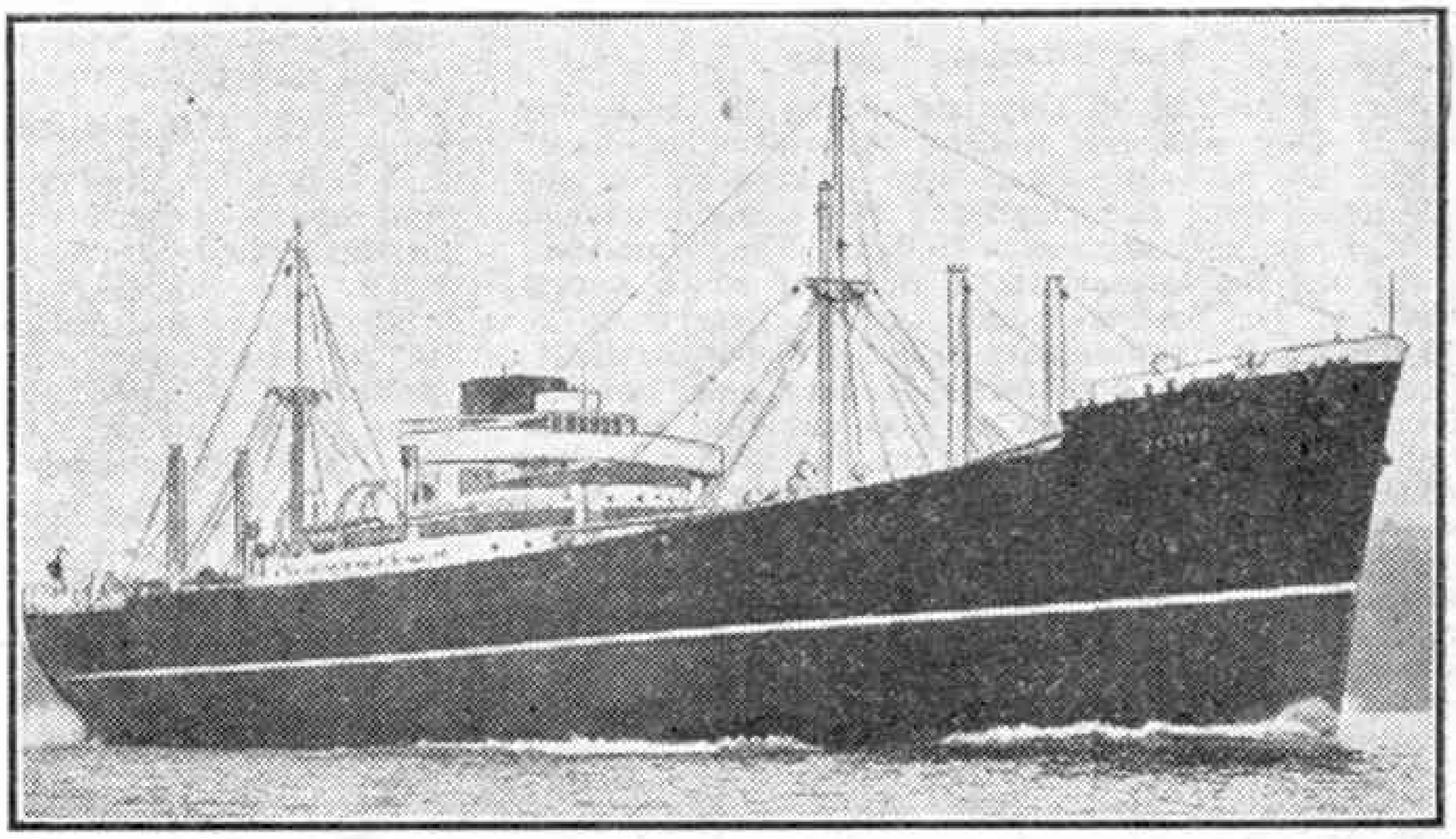
Some indication of the success of this unusual arrangement is given by the fact that quite recently reference was made in the technical press to further ships of this class being completed during the war period for the same owners. A very similar layout was adopted, the best proof of a good design.

The *"Delius"* class of vessel has six holds and six hatches. Each hatch is 20 ft. in width, which allows easy and quick stowage; and the hatch lengths vary from 20 ft. 3 in. to 34 ft. 8 in. Accommodation is provided amidships for 12 passengers, who have very pleasing cabins and public rooms.

It will be appreciated then that the M.V. *"Delius"* was one of the best ships for carrying cargo that Great Britain possessed when in September 1939 the second World War broke out; of the 9,060 ships of 21,000,000 gross tons owned by Great Britain and the Dominions in September 1939, the *"Delius"* was one of the thousands ready to play her part through hectic warring years.

Now we come to the epic story of this ship, and to the description of how brave men saved her from destruction. Details were officially released last year of a convoy battle that raged for four days and three nights out in the Atlantic, 250 miles west-south-west of Cape St. Vincent, when in spite of savage attacks only two ships sustained any damage. One of these two vessels was the *"Delius,"* which was homeward bound from India with 8,000 tons of cotton and peanuts on board. After enemy reconnaissance planes had shadowed the convoy for some time, a heavy air attack was launched by glider bomb planes. A Heinkel 111 which was three miles away from the convoy and flying at 2,000 ft. released a glider bomb that curved down towards the ships, then banked steeply and struck the *"Delius."*

The master and lookout who were standing on the bridge were killed instantly, and the blast wrecked the saloon, killing a steward and also the bo'sun, who was at work on the deck. The acting chief officer and a naval gunner were seriously injured and died later, whilst other members of the crew received injuries. The bridge and a large area of the forepart of the ship were wrecked. Fire broke out in the hold below, which resulted in the engine room bulkhead next to the hold becoming red hot.

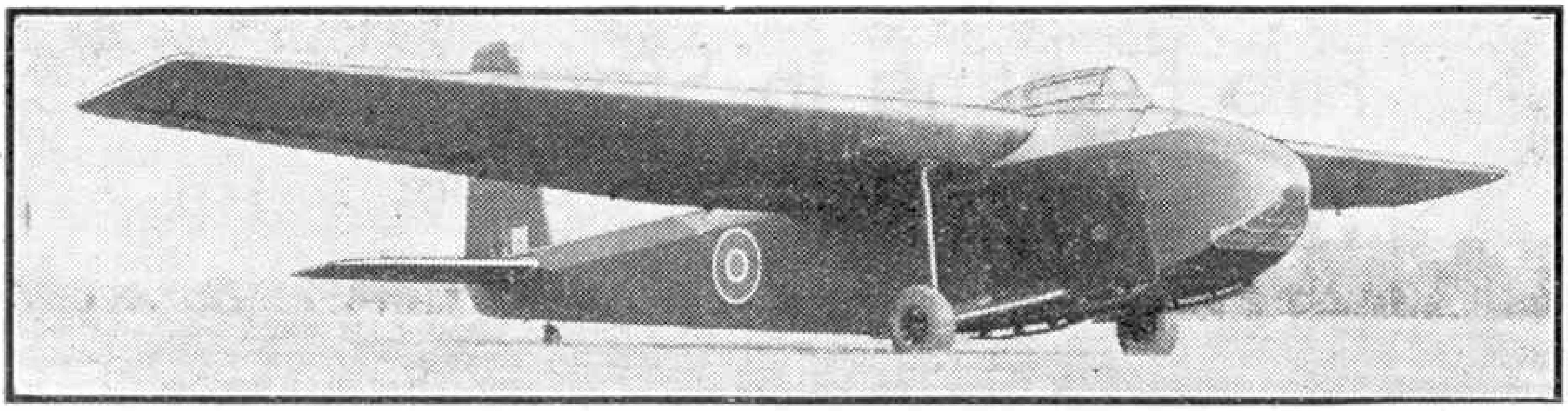


The motor vessel "Delius," the crew of which fought fire for days in stormy weather after the vessel had been hit by a glider bomb while in convoy.

The second officer took command, as the chief officer had died earlier on the voyage, and for five days he went almost without sleep while he navigated the ship and fought the fire. As the crew grappled with the fire the second officer signalled a corvette, which was busy picking up survivors from another bombed ship, and eventually this corvette was able to send over a doctor to attend to casualties. The ship's hose had been torn to ribbons by the bombing, and before day and night fire parties could be organised new hoses had to be brought on board from destroyers which came alongside.

In appalling weather the convoy ploughed on after the fight. For 24 hours, while the ship's crew battled to keep the fire under control and to repair the steering gear, which had been damaged, the *"Delius"* dropped astern. But later on she caught the convoy up again and held her station in it until the United Kingdom was reached. Throughout the voyage the gallant engineers kept the main engine and auxiliaries running, although the cargo in the hold next to the engine room was still on fire. The chief engineer, by drilling holes in the engine room bulkhead and pumping steam into the hold, managed to keep the fire under control.

This unvarnished tale of heroism on the high seas in the face of many adversities is typical of experiences which our Merchant Navy have faced, and are facing to keep open the sea lanes of the Allies.



General Aircraft "Hamilcar" Glider. It is larger than the Avro "Lancaster" bomber and can carry a 7-ton "Tetrarch" tank.

Air News

The "Hamilcar" Glider

One of the biggest surprises sprung on the enemy on D Day was the General Aircraft "Hamilcar" glider. It has since been used extensively on the Western Front, particularly in the airborne attacks at Nijmegen and Arnhem in Holland. The "Hamilcar" is by far the largest Allied glider of which details have so far been released, and can carry up to 15,000 lbs. of equipment, including jeeps, artillery, Bren gun carriers, and stores. Its chief asset however is that it was designed to accommodate a small, but formidable tank, thus for the first time providing Allied airborne forces with much-needed armoured support. This 7-ton tank, the "Tetrarch," was designed especially for the job and is armed with two .303 in. machine-guns and a 37 mm. cannon. The tank engine is started up in the air before the glider lands, and as soon as the "Hamilcar" touches down its nose is hinged open to allow the tank to be driven straight into action. Alternatively, in an emergency, the "Tetrarch" can smash through the fuselage skin of the glider.

The "Hamilcar" has a wing span of 110 ft. and is about 70 ft. long. But although this means that it is bigger than the "Lancaster," it is very manœuvrable and can be landed by day or night in quite a small space. Its undercarriage is jettisonable, of course, and large flaps are provided under the wings to reduce landing speed. J.W.R.T.

Jet-Assisted Take-off for U.S. Navy Aircraft

It was recently announced that the U.S. Navy is using jet-assisted take-off (JATO) for many of its carrier-based aircraft. The jet units, which are usually attached to the fuselage, are easily fastened in place and can be jettisoned after take-off. Each consists of a cylinder full of solid propellant, which includes oxygen in the mixture so that it can burn without air. It is fired electrically and the gases are forced out of a small vent at the rear of the unit. Jato units develop about 330 h.p. each, and their use reduces the length of take-off run by as much as 60 per cent. J.W.R.T.

"Priority X"

It can now be revealed that to combat the flying bomb attacks special equipment was flown across the Atlantic from the United States for our anti-aircraft defences. For security reasons this equipment was known only as "Priority X," the highest priority of all, but the British Overseas Airways' flying and ground staffs who flew and handled the consignments had an idea what they were, and "went to it" accordingly. Not a single consignment was late, and for many days staffs worked far into the night unloading the aircraft and loading the equipment on to lorries which rushed it direct to the anti-aircraft batteries.

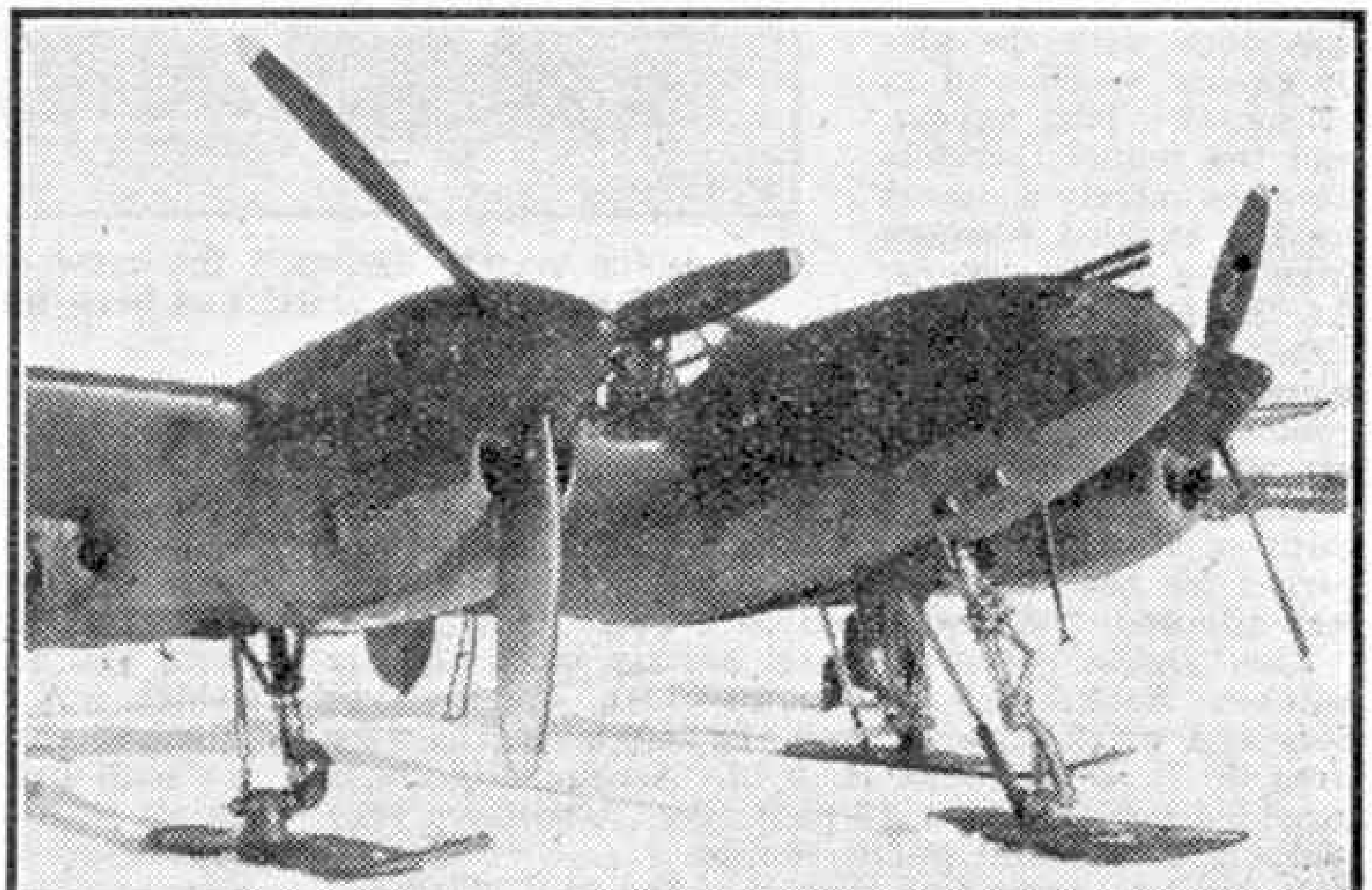
U.S. Helicopter Developments

A helicopter large enough to carry four passengers and capable of cruising at 120 m.p.h. has been designed in the United States.

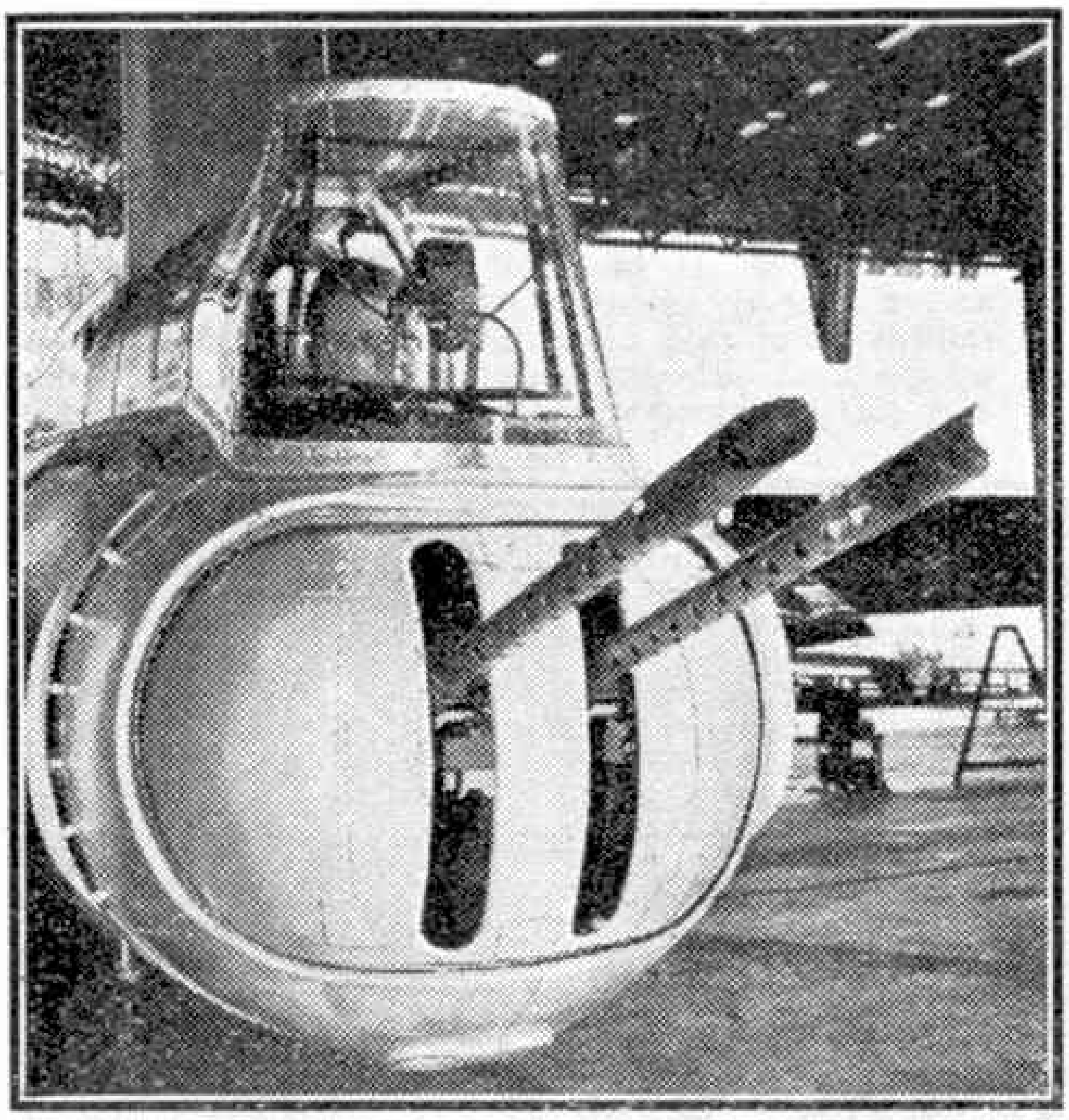
Mr. Igor Sikorsky, the famous aircraft designer, said recently that helicopters able to carry from 12 to 20 passengers "are not beyond reasonable expectation." He added, however, that it will be a long time before machines of this type capable of flying as fast as the ordinary aeroplane will be in service.

"The Stars Look Down"

Shortly after D Day, American Air Force engineers in France specially modified a North American "Mustang" to enable General Eisenhower to make an aerial reconnaissance of the battlefield. The fuselage fuel tank was removed and the radio and other equipment moved aft to make room for a passenger behind the pilot. The two-seat "Mustang" is apparently quite comfortable and the all-round view excellent. The machine is named *"The Stars Look Down,"* because, on its first flight, it carried the four-starred General Eisenhower and his pilot, the two-starred Major-General Quesada, chief of the U.S. 9th A.A.F. Fighter Command. J.W.R.T.



A Lockheed P-38 on skis, photographed at Ladd Field, Alaska, last winter. It is one of the first machines in the world to have retractable skis. This photograph and the upper one on the next page are by courtesy of Lockheed Aircraft Corporation, U.S.A.



The new swivel turret in the tail of the latest "Flying Fortress," described on this page.

Improved Gun Positions in the "Flying Fortress"

Improved gun positions are features of the latest "Flying Fortress" heavy bombers being turned out by the Lockheed Aircraft Corporation, who are helping to cope with the U.S. Army Air Forces' demand for more and still more of these great machines. In the latest "Fort" the tail gunner operates from a newly designed turret that gives the twin .50s it contains a 90 deg. swing of fire as compared with 60 deg. on the old type. Its full plexi-glass sides and top give him a better and quicker view of attacking fighters, its reflector sight gives him a better shot, and its armourplate—an all-around "flak curtain"—provides needed protection against spraying ack-ack and machine-gun fire. Additional protection also has been added in an expansive quadrangle of inch-thick bullet-proof glass in front of the gunner's face. As for ammunition, the new "stinger" can pour out half again as many rounds as the old type.

The waist gun ports in the aircraft have been enlarged, and closed with plexi-glass to reduce noise and to keep out the bitter stratosphere cold. The modifications at the side positions give the gunners a great deal more freedom of action. More protection against frontal attacks is provided, too, in greater freedom of movement for the cheek guns, which makes it possible to fire them in an arc that extends from the sides of the aircraft's nose almost straight backward or forward.

Armourplate has been added at all of the gun stations to deflect anti-aircraft fire.

"Commando" Transport Improved for Post-War Air Lines

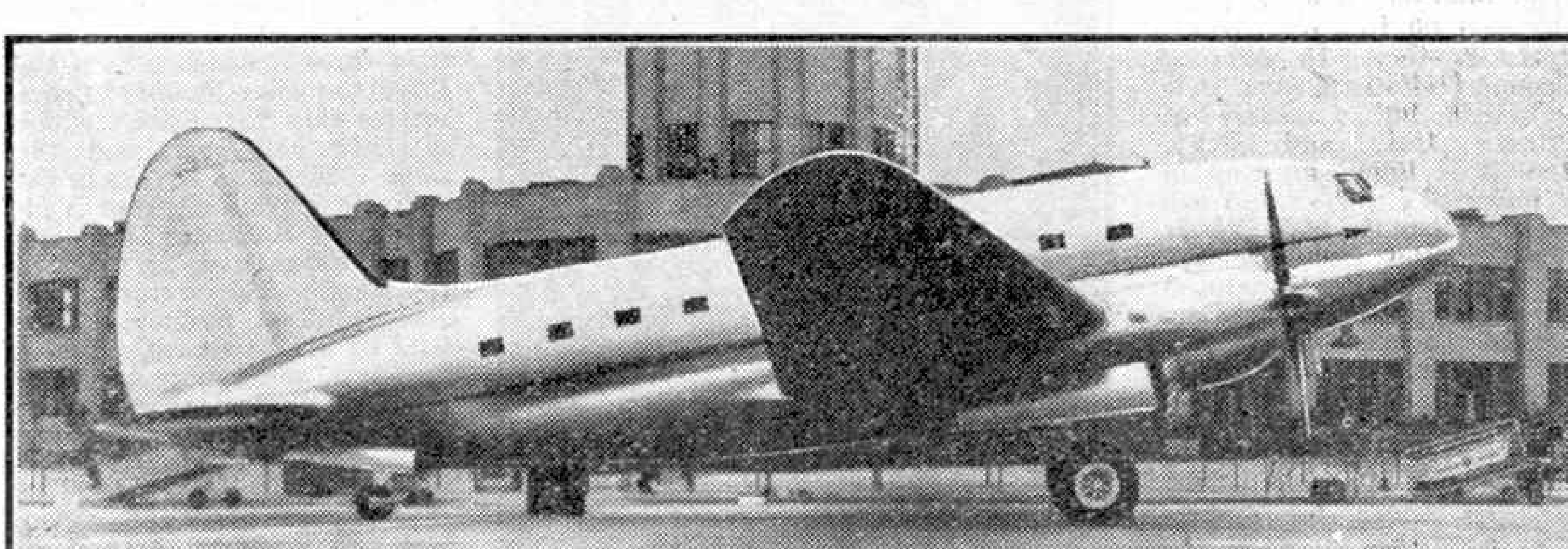
The Curtiss CW-20 "Commando," which was "drafted" into military service just over three years ago as it was about to make its debut as a luxury air liner, will have many improvements when it goes into post-war airline service. It is a 36-passenger machine, with a range of 1,520 miles, and is claimed to be the biggest and the fastest twin-engined transport in the world. An article on the first of these machines after it was acquired by British Overseas Airways appeared in the April 1942 "*M.M.*"

The most noticeable external change is a re-designed nose with recessed windshield to improve pilot visibility. The windshield is of the flat glass type that eliminates distortion and has two double panes of safety glass separated by an air space. Other design changes in the post-war "Commando" are all-welded, easily removable fuel tanks, more powerful engines, greater speed, and better flight control. Improved seating and roomy overhead racks for small luggage are among changes made in the passenger accommodation. This improved commercial version of the "Commando" is shown in the lower illustration on this page.

Eastern Air Lines, one of the chief U.S. transport companies, have ordered a fleet of the improved "Commando" as part of a big post-war expansion programme. This company have for two years been operating Army Curtiss C-46 "Commandos" for U.S. Air Transport Command on duties which to date have involved 10,000,000 miles of operational flying, much of it over water, including the Caribbean and the South Atlantic between South America and Africa; and not one flight has been missed on account of bad weather conditions. U.S. A.T.C. "Commandos" also have given wonderful service over the toughest air line route in the world — the "hump" over the 20,000 ft. Himalayan mountains between India and China. Flying by night and day, in all weathers, these machines have for many months past carried three-quarters of the tremendous tonnage reaching China over this "aerial Burma Road."

* * * *

Since the article on the Hawker "Tempest" in last month's "*M.M.*" was written both Wing Commander Beamont and Squadron-Leader Berry have been posted "missing" from air operations on the Continent and Beamont has been reported a prisoner of war.



The commercial version of the U.S. Army Curtiss "Commando" transport, showing the new recessed nose design. The old nose was flush with the fuselage contour. Photograph by courtesy of Curtiss-Wright Corporation, U.S.A.

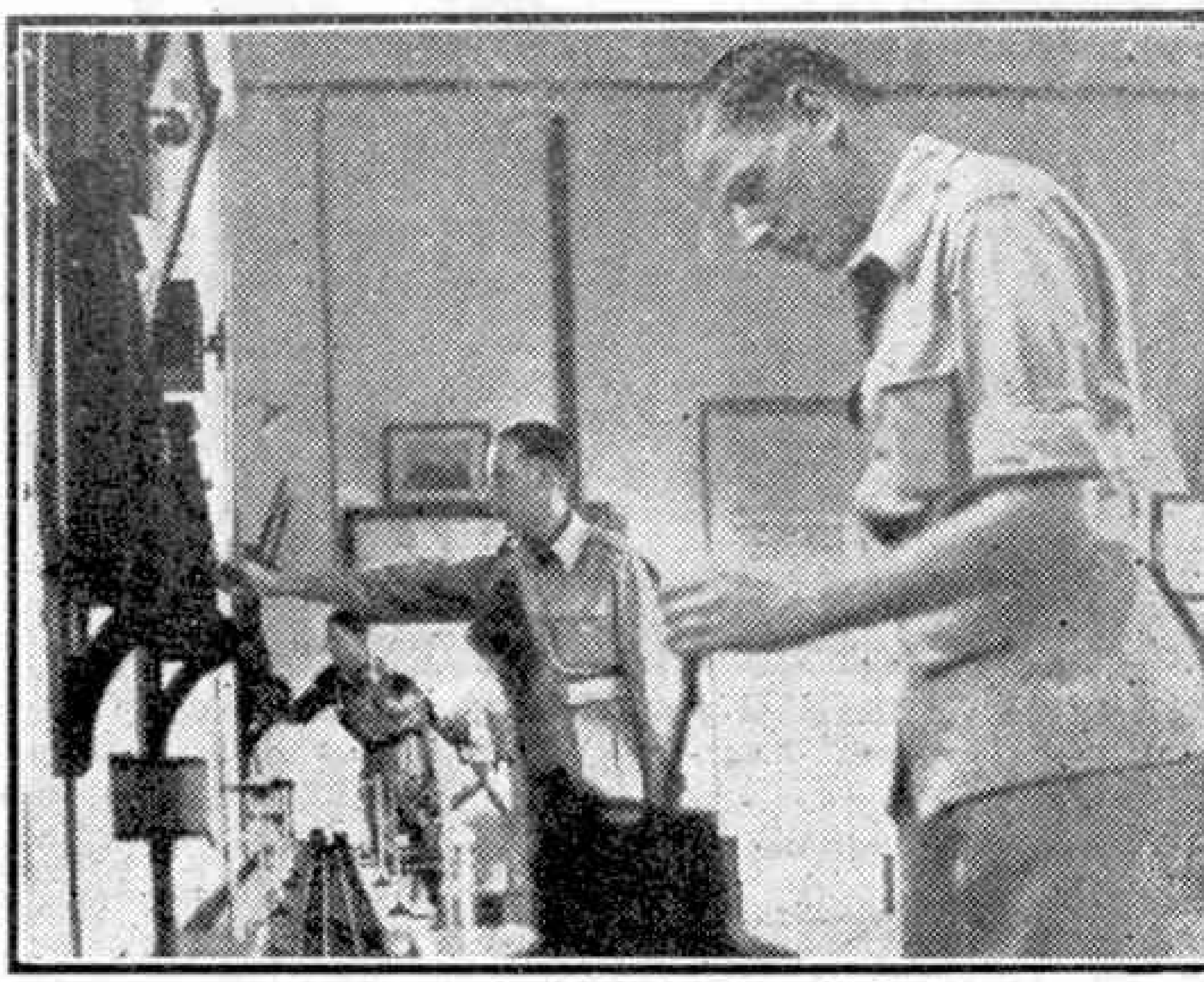
Of General Interest

Water!

Our country is the target for an amazing number of raindrops every year. About 52 million million gallons of water make up our average annual rainfall, and with memories of the terribly wet weather of last October and November we can quite well believe this.

This certainly seems a lot of water, and it is interesting to know where some of it goes. Those of us who live in cities use from 30 to 40 gallons a day, while the countryman uses 10 to 12 gallons. A cow requires about 16 gallons every day, so that a farmer with a large herd of dairy cattle has to look carefully to his water supply. We need water too for many purposes that are unsuspected by ordinary people. We all know that it is boiled away in huge quantities in the boilers of steam engines, locomotive and stationary; but how many of us stop to think that every unit of electricity used for lighting or heating purposes has requized 90 gallons of water in its production? Altogether nearly 7,000 million gallons are used for cooling purposes at British electric power stations every day.

We don't use all our rain, but we do take out 4½ to 5 million million gallons every year. Of the total of 52 million million gallons, one-third finds its way back to th air by evaporation, another third runs down to the sea in rivers, and the remainder percolates through the ground, or rather through strata that can be penetrated by water, for there are many that cannot. It will be seen that there is plenty more water for us when we want it, but in any case water is not in the same position as other riches of the earth, such as metallic ores and coal. When we mine these we are using up the accumulations of past ages, with the knowledge that these cannot possibly be replaced at anything like the same rate as that at which they are disappearing. Water is always with us, however. It comes to us from the sea, a practically inexhaustible reservoir, and practically all of it finds its way back there, either directly or after serving our purposes, to start out on its great circuit once more.



Army railwaymen prepare for "Civvie Street." Students operating a miniature railway. British official photograph. Crown copyright reserved.

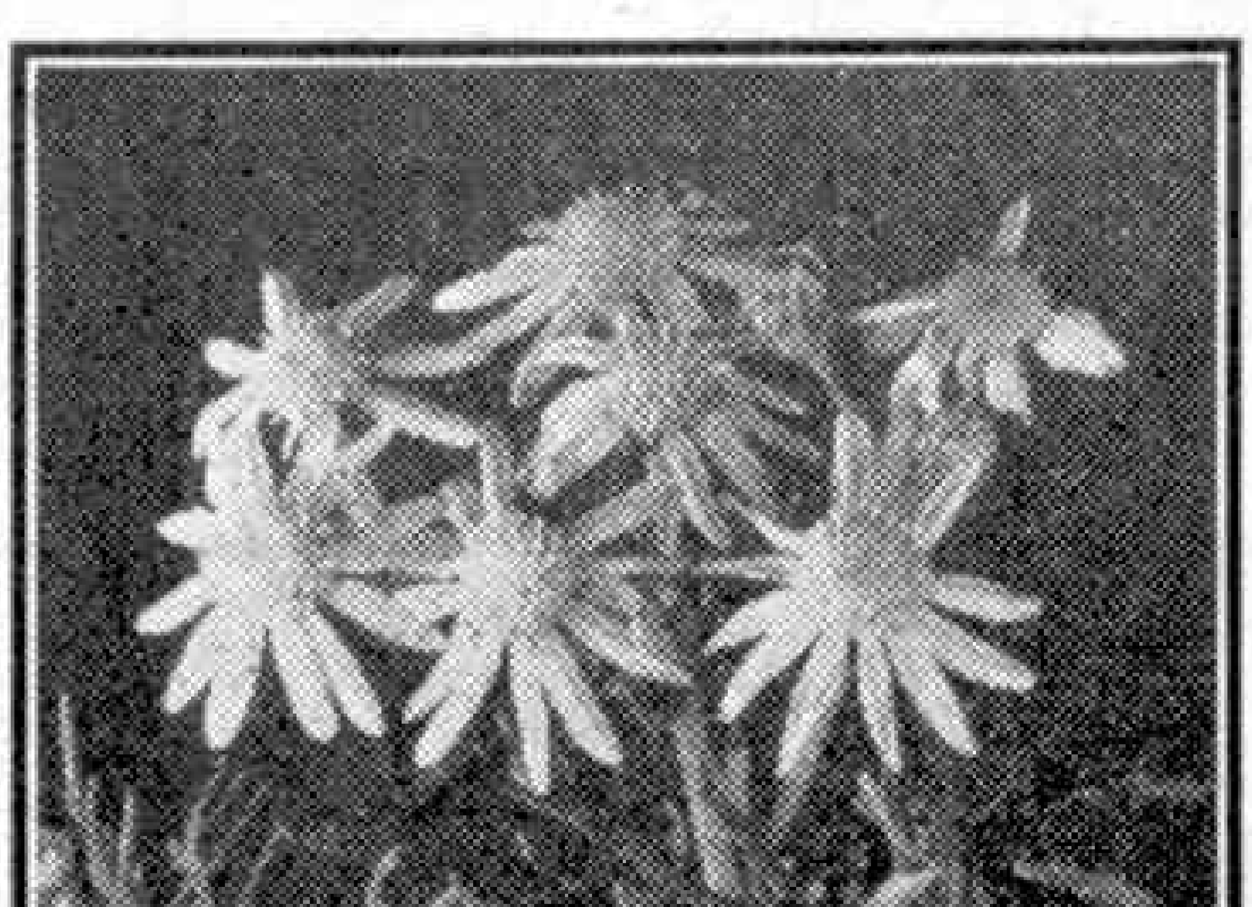
Plant that Spread by Rail

The innocent looking plant illustrated on this page has a surprising story. In spite of its name Oxford ragwort, it is not British, but is a native of Southern Italy and Sicily, where it is found growing in the midst of the lava and ash of the volcanic regions. It takes its name from the fact that specimens were introduced to the Oxford Botanical Gardens towards the end of the 17th century.

Seeds from the original plants established themselves on walls near the Botanical Gardens, and for nearly 200 years no wider distribution of the plant was observed. In 1877 a few plants were seen near the railway at Oxford. The clinker and ballast on which the tracks were laid apparently provided an ideal growing medium, reminiscent of the lava and ash of its native haunts, and a healthy colony was soon flourishing by the railway. The rush of air from passing trains caught up the light airborne seeds and carried them farther and farther along the tracks, until by 1890 this foreign invader was reported at Swindon, and by 1916 it was in Denbighshire. Since then it has been reported from many places all over the country, due primarily to the railways performing their orthodox function of distribution in a most unorthodox way.

As can be seen from the accompanying photograph, the leaves and general form of the plant resemble those of a large groundsel, with more handsome flowers.

A. W. Bull.



The Oxford ragwort, a foreign plant spread in this country by the railways. Photograph by A. W. Bull.

The Northwest Passage

A small Canadian ship of only 80 tons and 95 ft. long has created a record by sailing from the Atlantic to the Pacific through the Arctic seas north of Canada, in less than three months. She is the Royal Canadian Mounted Police service ship "*St. Roch*," which in 1942 had completed the same 10,000 mile voyage in the opposite direction, from Vancouver to Halifax. This eastward voyage took 2¼ years to complete. The return trip was begun at Sydney, in the Gulf of St. Lawrence, on 25th July last, and a more northerly route was taken than on the first voyage. The vessel arrived at Vancouver on 16th October.

The Northwest Passage, as this voyage has been called, was first made by Amundsen, the famous Norwegian explorer, 40 years ago. The "*St. Roch*" is the first vessel to complete the double voyage.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, and certain others that will be indicated, these should be ordered through a bookseller. We can supply copies to readers who are unable to place orders in this manner. Order from Book Department, Meccano Ltd., Binns Road, Liverpool 13 adding 6d. for postage.

Owing to wartime difficulties, it is impossible to guarantee prompt delivery of books ordered as described at the head of this page, but every effort will be made to ensure speedy despatch.

"AIRCRAFT OF THE FIGHTING POWERS," VOL. V

Edited by D. A. Russell, M.I.Mech.E.
(The Harborough Publishing Co. Ltd. £1/11/6 net)

The latest edition of this fine annual work follows on the lines of the earlier ones in dealing with new types of Service aircraft introduced during the year under review, in this case 1944, and with modified versions of older types. An aeroplane previously featured is not repeated, even if still in service, unless substantial change has taken place in its appearance, specification, or operational uses, and therefore absence from the current volume does not necessarily signify that a particular machine is no longer in service. For instance, the "Lancaster" and the "Horsa" have been omitted, as although they were in widespread use during 1944 they have not undergone any radical change since they were first described and illustrated in Volumes III and IV respectively.

Model-builders will be specially interested in the new machines described. The new British types include the "Barracuda," four versions of the "Spitfire," the "Albemarle," "Warwick," "York," and "Hamilcar." The American section of the previous volume dealt mainly with training aircraft, but last year production in the United States was concentrated on operational, or "combat" types, and the change-over is reflected in the types of American machines included in the current volume. The Russian section includes four new aircraft types, and enemy machines described and illustrated total 10 German and 8 Japanese.

Interesting notes on the history and development of each aircraft are given and, in some instances, brief details of its outstanding achievements in the war. In each case the specification is supplemented by details of all known performance figures. In addition there are splendid half-tone photographs, and the fine 1/72 three-view scale drawings of the machines that are such an important feature of this work.

The detailed notes on the aircraft designation systems of the countries mentioned, and the summary of the varied international markings and regulation colour schemes used on the military aircraft of those countries, will be very helpful to the model enthusiast. A useful new feature is a British camouflage colour chart.

The book is published by The Harborough Publishing Co. Ltd. Allen House, Newarke Street, Leicester price 32/6 post free.

"OUR PRIVATE LIVES"

By Lella Secor Florence (Harrap. 6/- net)

Readers will remember the review in the "*M.M.*" for August of last year of the author's "*Only An Ocean Between*," which provided an interesting general comparison, descriptive and pictorial, of Great Britain and the United States. Now we have another volume in the same series that contrasts family life in the two countries, explaining how British and Americans build and furnish homes, how they shop, cook and eat, work and play, and go to Church and school. It is in fact a remarkably full account of the actual lives of the peoples of the two countries, giving us pictures of all classes throughout their daily routine. It is interestingly written, with real humour to enliven it, and is always accurate and fair in its criticisms of features of each country that may not seem attractive to those who live in the other.

We are always interested in how other people live, as the number of books descriptive of life in foreign lands indicates, but the value of such descriptions is greatly increased by comparing and contrasting the lives of the people of one country with those of another. The plan is followed out not only in the text, but also in the illustrations. These are grouped in pairs, a typical American scene having on the opposite page a corresponding one from Great Britain, the subjects ranging from home life and gardens to sports and community singing.

Another feature of the book that readers will find both interesting and useful is a series of Isotype drawings, which present in graphical form detailed information on a wide variety of features of the two countries. Here again, the relative details are brought out by placing pictorial facts about each country on the opposite page to the corresponding ones of the other, and the use of Isotype symbols throughout for people, goods, natural features, etc., allows direct comparisons to be made.

The book is intended to provide us with as much true knowledge of the lives of both people as possible, and to correct any wrong impressions that may be current on either side of the Atlantic. It is remarkably successful in this, and in addition provides really enjoyable reading.

"CARDBOARD ROLLING STOCK AND HOW TO BUILD IT"

By E. Rankine Gray. 2/6

Cardboard modelling has been a familiar subject for a considerable time, and very successful items of rolling stock, buildings and even locomotives have been constructed in this material by miniature railway enthusiasts. At the same time, there has been an impression that there was some "mystery" behind the skilful manipulation and finishing of cardboard, and that models made of it would be too flimsy for working purposes. Actually this is not so, and to provide practical instruction on the subject is the purpose of this book, with special reference to the reproduction of goods rolling stock, in 00 or 0 Gauge.

After introductory remarks, the first chapter deals with the marking out of the parts required, and is intended more particularly for those who prefer to construct their own vehicles throughout. Those who make use of the ready-painted "E.R.G." parts are recommended to turn direct to the second chapter, which contains preliminary general hints on the steps to follow and indicates the simple tools and equipment required. The next two chapters detail the arrangement of the underframes and floor, and the preparation of body parts; and here we find numerous hints on the successful reproduction of special features, and of such items as hinges, hand-rails and door fittings. Finally comes excellent advice on finishing.

The text is illustrated by excellent drawings, and there is a good index. The book can be obtained from the author, 726, Christchurch Road, Boscombe, Hants., 2/9 post free.

Railway News

Speedy Transport of Army Mail

Since May, 1941, the Army Post Office in Nottingham have handed over to the L.N.E.R. one and a half million bags of mail for transport from Nottingham (London Road) station to our fighting forces. To-day 60,000 mail bags a week are sent from Britain to the British Liberation Armies, and to the railway authorities in Nottingham goes the credit for their expeditious handling and rapid transportation, which has contributed much to the subsequent speedy delivery of mail in the field by the Army Post Office.

No matter where in Britain a letter is posted to a soldier serving overseas, it is automatically sent by the G.P.O. to the huge Army Post Office centre in Nottingham. This tremendous mail is then sorted by members of the A.T.S. and men of the Army Post Office, and the bags of re-assembled letters, news packets and parcels are directed to individual units in Europe. The filled mail bags then leave in a continuous stream to be loaded on the train of box wagons standing in the L.N.E.R. station at Nottingham (London Road).

Six weeks before "D" day the troops who were to take part in the invasion of Europe were moved as a security measure to quarters which were secret from their relatives, and the whole of their mail was sent to Nottingham to be re-distributed to addresses known only to the Army Post Office.

As soon as "D" Day arrived, the mail for the troops who went overseas was concentrated in the special train from Nottingham, and the train, bound for a South-east port, has now come to be known as the train that must never be late. Consequently it is the best timekeeper on the system.

The train takes 300 bags of mail to each box wagon, and with the approach of Christmas carried approximately 10,000 bags each night. Each bag weighed about 56 lb. and contained an average of 95 news packets and nine parcels.

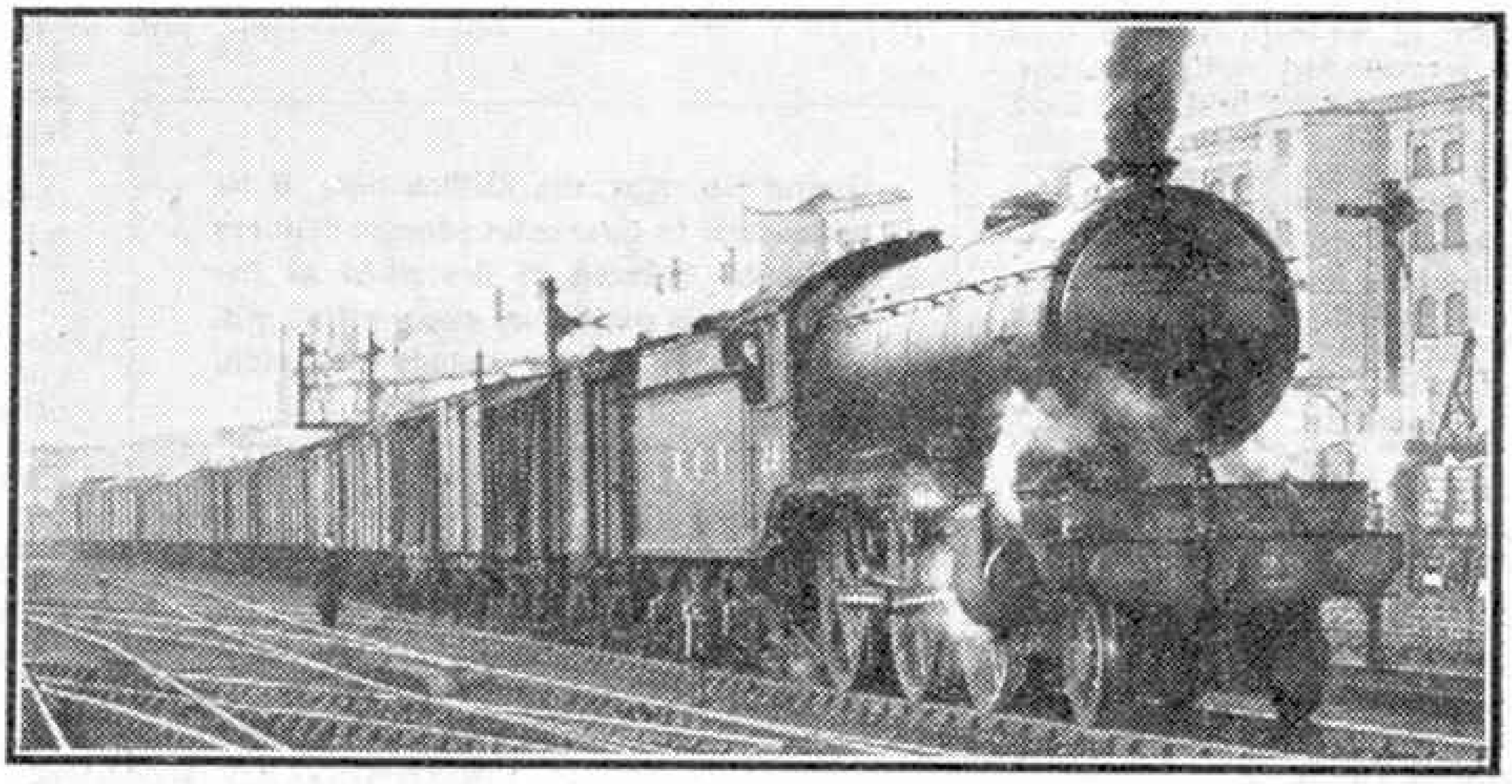
Other mail leaving Nottingham (London Road) station is in individual vans that go to Scotland and East and North-east coast ports. Mail for the Far East, India and East Africa goes from nearby Daybrook Station.

Centenary of the "South Eastern"

Round about 100 years ago the Kentish towns of Maidstone, Tonbridge, Ashford, Folkestone and Dover were connected by rail with London and with one another by the South Eastern Railway, which provided the first through main line railway in that part of south-east England. To celebrate the centenary luncheons were held in Dover and Maidstone, as well as interesting exhibitions of drawings, old prints, photographs and models illustrating the early history and subsequent development of the railway in those parts.

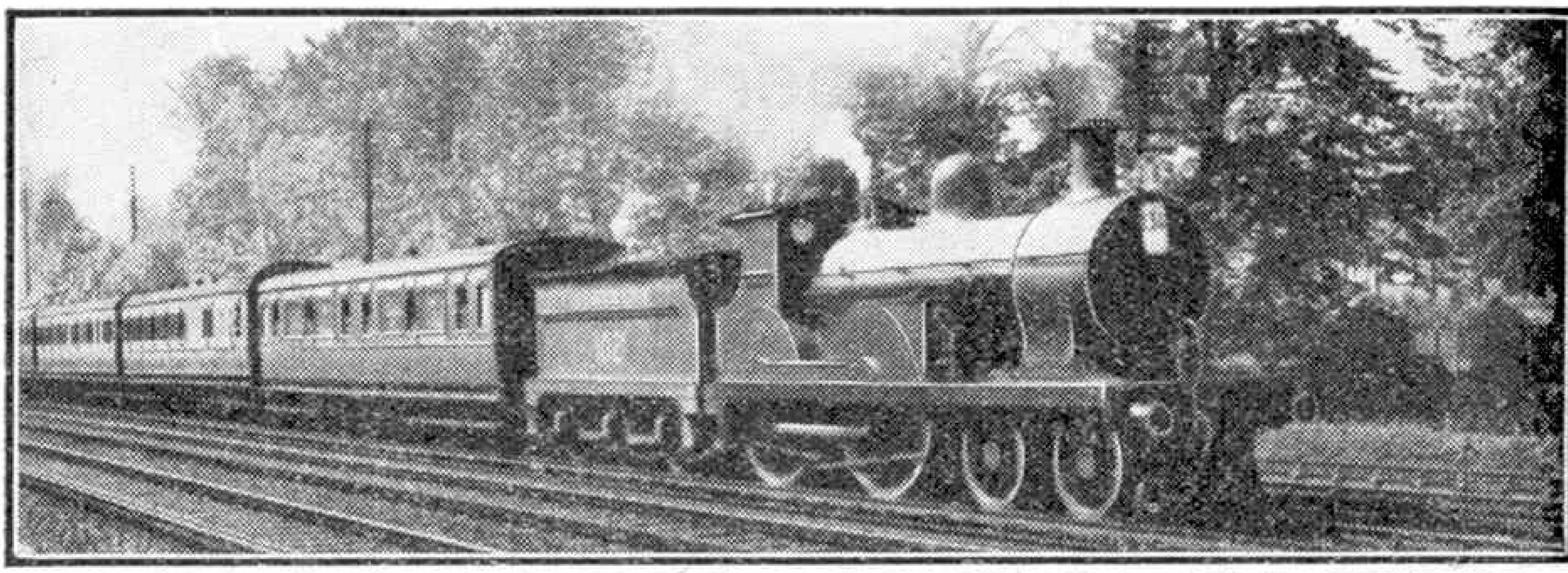
The original South Eastern system began at a point on the London and Croydon Railway near Norwood, about nine miles from London Bridge. It proceeded by way of Croydon, Purley and Redhill to Tonbridge, and thence through Paddock Wood, the junction for Maidstone, and Ashford along the route followed by the S.R. main line to-day. In early times the two tracks from London Bridge and Norwood to Redhill were shared with the trains of the London and Croydon, afterwards the London, Brighton and South Coast Railway, and also, near the metropolitan terminus, with those of the London and Greenwich line, which was the first in the field, though soon taken over by the South Eastern. The S.E. was subsequently extended to serve Canterbury, Ramsgate, Margate and Hastings, as well as many suburban areas on the Kent and Surrey side of London. In the 1860's the direct main line was opened from Charing Cross and Cannon Street, through London Bridge (High Level) by way of Orpington and Sevenoaks to Tonbridge, which reduced the rail distance to the coast by over 13 miles, though adding considerably to the gradient severity. The first railway in the south of England, the Canterbury and Whitstable, opened in 1830, became part of the S.E.R. in 1853 and is still worked as a goods branch.

For more than 30 years there was intensive competition with the London, Chatham and Dover Railway, which took shape mainly in the 1860's and built lines to most of the principal Kent towns. In 1899 however a sensible working agreement was formed, and from then until taken over as the Eastern Section, S.R., in 1923, the Kent lines were operated as one by a joint managing committee, the whole being popularly known as the South Eastern and Chatham Railway.



The special L.N.E.R. train that leaves Nottingham every night with mail for British Forces overseas. Photograph by courtesy of the L.N.E.R.

In a reboilered form, many 4-4-0 and 0-6-0 engines of James Stirling's South Eastern design are still running; the passenger locomotives are now classed "B1" and "F1," the goods "O1." There are also small "R" or "R1" 0-6-0 S.E. tank engines on local freight and shunting duties, some of which are well over 50 years old. Until rebuilt, Mr. Stirling's engines had domeless boilers, with safety valve well forward, and narrow rounded cabs on most types. The tenders had outside bearings and springs, and are still to be seen. It was rather curious that driving wheels of so large a diameter as 7 ft. should have been employed on the 4-4-0s, as there were steep gradients and often many stops. Furthermore, these engines were used a good deal on local passenger work, including tender-first running. Partly on account of revenues being low in comparison with expenditure, the old S.E., like its competitor and subsequent partner, did not enjoy a very good reputation for speed or comfort, apart from one or two excellently appointed Continental boat and residential expresses formed of early type Pullman cars.



A former South Eastern Railway "B1" class 4-4-0 on a Kent coast semi-fast train. Photograph by J. Sturt.

Eighty years ago the company was responsible for building what was at the time called "the most expensive length of railway in the world," as it cost about £1,000 per yard and extended for more than three miles on arches and bridges into the heart of London—from London Bridge to Cannon Street and Charing Cross, with direct approach to and from each. The work involved two substantial bridges over the Thames, triangular junction lines, and station buildings on a somewhat grand scale. As the opposition company built "West-end" and "City" lines to Victoria and Holborn Viaduct termini, and each line developed numerous routes which were afterwards linked up, the Southern now possesses a remarkable network of alternative lines and busy suburban tracks in Kent, many of which have been electrified.

L.N.E.R. Locomotive Notes

Five more 2-8-0 goods engines of the L.M.S. standard type built by the S.R. have been put into traffic, numbered L.N.E.R. 7671-5, completing the series of 25 "hybrid" locomotives. No. 7675 was the 128th engine of this heavy and substantial type to be turned out for other lines from the Southern Company's works in 15½ months, a very fine achievement of unusual character. No. 2378 is the third "B16" 4-6-0 to be rebuilt with three sets of Walschaerts valve gear as "B16/3," while further conversions from "04" to "01" 2-8-0 with Thompson modernisations are Nos. 5385, 6195, 6283, 6601 and 6624. Six of the original style G.C. "04" locomotives are now fitted with tablet-exchangers for working over single lines, and operate on part of the Midland and Great Northern Joint system that carries a heavy sugar beet and similar agricultural traffic, though it is the first time that eight-coupled engines have been seen on the route regularly.

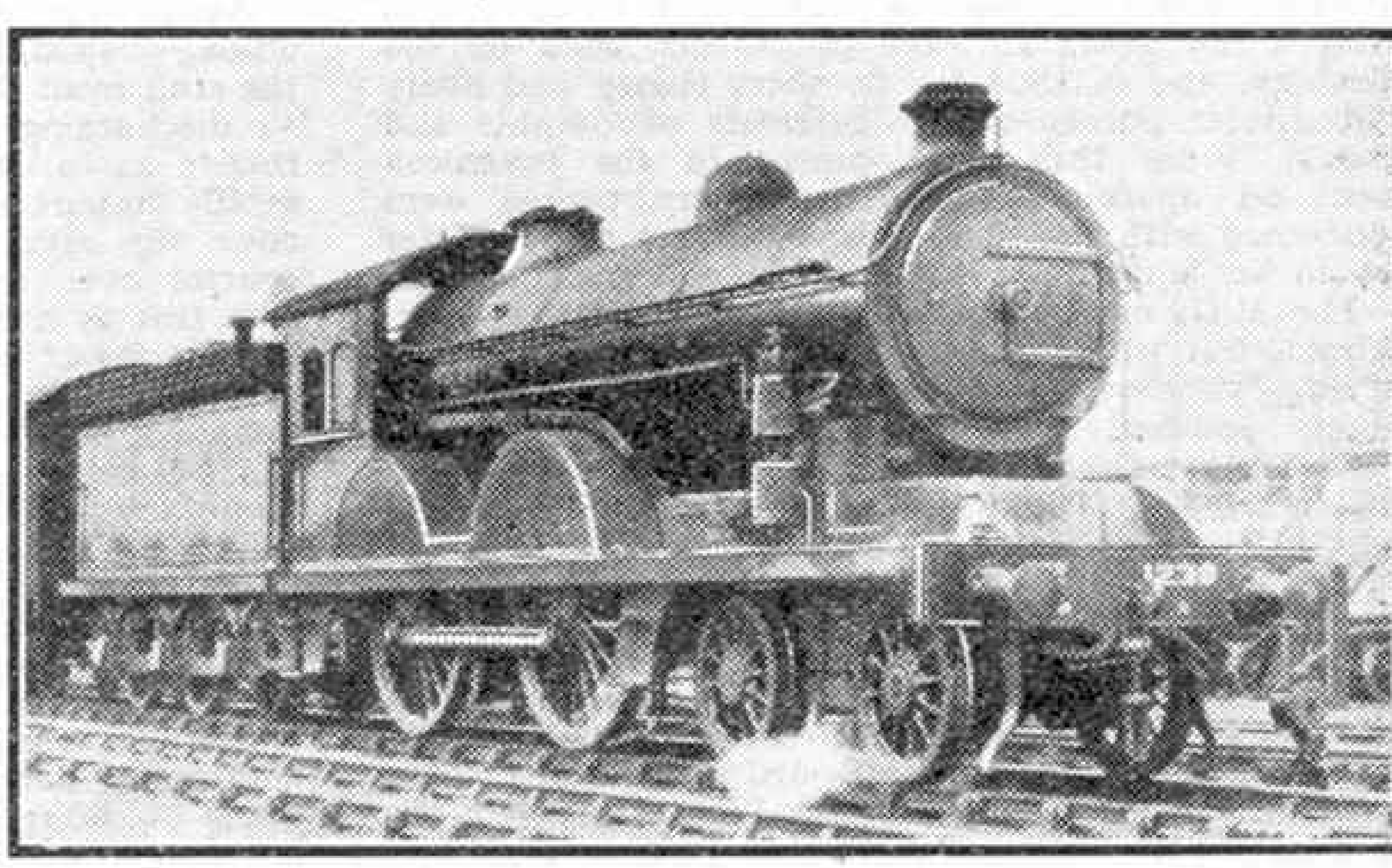
The former No. 4075 of class "D3" has become No. 2000, also, at the age of 47, a specially decorative rebuild. She belongs to the first class of Great Northern 4-4-0s, and was built in 1897 as No. 1075 with a characteristic long, single splasher; cylinders 17½ in. in diameter, with 26 in. stroke; driving wheels 6 ft. 7½ in.; and boiler pressure 170 lb. per sq. in. The boiler was originally 4 ft. 3 in. in diameter, but in due course all these engines were provided with the 4 ft. 9 in. boiler as on the later Doncaster 4-4-0 series now known as class "D2," though the "D3s" retain their smaller fire-boxes and none of the engines of the class has been superheated.

The "new" No. 2000 has just been provided with a double side window cab, brass beading over the splashers and brass-capped chimney. She is painted green and will be used for hauling Directors' or other officials' specials, thus perpetuating a time-honoured practice on some lines of having a picturesque locomotive set apart for such duties. The former No. 2000, a "J25" N.E. 0-6-0 lately returned from loan to the G.W.R., becomes No. 2050, taking a blank number.

The new Thompson "Pacifics" Nos. 3696/7 came to King's Cross shed at the end of November last and are highly spoken of by running officials. Their Kylchap blast arrangement and double chimney makes for a soft exhaust even when climbing out to Potters Bar with 18-coach trains.

New boilers with round-topped fireboxes constructed at Doncaster have been fitted to large ex-Great Eastern 0-6-0s of class "J20" numbered 8273, 8280, 8281, 8283, 8292 and 8294. "Pacifics" No. 2555 "*Centenary*," No. 2561 "*Minoru*," and No. 2570 "*Tranquil*" have been rebuilt to "A3/3" from "A1" class. An observer informs us that No. 2562 "*Isinglass*" has also been so converted.

Class "D21" No. 1244 has been withdrawn. When built in 1908-9 as N.E. class "R1," numbered 1237-46, engines of this class were the largest 4-4-0s in this country. They had 6 ft. 10 in. driving wheels, and 5 ft. 6 in. diam. boilers, pressed to 225 lb. per sq. in., with large fire-boxes, but after superheating boiler pressure was reduced to 200 lb. per sq. in. Those remaining at work still present an imposing appearance, as our illustration of No. 1239 shows.



L.N.E.R. "D21" class 4-4-0 No. 1239. When built the locomotives of this class were the largest 4-4-0s in Great Britain. Photograph by W. Leslie Good.

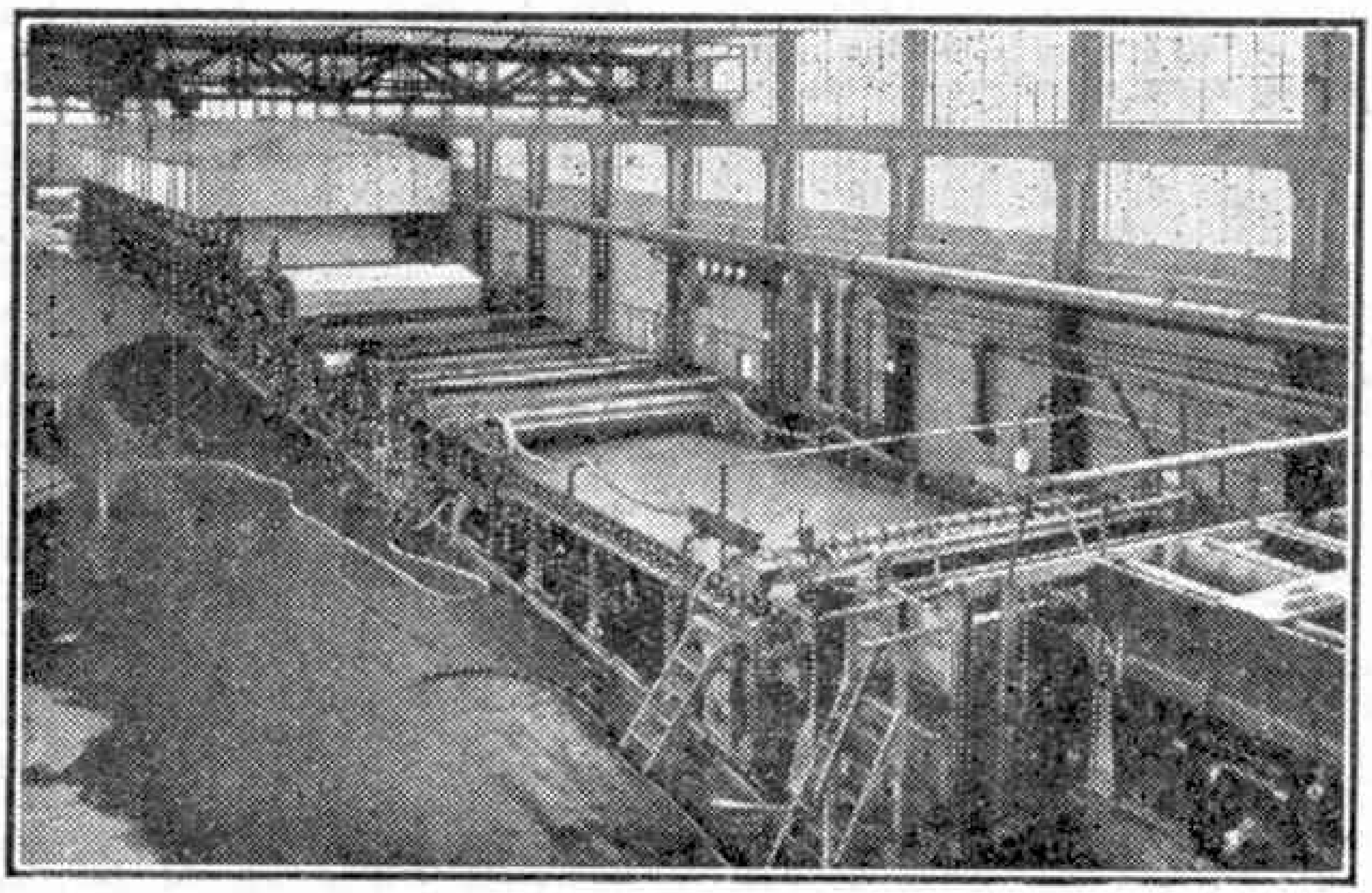
How Paper is Made

II—From Pulp to Finished Product

By W. Philip Conolly

IN the first part of this article we saw how the various raw materials the paper maker has at his disposal are treated to render them suitable for the manufacture of paper. The machines that bring this about vary only in details, to suit different classes of paper; in the main they conform to a few definite types that have proved themselves over a long period of years. Two principal types are in use. These are the Fourdrinier, which is the commonest, and the M.G. machine.

The first paper machine of any description was designed in 1799 by Louis Robert, a Frenchman, who sold his rights in his invention to his employer, one Didot. Didot came to England with the invention in 1800 and joined with his English brother-in-law John Gamble in its development. A Mr. Bryan Donkin then became interested and assisted the brothers-in-law in various ways, but these people after a few years all gave up further work on the machine, and in 1804 the brothers Henry and Sealy Fourdrinier purchased the interests of Gamble and Didot. From then development in the invention went on apace. Although so many people were concerned with the idea, it was the last comers after whom the machine as we know it to-day was named.



The "wet end" of a modern paper-making machine. The wire part, tube rolls, deckle straps and the couch and press rolls are shown. Our illustrations are reproduced by courtesy of Bentley and Jackson Ltd., Bury.

The M.G. machine is a modification of the Fourdrinier, but where the latter has a number of small drying cylinders, the M.G. has one large one, on the highly polished rim of which the paper takes up such a glaze that no further treatment by calender rolls is needed. The initials of the name indeed stand for "machine glazing."

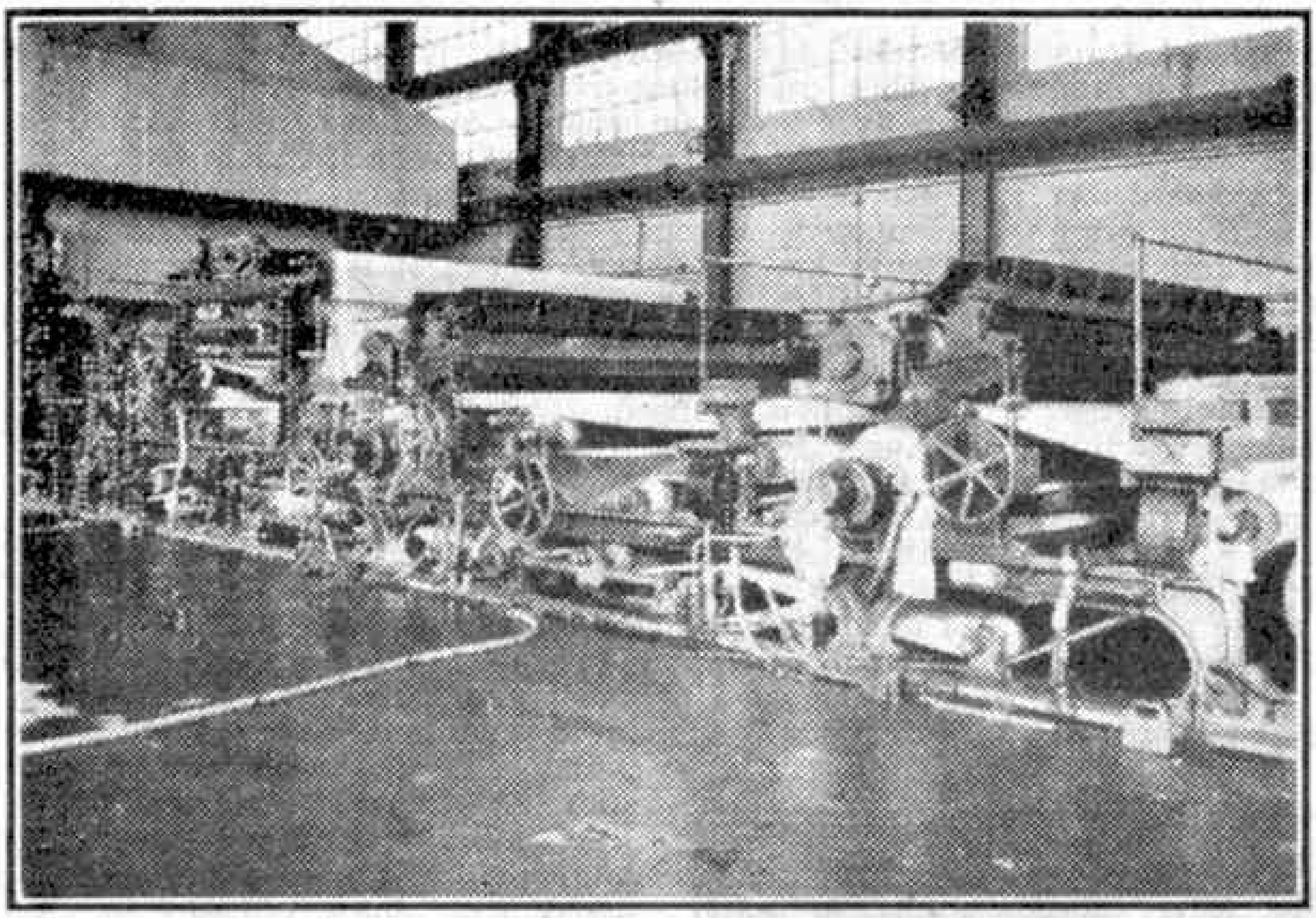
The Fourdrinier, or its modern descendant, is one of the largest types of machine used in any industry. This applies particularly to the machines in mills making "newsprint," the paper on which our dailies are printed. Newsprint requires a giant plant for its production, for paper up to 320 in. trimmed width is manufactured. Speeds of production of 1,400 ft. or more per minute can be attained on these machines and, when running 24 hours daily, in three shifts, 1,200 tons of paper are the result of a week's work. With its attendant preparatory plant, a machine of this class can be turning out paper, running on its reel, half an hour after the logs in their rough state—these are the raw material in this case—have entered the mill. As this type of paper sells at only a few pence per pound, in normal times about 1½d., mills making "news" must be run with a strict regard for economy and efficiency if they are to show a profit, and every department must be as nearly mechanically perfect as possible. Newsprint machines are in a class by themselves, and the machines used in mills in various parts of the country producing paper in all its many other varieties are less spectacular.

We left our account of paper manufacture in the previous article at the stuff chests, from which the pulp is ready to go on to the paper-making machine. While in the chests it is kept in a state of movement in water by means of agitators or paddles fixed to a central rotating shaft, to ensure a correct consistency by the time the machine is reached. When the stuff is pumped from the chests it must first pass over the sand-traps, where any heavy solids that have escaped the beaters can be deposited. Strainers are employed to obtain further purity, and one of the commonest and oldest of several types takes the form of a cradle carrying perforated metal plates. Each plate has a large number of very narrow slits or "cuts" spaced at quarter inch intervals, and the cradle is made to rise and fall rapidly. The fibres passing through the slits leave the impurities and knots and clumps of fibres behind.

This strainer, known as the jog-knotter, is old-fashioned, but is still quite extensively used. More modern strainers of rotary and centrifugal types are, however, finding increasing favour with mill engineers.

Across the width of the machine is placed the oblong-shaped breast box and this, while receiving the stuff from the strainers, overflows along its length, so discharging equally over the breast board and thence on to the apron. Cleanliness in these parts is vitally important, for no more straining takes place once the stuff reaches this stage. Some form of control over the wet stuff too must be provided, and this is effected by "slices," which are simply wide strips of brass, ½ in. thick and up to 6 in. wide, placed across the machine. Several of these are installed; they overlap in the middle so that they can be adjusted to allow of different widths in the manufacture of the sheet.

The stuff has now arrived at the "wet-end" or "wire part" of the machine. Here the whole process of paper making is concentrated, for it is here that the pulp, although still containing water, is made to assume its first resemblance to the sheet of paper it becomes when it is dried. The "wire" consists of a continuous band, about as wide as the machine and made of a fine gauze. This band, joined by a seam, is endless and it travels in the direction of the machine's length in the manner of a conveyor belt, which in effect it partly is. The mesh of the gauze is important; it varies considerably and its degree of fineness is dependent on the type of material used and the paper that is to be produced. Another important feature is its length, for papers with different characteristics require more or less water while on the wire to enable them to "felt" properly. While this is being achieved, the wire allows much of the water to drain away by way of the tube rolls.



The press section of a paper-making machine, showing the felts that carry the paper web to the drying cylinders.

The wire is supported at one end by the breast roll and at the other by the couch roll, and between these are tube rolls that carry it and keep it in a level plane. These rolls are also responsible for removing water from the wire. This they do by their wiping action as they revolve, creating a tiny vacuum in each pore of the wire. The pores fill again with water and are then drained once more by the next roll as the wire travels along the machine.

"Shake" is given to the wire by a suitable mechanism, and this movement from side to side, although slight, is practically the crux of the whole matter of paper-making, for by it the fibres suspended in water on the wire are made to engage with each other or "felt." Thus they form a cohesive sheet which, although laden with water, is the web of paper that is ultimately reeled up at the end of the process.

While, the tube rolls relieve the web of much of its water, the suction boxes take out still more before the couch rolls are reached. The couch rolls not only squeeze more water out, but they also consolidate the fibre and make a more homogeneous sheet ready for the drying cylinders. Further squeezing is provided by press rolls, of which the upper is made of polished granite and the lower of cast iron with a covering of rubber. The lower roll is driven and serves to pull the web through the machine. Assistance is also given by the "wet felt," which is another endless band, this time made of wool.

The two outside edges of paper are called deckles, and the same name is given to endless rubber straps on pulleys which keep the stuff from overflowing the wire part.

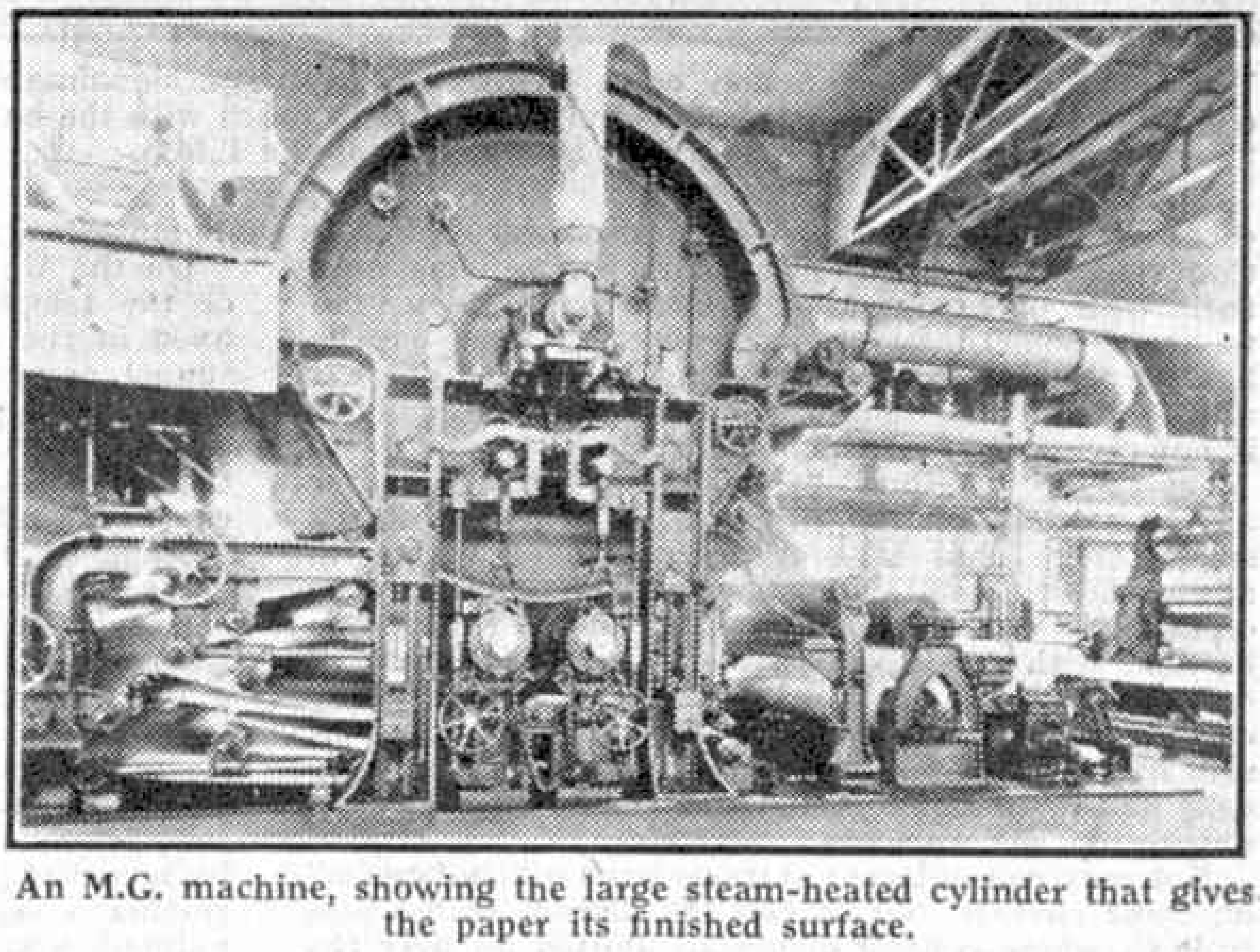
To the uninitiated, the water-mark that paper often shows is a most mysterious feature, puzzling them as to how it is produced. The method is quite simple. The mark is made by means of a wire-covered drum called the "Dandy" roll, which has the required design, also woven in wire, sewn on its face. The drum presses on the stuff while on the "wire" and so closes the fibres, with the result that when the web is dry the marked parts are thinner than the surrounding sheet.

The "dryer part" of the paper-making machine must now be dealt with. Here the web travels through a number of cylinders heated by steam; what are called the "dry felts" assist by pressing the sheet on to the faces of the cylinders, so that by the time the last one is reached the paper is 90 per cent. dry. On "news" machines 30 or more cylinders are used, but both types are equipped with a large hood over the cylinders to trap the steam and moisture, which makes the machine room very wet and unpleasant where no hood is provided.

The last operations are now taking place and the paper receives its finishing treatment in the calenders. These are a series of rolls through which the paper travels to acquire its finished surface. A super-calender is also used for finishing purposes; it is distinguished from the calender because it stands clear of the machine and is not built in, as are the calender rolls. This type can contain as many as 16 rolls stacked one above the other. Alternate rolls are made of chilled iron, which are steam heated, and cotton or compressed paper, the latter being known as "bowls." The rolls are "crowned" or "cambered," that is they are given a slight increase in diameter towards the middle of the face to enable them to withstand the bending action set up by their weight when stacked one above the other. Before the paper runs through the super-calender it is damped by water sprays, and the action of the rolls gives it the high gloss seen in the various art papers often used in book and magazine illustrations.

From the calenders the paper finally goes to the reel bars to be wound into reels ready for slitting, cutting and re-reeling or for storage.

In these last lines we must notice the machine's drive. In old machines a steam engine drives the whole plant including pumps, while a modern layout is provided with separate motors on each section.



An M.G. machine, showing the large steam-heated cylinder that gives the paper its finished surface.

The Railways' Own Postal System

By Frank Ferneyhough

WITHOUT means of conveying messages from station to station, the vast and complicated railway system we know to-day would never be possible. The necessary links are the telephone, telegraph, radio, and a letter dispatch system. At nearly every station, signal box and level crossing will be found telephones owned, installed and maintained by the railways. Day and night, the whole year round, messages concerning railway activities are being exchanged. They may be loading details of a train of bombs for an aerodrome; a headquarters official arranging a meeting to discuss the construction of some new marshalling sidings; or a stationmaster telephoning the next station about a pair of gloves which were left in a train.

Most of these telephones are of the "circuit" or "omnibus" type, that is, there may be up to a dozen, or even a score stations on one particular circuit. Each station has its own individual ringing code. One may be a long and a short ring, another two short rings, and so on. The remarkable thing is that railwaymen acquire the habit of noticing only their own particular ring, which they seldom fail to hear. Sometimes in a railway office there can be heard a telephone ringing and ringing, to the apparent unconcern of any officials present. Most probably it is not giving that particular station's code.

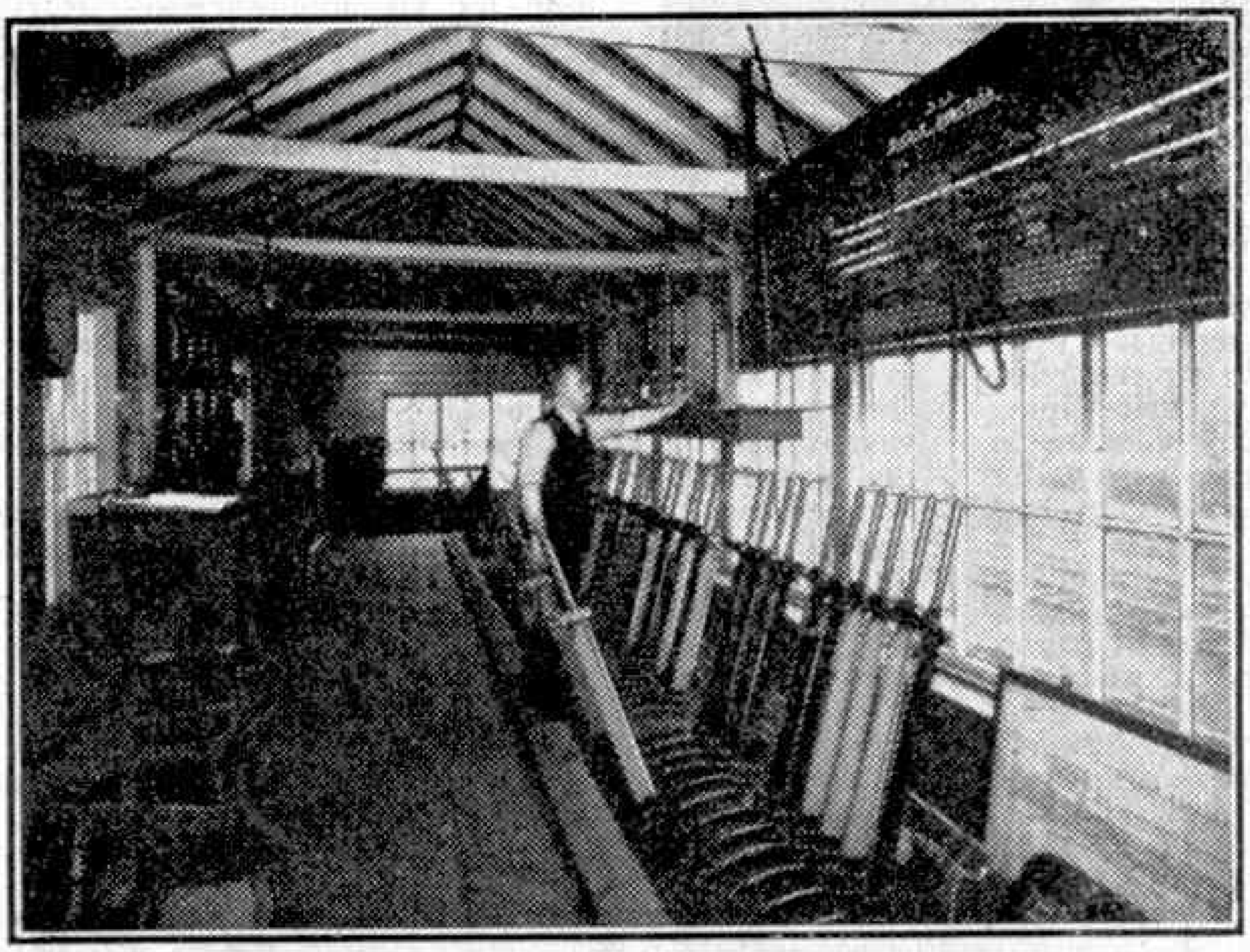
On these "omnibus" telephones it is possible for all the stations on the circuit to be listening at the same time. Thus if a traffic controller wishes to advise all the stationmasters and signalmen on a certain line that a special train is due to run, it can be done with the least possible delay; and so that all concerned will answer the circuit at once, an emergency call common to all is used. In this way, too, air raid messages are sent all along the line. If separate calls had to be made, valuable time would be lost in passing on the warnings.

Not only can adjacent stations have a "conference" on these circuits, but so can the district traffic controllers, whose control offices are dotted all over the system at strategic points. Vital information, such as that concerning troop trains and trains of tanks, can thus be given quickly over vast areas stretching the length and breadth of the country.

In the traffic controllers' offices are very many telephones, through which all the trains on each district are regulated. When it is remembered that the British railways haul loaded freight 11,000,000 miles a day, the equivalent of 46 trips to the Moon every 24 hours, the importance of the telephone and telegraph is realised.

Apart from the routine of regulating trains, the traffic controllers are in telephonic communication with doctors, hospitals and A.R.P. and military authorities; so that from the slightest technical failure to a major accident, every conceivable source of assistance that might be required can immediately be summoned.

In the case of mishap occurring miles from the nearest station, field telephones are always available which can be connected on the spot, so that officials may know from minute to minute what is happening and provide appropriate assistance. Snow ploughs in the moorlands of Yorkshire and Westmorland are now equipped with portable plug-in telephones so that delays to urgent freight trains may be reduced to a minimum in the event of blockages to the lines by heavy snowfalls. This installation enables the snow-plough staffs to keep in constant touch with traffic control.



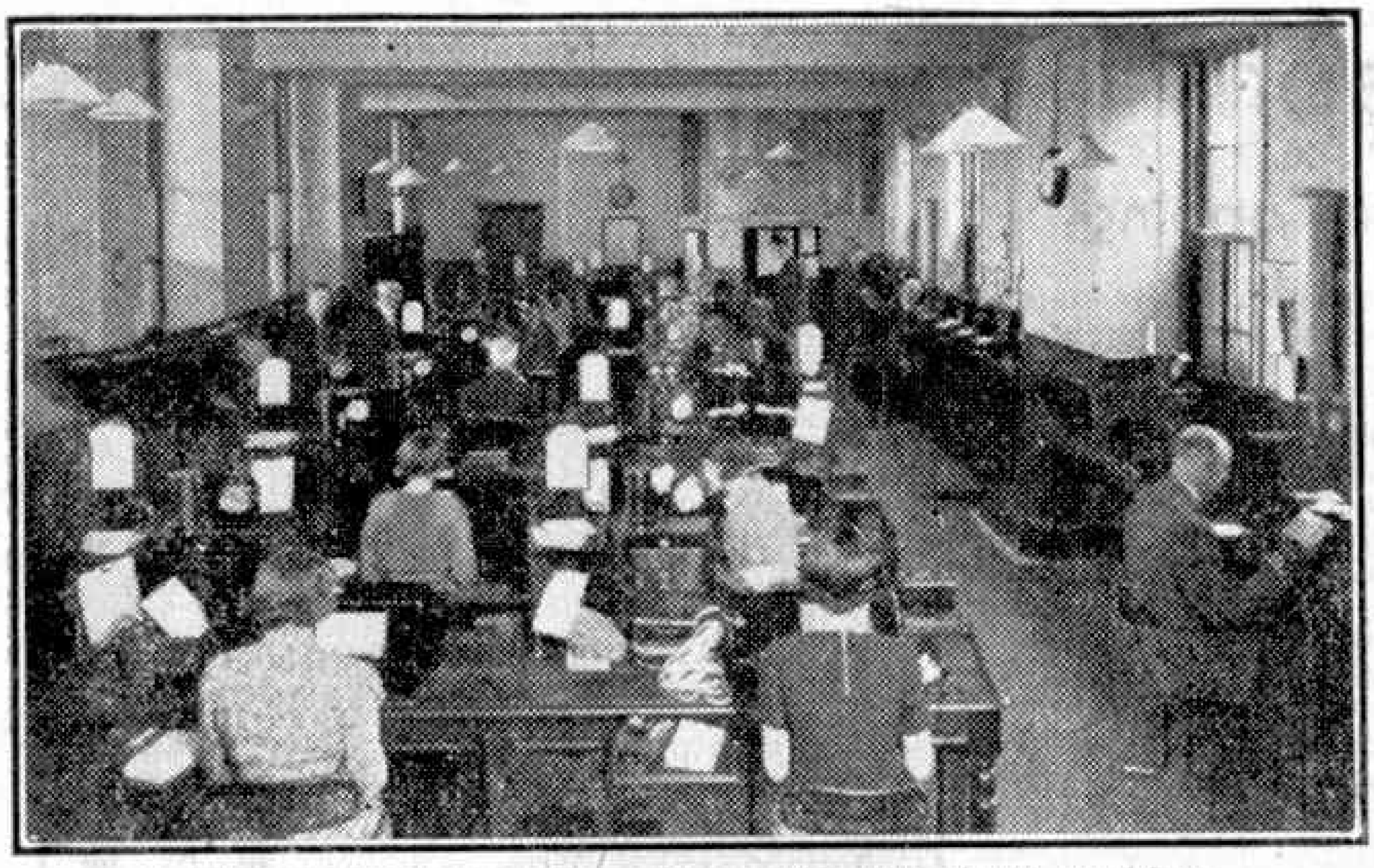
The signal box at a junction on a British railway. The signalman is operating the telegraph instruments that keep him in touch with the boxes on each side. Photographs by courtesy of the L.M.S.

Several of the larger stations where the railway Head Offices are located have their own automatic dialling telephones, just like those used by the Post Office. Special rooms of even temperature are provided for the automatic exchange selector racks, which hold the complicated electrical apparatus that does the "selecting" of numbers as the caller outside pulls the telephone dial round with his finger. The electrician in charge knows every coil and contact, and can locate in quick time the slightest failure.

Many of the bigger stations also have telephone exchanges, where girls wearing headphones connect distant stations through to each other.

On the Underground Railways of London, the use of the telephone is taken further. A telephone is fixed in the driver's cab; and if his train fails in a tunnel away from a station, he can connect it to wires running on the walls of the tunnel, without leaving his cab, and speak to the depot. He can then give his position and details of the failure, and can say whether the power should be cut off so that passengers, if the emergency demands, may walk along the track to the nearest station. The driver is usually able to telephone his guard at the rear of the train, a feature not yet used on steam trains.

Even more important for the actual movement of trains is the telegraph. In signal boxes, the telegraph instruments are generally placed on a long shelf just above the signal levers, and opposite the "circuit" telephones. The signalman sends messages in code by means of the tapping key on the instrument. By ringing a certain number of single strokes, the signalman asks permission from the box in advance



A railway telegraph office equipped with teleprinter machines.

for a train to enter the section controlled by it.

Altogether the signalman has to give at least five separate messages at intervals on his telegraph instruments for each train he signals. The almost instantaneous speed of these electric messages along the telegraph wires—those seen from the carriage window, alongside the track—make it possible to keep the line clear well in advance of oncoming trains, thus making for a high standard of safety and speed. Before the telegraphic system was used, trains had to be despatched from one station to another without any preceding message; the usual safeguard was to allow the lapse of a time interval of about fifteen minutes between trains.

To distinguish the different lines between two signal boxes, the bells have various pitches, and can often be heard by passengers when passing in the vicinity.

Telegrams too are sent in tens of thousands over the railways' own wires every day. Some are sent by the ordinary telephone; others by Morse code on single needle telegraph instruments; while many are sent by the teleprinter system, in which the telegrams come out of the machine typed on lengths of paper "tape" ready to be gummed on to a printed telegram form. In many of these telegraph offices the teleprinter machines are on desks in the middle, and the single needle Morse instruments are fixed round the walls.

Telegrams are used when letter despatch is too slow. For instance, if a luggage van sent from London has to be detached at a junction to connect with a branch line train, telegrams are sent in advance so that arrangements can be made for an engine to be ready to shunt the van to the required line.

To save time and word-space in these telegrams, a special code is used. One code word means, "Give this matter your special attention"; while another means, "Following parcel missing, urgently wanted. Have special enquiries made, and if at your station, forward immediately and reply." Addresses also are shortened. "S" means "Stationmaster," and "L" means "District Locomotive Superintendent."

A code word is frequently used for a particular train, especially if it is a military train the destination of which must be kept secret. Instead of calling it the "12.15 p.m. freight train, loaded with bombs, from A station to B station, via C junction," the train is referred to in all telephonic and telegraphic messages by a short word of a few letters, thus easing the already over-crowded wires.

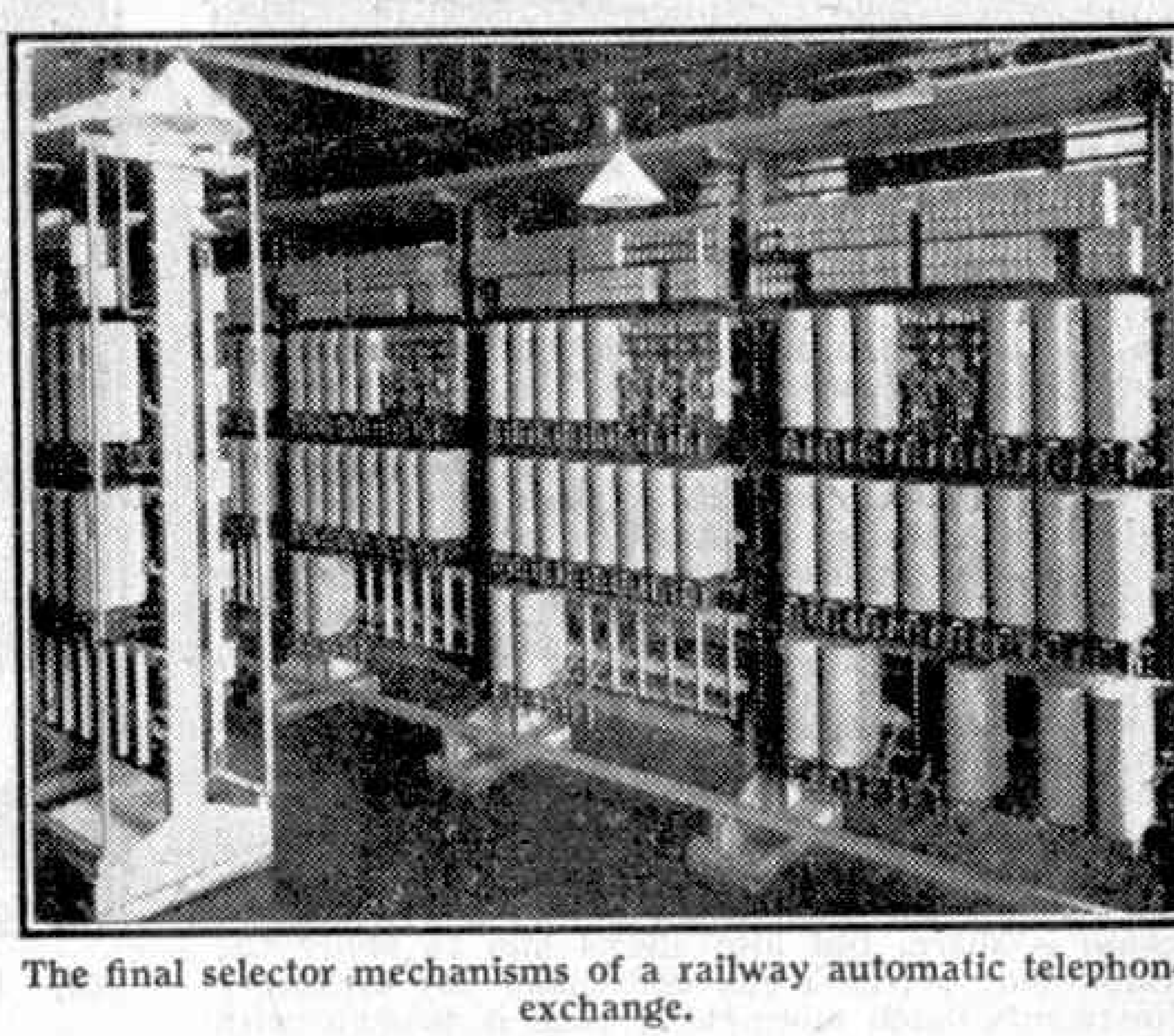
In case of possible damage to wires and apparatus by enemy action, the railways can fall back on a very elaborate radio control system; and this, coupled with the efforts of their own despatch-riders, recruited from regular railway staffs, can keep on the move all important trains of troops, equipment and war materials. Only key staff are acquainted with the requirements of these emergency communications.

To maintain the highest efficiency in the railways' telephone and telegraph systems, skilled electrical engineers known as "lines-men" are regularly employed all over the country, and are available for duty during the whole 24 hours. By this method, if a wire is down or a receiver faulty, an expert can be sent for immediately and the defect remedied with the least possible delay.

Another part of the railways' postal system is the sending of letters and documents that are on purely railway business. Letters about staff removals, parcels, merchandise, lost property and the like are despatched every day by the hundred thousand. To facilitate sorting, the whole country is divided into centres, each of which is denoted by a number. Envelopes are addressed much as usual, with the addition of a number. The idea is that passenger guards on the trains and sorters at stations sort out the letters according to the centre number, each bundle being sent to its own area for further sorting and final despatch to the various stations in the area.

At the smaller stations it is easy to see the station-master, clerk or porter handing a bundle of letters to the guard, or the guard putting out a bundle at the station, with the parcels and luggage. In his van, the guard has a pigeon-holed sorting rack, into which he puts the letters for various routes, handing them out at the appropriate sorting centres on his journey.

Usually letters despatched on one day reach their destination the next. To send all these letters by post would cost the railways hundreds of thousands of pounds a year *(Continued on page 70)*



The final selector mechanisms of a railway automatic telephone exchange.

Photography

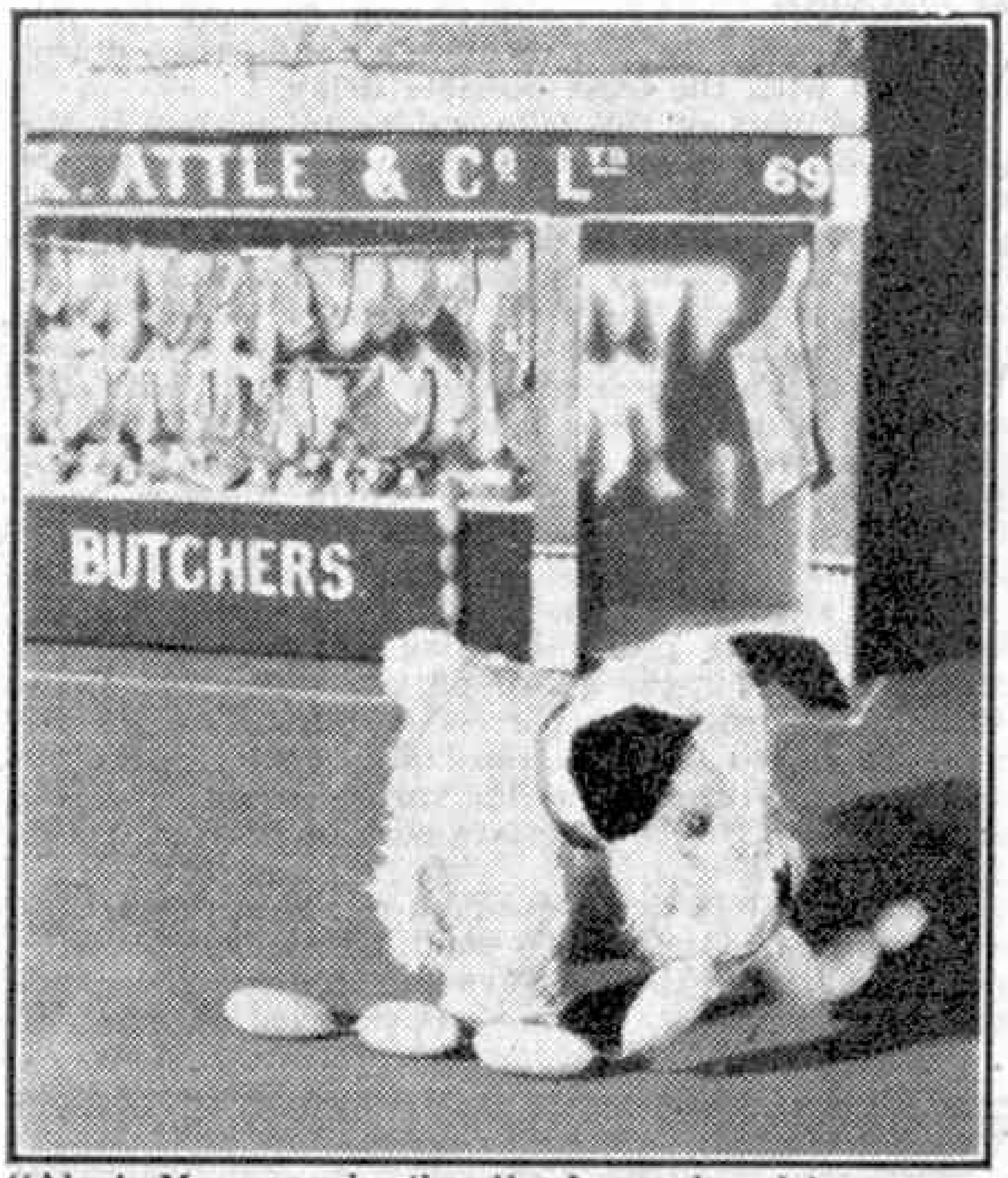
More About "Table-Topping"

TABLE-TOP photography consists of making pictures of small models in suitable surroundings in such a way that they have the appearance of actual full-scale scenes. The models and scenic materials can be arranged directly on a table-top, but it is best to use a loose base-board about 20 in. by 15 in. if possible, as this can be moved about into the best position for lighting. Examples of the realistic and humorous effects that can be obtained are shown in the illustrations on this page.

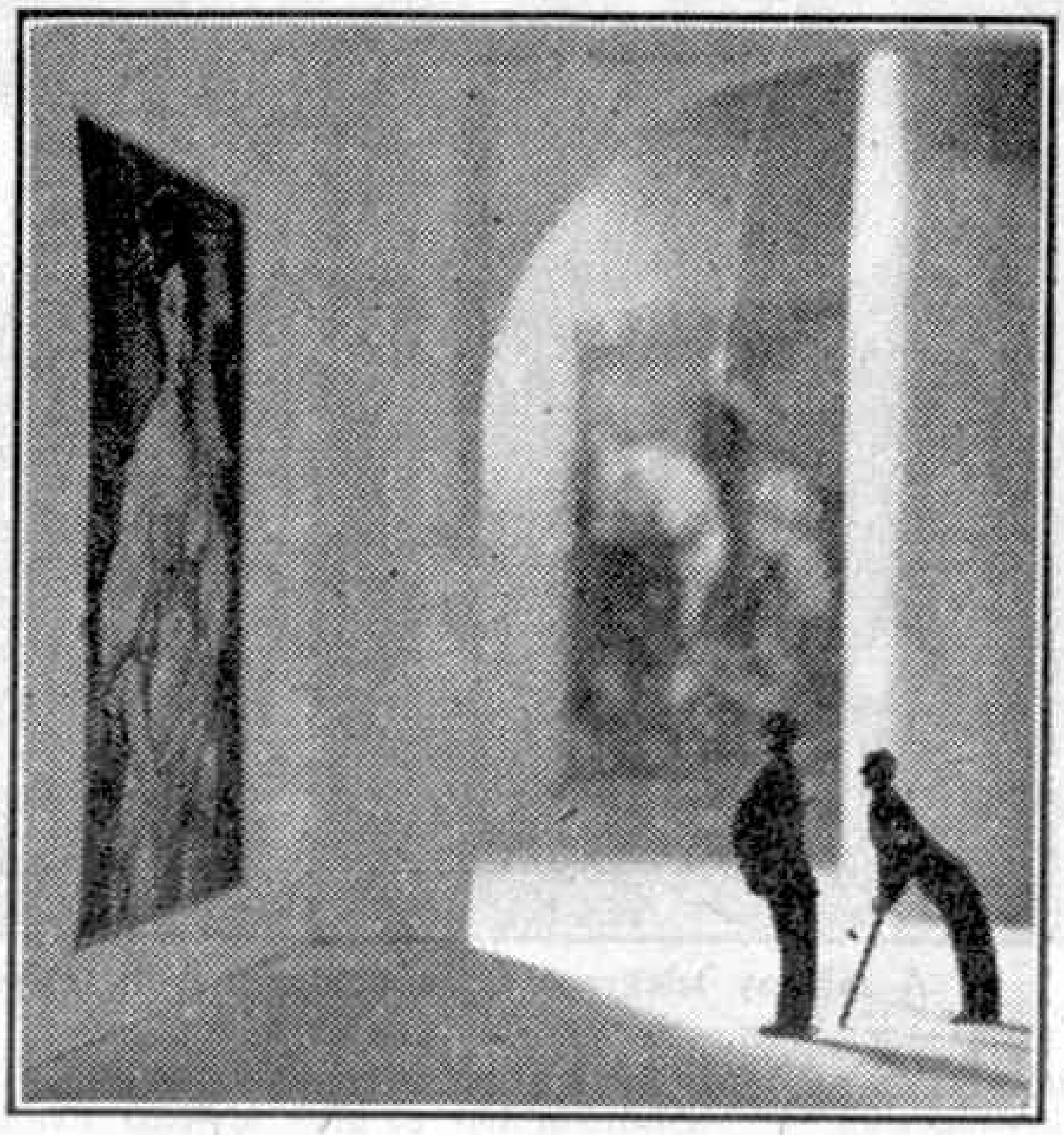
In the picture "*Alas, my poor brother,*" the butcher's shop is made from a small cardboard box suitably painted, and the plentiful supply of prime meat and sausages consists of nothing more tasty than well-moulded Plasticine models! A piece of paper forms the pavement. In the picture "*My biggest Fish*" Plasticine is again used to good effect, both the fish and the angler being formed from it. The fish's eye is a button, and the angler has eyebrows consisting of a few tufts of brown bristles. In "*The Critics,*" which represents two "highbrow" people viewing a picture in an art gallery, the walls of the gallery are made from thin white card, and the pillar is a tall round tin wrapped with a piece of plain paper. The "paintings" are illustrations cut from an old book, and the figures are cut out from thin black card. They are made to stand by folding back the card at the foot and passing a drawing pin through the lug so formed.

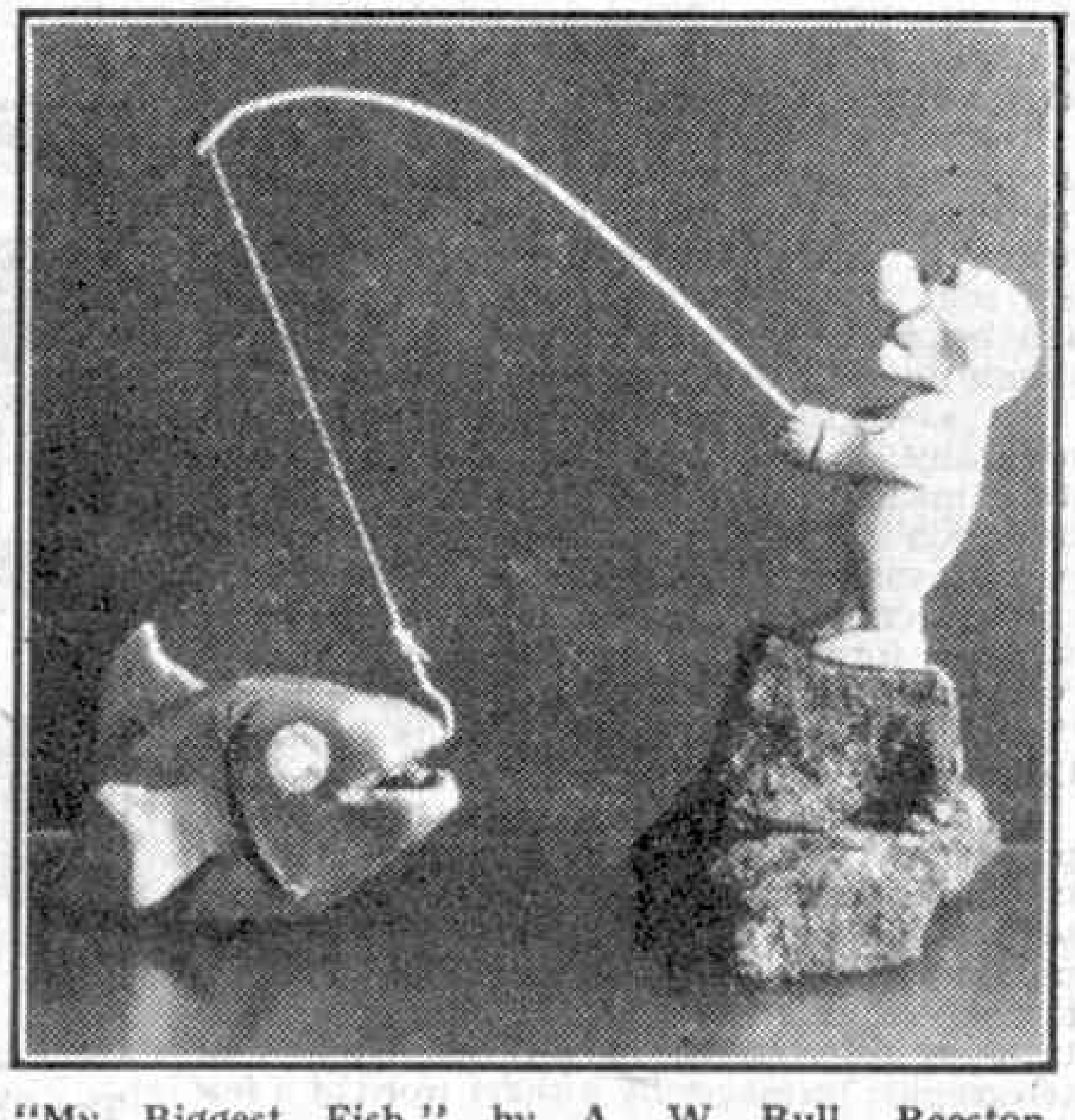
The photographic part of table-top work is by no means difficult and requires only a little care and patience. The most suitable type of camera is of course one fitted with a focussing screen. Focussing is very important, and a camera of this type not only enables the photographer to ensure that his picture is sharp, but also allows him to study the arrangement of the scene and make any necessary adjustments much more easily than is possible with the view finder of a folding film or box camera. First-rate pictures can be made with non-focussing cameras, however, but a portrait attachment must be fitted to the lens to allow the camera to be placed at a distance of about 3 ft. from the picture.

The best pictures are taken by artificial light. It is usual to place the table or baseboard almost directly under a top light, such as a 60-watt globe, and to have a second and more powerful light to one side and slightly in front of the scene, in order to avoid flat and uninteresting effects. A table lamp is very suitable and convenient for this purpose, and by moving it either nearer to or away from the scene it is quite easy to obtain the right effect and avoid harsh lighting. It is a good plan to carry out a few trials with different arrangements of the lamps, and to note the effects obtained as these will provide a useful guide for future operations.



"Alas! My poor brother." A novel and humorous table-top photograph by J. W. Terry, Epsom, Surrey.


"The Critics." A realistically-lighted "table-top" subject arranged by G. P. Duncan, Edinburgh.


"My Biggest Fish," by A. W. Bull, Beeston, Nottingham.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

HOUSE BUILT IN 24 HOURS

A wager led to the building of the house at Preston, Lancashire, illustrated on this page. Many years ago William Price was in the midst of a political difficulty; to become a county voter it was necessary for him to have a house and to be living in it and he had only 24 hours to qualify. So he set to work as midnight chimed. Working with all the help he could get he soon had the building under way and its four walls were up by midday, followed quickly by the bedroom floor and the roof. His house was finished, and William and his apprentice were sitting over a good fire, before the clock struck midnight, and he won his bet, which was for £5 and his county vote.

J. D. ROBINSON (Darlington).

THE HIGHEST PUBLIC ROAD IN BRITAIN

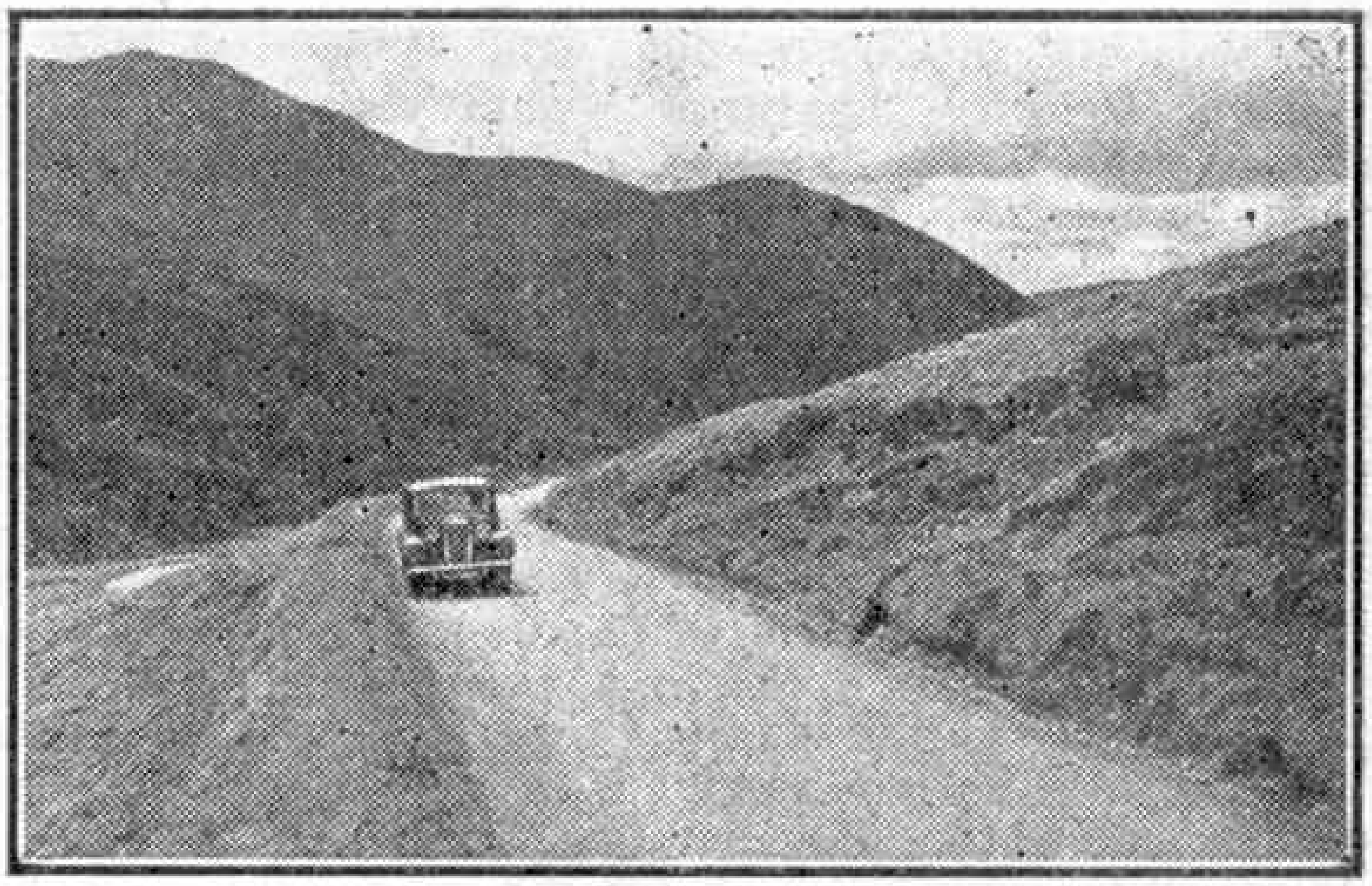
The Cairnwell, the highest public road in Britain, is a source of delight and interest to visitors to the Perthshire Highlands. It is situated on the road between Perth and Aberdeen. If we approach it from Perth, we turn right at the bridge in a village, 21 miles from Perth, that has the picturesque name of Bridge of Cally. On crossing the bridge we traverse an undulating road to Glenshee. Going down into the glen, we turn right at the forked roads, and proceed along a road not too kind to the motorist, but the grandeur of the beautiful mountain scenery more than recompenses us for the lack of a macadam surface. The scenery for the next few miles is very bleak, especially in winter, when the road is usually snowbound for a long period.

When about the middle of Glenshee we reach a hotel standing alone in the middle of this wild country, and faced by an unusual shaped clump of trees, known by the curious name of "Diamid's Tomb."

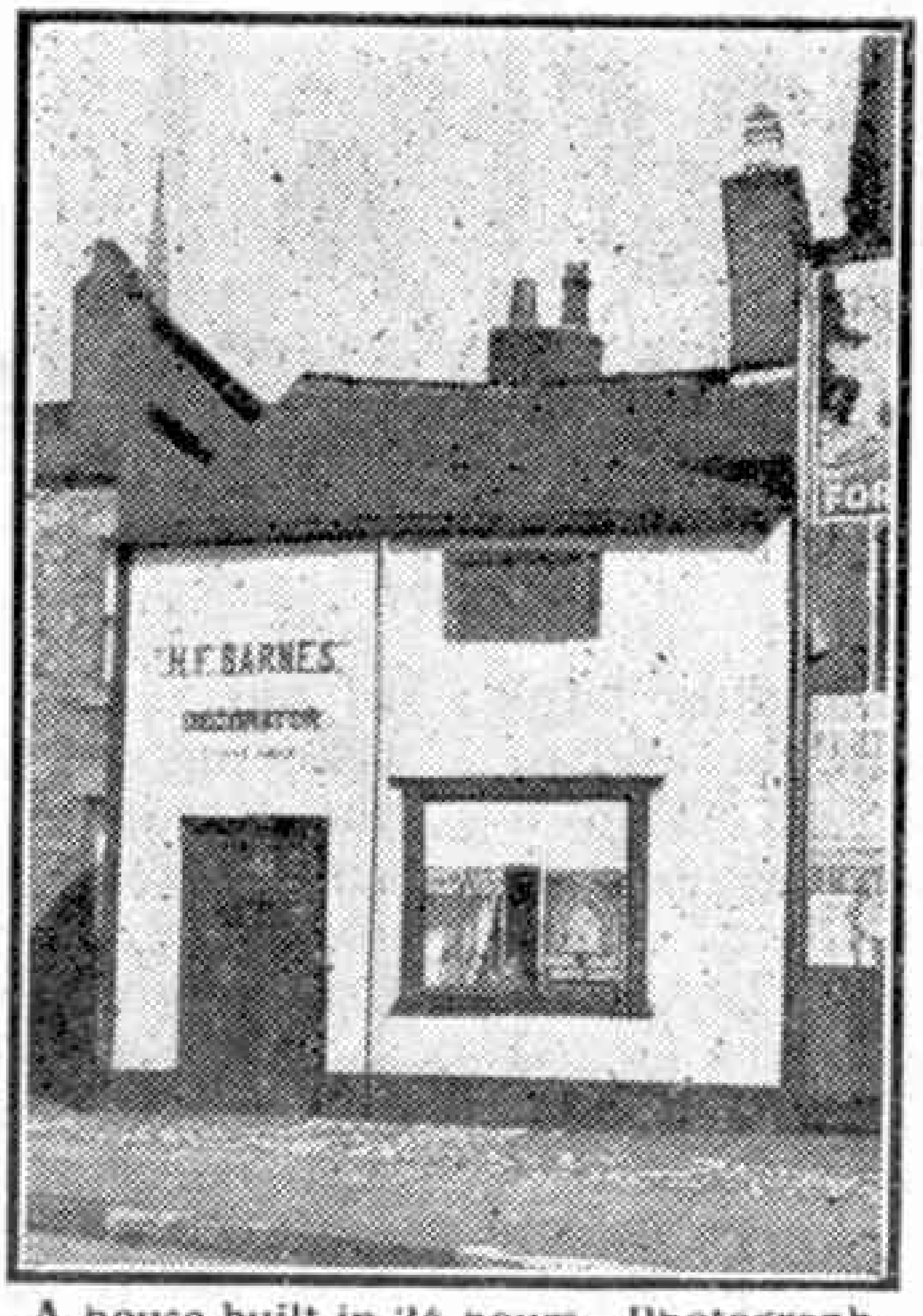
On crossing the very humpbacked bridge just past the hotel, we go up Glen Beag to the Devil's Elbow, a dangerous double bend, with very acute angles. Some of its corners have been somewhat improved during the past few years, but it is still a source of danger to motorists. It is a testing hill for a car too, for the gradient goes up to one in five, and some of the less fortunate break down.

At the top of the Devil's Elbow we come on to the Cairnwell, 3,000 ft. above sea level, and the magnificent vista of the range of Cairngorms makes the climb worthy of the labour. Travelling over the Cairnwell, we start a descent to Clunie Water, and on to Braemar and Royal Deeside. Those who go on to Aberdeen see Balmoral Castle, the Highland home of Their Majesties, and Crathie Church, which is attended by the King and Queen when in residence. Whether one travels over the Cairnwell on foot, on a bicycle or in a motor car, this is one of the finest trips in Scotland.

L. FRANCIS (Dundee).



In an Austin 12 on the Cairnwell Road, in the Perthshire Highlands. This is the highest public road in Great Britain. Photograph by L. Francis, Dundee.



A house built in 24 hours. Photograph by J. D. Robinson, Darlington.

A BURIED SHIP

While spending a summer holiday in Suffolk in 1939 I saw the treasure-burial ship at Sutton Hoo, near Woodbridge. This is 82 ft. long, and 16 ft. in the beam. In it were many fine gold ornaments and silver vessels, as well as a variety of other objects. It is believed that the vessel was a huge rowing galley rather than a sailing ship, but it would not have been very different from the craft in which the earliest Saxon invaders arrived on these shores. There have been several discoveries of this kind in Scandinavia, but this is the first in this country.

The idea of opening the tumulus in which the ship was buried was prompted by the finding in 1938 of a form of battle axe. Excavations went ahead, and many relics were found, including a number of gold ornaments, decorated with garnets and coloured glass, comprising a massive gold buckle enriched with interlaced ornaments, clasps of various forms, the remains of a purse that contained a hoard of coins, and of a sword with a richly decorated gold and jewelled pummel. Other discoveries were spearheads, bowls of bronze, and what may possibly have been sandals.

R. A. WILLIAMS (Southall).

Suggestions Section

By "Spanner"

(676) An Adjustable Eccentric

(A. Davies, Cardiff)

With the Meccano Triple and Single-Throw Eccentrics (Parts Nos. 130 and 170) it is possible to obtain throws of ¼", ⅜" and ½", and these will be found suitable for most purposes. Sometimes, however, the necessity arises for an eccentric giving a throw different from any of these, and with the arrangement shown in Fig. 676 it is possible to vary the throw within very fine limits. In the illustration it will be seen that a Single-Throw Eccentric (Part No. 170) is mounted on a Threaded Pin screwed tightly into the end traverse tapped hole of a Coupling, which is fixed on the end of a Rod. In the ordinary course the Eccentric would be fixed directly on the Rod, but with the arrangement shown, by adjusting the position of the Eccentric in relation to the Coupling, it is still possible to obtain a maximum throw of ½", and this can be gradually reduced until no movement at all is given to the connecting link. By substituting a Crank for the Coupling, or by using a Triple-Throw Eccentric, further variations of throw are obtainable.

Fig. 676.

(677) Watt's Centrifugal Governor

(R. Jones, Birmingham)

The mechanism shown in Fig. 677 is a reproduction of James Watt's centrifugal governor, which he designed as a means of controlling the running speed of his engines. The governor shaft, a 6½" Rod, is journalled at its upper and lower ends in Cranks suitably supported. At a point 2 in. from the end of this Rod, a "spider," removed from a Swivel Bearing, is locked in position, and into two opposite tapped holes ½" Bolts are screwed. These Bolts carry Boss Bell Cranks on their shanks, which are locked in position by nuts.

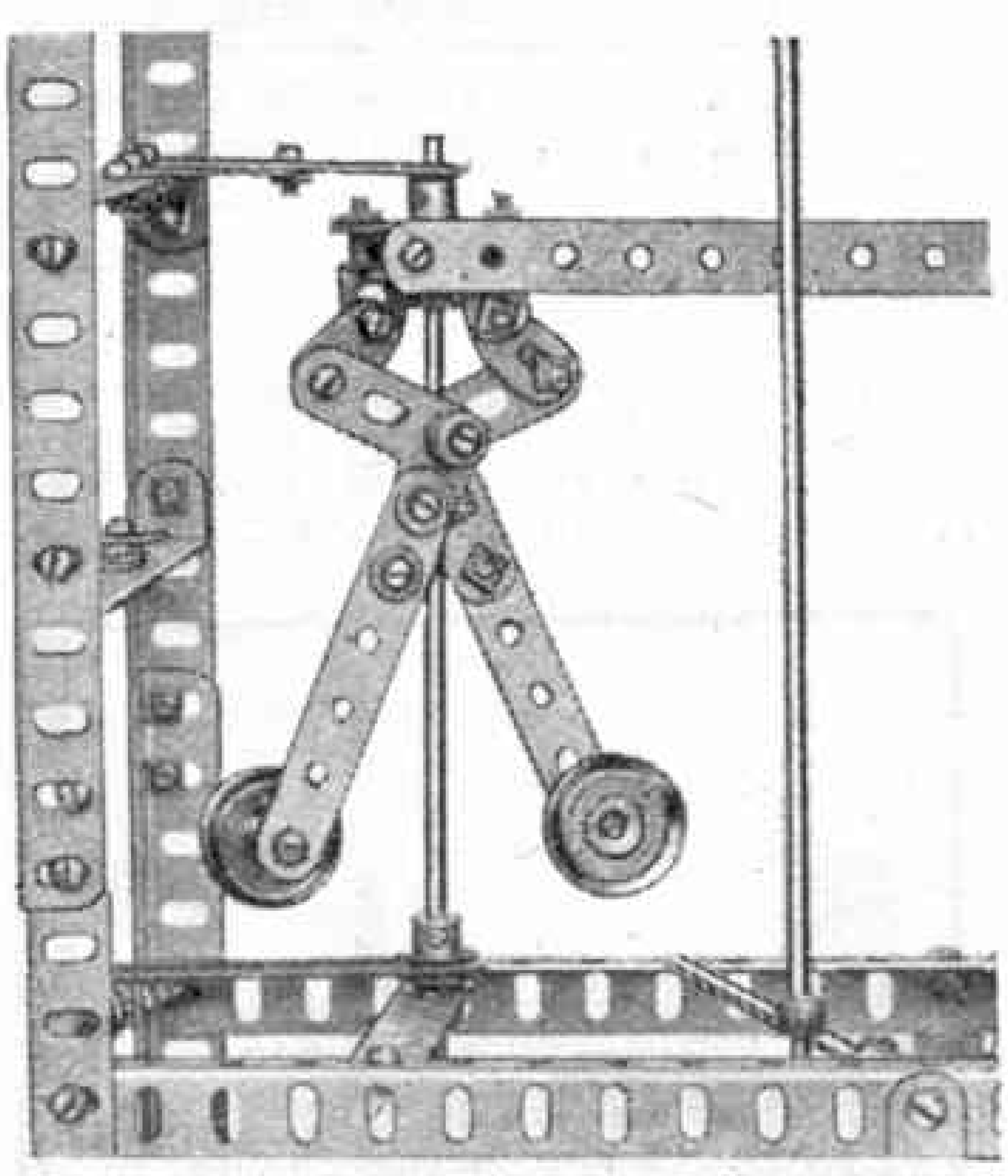


Fig. 677.

The lower arms of the Boss Bell Cranks are extended by 3" Strips, at the lower end of each of which a 1" fast Pulley is fixed by means of a ⅜" Bolt. The ends of the upper arms of the Bell Cranks are pivotally attached to pairs of Flat Brackets, and these in turn are lock-nutted to ½" × ½" Angle Brackets. The slotted holes of the Angle Brackets are used for this purpose, and their round holes are utilised for bolting them to the lower face of a Bush Wheel. This part is connected to a similar part by two ½" Bolts, and both Bush Wheels, which are spaced apart by four or five Washers, are allowed to move freely on the vertical 6½" Rod. Projecting into the space between the Bush Wheels is the end of a Bolt, which is fixed in the end hole of a long pivoted Strip. This Strip is connected at its other end to the valve that controls the steam supply to the engine.

(678) Variable Speed Friction Drive

("Spanner")

It is always best to allow a Motor to run at its highest speed, as under these conditions it develops its maximum power. There are, however, many models, cranes for example, in which it is desirable to be able to operate the mechanism at various speeds. The proper means to adopt is not to cut down the speed of the Motor by reducing its current supply, but to allow the Motor to run at constant high speed and introduce some form of mechanical speed-reducing device between the Motor driving shaft and the driving shaft of the model. Such devices can take many forms, and one of the rather less usual types is seen in Fig. 678. This is known as a variable-speed friction drive, and I have designed it as simply as possible so that younger model-builders will not be deterred from experimenting with it.

It consists of a Face Plate 1 that forms a friction disc and is fixed on a Rod suitably journalled. In contact with the Face Plate is a 1″ Pulley 2 fitted with a Rubber Ring. The Pulley is lock-nutted on a Screwed Rod 3, the inner end of which is held in a Coupling 4 as shown. Also held in the Coupling are two Rods 5 and 6, and these slide in holes in a second Coupling 7 fixed on a Screwed Rod 8.

A Threaded Crank 9 is threaded on a Screwed Rod 10, which is fitted with a Bush Wheel and a Threaded Pin to form a handwheel. This Screwed Rod is prevented from moving endways by Collars, and the arm of the Crank engages the Screwed Rod 3 between the boss of the 1″ Pulley and a Collar 11. By turning the handwheel the 1″ Pulley can be made to move across the Face Plate.

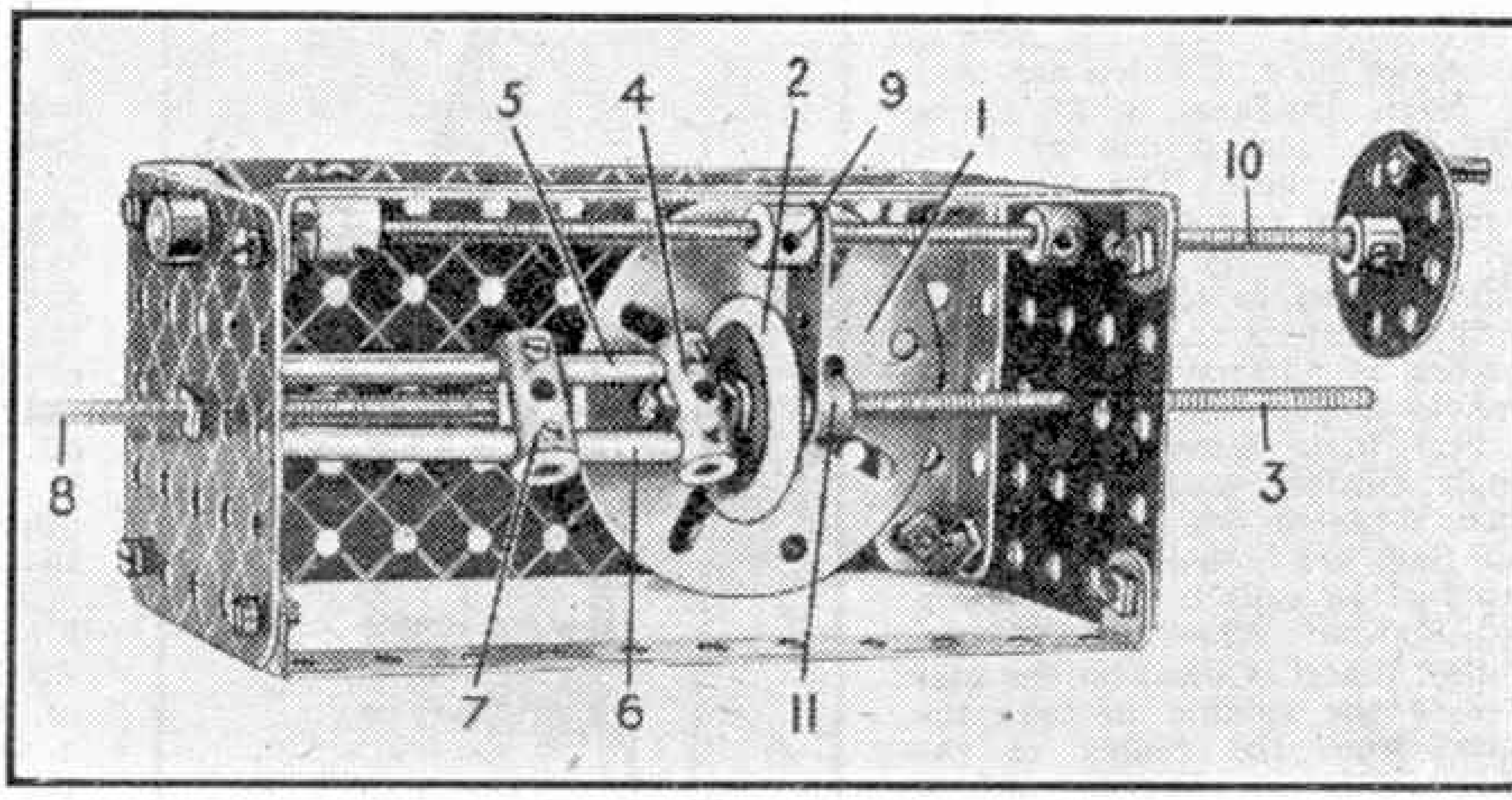


Fig. 678.

Either the shaft on which the Face Plate is mounted, or Rod 3, may be used as the driving shaft, and the speed at which the driven shaft rotates depends on the position of the 1″ Pulley in relation to the Face Plate. The nearer the Pulley is to the centre of the Face Plate, the smaller will be the difference between the speeds of the driving and the driven shafts. As the Pulley is moved nearer to the outer edge of the Face Plate the difference in the relative speeds increases. When the Pulley is contacting the exact centre of the Face Plate a neutral position is established, and no movement is imparted from the shaft 3 to the shaft of the Face Plate, or vice versa.

(679) Ball Catch Mechanism for Retaining Gear-Change Levers

(N. C. Ta' Bois, Woodford Green)

The base consists of a 1½″ × 2½″ Flanged Plate, to each end of which is bolted a 1½″ Flat Girder. A 3½″ Rod 1 carries a Collar at each end and two ½″ fast Pulley Wheels 2 at its centre, and between the two fast Pulley Wheels is a ½″ loose Pulley Wheel 3. The change lever 4 is suitably arranged to slide the Rod 1 in its bearings. Two Collars are joined together by 7/32″ Grub Screws. The Collar 5 is mounted on a Pivot Bolt while the Collar 6 is free to slide on the Rod 4.

A Socket Coupling 7 is attached to the Flanged Plate by a Bolt pushed through from below, two Washers being placed under its head. A ½″ × ½″ Angle Bracket 8 is bolted to the Socket Coupling, one Washer being first placed on the Bolt. A Threaded Pin is inserted into the Socket Coupling from the Angle Bracket end, and a Compression Spring placed between it and the Bracket 8. This Spring causes the rounded end of the Threaded Pin to press a Steel Ball 9 into the grooves of the Pulley Wheels. As the Rod 1 is moved laterally, the Ball passes from one groove to the next and retains the Rod in position. By increasing the number of ½″ loose Pulley Wheels between the Wheels 2 a larger number of positions for the Rod can be obtained. If it is desired to increase the grip a second Socket Coupling unit should be arranged to engage the other side of the ½″ Pulleys.

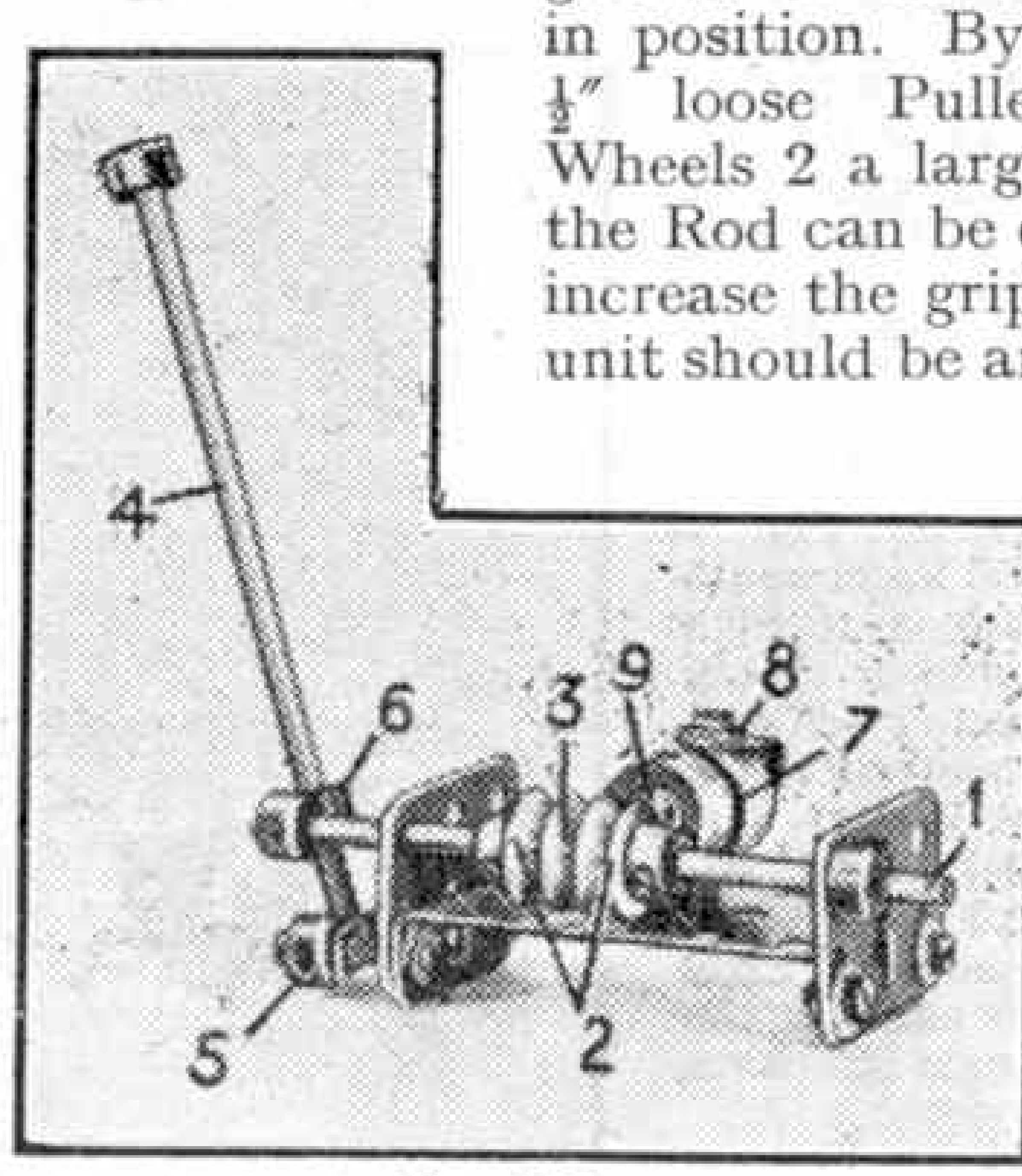


Fig. 679.

* * * *

When a slow action cam is required a suitable unit can be formed from three Double Brackets bolted between two Bush Wheels. The tappet is a pivoted Strip, the free end of which carries a 2″ Flat Girder that rides the Brackets.

New Meccano Models

Windmill—Lorry—Aeroplane

The simple windmill shown in Fig. 1 is fitted with a *Magic* Motor, which drives the sails at a realistic speed. The model is provided with a heavy base consisting of two Hub Discs and a 6" diam. Circular Plate. To the upper Disc are bolted two 3½"×½" Double Angle Strips, and these form points of attachment for four 12½" Strips, the upper ends of which are held by Angle Brackets to 2" Angle Girders 2, placed one at each side of the mill. The structure is made firm and sturdy by four 5½" Strips and 5½"×1½" Flanged Plates bolted to the 12½" Strips in the positions shown. The sail spindle is journalled in a 4½" Double Angle Strip 3 bolted to a Flat Plate fixed to the two Angle Girders, and it carries a Bush Wheel to which four Windmill Sails are bolted. A neat hub cap for the sails is formed by a 1⅛" Flanged Wheel. A 2" dia. Pulley Wheel is fixed on the rear end of the spindle to take the drive from the pulley of the *Magic* Motor. The windmill tower is capped by a Curved Plate, which is bolted to Obtuse Angle Brackets attached to the Angle Girders 2.

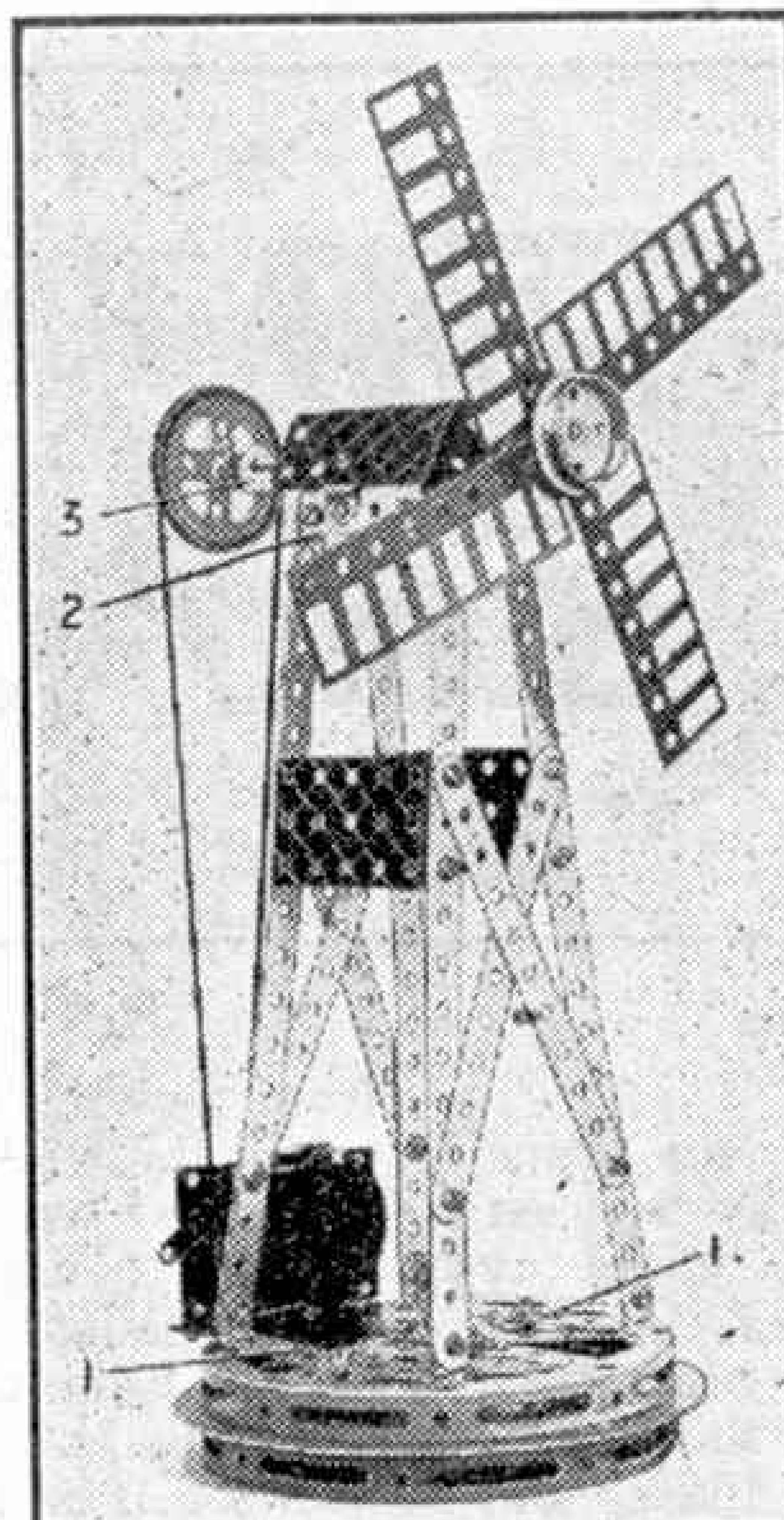


Fig. 1. A model windmill driven by a Magic Motor.

The *Magic* Motor is bolted to the upper Hub Disc of the base and to one of the rear 12½" Strips, and its Pulley is connected by a Driving Band to the 2" Pulley on the sail spindle.

The tower is arranged to rotate on the lower Hub Disc, and this is effected by pushing a short Rod through Bush Wheels bolted at the centres of the Discs. The Rod is gripped in the boss of the lower Bush Wheel and a Collar is placed on its upper end against the face of the upper Hub Disc.

Parts required to build model Windmill: 4 of No. 1a; 4 of No. 2; 2 of No. 9a; 1 of No. 12; 2 of No. 12c; 1 of No. 14; 1 of No. 18a; 1 of No. 20; 1 of No. 20a; 2 of No. 24; 48 of No. 37; 7 of No. 38; 2 of No. 48; 2 of No. 48b; 1 of No. 48c; 2 of No. 51; 2 of No. 59; 1 of No. 62b; 1 of No. 72; 1 of No. 73; 2 of No. 118; 1 of No. 146; 1 of No. 186d; 1 of No. 199; *Magic* Motor.

Lorry

The miniature lorry illustrated in Fig. 2 is fitted with a *Magic* Motor bolted underneath the truck platform, and this drives it at high speed over a level surface. If a Motor is not available, however, it can be omitted without in any way interfering with the constructional details of the model as described below.

The bed of the lorry is a 5½"×2½" Flat Plate, which is extended at its forward end by a 3"×1½" Flat Plate. Two 5½" and one 2½" Strip are fixed to the sides and rear end of the 5½"×2½" Flat Plate by means of Angle Brackets, and they form the sides of the body.

To each side of the 3"×1½" Flat Plate a 2½"×2½" Flat Plate is attached by means of Angle Brackets as shown. A Flexible Plate 1 is bolted to the Flat Plates to form the rounded front of the cab. A 2½"×1" Double Angle Strip 2 is bolted underneath the 3"×1½" Flat Plate and this carries the front wheel axle. The roof of the cab is supported by two 3" Strips, and is formed from a 2½"×2½" Flexible Plate edged at the front by a Curved Strip 3. A 5" Rod 4 is pushed through the centre hole in the Double Angle Strip 2 and then through the centre of a Cylinder placed vertically inside the cab. A 1⅛" Flanged Wheel 5 is placed on the Rod and it is then pushed through the roof, where it is held in position by a Collar. Another Collar is placed on the lower end of the Rod. The Flanged Wheel is pushed tightly against the upper end of the Cylinder to form the top of the boiler.

The back of the cab is a 1½"×2½" Flexible Plate fixed to a 1½" Angle Girder bolted to the bed of the lorry. The driver's seat is a 1½" Angle Girder 7 bolted to the Flexible Plate.

A ⅜" Bolt 8 held in a Collar on a Bolt fixed in one of the side 2½"×2½" Flat Plates, represents the control lever of the engine.

A *Magic* Motor is bolted underneath the body as shown, and its pulley is connected by a Driving Band to a ½" fixed Pulley mounted on the axle of the rear wheels. This axle is journalled in a 2½"×1" Double Angle Strip bolted to the rear end of the 5½"×2½" Flat Plate.

An Angle Bracket 6 is used to hold the Cylinder firmly in position in the cab.

Parts required to build the model Lorry: 2 of No. 2; 2 of No. 4; 1 of No. 5; 2 of No. 9f; 10 of No. 12; 1 of No. 15; 2 of No. 16b;

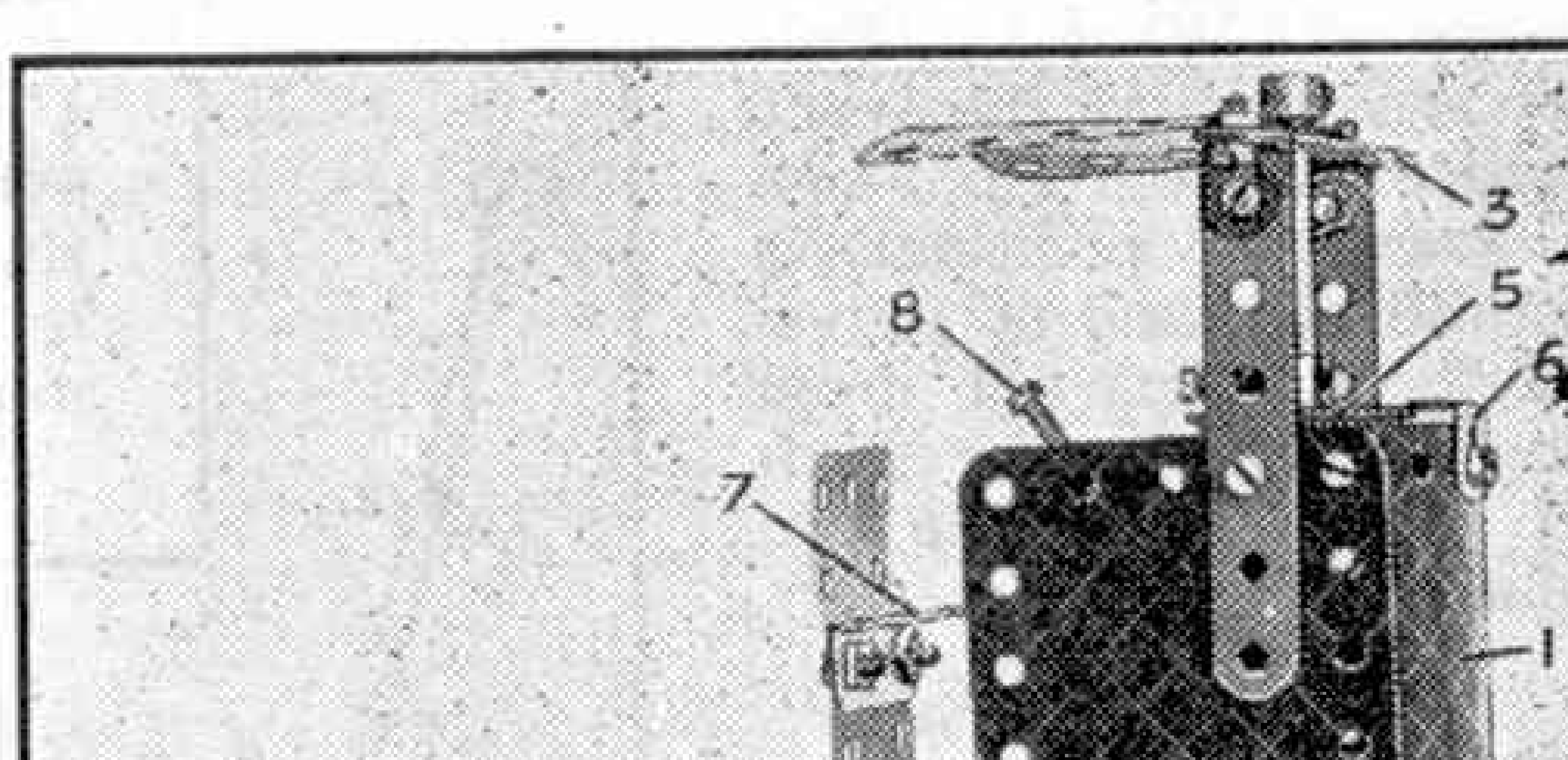


Fig. 2. A Magic Motor drives this miniature lorry at a good speed.

1 of No. 20; 4 of No. 22; 1 of No. 23a; 29 of No. 37a; 29 of No. 37b; 2 of No. 46; 3 of No. 59; 1 of No. 70; 2 of No. 72; 1 of No. 73; 1 of No. 90; 2 of No. 111; 4 of No. 155 or 155a; 2 of No. 190; 1 of No. 216; 1 *Magic* Motor.

Miniature Monoplane

The miniature monoplane that is shown in Fig. 3 is constructed in the following manner. Two 1½"×½" Double Angle Strips are bolted together by their turned-up ends. To the upper one of these two Propeller Blades are bolted and to the central hole of the lower one is fixed a large Fork Piece 1, by means of a ⅜" Bolt that is screwed into a Coupling 2. A Rod in the arms of the Fork Piece is fitted at each end with a ½" fast Pulley shod with a Dinky Toys Tyre. A Rod is pushed through the Coupling 2, so that it projects at the rear to carry an additional Coupling, a Strip Coupling and Collars that together form the fuselage.

A Rod Socket fitted with two Threaded Pins is inserted into the front end of Coupling 2 to represent the engine and propellers.

The rudder and tail-plane of the machine consist of a Triangular Plate 3 placed in the slot of the Strip Coupling, and two Angle Brackets. These are gripped in place by the grub-screw 4 in the Strip Coupling.

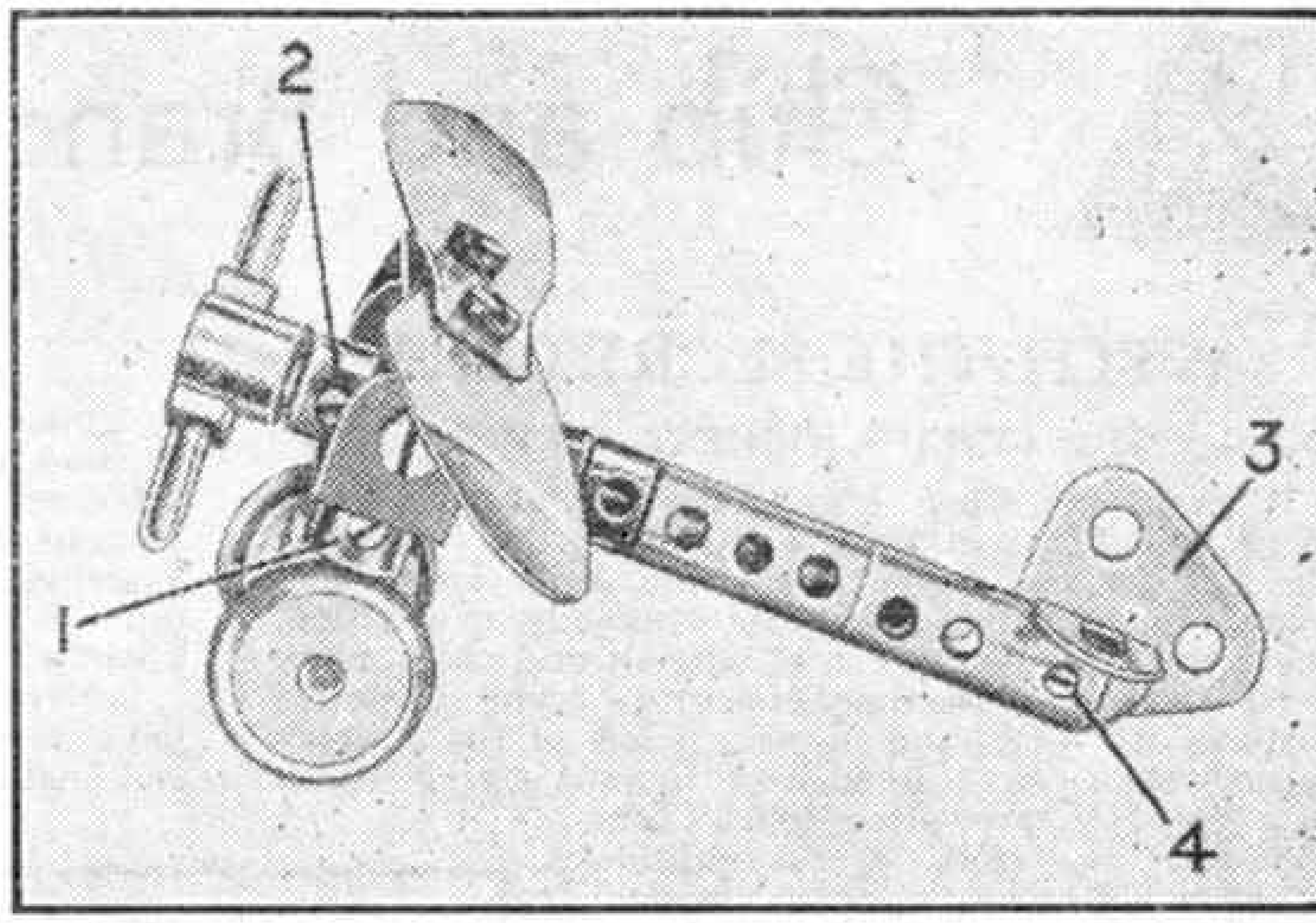


Fig. 3. A miniature monoplane of novel construction.

Parts required to build model Monoplane: 2 of No. 12; 1 of No. 16; 1 of No. 18b; 2 of No. 23a; 4 of No 37; 2 of No. 41; 2 of No. 48; 2 of No. 59; 2 of No. 63; 1 of No. 63b; 1 of No. 77; 2 of No. 115; 1 of No. 116; 1 of No. 179.

"Limited Parts" Contest Still Open For Entries

There is still time to submit entries for the "Limited Parts" Competition that was first announced in the January issue of the "*M.M.*" The contest closes on 28th February. We are aware that many keen model-builders would like to participate in the competitions announced in the "*M.M.*," but do not do so because they possess only a small quantity and variety of Meccano parts. They feel, although quite wrongly, that they will not stand so good a chance of winning a prize as more fortunate competitors who have a varied stock of parts at their disposal, and are able to build large and complicated models. In designing the "Limited Parts" Competition, therefore, we have tried to make the conditions as nearly as possible equal for everyone, irrespective of the size or scope of his or her Outfit. This has been done by limiting to 12 the kinds of Meccano parts that may be used in building models for entry in the contest, and the 12 parts we have selected are those most likely to be in the possession of the majority of model-builders. These parts are named in the panel on this page.

"LIMITED PARTS" COMPETITION

List of Meccano parts to be used in building models:

(1) Strips
(2) Angle Girders
(3) Rods
(4) Angle Brackets (½"×½")
(5) Trunnions
(6) Collars
(7) Pulleys (1" fast)
(8) Flat Plates (5½"×3½")
(9) Pulley Wheels (3")
(10) Pulley Wheels (½")
(11) Bush Wheels
(12) Meccano Cord (or string)

Nuts and Bolts may be used in any number required.

Competitors should note, however, that they are not obliged to use all of the parts in the list in building their models.

Competitors are allowed complete freedom to choose any subject they like for their models, but before making a decision on this point they should consider carefully whether it is possible to reproduce the proposed subject realistically from the small variety of parts they are allowed to use. Careful selection of the subject will be an important factor in deciding a model's chance of success, for in awarding the prizes the judges will look specially for models that make the best possible use of the parts permitted, and which show originality in their constructional details.

The competition is open to readers of all ages, and entries will be divided into two sections, A and B. In Section A will be grouped entries from all competitors over 14 years of age, while entries from competitors under 14 will be placed in Section B.

A separate set of prizes will be awarded in each Section, and will be as follows: First, Cheque for £2/2/–; Second, P.O. for £1/1/–; Third, P.O. for 10/6. There will be also a number of consolation prizes.

Competitors should note that actual models must not be sent. All that is required is either a photograph or a drawing of the model, together with a short description of its principal features and a list of the parts used in its construction. These should bear the competitor's age, name and address, and should be enclosed in an envelope addressed: "*Limited Parts Model-Building Competition, Meccano Limited, Binns Road, Liverpool 13.*"

Photographs or drawings of models awarded prizes become the property of Meccano Ltd., but unsuccessful entries will be returned if a stamped addressed envelope is sent for that purpose. More than one model may be submitted if desired, but no competitor will be awarded more than one prize. If two or more models are sent they will be assessed jointly.

The closing date of the competition will be 28th February.

Each competitor awarded a prize will be notified by letter as soon as possible after the closing date.

Club and Branch News

WITH THE SECRETARY

THE GUILD'S HIGHEST AWARD

A year ago, when I gave the list of winners of Merit Medallions in 1943, I expressed the hope that the list for the year 1944 would be a larger and more representative one. Unfortunately evacuation, the absence in the Forces of officials and older members, and other wartime difficulties have continued through the year, and in some parts of the country indeed these were intensified by the flying bomb attack, which prevented some Clubs from meeting regularly. In addition it continued to be impossible to send Merit Medallions overseas. As a result the list for 1944 is not by any means extensive, but I am glad to have the opportunity of including it in the "*M.M.*" so that I may have the pleasure of giving recognition to the splendid work of those who earned the Merit Medallion during this difficult year.

The list is as follows: EXETER—R. Gibbs, W. Whiddon, D. Parker, S. Coles, D. Huddart, R. Weeks, J. Prynn, D. Prynn. HORNSEA—C. Kemp. LONG ITCHINGTON—H. Windsor, J. Butler. SOUTHPORT—M. Oldfield, G. Dawson. To all these members I send my heartiest congratulations on their success. They have won their awards by good work of various kinds, all done freely and willingly with the sole aim of advancing the interests of their Clubs and of the Guild in general.

Once again I express the hope that the year just begun will yield better results than the last. It certainly will if conditions allow Clubs to operate more freely than they have done for some years, and I wish all Leaders of Clubs, both old and new, to keep the Merit Medallion in mind and to send me nominations for it at the end of each session. In each affiliated Club two Medallions are available for each of the four sessions into which the year is divided, and there is no restriction on the kind of good work that may be recognised by their award. This may take the form of special contributions to the programme, distinction in model-building, recruiting success, long and meritorious service and so on, and the nominations are made by the Leaders, who have the best opportunities of seeing what their members are doing.

PROPOSED BRANCHES

DUBLIN—Mr. D. Keogan, 13, Ailesbury Park, Ballsbridge, Dublin.

NOTTINGHAM—Mr. J. Yates, 36, Edgware Road, Bulwell, Nottingham.

LEWES—Mr. F. Gurr, 22, Cross Way, Lewes, Sussex.

CAMBRIDGE—Mr. G. P. Walker, 15, Sedley Taylor Road, Cambridge.

WHITCHURCH—Mr. A. S. McKie, 70, Bishops Road, Whitchurch, Cardiff, Glam.

GLASGOW—Mr. G. Ewing, 72, King Park Avenue, Glasgow, S.4.

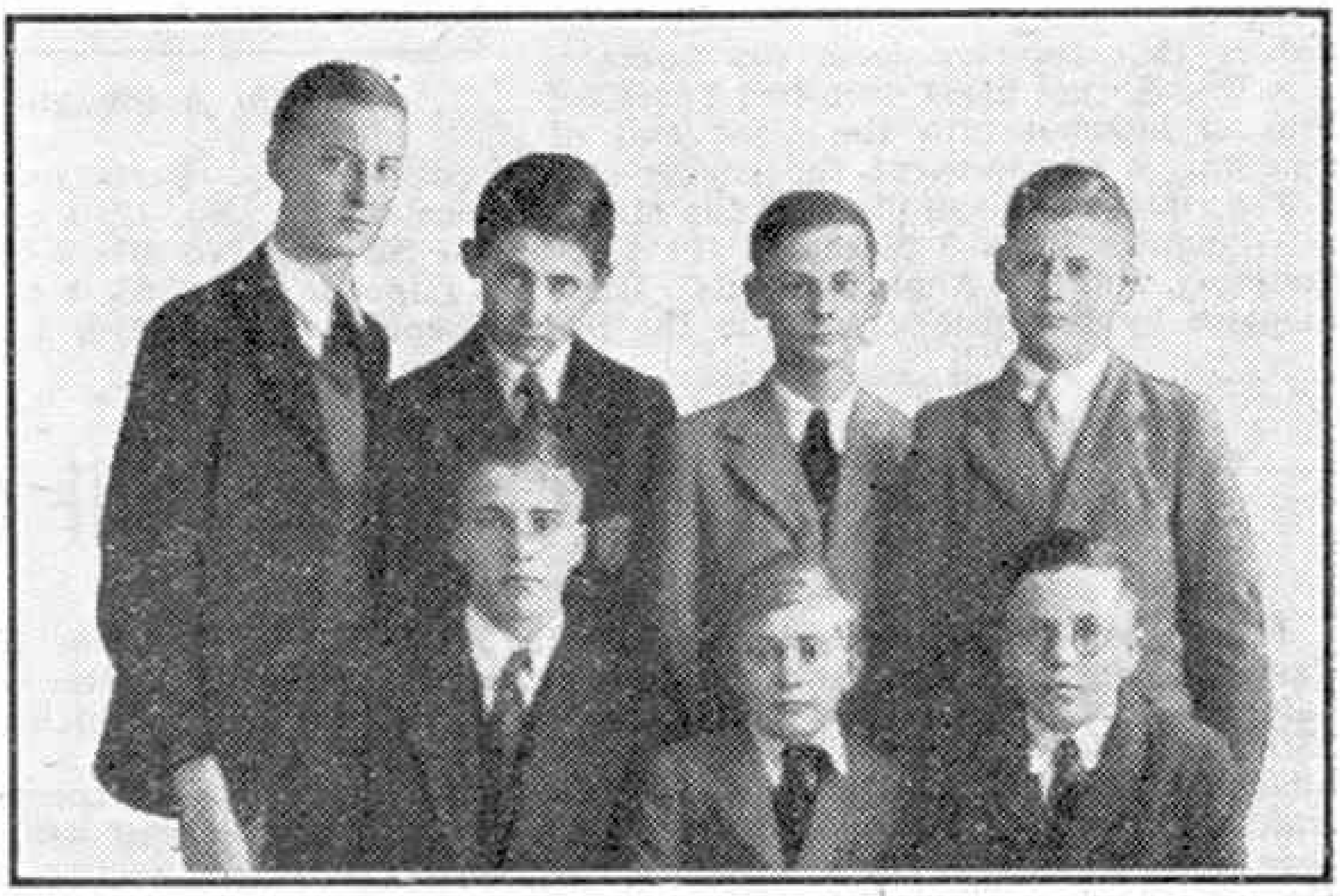
LONDON—Mr. R. J. ALDER, 86, Forest Road, Lower Edmonton, London N.9.

WITLEY—Mr. T. Ash, Lower Birtley Farm, Witley, Surrey.

CLUB NOTES

THORNTON GRAMMAR SCHOOL (BRADFORD) M.C.—A good programme is being followed, with various activities controlled by committees. There are sections for Woodwork, Engineering and Aeroplane Modelling. Film Shows also are being given. Club roll: 18. *Secretary:* W. Smith, 20, Masefield Avenue, Chellow Grange, Bradford.

SOUTHPORT M.C.—Interesting Model-building events have been enjoyed, with Hornby Train operation and Lectures on "*Ships*," "*Railways*," and "*Fireworks*."



Members of the Woodlands (Hull) Branch of the H.R.C., No. 459, Chairman, Mr. M. E. Kennington. The Secretary, D. Kennington, is second from the left on the second row, with Mr. G. Gregson, Deputy Chairman, on his right. The Branch was incorporated in December 1943. A good layout is operated, all stations and other buildings being fitted with electric lights. Two groups have been formed, known as "Staniers" and "Gresleys" respectively, and inter-group competitions of all kinds are keenly contested.

A particularly interesting Lecture on "*Water*" was given by Mr. Fryer, Water Engineer of Ormskirk. General Knowledge Tests, Debates and Visits complete a very fine programme. Club roll: 10. *Secretary:* G. Dawson, 9, Clifton Road, Southport.

EXETER M.C.—Model-building continues to be pursued with interest, and a mystery model said by some to resemble a skyscraper is now under construction. The Club continues to be strongly represented in the Exeter Youth Parliament, and 12 football teams are being run this year, eight of them for Junior members. Club roll: 200. *Secretary:* Edward Parker, 11, Morley Road, Exeter.

AUSTRALIA

THEBARTON BOYS' TECHNICAL SCHOOL M.C.—Great activity prevailed throughout 1944. A special model that aroused great interest was a reaction meter that measured the speed with which members responded to the appearance of light signals of various kinds. Competitions also have been arranged, with Talks and Visits. Mr. Gibson, Leader, demonstrated a working Meccano model of a coin slot machine, and a reproduction in Meccano of the Foucault Pendulum, which shows how the Earth rotates. Club roll: 50. *Secretary:* K. Eastick, Thebarton Boys' Technical School, Ashley Street, Thebarton, South Australia.

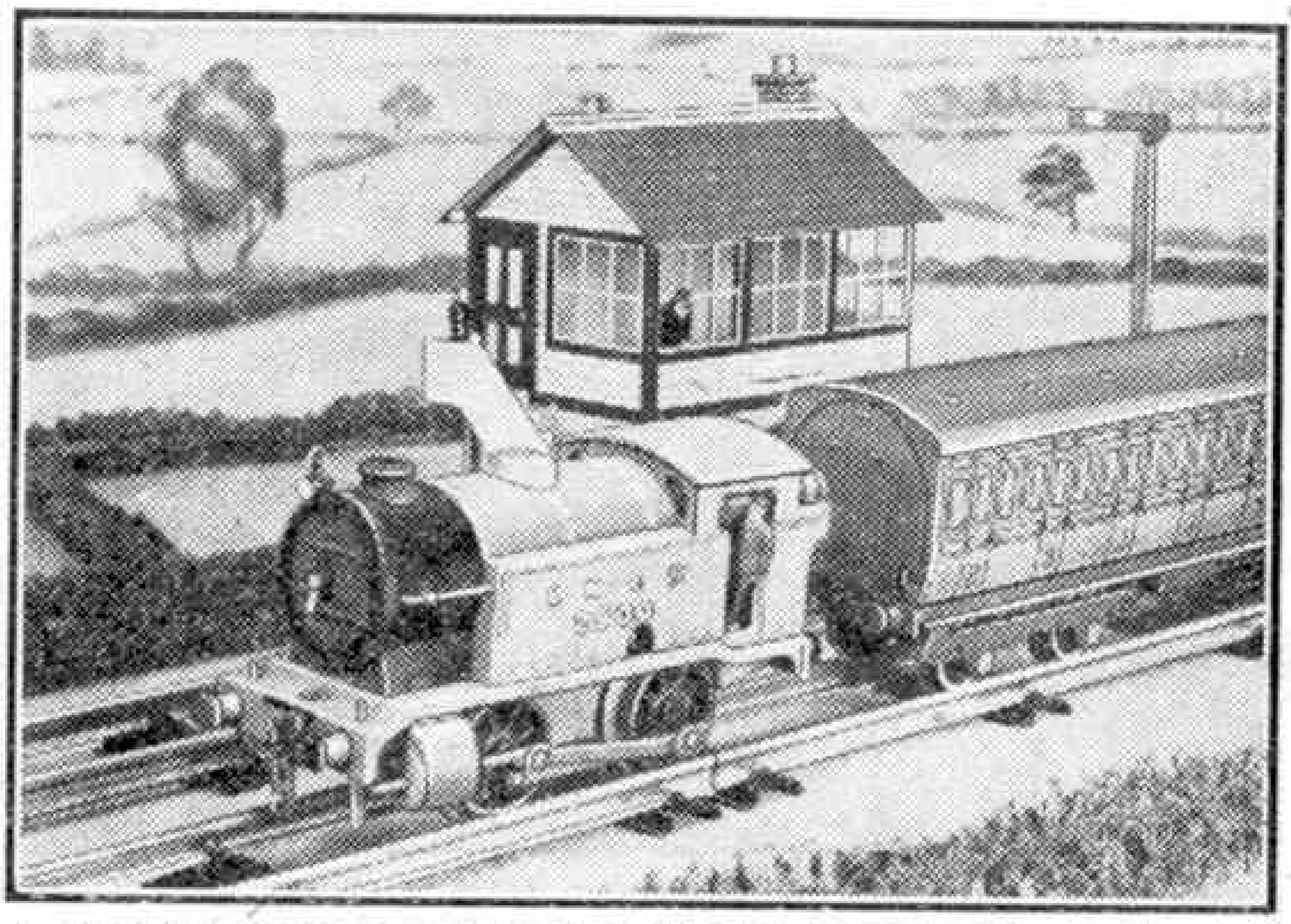
Coal and Lamps for Hornby Trains

IN spite of the fact that Hornby Railway supplies are not available owing to present conditions it is still possible for the owner of even the most "war weary" equipment to give attention to the many little details that add to the general realism. In this article we give a few ideas for home construction, and no doubt these will suggest further schemes to the keen miniature railwayman.

One of the first things that strike us about many model locomotives is the fact that the tender is empty. In actual practice this would never do, and the great heap of coal that is carried in a locomotive tender is usually a source of wonder to the onlooker. We do not of course expect to find water in our miniature tenders, but a load of coal, whether real or substitute, makes a splendid improvement to the effect. It is not difficult to provide this. The best scheme is to prepare a false bottom of card painted black, on which the load can be glued. For this load we use coal broken small, washed to remove the dust, and allowed to dry. The pieces are then glued to the top surface of the card shape and built up carefully into a nice heap. This should be allowed plenty of time to set, and then there will be no trouble with individual pieces shifting and breaking loose while the adhesive is still tacky. With the coal secured in this way, and with the card shape a snug fit in the tender body, there is little likelihood of the coal load spilling and thus arousing complaints from the domestic Authorities in the event of a mishap and an overturned tender.

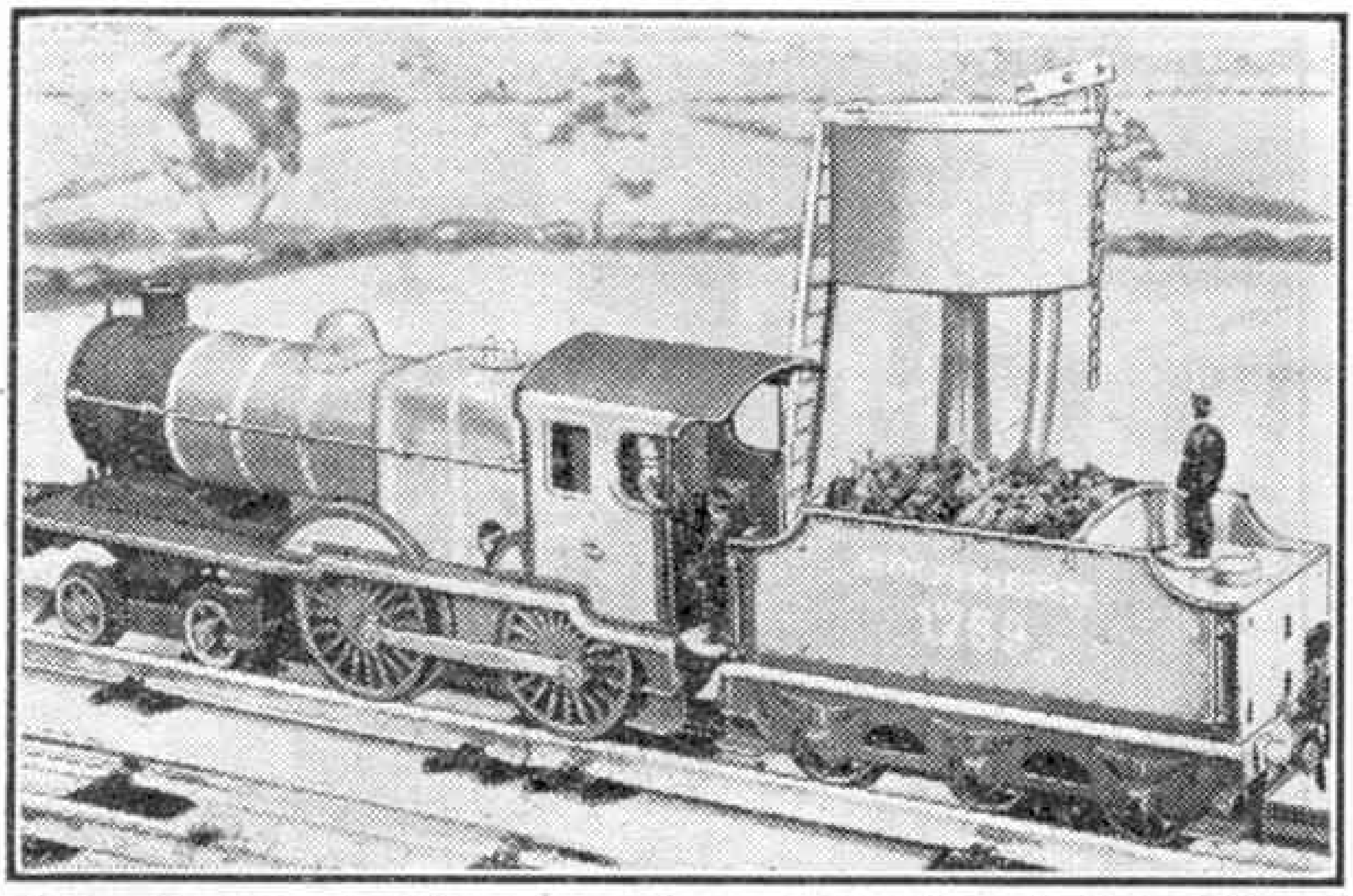
If coal is forbidden, a good substitute can be made from a few corks cut up into rough shapes with a penknife. The rounded surfaces should be carved off as much as possible, and when the lumps have been stuck into position the whole can be painted black. A reasonable representation of a heap of coal will result that will certainly be better than an empty tender.

Every reader knows that practically all locomotives carry headlamps when at work and that a tail lamp is necessary at the rear of a train to indicate that the train is complete. Most Hornby Locomotives are fitted with lamp brackets, and these fittings are also found on the No. 1, No. 2 and No. 2 Corridor Coaches. Unfortunately on many model railways the miniature lamps required to put the finishing touch to the front and rear of a train have become "missing," as it is rather easy to mislay these little items.



A stopping train on a Hornby L.N.E.R. layout. The position of the headlamp on the engine indicates the kind of train.

It is not really difficult, however, to make a few substitute "lamps" that will at all events be good enough to carry on with until the standard products are again available. Quite good lamp bodies can be cut from wood, or from bottle corks, preferably the "smooth" kind usually used for medicine bottles. Little cubes measuring about $\frac{3}{16}$ in. each way should be cut carefully. Then we need a few of the smaller kind of paper pins. We gently pierce a slot through each lamp body, and press the legs of the paper pin through until the head touches what now becomes the front of the lamp. The pin head of course forms the lamp "glass" or bull and the legs projecting at the rear should be opened out, and bent to form a socket that will fit the brackets on our engine or coaches. The handle of the lamp can be reproduced by bending a short piece of wire into a U-shape, like a staple. The legs of the staples are then pushed into the top of the lamp body and all that is needed now is to paint them.



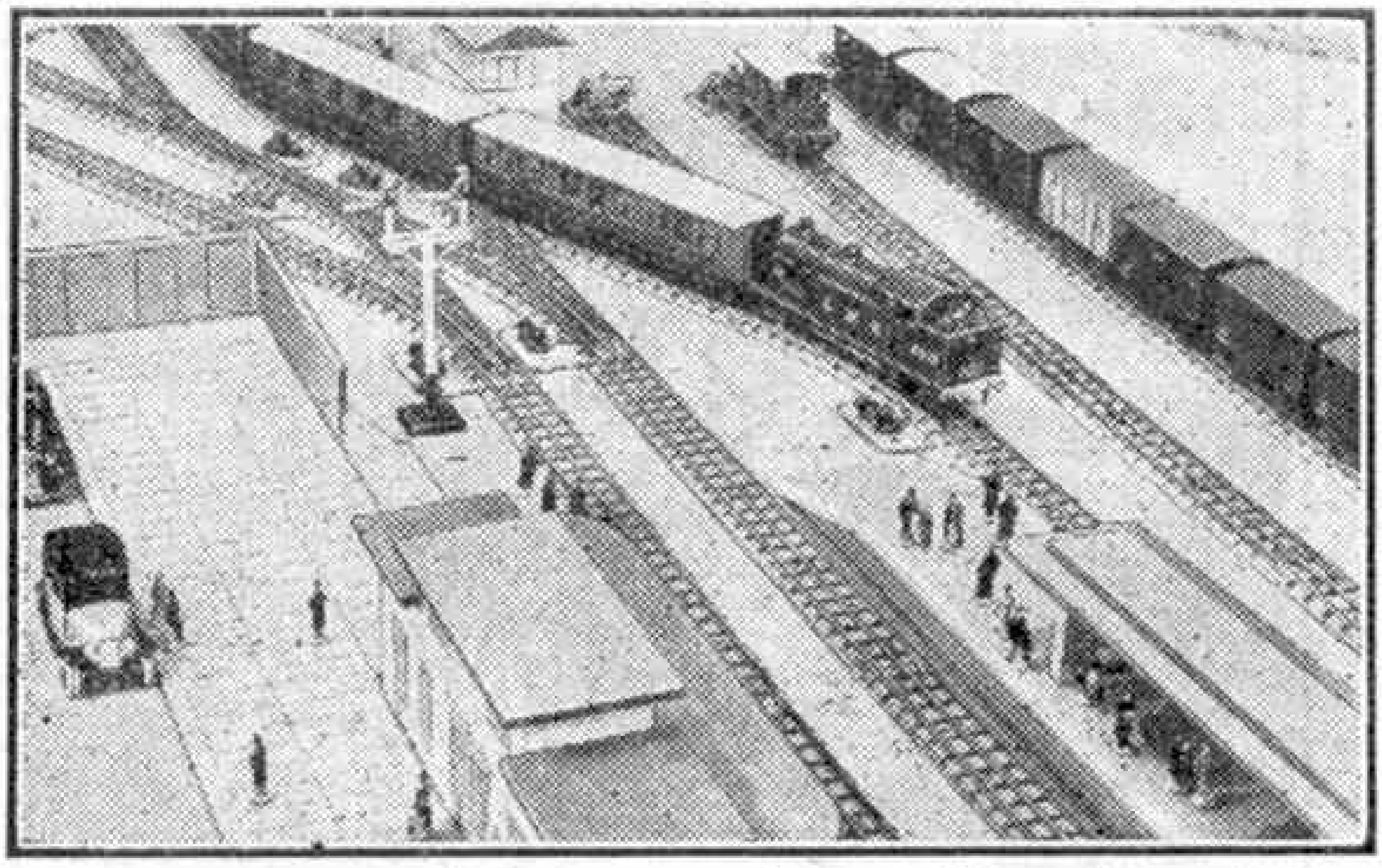
"Whoa"! A Hornby S.R. 4-4-0 easing up to the Water Tank to "fill up." Note the load of coal on the tender.

Headlamps for locomotives can have their bodies painted black, white or red, according to the general practice of the railway we are following. The bulls can be white, or better still silver. It is not a bad plan to do a few of the headlamps with red bulls for use at the rear of the engine or tender when running "light," that is without a train. Tail lamp bodies are generally bright red, although on some lines they are white in order to show up better in daytime. In either case bulls should be a fairly dark red.

Other similar ideas no doubt will occur to readers, and we shall be glad to hear of them.

Fun With Hornby-Dublo Tank Locomotives

IN full-size railway practice the tank locomotive is a particularly handy type of engine. It is self-contained in carrying its own fuel and water supplies without the aid of a separate tender, and is therefore compact and able to run in either direction equally easily. These advantages are also found with tank locomotives on miniature railways, and especially so with the Hornby-Dublo Tank.



Bunker first to town! A passenger train arriving at a suburban junction in charge of a Dublo Tank Locomotive.

There is a peculiar idea about that the standard tank of the Dublo Series is only suitable for goods trains. Possibly this is because it was included in the Goods Train Set. This idea is quite wrong of course, for the engine represents the general run of 0–6–2 tanks with driving wheels of medium size, and like its big sisters it is fully capable of dealing with suburban passenger trains. This fact widens the scope of its work considerably and it can be employed with every success as a "general purpose" engine. Let us see how this idea works out "on the road," where the Dublo Tank stands in the engine shed or locomotive siding ready for duty.

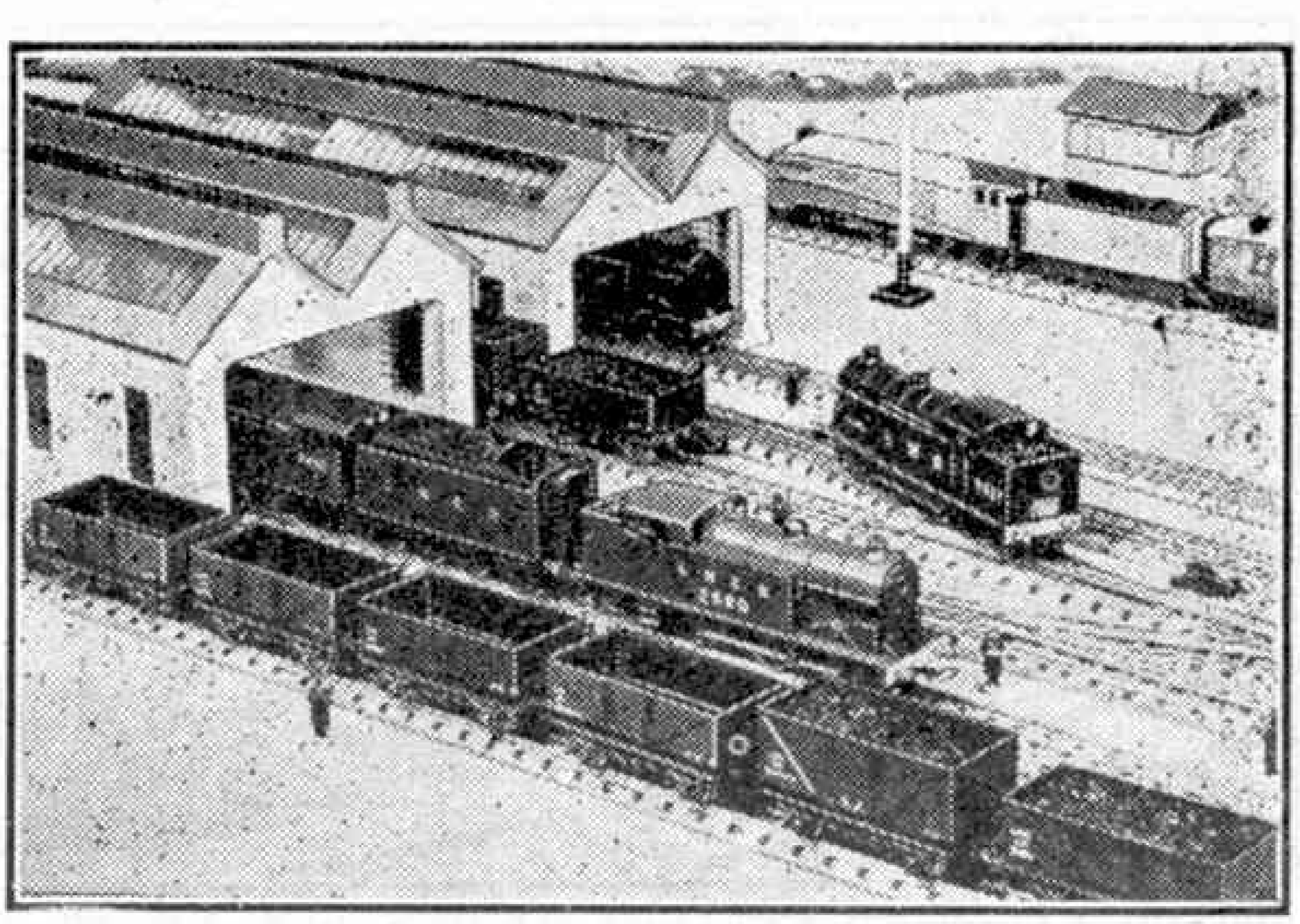
Probably its first job will be to potter off to the station and pick up a train of coaches waiting in the siding to form a local passenger train. If there is no siding handy the vehicles may stand alongside the platform. This is often done on miniature systems where space is a problem or the shortage of track is acute. Both are quite frequent nowadays! The train, we will suppose, forms part of the "morning rush" to town, and so making various stops and running smartly between them soon reaches its destination. On a layout of fair size this may be an actual terminus or a branch off the main track. Often, however, one station of a small continuous line has to serve for all purposes, so we may have to "pretend" quite a lot.

Incidentally it appears to be a long-standing habit of London district tank engines to run bunker first on the up journey and chimney first on the outward trip. Elsewhere the rule may not be so hard and fast, so we work our engine according to its supposed district. If the terminus has a run-round loop either in the station or near to it, we can get our engine round the train and prepare for an outward run. On the simple continuous layout running round may be necessary in its literal sense; that is we detach our engine from one end of the train and send it off (unknown to the people on the platform, of course!) round the track to appear at the other end of the train.

The outward run will be similar to the trip described previously; then probably with the rush period ending the engine again sets out with its train to the town destination. Perhaps stops are less frequent than before and several stations are passed by. On arrival the coaches, which will invariably be the standard corridor type L.N.E.R. stock of the Dublo Series, are required to form a down express. So our tank engine is free, after the express has left, to move out to the engine sidings, re-fuel, and then wait for its next job.

Some "Loco Coal" Wagons perhaps need moving, and after that there may be a little shunting to do in the goods yard, forming a train for a trip down the line or rearranging the vans and so on that are being dealt with at the Goods Platform. Here perhaps a local goods journey is made, or there are possibly some "empty" vehicles to be distributed at local stations and other "loaded" ones to be picked up on the way back. They probably will be the same ones in miniature anyway, but that need not cause us any great concern!

Arrived at the goods yard again, our Tank Locomotive once more shows how capably it can shunt the train. Then, after a short spell at the shed, once more sets off to the passenger station to help deal with the "evening traffic." This will be on similar lines to the morning journeys, and when we have no further duties for the engine to perform, and all rolling stock is placed ready for the next "episode" or spell of operations, the engine is free to go back to the "loco yard," and so to shed. Lots of fun can be had with these simple operations.



A Dublo Tank Locomotive leaving the Engine Shed. The Coal Wagons in the foreground lend a realistic touch to the scene.

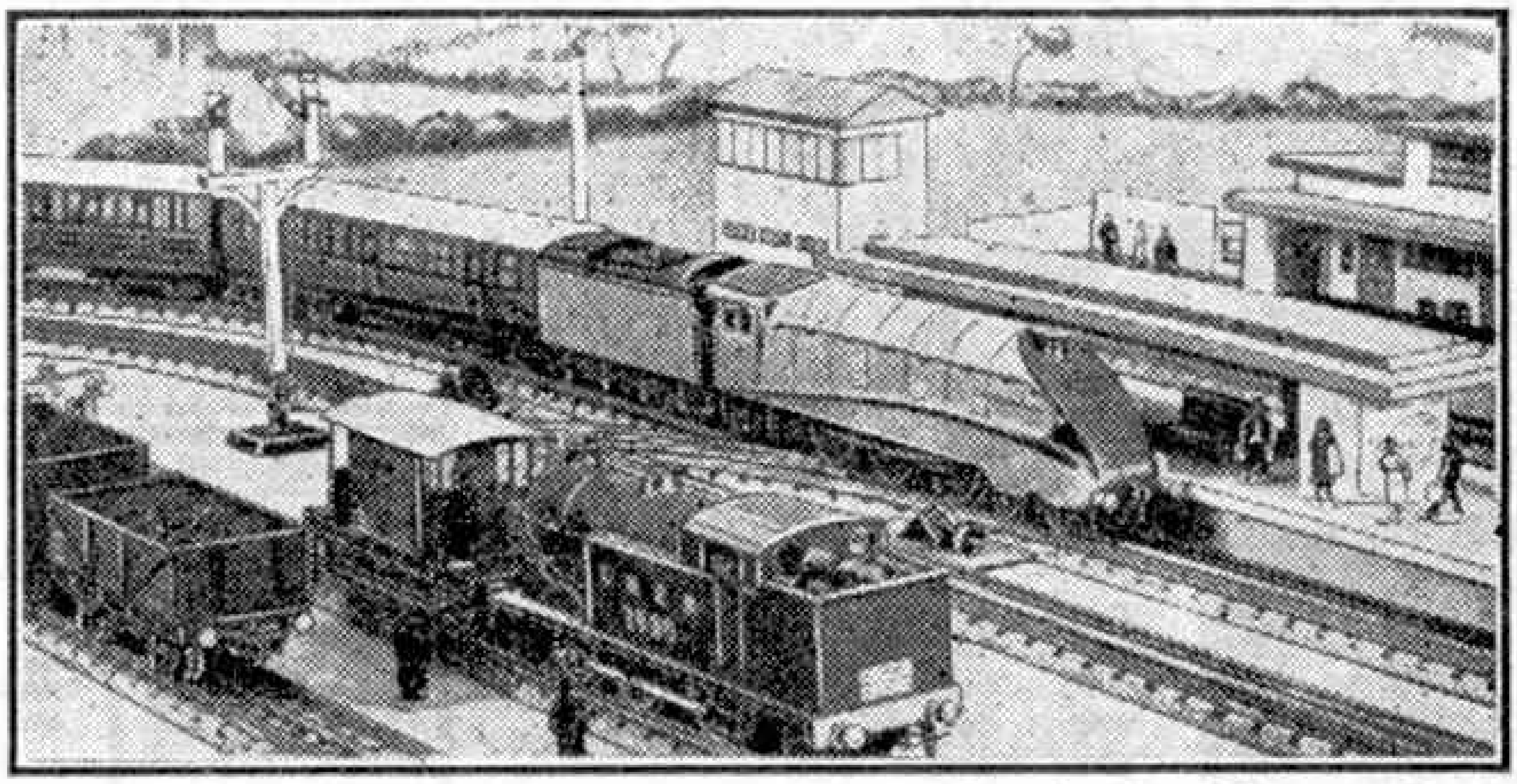
Shunting on Hornby-Dublo Layouts

SHUNTING is, from the railway company's point of view, a necessary evil, and it is not as a rule regarded very favourably by those who happen to live near places where much shunting is carried out. It is however a fascinating business to watch, and the model railway owner invariably attempts to reproduce on his line the shunting operations that he sees on real railways.

The type of shunt with which we are all familiar is that carried out at wayside stations by the friendly and unhurried "pick-up goods." This kind of train runs from point to point, stopping here and there to pick up loaded wagons and perhaps to leave behind a few empties or vice-versa. On a much bigger scale the sorting out of loaded and empty vehicles, or the assembly of wagons for particular destinations, is carried out in the larger yards, often at busy junctions. Here the traffic from a whole district may be concentrated for despatch, and the re-distribution of traffic from all quarters may keep a fair number of engines busy night and day.

On a small Dublo layout there most likely will not be room for anything more than a siding or two, but this simple arrangement is quite sufficient for a series of fascinating shunting operations to be carried out. At the start of the period of working the wagons and vans can be placed in the sidings in any order at all. For yard operations and local freight working generally the Dublo 0-6-2 Tank Locomotive is quite suitable. The engine arrives at the yard either "light" or with a Brake Van attached. The scheme now is to assemble the varied collection of wagons and vans into a particular order. This will involve quite a number of movements to and fro until the operator has the train made up to his liking.

Usually the next step is to complete the train with the Brake Van at the rear and send it for a run along the main line. The next supposed point of call will no doubt be the same yard again, although larger layouts may include sidings at various points. However this may be, we can detach a wagon or two and then at the next step pick one up and so on. Actually this kind of working can go on almost indefinitely, but most miniature railwaymen will no doubt prefer to restrict operations to the assembly of the train at the start and its ultimate working into the yard with the vehicles in different order from when they started out.



A Hornby Dublo Tank Locomotive and Brake Van in the sidings ready to start operations as described on this page.

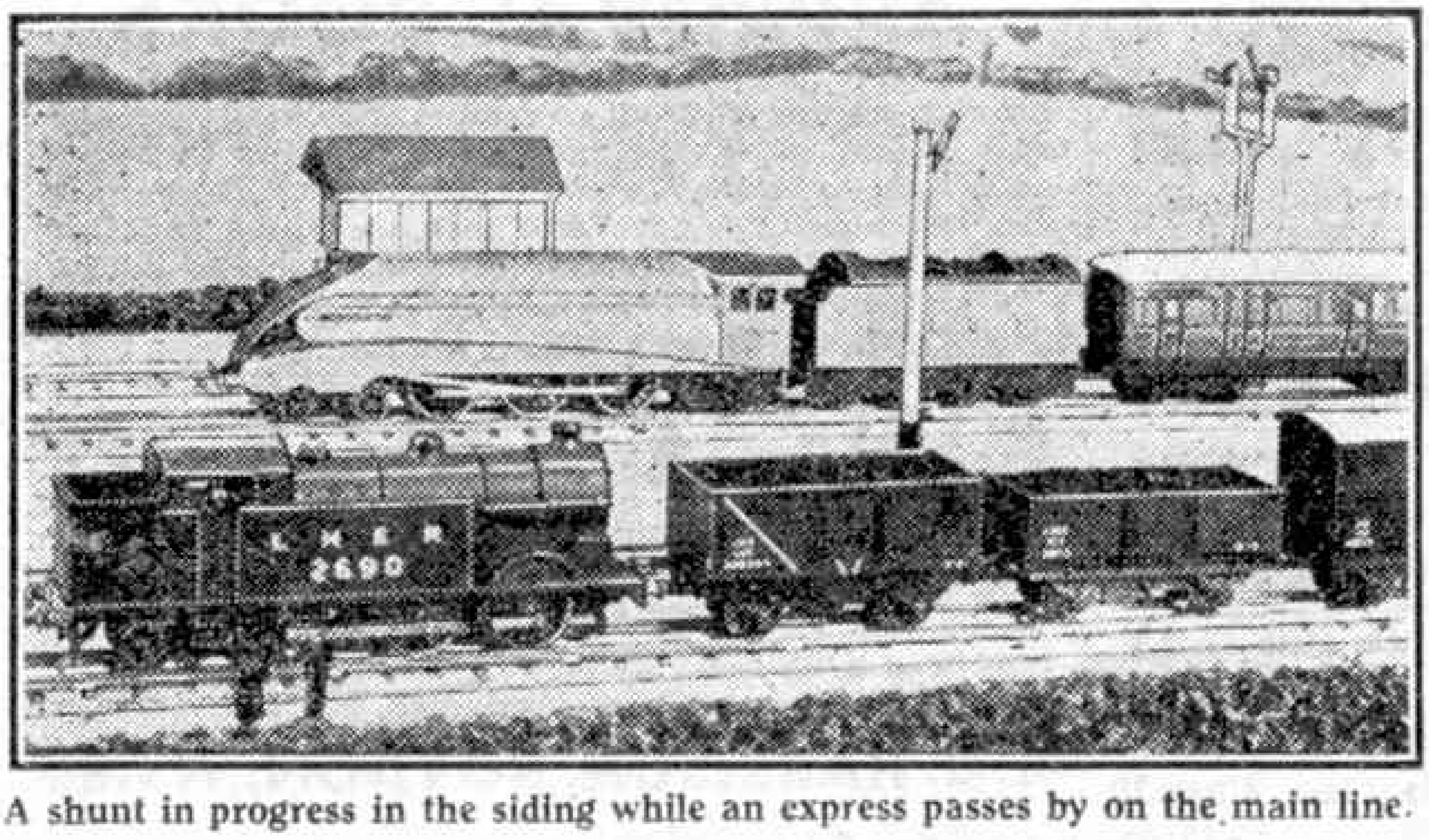
There are also other kinds of movements that can be considered as shunting operations. These involve the attachment of an odd van or two to a passenger train at a wayside station, and possibly their detachment at a further point. Often the train engine, whether a tender express or a tank, will have to do the work, especially if the extra vehicles travel next to the engine. This is quite a handy arrangement and one that is often seen in real life, and it saves the employment of a separate engine to carry out the station work.

On the other hand the layout plan may be such that a second engine is required to attach the additional vans in the rear of the passenger train.

Success in shunting operations in miniature depends a great deal in not carrying out the movements at too high a speed. With electric locomotives gentle handling of the controller is essential, and the work will proceed smoothly and realistically. Clockwork engines are not so docile as a rule, but they can be made to move slowly if they are wound just sufficiently for the movement to be carried out.

The rolling stock and track too must be maintained in good order, but the model railway owner who follows the hints on these points that are given from time to time in these pages will obtain a good performance. The adjustment of couplings is important, and it is well to see that these are in order before beginning operations; otherwise there may be a succession of attempts to couple vehicles together without the couplings engaging properly.

For uncoupling, the Hornby Shunter's Pole is useful. The "shunter" should see which is the lower of the two couplings in engagement, and by manipulating the pole the lower coupling can be depressed so that the couplings disengage.



A shunt in progress in the siding while an express passes by on the main line.

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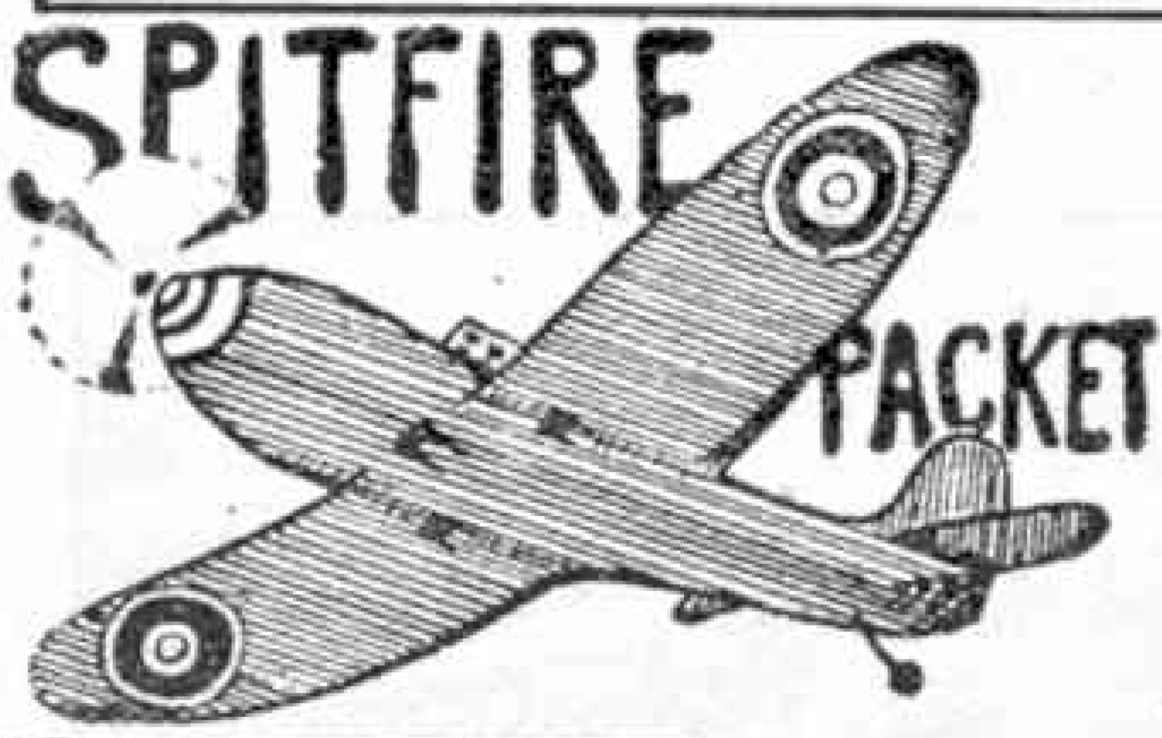

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For other Stamp Advertisements see also pages 68 and viii.

Stamp Collecting

Burma on Stamps

By F. Riley, B.Sc.

THE stamp story of Burma is a short one, for it does not really begin until 1937, when the country was separated politically from India. Previously the stamps of India had served. When the country began to use its own stamps, the first issued were India types overprinted with the name "*Burma*" in bold capitals, but in the meantime preparations were being made for the production of definitely Burmese stamps and native artists were invited to submit designs to include pictorial subjects as well as the head of the King. To most of us Burma is the land of pagodas, but these were excluded on the ground of religious objections; the rice and teak industries of the country were specially mentioned as desirable.

The result of this invitation was the production of a very fine series of pictorial stamps that help us to picture the country, its people, and its story. The suggestion to mark the Burma rice industry was one of those taken up by the artists who submitted designs and the 3a. 6p. stamp illustrated on this page was the result. This is in two colours, light blue and blue, and it illustrates a rice field in the country, with the words "Burma Rice" under the design. "Burma Rice" was produced in such enormous quantities that there was a surplus for export, and a large part of this went to neighbouring India.

Burma teak also was the subject of one of these designs, on the mauve 3 a. value. Two other designs in this fine set are of special interest. One of them shows a Burmese prah, a native sailing vessel, on the waters of the Irrawaddy, the great river that flows throughout the length of the country and enters the Indian Ocean through a delta, on which stands Rangoon, the capital. The second shows the royal barge used by the former kings of Burma, a remarkably ornate vessel with a pagoda-like structure towering up from it. The Irrawaddy scene is on the 8 a. stamp and the royal barge appears on the 2 a. 6 p. value.

The remaining values in the series show only the King's head. These include the lowest values, from 3 p. to 2 a., and also the 4 a. stamp; the 1 a. is illustrated here. The design shown on this stamp appeared also on all three lowest values, the remaining stamps of this type being distinguished by a difference in the design used for supporting the head of the sovereign. Dragons mark the design illustrated, while on the remaining stamps these are replaced by mythical lion-like animals, which are seen also on the later 1 p. portrait stamp of 1940, illustrated here. These lions are reproductions of carved creatures that guard the approach to the throne in the palace at Mandalay of the former rulers of Burma.

The four highest values of all also are portrait stamps, larger than those just described. On the 1 r. and 2 r. values the head of the King is framed in the tail of a strutting peacock, the national emblem of Burma; on the 5 r. and 10 r. values the peacock is replaced by idols.

There is little doubt of the Burmese character of the stamps of this set, but not only the design but also the watermark is characteristic. This is a multiple pattern of elephant heads. The design has been made somewhat conventional, but there is no mistaking the frontal view given of the elephant head, on which the trunk, the tusks and the great ears are all prominently displayed.

One of the results of the Japanese occupation, which interrupted the life of this fine set, has been that the prices of many of the stamps in it, particularly the higher values, have advanced to a remarkable extent. Specimens of the lower values can still be obtained for a few pence, however, and those who are attracted by them should be able to acquire at least representative specimens. All are well worth having for their stamp interest alone, which of course is the main point.

Those who were fortunate enough to obtain specimens of Burmese stamps before the war will no doubt feel intense satisfaction in the increased values. There certainly is comfort in thoughts of this kind, although the financial side of stamp collecting is not one on which to place emphasis. One of the most sensational increases of value is that of a later Burmese stamp that is at the same time of outstanding stamp interest. This was issued on 6th May, 1940, to celebrate the centenary of the first adhesive postage stamp, the Penny Black. It was the 2 a. 6 p. value of the 1938 series, the royal barge stamp, and on it were printed the words "*Commemoration Postage Stamp, 6th May, 1840,*" and the surcharge 1 a. The great interest of this stamp is that it was the only special one commemorating the centenary of the Penny Black that appeared in an overseas possession of the British Crown. As for its rise in value, unused specimens were priced 3d. in the catalogues of four years ago, but to-day the price for unused specimens is 10/–, and the used stamp is quoted at 17/6.

Soon there will be Burmese stamps on issue again, and these may possibly be Indian stamps overprinted, as was the case when the country's stamp history began.

For other Stamp Advertisements see also pages 66 and viii.

Stamp Gossip
and Notes on New Issues

By F. E. Metcalfe

THE most interesting set of stamps, for British collectors, to be released recently are those of India, overprinted for use in Muscat, to commemorate the bicentenary of that great Arab Al Bu Said. Last month we gave full details, with a reproduction of the Zanzibar commemorative design, and all that remains to be done now is to illustrate one of the 25 values which have been overprinted. There are values for ordinary postage and for official use. Altogether they have a total face value of 13/3 though of course this sum is expressed in Indian rupees and annas.

At the time of writing a complete set can be purchased for under £1, and if a reader can still obtain a set at this figure—or somewhere near—he will be well advised to do so, as the stamps have only had a currency of six weeks, 20th November to 31st December, 1944, and some dealers, for lack of notice, did not even get a supply. These stamps were only for use in Muscat. It remains to be seen now if that place is to have its own particular stamps in future, or is to resume the use of ordinary Indian stamps.

The overprinting has been quite well done, but the lynx eyes of some collectors are bound to find some small varieties, as happened when the "Landfall" overprints of Bahamas were issued. All kinds of dots and dashes were discovered then, and a lot of fuss was made, but none of these "varieties" was of the slightest philatelic importance; consequently none will ever be catalogued by Gibbons. As a matter of fact they are mostly forgotten by now, though it is noticed that pairs are being offered at £15. On one stamp of each value there is a tiny speck of ink between the "A" and the "L" of "Landfall." This speck has been raised to the dignity of an "apostrophe." Readers should be on their guard against offers, at fantastic prices, of fancy "varieties" on the new Muscat overprints.

Last month we mentioned the U.S.A. stamp that had been emitted to commemorate the 50th anniversary of the motion picture industry. We are now illustrating this stamp, but are afraid that whereas the design is original enough, it does not come out too well. The impression in dark violet is rather heavy. A much brighter stamp is the 13th of the flag series, issued in honour of Korea.

Another stamp which we are showing is one of 14 issued in London by the French authorities for use in various French colonies. Each colony gets one, and all have the face value of 5 fr., plus an extra 20 fr. for the benefit of the Entr'Aide Francaise, whatever that may be, and the French Red Cross. A premium of 20 fr. per stamp is a fairly stiff proposition, but this probably will be the last set of stamps printed in England for the French Government. Alas, no one with the slightest artistic leaning will be sorry if the manufacture of these "doodleacs" ceased to-morrow. The editor of "*Gibbon's Stamp Monthly*" calls them ghastly, and he is not far out.

Our last illustration this month is the Gambia 1½d., which was issued on 2nd January in the new colours of grey and ultramarine. Gambia continued to be one of the most popular colonies with collectors and the current set is much sought after in a used state, but the 5d. value is rarely seen thus. A Bathurst collector says that this is because it is chiefly used on telegrams. Readers should be very careful when they get a used copy offered. There are lots of forged postmarks about.

There is still no definite news when the new sets for Jamaica and Nyasaland will be issued, but readers are again warned not to be in a hurry to part with their money, for there will be plenty for everybody, in spite of any statements to the contrary that may be made.

Last month a stamp was mentioned as a good "buy," which was only a perforation variety, and as such would not interest all collectors. Here is one, which even appears in Gibbons' Simplified Catalogue, and which will surely rise a lot in the next edition. It is the 2½d. Bermuda, light and deep blue, which appeared in 1938, the design showing Grape Bay, in that island. It is catalogued at only a few coppers, but is probably worth a couple of shillings or more; don't be surprised if the stamp needs a bit of finding, either mint or used.

Stamp dealers are feeling very sorry for themselves and their customers, for during the recent holidays they were inundated with orders for stamp albums. Of course they could not supply, for their manufacture is not permitted; although there are plenty of ill-printed story books at several times their pre-war price.

Facts about Steel—(*Continued from page 41*)

ball test. In this, a small hardened and tempered chromium steel or tungsten carbide ball measuring 10 mm. in diameter is pressed mechanically into the steel to be tested. The pressure is usually standardised at 3,000 kg. The pressure is maintained for 15 seconds, after which the testpiece is studied under a microscope whose inner lens carries a millimetre scale divided into tenths. This enables the diameter of the ball impression to be accurately measured.

The Brinell test is useless for thin sheet metal or for thinly case-hardened steels, which would give way under the pressure too easily for the size of the impression to mean anything.

The hardness is expressed by what is termed a Brinell number. This number is obtained by calculating the area of the ball impression, or dent, from the diameter, and dividing the figure thus obtained into the standard pressure or load. Obviously, the harder the steel the smaller the dent, and in consequence the higher the Brinell number.

The Brinell test is only one of numerous hardness tests, among which may be mentioned the Rockwell, Scleroscope, Herbert Pendulum, and Durometer, but space does not allow of their description.

Other tests to which steel is subjected include tests of torsion or twisting stress and the steel's ability to resist this; shearing tests, which ascertain the ability of steel to withstand a shearing action (this test is much used for rivet steels); and fatigue tests. In these fatigue tests the stresses are rapidly repeated, whatever their form, because it is known that rapidly repeated stresses if continued long enough cause steel to become "tired" or "fatigued" and break. For example, the crankshaft of an engine twists and bends alternately with the loads on the piston of the engine at each stroke of the engine. These repeated stresses may cause fracture. Similarly, the axle of a railway wagon suffers from the repeated change from compression to tension at each revolution of the wheel.

We have by no means enumerated all the tests to which steel may be subjected. There are tests that tell how much a steel will increase in volume when heated, or decrease when cooled. There are magnetic tests for cracks. There are tests of hardness of steel when red hot. But these must all be reserved for some future occasion.

In the next article, I hope to tell you why steel is subjected to heat-treatment, and what the various processes of heat treatment do to it.

Railways' Own Postal System—

(*Continued from page 55*)

on postage stamps; instead the work is done by railwaymen, mostly in odd moments.

So that the clocks at far distant provincial stations shall show exactly the same time as those in London, the telephone and telegraph systems again come to the rescue. Each morning, generally at nine o'clock, the time signal is given from Greenwich Observatory to the main London stations. These in turn send the signal to several hundred main stations all over the country, which in turn repeat it to the local stations.

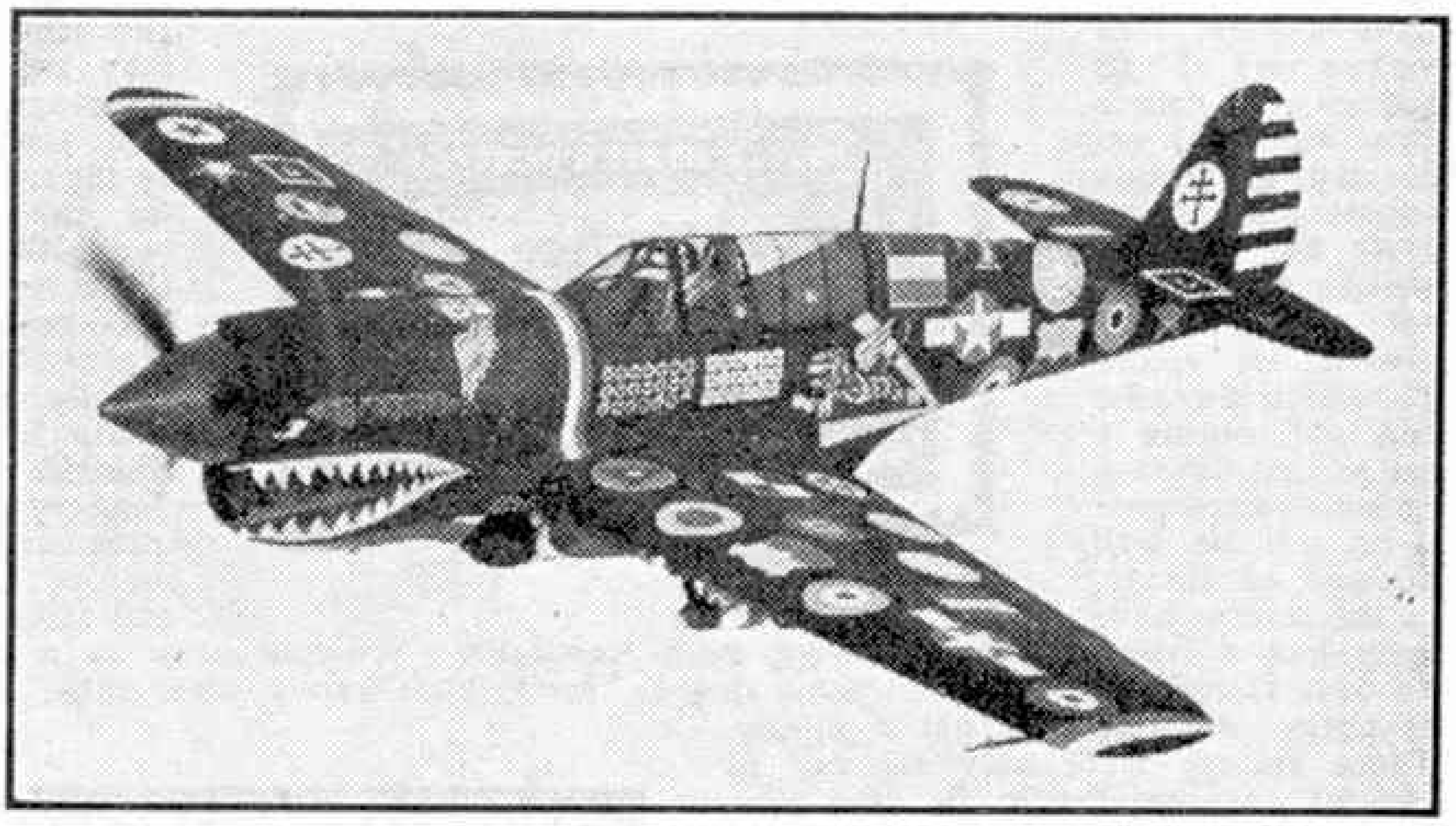
Just before the signal is due, all those whose duty it is stand ready at the instruments, so that as soon as the signal is given it shall be immediately passed on. By this means, the most out-of-the-way station with its two or three trains a day can boast of its Greenwich time a matter of seconds after Greenwich itself has transmitted it.

The most notable feature of this system of transmitting the time signal is that it has been operating for nearly a hundred years.

COMPETITION RESULTS

HOME

October "Crossword" Contest.—1st Prize: A. Smedley, Swinton; 2nd Prize: B. W. Showell, Bexleyheath; 3rd Prize: R. J. Lakin, Aldridge. Consolation Prizes: G. Roberts, Liverpool 11; W. H. Beauchamp, Ickenham; Miss D. Haile, Mayford; L. Samuel, Glasgow; T. G. Lynch, Hove; M. Sharman, Rothwell.



The 15,000th Curtiss fighter, a P-40 "Warhawk," decorated with the insignia of the 28 Air Forces that have used Curtiss fighters during the war. Photograph by courtesy of Curtiss-Wright Corporation, U.S.A.

October "Locomotive Names and Numbers" Contest.—1st Prize: P. W. Hunwick, Uppingham; 2nd Prize: R. H. Cropper, Dewsbury; 3rd Prize: H. R. Simpson, Birmingham 28. Consolation Prizes: G. D. Stephens, Penzance; N. Barnes, Twickenham; H. Binner, Manchester 8; P. A. Mills, Dorking; P. M. Hoskins, Bristol 3.

October "Photographic" Contest.—1st Prizes, Section A: P. W. Lang, Sevenoaks; Section B: P. Seedhouse, Oakham. 2nd Prizes, Section A: F. G. Reynolds, Sidcup; Section B: D. Hamilton, Hove 4. Consolation Prizes: S. S. Pethybridge, Newton Abbot; W. E. Silvester, Bromley; H. W. Jones, Cardiff; A. Smith, Leicester.

November "Locomotive Figureword" Contest.—1st Prize: J. C. Fryer, Cheltenham; 2nd Prize: M. Sharman, Rothwell; 3rd Prize: G. Bickmore, West Wickham. Consolation Prizes: M. W. Buxton, Shipley; B. W. Showell, Bexley Heath; D. Edgley, Northampton; D. A. Wheeler, Great Missenden.

November "Photographic" Contest.—1st Prizes, Section A: R. D. Barrett-Lennard, Cressing; Section B: L. Francis, Dundee. 2nd Prizes, Section A: J. E. Martin, Fishguard; Section B: O. Burr, Tunbridge Wells. Consolation Prizes: F. G. Reynolds, Sidcup; B. Chulindra, Cornwall; P. W. Sullivan, Bilston; N. A. Killgreen, Cottingham.

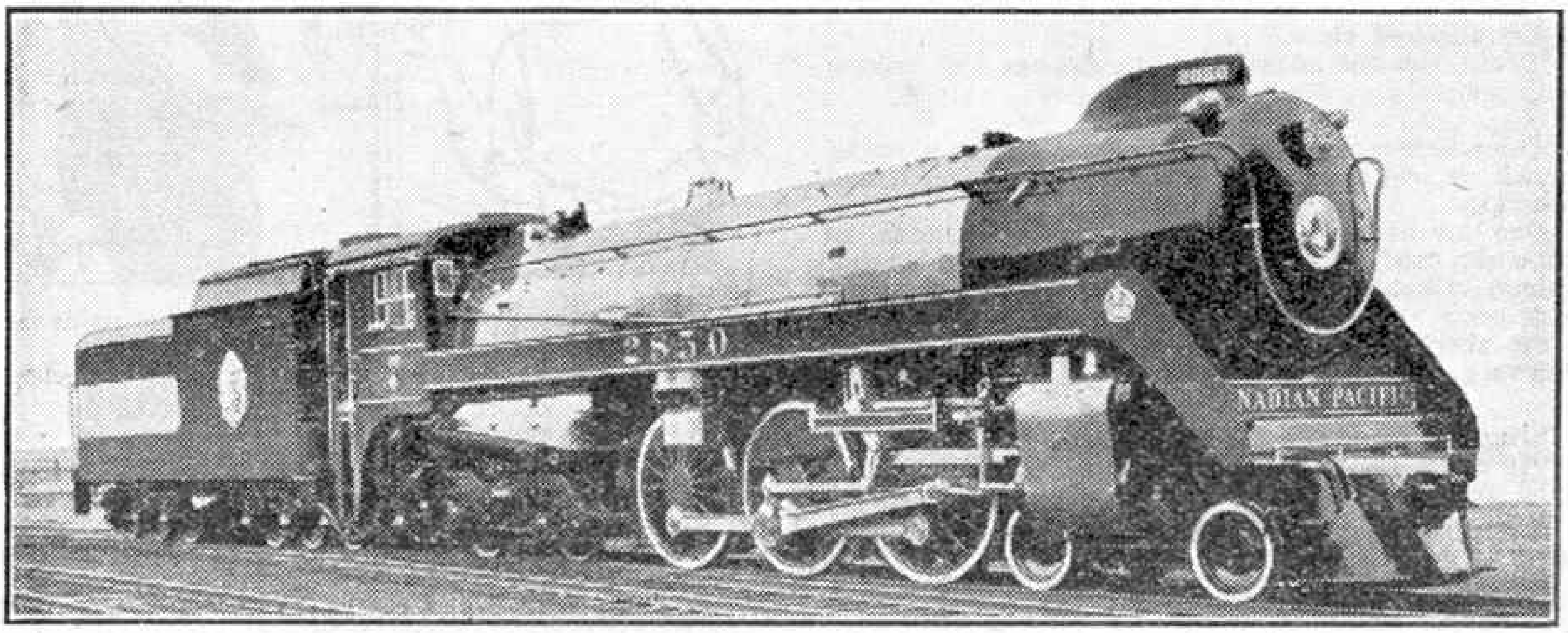
OVERSEAS

March "Shunting" Puzzle.—1st Prize: B. Ollett, Cottesloe, Western Australia; 2nd Prize: R. R. Vanjers, Johannesburg; 3rd Prize: G. Myers, Bloemfontein.

March "Photographic" Contest.—1st Prizes, Section A: D. F. Mason, Pietermaritzburg; Section B: J. D. Robinson, Toronto. 2nd Prizes, Section A: J. S. B. Taylor, Johannesburg; Section B: R. F. S. Williamson, Sydney.

Competitions! Open To All Readers

Locomotive Features Contest



On this page is illustrated No. 2850, a 4-6-4 locomotive of the Canadian Pacific Railway, which became known as the "Royal Engine" because it hauled the Royal Train during the tour of their Majesties the King and Queen in Canada in 1939. Now this locomotive has many features that will not usually be found on British engines. For instance, to mention only two of a comparatively minor kind, there are the centre coupler and the headlight. Competitors are asked to make a list of items of this kind they can see in the illustration, which are not normally found on engines made in Great Britain. A brief explanation of the purpose of each part listed also should be given.

The competition will be divided into two sections, Home and Overseas, and in each prizes of 21/-, 10/6 and 5/- will be awarded to the three competitors who send in the best lists. In addition there will be consolation prizes for other good entries. Prizes will not necessarily be awarded to those who send the longest lists; accuracy too is necessary.

Each entry should be addressed "*February Locomotive Contest, Meccano Magazine, Binns Road, Liverpool 13,*" and posted to reach us not later than 31st March in the Home Section, and 29th September in the Overseas Section. Please note that each sheet of each entry *must* bear the sender's name, address and age, preferably on the back.

A Flight of Fancy

Here is an interesting story of a hunt meeting, contributed by G. W. Cooke, a reader of the "*M.M.*" What makes it interesting is that there are many missing words in it, and these we ask our readers to fill in. The words of course must make sense, and in addition each must be the name of a bird. The actual spelling of the bird's name need not be that of the word as used in the story, but the pronunciations must be the same.

Bill Jones, the M.F.H., together with hounds, huntsmen and huntswomen, assembled outside the local inn at Puddlecombe, Berkshire, ready for the 11 a.m. meet. The spectators and foot followers were getting impatient.

"Sound your .....," cried one of the latter, a little man named Alfie, who was as bald as a ....., and as tame as a ...... "Hold your tongue, you ..... and stop your .....," snapped the master, adjusting his ..... to suit his head. "Don't get .....," retorted the crowd. At last, and with one blast of the horn the whole hunt moved off, all barring poor old Bill, whose horse, Kitty, refused to budge (what a .....). "..... up," he cried, "come on ...." He was so flabbergasted with his horse's behaviour that he forgot to call the others to a standstill; instead he had to ..... his neck to see them.

Just then one of the huntswomen, a ....., shouted "Tally ho!" The cry soon reached Kitty's ears, and off she bolted. She spotted the fox at the brow of the hill; she had eyes like a ....., but Bill was as blind as an ....., and saw it only when it was about to disappear into a field of wheat. They trampled the ..... and there, till they found the fox ..... and blowin', quite exhausted. Alfie by this time was as hungry as a ....., yapping like a ....., and looking as yellow as a ...... He made a grab at the fox, to rob the poor hounds of their kill. "..... play at that game," cried Bill, rushing in. "Don't be so blinking ..... Bill," yelled Alfie.

The weary wanderers wended their way back to the inn in time for supper, where they were offered drinks and cauliflower, of which Alf had the ...... Bill, of course, didn't even get a ....., which should teach him not to ..... so much in future.

In this contest there will be the usual separate sections for Home and Overseas readers, with prizes of 21/-, 10/6 and 5/- respectively in each. In addition there will be consolation prizes for other good efforts. Entries should be addressed: "*February Missing Word Contest, Meccano Magazine, Binns Road, Liverpool 13.*" Closing dates: Home Section, 31st March; Overseas Section, 29th September.

February Photographic Contest

This month's photographic contest is the 2nd of our 1945 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of the print must be stated exactly what the photograph represents. A fancy title may be added if the entrant desires.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed: "*February Photo Contest, Meccano Magazine, Binns Road, Liverpool 13.*" There will be separate sections for Overseas readers. Prizes in all sections, 15/- and 7/6. Closing Dates: Home, 28th February; Overseas, 31st August.

Fireside Fun

A business man dashed into the Labour Exchange. "I say!" he exclaimed, "I'm looking for a cashier."

"But didn't we send you one yesterday?" asked the bewildered clerk.

"Yes," was the answer, "that's the one I'm looking for."

* * * *

The village milkman bought a horse for the morning round. It was not exactly a thoroughbred, but it had four legs.

One day he took his bargain to the blacksmith to have him shod. The smith regarded the weary-looking animal critically, paying particular attention to his lean body and spindle legs. "You ought to have a horse there some day," he said at length. "I see you've got the scaffolding up."

* * * *

"But how could skin trouble give you a broken arm?"

"It was a banana skin."

* * * *

A customer entered a gramophone shop to purchase some records.

"I want '*The Vienna Woods*,' '*The Blue Danube*,' '*Jerusalem*,' and '*The Holy City*'," he explained.

Springing to attention, with arm outstretched, the assistant shrieked, "Heil Hitler."

* * * *

THIS MONTH'S HOWLER

The liver is an infernal organ.

* * * *

BRAIN TEASERS

WHICH WAY WOULD YOU GO?

Here is an interesting travel "Quiz," with answers that to most readers will be a little startling. They concern aeroplane journeys. In what direction would an aeroplane leave London for Tokio, Winnipeg, Bombay or Auckland, supposing the flight to be made in each case non-stop, and by the shortest route? Name any city or geographical feature, such as cape, sea or country, over which the route passes.

* * * *

STRANGE TALK

From the air let us descend to the sea. What do the following nautical phrases mean? "Boxing the Compass," "Running the Easting down," "Splicing the mainbrace," "Taking the hitch," "Full and by," "In the Roaring Forties."

"The guy who made this nail is crazy, the point is on the wrong end."

"You're the crazy one—that nail's for the opposite wall."

FISHY JUMBLES

After the last two brain teasers readers will look for something a little easier, and here it is. The following jumbles hide the names of fish with which they should all be familiar, and they will enjoy working out the correct order for the letters:

FODRSWISH; KARSH; KREMELAC; LUMLET; GENROC LEE; CRUBARADA.

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

Of the two full stops required in the first teaser, one is the usual dot and the other consists of two words. After they have been inserted the sentence reads "*The wagons are full. Stop the train at Weybridge.*"

Here is the solution to the unusual division sum.

```
4502 )27088883( 6017
      27012
      -----
        7688
        4502
      -----
       31863
       31514
      -----
         349
```

The following stations satisfy the conditions of the second of last month's puzzles: Cowes, Seaton, Hayfield, Norfolk, Sunilaws, Swindon and Orston.

Reproduced by courtesy of Editor. "The Commercial Motor"

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THE WALL NUT, a bargain crystal set in fine quality G.P.O. polished walnut hinged case. For table or shelter wall. Price **42/-**

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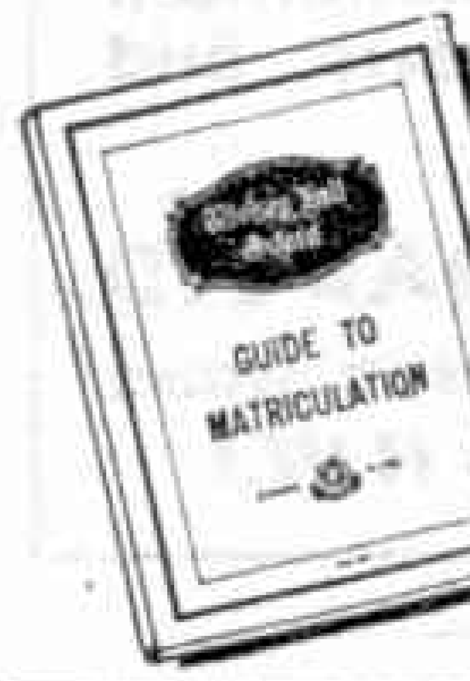

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STAMP ADVERTISEMENTS

(*See also pages 66 and 68*)

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Telegrams: "Meccano, Liverpool."

Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/-. Cash with order. Readers' advertisements are published as soon as possible; inclusion in the first issue after receiving them cannot be guaranteed.

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SALES

Magazines: "Meccano," Year 1932 8/-, 1941 6/-, 1942 (February Missing) 5/6, 1943 January, July, 6d. each; "Amateur Photographer," year 1943, £1. Frog Penguin Planes: Hawker Hart 6/-; Unfinished Wellington 10/-. Everything perfect condition.—8, Cliff Park, Paignton.

Complete Model Railway, Twin Trix; Four Trains, "Princess" Pacific; large Track Layout; Stations, Passengers, etc., £50.—27, Collingwood Avenue, Tolworth, Surrey.

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450 Foreign and Colonial Stamps (cat. over 64/-) 20/- or nearest offer; stamp please.—Binner, 43, Leicester Road, Cheetham, Manchester.

Gauge "0" Station, Bridge, Platelayers' Hut; 11 William Books. What offers?—Pudsey Dawson, 11, Park Crescent, Abingdon.

Hornby Electric Trains, Gauge "0," in perfect condition.—Mason, 215, Magdalen Road, London S.W.18.

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Trix Track and Locos.; also Skybird Army; send particulars.—A. Mumby, The Grove, New-Balderton, Newark, Notts.

12 Monthly issues of the "Meccano Magazine" for 1942.—J. Gardner, Hawthorne Road, Litherland, Liverpool 21.

"Meccano Magazines" for January, February, March and November, 1943.—R. Burns, 5, Brownside Road, Cambuslang, Lanarkshire, Scotland.

Dinky Cars, Lorries, Buses, in good condition; also Meccano Instruction Manuals.—Edwards, "Arundel," Brownhill Road, Chandlers Ford, Hants.

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"M.M.'s" January to July 1943; good condition.—Russell, Bramshott, Beacon Road, Loughborough, Leicestershire.

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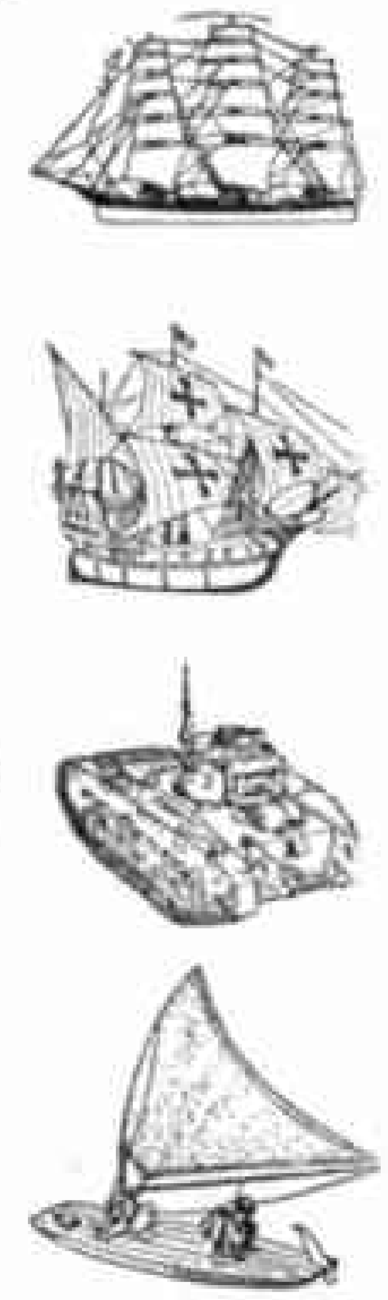

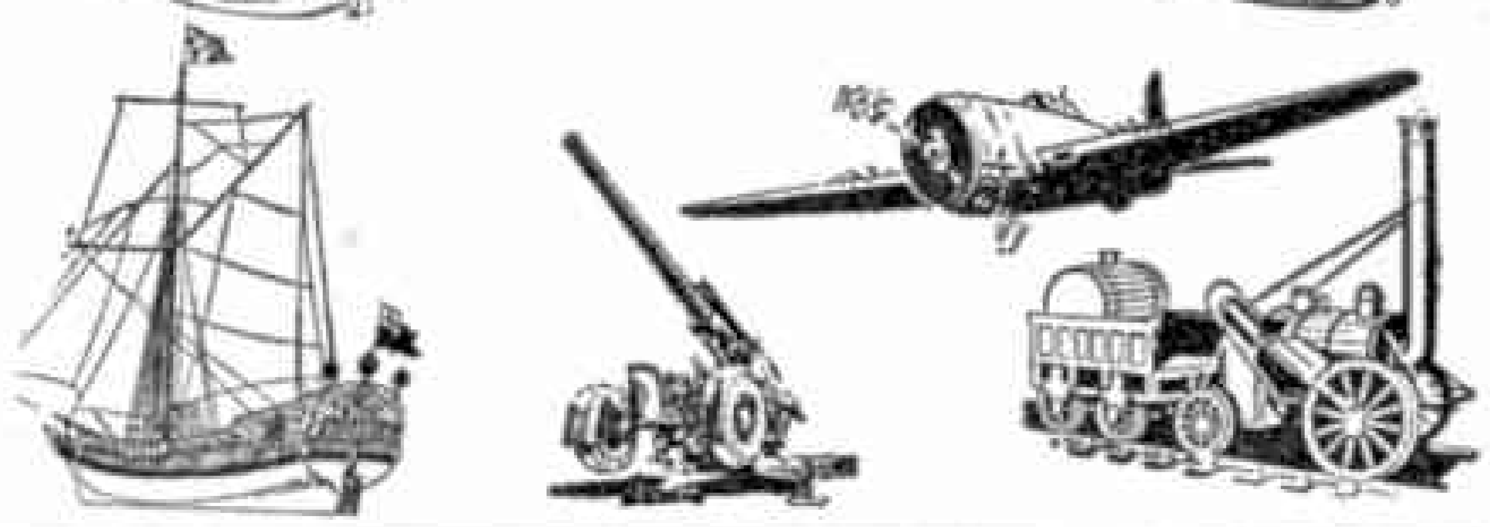

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