

VOL. XXX No. 10

OCTOBER 1945

# MECCANO

## MAGAZINE



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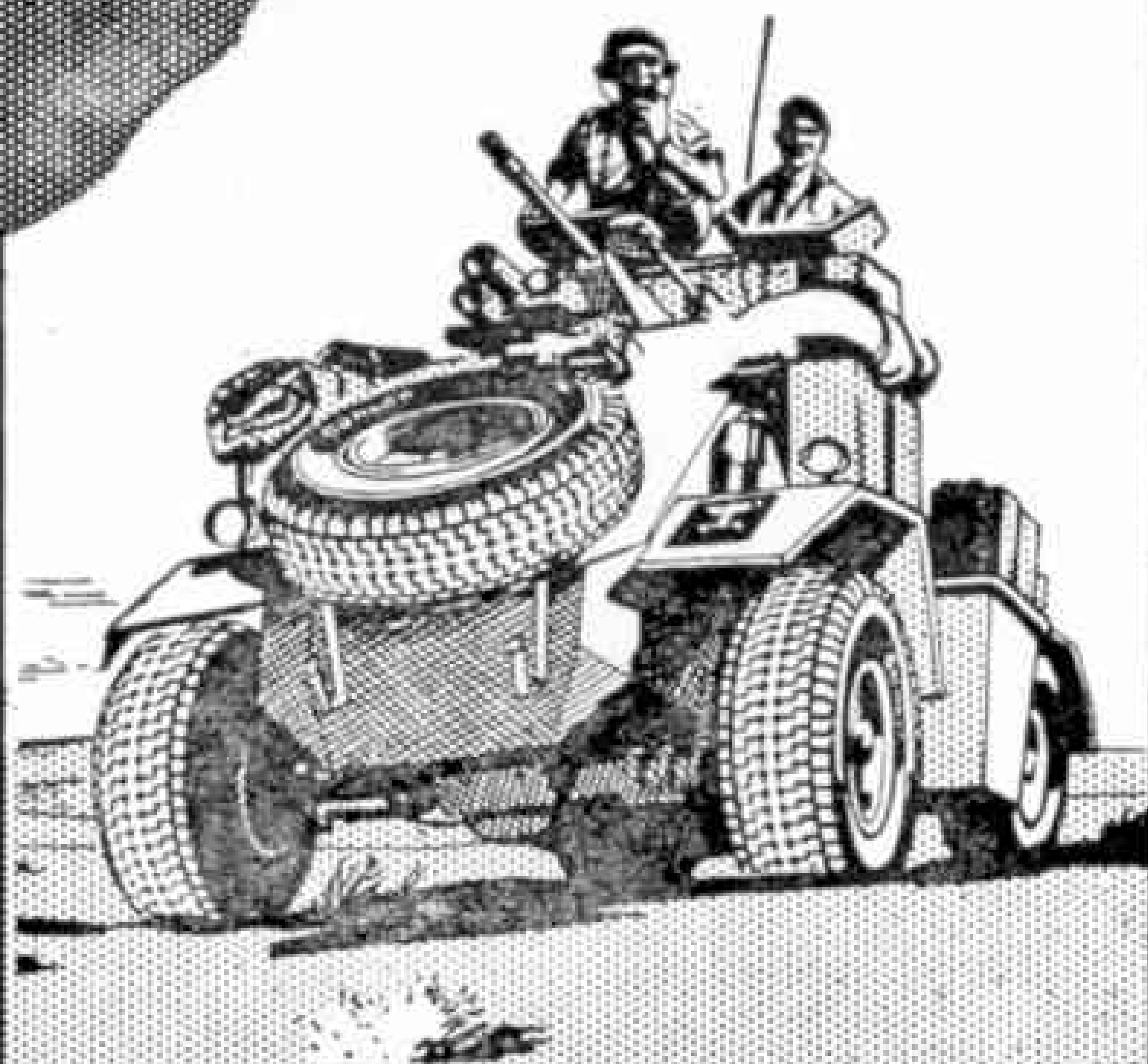
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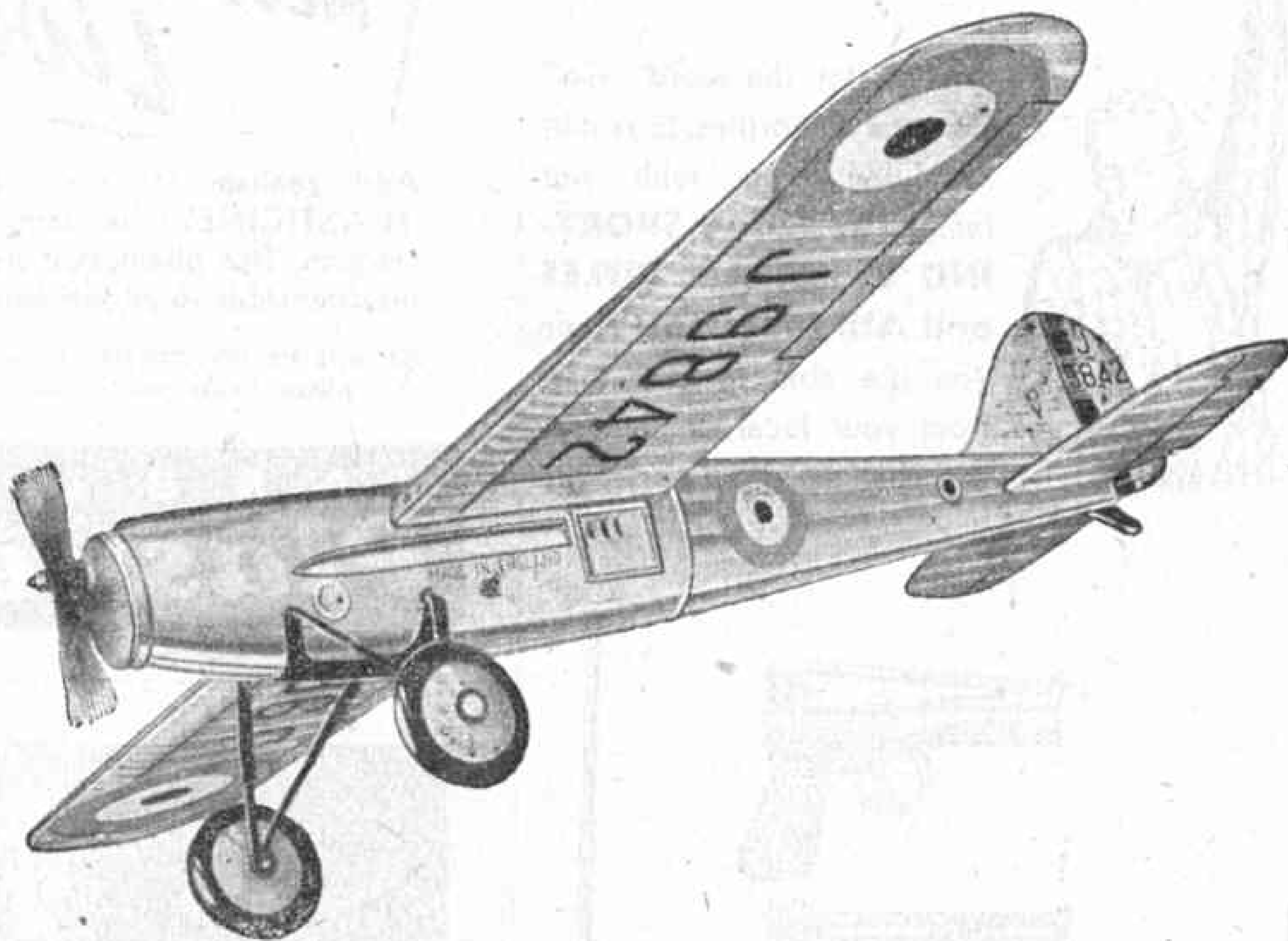
### No. 3 THE DESERT WAR

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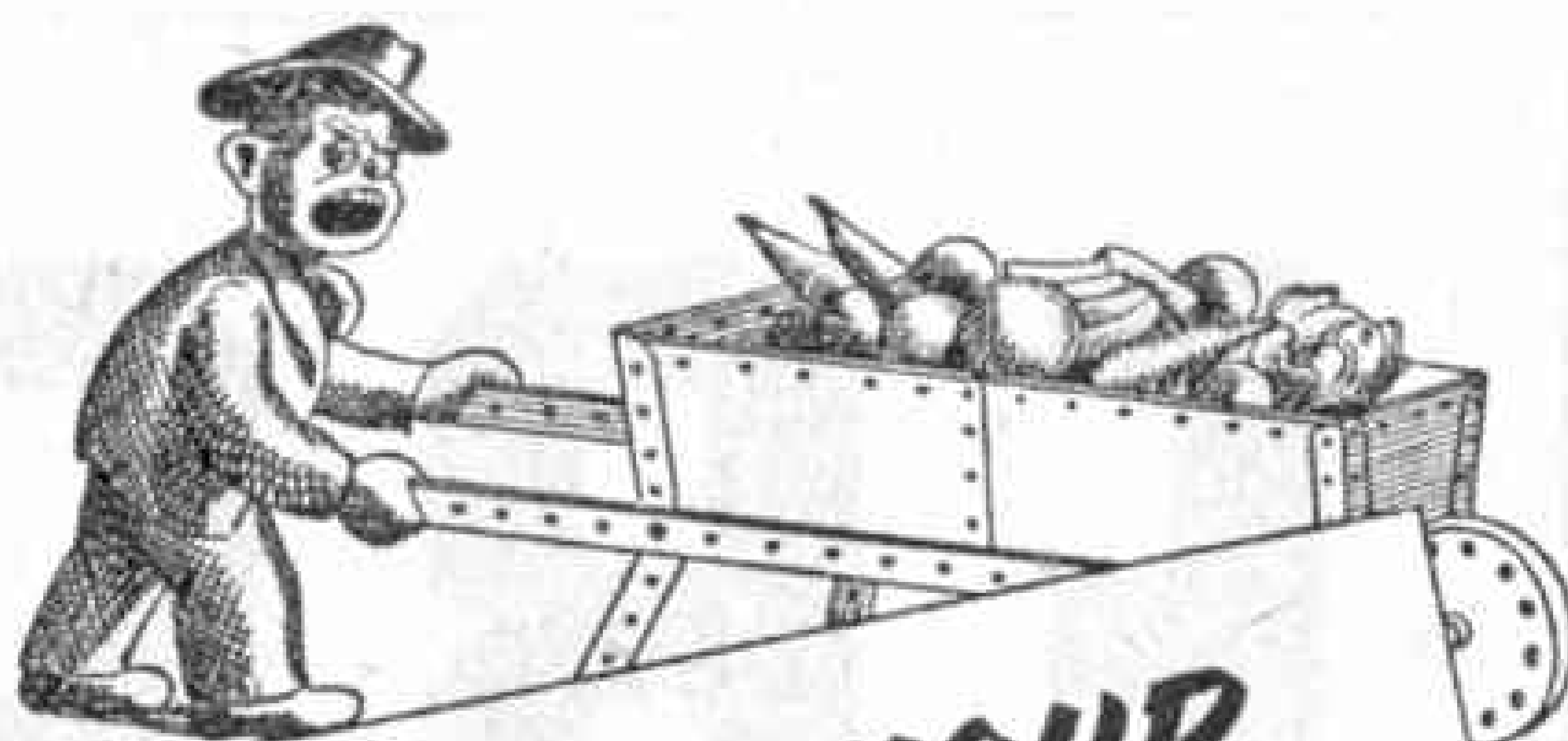


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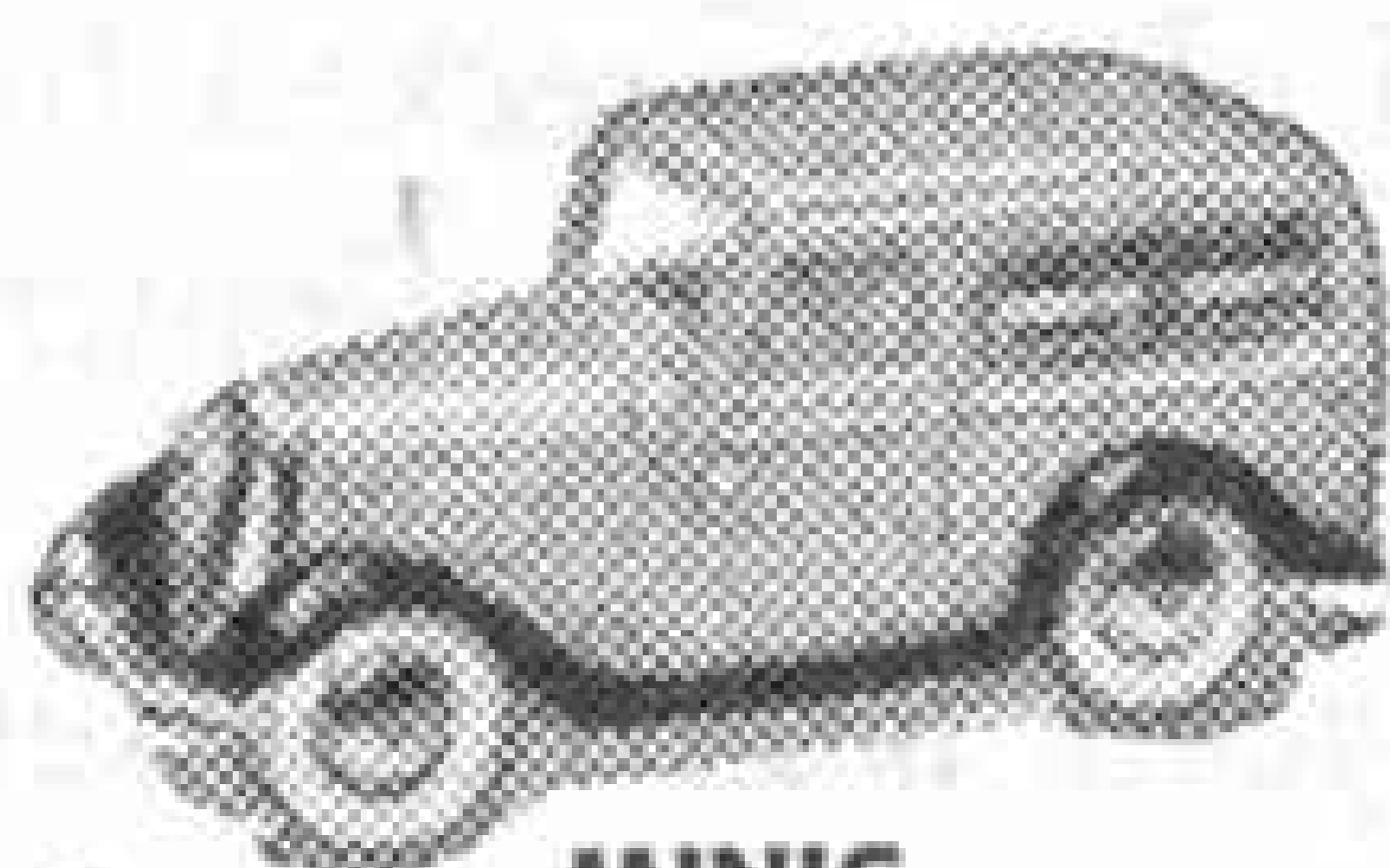
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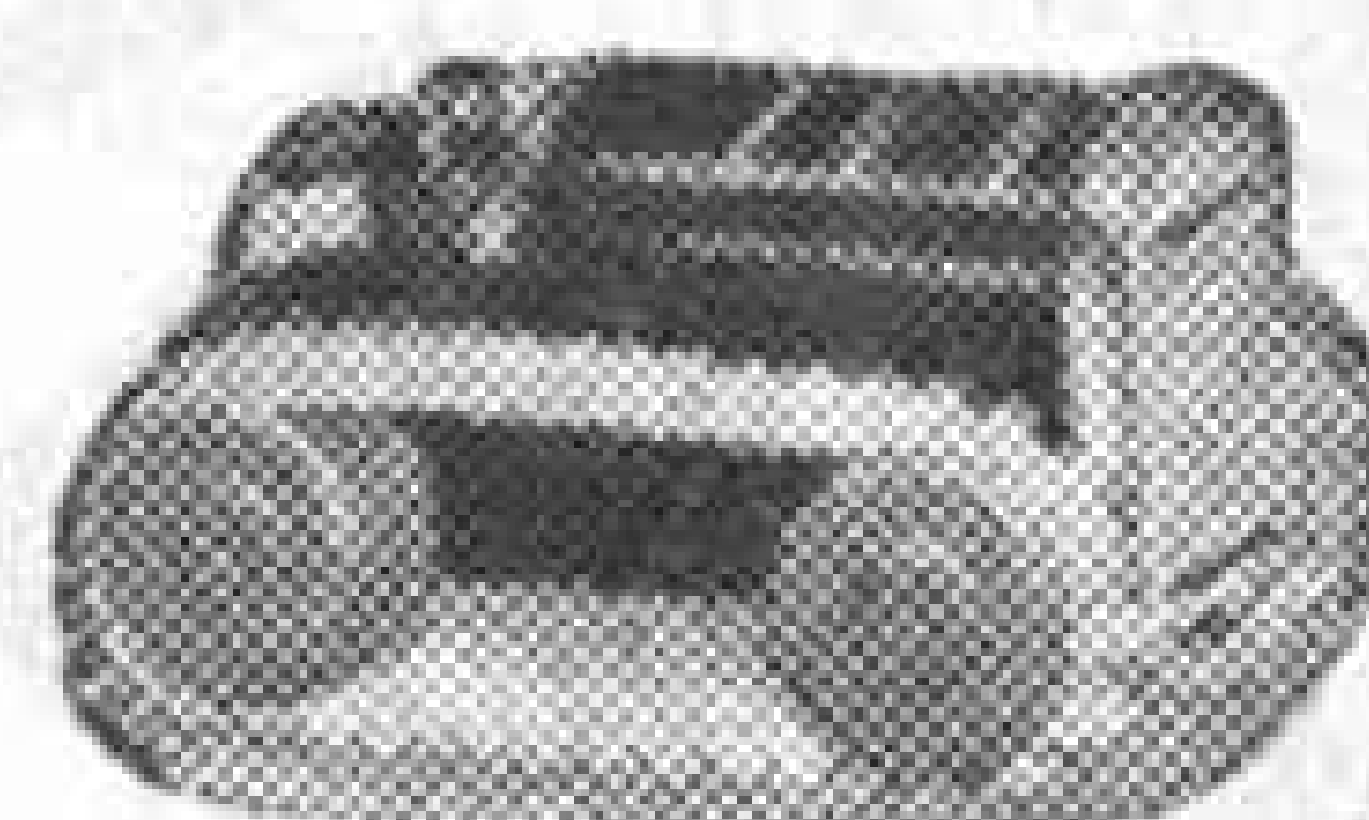
The illustrations underneath are just a reminder of what real toys look like.



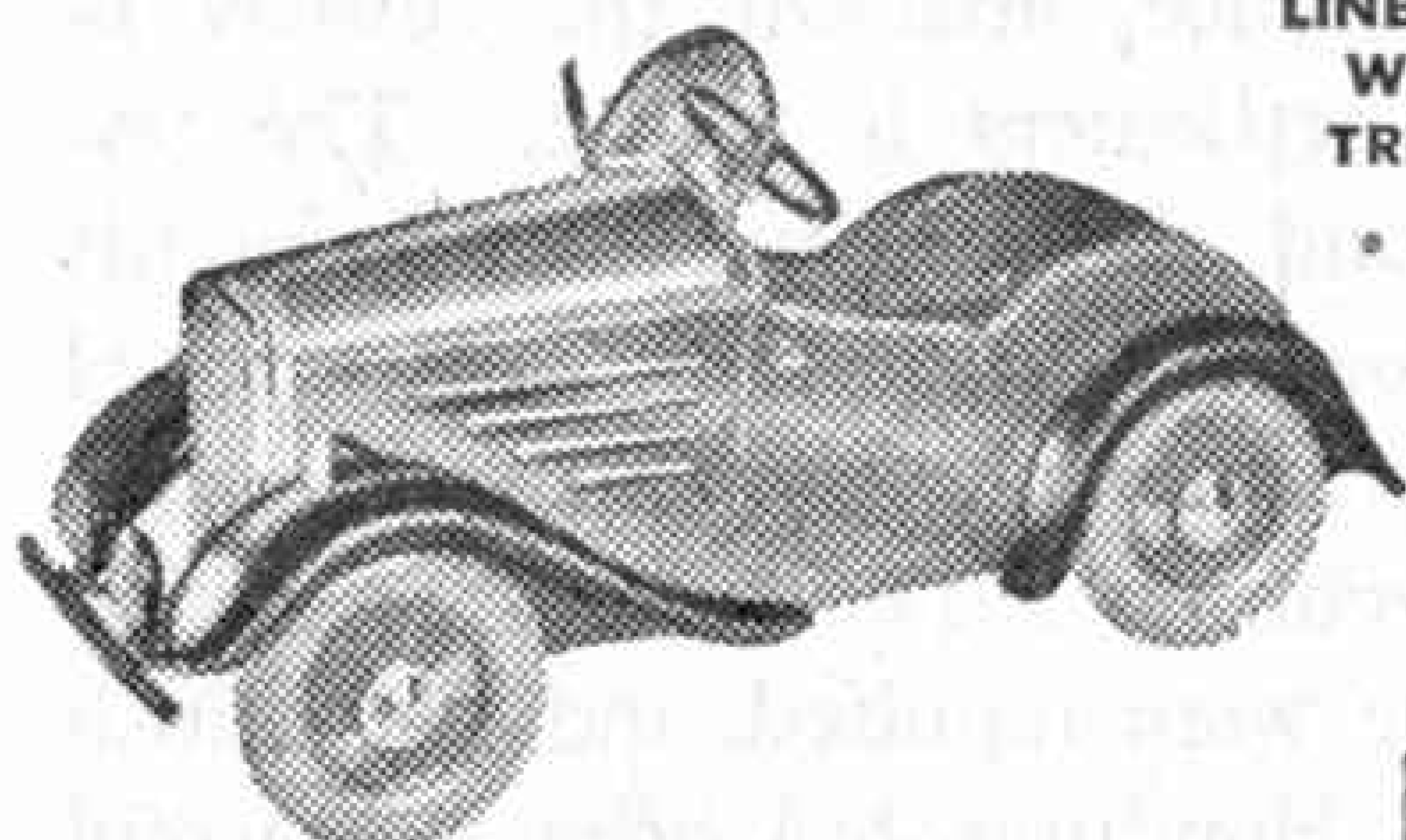
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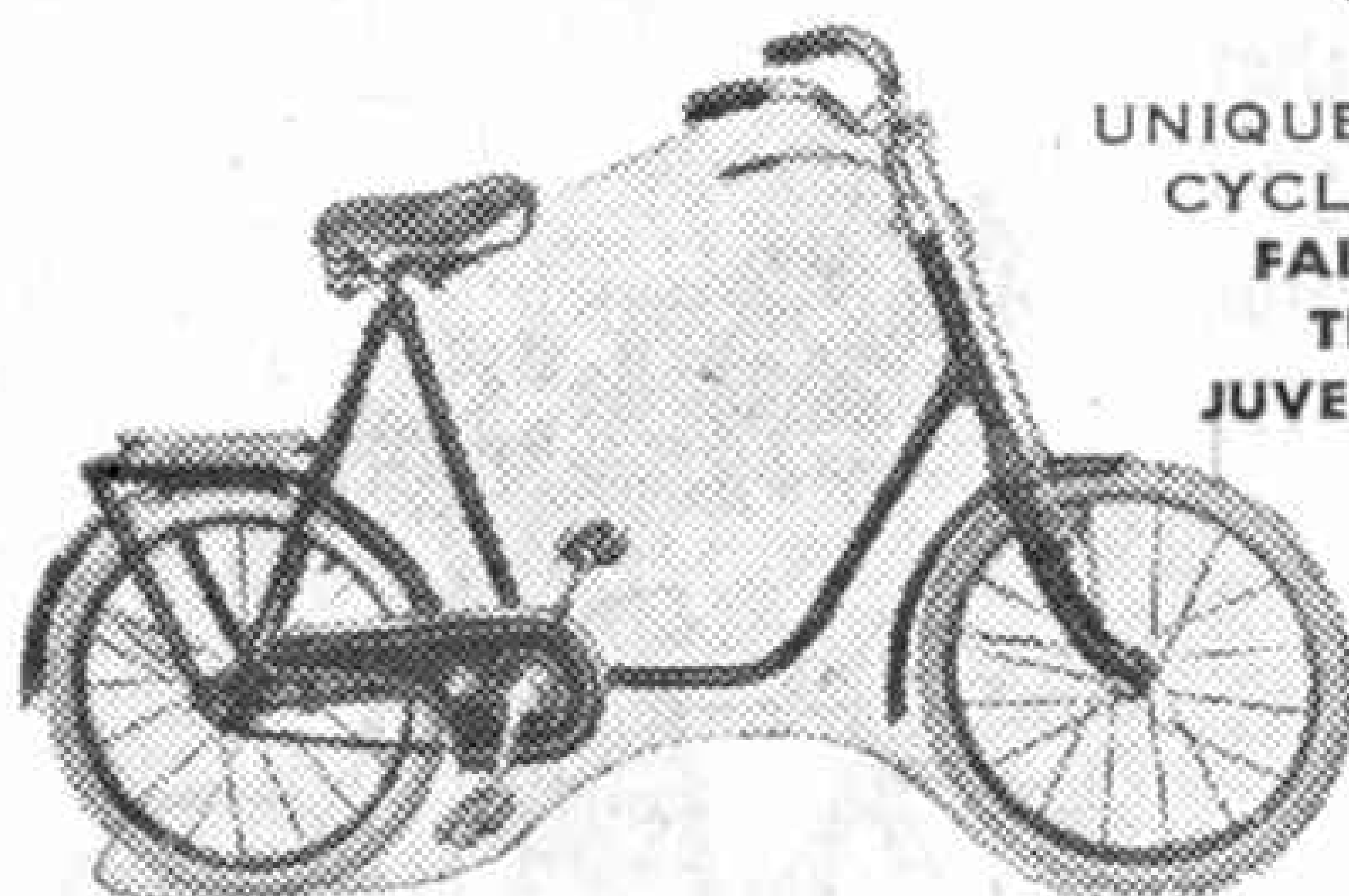
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## ROUND THE WORLD WITH **BSA** No. 15



### BRITISH HONDURAS

A small band of shipwrecked buccaneers began the British settlement in Honduras in the first half of the 17th Century. Some 25 years later other settlers arrived, attracted by the logwood and mahogany, and soon built up an important industry. But the Spaniards, who resented their presence, attacked the settlers in overwhelming numbers, destroying the settlement in Belize. The few survivors made their way to Yucatan and Havana, and the Spaniards thought that the British had "had enough." But they were wrong! The survivors were joined by other adventurous spirits and returned to Belize, where they resumed their timber-cutting. The furious Spaniards made another fierce attack, but this time were repulsed, and the British were left in peace. Since then British Honduras has been a peaceful and prosperous country. There are no buccaneers, but there *are* B.S.A. Bicycles — though, as is the case everywhere just now, there are not enough to go round! But that will soon be changed, so — whether you live in Highgate, Hartlepool or Honduras — *keep in touch with your dealer!* He will help you.

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# MECCANO

## MAGAZINE

Editorial Office:  
Binns Road  
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Vol. XXX  
No. 10

October 1945

### With the Editor

#### The L.N.E.R. Want to Know

During the war years our railways have been overburdened by war traffic and have been short of staff. They have been unable to build new coaches, and the immense crowds of passengers who have packed themselves into the restricted number of trains have not had very comfortable times during their travels. But now the war is won, and we can begin to think of ease and comfort again, at any rate while in a railway carriage; and the L.N.E.R. have gone so far as to invite passengers to tell them what they would like. That company will soon be placing orders for 4,600 new coaches, and have had the bright idea of trying to find what passengers have in mind directly, instead of just working out a scheme and leaving their passengers to put up with the results—and to criticise them.

The L.N.E.R. have done this by issuing a booklet in which travellers can express their opinions on such questions as whether seats should be higher or lower than they are now, whether they should slope more or less, and so on. Altogether there are twelve questions in the booklet, and with two exceptions they are presented graphically by means of pictures. For instance, the first question is "Do you prefer to travel in an open vehicle or a compartment?" and sketches of the interiors of an open coach and of an ordinary compartment are given.

The range covered by the questions is excellent. They concern not only the types of coach and seat, but also the kinds of window and door, the style of lighting, and the provision of space for luggage. There are in addition diagrams showing the new design of L.N.E.R. corridor coach. This in itself will increase the comfort of travel, for with it crushing

and crowding in the corridors and round the doors is sure to be less than with the existing type, and the average distance between door and seat is very much reduced.

For three weeks beginning 11th September copies of the booklet were placed in 31 principal day and night trains from King's Cross, Marylebone and Liverpool Street to destinations in the north of England, Scotland and East Anglia. Other copies were distributed through L.N.E.R. enquiry offices, and those who received them had only to make ticks in spaces provided in order to show their preferences.

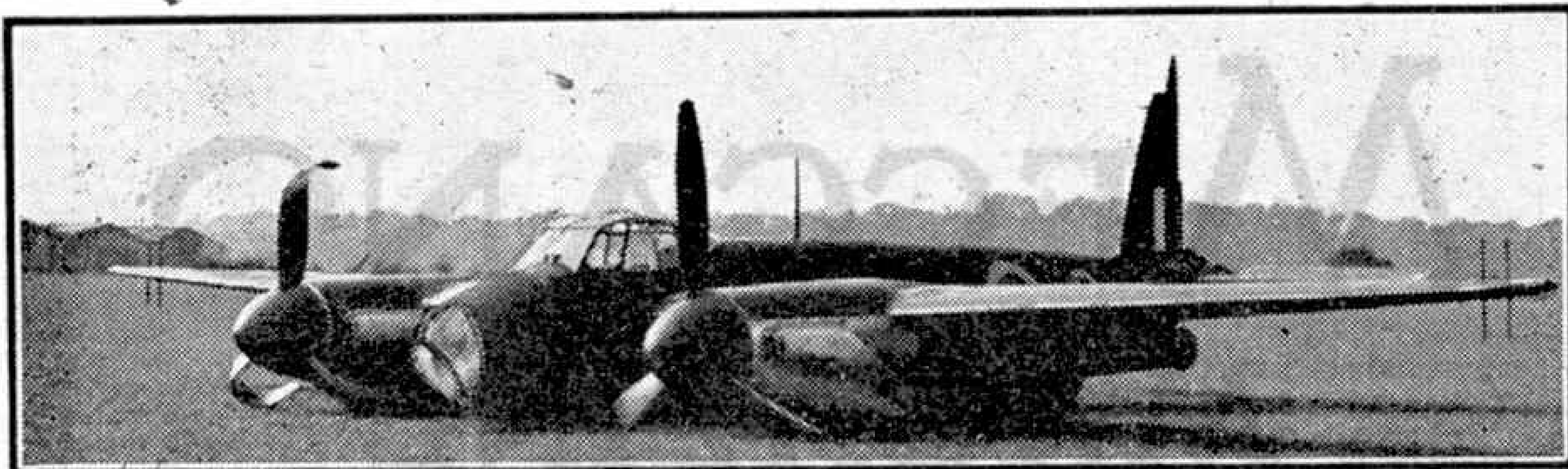
The results will be very interesting. For years most of us have made a practice of criticising railway travel, and our complaints have become harsh and shrill during the war years. Now some of us have had an opportunity of making helpful criticisms with our own comfort in view.

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Another subject for repair. Photograph by courtesy of the de Havilland Aircraft Co. Ltd.

## New Propellers for Old

### The de Havilland Repair Service

By John W. R. Taylor

"BOMBS gone" . . . . Q for "Queenie" flew straight on just long enough for her pilot to see a terrific eruption of flame and bricks as the 4,000 lb. "cookie" exploded right on the target, far below, and then roared over in a vertical bank, heading for home.

"Queenie," a "Mosquito" XVI of the Light Night Striking Force, was an old hand at this sort of job—Berlin and back in four hours from England. But this time, as she dived down to roof-top height her luck changed. All the light flak in Germany seemed to open up at once, a direct hit put the starboard engine out of action, shrapnel tore holes in the wooden fuselage and the "hydraulics" packed up. By a miracle the pilot regained control, feathered the starboard propeller and flew on on one engine. For three seemingly endless hours the lives of two men and a valuable aeroplane depended on that one engine and its propeller.

At last "Queenie" reached home. The flaps and undercarriage would not come down but her pilot decided to risk a belly-landing. The ground loomed up nearer and nearer, suddenly there was a violent shudder, a horrible wrenching and screaming as "Queenie" skidded along on her belly and the two bent-back metal propellers, then silence as she bumped to a standstill amid a cloud of dust.

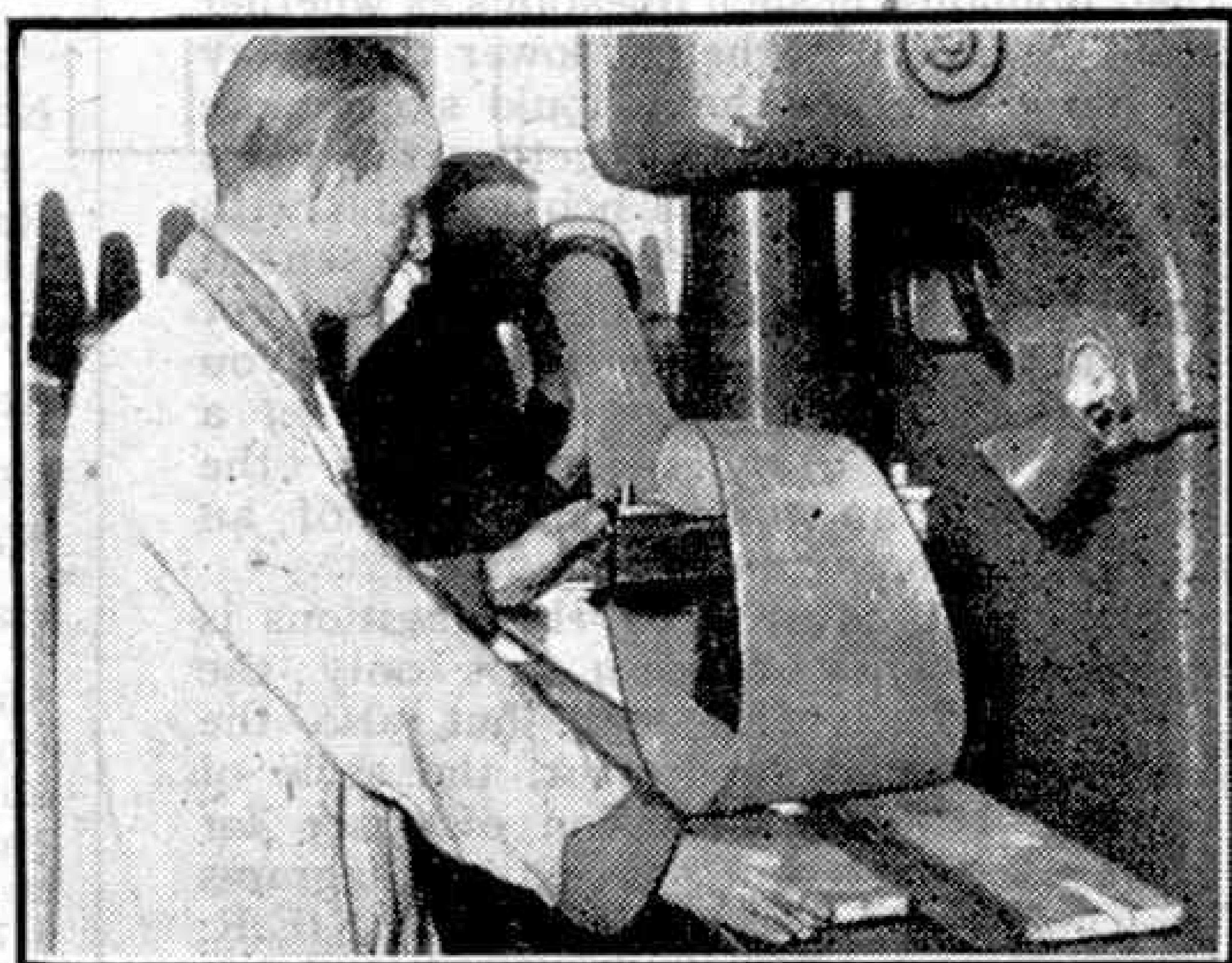
The pilot and observer clambered out, only dazed, and, surprisingly, the "Mosquito" was not a complete loss. Next day it was taken away to a repair depot and the propellers were returned to de Havillands for repair. The port one was in pretty bad shape, as, apart from the fact that all three blades were bent by the crash landing, one of them had a hole in it caused by a piece of flak over Berlin. When it arrived at the repair depot it was laid on the floor of a vast hangar-like building—"Octopus Corner"—with scores of other propellers. At the height of the Battle of Britain there were some 20,000 sq. ft. of this floor covered with damaged propellers, and even German propellers from captured Heinkels and Messerschmitts were sent in for repair.

You might wonder if the trouble taken to collect and repair these battered propellers is really worth-while. The answer is that the average cost in men-hours of repairing a damaged metal propeller is only one-third of that absorbed in making a new one and that nearly three-quarters

of all damaged metal blades are repairable. This is largely due to the ease of repair of duralumin blades.

Now let's see what happens to "Queenie's" port propeller after it leaves "Octopus Corner". A careful record is kept of every stage of its progress through the workshops. First of all it is dismantled and any obvious scrap put on one side and noted. All paint, grease and oil are next removed and the propeller is given a very thorough inspection. Up to this stage all the parts are kept together as one propeller, but, afterwards, the component parts are repaired separately and pooled with those of hundreds of other propellers. Only the barrel, stamped with the serial and type number, retains its identity.

The hub is comparatively easy to repair—usually it is only necessary to clean out small running marks and possibly straighten the counterweight brackets or spider arms, followed when necessary by replating. The components are then sent to the pool store. The blades naturally provide the bulk of the repair work as they take most of the shock of impact, and here the advantages of metal blades become immediately obvious. For instance, they normally bend back in



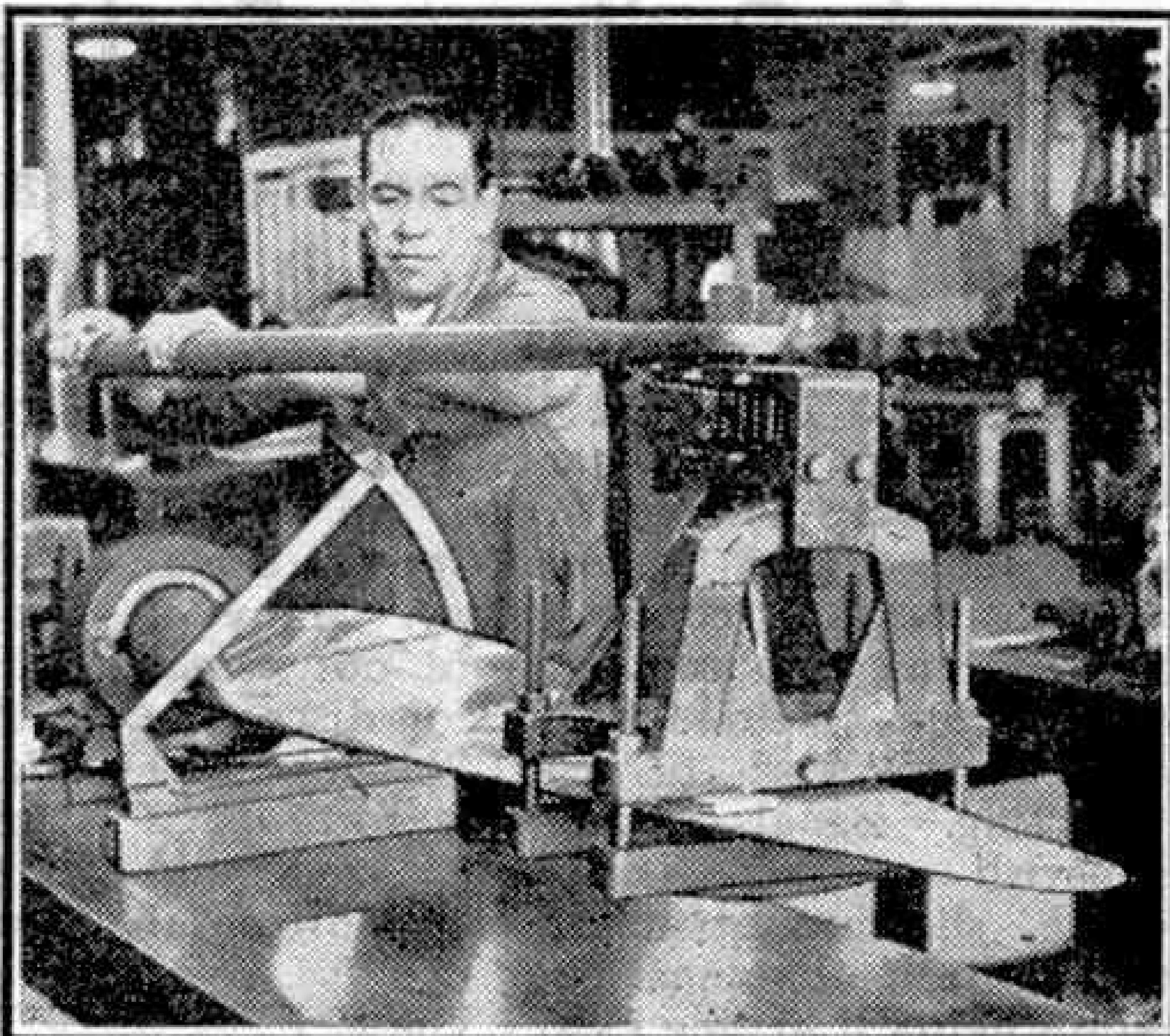
The first stage after annealing. Removing the worst bend. Photograph "The Aeroplane" copyright.



a crash-landing and serve as skids, which absorb much of the shock and support much of the weight of the aircraft, so reducing damage to the engines and airframe. In addition they never shatter, even when struck by shell fragments, and some blades have been repaired as often as six times, as a result of damage by cannon, machine-gun or heavy anti-aircraft fire, and still have been returned for further service.

Straightening the blade is, surprisingly, one of the least difficult operations. Whether heat treatment is needed for this depends on two factors—the thickness of the blade at the point of bend in relation to the angle of the bend, and the number of "cold bends" the blade has already endured in its past life. For instance at a point where the blade is  $\frac{1}{4}$  in. thick, the maximum bend without heat treatment is  $17^\circ$ . At the thicker part of the blade near the root hardly any bending is allowed. And no blade may be straightened without heat treatment more than two successive times. There is, however, no limit to the number of times a blade may be straightened provided one "hot bend" follows each pair of "cold bends."

Actually the terms "hot bend" and "cold bend" are not strictly correct as all bends are done cold. A "hot bend" is simply one in which the blade has been subjected to heat treatment before and after bending. The equipment for applying this heat treatment consists basically of two electrically-heated forced air-circulating furnaces, each capable of accommodating 36 blades hung vertically in a basket, with a water quench between the furnaces. The blades are annealed, or softened, in one of the furnaces before straightening, by remaining at a temperature of  $380^\circ\text{C}$ . for three



Hand-operated "twister" for correcting blade angles at tip. Photographs on this page "The Aeroplane" copyright.

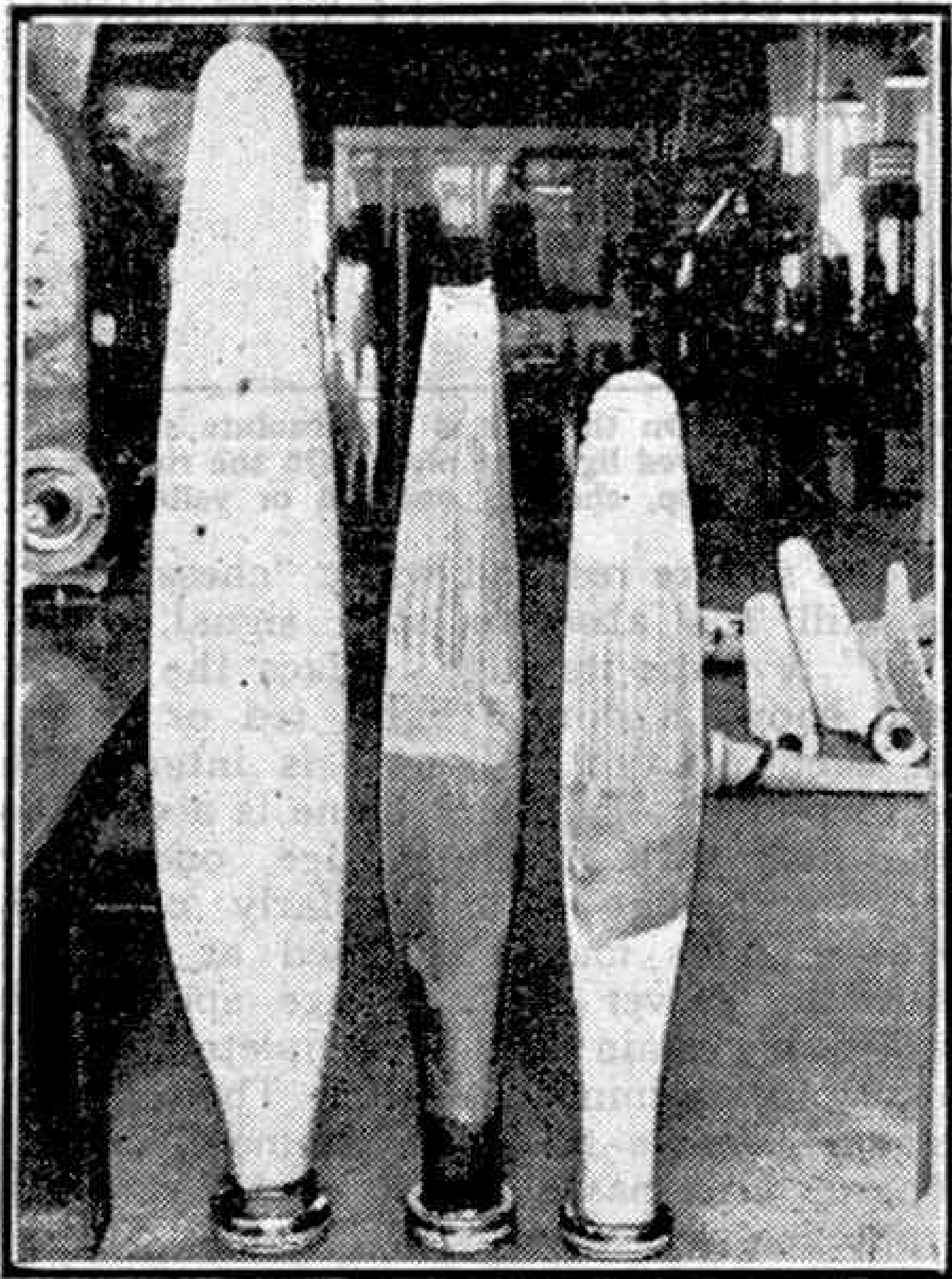
hours. Having been allowed to cool, they are straightened and then held in a temperature of  $500^\circ\text{C}$ . for three hours, followed by quenching in hot water at a temperature of  $85^\circ\text{C}$ . and age-hardening naturally for five days. The time between removing the blades from the second furnace and lowering them into the water quench must not exceed 30 seconds, but hot water is used to lessen the shock.

The actual straightening is done in two stages. First, a hardwood block is placed in the concave bend of the blade and a hydraulic pressure of up to two or three tons is applied to the block. Then the job is completed by similar pressure on the convex surface. Needless to say this job requires two highly-skilled operators, one holding the blade and the other working the press. But this straightening is only the first part of the process. Next the blade helix angles—or twist—have to be put right in special twisting machines, and the edges have to be aligned in a simple combination of clamps and hydraulic jacks. Actually the edges are given a slightly negative alignment of about  $1/10$  in. at this stage to compensate for an inevitable bodily distortion of the blade during the final heat treatment.

If the tip of the blade is damaged it may be shortened as much as an inch without any adverse effects. And even blades which are too badly damaged to come within this tolerance are often still quite serviceable, and by judicious amputation they can be made suitable for other aircraft. For instance, a "Typhoon" blade can be cut down by  $7\frac{1}{2}$  in. and reshaped for use on a "Wellington"; similarly, a "Blenheim" blade can be cut down and used on a "Master."

Extensive gashes made by flak cannot be repaired, but bullet holes present little difficulty. No attempt is made to plug the holes as they do not affect the efficiency of the blade; instead, providing the metal has not cracked round the hole, the rough edges are smoothed out to a fixed minimum radius, no further treatment being necessary. Any number of bullet holes in one blade are permitted, as long as they are not less than six inches apart—this means that a "Mosquito" blade can be holed in five places without becoming unserviceable.

After all the repair work is finished the blades are cleaned up, all nicks and dents are removed and then they are polished, shot blasted, anodised and dyed. Finally they are matched dimensionally and balanced in sets of two, three (Continued on page 358)



The blade at the left has two "repaired" bullet holes. The centre blade, having lost its tip, is no longer suitable for a "Blenheim" but can be cropped to suit a "Master." The right-hand blade is at the "half-way" stage, having been straightened only.



# A Railway Enthusiast Abroad

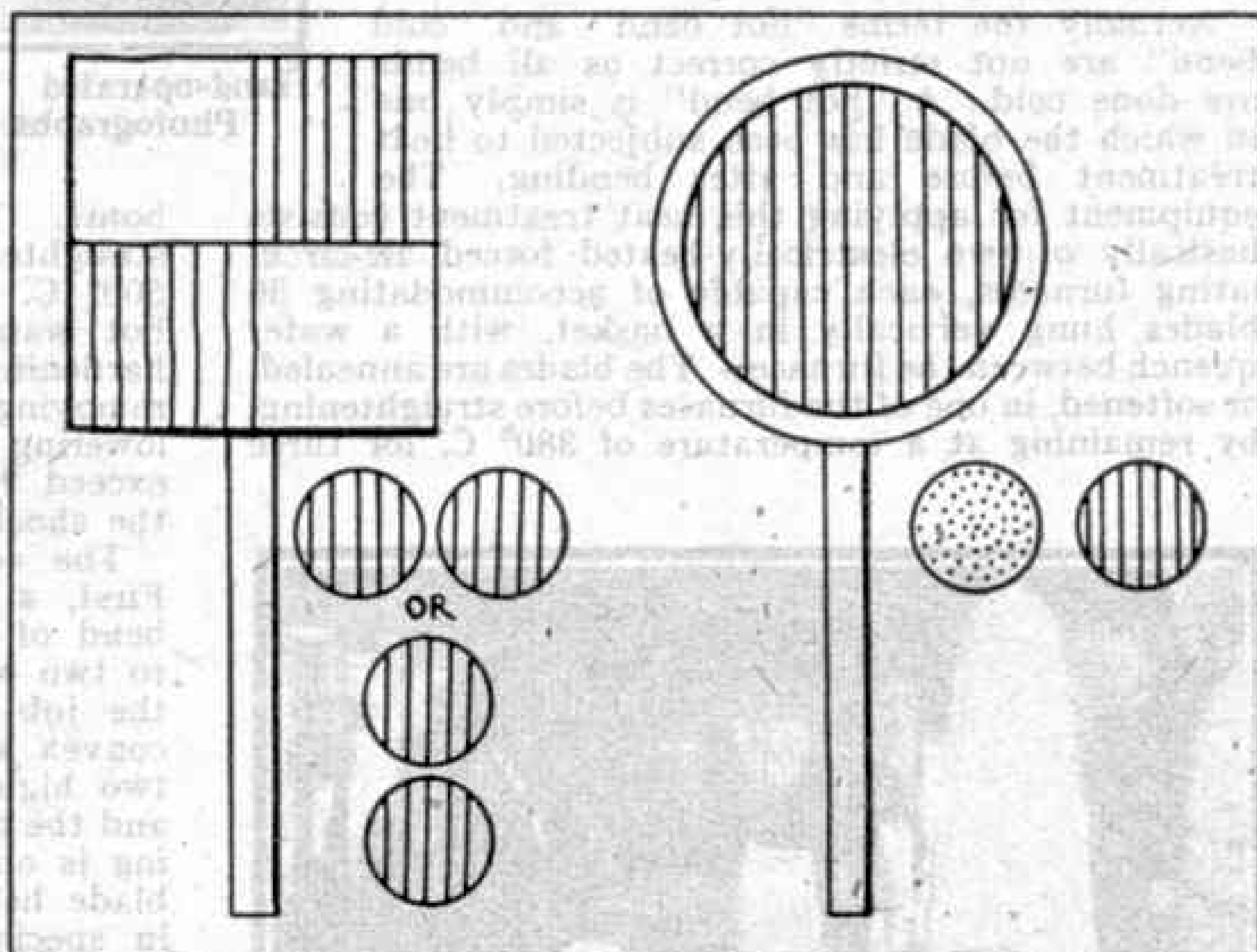
## II.—Some French Railway Practices

By R. A. H. Weight

**D**URING my earlier railway trips in France I noticed particularly how the signalling arrangements differed from those familiar here at home. To British eyes, indeed, the systems appear somewhat vague and contradictory. Many of the running line signals were not semaphores, but coloured boards or discs, the usual equivalent of our "home" and "starting" signals taking the form of a squarish rectangle quartered red and white, showing at night two horizontal red lights if at danger, but two white lights if at line clear. The "distant" signals, actually repeaters, were diamond-shaped, quartered green and white, displaying two vertical green lights when at danger, white when clear; and a circular red disc with a white edge, showing one red light at night for danger or one white when pulled off, was a sort of outer home signal. These signals turn on a vertical spindle, making a quarter revolution on a central pivot, so that at "line clear" only the thin edge was seen by a driver when he was close to. In other words, it practically amounted to this, that no signals were visible by day, only the bare, short posts, and white lights were seen by night, in both cases when line clear was indicated. At junctions there were semaphore signals, something like small versions of a British "distant," coloured violet, showing one violet or one white light, indicating the direction in which points were set, possibly preceded by a "Y" bifurcation sign.

Practice varied on different lines and the drawback was that the same shape of board might have different meanings according to colour, though trainmen were thoroughly familiar with it all. As the result of a new Code of Signals authorised by the Government in 1930, however, radical changes for the better were gradually introduced on all lines according to one standard. It had been realised that white lights at night for indicating line clear were liable to be

confused with those on bridges or by the lineside, so henceforth, except on subsidiary lines, this aspect was changed to green. The green lights hitherto used to indicate "caution" gave way to yellow, so following British practice. A distinctive shape was adopted for each type of signal, thus rendering its recognition simpler by day, and semaphore signals were also brought into use to a greater extent and constructed so as to be more clearly understood.

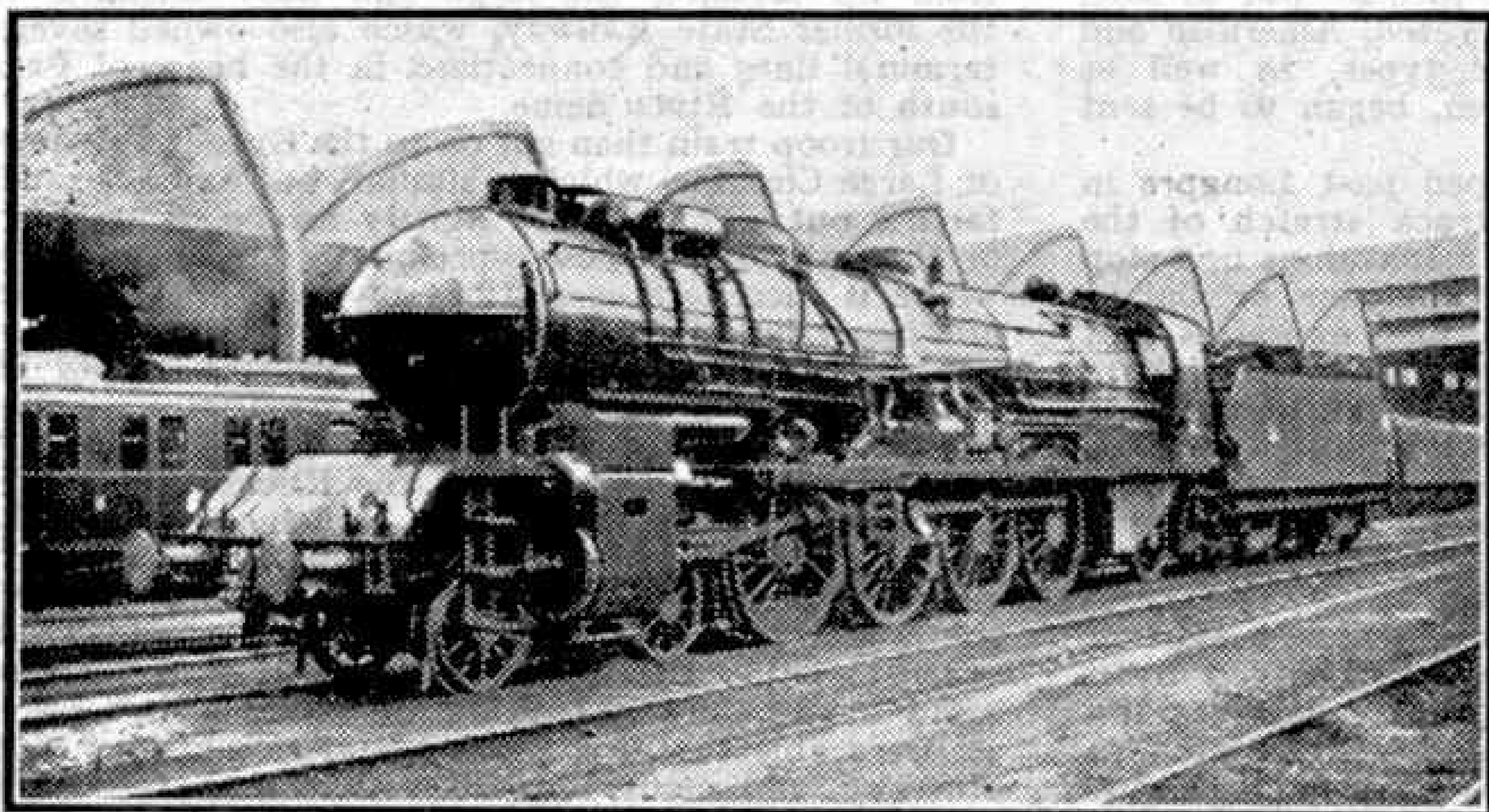


French signals at danger. On the left is an absolute stop with alternative positions for the red lights at night. On the right is an outer home, or deferred stop, showing one red or yellow light.

The square red and white "chessboard" is still the absolute stop signal; when "off" it turns its edge to face the driver and shows a double light, red or green, in each position. Often it is interlocked with points. The outer home is a circular red disc with a white edge, one lamp usually having with similarly coloured lenses. This may be passed at danger, but the driver must reduce speed and bring his train under complete control ready for an immediate stop. The repeater signal became a yellow diamond-shaped board, also passable. It is the nearest approach to our distant signal and is sometimes preceded by striped warning boards; it has a black and white edge and one yellow or green light.

It should be understood that these signals





"Mountain" type express locomotive No. 241-A-9 of the P.L.M. at Bercy sheds.  
Photograph by O. S. Nock.

may be found only at stations or principal junctions, and not necessarily at every one, because block working from signal box to signal box, or between level crossing posts provided with protecting signals, often operated by women, is controlled by semaphore signals, which are not usually locked, nor associated with points. These may be called intermediate signals; they are just as important in securing safety, and work in pretty much the same way as our home signals. They are preceded either by the yellow diamond repeater or, in Northern France, by an arm pivoted to the post almost centrally, showing a bar of yellow light at night if against the train, or a panel of green light when clear. There are yellow striped triangular or inverted triangular boards displaying two yellow lights, indicating the necessity to reduce speed on curves, through junctions and so on, as well as combination semaphore indications having the same meaning.

Direction indicators at junctions are sometimes electric, with various wordings illuminated; in other cases they look like fish-tailed distant signals, one over the other, painted bluish white and provided with lunar white lamps. If the route to the left be set, the top arm is "off" and one white light is exhibited at night; for the second route from the left two arms and two lights are shown, and so on. Colour light automatic signalling also has been introduced

a good deal on main lines, the light aspects being similar to the night indications described above. Systems of automatic train control also were being developed that by means of track circuit and conductor shoes or ramps give audible indication to the drivers as to the state of the signals passed, much as is done on the G.W.R. in England, and on the L.N.E.R. Edinburgh - Glasgow line in Scotland.

My first journeys in France were made in troop trains about 1915-6, in those four-wheeled covered wagons all too familiar years ago, bearing the legend in French, "8 horses or 40 men"—a tight squash in either case! At any rate they were screw coupled, so they did not jostle each other so joltingly as loose-link coupled freight wagons in Britain, but it was slow going of an uncomfortable nature, especially when lasting for several days and nights on end, even if one's party had succeeded in getting away with only 30 or so men in a truck plus rifles, ammunition and full equipment. The railway traffic on the State and Nord lines between the Channel and forward bases was then enormous, as road motor possibilities were at that time by no means fully developed, while air transport of a regular nature had yet to be introduced. A huge Army railway operating organisation was built up, using mainly British 0-6-0 and G.C. type 2-8-0 locomotives until supplemented



"North Star" Pullman from Brussels to Paris non-stop, passing Hae Junction. The engine is French Nord "Pacific" No. 3-1115, of the rebuilt Paris-Orleans type. Photograph by C. R. L. Coles.



from the U.S.A., just as in the present war as soon as France and Belgium were liberated, American and "Austerity" 2-8-0s with other types, as well as rolling stock, equipment and men, began to be sent over in large numbers.

When on later occasions I sped past Longpre in the Somme Valley on a four-track stretch of the Nord main line at 70 m.p.h. in a luxurious non-stop boat train between Paris and Boulogne or Calais, or when I saw one of the best P.L.M. expresses that would cover the 535 miles from the capital to Marseilles in about 9½ hrs., I thought of the late autumn evening in 1916 when my unit entrained in the yard at Longpre for an unknown destination, though we had an idea we were bound for the Mediterranean, where things at the time were in an exceedingly uncertain state for the Allies.

Readers will be familiar with the slower type of goods train here, heavily loaded and hauled by a small-wheeled engine, which frequently has to stand for more important trains to pass, also to stop at intervals for examination and water, changing crews and so on. Well, it was something like that, as our 640-mile journey to Marseilles took four days! Soon after daylight on the first morning we had covered 96 miles and were crawling round by La Chappelle Locomotive Sheds, north of Paris, having left the

from St. Lazaire, the large and busy terminus of the former State Railway, which also owned several terminal lines and connections in the heart of Paris south of the River Seine.

Our troop train then got on to the Grande Ceinture, or Large Circular, which is similar, but extends much farther out. This is used mostly for goods transfers or through connections, especially on the south side, where it incorporates sections of main line branches and many junctions, flat or by viaduct. By secondary lines leading more towards Spain, west of the P.L.M. trunk route through Dijon, we eventually reached that focal city of mid-France, Lyons, thereafter following the main way down the Rhone Valley past the vineyards and castles of Provence, where the war happily seemed far away. The weather having cleared and become warmer, it was possible to have the wagon door open—there were no windows—in order to enjoy the scenery. While in Marseilles for a few days before embarking for Salonica, in Greece, we were able to enjoy perfect Riviera sunshine with blue sky, and really blue sea visible from the camp.

At this time, when much of France was occupied and devastated by the Germans, long-distance trains on the P.L.M. stopped at all principal stations and were largely formed of many coaches, with four or six wheels, of the substantial, long-bodied type then

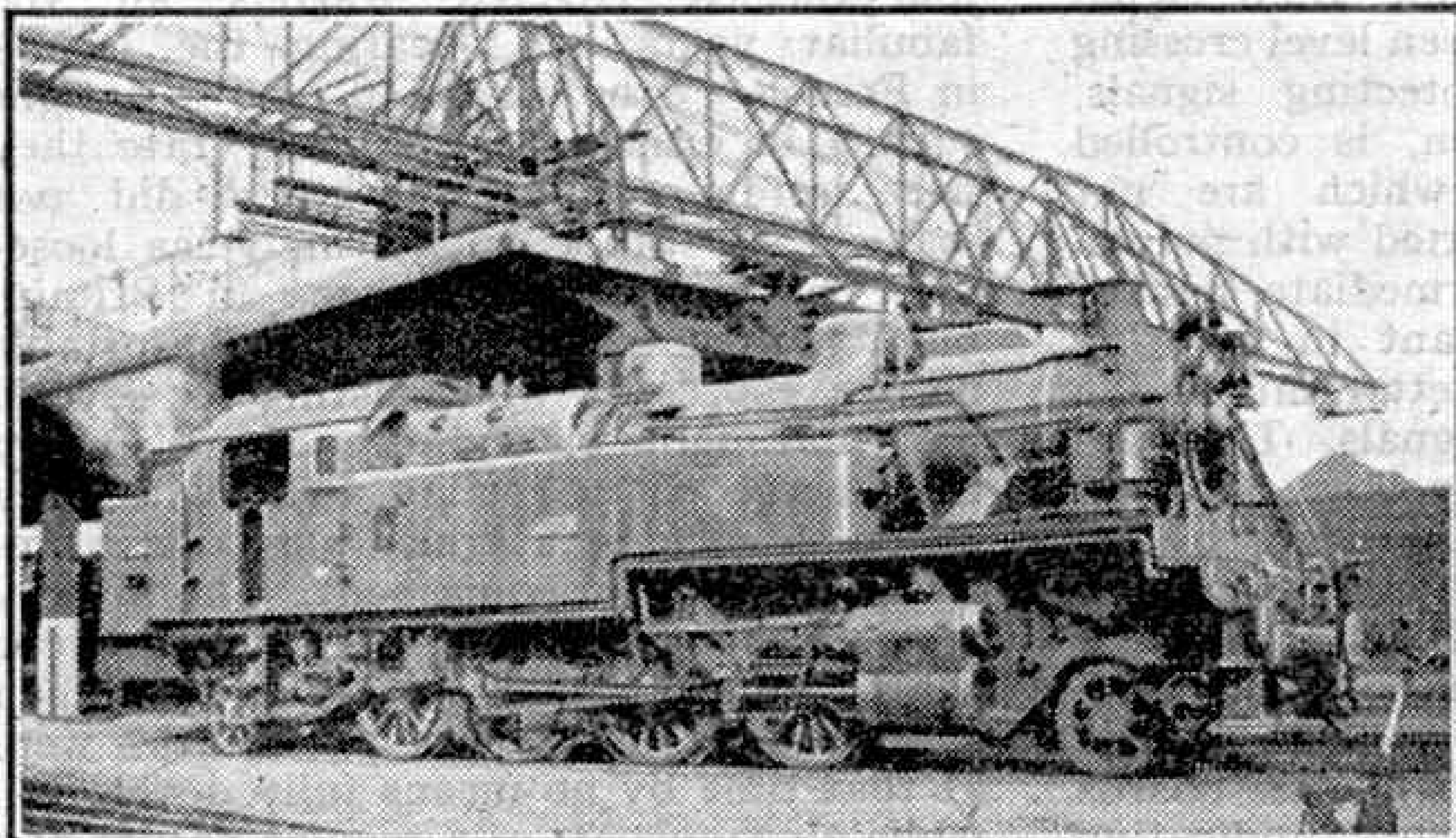
so familiar abroad. As soon as conditions permitted, bogie corridor carriages for all classes of passengers reappeared and many new ones were built for the extensive international and other services, operated by fine light green 4-6-2 and 4-8-2 engines. P.L.M. trains presented quite a kaleidoscopic appearance, since first class coaches were painted crimson and black, seconds yellow and black, and thirds and vans dark green. The coaching stock of all other French lines was recently painted dark green, as also in Switzerland and other countries.

Signs and indications to passengers or staff are pretty thorough on European railways. Prominent indicators are usually provided above the entrances to platforms at principal stations, showing

destination, time of departure and other details of the next train. Each intermediate station, large and small, has bold nameboards at the outer ends of its buildings, or on awnings fairly high up facing incoming trains. There are often boards on the platforms indicating the principal city or route served therefrom.

Platforms are much lower on the Continent than in these islands. Here they are built up to the higher footboard level of the coaches; in other countries they are generally not higher than our lower footboard level. In consequence there are permanently fixed steps at the ends of the coaches leading up to the inset end doors, from which access to the compartments or seating is obtained. At country places in Germany, I remember seeing folding wooden steps being brought out to enable people to entrain in old carriages. Nearly all modern stock is corridor, however, with large windows that open downward to a wide extent.

Boards are carried just below the window line near the doors, giving each vehicle's destination and compass of journey, such as "*Boulogne-Laon-Inter-laken*" or "*Altona-Hamburg-Dresden*." On the principal expresses each coach may have a number board also to facilitate finding reserved seats. Painted on are lots of signs, figures and abbreviations. These include the owning Company's or State's initials.



French State Railway 2-8-2T No. 42-110, a three-cylinder simple engine for Paris suburban work. Photograph by O. S. Nock.

Nord main line and entered upon the network of tracks and junctions constituting the Petite Ceinture or Small Circular ring railway, which circles inner Paris linking all main lines. It is by this means that famous through sleeping-car expresses such as the "*Blue Train*," connecting Calais with the French Riviera, were transferred from the Nord to the P.L.M. system, and through carriages for far distant destinations were worked from one terminus to another over it.

The Petite Ceinture used to operate a frequent local service of steam passenger trains. Its own rolling stock was painted the popular Continental shade of dark green, except the first-class coaches, which were red. This joint line had some chaired rails, inside cylindered 0-6-0T engines and 4-6-0 four cylinder compound tanks for quick acceleration, with the strange arrangement of high and low pressure cylinders placed one in front of the other outside the frames on each side, the same piston rod passing through both. They also had some articulated 2-6-0, 0-6-2Ts, with two sets of outside cylinders actuated by Walschaerts gear. In recent years, owing to more convenient services offered by the Metro underground electric railway and by motor omnibuses, the Ceinture suburban traffic has much diminished, leaving mainly goods or transfer trains, except on the section used by electric locals to and



# Photography

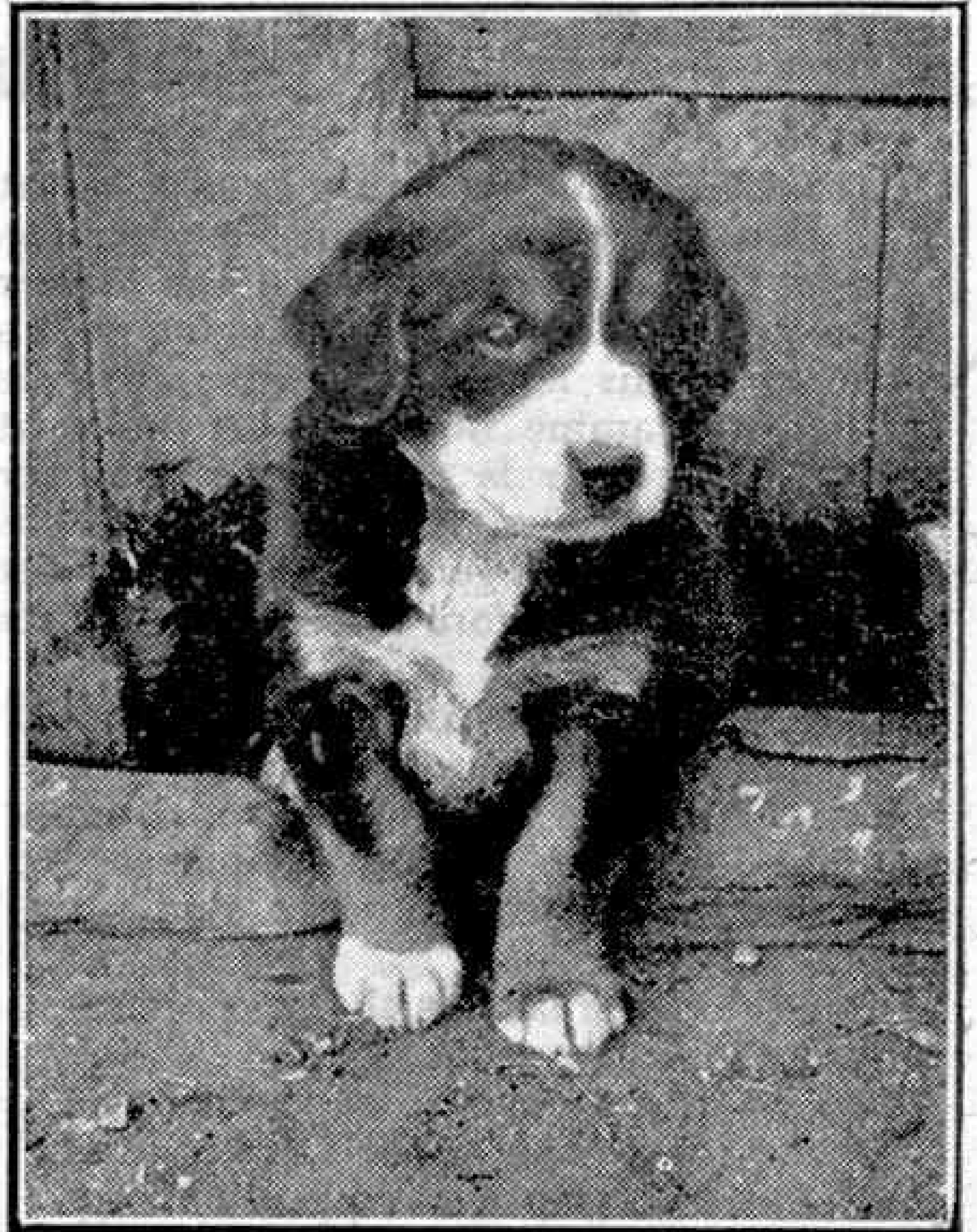
## Further Pages from My Album

By E. E. Steele

LAST month I wrote about some photographs picked at random from my album, describing the ways in which they were taken. Here are some more prints selected to show how the camera can make interesting pictures out of all kinds of subjects.

This one of the puppy recalls an amusing incident. He was very bashful, and simply couldn't face the camera, scampering away with his tail between his legs whenever an attempt was made to take his picture. Not to be outdone I followed him, and was just in time to see him vanishing through a hole in the base of a door into what was evidently his sleeping quarters. Remembering the curiosity of animals, I quickly stooped down and focussed the camera on the hole, and, sure enough, after waiting only a few moments out popped the head of the puppy to see what was happening, and the click of the shutter secured his picture.

The photograph of the white dead nettle shows how an ordinary, common thing, can be given a new interest by photographing at really close quarters. In this case my enlarger was used to make the picture. The flower was placed on the baseboard, and the bellows racked fully out to give as large a picture as possible. A piece of film was then placed in a small home-made plywood carrier, fitting in a



The Bashful Puppy

position normally occupied by the negative. An ordinary electric lamp, used near the subject, provided the illumination, and the lens of the enlarger was stopped down as much as possible to give sufficient depth of focus. Very many interesting pictures of common objects can be made in this way, if you have an enlarger capable of being converted into a temporary camera.

On this page of the album is a photograph of a tortoise-shell butterfly, and a bee feasting on Michaelmas daisies, a picture which reminds me of the end of Summer. By this time most of the flowers are over, and the days are growing a little colder. Very often the insects can be found making a last meal on such flowers as the Michaelmas daisies in the drowsy sunshine which precedes the colder days heralding the approach of Winter, when the remaining insects hibernate in holes and corners to await the distant Spring. Because of their drowsy condition it is often easier to photograph insects at this time of the year. Like old people sitting in the sun, they are reluctant to be disturbed, and will not readily leave their chosen spot. Be on the lookout for such opportunities.



Close-up of White Dead Nettle



# From Seedtime to Harvest

**A**UGUST and September are the great corn harvest months of the year. As soon as this harvest is finished the farmer begins to prepare for the following year's cropping of his land. If winter wheat is in the programme he must get busy at once, for October is the best month for sowing. When sown this month the seeds are given time to germinate and to get well established before the severe winter weather arrives.

Methods of cultivation vary in different parts of the country according to the nature of the soil—heavy, medium or light—but the main principles are the same, the object being to attain a satisfactory seed-bed.

Ploughing the land is the first operation, and as the root system of the wheat plant goes down deeper into the soil than most other cereals the land is ploughed to a depth of approximately six inches. The furrows are turned well over to bury the weed and stubble, and also to give consolidation. Knives fitted on the shell or breast of the plough slice the furrows as they roll over, making easier the operations that follow.

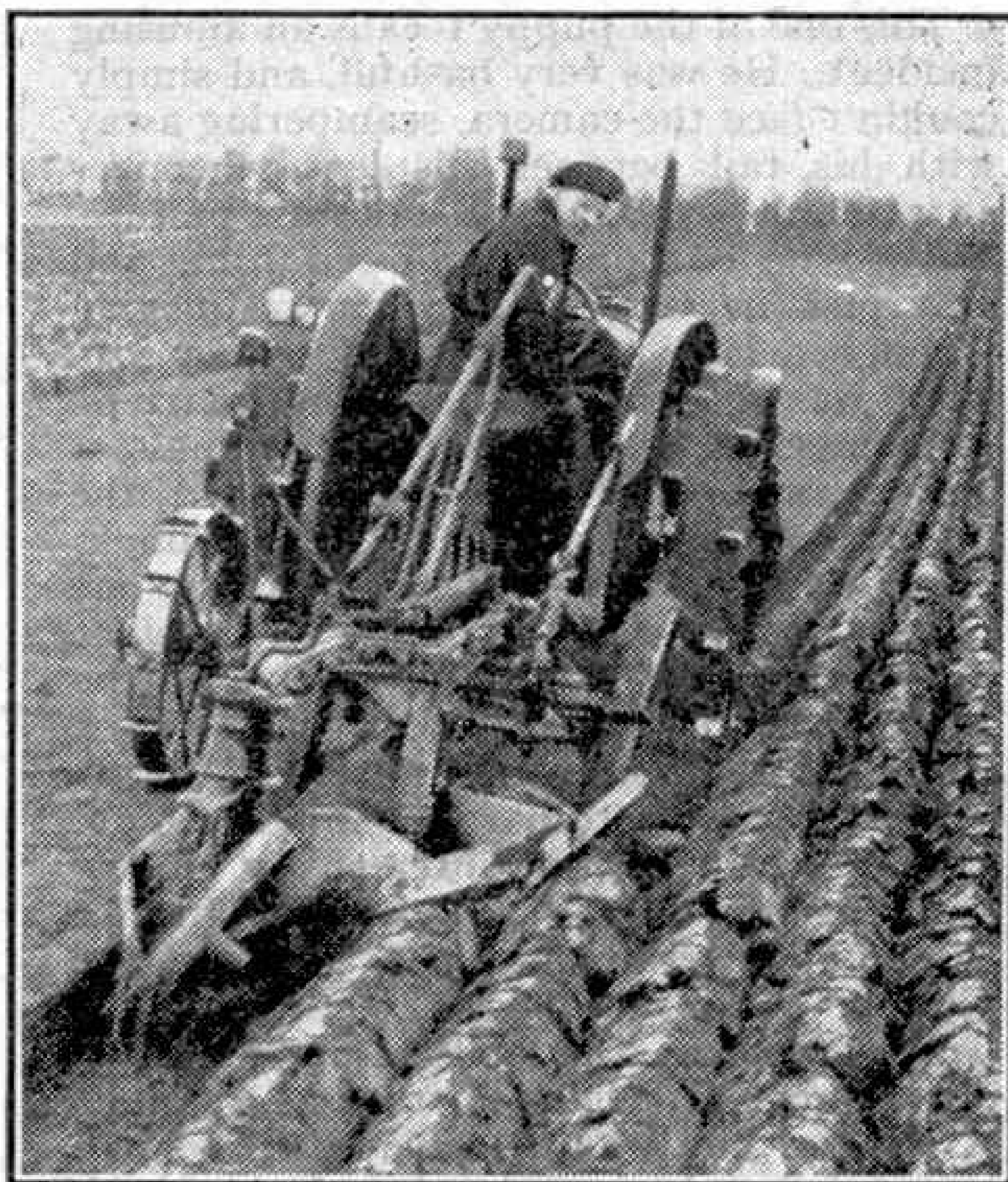
Harrowing with disc-harrows is the next job. These harrows are comparatively modern agricultural implements, having two rows of steel discs that revolve on two separate shafts as the harrows are hauled along. An interesting feature is that the rows of discs can be set obliquely so that they churn up the soil in a criss-cross manner.

Next comes a further harrowing with heavy spike harrows, once or twice as necessary. The picture on our cover shows this being done with a pair of heavy horses. By this time a suitable tilth for the reception of the seed will have been attained and all is ready for the sowing.

The sower, or seed-drill as it is more commonly called, is carefully prepared for its particular part in the proceedings, and is adjusted to sow the requisite quantity of seed to the acre, usually 2 cwt. This is more seed than is actually necessary, but allowance has to be made for the ravages of rats, mice and birds. The seed is placed in an oblong hopper under which flexible spouts are attached. At the bottom the spouts fit into feet, set five or six inches apart, and these are lowered into the soil to the required depth, about two

inches in the case of wheat. As the machine moves along these feet make small channels or drills into which the seed falls. The flow of seed is regulated by means of small cogged wheels fitted on a shaft at the bottom of the hopper, one over each spout. These wheels slowly revolve, gently forcing the seeds into the spouts.

The final operation is harrowing in the seeds, carried out by means of spike

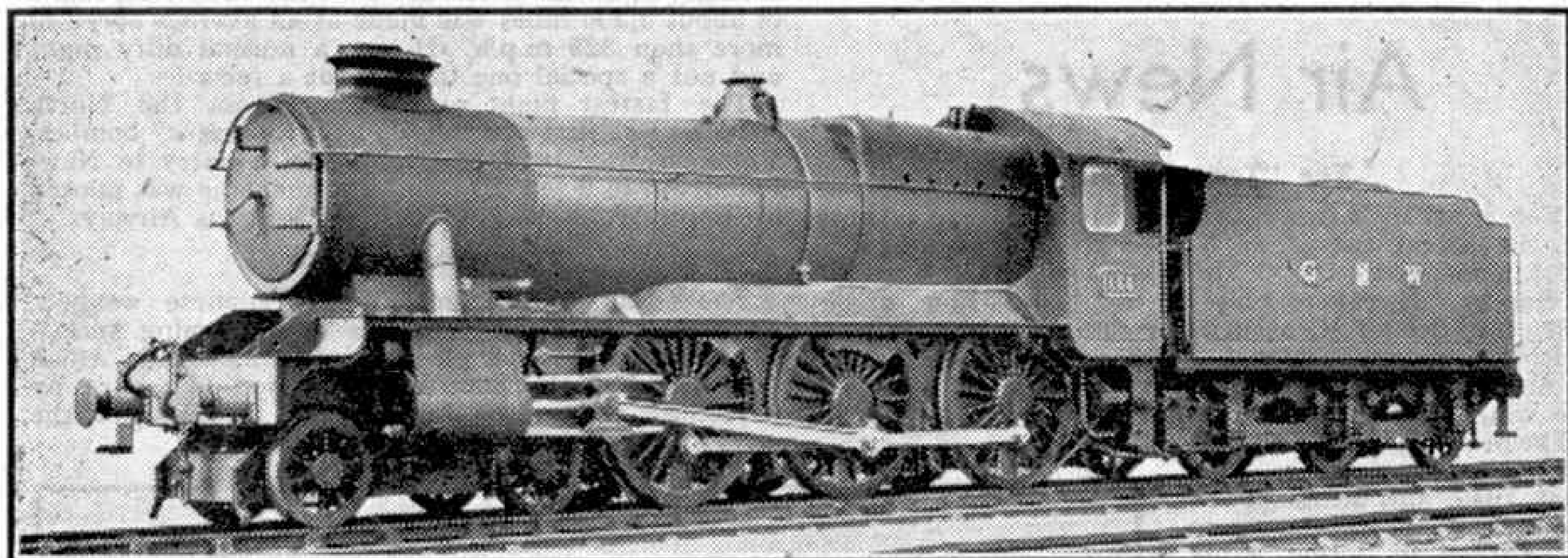


Ploughing the land—the first operation.

harrows of rather lighter weight than those used for the earlier preparation of the seed-bed. This final harrowing will leave the surface in a somewhat cloddy condition, which is all to the good, as the small clods of soil afford protection to the young wheat shoots from the winter gales.

The wheat germinates fairly quickly, and in two or three weeks the tender shoots appear. By the time they are two or three inches high, however, the cold weather calls a halt to growth, and they are then dormant until the "good earth" begins to warm up again in the following March. Immediately there is any sign of growth an application of chemical fertiliser is given to feed and stimulate the young plants. Following this the field is rolled, and is then left alone until harvest time comes round again in August.





The new G.W.R. 4-6-0 locomotive No. 1000 is remarkable for its double blast pipe and chimney and other departures from Swindon practice in the past. Photograph by courtesy of the G.W.R.

## A New G.W.R. 4-6-0 Locomotive

### Changes in Traditional Swindon Design

FOR some time past there have been rumours of a new locomotive from Swindon; all conjectures as to its nature have now been set at rest by its actual appearance. It proves to be a two-cylinder engine to which the number "1000" has been given. It is the first of a new series for the design of which Mr. Hawksworth, who succeeded Mr. Collett as Chief Mechanical Engineer of the G.W.R. in 1940, has been responsible. No. 1000 is indeed the first of Mr. Hawksworth's own productions, but we have already seen something of his ideas in the modifications that were made to the "Hall" 4-6-0 class from No. 6959 upward.

In the new 4-6-0 design the greatest number of departures from Swindon practice have been made with the boiler. The working pressure is raised to 280 lb. per sq. in., a record for the Great Western, which led the way to higher pressures 40 years or more ago. On the G.W.R. light superheating has always been the rule. A greater degree of superheating was introduced in the modified "Halls," and this is a feature of the "1000" Class, although the actual superheating surface employed is less. The evaporative surface too is less, but only slightly; and the fire-box heating surface is 169 sq. ft., or 14 sq. ft. greater than that of the modified "Halls." It is claimed that the new superheater gives a higher degree of superheat than previous arrangements.

Another striking change concerns the chimney and blast pipe. The chimney impresses itself at once on the onlooker

as something that so far has been completely foreign to the G.W.R. The double blast pipe and chimney is now a familiar sight in this country, but has never previously been seen on a Swindon locomotive. The fitting is said to be for experimental purposes. Although the new chimney is strange in appearance, it is quite handsome, and is distinguished by the copper cap characteristic of the G.W.R. Another notable difference from the "Halls", and indeed from the general run of G.W.R. locomotives, is the fitting of a continuous splasher, not a very deep one, above the coupled wheels. The tender also is a novelty for the G.W.R. It is of a new design worked out to simplify construction. The tanks are welded and the capacity is 7 tons of coal and 4,000 gallons of water.

Details of the leading dimensions of the locomotive are all interesting. The cylinders have a diameter of 18½ in. and a stroke of 30 in. Piston valves are installed, with a diameter of 10 in. The coupled wheels are of 6 ft. 3 in. diameter, and those of the bogie have a diameter of 3 ft. We have already given the working pressure of the boiler, 280 lb. per sq. in., and the tractive effort at 85 per cent. of this is 32,580 lb. The fire-box grate area is 28.84 sq. ft. and the total combined heating surface is 1,979 sq. ft., made up of 1,714 sq. ft. evaporative surface and 265 sq. ft. superheater surface. The weight in working order of the engine is 76 tons 17 cwt. and of the tender 49 tons, giving a total of 125 tons 17 cwt.



# Air News

## The "Tempest" II

Yet another Hawker fighter has now been taken off the secret list—the "Tempest" II. Similar in most respects to the "Sabre"-engined Mark V, the "Tempest" II differs only in the installation of a 2,500 h.p. Bristol "Centaurus" V radial engine driving a Rotol airscrew, which has necessitated the fitting of an oil cooler and two carburettor air intakes in the wing leading edge.

The prototype, LA 502, flew for the first time on 28th June 1943, and although the production machines were never used in action, large numbers of them were in squadron service before VJ-Day. Most of these aircraft were fully equipped for operation in tropical climates.

The "Tempest" II has the same wing span as the Mark V—41 ft., but its length of 34 ft. 5 in. makes it 6½ in. longer than the earlier machine. Like the Mark V it is armed with four 20 mm. Hispano Mk V cannons, and can also carry under its wings either two 45 gall. drop fuel tanks, eight rockets, or two 250 lb., 500 lb. or 1,000 lb. bombs.

The Bristol "Centaurus" is the most powerful radial engine at present in service anywhere, and is also being used in the Short "Shetland" flying boat and the Vickers "Warwick" V bomber. It is an 18-cyl. sleeve-valve engine, with its air-cooled cylinders staggered radially in two rows, and although it develops about 50 per cent. more power than the well-known Bristol "Hercules" engine it is only 3.3 in. greater in diameter. There is no doubt that the "Centaurus" will be developed a great deal, and we can expect to hear a lot more about it in the years ahead. J.W.R.T.

## Another Record Atlantic Flight

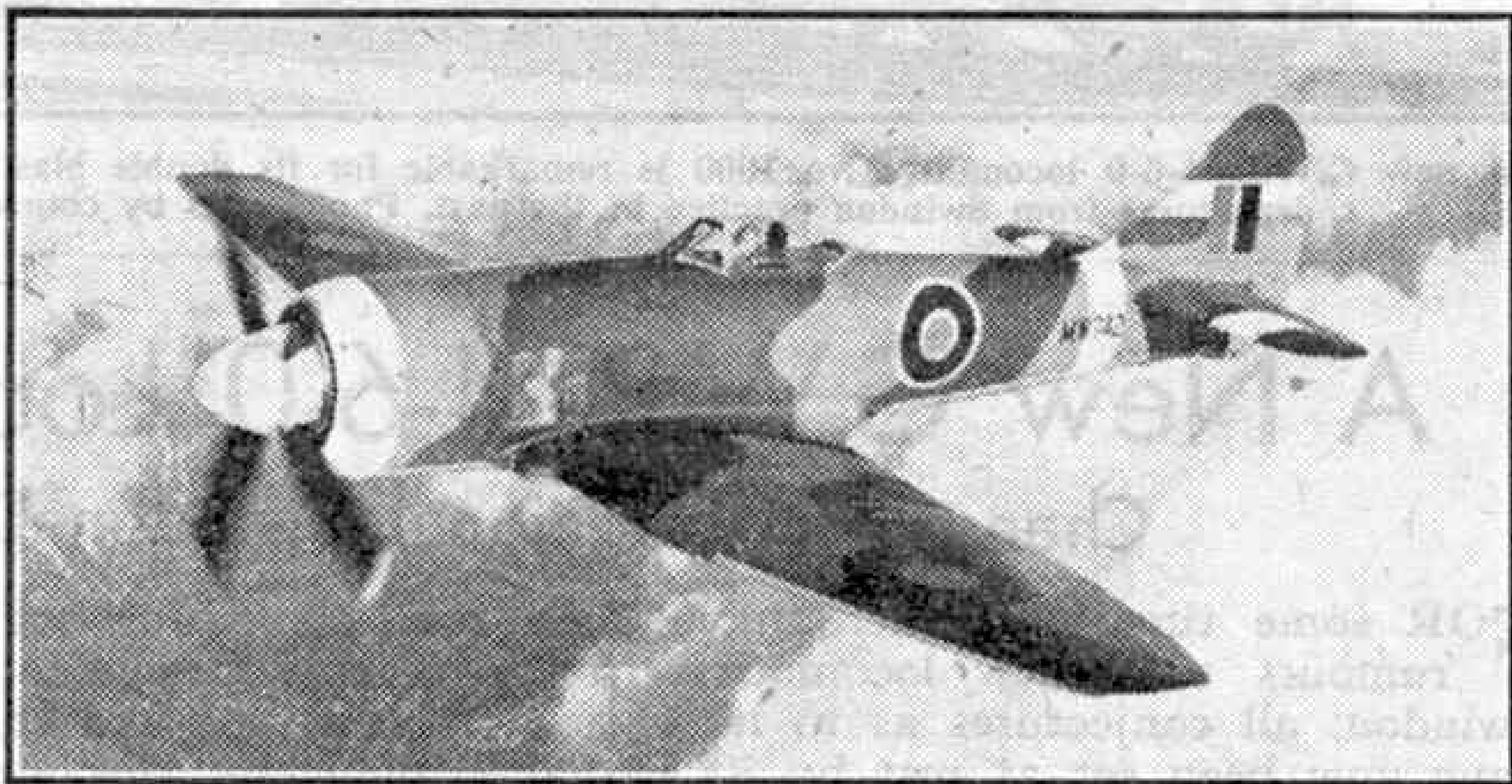
On the 7th September last a photographic reconnaissance "Mosquito" of R.A.F. Coastal Command flew from St. Mawgan, near Newquay, Cornwall, to Torbay, Newfoundland, in 6 hrs. 58 min., which is claimed to be the fastest recorded East-to-West

crossing over this much-flown ocean. The long flight of about 2,300 miles was made at an average speed of more than 325 m.p.h. It was a normal duty flight and not a special one to attempt a record.

The fastest flight ever made across the North Atlantic was that of a fully-laden "Liberator" bomber, which in May 1943 flew from this country to Newfoundland in 6 hrs. 29 min. The machine was piloted by Capt. W. S. May, of British Overseas Airways.

## The Japanese "Baka"

The "Baka" is essentially a Japanese weapon. Early this year the Germans were forming special fighter squadrons, whose sole duty was to ram Allied bombers; but the pilot was supposed to escape by parachute before the impact. In the case of the



The Hawker "Tempest" II fighter in the air. Photographs on this page are by courtesy of Hawker Aircraft Ltd.

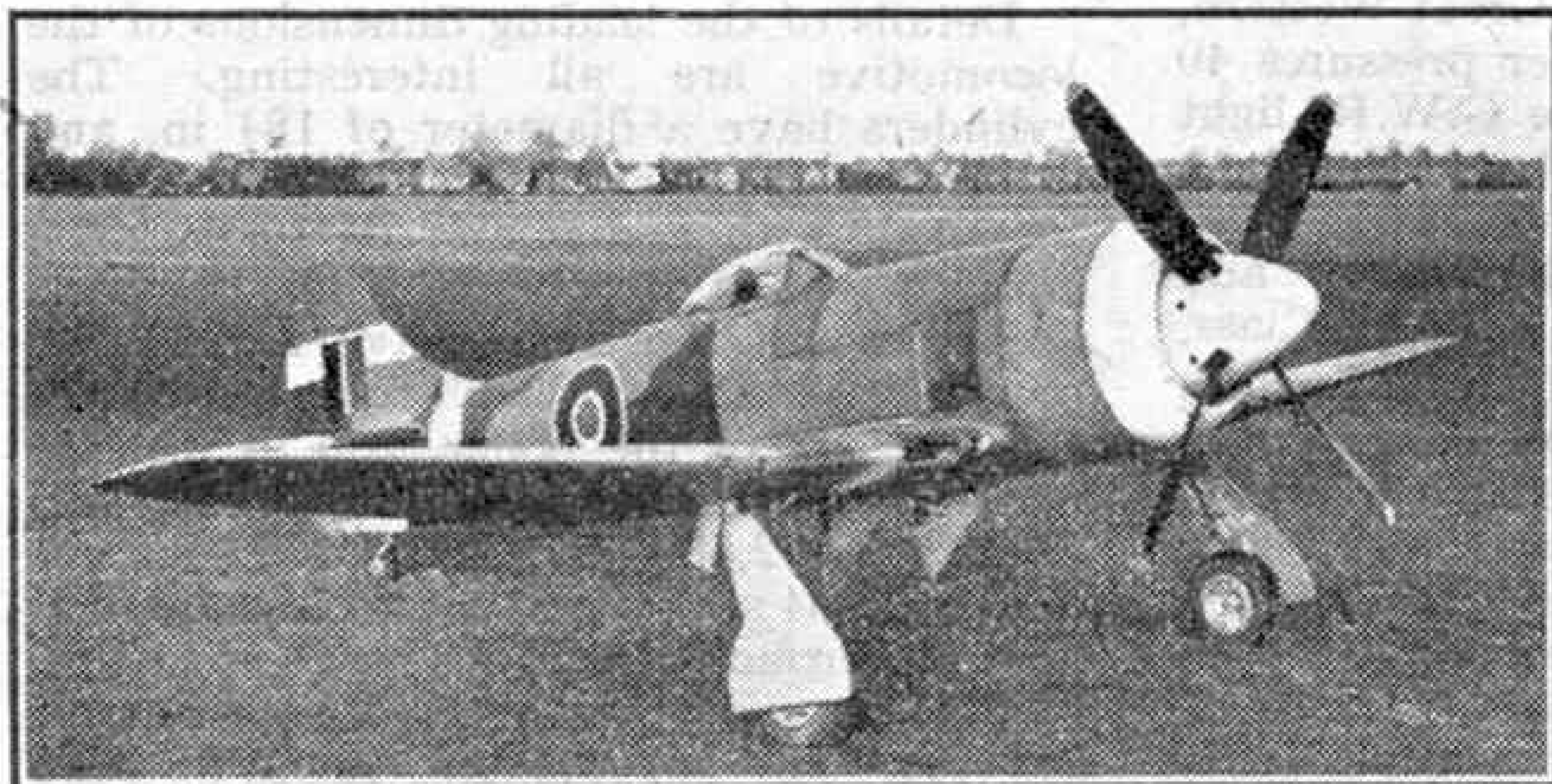
"Baka" the pilot has no parachute, and it is therefore a suicide-weapon in the strictest sense. It was used with only small success against "Superfortress" formations, but proved more formidable in attacks on Allied shipping. Several small ships were sunk by "Baka" fighters which dived straight down on to their decks. Aircraft carriers, the chief targets for the suicide planes, fared less badly, and although three British carriers were hit five times by them in one battle, they were not put out of action.

In plan view the "Baka" is something like a German V1 "Doodlebug," but it is fitted with a cockpit and twin fins and rudders, and the rocket-propulsion unit is inside the fuselage behind the cockpit. It has a wing span of 16 ft. 5 in., is 19 ft. 10 in. long, and carries between 1,000 and 2,000 lb. of explosive in its nose.

The "Baka" was normally carried under a Mitsubishi "Betty" bomber, with its cockpit inside the bomb-bay. As the target was approached the pilot, a volunteer who theoretically considered it an honour to die for his emperor climbed down into the "Baka's" cockpit, after which the hood was screwed on—just to prevent him changing his mind at the last moment. Then the "Baka" was released, and its rocket motor was started. It dived at about 640 m.p.h., controlled by the normal ailerons, elevators and rudders.

Six months ago several military commentators described the "Baka" as "the perfect weapon." The atom-bomb seems to have been considerably more effective!

J.W.R.T.



Another view of the "Tempest" II, the engine of which is the Bristol "Centaurus," the most powerful radial engine in service anywhere.





The "Privateer" PB4Y-2, the U.S. Navy's latest land-based patrol bomber. Photograph by courtesy of Consolidated-Vultee Aircraft Corporation, U.S.A.

#### "Privateer" Patrol Bomber

The upper photograph on this page shows the "Privateer" PB4Y-2, the latest land-based patrol bomber built for the U.S. Navy by Consolidated-Vultee Aircraft Corporation. Squadrons of these powerful machines were operating in the Pacific war zone for the U.S. Navy on patrol, reconnaissance and bombing missions at the time the war against Japan ended.

The "Privateer" is fitted with four improved Pratt and Whitney engines, has a top speed of over 250 m.p.h. and a range of well over 3,000 miles. The single tail assembly and side turrets distinguish it from its predecessor, the U.S. Navy PB4Y-1. Six power-operated gun turrets are installed to increase its effectiveness as a long-range patrol bomber without fighter protection, and each turret is equipped with two .50 calibre machine-guns.

#### South African Airways

British Overseas Airways and South African Airways are jointly to operate a new air service to Johannesburg, at first with "York" and ultimately with "Tudor" aircraft; and 18 S.A.A. pilots have been training with the Corporation at Whitchurch for this work.

South African Airways was formed on 31st January 1943, when the South African Government took over the then operating company "Union Airways." At that time services were being flown three times a week between Johannesburg and Durban, and once a week between Durban and Capetown. The small fleet of aircraft used consisted of five single-engined Junkers, each carrying four to five passengers. Three Junkers Ju 52s which were on order when Union Airways was taken over were delivered to South African Airways.

This company is now flying 156,000 miles a month. The chief airport is Germiston (Johannesburg), from which there are six services a week each way to Capetown, 14 to Durban, and two each to Port Elizabeth and Salisbury. In addition there is a service six times a week each way between Durban and Capetown. At present the services are flown with a fleet of 16 Lockheed "Lodestars," but it is anticipated that soon they will greatly expand, and, when available, British aircraft will be used. The company plan to make their routes the most efficient in the world.

#### Controllable Wings

The Stout Research Division of the American Consolidated-Vultee Corp. have been flight-testing a small unorthodox aircraft fitted with the Spratt controllable wing, which may make light aeroplanes so simple that anyone can fly them.

The Spratt wing was devised originally in 1903 by the late Dr. George A. Spratt, and utilises the principle that a wing may be moved relative to the aeroplane's position,

around two universal pivots, in such a manner as to provide full control. This dispenses altogether with the normal tail control surfaces and ailerons. Obviously the wing is only practical for small aircraft, as the pilot could not move the mass of a large wing manually.

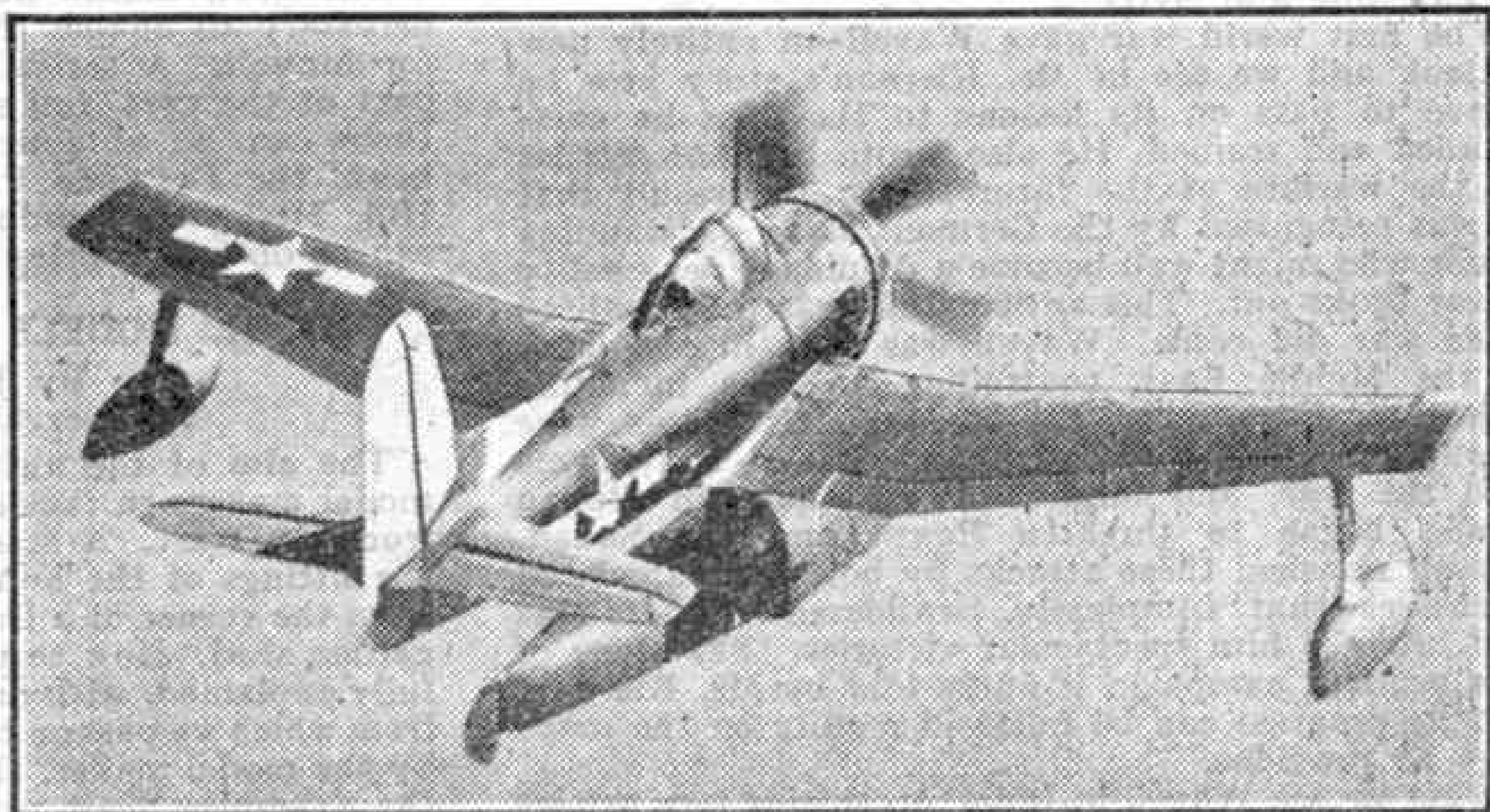
The little monoplane already referred to has a wing span of 26 ft. 6 in. and is very unusual in appearance. It has a short, streamlined fuselage nacelle with a fixed fin and tailplane at the rear. There is also a fixed vertical stabiliser at each end of the tailplane. The controllable wing is pivoted above the enclosed cockpit, the whole aircraft being carried on four small-diameter wheels, two at each end of the fuselage. A pusher propeller is mounted right at the rear of the aircraft, behind the fin. J.W.R.T.

#### Amy Johnson Scholarship

The Society of British Aircraft Constructors have awarded the first Amy Johnson Scholarship to Dorothy L. Gwynne, of Coventry, the first girl in Great Britain to receive an engineering scholarship granted by an industry. Miss Gwynne is 18 years of age and a draughtswoman, and soon will begin a four to five year aeronautical engineering course in the technical training centre of the firm for whom she works.

It has been disclosed that a new U.S. height record for aircraft was set up on 30th April 1943, when a Lockheed P-38 "Lightning" flew to 44,940 ft.

During the war the British aircraft industry produced a total of 125,000 aircraft.



The new Curtiss SC-1 "Seahawk" is in service with the U.S. Navy. It can fly faster, higher and farther, and defend itself better, than any previous U.S. Navy scout aircraft. Photograph by courtesy of Curtiss-Wright Corporation, U.S.A.



# 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.*

## "WAVELL"

By R. H. KIERNAN (Harrap. 6/- net)

Here is a timely and appropriate addition to Mr. Kiernan's series of life stories of famous men. Viscount Wavell earned undying fame by his brilliant campaign in Northern Africa in 1940-41, and is widely known to-day as Viceroy of India. His victories against the Italians and his work on behalf of British India are however only two outstanding features of a successful career that has been full of adventure. The rest of his story we can read in Mr. Kiernan's excellent account, which leads us to an even higher appreciation of the character of this great soldier.

It is interesting to find that Viscount Wavell comes of a family that entered Great Britain with William the Conqueror, and has been prominent at many times throughout the 900 years since that event. One member distinguished himself greatly in the Napoleonic wars and afterwards played a part in the liberation of Latin America from Spanish rule. Another was a hero of the Indian Mutiny while still almost a boy, while a third explored Bechuanaland and penetrated to Medina and Mecca, then closed to all but Moslems. The future Field Marshal's father was a Major General and so it was only natural that the boy should become a soldier. When only 18 he was commissioned in the Black Watch and soon went to South Africa, then in the throes of the Boer War. From that time onward he was always to be found where there was fighting, notably on the North West Frontier, where he showed resource, skill and initiative, and gained valuable experience. He visited Russia on several occasions, learning the language and taking part in manoeuvres. Then came the first world war, in which he fought in France, returned to Russia on a military mission, and took up an important post on the staff of General Allenby during the brilliant campaign that crushed the Turks in Palestine and Syria.

The first world war gave Wavell an entirely new outlook and we see in Mr. Kiernan's story how he strove to pass on its lessons to the men he commanded and trained. He also wrote brilliant articles on the warfare of the future, with the result that he was recognised by the Germans as an outstanding leader who might well become a dominant personality if war broke out. This anticipation was fully realised when war did come. Wavell was then in command in the Middle East, controlling an area including Palestine, Egypt and the Sudan. His forces were small, and there was real anxiety when Italy came into the war, and large and well-equipped Italian armies began to threaten Egypt and the Sudan. Wavell smashed these attacks by bold but calculated offensives that completely bewildered the Italians and brought him spectacular victories. The story of this brilliant campaign is finely told by Mr. Kiernan, and its progress can be followed readily on the maps that he provides.

Next we see Wavell in India, organising new armies and preparing for the imminent Japanese onslaught. Again he had to begin his work with too few men and inadequate supplies, but the enemy was harassed and delayed when he did attack, and eventually

Wavell brought into the field, ready for action, the great forces he had been organising, with the result that the Japanese effort to invade India was checked and the successful Burma campaign was begun. By that time he had become Viceroy of India, and there for the present we leave him, a soldier with a deep and sympathetic knowledge of India and its problems.

The book includes seven half-tone illustrations and six maps.

## "HOW TO FORM A MODELMAKERS' CLUB"

(Modelcraft Ltd. 1/- net)

Modelmakers naturally form clubs, for they like to discuss their models and the way in which they are made, and to share the results of their experience. Modelcraft Ltd., the makers of kits for a wide range of models, have recognised this and have issued this booklet to guide those who set out to form such a club. It deals with the way in which a start should

be made and explains what may be called the business side of running a club, with many useful suggestions for the form of the programme and a host of minor details that contribute greatly to the success of a club if they are given proper attention.

The book can be obtained from Modelcraft Ltd., 77, Grosvenor Road,

London S.W.1, 1/2 post free.

## "MODEL RACE CARS"

By D. A. RUSSELL, M.I.Mech.E. and D. E. M. WRIGHT  
(Drysedale Press Ltd. 3/- net)

The building and running of model racing cars, driven at high speed by petrol-engines, has been developed mainly in America, and so far is relatively new to this country. In presenting "Model Race Cars" the authors have attempted to collect all the information now available on model cars now in operation and several of these are described and illustrated. The cars run at speeds up to 60 m.p.h.

The book makes no attempt to give the details necessary to enable the reader to build the models for himself. A series of large plans showing every part of the cars full size is available, however, and these can be obtained from the publishers of the book, the Drysdale Press Ltd., 82, Highgate West Hill, Highgate, London N.6, from whom the book can be obtained, price 3/5 post free.

## "HOME MODELS AND MODEL MAKING"

By J. B. LITTLE  
(Vawser and Wile. 2/- net)

The aim of the author of this booklet is to help model makers to tackle their hobby in the right way from the start. A start is made with the tools and the fittings of the home workshop, which may vary from the corner of a living room to a spare room or a garden shed. How to use the most important tools is fully explained, with drawings to make things clearer, from which we pass on to accounts of materials required by the model maker. Then we turn to actual models, the examples dealt with including a model theatre, a wayside station, and a signal box and accessories for model railways.

The book is published in paper covers at 2/- net, or cloth bound at 3/6 net.

Owing to difficulties due to the war, it is impossible to guarantee prompt delivery of books ordered as described above.

Every effort, however, will be made to ensure speedy despatch.



# Engineering Notes

## Gears for Giant Turbines

The great turbine engines installed in many modern ships run at speeds very much higher than those at which the propellers can function efficiently. It is therefore necessary to incorporate in the drive, between the turbine and the propeller shaft, speed reduction gearing, and in view of the very great power that has to be transmitted and the necessity of avoiding setting up dangerous vibrations, this has to be immensely strong and of a very high degree of accuracy.

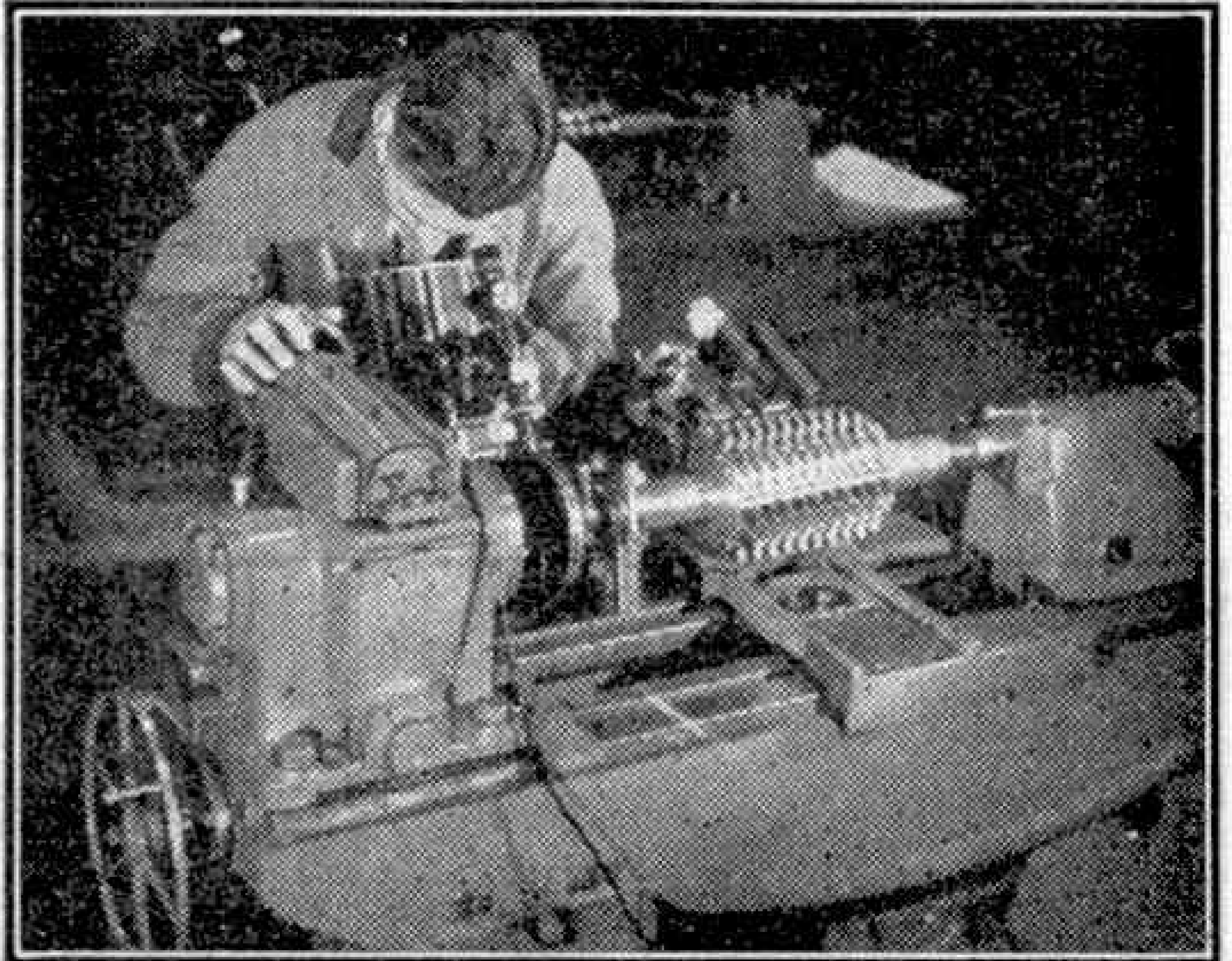
The form of gearing now generally employed for the purpose is the double helical type, which is machined or "generated" to the required degree of accuracy on hobbing machines specially designed for the purpose. One of these machines manufactured by David Brown and Sons (Huddersfield) Ltd., is shown in the lower illustration on this page actually at work on a large gear. This machine has two separate cutting heads, each equipped with a special cutter or hob by means of which the teeth are actually cut. The making of the hob involves a series of very delicate and highly skilled operations, and each hob after completion is subjected to rigid accuracy tests.

In the upper illustration, a hob is seen undergoing accuracy tests in a specially designed testing machine, which is another product of David Brown and Sons (Huddersfield) Ltd. This machine is equipped with optical devices that ensure the utmost precision in the finished job.

## A Disused London Bridge Goes to Holland

The seven spans of the temporary bridge that was built across the Thames at London to carry traffic

while the new Waterloo Bridge was under construction, will soon be carrying traffic across waterways in Holland. The seven spans have been purchased by the Netherlands Government, and the largest



Testing a profile ground hob of the type used for cutting double helical turbine gears. The machine used for the tests is a special product of David Brown and Sons (Huddersfield) Ltd.

one, which is 280 ft. long, is being sent to Dordrecht. One span of 150 ft. will be erected at Moerdijk, while other sections will be used at Lingebrug, Daventer, and Zwolle.

## A 48 in. Lens for Aerial Photography

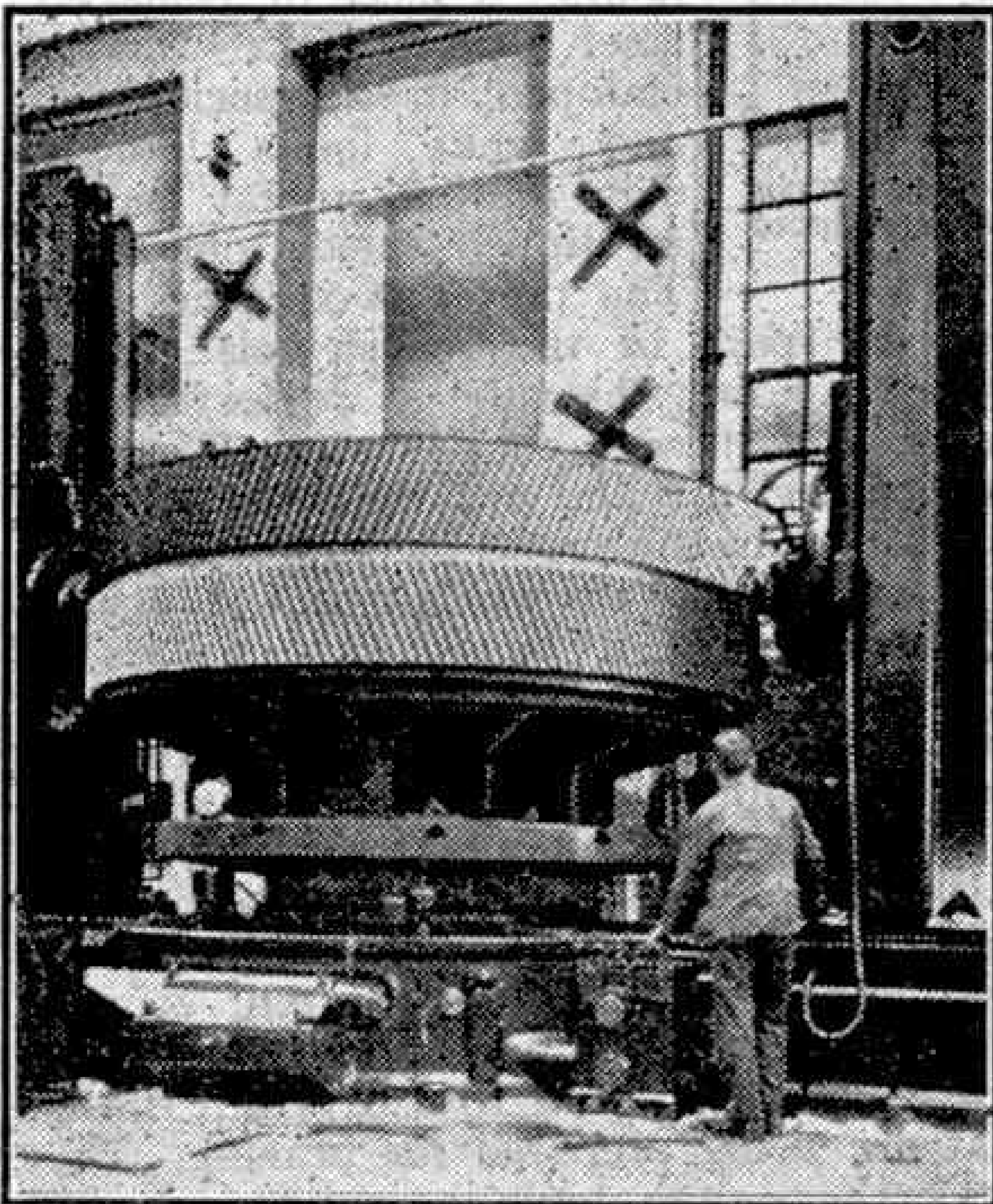
Mapping of the countryside by means of aerial photographs may be greatly facilitated by a giant new camera lens, fitted with a built-in heating system, that has been developed in the United States. The lens is 48 in. in diameter, and the heating system is to prevent the lens being thrown out of focus through shrinkage of its metal mounting when it is in action at very high altitudes. The lens will produce pictures measuring about 9 in. by 18 in., and by overlapping successive "shots" a map covering a large area can be built up.

The photographs will be taken at a height of about eight miles, and it is expected that they will show details of the countryside more clearly than any aerial pictures have been able to do up to now when taken at a similar height.

## A New Life-boat Fleet

Early in the war the building of motor life-boats almost ceased, because of the demands on the shipyards made by the fighting services. During the five years and eight months of war, 17 new life-boats were sent to the coast, whereas in normal years the number would have been between 60 and 70. At the same time the Royal National Life-Boat Institution lost several boats by enemy action and requisitioning by the Government. As soon as ship-building facilities permit, therefore, the Institution intend to build 29 boats as a first step towards making up for the losses and delays of war.

Important changes are to be made also in the constitution of the Fleet. All one-engine single-screw boats will be replaced by two-engine twin-screw boats, and to eliminate fire risks petrol engines will be replaced by oil engines. To carry out these improvements another 50 life-boats will be built in due course.



Cutting a double helical gear on a double head hobbing machine. The illustrations on this page are reproduced by courtesy of David Brown and Sons (Huddersfield) Ltd.



HOW THINGS ARE MADE:

# B.S.A. Bicycles

TO see how bicycles are made it is best to follow one bicycle through every operation from the raw material to the time when it is finally inspected. To describe every one of these operations in detail is out of the question—there are more than 60 in frame building alone—but a good general idea of production can be given, covering the essentials while leaving out operations of minor interest.

What is the very beginning of a B.S.A. bicycle? Few would guess the right

similar operations. In this case the tube is first made oval, and after each end has been flattened, holes are pierced for bolting it to the chain stays and seat tube. The bridge joining a pair of seat stays is welded in position, and the seat and chain stays are then bolted together in sets.

Passing to another section of the frame shop we see the frame itself coming along. Every one of the many operations on it is carried out on a special jig, which prevents the smallest possible error in

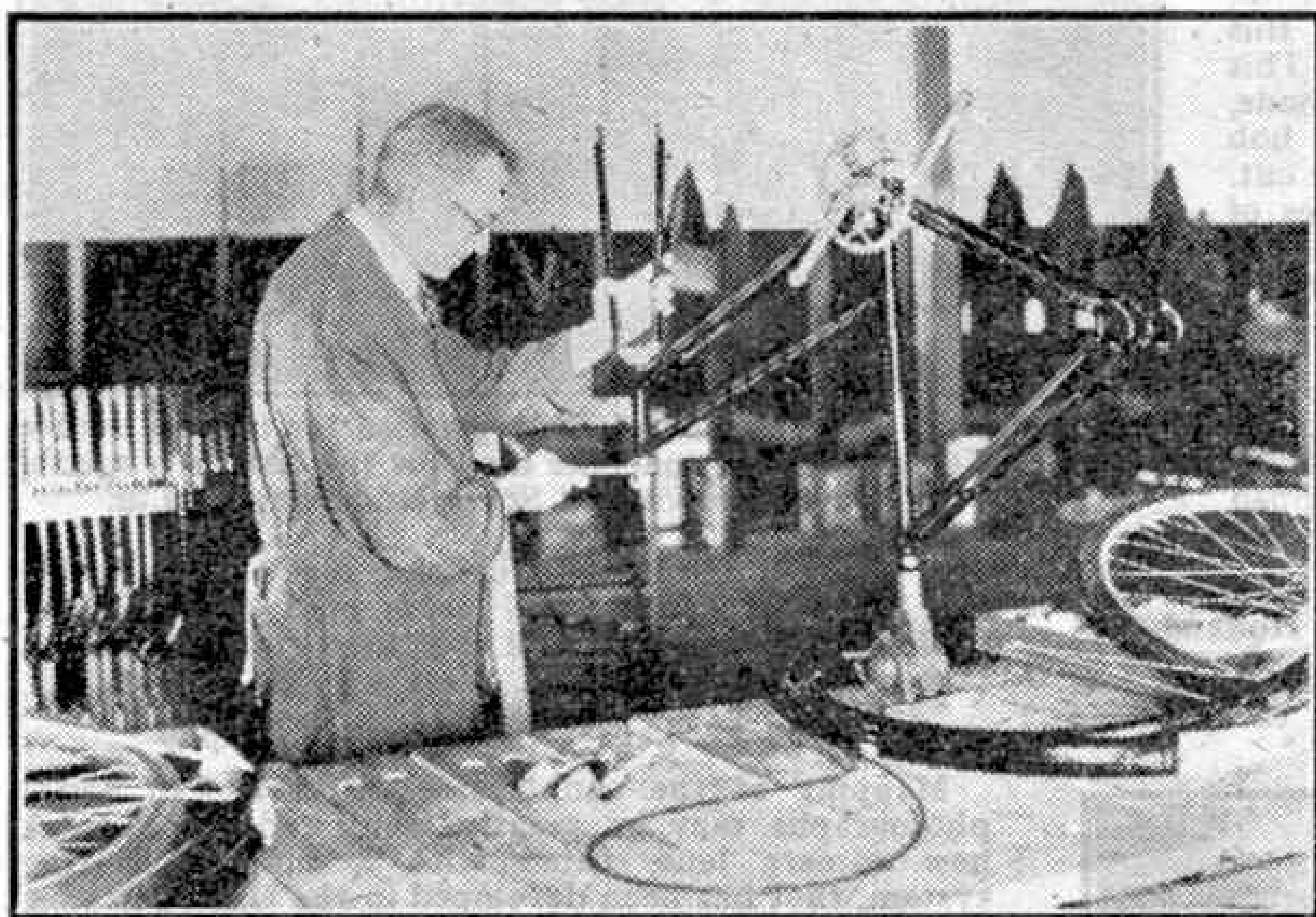
size or shape. First the bottom bracket and bottom head lug are pressed on to each end of the down tube. Then the seat lug and top lug are pressed on to the seat tube and top tube, and the two halves of the "diamond" are fitted together, drilled and pegged.

Here we must leave the frame a few minutes to see handlebars being made in the varied shapes required for different models, a fascinating process that one could stand and watch for hours. A piece of T-shaped steel tubing is firmly clamped in a special jig, and what looks like a close-jointed metal snake is slipped inside one end.

The power is switched on,

and one part of the jig swivels gently round, bending the tube as perfectly and easily as if it were copper wire. There is no heating up and no apparent effort. The secret is the metal snake, or internal mandrel, which travels along the inside of the tube as it bends and ensures a perfect circular section all the way. Each half of the handlebars is bent separately, but so simple and rapid is the process that an experienced operator turns up to half a dozen sets of handlebars, with as many as four bends in some cases, in the few minutes we stand and watch.

Before returning to our frame we may pause at an endless row of front forks that are being prepared for brazing. The forks themselves have been shaped and pierced in a similar manner to the seat and chain stays we have already seen



Assembling B.S.A. bicycles on the moving assembly track, which travels at the rate of 6 ft. per min. The illustrations to this article are reproduced by courtesy of B.S.A. Cycles Ltd.

answer. It is the chain stays, and on entering the frame shop we see these being tapered to shape in a machine consisting of a series of rollers and hammers working at high speed. Although the actual operation takes less than five seconds, the tubing becomes very hot in the process.

Then passing along a series of 40-ton presses, the chain stays begin to take shape. Those for roadster bicycles are flattened at each end, in two operations, and a slit is cut to take the hub liner, which is placed in position and pressed home. The notch to fit the steel spindle is then cut, and finally the liner is spot-welded. All this takes but a minute or two, after which the completed chain stay is carefully examined.

Meanwhile seat stays are going through





Removing a bicycle frame from the brazing hearth.

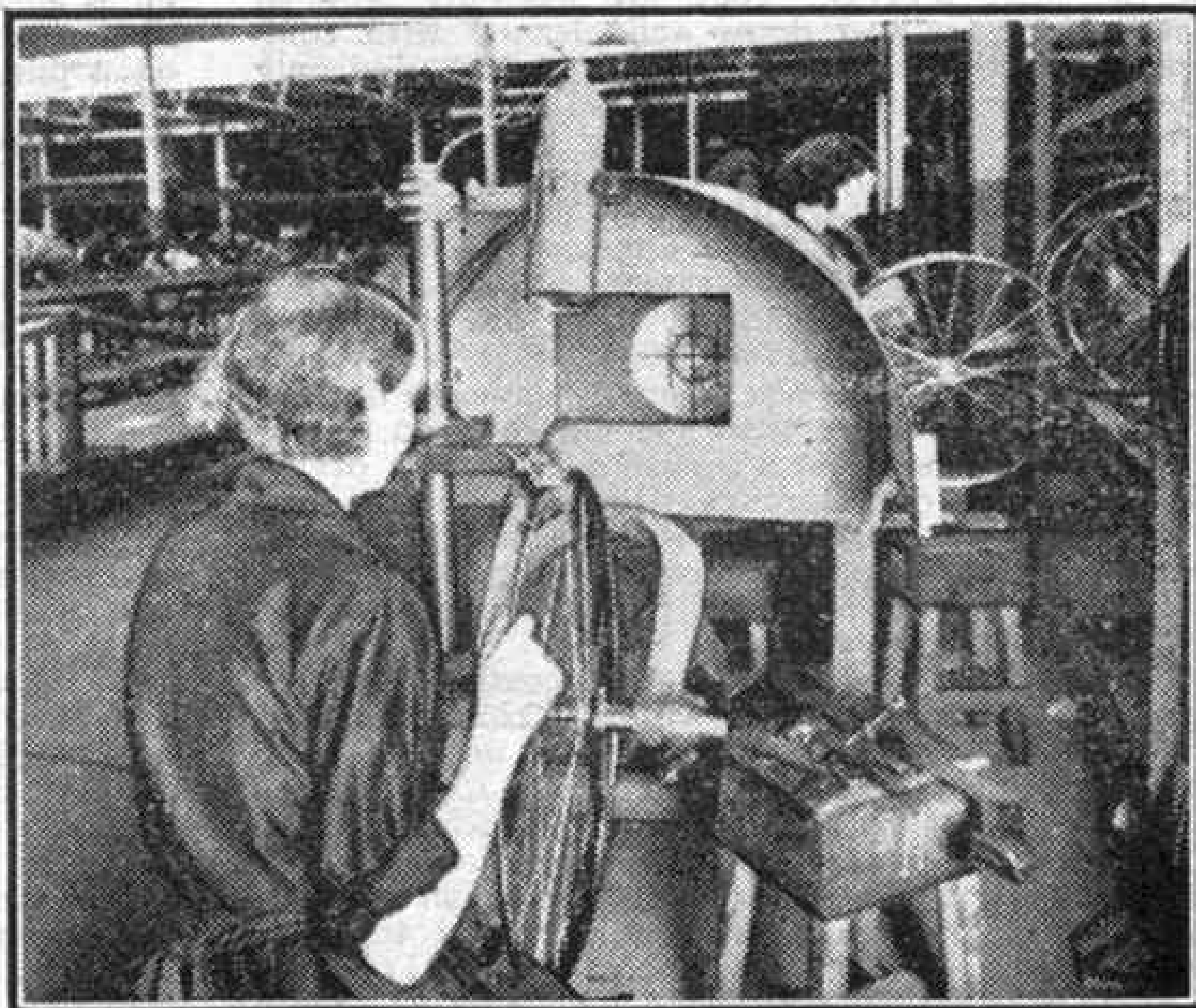
being made. Inside each is placed a plug of brass and flux before it is pressed on to the fork crown. In the brazing hearth, at a later stage of operations, the brass fuses and flows into the fork crown to form a solid compact whole. The flux keeps the steel clean and helps the brass to make a good sound joint.

In the meantime our particular frame has moved on to have the bridges across the sets of seat and chain stays brazed. This is done on an open framework jig that can be swivelled upside down to simplify the task of working on each side. The frame passes into the warm orange glow surrounding the oil-fired liquid brazing hearths, and for a few minutes it is placed on a heater alongside the hearth to warm up, so that the shock of being dipped into the mixture of molten copper and brass at a temperature of approximately 900 deg. F. is not too great. When it is warm enough the bottom bracket is first dipped. As it is carefully lifted out of its bath, glowing bright red, we can see molten brass flowing into every corner of the bracket, and after a few seconds to cool down this looks like a bottom bracket of solid gold. The frame tubes are trued up on a jig to correct any distortion caused by heating, and then the head lug is dipped in the brazing hearth, to be followed in due course by the seat lug.

Next our frame is inspected, and after passing scrutiny, it goes on to an overhead conveyor, to travel steadily along in its turn to the de-brassing vats at the other end of the shop, where there is a battery of large tanks containing a solution of sodium nitrate and nitric acid, through which an electric current can be passed. Our frame goes into the tank for about 20 minutes, just long enough to remove all exterior brass without seeping into the actual joints. Then it is lifted out, well swilled with water, held a few seconds to drain, and hooked on to the overhead conveyor on its way to the shot-blasting booths for the second stage in its clean-up.

Peering through small glass panels into a lighted inferno of flying particles, the operators direct jets of shot over every inch of the frame to give a smooth velvety finish to its tubes and brackets. Polishing follows, and there is a bright shower of sparks as the frame is turned quickly at every angle against the spinning polishing wheels, which make it gleam a brilliant silver.

Minor operations complete the building of the frame. The interiors of the head and seat tubes are reamed to remove "flash" left in brazing, the notch in the top of the seat tube is cut, and the head tube is cupped to form the ball races

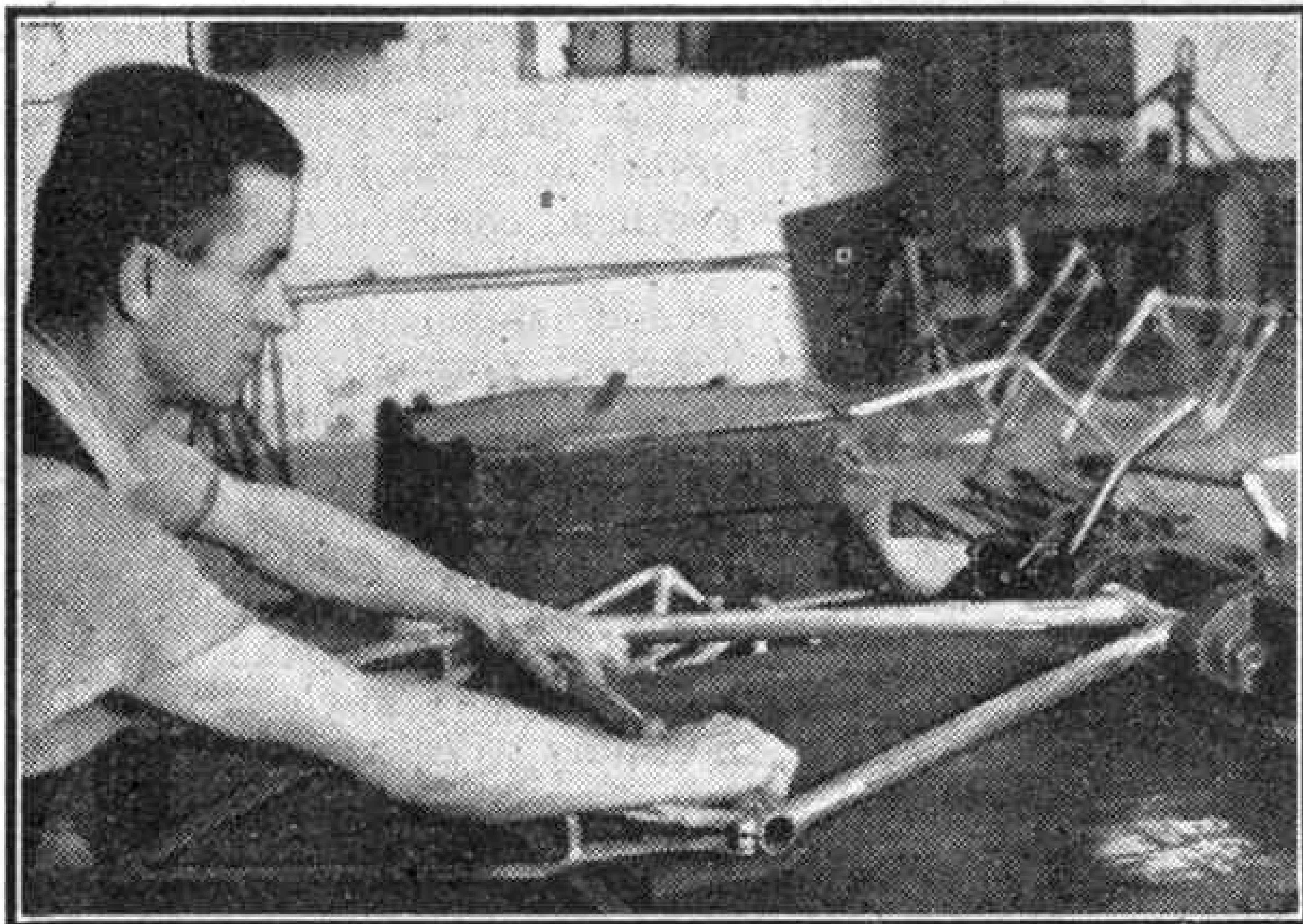


Truing bicycle wheels by means of a beam of light, as described in this article.



when the head fittings are assembled. Then the brightly shining finished frames pass along the conveyor line to the testing, viewing and final inspection departments, where each is checked minutely for size, alignment and general accuracy. The limits of tolerance allowed are very small, but in deciding on these limits B.S.A. engineers are looking five years ahead, to the time when a frame that is not absolutely true to begin with may be responsible for other defects in a machine.

After passing its final inspection our frame is given no time to rest on its laurels. It next undergoes the Coslettising process to which all B.S.A. frames are subjected before enamelling. This is a patent rust-preventing process in which the frames are immersed in tanks containing a special chemical compound at a temperature of 205 to 208 deg. F. A similar process is used for rolled metal such as mudguards and name plates. After this treatment



A bicycle frame undergoing inspection.

forks and mudguards are never touched by hand, for the slightest trace of moisture might in time cause a blemish in the enamel that they are given in the next process. They are carefully handled with gloves, rubbed down and cleaned with compressed air to remove every trace of dust, and only then are they sent on by overhead conveyor to the temperature-controlled Enamelling Shop, where we see frames being dipped one by one into a tank of gleaming black enamel. Then they dangle in batches, as they disappear into the oppressive heat of the long drying tunnel at the rate of a foot a minute. Alongside, in sharp contrast, there are rear mudguards already enamelled black that are being partially dipped into white enamel to give the familiar patch. These too are suspended in rows on a conveyor that carries them through a second drying tunnel, the journey through which occupies 1½ hrs. The first 15 min. of this trip is for draining purposes, and at a later stage they pass through a section at a temperature of 250 deg. F., or in the case of the frames 445 deg. F.

Frames and forks receive three coats of enamel; the first is known as the "rubber" coat, and it is followed by two coats of high gloss finish enamel. Mudguards take a heavier enamel, and for them one coat of finish on top of the "rubber" coat is sufficient. Then they are cleaned and taken to the lining and transfer section, where girls working at an amazing speed twist the frames first one way and then another, drawing the lines by hand with the aid of small containers from which the colour emerges on a tiny wheel. After lining, the parts are stoved before transfers are affixed and varnished.

In our tour we have had little opportunity of watching the production of small parts, such as the original B.S.A. chain wheel, hubs, brake parts and so on, which all the while pass in a steady stream from one machine to another and on to final inspection. Much of this work is repetition, and is carried out chiefly by girls, who work speedily and without obvious effort. We may pay a visit to the chromium plating plant, however. Here we see handlebars, rims and the many brake parts down to nuts and other small items receiving their undercoat of nickel, followed by the whiter finish of chromium. The very small parts are lowered into the plating vats wired together on screens. Others are placed in neat rows on magnetic arms that slowly make one revolution of the vat in the exact time it takes to give them the heavy deposit of plating specified.

Now comes assembly, the first stage in which is wheel building, carried out by highly trained girls working in the soft but brilliant glow of fluorescent lighting. Picking up a complete hub in the left hand and a bunch of spokes in the right, a girl will thread a set of spokes through the flange in a few seconds. Then, supporting a rim on the bench, she rapidly picks out the spokes in correct sequence and screws up the spoke nipple. After working round the rim with both the inside and outside sets of spokes, she passes the wheel to a second operator who tightens up the nipples.

Next the wheel passes to a section where the light is dimmed. The reason for this is that the smallest inaccuracies in the wheel are magnified many times by a thin pencil of light thrown on to a screen by means of a tiny mirror carried on a bogie that runs on the rim as it is revolved. The screen, shaded beneath a hood, is marked with the limits of error allowed, somewhat like a dart board, and as the light spot hovers from side to side the spokes are tightened or loosened

to bring it back to the centre, and so to make sure that the wheel is trued. After this, tubes and tyres are placed on the rims and inflated with compressed air at amazing speed, only 50 sec. intervening between mounting the untyred wheel on a jig and placing it on a pile of tyred wheels, ready to be run down a chute to the point on the assembly line where the wheels are fitted in assembling the bicycles.

Our first impression of the assembly line itself is that of a very long bench with youths standing a yard or two apart along one side. On looking more closely we see that the surface of the bench is moving, at approximately 6 ft. a minute, carrying the bicycles along as they are assembled, while the workers remain in position alongside wheeled bins containing the components that they add at the various stages.

On the assembly line the frames are first mounted upside down by placing the seat tube over an adjustable spigot on the conveyor. The bottom bracket is assembled first, followed by chain wheel and crank. The next operator introduces the rear brake fittings, after which the spigot is raised from a horizontal to a vertical position and the front fork and head fittings are screwed home. Front and rear mudguards come next, followed by the front brake fittings, the wheels and the chain. At this stage the machines are lifted from the conveyor, one following another every two minutes, and passed to the finishing section, where brakes are adjusted and chain-guards, gear cases and saddles fitted. The pedals are tied to the frame for convenience in transport.

From this point the bicycles travel by overhead conveyor, while final

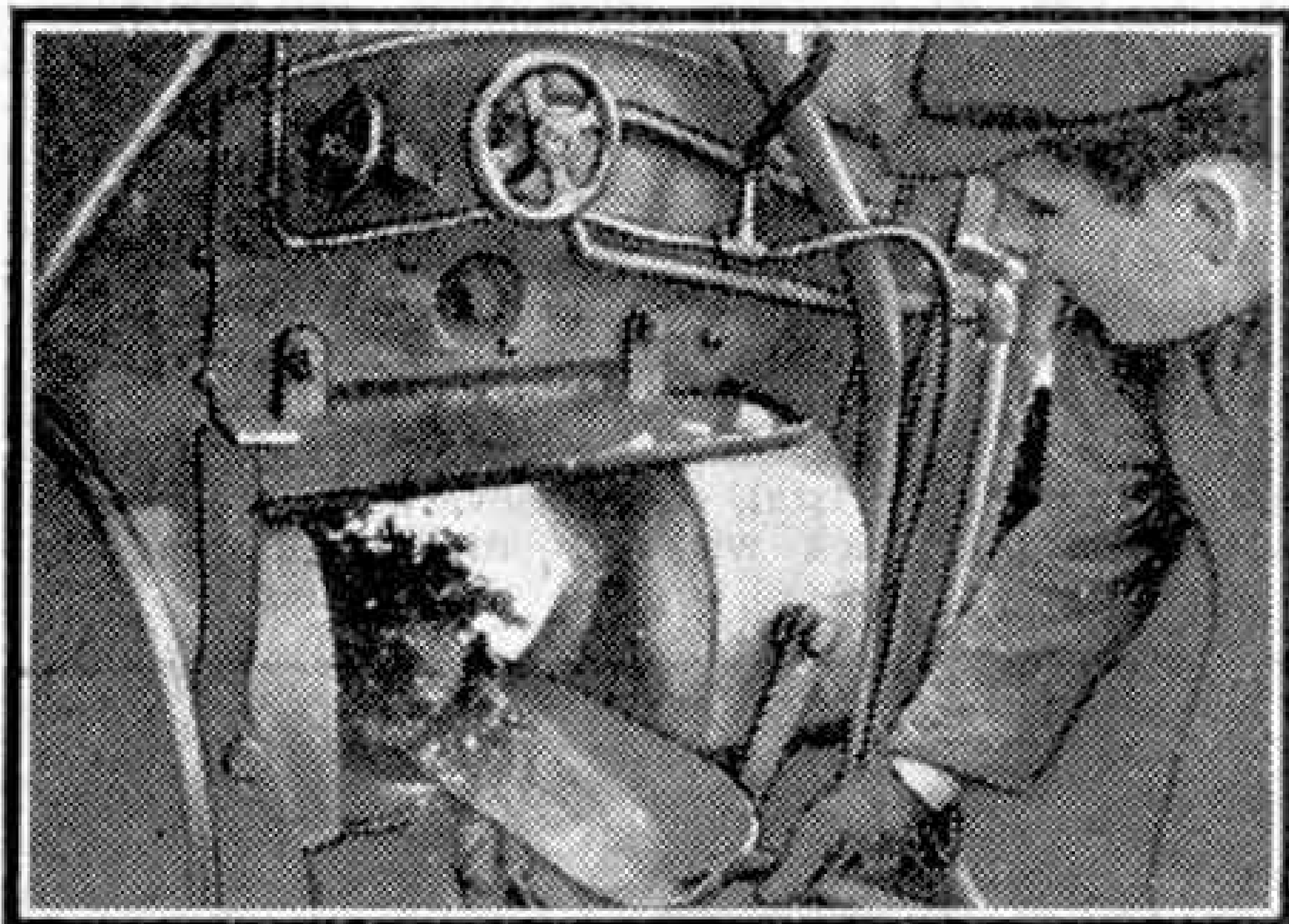
(Continued on page 358)



# Firing for Boys

By "Shed Superintendent"

OWING to the "Call-up" and the increased rail traffic during the war, thousands of boys under 18 years of age have found themselves firing on the



Firing to the back of the firebox. Placing a shovel of coal just inside the firebox door.

footplate after only a few months of railway service. Here are some details of the methods adopted to train them.

First of all, selected drivers were appointed as Firing Inspectors or Instructors, and each was made responsible for looking after all the juniors in a given area. Any boy who is not sure of his capabilities can ask for an Instructor to ride with him, especially if the trip is a hard one, though normally the shunting engines and branch trains have been fired by the younger men, leaving the main line work to the more experienced. Even the lighter jobs can be difficult enough, however, because the railways have had to use coke and low-grade coal on much of their work.

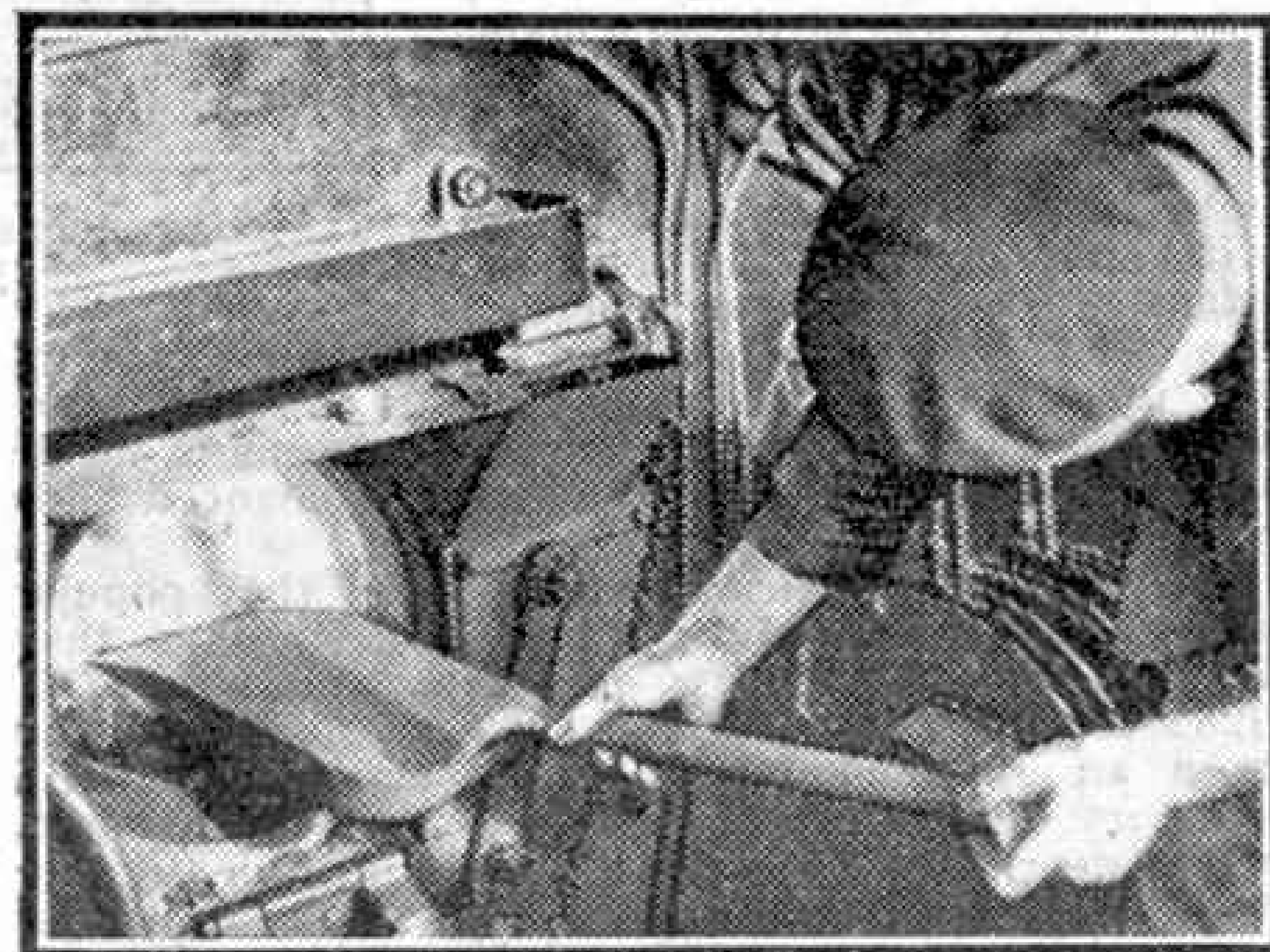
Books and pamphlets have been issued to the boys. In the words of one of these, "The art of firing is to regulate the fire and height of water in the boiler at all times according to the work to be performed, and to have full boiler pressure when required, without unnecessary blowing-off. This needs good judgment." And, it may be added, quite a lot of practice.

Each Instructor, therefore, rides on different engines day by day, and prides himself on his ability to "roll up his sleeves" and show how it should be done. "Sit down a minute, sonny," he will say to the struggler, "Let me have a go."

The commonest mistake, of course, is to fire too heavily, in the anxiety of the moment. Then you get, as the saying is, 100 lb. of smoke and no steam! "Put the shovel down," says the Instructor. "Let the fire burn through for a bit." Novices always have to be reminded that fresh coal must be heated to about 800 deg. F. before it starts to burn, and that proper combustion does not occur until the fuel reaches over 2,000 deg. F. This illustrates the difference between simply burning coal and firing to get the most heat from it.

The L.M.S. have developed a methodical system of firing known as "Controlled Firing." A number of shovelfuls of coal (varying from 4 to 7 according to the size of the engine) must be added to the fire every two minutes, that is to say, the firing is on a time basis and not a distance basis. If you think this out, you will see that this method provides steam in proportion to the work the engine is doing, whether uphill or downhill, which would not be the case if one fired every two miles.

Young firemen are taught that the driver is the "Skipper" on the footplate, and credit is also due to the drivers who have cared for their fledglings and turned them into capable mates. It is a real compli-



Firing to the front of the firebox. The coal has just shot off the shovel to the right front corner of the firebox. Note the grip of the hands.

ment when a driver says of a boy, "I'll take him anywhere." That is the day, when the one-time novice has fired perfectly and the train runs in on time! And what a feeling of pride he has, in doing a man's job, to keep the trains running!



# Railway Notes

## "Small Atlantics" Disappear from Traffic

The first "Atlantic" introduced in this country by Mr. H. A. Ivatt for the former Great Northern Railway in 1898 caused a considerable stir. The designer wished to test the steaming capacity of the long boiler that the additional trailing or carrying wheels permitted, in order to cope with the increasing weight of corridor trains and heavier bogie stock then in course of production. Expresses at the time were often hauled by two of Patrick Stirling's "Singles," which were becoming outclassed by the loads. No. 990, later named "*Henry Oakley*" after a famous G.N.R. General Manager, was the sole 4-4-2 on the line for nearly two years; meanwhile she was being well tested and 4-4-0 locomotives were under construction for passenger work. It was not long before No. 990 demonstrated her ability to haul expresses weighing about 300 tons tare at current "*Scotsman*" speeds.

The boiler was 4 ft. 8 in. in diameter and 14 ft. 8½ in. long, pressed to 175 lb. per sq. in. and providing a heating surface of 1,302 sq. ft. by means of 191 tubes of 2 in. diameter; an ordinary narrow grate added a fire-box heating surface of 137 sq. ft. The "990" class, which expanded to 22 engines, was a stepping stone to the much bigger-boilered and more outstanding "large Atlantic" design of 1902, which developed into a famous class of 93 locomotives. Nevertheless as built the small 4-4-2s perhaps presented a more reasonable ratio between heating surface and cylinder diameter than their later and bigger sisters. For many years, particularly between 1905 and 1916, the two "Atlantic" types shared principal express haulage almost indiscriminately, especially on the easier grades between Grantham and York, where there was little to choose between their good performances, though that was before the days of general high-degree superheat, with piston valves in conjunction with larger cylinders on the large engines. The outside cylinders of the "990" series were rather small. They were of 18½ in. diameter, with a stroke of 24 in., and drove the second pair of driving wheels by means of inside link motion or valve gear actuating balanced slide valves.

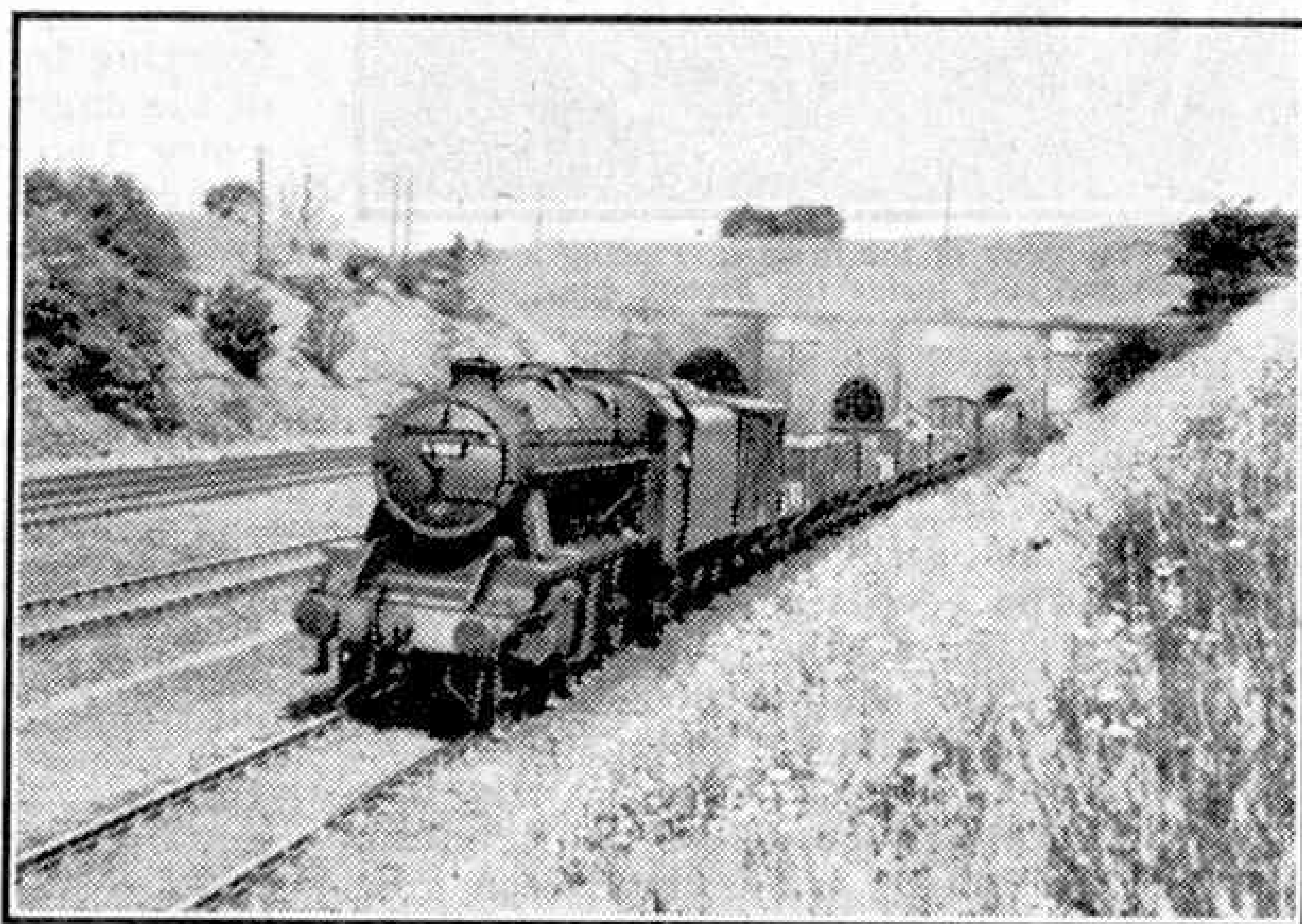
The small "Atlantics" were known by their popular nickname of "*Klondyke*"; in L.N.E.R. days they became the "C2" class, carrying numbers 3250, 3252-60, 3271, 3949-50 and 3982-90. No. 3271 had been an experimental 4-cylinder simple, first with ordinary link motion and later with Walschaerts valve gear, but from 1911 was unique in another way. She was rebuilt with a superheated boiler, as successfully tried from 1909 on the engine numbered 988 in G.N.R. days, and also with two new inside cylinders only, of 18½ in. diameter, though with the longer stroke of 26 inches. The original four cylinders had each had a bore and stroke of 15 in. by 20 in. respectively. In this new form the engine performed excellently and was of handsome appearance. Gradually the small "Atlantics" were fitted with extended smoke-boxes and new boilers with altered heating surface, providing large flue tubes, and 18-element superheaters. Boiler pressure was standardised at 170 lb. per sq. in., the original cylinders

and valves being usually retained.

During recent years they have been employed on secondary main line and country work in the Midlands, largely on the G.N. section though partly on the G.C., but withdrawals have been thinning the ranks and it is now our melancholy duty to record that the last "C2" in traffic, No. 3252, is being scrapped. As G.N.R. No. 252, this particular "*Klondyke*" over 30 years ago used to take turns at King's Cross shed on the Leeds or Doncaster and back in a day express turns. The former included a non-stop run of 175½ miles in 186 min. with five cars from Wakefield to King's Cross. This engine seemed to be the best of the London batch, being in later years well known as a fast runner at Cambridge. The pioneer of the class painted in her original style as G.N.R. No. 990, though with a superheater boiler, is preserved in the L.N.E.R. Museum at York.

## Southern Notes (Eastern Section)

Mr. R. A. H. Weight writes: During three hours' most interesting observation of S.R. locomotives and traffic at and through Tonbridge on 13th August, No. 21C 2 "*Union Castle*" passed each way on a special boat train trial, one of several, from Victoria to Dover and back with 10 empty Pullmans and



L.M.S. up goods train leaving Northchurch Tunnel, headed by "8F" 2-8-0 No. 8109. Photograph by H. C. Casserley.

two corridor brake coaches. The first and third class Pullman cars were in normal colours, so that apart from the very modern locomotive the appearance was reminiscent of the early days of the "*Golden Arrow*." It is understood that the best peacetime schedules for Continental expresses hauled by "Lord Nelsons" were considerably improved.

An officials' special from up main to Redhill line, hauled by "D1" 4-4-0 No. 1497, consisted of a handsome 12-wheeled saloon, Pullman "*Rosemary*," in chocolate colour, and an S.R. corridor.

On up B.L.A. leave trains bound for the L.M.S. system, and formed of that company's stock, were "U1" 3-cyl. 2-6-0 No. 1901, going through to Willesden, and "King Arthurs" Nos. 783 and 781, both grubby, which would come off at Factory Junction, near Battersea, in exchange for some lesser S.R. locomotive to work respectively to Willesden or Dudding Hill, Midland, in the latter case via Clapham Junction. The heaviest load was 13 vestibuled coaches including an improvised "N.A.A.F.I. canteen" buffet car. On a Folkestone-Victoria B.L.A. special of S.R. stock including kitchen car was "Schools" 4-4-0 No. 924 "*Haileybury*," the first of the four "V" class lately transferred from





S.R. "M.N." Class No. 21C 12 "United States Line" approaching Christchurch on an up Waterloo express. Photograph by G. O. Pearce.

Bournemouth, etc. to the Eastern Section for boat train traffic.

Maunsell "Q" class 0-6-0 No. 535 was on a Redhill-Paddock Wood freight. Goods and fruit traffic is considerable and before these lines are in print the very busy hop-picking season will have caused the old-stager South Eastern and Chatham 4-4-0s to be in even greater demand, as there is a decided shortage of really powerful passenger engines at present. Double-heading has to be resorted to at times with the heavier trains over parts of the steeply graded Kent and Hastings routes, so recently in the "front line," but now carrying thousands of holiday makers. Relief fasts formed of old rolling stock hauled by Wainwright locomotives, "E," "E1" rebuild and so on, savour of the 1920's, but it's all most interesting and 46 locomotives of 17 different classes were noted.

#### L.M.S. Locomotive News

New construction continues of class "5" 6 ft. mixed traffic 4-6-0s, class "4" lighter weight 2-6-4Ts numbered 2686, etc., 0-6-0 diesel shunters and class "8F" 2-8-0s, in the latter case at L.N.E.R. and G.W.R. Works as well as at Horwich.

Withdrawals include: "2P" ex-Lancashire and Yorkshire 2-4-2Ts Nos. 10677, 10724, 10742 and 10780; No. 12117 "3F" 0-6-0 of the same line's standard type familiar for over 40 years; former L.N.W. "Prince of Wales" 6 ft. 3 in. express 4-6-0s No. 25798 and 25805; No. 28552, another Webb "Cauliflower" 0-6-0 goods, of which there are still over 100 left; and No. 3115 of the typically Victorian Midland similar freight type. Further small inroads have also been made in the Crewe 0-8-4 and 0-6-2 tank classes by the scrapping of Nos. 7953 and 7824 respectively.

As No. 17905 has gone, there is now only one survivor of the ex-Caledonian "179" class of 5 ft. 9 in. 4-6-0 fast goods series that in recent times had superheater boilers with 170 lb. pressure.

#### Miscellaneous Items from the South

"West Country Pacifics" Nos. 21C 106-7 were running trials or about to do so at the end of August, construction of a further six being well in hand at Brighton. The steel fire-boxes are fitted with thermic syphons. Although the "12" class of 4-4-2T has been defunct as far as the capital list is concerned for some time, two exist

as W.D. locomotives. One of these, former L.B.S.C. No. 19, was lately in Brighton Works, as was the electric locomotive No. CC2 for completion.

All 20 "Merchant Navy" engines are out and are generally found on Western Division expresses. The Kent and East Sussex No. 3 of the former L.B.S.C. "Terrier" 0-6-0 tank type, was working the Robertsbridge-Tenterden train of that little line recently. She was at one time named "Bodiam" and numbered 670. K and E.S. No. 4, an old former London and South Western "saddleback" 0-6-0T, still exists, while power is also loaned by the Southern especially during hop-picking time.

"Merchant Navy" 21C 20 is painted green, like 21C 12 "United States Lines." The last eight of this class have been completed in approximately the first half of 1945. It is reported that all S.R. locomotives loaned to the other three main British companies have been returned.

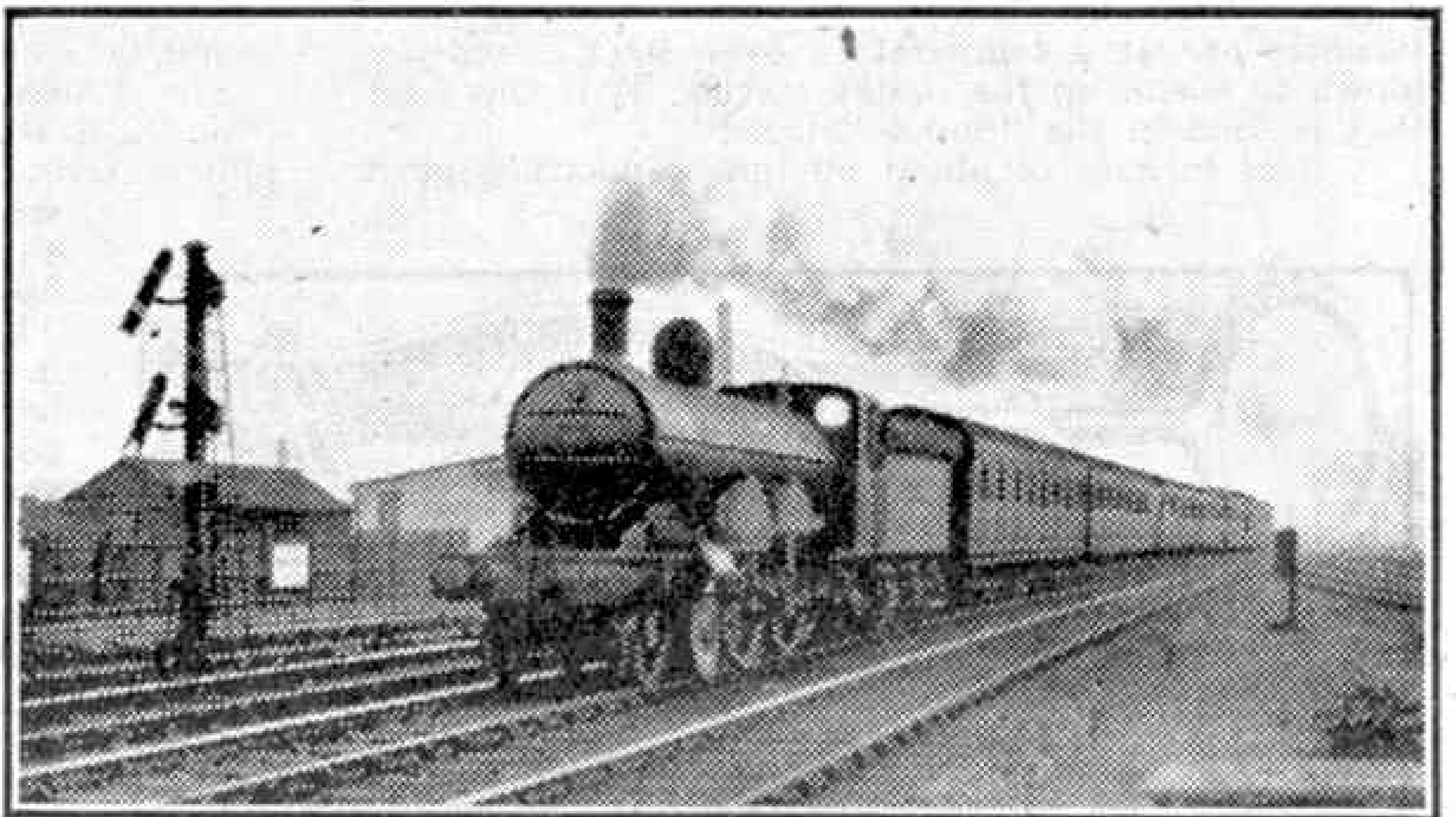
#### New 2-8-2s for India

Messrs. W. C. Bagnall Ltd., Stafford, have designed and built two powerful metre gauge 2-8-2 locomotives intended for heavy work on the Bombay, Baroda and Central India Railway, having driving wheels only 4 ft. in diameter but a large fire-box and superheater boiler. An 8-wheeled bogie tender is provided, also electric lighting as well as vacuum and steam brakes.

#### General Eisenhower's Armoured Sleeping Car

The Supreme Commander's conference and sleeping car used recently on Continental railways was converted from one of the latest L.N.E.R. cars. As built this had 10 berths, a shower bath, toilet and attendant's compartments, but as temporarily altered it has a conference room occupying the space of six sleeping berths, and a combined sleeping and dressing apartment provided with table, chairs and desk. A wireless aerial is fitted to the roof, and armourplated shutters or armourplated glass enclose the windows.

L.N.E.R. "A4" locomotive No. 4496 "Golden Shuttle" has been renamed "Dwight D. Eisenhower" and painted Garter blue with red wheels.



The last "C2" or "small Atlantic" in traffic on the L.N.E.R. Photograph by C. Stevens.



# Harnessing Waste Heat

## Steam Generation by Exhaust Gases

ENGINEERS are constantly engaged in a struggle to prevent waste, which if neglected may seriously reduce the efficiency of their creations. Over some causes of waste they have no control, but they are always searching for the sources of others, and devising ways and means to eliminate the loss of power or increased maintenance costs to which they give rise.

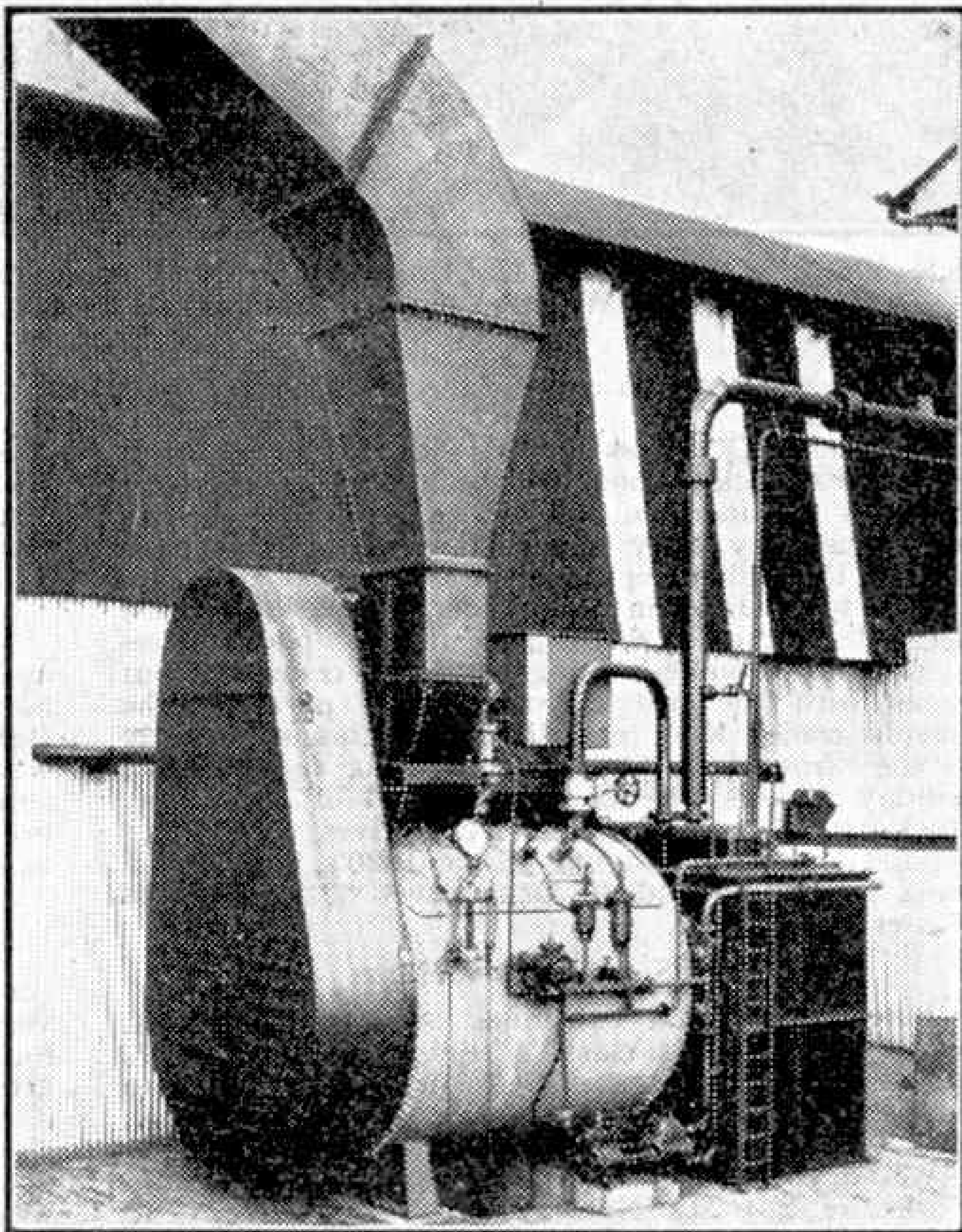
One important source of waste arises from the burning of fuel in furnaces. For example, in steam plants there is a heavy loss right at the beginning of the process of generating power, for a large part of the total heat produced by fuel consumed in the furnace passes away up the chimney in the form of hot gases. Heat losses of this kind are liable to occur wherever fuel of any kind is burned—in forges, smelting, and glass and pottery furnaces, gas-making retorts, and even in the domestic grate.

Engineers have worked hard to devise means of reducing this wastage, and nowadays in most industrial processes where large quantities of fuel are consumed, some kind of apparatus is installed between the main process plant and the smoke stack, to extract the surplus heat of the waste gases and turn it to some useful purpose before the gases pass on to the open air. For example, in an ordinary boiler plant the hot air and gases leaving the combustion chamber of the boiler are led around a nest of tubes housed in a steel casing, this arrangement being known as an economiser. Feed water on its way to the boiler drum is pumped through the tubes, and the hot gases circulating between the nests heat the water to a fairly high temperature before it enters the boiler. This arrangement has the two-fold advantage of preventing lowering of the temperature in the boiler by the entrance of cold water, and of reducing the amount of fuel required to convert the make-up water into steam.

In a blast furnace or a producer gas furnace the waste gases have a very high temperature, and they can be used to generate steam in a special type of boiler known as a waste heat boiler. There are many different forms of these boilers, and one type known as the Cochran "Sinuflo" boiler is illustrated on this page. It is specially intended for use in conjunction with melting furnaces in steel works. Normally the waste gases leaving such furnaces are at a temperature over 500°C., and are blown to waste up the smoke stacks. It is this heat that is used in the "Sinuflo" boiler.

A steel furnace of about 90 tons capacity, tipped

14 times a week, will produce about 1,260 tons of steel; and if a waste heat boiler is installed over 1,750,000 lb. of steam can be raised from the waste gases. If an ordinary coal-fired boiler were used to



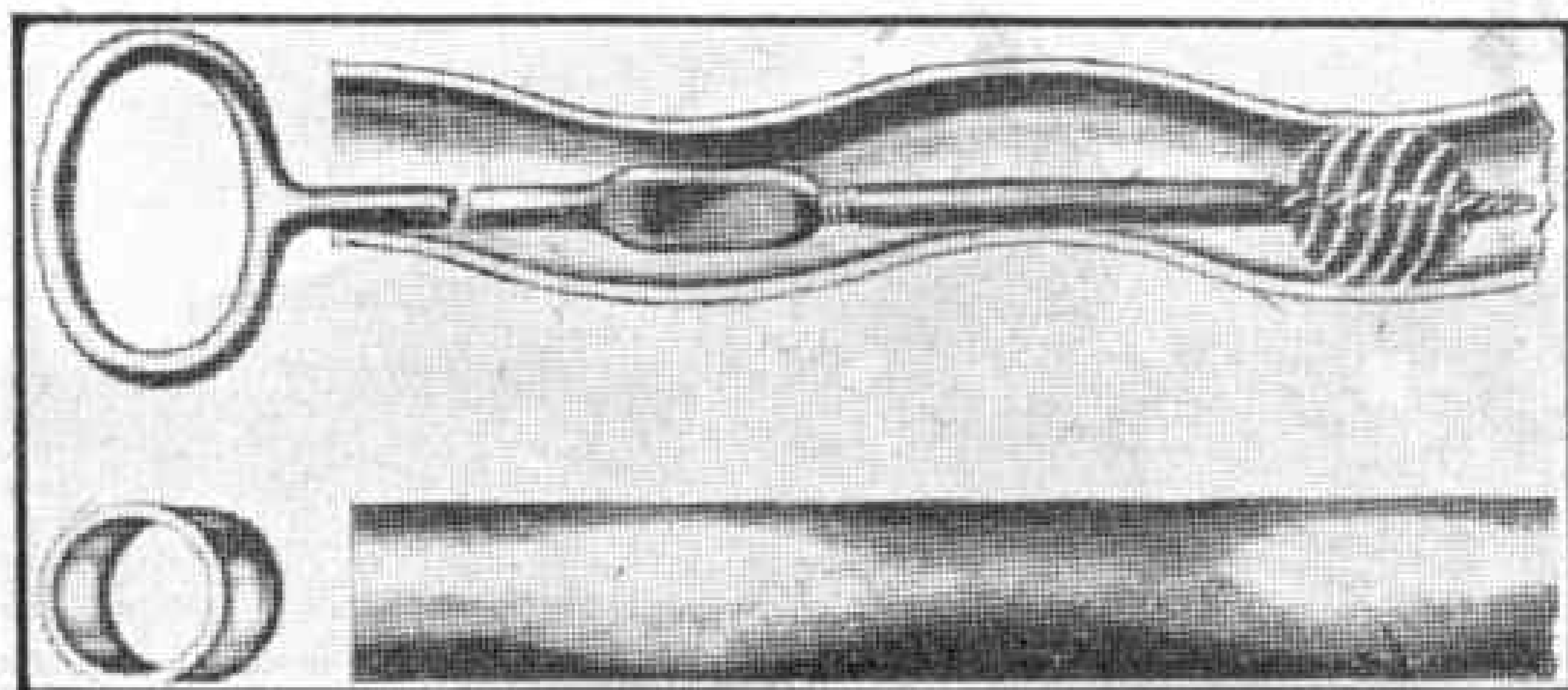
A 9 ft. dia. Cochran "Sinuflo" Waste Heat Boiler working in conjunction with soaking pits at a steelworks in South Wales. Our illustrations are reproduced by courtesy of Cochran and Co. Annan Ltd., Annan, Scotland.

raise this amount of steam about 100 tons of coal would be consumed.

The "Sinuflo" waste heat boiler consists of a cylindrical water drum constructed from mild steel plates, inside which is a nest of specially shaped steel tubes, fitted into end plates at each end of the boiler. The water circulates around the tubes inside the boiler shell. Through these tubes the hot gases are drawn into the outlet products chamber by a powerful fan placed at the end of the boiler opposite to that at which the gases enter the tubes. The fan usually is driven by an electric motor, but steam operation is possible. Leading from the top of the fan casing is a short steel chimney that discharges the spent gases to the atmosphere.

The hot gases coming from the furnaces enter the waste heat boiler through a steel inlet chamber lined with high grade fire-brick.

A unique feature of the "Sinuflo" boiler is the special shape of the tubes through



A sectional and an exterior plan view of a "Sinuflo" waved tube. The sectional view shows how a sweeping brush clears the waves.

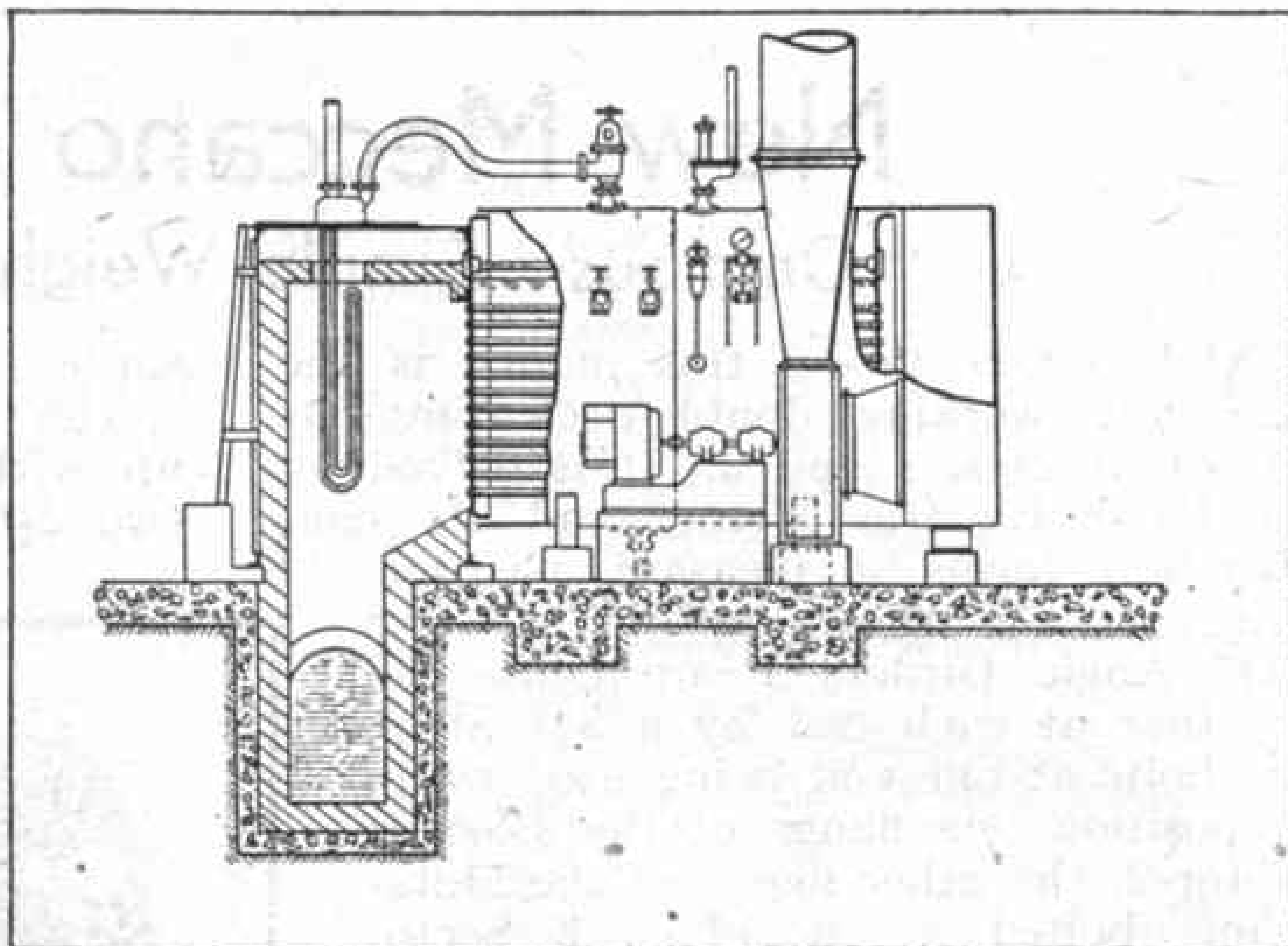


which the gases are drawn. A short length of one of these tubes is illustrated on page 344 and it will be seen that they are "waved," instead of parallel sided. This feature is claimed to give the tubes greater heat extraction properties than an ordinary straight tube, for on passing through the "Sinuflo" tube the hot gases impinge on the tube walls as they meet the series of waves in their path. This sets up turbulence in the gas and results in every part of it coming into contact with the heating surface of the tube. In a straight tube the gases merely flow along parallel to the tube walls, with the result that the central core of the gas passes right through without coming in contact with the tube and imparting its heat to the tube surface.

Although the "Sinuflo" tubes are "waved" they can be swept when necessary with an ordinary spherical wire brush, as shown in the illustration. The outlet products chamber, into which the gases pass after being drawn through the tubes, is fitted with hinged access doors each pierced with holes, which are placed opposite the end of a boiler tube so that the tubes can be swept while the boiler is in service. Normally the holes are closed by easily removable cast iron plugs.

The largest waste heat boiler of this type at present in use in this country is over 13 ft. in diameter and 29 ft. 6 in. long. It generates about 20,000 lb. of steam an hour, at a pressure of 170 lb. per sq. in.

An interesting development of the original "Sinuflo" is the "Siamese Twin" type. Normally one waste heat boiler is connected to one furnace, but the "Siamese Twin" type is designed to take the waste



A diagrammatic illustration of a "Sinuflo" Waste Heat Boiler. The inlet chamber is at the left-hand end.

gases from two furnaces. It has an inlet chamber divided into two compartments by a brick wall, while the outlet chamber is divided by a steel diaphragm plate. These partitions steer the gases through two separate nests of tubes housed in a single boiler shell. Each tube nest is provided with its own draught fan. The latest boilers of this type to be installed are 12 ft. 6 in. in diameter and 15 ft. 8 in. long, which are designed to take the waste gases from two 65-ton steel furnaces. Each half of these boilers is rated to produce about 9,000 lb. of steam an hour, at a pressure of 200 lb. per sq. in.

## Model-Building Competition Results

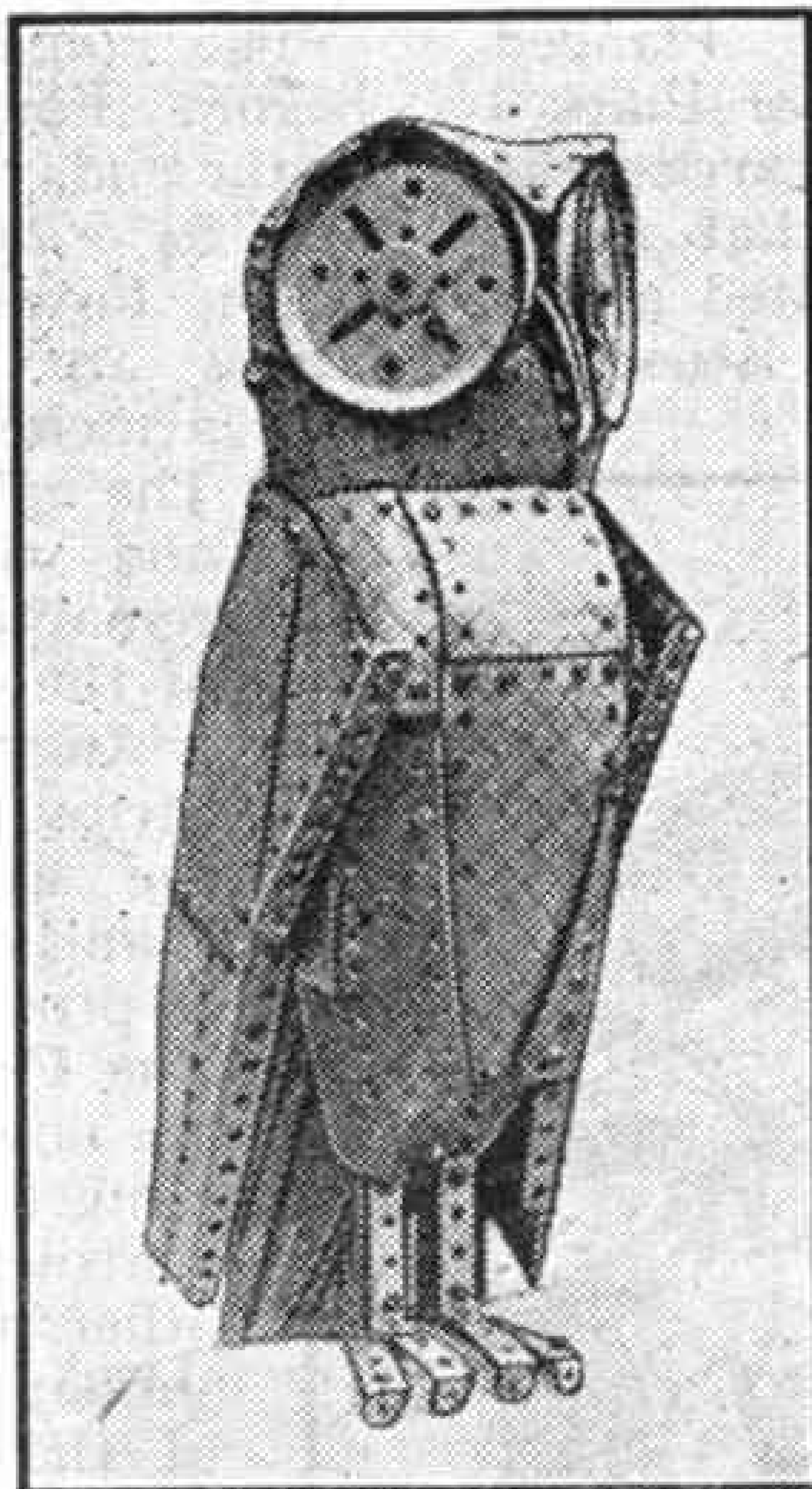
By "Spanner"

One of the most successful competitions organised recently was the "*Birds and Beasts*" Contest, details of which were announced in the July and August issues of the "*M.M.*" The prize-winners in the Home Section of this Contest are as follows:

1st Prize, Cheque for £2/2/-: P. W. E. Bridle, Chichester; 2nd, Cheque for £1/1/-: B. Douglas, Glasgow S2; 3rd, P.O. for 10/6: I. Mitchell, Eastbourne.

Consolation Prizes of 5/-: A. Hollick, Wimborne; M. G. Morris, Ynysddu, Mon.; M. Bleckwen, Feltham.

The contest was open to all readers of the "*M.M.*" and models had to represent an animal, bird, reptile or some other living thing, human beings alone being excluded. Many of the models submitted were most interesting, and considerable enterprise was shown by



A model barn owl, in which the expression peculiar to these birds has been successfully obtained. It was built by Paul W. E. Bridle, Chichester.

competitors in finding novel subjects. The model that was awarded First Prize represented a barn owl and is shown at the foot of this page. Another excellent effort was a model rabbit sent by Bruce Douglas, and an outline of a mastiff puppy won a Prize for Ian Mitchell. All of these owed their success to the skill displayed by their builders in selecting Meccano parts most suited to the reproduction of their chosen subjects. For example may be mentioned the use of 3" Pulley Wheels to represent the large eyes of the owl, which are most successful in giving the creature the expression peculiar to these birds.

Among the winners of the smaller prizes were several models of cats, elephants, and snakes.



# New Meccano Models

## Omnibus—Simple Weighing Machine

OUR larger model this month is the fine working double-deck omnibus shown in Figs. 1 and 2. It is driven by an E120 Electric Motor, and its construction forms a pleasant pastime. The chassis is shown in Fig. 2. Two  $12\frac{1}{2}$ " Angle Girders 1 are connected together at each end by a  $5\frac{1}{2}$ " Strip, the bolts at one end being used to fix in position one flange of the Electric Motor 2, the other flange of the Motor being bolted to a Flanged Sector Plate 3.

The mechanism that transmits the drive to the rear axle is now fitted. This is accomplished by first bolting a Reversed Angle Bracket 4 to the chassis, the bolt carrying three Washers on its shank for spacing purposes. The Bracket 4 forms a bearing for one end of the  $11\frac{1}{2}$ " Rod 5, which is journalled also in the Double Angle Strips and Double Bent Strip forming the sides of the dummy differential casing. Rod 5 carries a Worm 6 that meshes with a  $\frac{1}{2}$ " Pinion fastened on the  $5\frac{1}{2}$ " Rod used for the rear axle. The differential casing is prevented from moving endways by Collars.

The radiator is a  $2\frac{1}{2}$ " $\times$  $1\frac{1}{2}$ " Flanged Plate attached to Flanged Sector Plate 3 by an Angle Bracket, and it carries the second Flanged Sector Plate that forms the bonnet. A  $3\frac{1}{2}$ " Strip is bolted across the  $2\frac{1}{2}$ " $\times$  $1\frac{1}{2}$ " Flanged Plate and is used to

support the mudguards.

The near side of the bonnet is built up with a  $2\frac{1}{2}$ " $\times$  $2\frac{1}{2}$ " Flexible Plate and two  $2\frac{1}{2}$ " $\times$  $1\frac{1}{2}$ " Flexible Plates, one of the

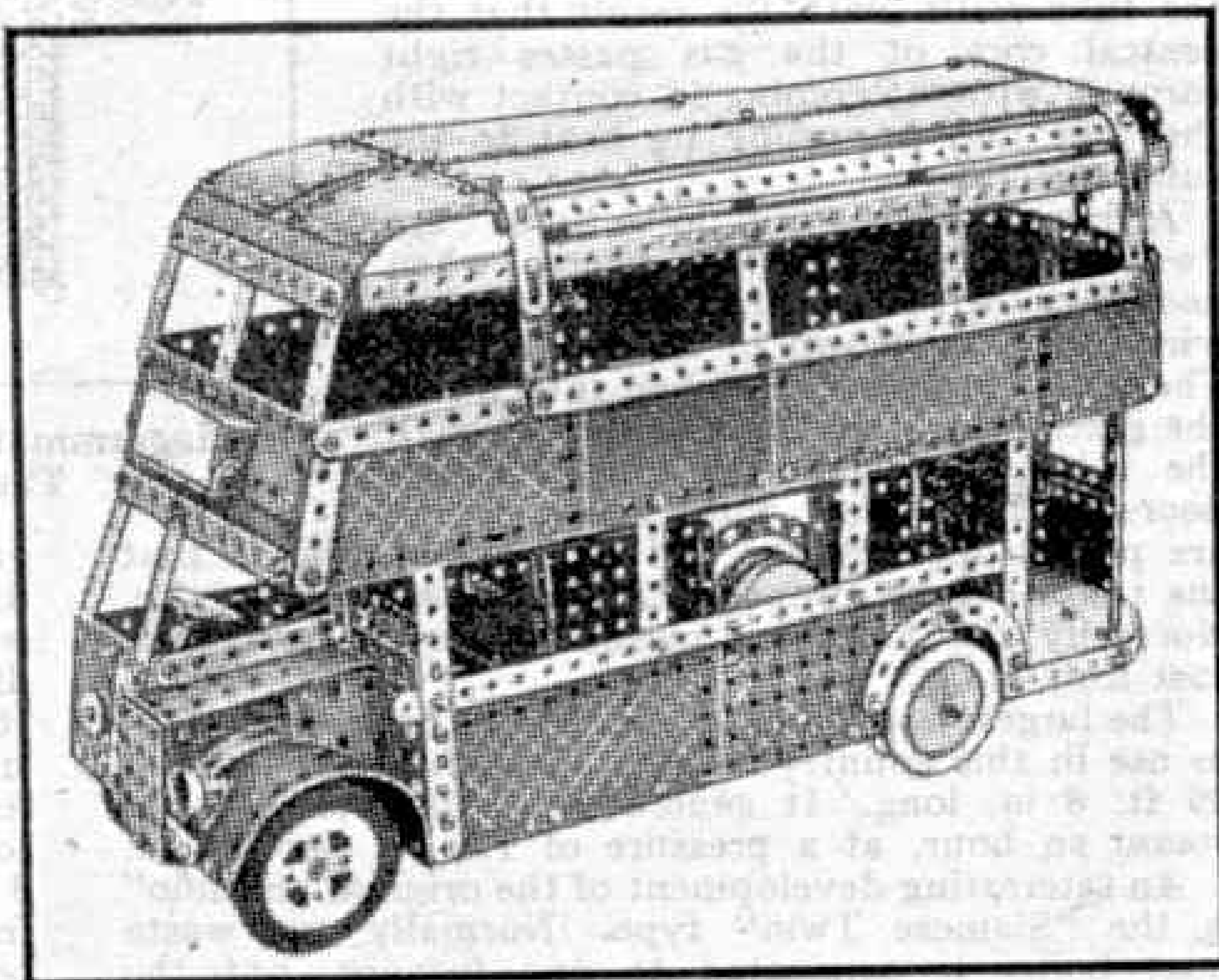


Fig. 1. General view of a fine model omnibus driven by an E120 Electric Motor.

latter being bolted to a Trunnion 7, shown in Fig. 2, while the other is curved as shown in Fig. 1. The off side of the bonnet is built up to form the driver's cab.

The construction of the body is now begun. Four Angle Brackets are bolted to the ends of the  $5\frac{1}{2}$ " Strips of the chassis, and  $5\frac{1}{2}$ " $\times$  $2\frac{1}{2}$ " Flexible Plates are bolted to the forward pair. To these Plates  $5\frac{1}{2}$ " Strips are bolted, which in turn are attached to the horizontal  $12\frac{1}{2}$ " Strips. The  $5\frac{1}{2}$ " Strips are the window sashes, and their lower ends carry the remaining Plates that form the sides of the bus.

Angle Girders 9 extended by  $12\frac{1}{2}$ " Strips form the main members of the upper deck, and a  $5\frac{1}{2}$ " $\times$  $2\frac{1}{2}$ " Flanged Plate 8 is bolted in position to provide a roof for the driver's cab. The Plates enclosing the upper deck are now added. Plate 10 is half of a Hinged Flat Plate from which the centre pin has been removed; the other half of the Plate is used in a similar position on the opposite side of the model. The sides are connected at the front by  $5\frac{1}{2}$ " $\times$  $1\frac{1}{2}$ " Flexible Plates and Angle Brackets. Strip 11 is a compound strip made by overlapping two  $5\frac{1}{2}$ " Strips six holes.

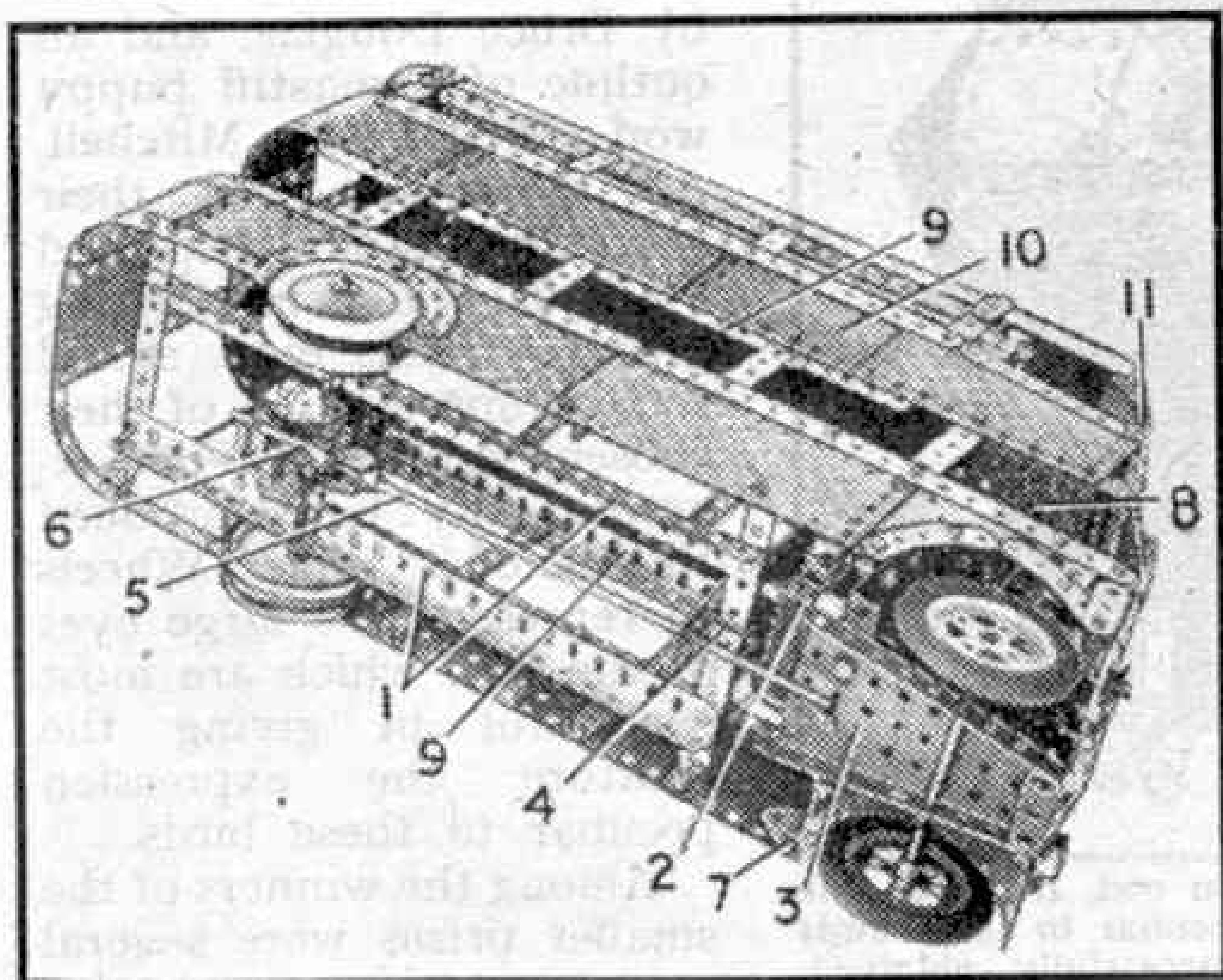


Fig. 2. Underneath view of the Meccano omnibus.



The roof is constructed as shown in Fig. 1. It consists of  $12\frac{1}{2} \times 2\frac{1}{2}$ " Strip Plates extended by Flexible Plates of various sizes, the whole being strengthened with Angle Girders. This assembly is extended at each side by  $12\frac{1}{2}$ " Strips and Angle Girders bolted to Formed Slotted Strips, and is then fixed to the window sashes of the upper deck.

Parts required to build the model Omnibus: 4 of No. 1; 18 of No. 2; 6 of No. 3; 2 of No. 4; 11 of No. 5; 3 of No. 6a; 8 of No. 8; 7 of No. 10; 1 of No. 11; 12 of No. 12; 2 of No. 12c; 1 of No. 13; 1 of No. 14; 1 of No. 15; 1 of No. 15a; 1 of No. 16; 2 of No. 20a; 1 of No. 20b; 1 of No. 22; 1 of No. 23; 1 of No. 23a; 1 of No. 24; 1 of No. 26; 1 of No. 32; 4 of No. 35; 150 of No. 37; 10 of No. 37a; 24 of No. 38; 1 of No. 45; 1 of No. 46; 2 of No. 48; 7 of No. 48a; 2 of No. 48b; 2 of No. 51; 1 of No. 52; 3 of No. 53; 2 of No. 54a; 4 of No. 59; 2 of No. 90; 4 of No. 90a; 2 of No. 111; 2 of No. 111a; 6 of No. 111c; 1 of No. 125; 2 of No. 126; 1 of No. 126a; 2 of No. 142a; 1 of No. 147b; 1 of No. 186; 4 of No. 187; 4 of No. 188; 5 of No. 189; 6 of No. 190; 2 of No. 191; 4 of No. 192; 2 of No. 193; 2 of No. 195; 2 of No. 197; 1 of No. 198; 1 of No. 199; 2 of No. 200; 1 of No. 214; 8 of No. 215; 2 of No. 217a; 2 of No. 217b; 1 E120 Electric Motor.

The simple model scales shown in Fig. 3 will indicate the weight of light articles placed on the pan, by the movement of an arm across a graduated scale. The model is constructed by attaching two Trunnions to a  $5\frac{1}{2} \times 3\frac{1}{2}$ " Flanged Plate that forms the base. Two  $5\frac{1}{2}$ " Strips are fixed to the Trunnions, and their end holes provide bearings for a 2" Rod, to which is attached a beam formed from two  $5\frac{1}{2}$ " Strips. These are mounted on the Rod between two 1" Pulleys, and the scale pan, consisting of two Trunnions bolted together to form a square, is suspended from their right-hand ends by lengths of Cord.

Two  $2\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strips, lengthened by two  $2\frac{1}{2}$ " Strips and Flat

Brackets, are bolted to the other end of the beam. A  $\frac{3}{8}$ " Bolt fixed to the lower ends of the Double Angle Strips provides a pointer for the scale. The latter consists of a piece of paper gummed to one of two  $2\frac{1}{2}$ " Cranked Curved Strips, which are attached to the base by two  $\frac{1}{2} \times \frac{1}{2}$ " Angle Brackets and spaced at their outer ends by a  $\frac{3}{8}$ " Bolt and nuts. The scale is calibrated by placing small articles of

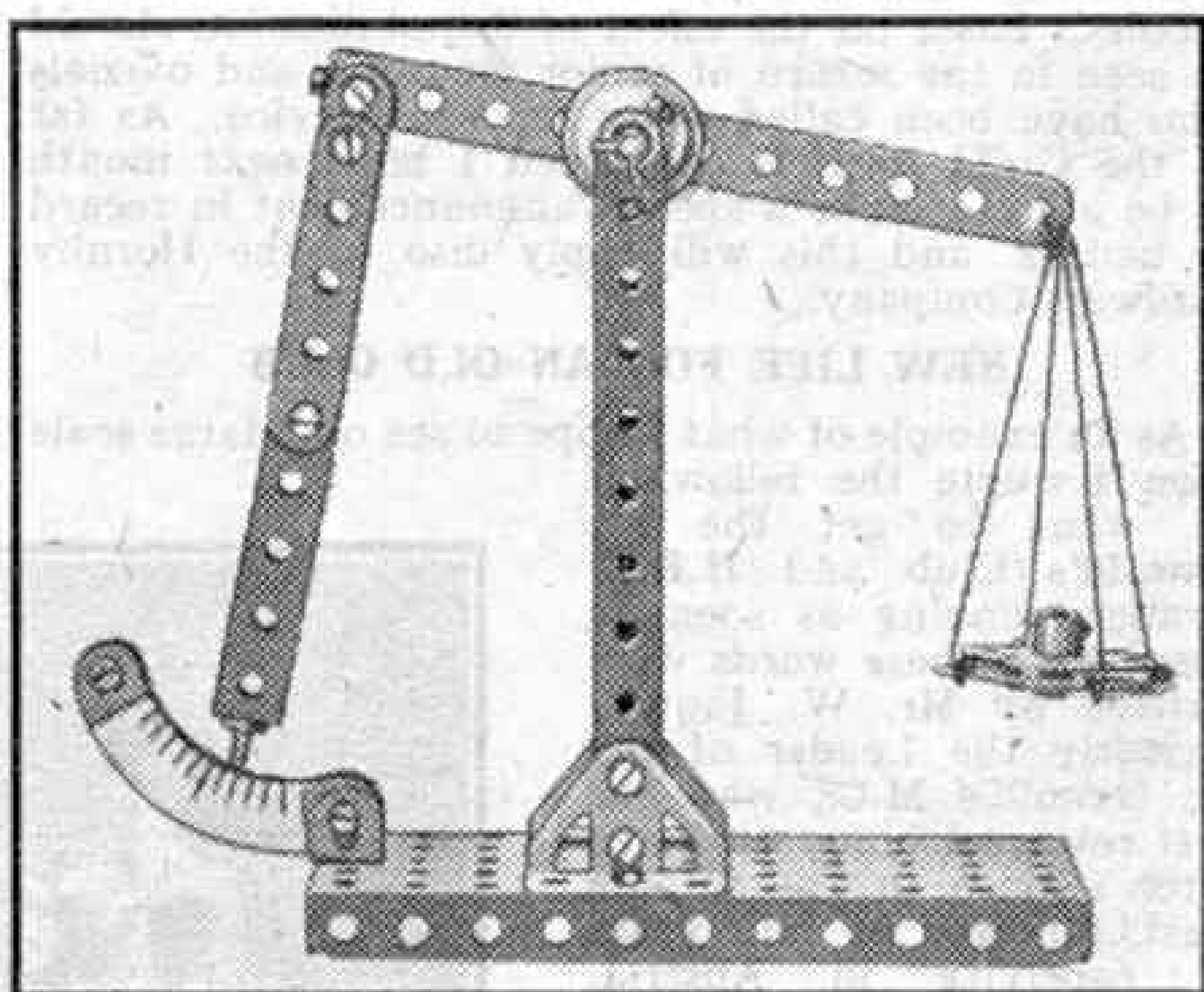


Fig. 3. These simple scales can be used to weigh light articles.

known weight on the pan and then marking the position taken up by the pointer for each weight.

If it is desired to weigh heavier articles, a few Strips or a 50 Gramme Weight should be bolted to the lower ends of the Double Angle Strips.

Parts required to build model Scales: 4 of No. 2; 2 of No. 5; 4 of No. 10; 4 of No. 12; 1 of No. 17; 8 of No. 22; 4 of No. 35; 22 of No. 37a; 18 of No. 37b; 2 of No. 38; 2 of No. 48a; 1 of No. 52; 2 of No. 90a; 2 of No. 111c; 2 of No. 126; 2 of No. 126a.

## Prizes for Model-Builders

In the September "M.M." we announced details of an important model-building contest for which Meccano models of any type or size may be submitted. This competition is still open and therefore we are repeating the main details governing entries for the benefit of readers who did not see the original announcement.

Models of any kind, large and small, are suitable for entry in the Contest. The model itself is not required, all that should be sent being a photograph or drawing, with any notes required to explain special constructional features. Each photograph or drawing must bear the competitor's name, address and age, and the entry should be forwarded to "Autumn Model-

Building Contest, Meccano Limited, Binns Road, Liverpool 13."

Entries will be divided into two sections, A for competitors of all ages living in the British Isles, B, for competitors of all ages living Overseas. Section A will close on 31st October, but Section B will remain open for entries until 31st December.

The following prizes will be awarded in each Section of the Contest to the builders of the most interesting models received: First, £2/2/-. Second and Third Prizes will consist respectively of £1/1/- and 10/6. There will be also five further prizes of 5/-.

All prize-winners will be notified as soon as possible after the closing date.





# Club and Branch News



## WITH THE SECRETARY

### GOOD TIMES AHEAD

Now that the Japanese war too has come to an end it should not be long before conditions are sufficiently settled to make it easy to run Meccano Clubs with success. Later on the effect of demobilisation should be seen in the return of senior members and officials who have been called away for war service. As far as the Guild itself is concerned I hope next month to be able to make a special announcement in regard to badges and this will apply also to the Hornby Railway Company.

### NEW LIFE FOR AN OLD CLUB

As an example of what I hope to see on a large scale soon I quote the following: "I want to get the St. Oswald's Club and H.R.C. Branch running as soon as possible." These words were written by Mr. W. Jaques, formerly the Leader of the St. Oswald's M.C., who has just returned home on leave after service in the Middle East, followed by four years of captivity in Austria. Throughout that time his thoughts have always been with his Club, and he has looked forward to the time when he could do something to put it on its feet once more after the many disturbances to which it has been subjected. In this he will be helped by Mr. J. F. Jaques, his brother, and Mr. C. B. Chapman, former Secretary of the Club. All these former officials of the Club are in the Services, but those who are still at home are looking round for new members so that activities can be started at the earliest possible moment. The acting Secretary is A. Bennett, 25, Buckingham Gardens, Thornton Heath, Surrey, and all readers of the "M.M." living in the district who are interested, and would like to join a really live and active Club, should get in touch with him.

### PROPOSED BRANCHES

- LANGFORD—Mr. D. Doubleday, 51, Ulting Lane, Langford, Nr. Maldon, Essex.  
 RATHFRILAND—Mr. G. Fogarty, 21, Dromore Street, Rathfriland, Co. Down, N. Ireland.  
 NOTTINGHAM—Mr. J. Yates, 36, Edgware Road, Bulwell, Nottingham.  
 LEICESTER—Mr. F. Gumley, 31, Park Vale Road, Leicester.  
 NOTTINGHAM—Mr. J. L. Rowbotham, 21, Albert Grove, Lanton Sands, Nottingham.  
 CROWTHORNE—Mr. J. N. Peters-Dickie, "Whitecain," Crowthorne Berks.  
 FROME—Mr. D. W. Jukes, 7, Green Lane, Frome, Somerset.  
 LYTHAM—Mr. P. S. Walker, King Edward VII School, Lytham, Lancs.  
 UPMINSTER—Mr. R. G. Coombes, 45, Maple Avenue, Upminster, Essex.

### RECENTLY INCORPORATED BRANCHES

477. BOGNOR REGIS—Mr. R. R. Ludlow, Mon Bljou, Yeomans Acre, Aldwick, Bognor Regis.  
 478. HINDHEAD—Mr. E. J. C. Peaty, Bramley Croft, Hindhead, Surrey.  
 479. STUART ROAD—Mr. C. E. Loader, 12, Stuart Road, East Barnet, Herts.  
 480. NORTHAMPTON—Mr. J. Southwell, 127, The Drive, Northampton.  
 481. MUNDELLA—Mr. Harris, 93, Lenton Boulevard, Nottingham.  
 482. URMSTON—Mr. J. A. Denton, 6, Southgate, Urmston, Manchester.

### CLUB NOTES

DURHAM M.C.—"Flying Days" have been held



A new group photograph of officials and members of the Hornsea M.C. Mr. R. W. Shooter, Leader, is seated in the centre, with Mr. C. Kemp, Deputy Leader on his left, and P. Hobson, Secretary, on his right. D. Kitchen, Sports Secretary, is next to the Secretary. This old-established Club continues its fine programmes with great success. Each Section works to a definite plan, and practical Model-building and similar activities are varied by Lectures, Film Shows, Excursions and indoor and outdoor Games.

regularly, members bringing to these meetings aeroplane models they had built. An Exhibition and Film show has been held. Club roll: 7. Secretary: T.C. Hindson, Westholme, Durham Moor, Durham.

MOORTOWN (LEEDS).—All recent meetings have been held outdoors. They have included Walking and Cricket, together with all-day Cycle Runs. These meetings have been well attended. Club roll: 16. Secretary: A. M. Cohen, 18, Stainburn Avenue, Leeds 7.

RANELAGH (LIVERPOOL) M.C.—Good all round progress has been made. Model-building has been carried out with success. A Cycle Tour has been arranged and a Concert also has been given. Club roll: 26. Secretary: A. I. Manners, 2, Ranelagh Drive North, Grassendale, Liverpool 19.

### BRANCH NEWS

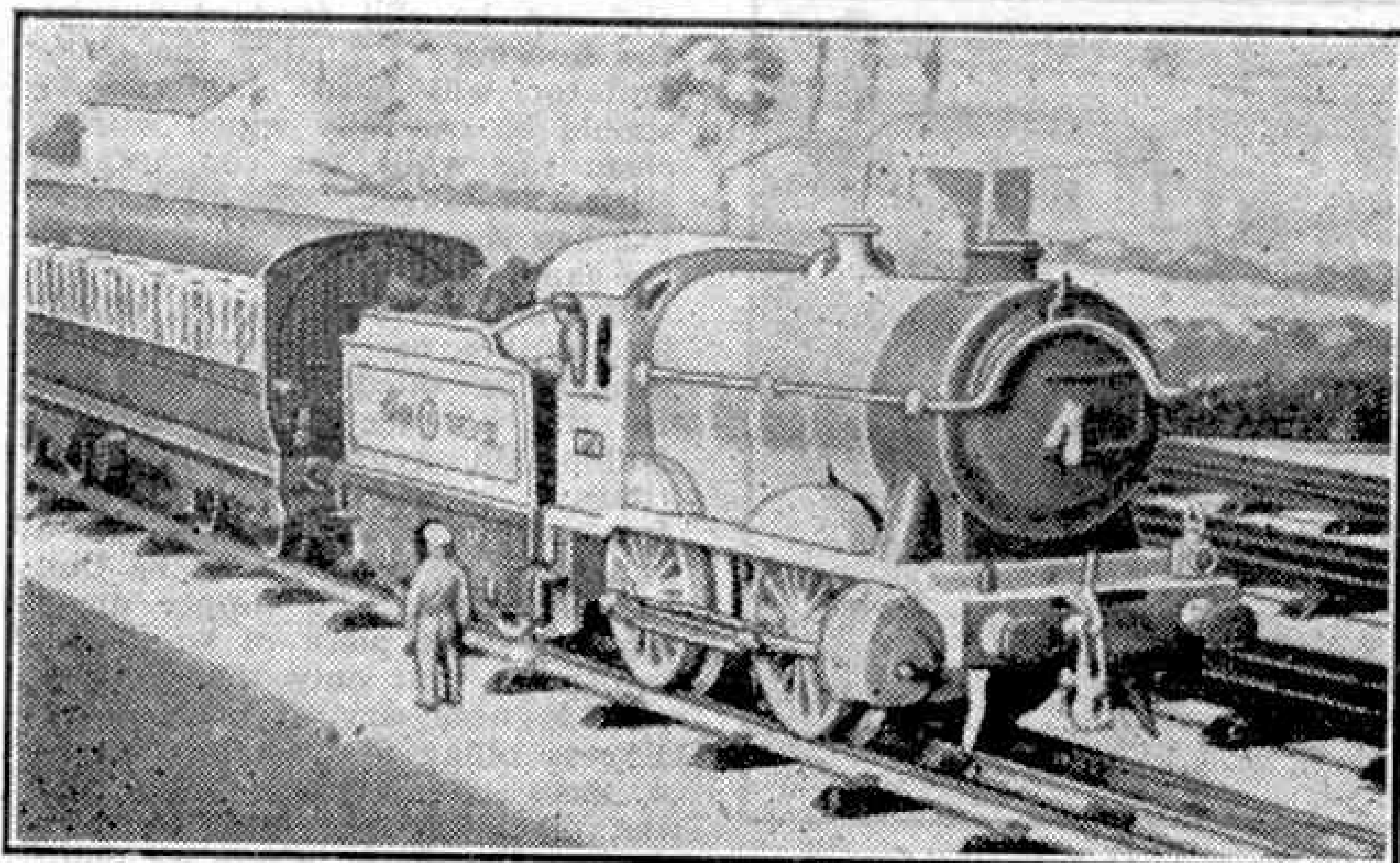
HASTINGS.—This newly-incorporated Branch has an excellent track, with stations, scenery and many accessories. The track itself is kept in fine condition and good running is obtained. A special feature is made of loads for goods trains run to timetable. Secretary: A. Lawrence, 53, Collier Road, West Hill, Hastings, Sussex.



# Hornby Locomotive Working Schemes

IN addition to what we may term "normal" operations in actual practice, there is a great variety of unusual workings that can be of great interest when reproduced in miniature. On page 314 of last month's "M.M." we gave a few suggestions for special working of various kinds; this month we deal with further schemes.

We have often described the working in miniature of a local pick-up goods train. Where such real trains "do the round" of a particular district, and bring the traffic to a concentration yard where the marshalling and despatch of trains to other centres is carried out, they are usually operated on a regular schedule. The engines so employed often display on a convenient lamp iron a numbered board, the number shown corresponding with the working timetable dealing with the particular trip. This of course allows any trip working to be identified and so aids the operating staff.



Backing out the empties! In performing this operation the engine shown displays a tail lamp for the guidance of the "staff," as it is at the rear of the train.

The scheme is similar to that referred to last month in dealing with the identification of long-distance special trains. The trip working board is usually different from that displayed by the engines of special trains. As a rule it is more square in shape, unless it happens to be circular, and generally metal plates with the numbers painted on are used as the trip numbers are more permanent.

So if we make a few little boards or "targets" from metal or thin card according to our skill, we can number them to agree with our working programme, and the trip engines thus distinguished will give an added interest to the working. For Hornby locomotives the size of the board should be about  $\frac{3}{8}$  in. square; if we prefer a round "target," then the diameter should be a little more than this. The exact size does not really matter as long as the boards are not too big.

Southern Railway enthusiasts will recall that their favourite line goes one better than this, in that all engine workings are covered by a "duty number," and this number appears on one of the white discs on the engine that are such a characteristic feature of Southern operation. These discs of course indicate the route of the train, not its class as on other lines, and they are necessarily replaced by lamps after daylight hours. Here then is another scheme that Hornby railway owners with S.R. interest can adopt. It is a good plan to make several sets with a selection of discs bearing the duty numbers that are mostly

required. The correct numbers can be obtained by observation, from illustrations of S.R. trains and no doubt from conversation with friendly engine-men! But we must ask readers not to expect the Editor of the "M.M." to supply details!

A practice that is still in vogue to a certain extent at important intermediate stations is that of keeping a locomotive "standing pilot," as it is called. This is in effect a spare engine that is set aside in case of any difficulty being experienced with the engine of any train passing through. Alternatively, if an assistant engine should be required, the "pilot" might be used as such, or it might be called upon to work any special train that is required at short notice. This is an idea that might appeal to readers. Naturally we cannot afford to have our spare engine simply waiting for a job, so, as in real practice, we can use it in the neighbourhood of the station to perform odd jobs such as shunting in the yard and perhaps dealing with "empty" coaches.

Arrangements for the working of supposedly empty stock can be made quite interesting if the movements are planned, as they should be in accordance with the requirements of our working programme. On the freight side regular traffic that is dealt with in more or less specialised wagons, such as coal or perishable, usually involves the movement of the vehicles loaded in one direction only; therefore there should be a balancing "empty" trip in the reverse direction and engine working should be arranged accordingly.

In dealing with passenger traffic we might set aside an engine for dealing specially with the movements of empty stock before and after its main journey. Such an engine in fact might display a target or board of the kind referred to earlier in this article. In the case of trains

starting from a terminal station, or even from an important intermediate station if we have not the luxury of a miniature terminus on our system, the following scheme can be adopted. It is in effect an adaptation of the "turnover" system of locomotives working that we have frequently described.

The first engine "off the shed," not necessarily a "top link" express engine, runs to the carriage sidings and possibly assembles the stock that is to form an outgoing express. This being done it brings the empty train, tender first, along to the station where the train will start. If this is a terminus the engine is necessarily held at the buffer stops, unless the station is long and crossover points for running round are available. For the present instance we will assume that they are not.

So the engine remains with the train supposedly providing "steam heating" for the coaches until the train engine comes on. A little before "time" the engine booked for the train arrives from the shed and couples on at what is now the front of the train. After a last minute inspection by the operator, head and tail lamps in place, corridor connections properly coupled, destination boards in position and so on, the train leaves.

The first engine follows the train up slowly as far as the platform end, and there waits until the points are set and the necessary signals worked to allow it to proceed to the engine line outside the station and wait for an incoming train.



# Fun With Your Dublo Railway

## Preparing for Intensive Running

WITH the coming of Autumn there is always a quickening of interest in miniature railway matters, especially on the part of those railway owners who have more or less laid up their equipment during the summer months. This is the time, then, to examine our stock and to devise new ideas for operations during the forthcoming winter season. Even for those who do not admit of a "close season" for miniature railway working the present is a suitable opportunity to revise layouts and working schemes, and to see that their equipment is in order for the more intensive working that is sure to be the rule.

The first consideration is usually the condition of the track, for if this is not in order the running results will be disappointing and unsatisfactory. Even on

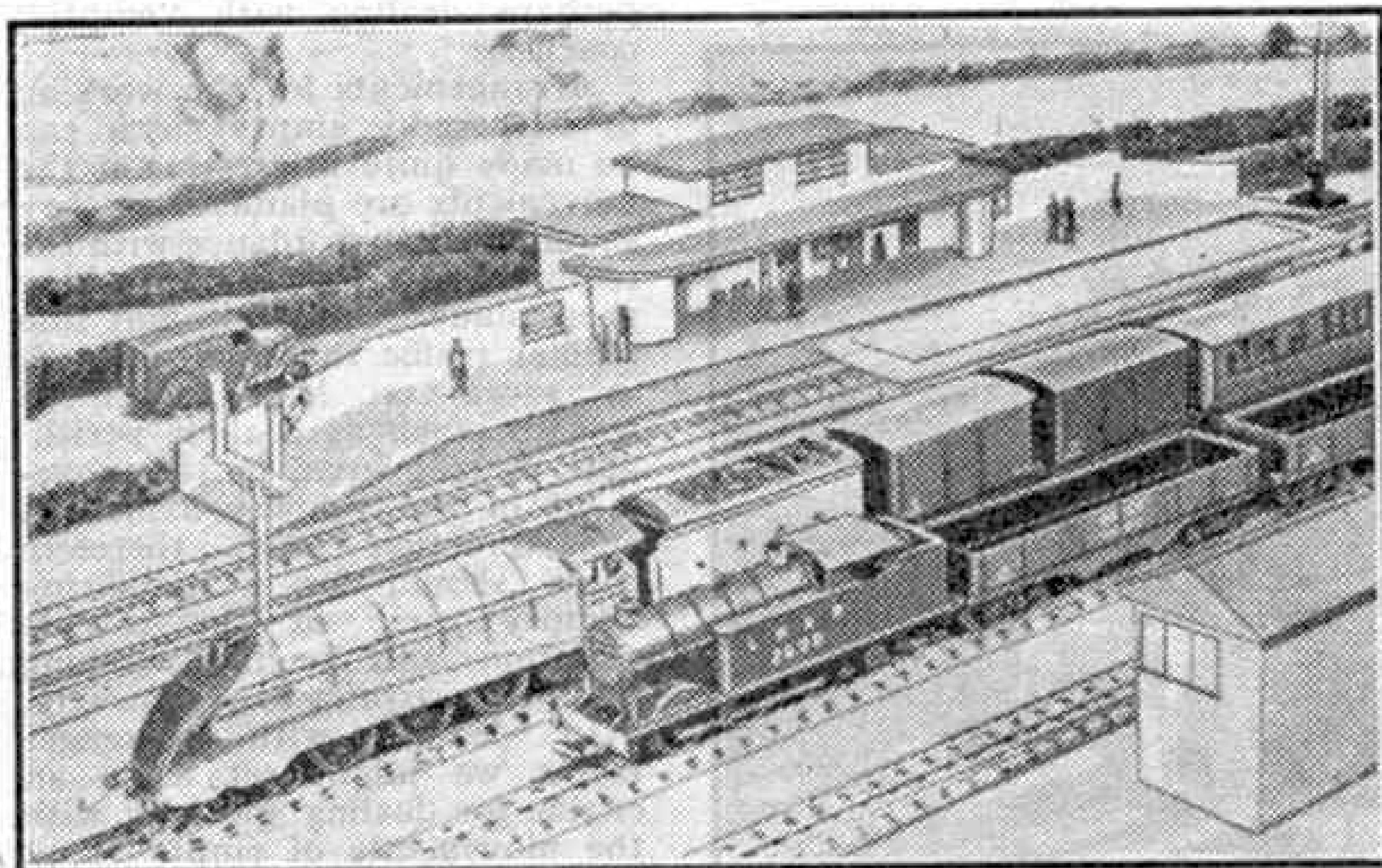
items will be dusty at least, and the working parts will require cleaning up. Axles and wheel bearings should be freed of the oily fluff that persists in collecting on them. An ordinary pin is a useful weapon for the job, the pointed end being handy for dislodging any particularly obstinate bits of dirt. The wheel treads should all be carefully wiped with a clean rag; this as a rule is sufficient to remove any of the soft dirt that gets rolled round the treads. If it is not, then the head of our pin can be used as a scraper. Fluff or "whiskers" between the locomotive wheel spokes can usually be blown or brushed out.

The engines may need special attention to their motors, and to get at these the housing must be removed from the underframe. Undo the nut that will be found underneath the engine at the front end; the underframe can then be lifted clear of the holding bolt and can be slid forward out of the housing. Probably the commutator will need cleaning. It should be carefully wiped with a clean rag while the commutator shaft is revolved, any oil on the brushes should be cleaned off at the same time.

Bearing surfaces of all stock, locomotives, carriages and wagons should be oiled after cleaning. In the absence of the special Dublo Oil available in normal times a good thin oil as used for sewing machines and so on can be used, but it must be thin oil! Apply with a dipper made from a short piece of wire, and remember that only the slightest spot is necessary at each point. Excess oiling is wasteful, makes a mess and attracts dirt, and the oil invariably finds its way to just the places where we don't want it, the wheel treads and the rails.

Finally all couplings should be adjusted if necessary so that they extend from the vehicles perfectly horizontally. Care is needed in any adjustment with these items, and to preserve the adjustment rough shunting operations should be avoided. The bodywork of engines and rolling stock should be wiped or gently brushed; and to put a finish to the job the use of a good wax polish is recommended. Very little, however, goes a long way, especially on the tinprinted surfaces of the carriage and wagon bodies. Working accessories such as signals should be cleaned and looked over, the parts wiped clean of any fingermarks and any bent semaphores or operating wires should be corrected. Stations and other buildings may need dusting, and possibly the paint will require touching up here and there.

Our equipment should now be in reasonable order, and we are bound to consider the possibilities of fresh working schemes and other developments. As extensions and additions are remote possibilities we have to make the most of such equipment as we have. We can modify the track layout perhaps by retaining the same general scheme for the main line but altering the dispositions of certain sidings. Possibly some of these have been situated inside the main oval; if space permits we may alter the layout by placing some of them outside the main track. Again, by doing away with one dead-end siding we have a set of points to spare; these added to another siding will convert the latter into a loop, a more useful arrangement from the running point of view.



Passenger and goods trains on parallel tracks on a Hornby-Dublo system. Note the special use of the Junction Signal to govern both tracks.

permanent layouts the track should be cleaned, the rail heads being given a good wipe with a clean dry cloth. The base generally of the track and any little spots, such as on points, that require dusting can be dealt with satisfactorily by means of a paint brush, say 1 in. wide, kept specially for the purpose. This allows the track to be gone over quickly, and the brush will penetrate where fingers and cloths cannot be very effective. Careful cleaning will usually show up any spots where the track requires attention. This will only be slight as a rule on a permanent line. Holding down screws may need a little tightening here and there, a little re-aligning may possibly be required; or the switch blades of points may need a little adjustment with a pair of fine pliers in order to ensure that they sit close up to the fixed or "stock" rails in either position of the points operating lever.

Practically the same methods are employed where the track is portable. Owing to the frequent connection and disconnection of the pieces of track, however, there are one or two additional items to examine. We must make sure that none of the centre connecting clips is bent out of position; if they are we must bend them gently back into place so that they engage properly. In addition the little "fishplates" that maintain the running rails in alignment at the joints are liable to become distorted from frequent use, and these should be carefully corrected with a pair of pliers.

So much for the track; now to deal with the locomotives and rolling stock. No doubt the different



## The Hornby-Dublo "Locomotive Department"

ON a real railway the term "Locomotive Department" is a very wide one. It embraces almost everything connected with the designing, building, running, stabling and maintenance of the locomotives; in addition it includes the maintenance of the numerous appliances and items of machinery required in connection with locomotives and frequently those also operated by other departments as well. On a miniature railway things are rather more simple; we have our engines ready designed and built for us so that we are only concerned with their running, accommodation and to some extent their maintenance. In this article we deal principally with the arrangements that can be made with their accommodation.

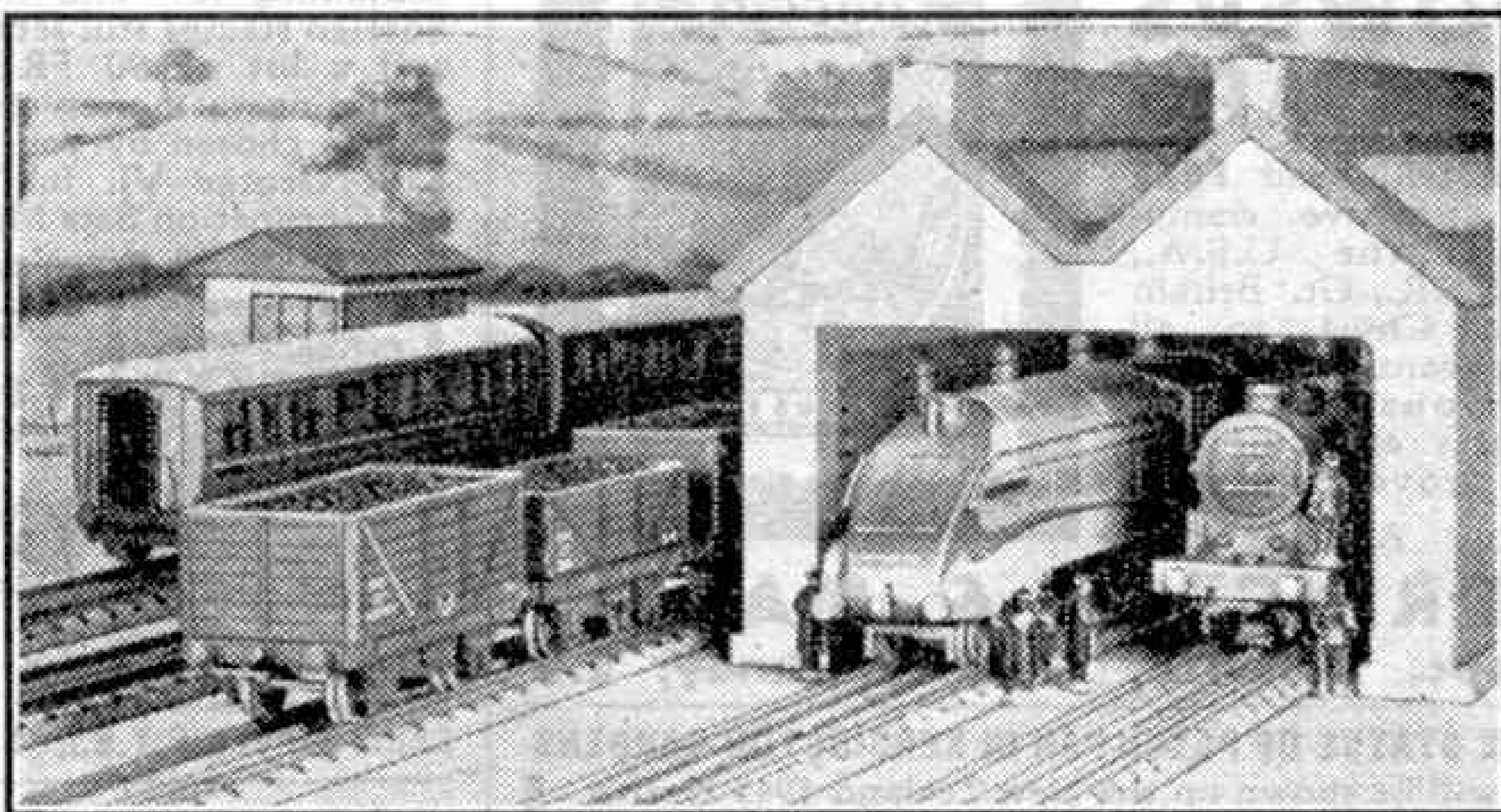
Even on the simplest layout that is only operated when required and has to be put away when it is finished with there is usually a siding on which the locomotive stands in between its turns of duty. Such a modest arrangement as this can be made quite realistic, however. It can be provided with an Engine Shed, if we have one of these Hornby-Dublo buildings. If not, then perhaps we may be able to adapt some other building or even make one up. We have heard of two Dublo Locomotives that are literally stabled quite successfully in a model building that was originally intended to accommodate a toy horse and cart! It is not difficult really to convert a cardboard or, better still, wooden box into quite a presentable engine shed. Not all real sheds are of the latest modern pattern so that a relatively simple structure will do, especially on a small railway with perhaps only one engine. Another scheme that can be adopted is to make our shed either partly or completely from the components of one or other of the sets of building or constructional "bricks" that are sometimes to be found at home.

Whichever plan we adopt it is better to make the shed of the "through" type, that is with an entrance at each end. It can then always be used if we are able to convert our dead-end line into a more useful loop. Engines can then enter or leave at either end, which is a considerable advantage in operating. We can place a "through" type of building on a dead-end line, allowing the track to project about an engine length from the inner end of the shed and terminating the rails in the usual way with Buffer Stops.

There is another locomotive shed arrangement that can be very attractive, but it is not often found in miniature. This involves the use of a "roundhouse," which in its original form is, as its name implies, a circular building. It can have an opening at one side and another also if required in the opposite side through which engines can move in and out. On this entrance track in the centre of the building is a turntable from which various roads radiate like the spokes of a wheel. The outer end of each of these roads is provided with stop blocks of one build or another. Thus the engines move to and from their appointed "stalls" by means of the turntable, and they can at the same time be turned round if necessary ready for their next duty. The turntable presents a bit of difficulty especially on electric layouts, but we have heard of some Dublo enthusiasts who have been able to fix up an accessory of this kind.

Any engine line, even if nothing to do with an engine shed or depot, invariably is provided with a water column or a tank so that the engines standing there can replenish their water supply if required. A water column or "crane" is perhaps rather a tricky subject to reproduce but the average reader of the "M.M." will be able to make up a suitable water tank, adapting small tins, cardboard spools of the kind sometimes used for wool or even wooden bobbins of the larger parallel type used for certain kinds of thread or cotton. Round wood, metal or even a length of pencil can be used for the "post" or support for the circular tank. Details can be added according to the maker's skill. Even a simple model can be quite effective, especially if it is finished off with care and painted.

The larger rectangular type of tank can be modelled with the aid of a box of suitable shape and size. This will represent the brickwork and if a suitable kind of tin box cannot be found to represent the tank



Dublo locomotives "at home," with the shed staff busy attending to them. Note the coal wagons on the track alongside.

proper then a little cardboard modelling will soon do the necessary. Model "bricks" again could be pressed into use for the building part of the tank, if available. For either type of tank the hose or "bag" as it is called by enginemen can be imitated by a length of cycle valve tubing. This can usually be obtained in a continuous length for a few pence. Coaling arrangements must next be considered. With a single track only we cannot adopt the scheme where the coal wagons are run alongside the locomotive line and the fuel transferred either direct or over a coal "stage" from the wagons to the engines. The wagons must use the same track as that which the engines use and the coal stage must therefore be stocked up when no engines are required to move in or out of the shed. The stage can be simply a raised platform on to which the coal is unloaded from the wagons and later transferred to the tenders or bunkers of the engines.

A great deal more scope is afforded if more than one road is available as the coal wagons can stand alongside and the engine can be "coaled" direct. Not all engine sheds have elaborate coaling plants or even a stage. However, if we can provide either of these accessories so much the better. Wood and card can be used successfully in their construction but a coaling plant of modern type is not a beginner's job! The type of equipment and details can perhaps be studied on an actual shed "visit" or taken from a book dealing with railway subjects.

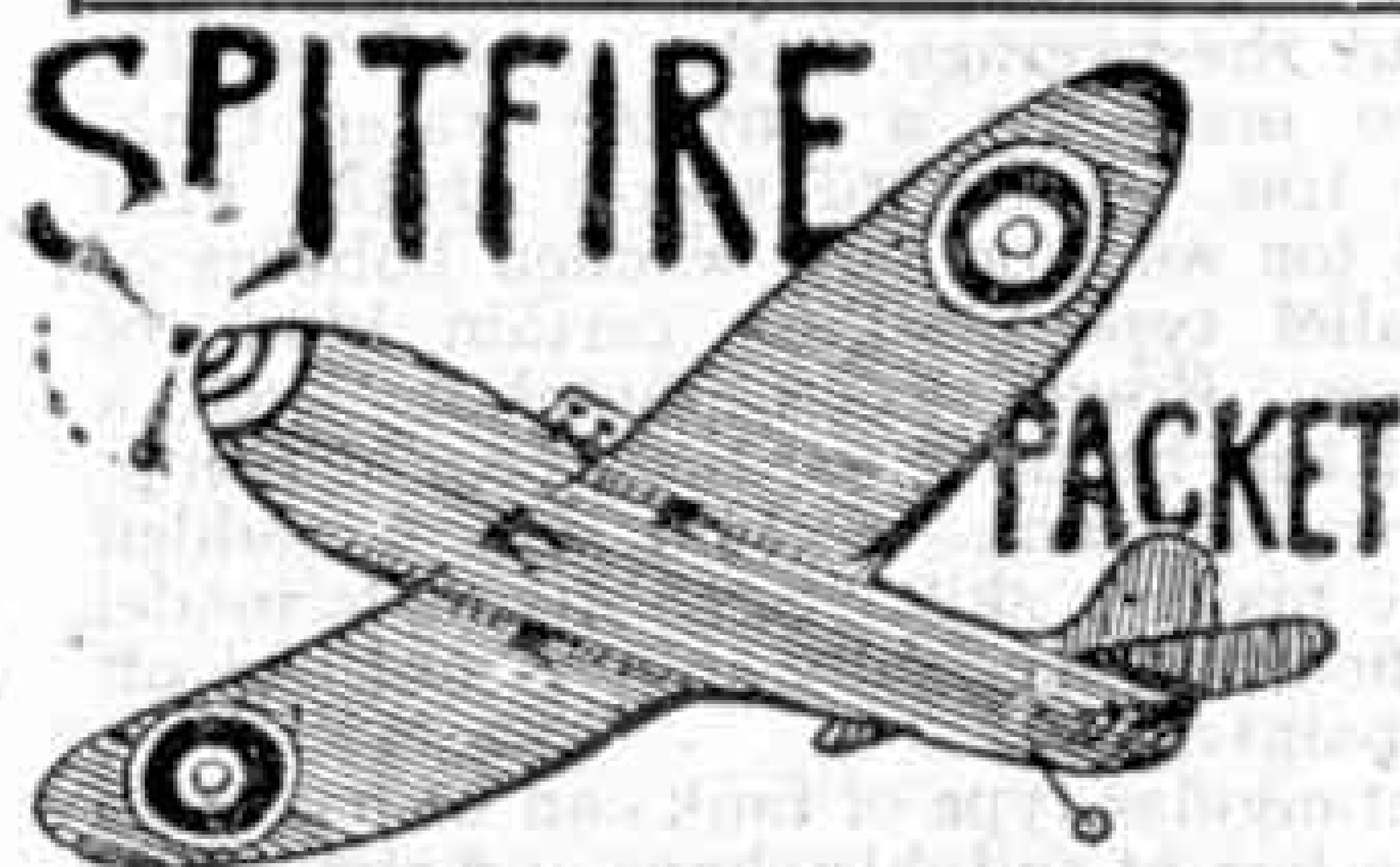


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# Stamp Collecting

## A Visit to the Solomon Islands

By F. Riley, B.Sc.

BEFORE the war many readers of the "M.M." would have little idea where exactly the British Solomon Islands were to be found. These very interesting Pacific islands came prominently into the news after the battle of the Coral Sea, when the forward movement of the Allied forces was commenced by the capture of Tulagi, the capital of the islands, and the invasion of Guadalcanal. They are to the east of New Guinea, and so naturally form our next place of call in our Empire stamp tour.



It is interesting to learn how the islands got their name. They were discovered by Mendana, a Spanish explorer, who thought them to be full of riches and perhaps to be the land of Ophir, from which Solomon's wealth came. Most of them have Spanish names, such as Guadalcanal and Ysabel. A notable exception is Bougainville, named after a French seaman who visited the islands in 1768. British protectorate was declared in 1893 and later the islands were divided between our own country and Germany, the latter country taking the northern group. The German islands came under Australian mandate after the last war, and so are part of the Territory of New Guinea; the islands to the south west form the British Solomon Islands of our stamp catalogues.

The stamp history of the Solomons does not take us very far back. It is not so many years ago since the islands were the home of fierce warrior tribes and cannibals, but once the British entered them it was not long before they became peaceful and prosperous. When the Japanese invasion came splendid support was given by the natives to the British officials who were compelled to take to the jungles, and later to Allied invading forces, and the native constabulary in particular performed magnificent service, two of them being decorated for bravery.

The first Solomon Islands stamps were issued in 1907. Before that time New South Wales stamps had been used in order to avoid the unsatisfactory practice of simply handing over letters from the islands to the captains of passing



ships. The new stamps were pictorial, showing a Solomon Islands war canoe, with an island scene in the background. An interesting feature of these early stamps, and of Solomon Island stamps generally, is that they have not soared to great heights as far as prices are concerned. Practically all of them, including the very first issue, can be bought for reasonable sums, and so a full collection is within the reach of all. The exceptions are certain varieties of the 1907 issue, including a 2½d. value in which there is no perforation between horizontal pairs.

Another issue followed in 1908, with the same pattern, but the stamps themselves were much smaller. Then came portrait stamps in 1913, and these continued in use until the appearance first of the Silver Jubilee stamps and then of the Coronation issue, both of which were of the type usually adopted for colonial possessions. This brings us to the splendid pictorial issue of 1939, examples of which are reproduced on this page. These handsome stamps are typical of the modern pictorial trend, for they are attractive in themselves and in addition they help to give some idea of the islands and of native life on them. This of course cannot be complete, for there is a remarkable variety of features of interest in the several islands of the group. There is however plenty of material for further issues in the future.



Altogether there were 12 values in this fine set, ranging from ½d. to 5/-; a 10/- value was added later. There was an entirely different design for each value except the 10/-, which repeated the 4½d. design. The ½d. stamp shows a variety of spears used by Solomon Islanders for fighting, hunting and fishing, and a native shield too is included in the design. The shields of native warriors in these islands are works of art. They are 3 ft. in length, made of reeds or

canes lashed together by rattans, and near the top is a slit through which the holder can look as he advances.

The next value, the 1d., has two typical Solomons figures on it. On the left is one of the native constabulary, men of fine physique and well trained. On the right is a native chief in full war array, holding his club. The 1½d. value shows Auki island, off the coast of Malaita, the most thickly-populated of the group. Native canoes are shown in front of the island, which is memorable as the home of some of the fiercest of the Solomon Islanders and the scene of the last native outbreak. This occurred in 1927, when a District Officer and a cadet, (Continued on page 358)





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**EGYPT**S.G. SIMPLIFIED Catalogue Numbers  
Mint Marked \* Postage Extra

1d. ea. 33, 35, 39, 40, 42, 44, 48, 54, 55, 56, 60, 69, 70, 77, 78, 81, 82, 83, 85, 114, 115, 120, 121, 123, 123A, 124, 127, 191, 192, 194, 196, 206, 207, 210, 211, 213, 214, D11, D12, D13, D26, D26A, D32, O1, O2, O3, O4, O6, O7, O39, O47.  
2d. ea. 25, 29, 32, 43, 49, 51, 66, 84, 116, 117, 121A, 125, 126, 208, 209, 210A, \*1M. new, \*2M. new, D17, D19, D21, D27, D29, O5, O9, O35, O37, O38, O41, O48, O49, O50.  
3d. ea. 50, 58, 71, 118, 128, 193, 195, \*4M. new, D28, D30.  
4d. ea. 37, 47, 65, 73, 74, 123B, 197, 232, 239A, \*10M. new, A4, D31, D33, O46.  
6d. ea. 31, 84, 52, 64, 67, 68, 75, 79, 122, 162, 233.  
9d. ea. 18, 28, 57, 61, 72, 80, 86, 119, 152, 154, 159, 161, 181, 182, 184, 234, 240, \*20M. new, \*22M. new issue.  
1/- ea. 41, 47, 62, 76, \*132, 177, 178, 203, 212, 214A.  
1/3 ea. 132, 137, 153A, 156, 185, 240A, 243, 247, 248.  
1/6 ea. 30, 59, \*84, 135, 136, 179, 198, 223, 226, 229.  
2/- ea. 63, 101, \*133, 138, 153, 158, 164, 165, 180, 239.  
2/6 ea. 17, 38, 53, 102, 103, 129, 133, 139, 141, 142, 183, 199, 216, \*219, 230, 236. 3/- ea. 16, 26, 104, 105.  
3/- ea. 204, \*217, \*220, 231. 3/6 ea. 92, 93, 94, \*106.  
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For other Stamp Advertisements see also pages 352 and viii.

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**FALKLAND IS.**, K.G.VI 2d. obs. mint ... 1/8.

" " K.G.VI 2½d. obs. mint ... 1/5.

**NEW ZEALAND**, 1943 Health pair ... 10d.

Details of collectors' interests and 'Want Lists' will receive careful attention.

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**IVAN GRAY & CO., 76, UNIVERSITY AVENUE, BELFAST****BARNET & FORD**

The Stamp Shop, 5b, High Street, CONWAY, N. Wales

**NEW ZEALAND****1945 HEALTH STAMPS**

Available by air mail at end of October.

Mint pairs 6d.

Available by ordinary mail at beginning of December.  
F.U. pairs 6d., F.D.C. 9d.

Reliant 1946 Empire Catalogue 6/3.



# Stamp Gossip and Notes on New Issues

By F. E. Metcalfe

THIS month we are able to illustrate two of the commemorative set of Jamaica, and with all the goodwill in the world it has to be admitted that the set is nothing more nor less than a flop. It is the old story of getting amateurs to do professional jobs. Most people can do some kind of drawing and get away with it, but that is very different from the making of a satisfactory design for a postage stamp, and all the designs of this new Jamaica set, with the possible exception of the 4d. value, simply shout out that they are the work of artists ignorant of the art of designing in miniature.

But the government of Jamaica should not worry. According to newspaper reports stamps to the value of £10,000 were sold the first day in Kingston, and probably the Crown Agents in London have sent out to British dealers stamps costing at least as much as that.

The design used for the 3d. and 10/- stamps, blue and green respectively, shows a building that looks as though it is ice-bound; surely a design more apt for say Moscow than the tropics. As to what the 2/- value represents, please apply to the designer himself. It has the writer of this completely beaten. Incidentally, although the Jamaica set is supposed to be on sale for one year, interested collectors will be well advised to buy their sets as soon as convenient, for we have a hunch that maybe the set will not be on sale for twelve months; at least not all values. Don't forget that the 2d. stamp is in two perforations.

Last month the first of three stamps which the U.S.A. Post Office is emitting out of respect for the late President Roosevelt was illustrated. The gesture was well worth making from more than one point of view, for not only was a great and good man being honoured, but Post Office finances were receiving a fillip at the same time. Figures to hand from America were quite illuminating. The first day the 3 c. Roosevelt stamp illustrated last



month was placed on sale at the Government Philatelic Agency in Washington, over 2½ million copies were disposed of. These were worth \$75,000 or more than £18,000.

The second of the three Roosevelt stamps has now appeared, the 1 cent., and a very beautiful stamp it is. Although it has been out a little longer, we prefer to show the 3 cent. green stamp emitted in

honour of the U.S.A. Marines. This fine body of men hold the same place in the affections of Americans as does our own Navy in ours. Later on stamps will be issued in honour of both the American Army and Navy.

The stamp shows a number of U.S. Marines hoisting the "Stars and Stripes" on the island of Iwo Jima. The capture of this island was a great feat, and the most effective means of drawing the world's attention to it is precisely the method which has been adopted, the emission of a postage stamp. Incidentally U.S. 3 cent. stamps are generally issued in a shade of purple, but this particular stamp is green because the Marines wear green uniforms in winter. The coming Army and Navy stamps will be khaki and dark blue in colour respectively.

The Philatelic Agency in Washington netted another \$65,000 in first day sales of this "Marine" stamp. Surely our own Forces did deeds in the war well worthy of notice, and our own Post Office can do with a few similar windfalls. When are we going to do anything about it?

The illustration at the foot of this page is of a single stamp issued in Holland to commemorate its freedom, appropriately in orange; a handsome stamp, by a designer who knows his job.

The fifth and last stamp to be shown this month comes from France. Actually it has been out a few months, but it hasn't been long to hand

over here and its subject makes it of interest to many "M.M." readers, as it is a railroad commemorative stamp.

News is gradually coming out about the various "Peace" issues to be emitted by various countries of the British Commonwealth. It is now certain that all the Dominions will bring out sets, and, probably most of the Colonies would like to do so, but we make such a fuss about producing a new set that, as happened after World War No. 1, not all who want will be able to do so.

This month, instead of tipping a single stamp, I will suggest that the new commemorative set of Jamaica should be bought, just as soon as the necessary cash is forthcoming. It is such a poor-looking set that many collectors will put off buying until the last minute, and that last minute may be what Hitler called five minutes after twelve!





# 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.*

## ON A DARJEELING TEA PLANTATION

During my stay in India I paid an interesting visit to Darjeeling. I travelled there by rail. The line is a remarkable one of 2 ft. gauge and the journey up has to be experienced to be believed. The track

The manager of an estate has to be planter, engineer, road builder, magistrate and nurse to all on his estate. There is an estate doctor, with houses for the workers and a school. Bamboo is provided for the buildings, and straw for the roofs, and each family have a tenth of an acre on which to grow their own crops.  
E.R.H. (S.E.A.C.).

## GERMAN RAILWAYS TO-DAY

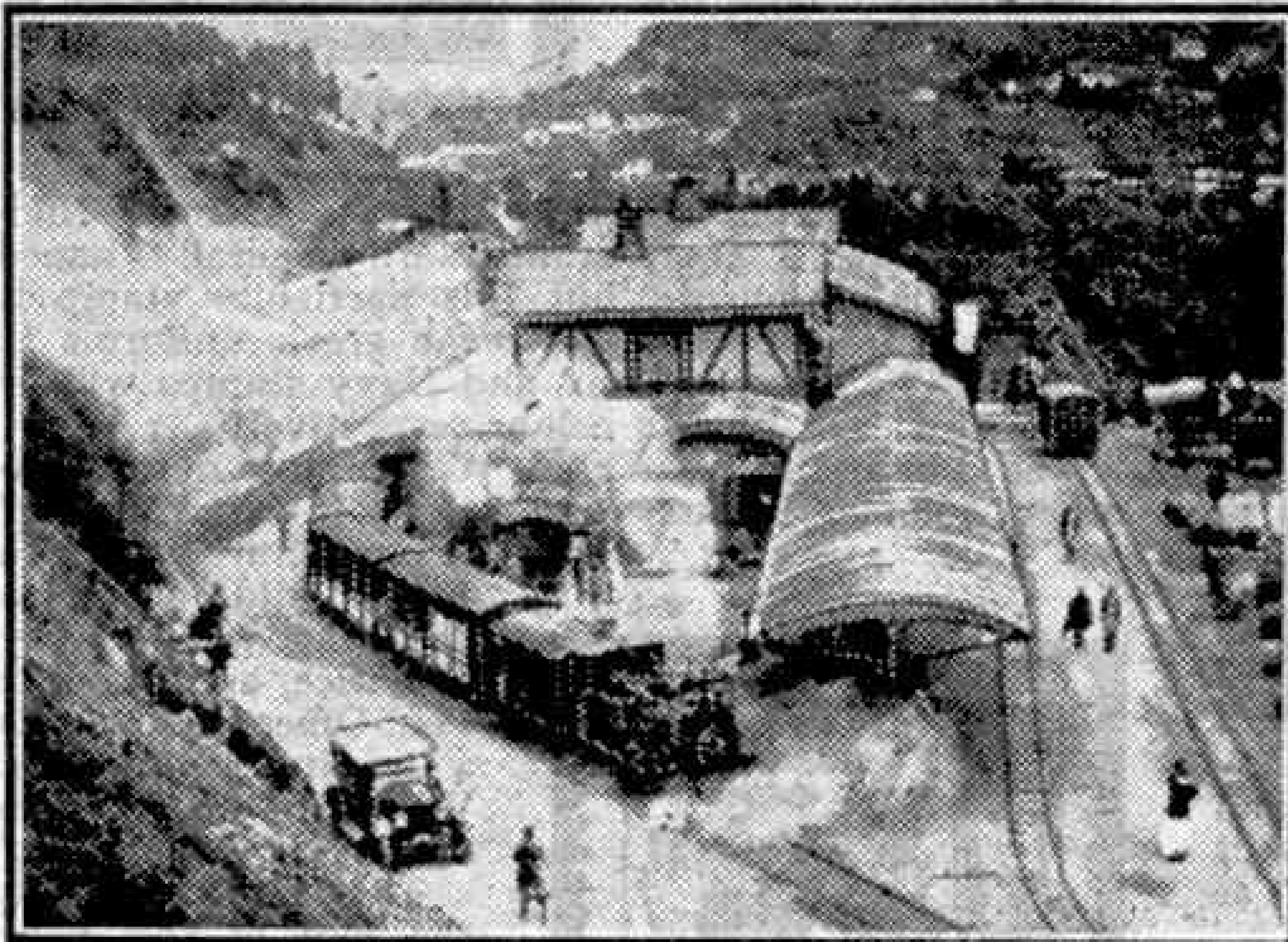
The much battered German railway system is gradually being put back into working order, and some sections of track are very busy. The locomotives are of chief interest. They are of types ranging from 0-6-0 tanks to huge 2-10-0 freight engines. The most numerous appear to be the 2-10-0s, of which there are two classes, the pre-war standard type and the later war "Austerity" engines. The latter have all enclosed cabs and semi-circular tender water tanks, and are very large and powerful.

There are also large and powerful 2-8-2 and 4-6-2 passenger engines, and for freight work 0-8-0, 2-8-2, 0-10-0 and 2-10-2 tanks, as well as large 2-6-0 tanks, a rather unusual wheel arrangement. Short-distance passenger trains are to be seen hauled by 4-6-4 "Baltic" tanks, a fairly numerous class, which are also used on freight trains occasionally.

On looking round the various locomotive depots, plenty of war-damaged engines are to be seen. Some of these are in a very sad condition, and many no doubt will be scrapped. As regards rolling stock, the passenger stock consists of a weird and wonderful variety of

four and six-wheeled coaches, many of which have wooden seats. There are not very many main line bogie coaches to be seen these days.

Freight trains are usually composed of wagons from France, Belgium, Holland, and even Italy, as well as those of German origin, and large numbers of U.S.A. vehicles are to be seen. A great deal of wrecked rolling stock is still to be seen at many stations and yards that were damaged during the war and have not yet been cleared up.  
J. W. GAHAN, B.L.A.



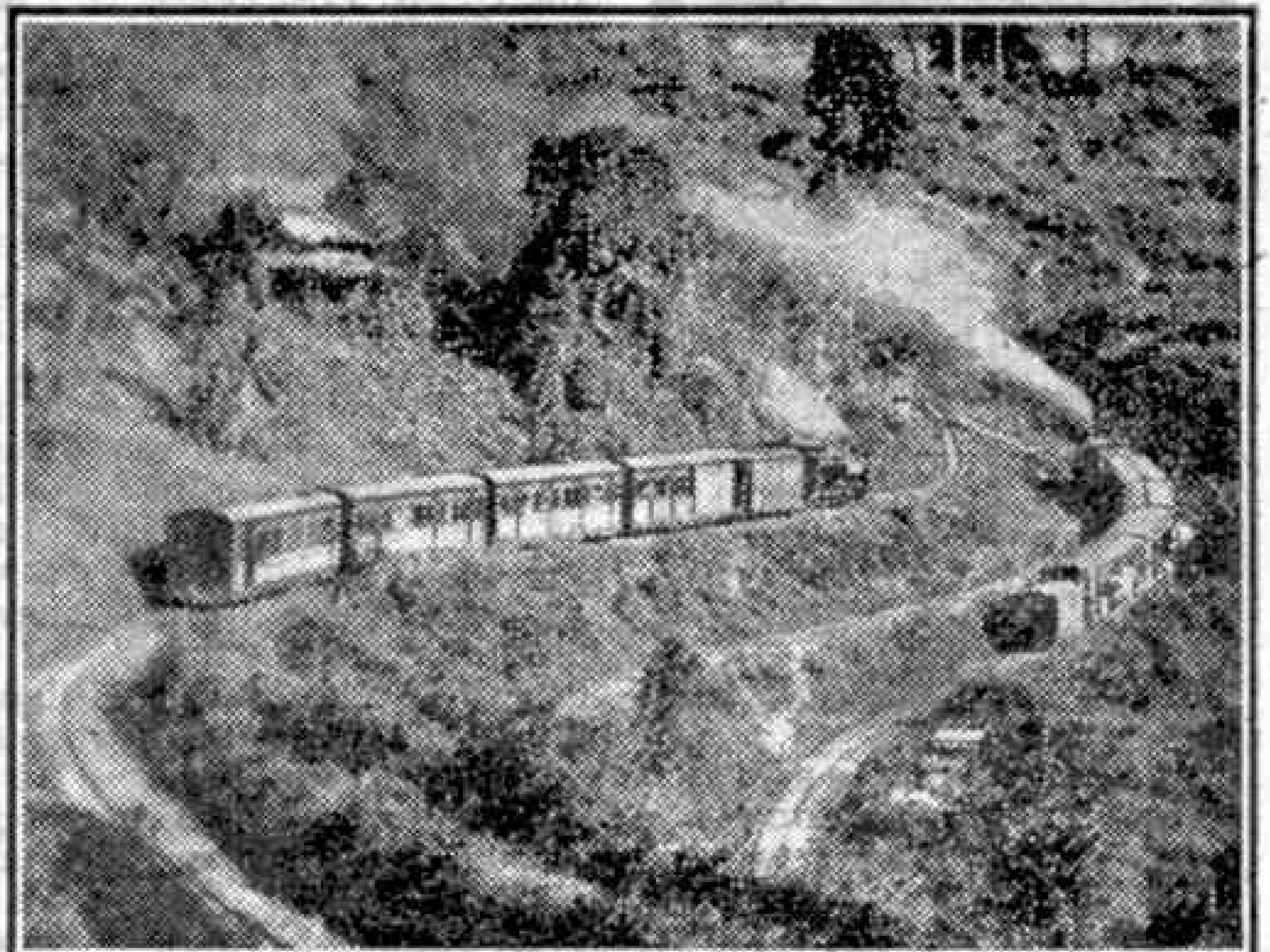
Goom station, on the Darjeeling Himalayan Railway. This is at a height of more than 7,000 ft. and is the highest in India.

follows the road all the way up, twisting and turning, and crossing and re-crossing the road a thousand times. In two places it actually loops the loop in order to gain altitude, and in three others it shunts backward and forward up the hillside with the same purpose in view. How such a track could have been laid in face of such enormous difficulties is difficult to imagine.

One purpose of my visit was to look over a tea plantation, which covers an area of 1,500 acres. The tea is picked every 10 to 14 days from April to October, so that each plant is continually growing fresh young shoots. Women do the picking. Twice a day the leaves are brought to the factory, where they are put on trays to wither for 18 to 20 hrs., and are then rolled mechanically to ferment them by bringing the juice to the surface. They turn a copper colour in a temperature of 80 deg. F., and it takes five or six hours or more for the tea to turn black, with bits of orange or coppery colour showing. This colour is the origin of the name Orange Pekoe.

The tea then goes through a complicated machine that dries it at a temperature of 240 deg. F., after which it is sorted by means of wire trays set over each other. In this way the fine stuff is separated from the smaller, leaving something like dust at the bottom. The graded tea is packed in chests to be sent away.

The tea planter is an expert taster. Darjeeling tea has a distinctive flavour and the liquor is thin but strong. Some of the plants are 80 years old. They are grown six or eight feet apart and waist high for easy picking and cutting. They soon grow bushy, so that there is no space between the individual plants.

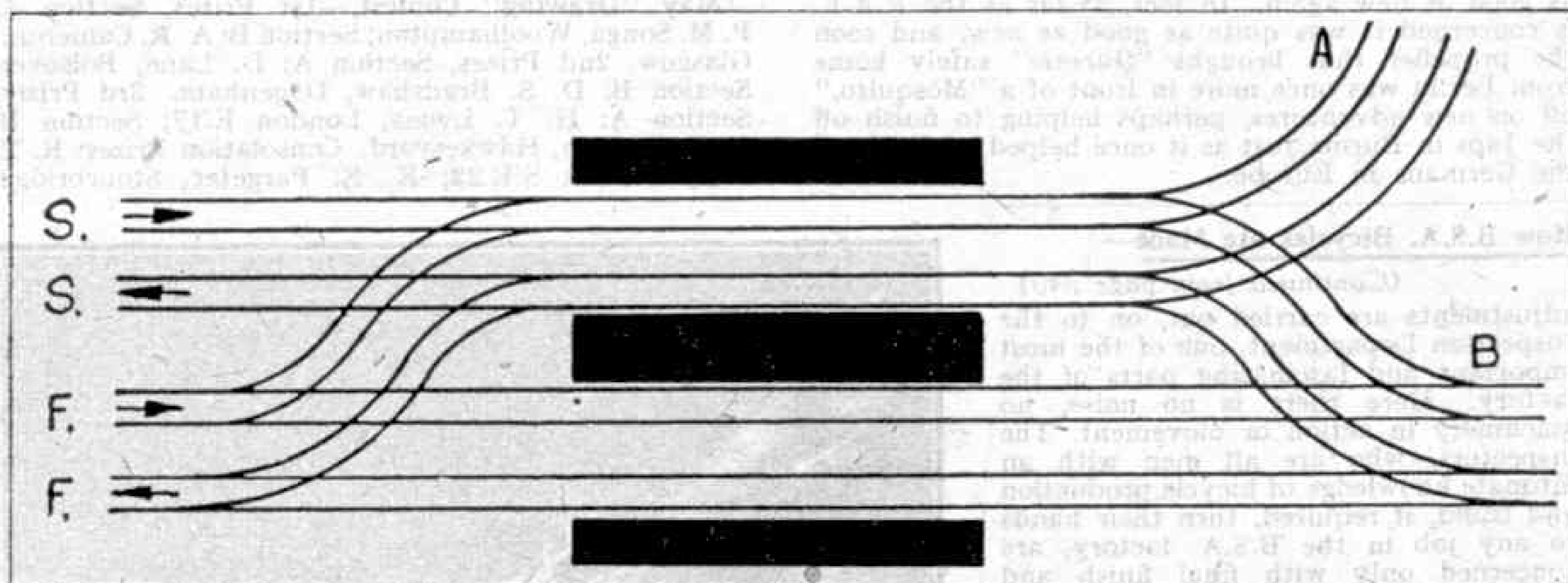


A switch and passing place on the Darjeeling Himalayan Railway. Photographs by E.R.H., S.E.A.C.



# Competitions! Open To All Readers

## Where are the Signals?



The handling of heavy traffic through more or less complicated junction stations and their approaches is always a source of wonder, even to non-railway minded people. "How does the driver find his way?" is a question we often hear. Actually the driver does not "find his way"; his way is literally found for him and is pointed out to him by means of the signals, with which of course he must be thoroughly familiar.

In our competition this month we are giving readers a chance to imagine themselves in the role of a Signal Engineer who has to provide the necessary signals for the junction layout in the accompanying diagram. There are four tracks through the station, two fast, marked "F,F," and two slow, marked "S,S," with double crossovers at each end of the diagram. The main line carries on as a two track length "B," while there is a diverging line "A" turning away as a development of the slow tracks.

Competitors should copy out the diagram carefully on a sheet of paper and indicate the position and type of what they consider to be the necessary signals. It is assumed that semaphore signals are to be employed. If a competitor wishes to suggest an alternative arrangement at any spot from that shown in his diagram he should indicate the fact in a note, preferably with a small sketch. *Do not cut out the diagram on this page.*

There are two sections in this contest, for Home and Overseas readers respectively, with the usual prizes in each of 21/-, 15/- and 10/6, and consolation prizes will be awarded for other good efforts. Entries should be addressed "October Signal Contest, Meccano Magazine, Binns Road, Liverpool 13." The closing date in the Home Section is 30th November; that in the Overseas Section is 30th April 1946.

## Prizes for Motor Car or Lorry Drawings

For our second contest this month we are continuing our Transport Drawing series. In previous contests in this series the subjects have been public service vehicles and ships, both of which attracted splendid entries, and we are confident that a further competition dealing with motor cars and lorries will prove equally attractive. Competitors can choose their own subjects within the limits given, but they should note carefully that buses and other public service vehicles are excluded, drawings of private motor cars and motor lorries only being eligible for this competition. Coloured drawings may be submitted if a competitor wishes to show what he can do in this direction, but the judging will be based on the merits of entries as drawings only, so that those who cannot make use of colour need have no hesitation in sending in entries.

As usual in these competitions there will be separate competitions for Home and Overseas readers, and in each of these there will be two sections, A for competitors of 16 years of age and over, and B for competitors under 16 years of age. Prizes of 21/-, 15/- and 10/6 will be awarded to competitors in each section whose drawings are considered to be the best, and consolation prizes also will be awarded. Entries should bear the sender's name, full postal address and age on the back. Competitors are par-

ticularly requested not to put their names on a separate sheet of paper. Winning entries become the property of Meccano Ltd. Others will be returned if accompanied by a stamped addressed envelope or wrapper.

Envelopes containing entries should be addressed "October Drawing Contest, Meccano Magazine, Binns Road, Liverpool 13," and should be posted to reach us not later than 30th November in the Home Section and 30th April 1946 in the Overseas Section.

## October Photographic Contest

This month's photographic contest is the 10th 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 desired. Unsuccessful entries will be returned if a stamped addressed envelope is sent with them.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed: "October Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13." There will be separate sections for Overseas readers, and in each section prizes of 15/- and 7/6 will be awarded. Closing dates: Home Section, 31st October; Overseas, 31st March 1946.



**New Propellers for Old**—(Continued from page 327)

or four, depending on the number of blades required for any particular engine installation.

After a time the hub taken from "Queenie's" damaged propeller was drawn from the pool store, ready to receive a new set of blades. A set of three repaired blades was fitted and the "prop" was almost as good as new again. In fact, as far as the R.A.F. is concerned it was quite as good as new, and soon the propeller that brought "Queenie" safely home from Berlin was once more in front of a "Mosquito," off on new adventures, perhaps helping to finish off the Japs in Burma just as it once helped to finish off the Germans in Europe.

**How B.S.A. Bicycles are Made**—

(Continued from page 340)

adjustments are carried out, on to the Inspection Department, one of the most important and fascinating parts of the factory. Here there is no noise, no machinery in action or movement. The inspectors, who are all men with an intimate knowledge of bicycle production and could, if required, turn their hands to any job in the B.S.A. factory, are concerned only with final finish and assembly. They work with their brains, almost all their senses, and a few small and very accurate gauges carried in the pockets of their spotless white coats. They really know a well designed and properly made bicycle, and they work quietly and methodically, always in search of flaws, the majority of which would never be noticed by the ordinary onlooker.

Once again, for the last time, the bicycles travel along, suspended from an overhead conveyor, while girls wrap the tubes and other parts with paper and cardboard to prevent scratches in transport. The wrapped machines are then stacked in neat rows ready for labelling to cycle dealers in every part of the British Isles, and next time you see a new B.S.A. in a shop window you will know something of the care and skill with which it has been made!

**Stamp Collecting**—(Continued from page 353)

with 13 native constables, were massacred.

Canoes figure very large in this fine set, as would be expected of Pacific island pictorials, and there is a fine example of the work of the New Georgians, the finest canoe builders of the group, on the 21d. stamp. This is a war canoe, the native name for which is tomoko. Canoes of this type are often 50 ft. in length, with their high prows and sterns inlaid with pearl shell, and they are among the most graceful craft in the world. This design is based on an actual photograph taken over 30 years ago by a Methodist Missionary, and correctly shows the prow of the canoe as lower than the stern. In former days human heads had to be secured before such a canoe could be launched, and the design should include a grotesquely carved head at the prow, to keep watch for hidden dangers and evil spirits.

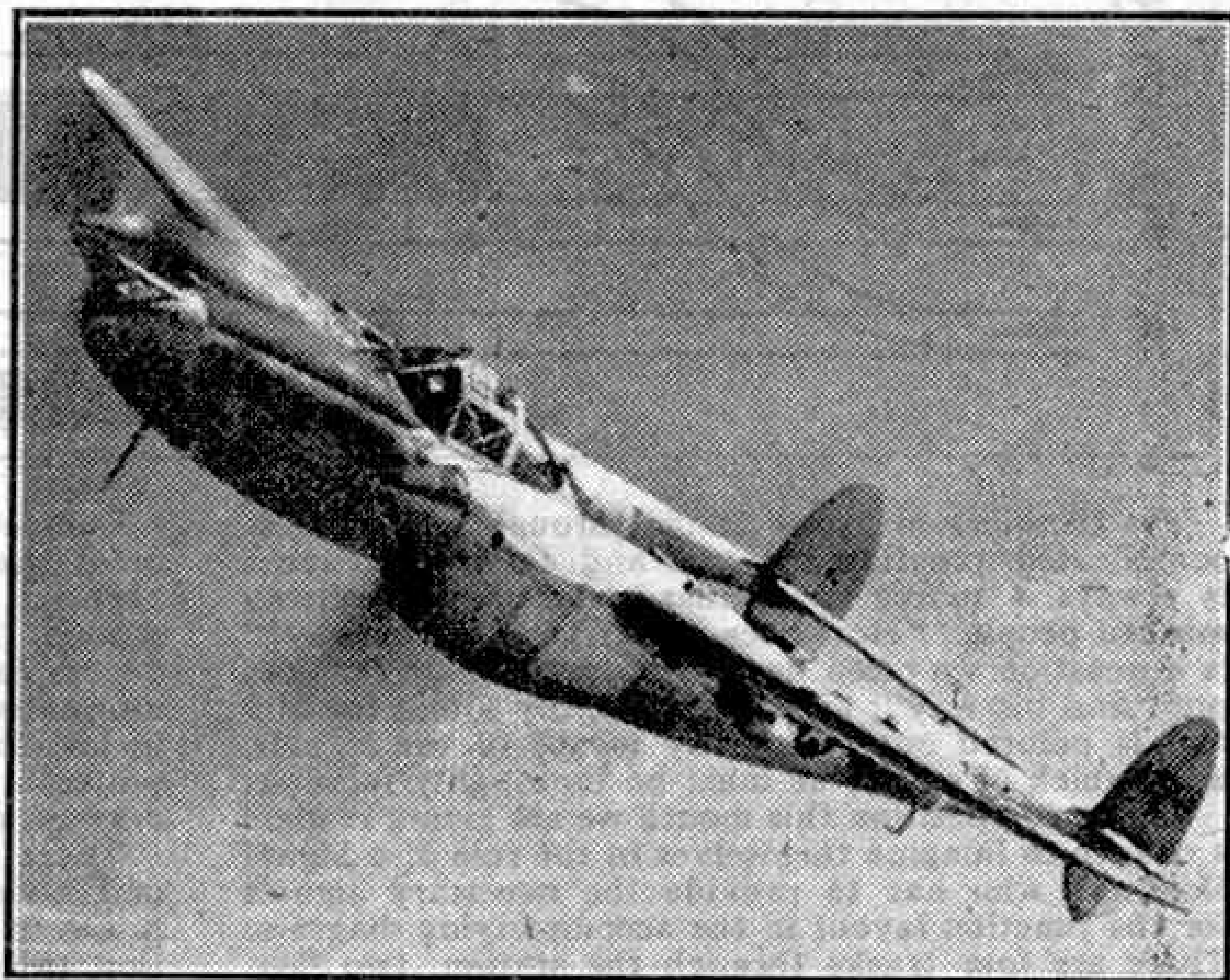
The 3d. stamp in the series shows Munda Point, New Georgia, which during the war was the site of the chief Japanese airfield in the island. Other values draw attention to native houses, such as that shown on the 2d. stamp reproduced here, and to such products of the Islands as coconuts, illustrated by a picture of a typical plantation, and breadfruit. One of the higher values, not reproduced here, shows a strange bird that buries its eggs in the warm sands and leaves them there to be hatched. This is the megapode, which lays an egg as big as that of the turkey, although it is itself only the size of a small hen

All these stamps bear the King's portrait and each is in two colours. They make an impressive display that will remind us of the very remarkable part that the Islands and their people took in the war.

**COMPETITION RESULTS**

(HOME)

**May "Drawing" Contest.**—1st Prizes, Section A: P. M. Souga, Woolhampton; Section B: A. R. Cameron, Glasgow. 2nd Prizes, Section A: D. Lane, Bolsover; Section B: D. S. Bradshaw, Dagenham. 3rd Prizes, Section A: H. T. Lyons, London E.17; Section B: K. F. Bogden, Hawkesyard. Consolation Prizes: R. T. Fox, London S.E.22; K. R. Pargeter, Stourbridge.



Lockheed P-38L, the eighteenth version of the famous "Lightning" fighter. It carries a 4,000-lb. bomb load, and is armed with a 20 mm. cannon in the nose and four 50 calibre machine-guns. The P-38L has special wing flaps to overcome air turbulence when diving at extremely high speeds during air combat. Photograph by courtesy of Lockheed Aircraft Corporation, U.S.A.

P. D. Hancock, Edinburgh 10; G. Rouse, Preston; C. P. Hellon, Birkenhead; D. Face, Birstall; P. D. Beddoe, Welling; B. S. Beddoe, Welling.

**May "Photographic" Contest.**—1st Prizes, Section A: R. Atkins, Eccles; Section B: N. Cox, Heath. 2nd Prizes, Section A: F. G. Reynolds, Sidcup; Section B: J. W. Waddington, Lonsdale. Consolation Prizes: B. Cheetham (Miss), Blackburn; P. W. Sullivan, Bilston.

**June "Crossword" Puzzle.**—1st Prize: B. M. Diver, Ilford. 2nd Prize: P. A. Lawson, Sutton Coldfield. 3rd Prize: K. B. Fenton, Harrow. Consolation Prizes: D. Burman, Wakefield; D. S. Heslop, Darlington; M. Nelson, Glasgow W.2; A. E. Sparrow, Hayes; P. I. Adams, Redland.

**June "Locomotive Pie" Contest.**—1st Prize: H. R. Simpson, Birmingham 28. 2nd Prize: W. F. Jones, Tynemouth. 3rd Prize: J. C. Fryer, Cheltenham. Consolation Prizes: B. Snow, Reading; B. Bottomley, Sheffield 8; D. J. Herd, Morden; M. Bott, Totten; M. H. Heard, Harrogate; G. L. Davies, Chorlton-cum-Hardy.

**June "Photographic" Contest.**—1st Prizes, Section A: C. A. Reader, Guildford; Section B: J. A. Nicol, Dingwall. 2nd Prizes, Section A: F. G. Reynolds, Sidcup; Section B: C. P. Dodworth, Repton. Consolation Prizes: R. Atkins, Eccles; B. Smith, Oakham; F. R. Carr, Purley.

**July "Photographic" Contest.**—1st Prizes, Section A: M. B. Aylott, Letchworth; Section B: M. I. McAlister, Wakefield. 2nd Prizes, Section A: P. Milne, Whyteleafe; Section B: D. L. Knott, London E.18.



# Fireside Fun

Diner: "Why has this chicken only one leg?"  
 Waiter: "It had been in a fight, sir."  
 Diner: "Well, you can take it back and bring me the winner."

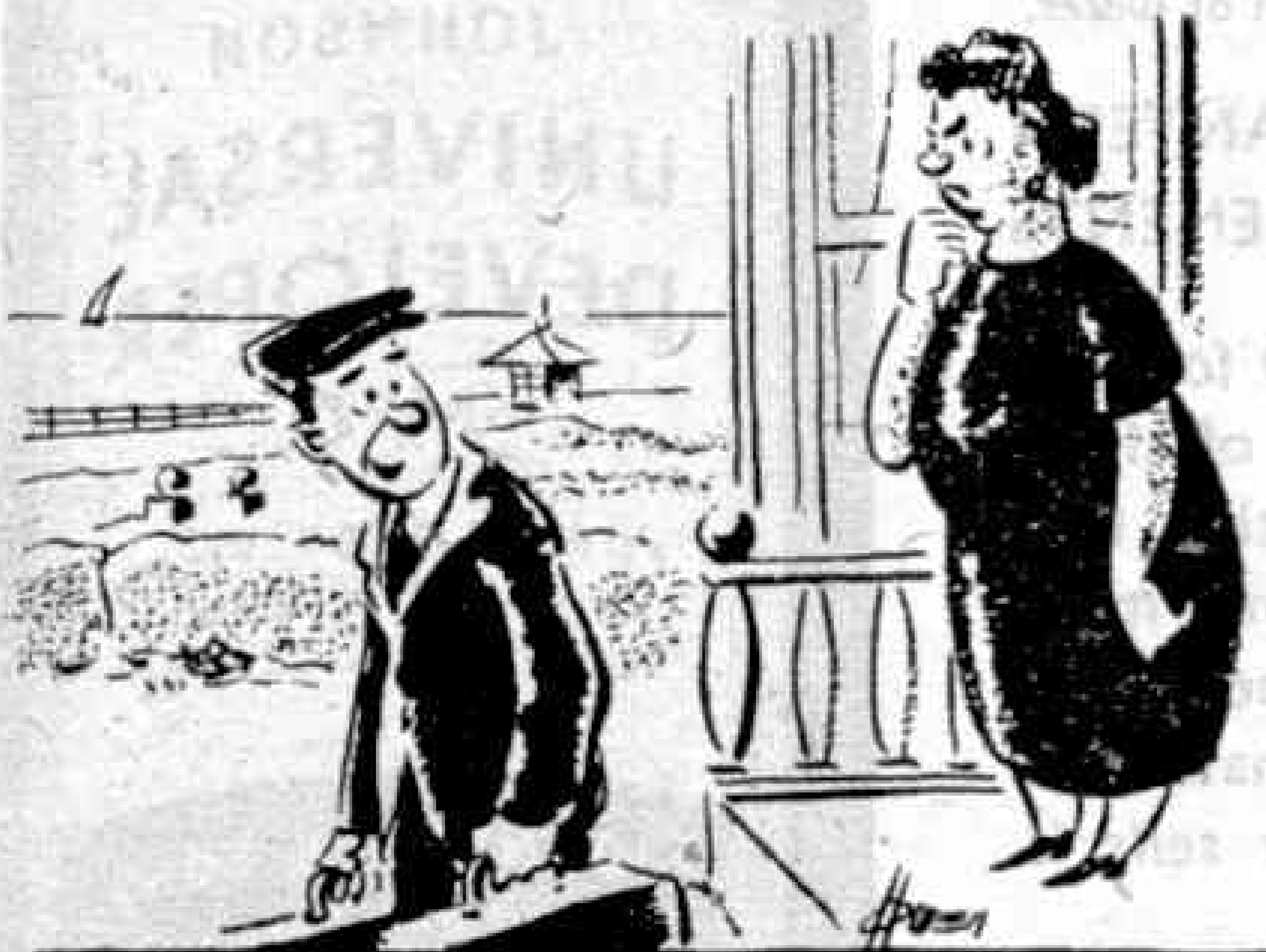


"What's your name, Boy?"  
 "Billy McHugh, Sir, but they call me Billiard Cue cos I work much better with a tip!"

"Did you hear about the row in the confectioners?"  
 "No. What happened?"  
 "Two stale buns tried to get fresh."

"Have you ever studied blotting paper?"  
 "Of course not. Why should I?"  
 "It's a very absorbing subject."

Quartermaster: "You'll have to pay for that rifle you lost."  
 Private: "Has everyone in the Services to pay for what they lose?"  
 Quartermaster: "Of course."  
 Private: "H'm, so that's why captains always go down with their ships, is it?"



"I'll recommend you to some people I know."  
 "That's nice of you."  
 "Not at all. I've got a grudge against them."

## THIS MONTH'S HOWLER

Sinister means a woman who isn't married.

## BRAIN TEASERS

### FUDDLED UNITS

There are 10 blimpies in a krull and 20 cundalls in a flitter. A flitter is the same as 5 krulls. Which is the greater, 240 cundalls or 500 blimpies, and by how many flitters?

### FILL IN THE MISSING LETTERS

Below are the names of nine well known British motor cars, with asterisks in place of every letter but one in each case. What are the cars?

\* \* S \* \* \* \* \* U \* \* \* O \* \*  
 \* I \* \* \* \* \* \* G \* \* \* \* \* M \* \* \*  
 \* \* R \* \* \* \* \* M \* \* \* \* \* E \* \*

### SITTING ROOM ONLY

An 18 ft. bench provides seating room for 3 men and 8 women, or 6 men and 4 women. What length is required for 5 men and 5 women? B.I.N.

### ENDS AS IT BEGINS

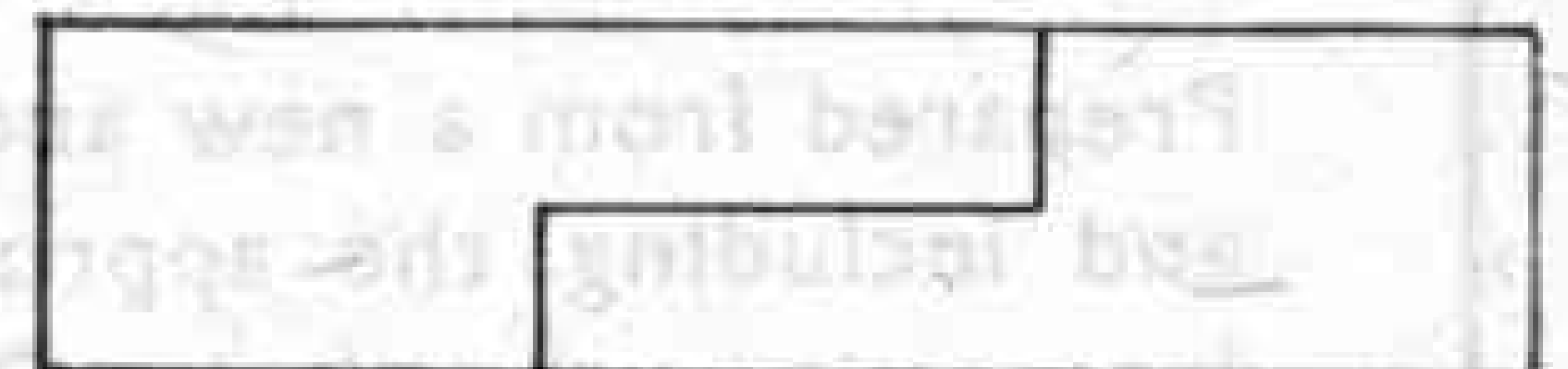
"Tracks," the organ of the Chesapeake and Ohio Railway Company, points out that the name of a famous man, now living in the United States, begins and ends with the same three letters. Who is he?



"Age! I'm the oldest man in the village, and I haven't an enemy in it."  
 "That's fine, Dad! We're glad to hear it."  
 "Yes, boys. They're all dead now."

### SOLUTIONS TO LAST MONTH'S PUZZLES

The accompanying diagram shows the shapes of the two pieces into which the strip of linoleum in our first puzzle last month should be cut to make it fit a space 9 ft. by 2 ft. The long and short horizontal sides of these pieces are 6 ft. and 3 ft. in length respectively.



We have picked out nine aeroplane names from the letter rectangle of our second puzzle. These are: Mosquito; Stirling; Fortress; Spitfire; Boston; Corsair; Dakota; Vigilant; and Mitchell. Have you found any more? If so let us hear about them.

In the first part of our third puzzle 30/- is the lowest sum possible and 150/- the highest. Every time a 6d. stamp is replaced by one for 2/6 there is an increase of 2/- in the total value, so that every even number of shillings between 30 and 150 is a "Possible." There is only one solution to the second part; the sum of 2/- must be made up of two 2d. stamps, ten 1d. stamps and four 2½d. stamps.

The tree in our last puzzle must have a height of 18 yds. to cast a shadow of 24 yds.



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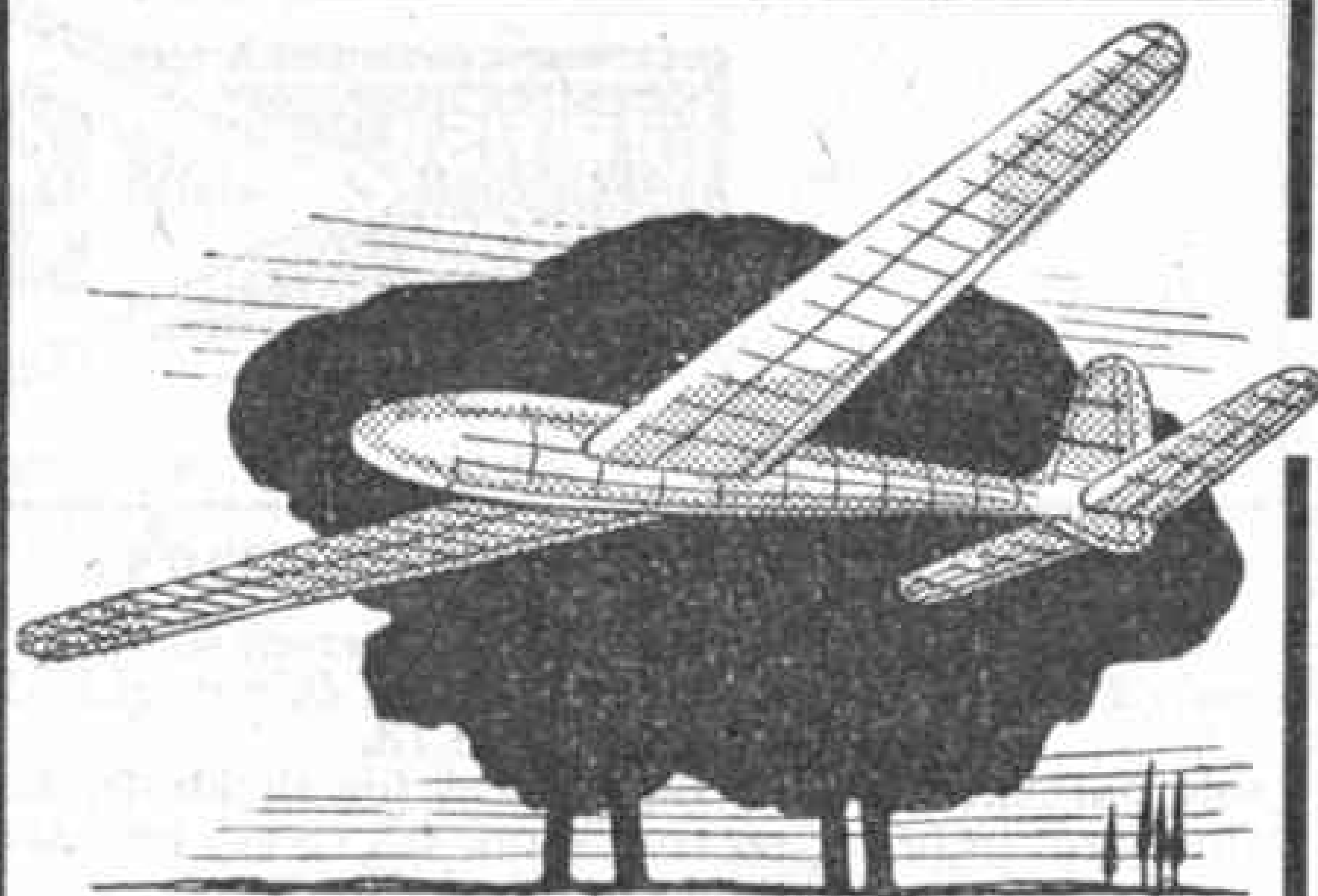
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Draughtsmanship	Structural Steelwork
(State which branch)	Surveying
Drawing Office Practice	(State which branch)
Electrical Engineering	Telegraph Engineering
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Eng. Shop Practice	Textile Designing
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(See also pages 352 and 354)

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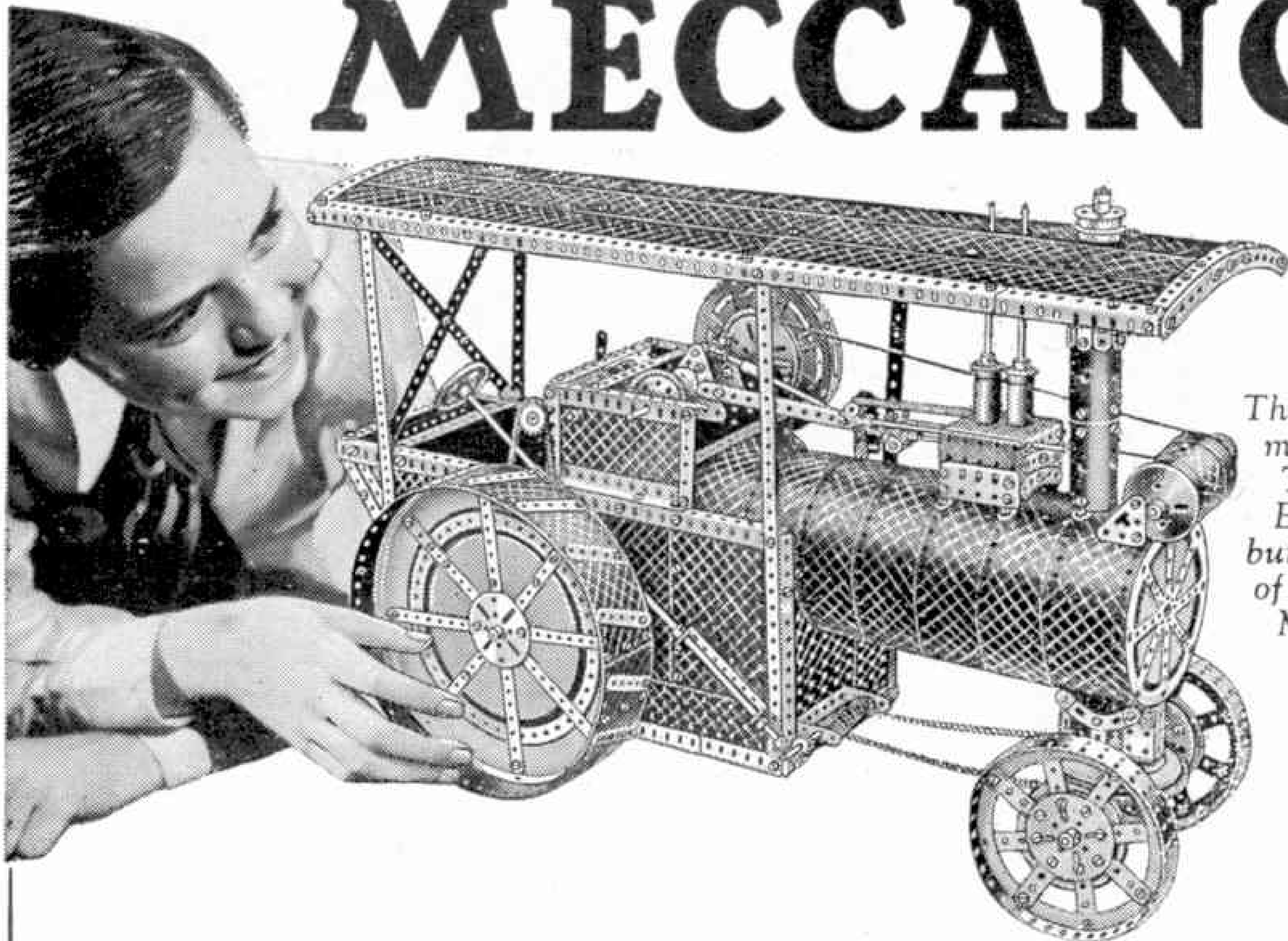
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