VOL. XLII No. 2 FEBRUARY 1957

MECCANO MAGAZINE

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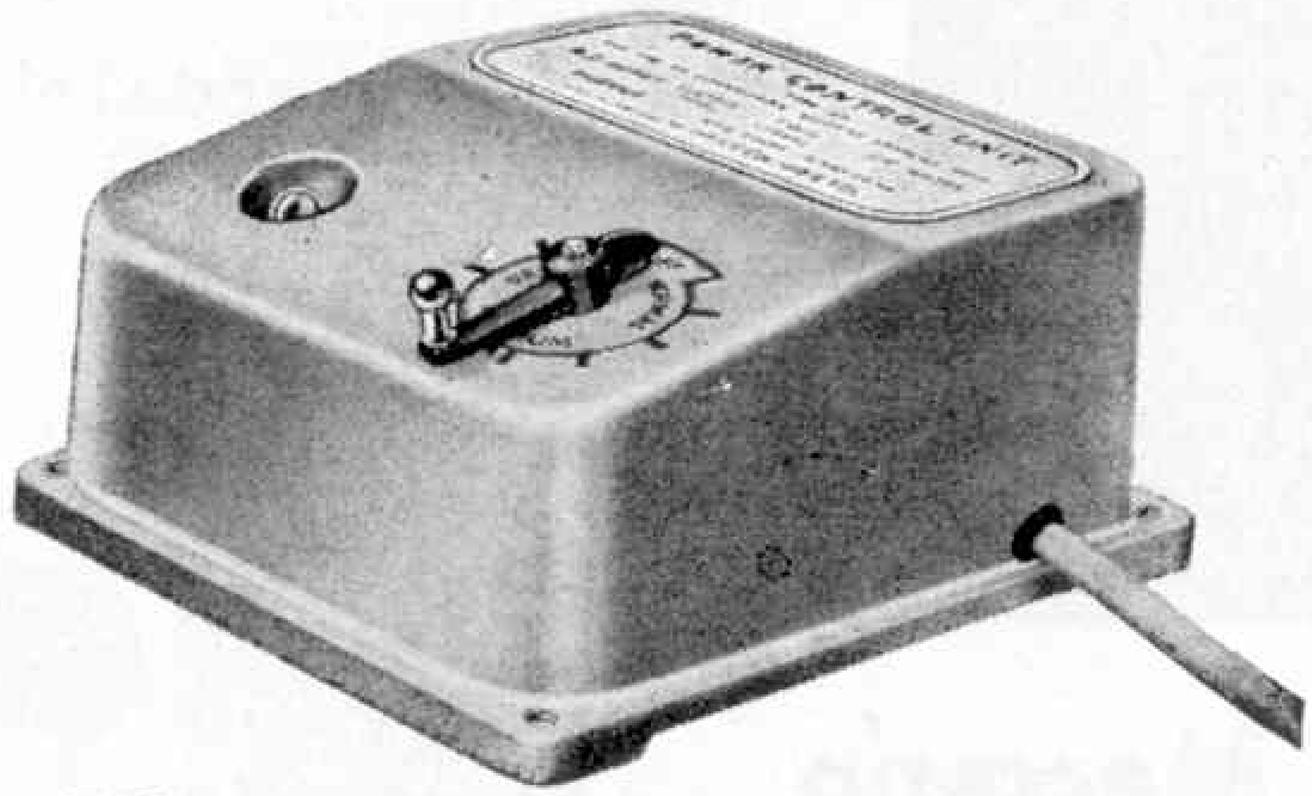

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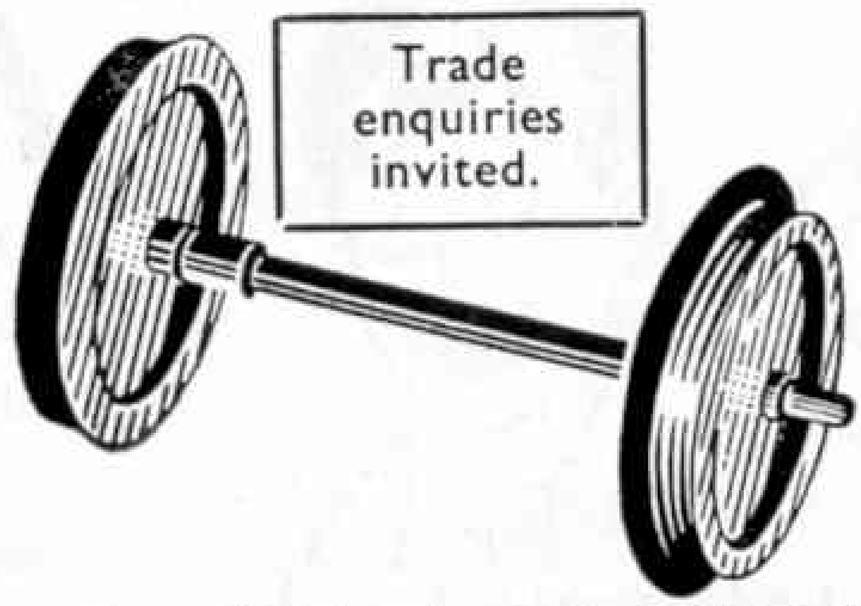

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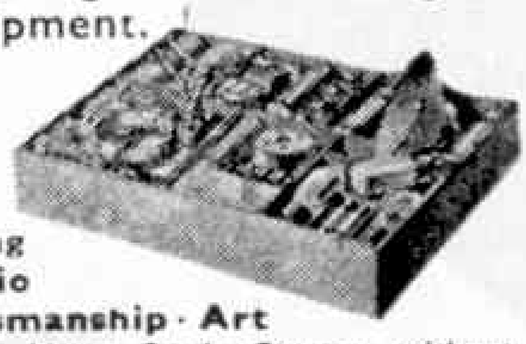

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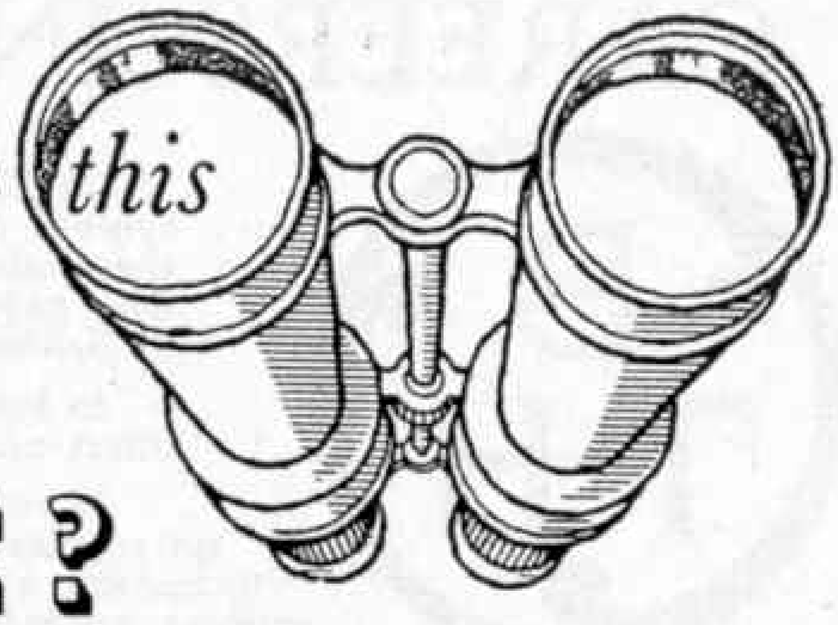

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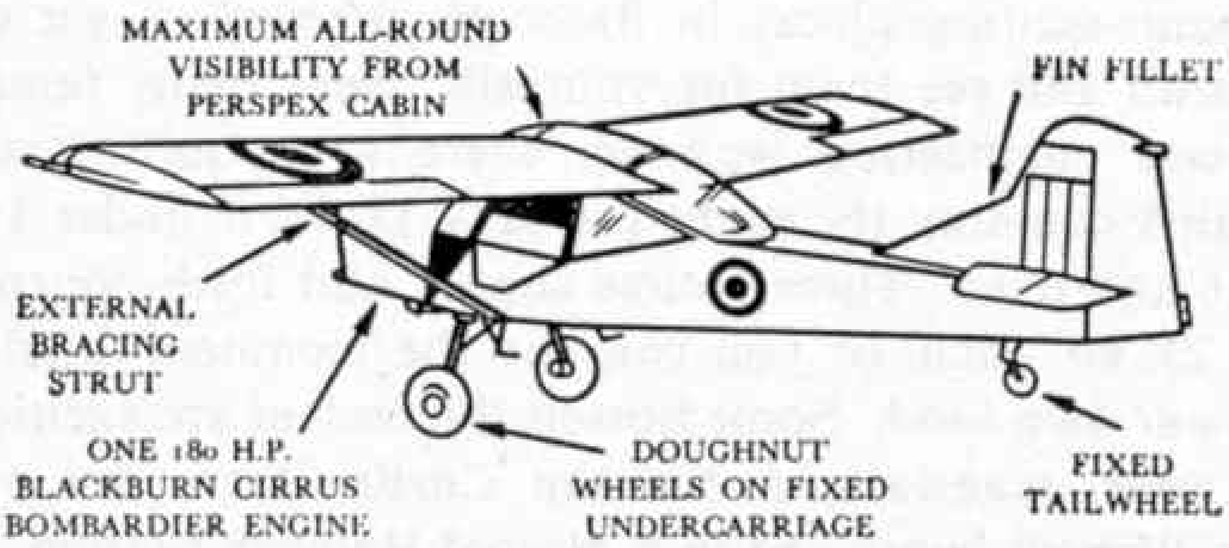

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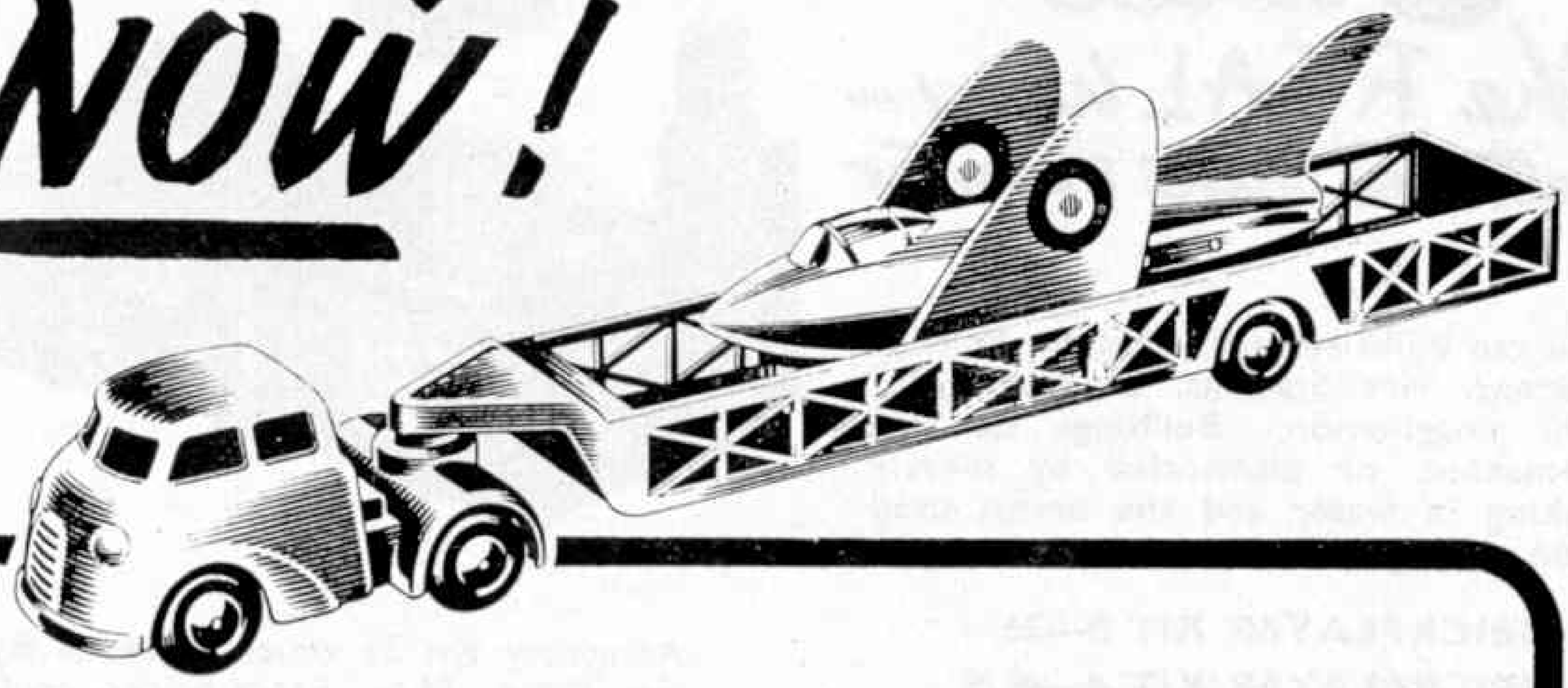

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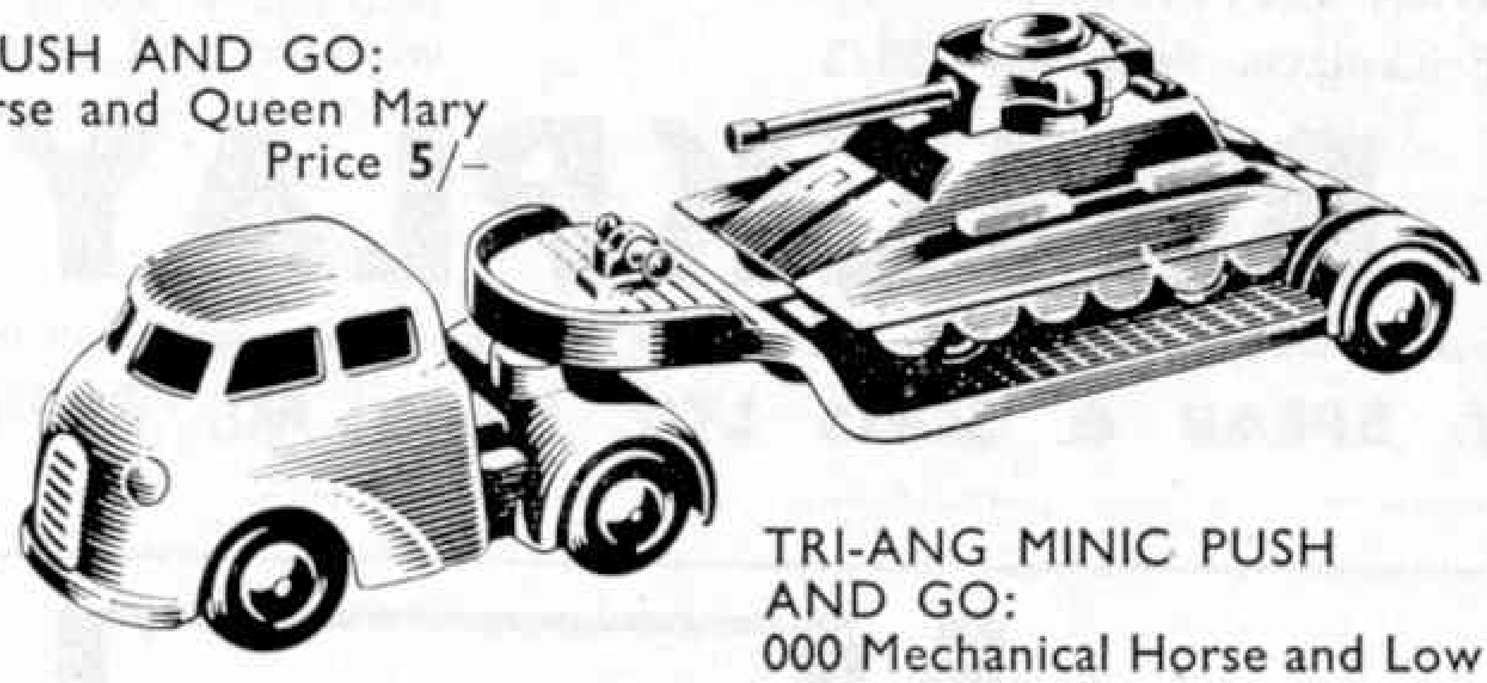

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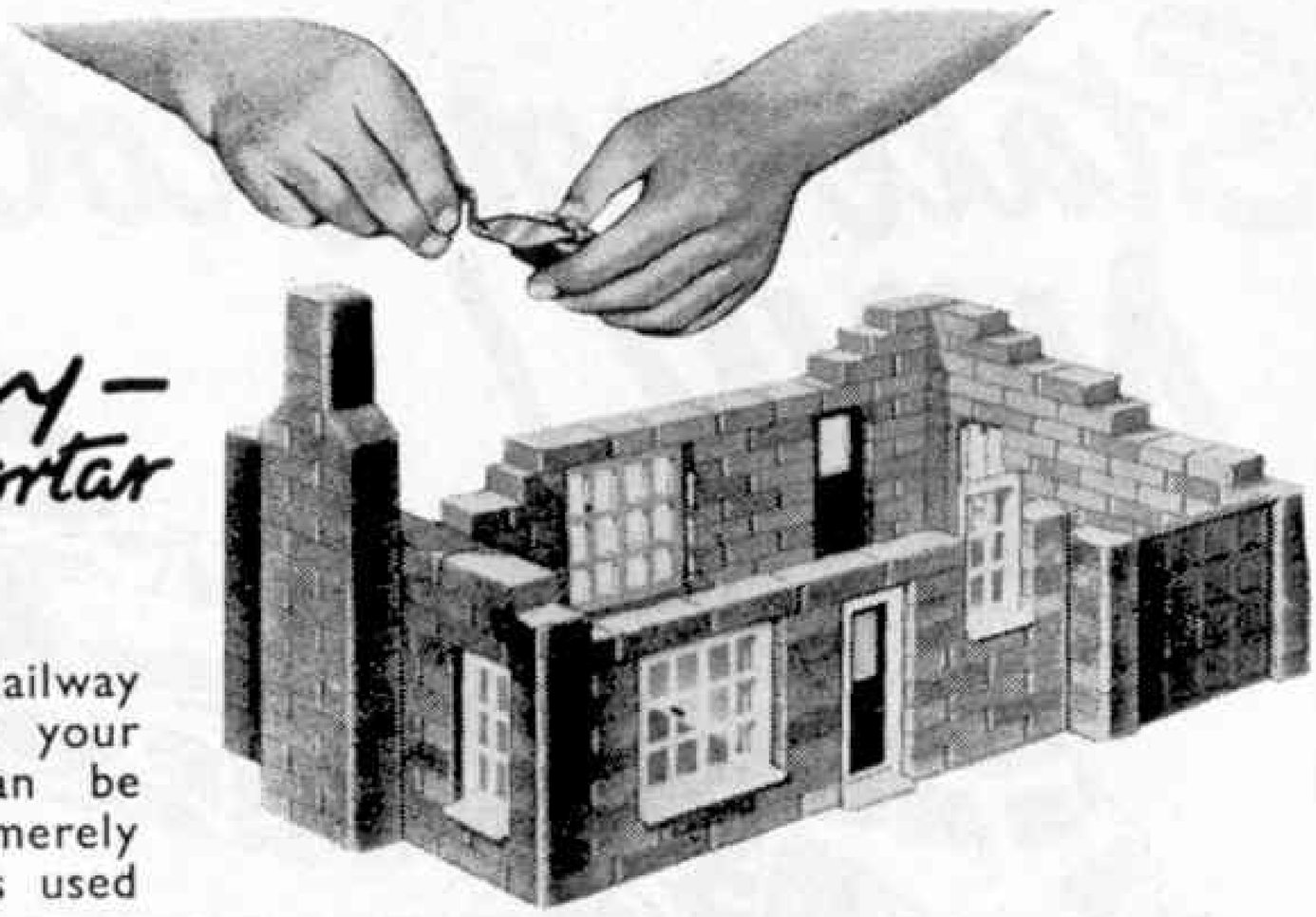

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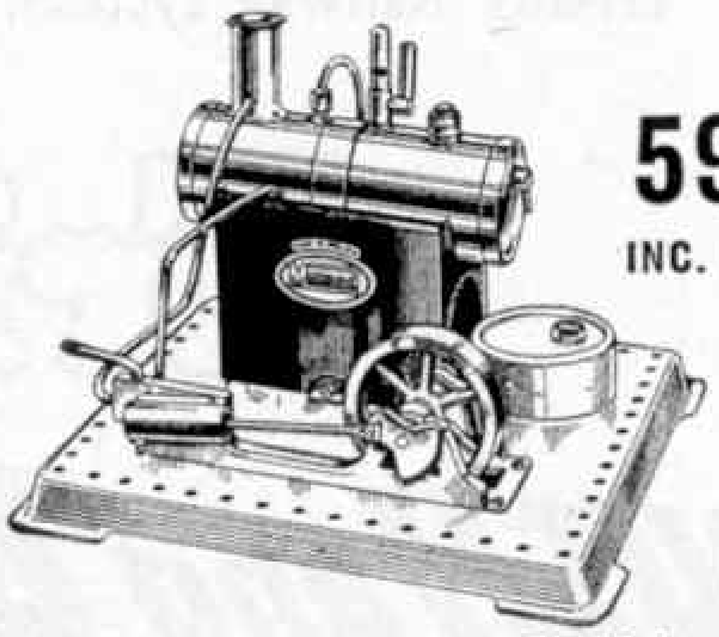

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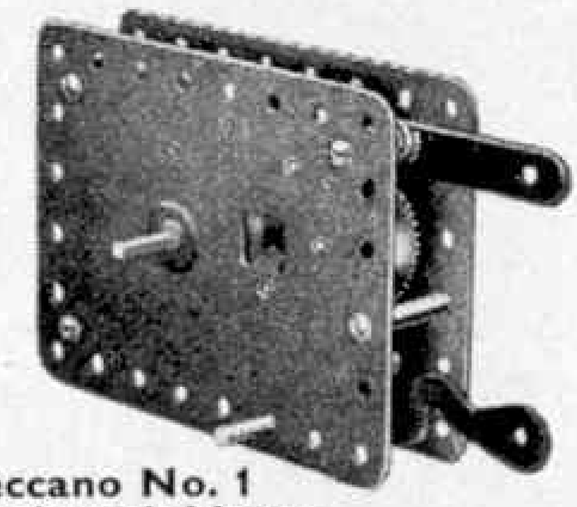

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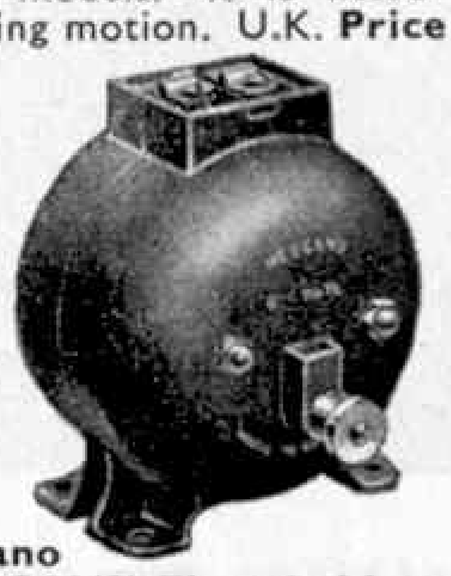

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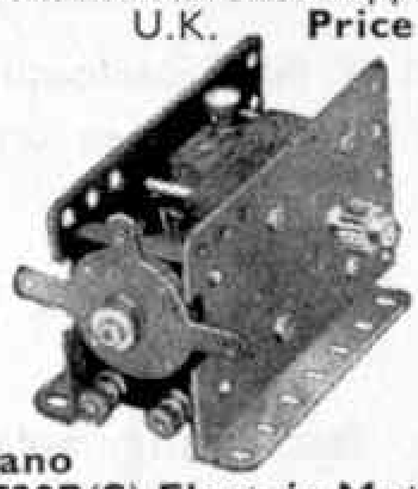

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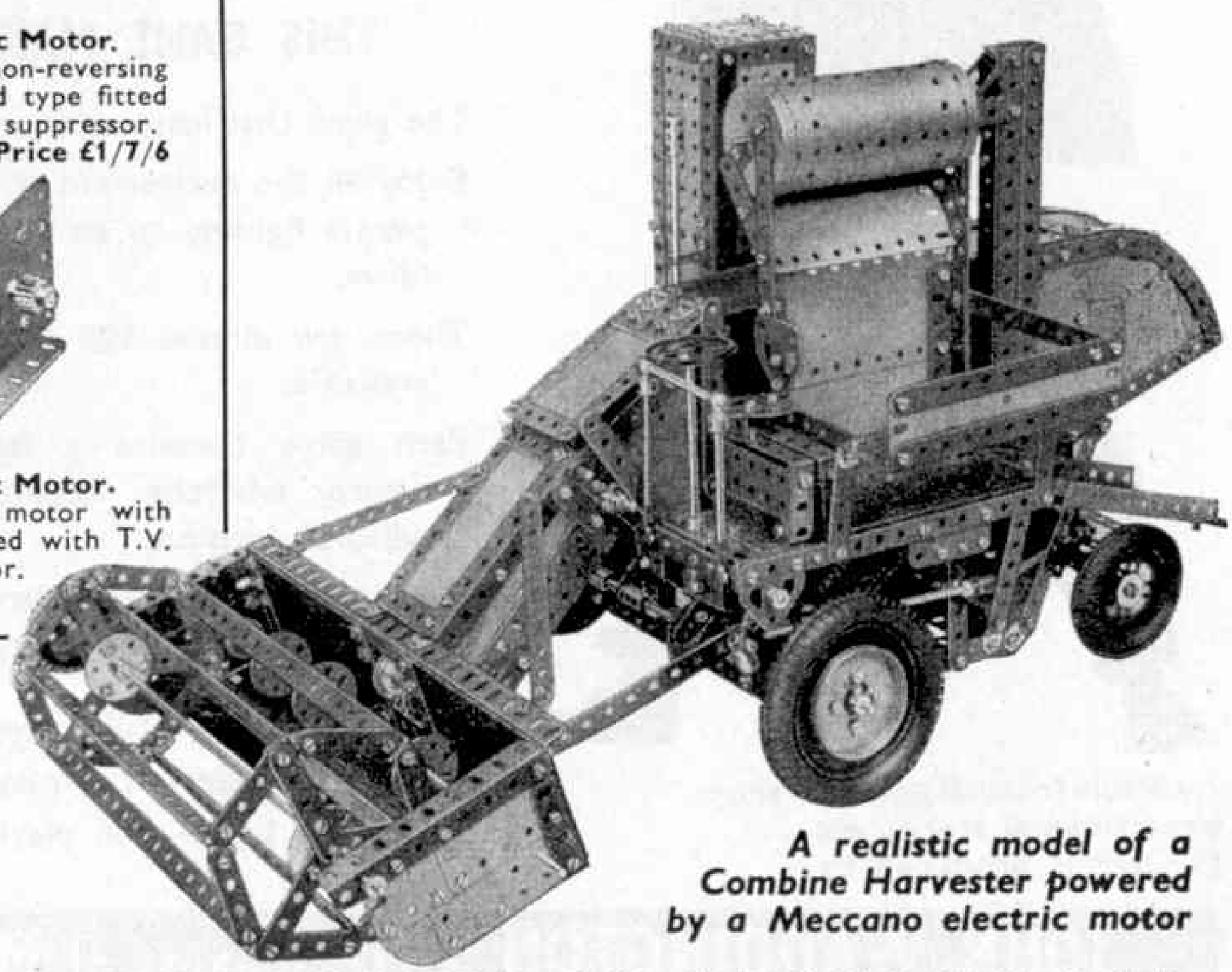

A realistic model of a Combine Harvester powered by a Meccano electric motor

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Next Month: "ISLE OF WIGHT FERRY SERVICE."

MECCANO MAGAZINE

Editorial Office:
Binns Road
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EDITOR : FRANK RILEY, B.Sc.

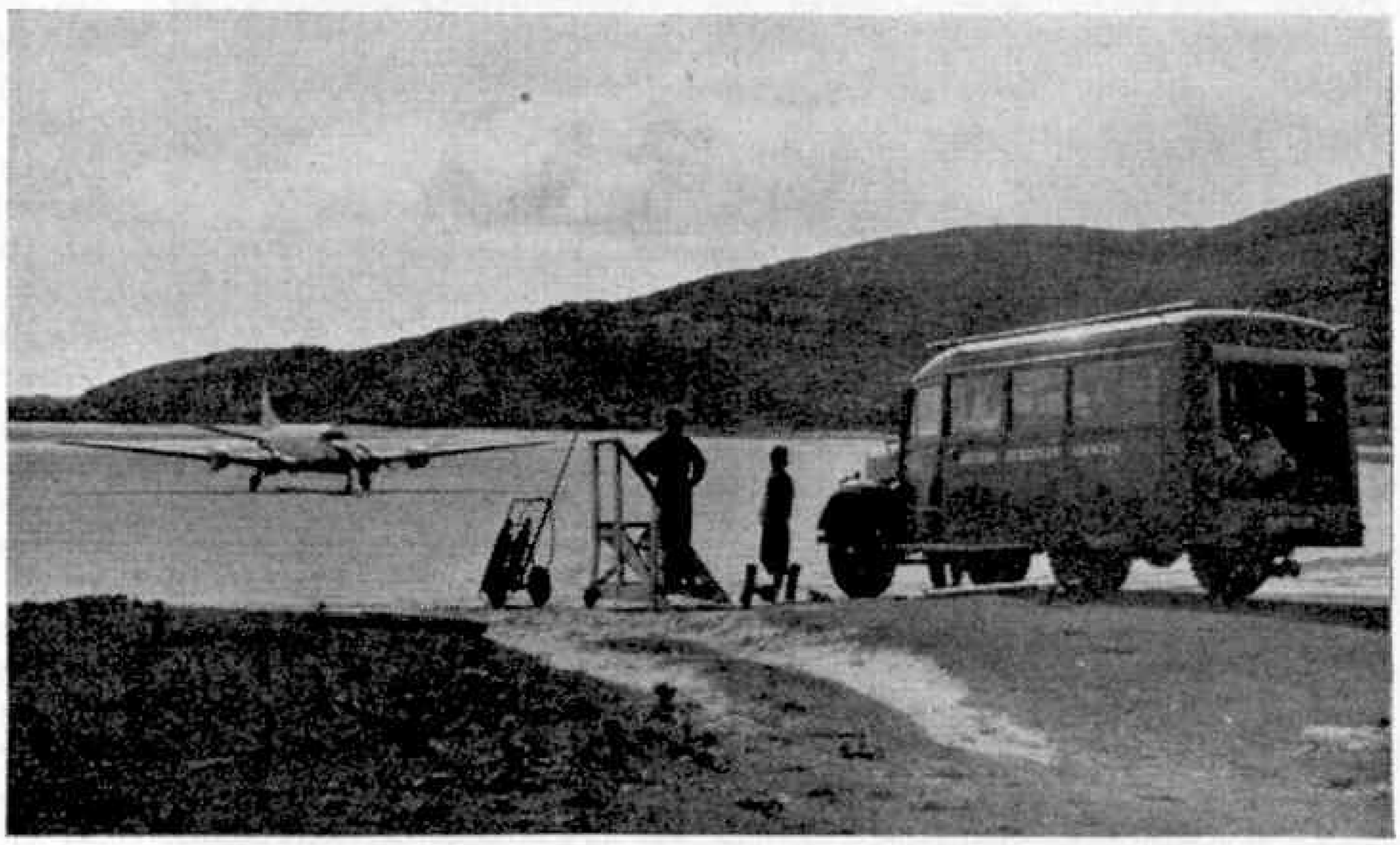
Vol. XLII
No. 2
February 1957

An Island Airfield

First I must thank all those readers who were kind enough to send me Christmas and New Year greetings. I always receive a goodly number, but more seem to flow in every year and the Christmas season of 1956 seems to me to have created a record. Whenever I could identify the sender I replied directly at once, and I am now extending my appreciation of greetings to myself and to members of the staff of the *M.M.* to all those whose addresses I was unable to trace.

And now I am paying a visit to one of the more lonely quarters of the British Isles. As we have not yet advanced far into 1957 I am doing this with progress in my mind again, and it is progress that has brought real benefit to quite a number of people and, unlike some so-called advances in civilisation, does not do anyone any harm.

As you will probably have learned from my picture this month, the scene of this fine progress is Barra, one of the southernmost islands of the Outer Hebrides. And the photographer, a regular reader of the *M.M.*, points out that it shows what is probably the most cheaply maintained airfield in the British Isles that is in regular use. The landing ground is a cockle beach on the north east coast of the island. The runway is firm and solid, and the only difficulties encountered are caused when a strong wind is blowing.



An airfield in the Hebrides. The cockle-shell beach on the north east coast of the island of Barra, with a B.E.A. Heron approaching the landing steps. Photograph by H. E. Meyer, Chandler's Ford, Hants.

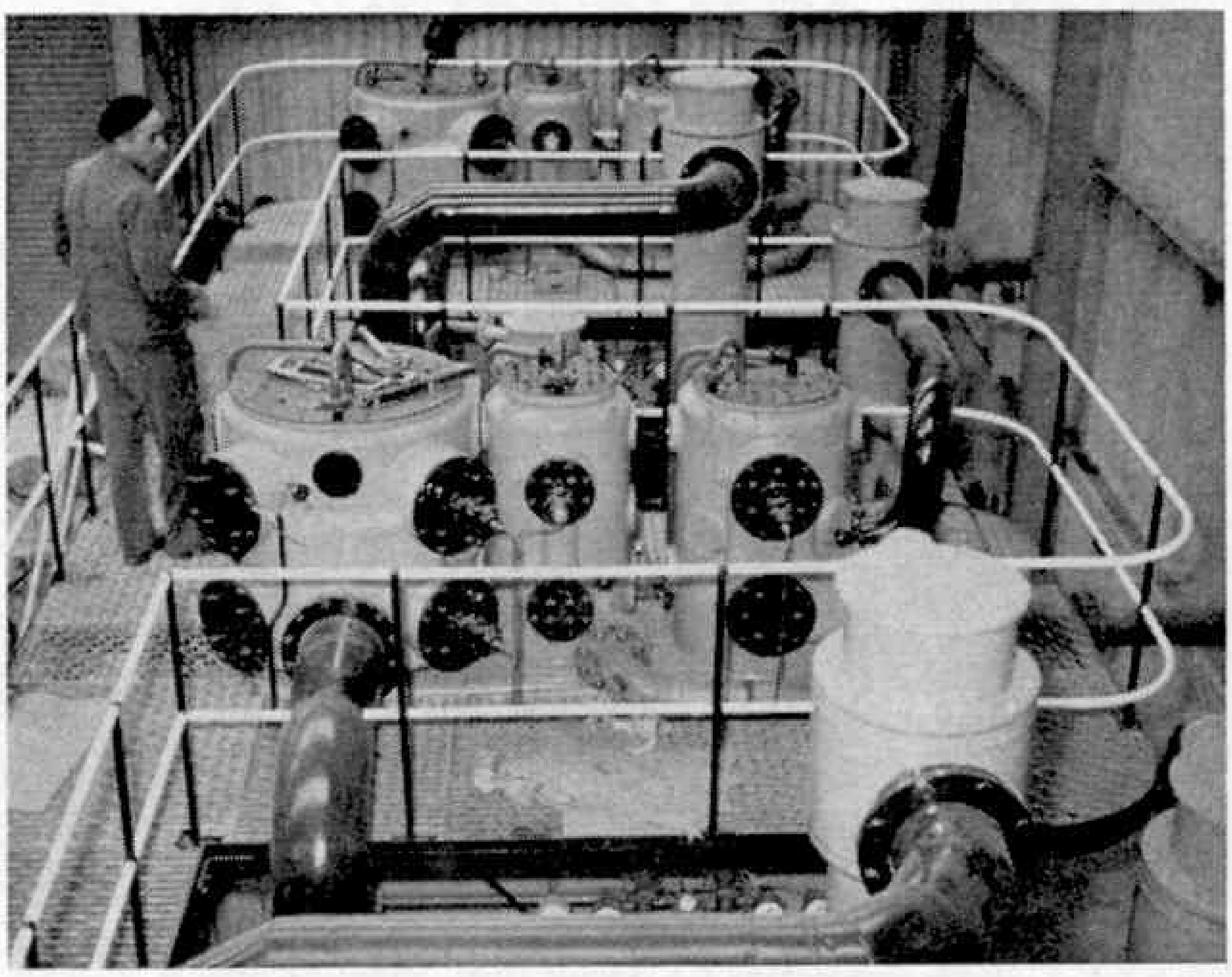
The de Havilland Heron seen landing on this cockle beach is a B.E.A. machine that arrives three times weekly at periods when the tide is low. It carries mail, but is also used as an ambulance when necessary. The Heron carries passengers too, a handful of visitors in the summer and crofters who make use of it as a link with Glasgow and the mainland generally. The entire equipment of this airfield, apart from a small waiting hut, is to be seen in the picture.

The Editor

Oxygen by the Ton

By the Editor

IN a sense, we have so far only touched the fringe of producing oxygen and using it. There is plenty of it in the atmosphere. Above every *square inch* of the world's surface there is a column of air weighing about 14 lb., and some 3¼ lb. of this is oxygen. Remembering that the area of the world's surface is about 197,000,000 *square miles*, perhaps you would like to calculate from this how many tons of oxygen there are in our atmosphere. Use a large sheet of paper, because there are plenty of figures in the answer!



Oxygen compressors at Margam seen from above. The illustrations to this article are reproduced by courtesy of British Oxygen Ltd.

The oxygen of the air is free, but it takes a lot of energy to separate it from its main companion, nitrogen, and other gases in our atmosphere. So the plant that has to be used for this purpose is complex and expensive. We are now at the beginning of an era in which oxygen will be produced in much larger quantities than in the past, on a scale indeed that justifies the introduction of the new term "tonnage oxygen." It is planned to erect oxygen plants near steelworks and factories where the gas is required in large quantities, and to deliver the gas, not in the familiar steel cylinders that have been in use for many years, but in quantity through direct pipelines.

The first of these plants has been built near the Margam Works of The Steel Company of Wales, and was opened by the Rt. Hon. Gwilym Lloyd George, Home Secretary and Minister for Welsh Affairs, in August of last year. It is capable of producing 100 tons of oxygen a day. A second plant is to be constructed there to yield 200 tons of oxygen daily, and plants are to be established also at Scunthorpe, Middlesbrough and other steel-making centres.

Now let us see how the oxygen is produced at Margam. The plant erected for this purpose works on what is known as the Rescol principle, a name that is made up of the initial letters of the three words Regenerator Single Column used to describe the process. The air is first compressed and then has to be cooled, because compressing a gas heats it.

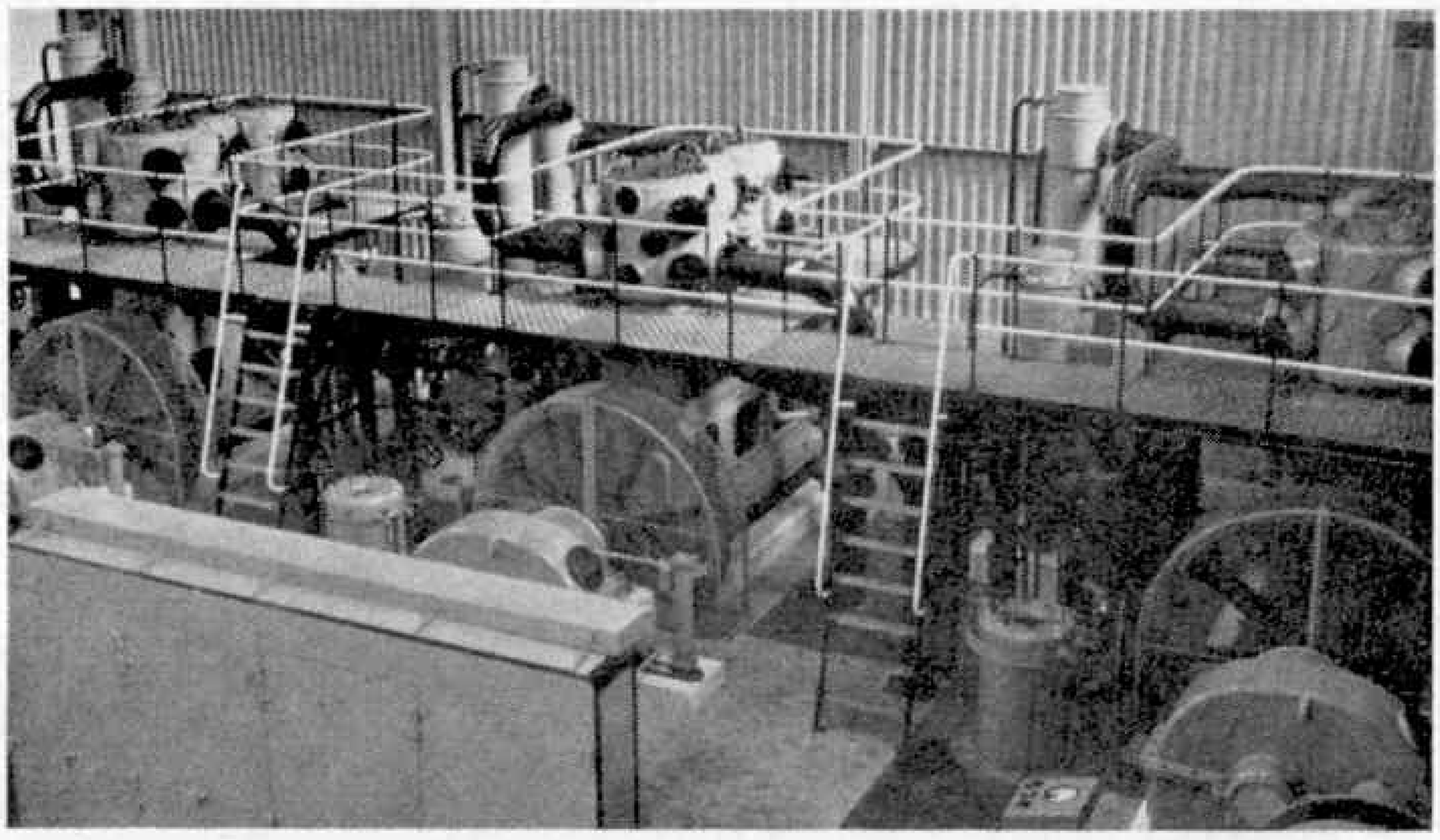
Then the cooled air passes on to the regenerators. These are separate vessels built up inside a large box, known as the cold box, packed with insulating material to prevent heat reaching them from outside. Inside the regenerators are materials with a very large surface area per unit volume, and these provide the surface on which the incoming air is further cooled. The "cold" is supplied by the return of low temperature gases from the air separation unit, in which the next stage of the process is carried out.

The regenerators work alternately in two directions. First the cold gases from the air separation unit pass through a particular regenerator; then valves are closed to shut them off, and others are opened to let in air from the coolers, which in this way is cooled to about 320 deg. F. below freezing before passing on to the separation unit.

In the separation unit the purified air is cooled even further, and liquified ready for rectification, or distillation, in the separating column, which is similar in a general way to that used in oil refineries. The air enters at the top of the rectifying column. As it flows downward it is separated into pure gaseous and liquid oxygen on the one hand, and waste nitrogen and a smaller proportion of pure nitrogen on the other. The oxygen is heavier than the nitrogen, so it leaves the column at the bottom, while the nitrogen leaves at the top. It is these nitrogen fractions that are the constituents of the gases that are passed back through the regenerator units in order to cool the incoming air, as already mentioned.

The temperature in the air separation unit must be very low, so an expansion turbine is used. In this, part of the cooled air is expanded, giving a fall in temperature, as in a domestic refrigerator. It is the "cold" produced in this way that maintains the air separation unit in the condition required to do its work. The machines that do this are quite small and compact, as the air with which they deal is at a very low temperature and correspondingly small in volume.

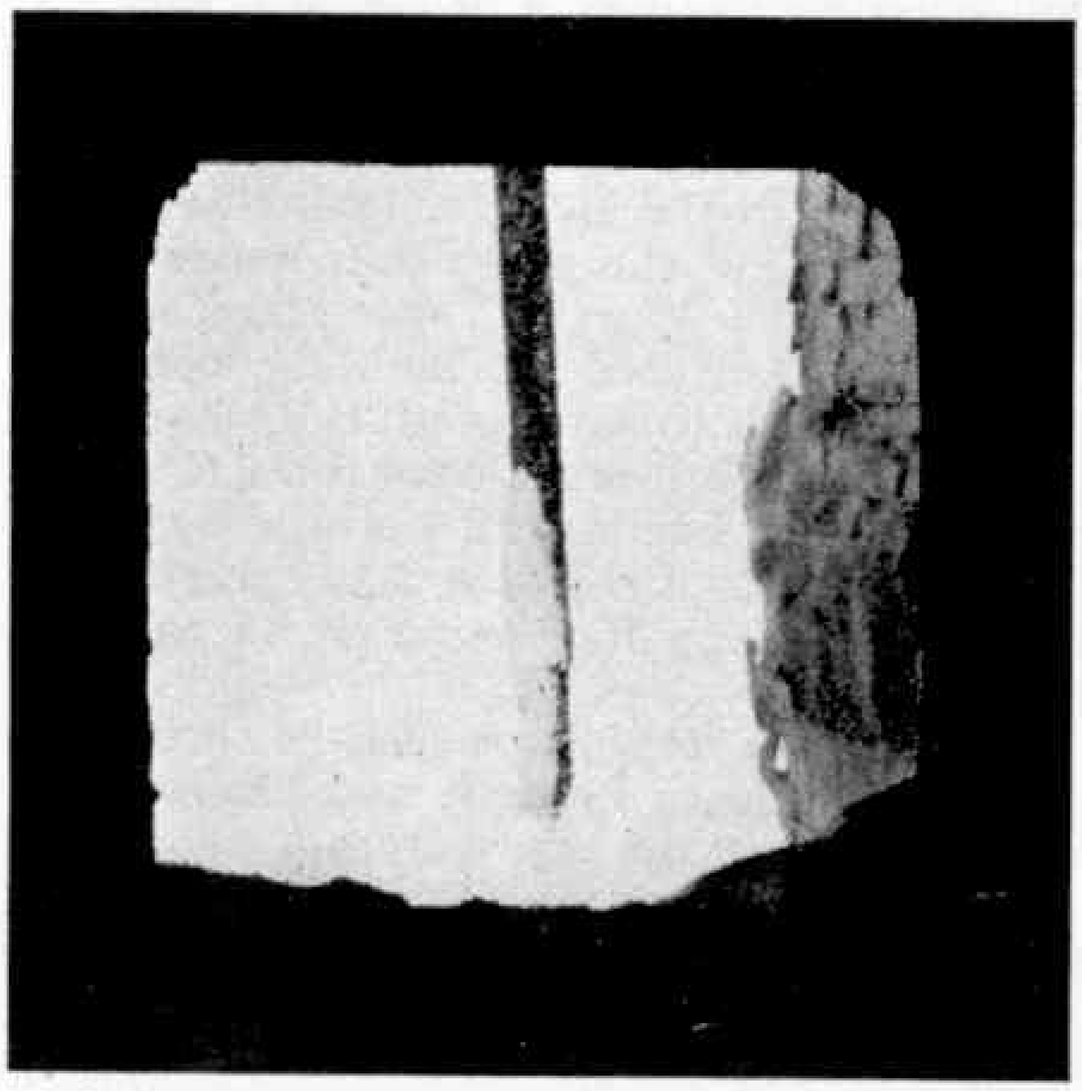
The whole process is controlled from a central panel, where instruments show on dials temperatures, pressures, rates of flow and even composition of the gases passing through the plant. The oxygen itself is fed into a storage gas holder, from which it is pumped at high pressure through a pipeline for use in the nearby steelworks.



Another view of the oxygen compressors at Margam. The oxygen produced is used in the Abbey Steelworks of the Steel Company of Wales.

Now, how is the oxygen used? Steel is made by melting together in an open hearth furnace steel scrap and molten pig iron, the last named of which is obtained from blast furnaces and contains about 4 per cent. of carbon. On melting there still remains about half of one per cent. of carbon, and during the refining process this has to be reduced to about a tenth of that amount in order to give steel of the quality required for steel sheet for the motor car industry.

Normal melting practice in the open hearth furnace only allows this carbon to be burned away at a fairly slow rate, and the idea of feeding oxygen into the furnace is to speed up the burning. Through the pipeline the oxygen is led to a water-cooled gun or probe that can be lowered through the roof of the furnace, so that the oxygen is fed in at the surface of the molten steel. This speeds up the elimination of carbon, and reduces the actual time required for this process to one third of that when no oxygen is used, giving an overall increase of about 10 per cent. in steel production.



The water-cooled probe that feeds oxygen into molten steel.

America's Big Stick

By John W. R. Taylor

THIS month's cover shows one of the world's biggest aeroplanes, the Convair B-36 bomber, over the Grand Coulee Dam, which is the largest concrete structure ever built.

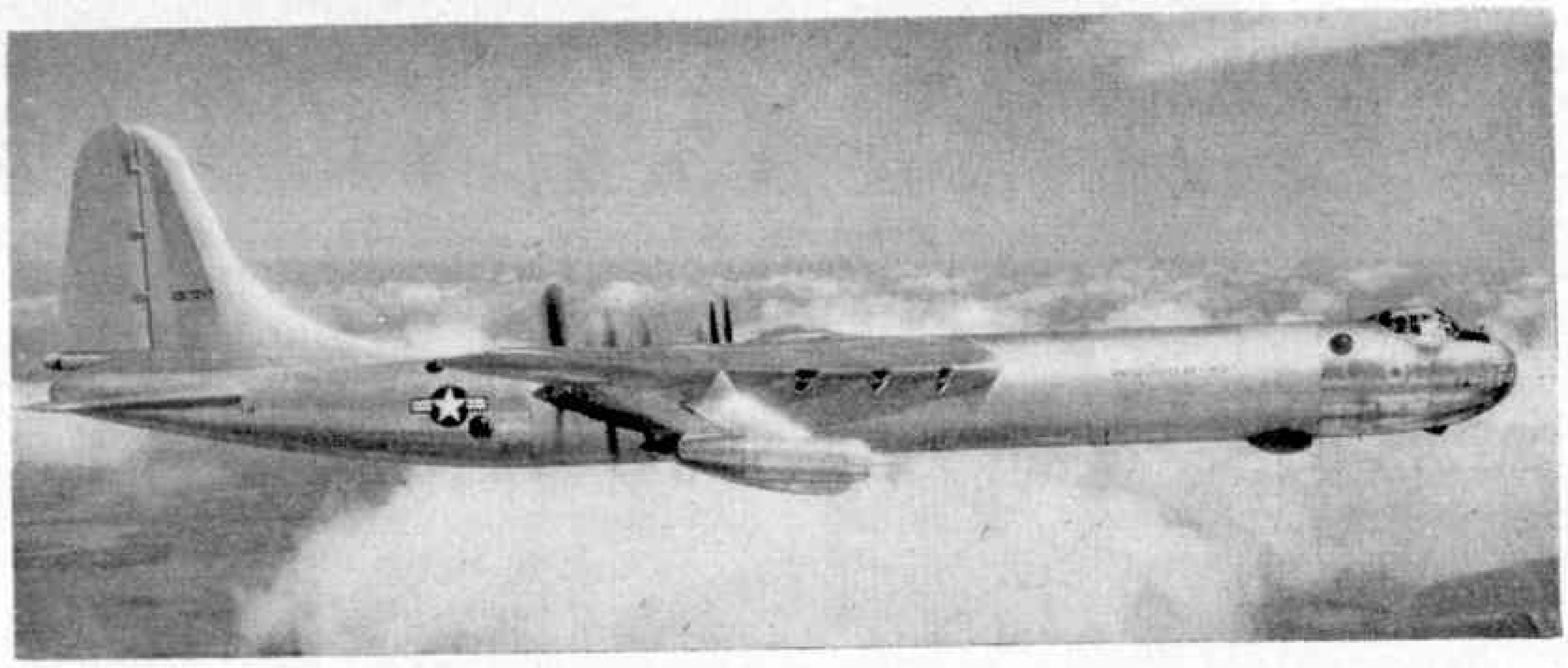
Standing on the Columbia River in Washington State, the dam is only 550 ft. high, yet it contains more than seven times as much masonry as the great Cheops pyramid in Egypt and is capable of passing a flood of one million cubic feet every second, a quantity that would be sufficient to create a waterfall five times the average flow of Niagara Falls and three times as high.

Such figures are impressive; but the real importance of the Grand Coulee Dam is that its hydro-electric power plant can produce more than a million and a quarter kilowatts of electricity, so that it is able to supply light, heat and power to factories, farms and homes over a vast area.

It is easy to think of the Grand Coulee as one of man's greatest achievements, because it is helping to improve the comfort and well-being of so many people; whereas the B-36 is an atom-bomber, designed to spread death and destruction. But is this really so?

The American President of 50 years ago, Theodore Roosevelt, said that the only sure guarantee of being able to live in peace, so that we can build dams and houses instead of wasting our lives fighting, was to "speak softly and carry a big stick." The B-36 has been the "big stick" of the North Atlantic Treaty powers for several years now, and its ability to carry an enormous bomb-load for long distances has made it the best possible deterrent to any nation with warlike ideas.

The story of the B-36 began in 1941, when Convair won a U.S. Air Force design competition for an aircraft with a range of 10,000 miles carrying a 10,000 lb. bomb-load. By a coincidence, this was the year that the Grand Coulee Dam began operating; and it was also the year in which America entered the second World War.



A Convair B-36D bomber of the U.S. Air Force. This version has two pairs of jet engines in pods under the wings to supplement its six "pusher" piston-engines, three in each wing.

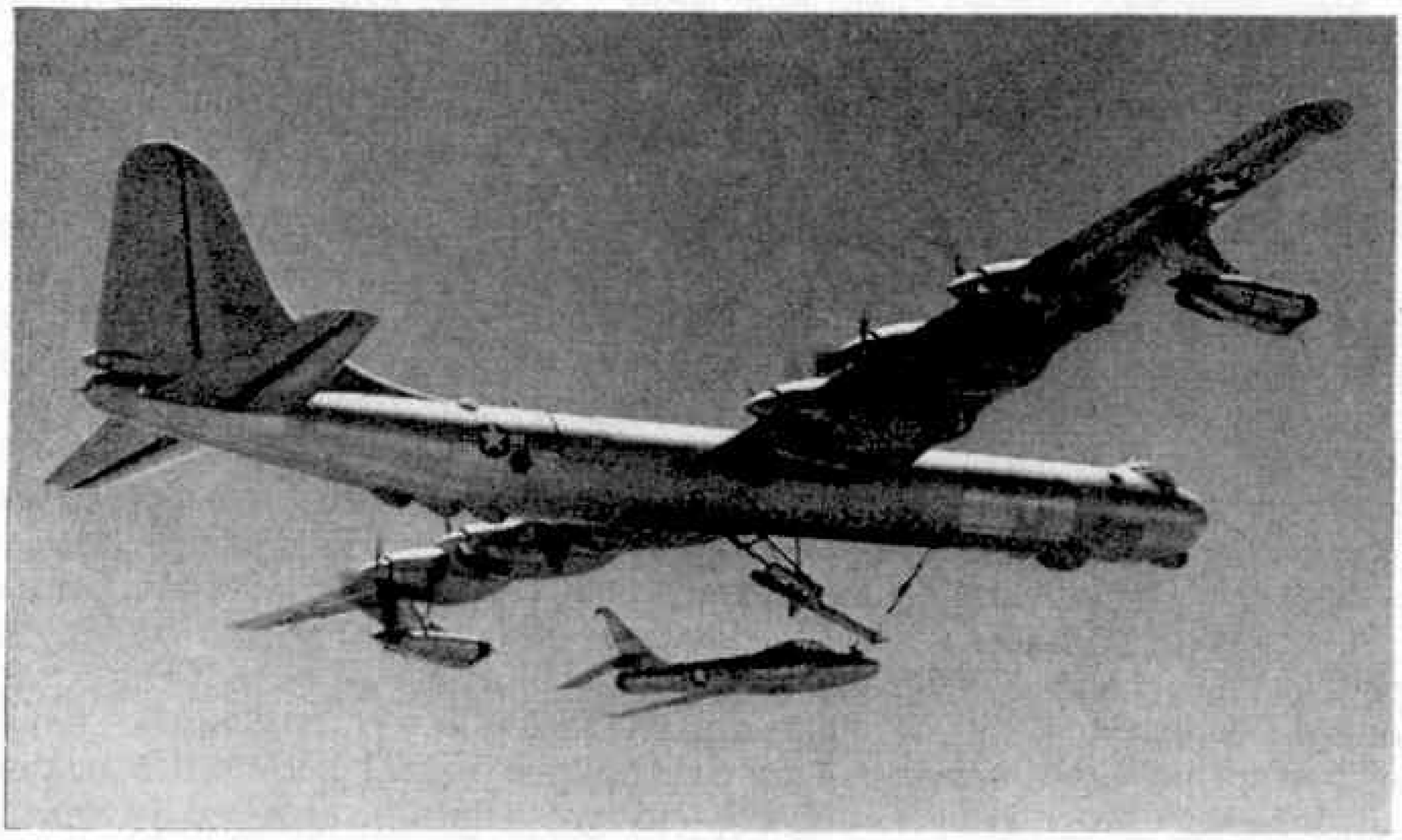
Convair received a contract for two prototypes of the B-36 on 15th November, 1941; but for the next four years work at their Fort Worth, Texas, factory had to be concentrated on building the four-motor B-24 Liberator and B-32 bombers. As a result, full-scale construction of the B-36 did not begin until the war was won, although the Air Force had planned to buy 100 of the huge aircraft as early as July, 1943.

When the prototype XB-36 first flew on 8th August, 1946, it was different in many ways from the aircraft shown on our cover. To start with, it had only six 3,000 h.p. Pratt and Whitney R-4360-25 "pusher" piston-engines, and each of its main undercarriage legs was fitted with a single wheel and tyre, more than nine feet in diameter.

The Convair B-36H, with improved radar and other changes, was introduced in 1952.

On the B-36A production version, which followed a year later, on 28th August, 1947, the roof of the flight deck was raised to give the crew a better view, and the single main wheels were each replaced by a four-wheel bogie to save weight and spread the aircraft's 260,000 lb. weight over a bigger area of runway.

That was only a start, because the B-36B of 1948 was fitted with more powerful, 3,500 h.p. R-4360-41 engines and, in the following year, the huge bomber was given an over-the-target speed of 435 m.p.h., by slinging two pairs of 5,200 lb. thrust General Electric J47-GE-19 jet-engines in pods under its wings. This version, the B-36D, is the one that we have seen often over Britain, the roar of its ten engines booming down even when it draws its vapour trails across a blue sky at a height of over 30,000 ft.



A Republic F-84F fighter of the U.S.A.F. about to make contact with the trapeze of a Convair GRB-36 bomber. The trapeze hauls the fighter up into the bomb-bay of the parent aircraft.

Everything about the B-36D is big. Its wing span of 230 ft. is nearly twice as long as the distance covered by Orville Wright when he made the first flight in a powered aeroplane in December, 1903. Its cylindrical fuselage is 162 ft. long and contains an 85 ft. long tunnel through which members of the 16-man crew can pull themselves on a small wheeled trolley if they want to get from the flight deck to the pressurised tail compartment during flight. Its engines drive 19 ft. dia. propellers and its wing tanks contain over 30,000 U.S. gallons of fuel. Maximum bomb load is nearly 38 tons, which is far more than the weight of a fully-loaded Lancaster bomber of World War II, and it is armed with no fewer than sixteen 20 mm. cannon, mounted in pairs in the nose and tail and in six retractable, remotely-controlled turrets.

Yet even the B-36D did not represent the end of the story, because the "F" model of 1950 introduced R-4360-53 engines of 3,800 h.p. each; the B-36H brought improved radar and other changes in 1952; and the "J" had to have a strengthened undercarriage to cope with its new loaded weight of over 400,000 lb., which makes it heavier than any other aircraft ever flown.

The design was adapted for other duties. First of all, in 1949, fourteen cameras were mounted in the forward bomb-bay of a B-36D, converting it into the RB-36D reconnaissance-bomber, and "RB" versions of the B-36F and H followed. Then, when even 435 m.p.h. became too slow to enable the bomber to dodge the enemy defences, somebody thought of the "Ficon" idea.

The first Boeing KC-135 jet tanker-transport, seen during initial aerial refuelling tests with an eight-jet, 650 m.p.h., Boeing B-52 Stratofortress. Illustration by courtesy of the Boeing Airplane Co., U.S.A.

This was probably a flashback to 1948, when the McDonnell company had built a hideous little fighter, only 15 ft. long and with folding wings so that it could be carried inside the bomb-bay of a B-36 and released during combat to protect it. "Ficon" (Fighter Conveyor) follows the same idea, but this time a standard RF-84F Thunderflash reconnaissance-fighter is carried under the B-36, with the bomb-bay cut away to accommodate it.

The idea is that the bomber, now designated GRB-36, can use its 10,000 mile range to carry the fighter to within a few hundred miles of the target. There, it releases the fighter, which dashes in at 650 m.p.h. to drop its bombs or take reconnaissance photographs and then returns to the "aircraft carrier" GRB-36, which collects it on a trapeze and hauls it up into the bomb-bay for the return flight.

"Ficon" has helped the U.S.A.F.'s Strategic Air Command to keep its "big stick" effective while faster jet-bombers were being designed and built. Now the B-36's are beginning to retire. Over the past few years they have been joined by around 1,500 Boeing B-47 Stratojet six-jet medium-bombers, and now the first B-52 Stratofortress bombers are in service to replace them. Although smaller than the B-36, these eight-jet sweptwing aircraft can carry a tremendous load of hydrogen, atomic and H.E. bombs or reconnaissance cameras at well over 600 m.p.h., and for virtually unlimited ranges, by refuelling in flight.

Nor have Convair rested on their laurels, for they recently flew the prototype of the world's fastest, most formidable bomber, the B-58 Hustler. This is secret and until recently no photographs were permitted by the U.S.A.F. It is a delta-wing aircraft spanning only 55 ft., but with a fuselage 95 ft. long and powered by four General Electric J79 turbojets each giving 12-16,000 lb. of thrust.

The B-58 is the world's first faster-than-sound bomber, designed to carry a crew of three and an atomic bomb for long distances with an over-the-target speed of about 1,000 m.p.h. In fact it is so fast that Convair are even producing a fighter version carrying a pod of air-to-air missiles instead of bombs under its slim fuselage.

Strategic Air Command expects its men to be every bit as good as these advanced aircraft. Each crew of a bomber squadron knows the target it would have to attack if war started. The men know their route to and from the target, where they would meet tanker 'planes to refuel in flight, and even how to evade capture if they were shot down—and they have to be ready to go at the proverbial moment's notice.

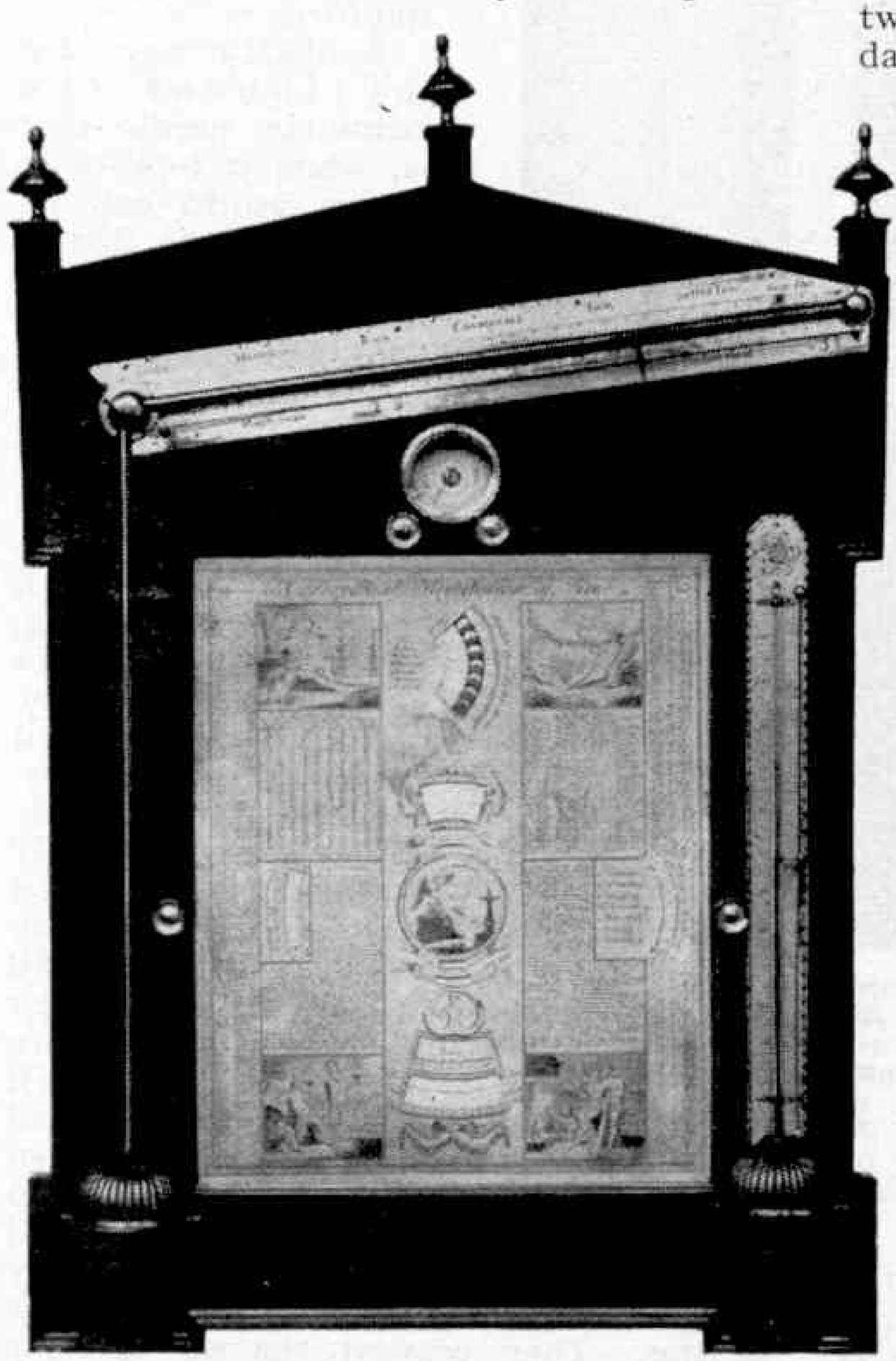
Long-range flight-refuelled training flights, often to Europe or North Africa, are ordered for complete squadrons and wings without advance warning. An example of the standards of efficiency expected and achieved was given last December when over a thousand B-47's flew non-stop missions averaging 8,000 miles each over the North American continent and Arctic regions during a two-week period. Previously, in a similar series of intensive training flights, a number of B-52's had completed dummy combat missions on which they stayed up more than 24 hours and flew as much as 17,000 miles, making mock attacks on selected targets with electronic checks of accuracy.

Fun With Your Barometer

By David Bowen, F.R.Met.S.

A HANDSOME aneroid barometer, mounted in polished wood, costs between £2 and £3, and if used correctly will give its owner a life-time of pleasure and help. But on no account let anyone tap such an instrument. That is a practice which will ruin the delicate mechanism and lead to inaccurate readings.

The least valuable part of a barometer is the wording on the dial. Its main function is to provide decoration and to act as a very general guide, for unfortunately there is no definite kind of weather for each position of the barometer needle. Of course, if the needle has fallen very low and points to *Stormy*, there is no doubt that gales are imminent. But as soon as the needle moves away from this position the words on the dial can be very misleading. It can be fine and warm when the reading is *Changeable* and very wet, at least, for a time, when the needle points to *Dry*.



A handsomely mounted "diagonal barometer" made about 1750. It was the practice by then to include various drawings in the design (centre), giving the Signs of the Zodiac, as well as a mercury or spirit thermometer (right). Crown Copyright, Science Museum, London.

Once we allow for this, we should have nothing but praise for our barometer, since we can find out all we want to know by studying what the experts call "barometric tendency". This is the rise or fall of pressure, as indicated by the needle, over a period of time. To follow it we must read the barometer at regular intervals—at least twice and, for preference, three times a day. The best times are first thing in the morning, mid-day, and before going to bed. Each time the barometer should be set, by moving the hand-operated extra needle to the position of the actual reading, so that, when the next reading is taken, the rise or fall of barometric pressure can be seen at a glance.

When you have taken barometer readings over a period of several years, you will probably notice all the symptoms—or "rules"—of fine and bad weather without any difficulty. In my own experience the most important of these are as follows:

1. A prolonged slow fall *or* quick fall: rain and wind.
2. A fall of ½ in. in less than 12 hours: sudden gale.
3. A rise of ½ in. or more in 12 hours: remaining stormy.
4. A slow rise from "low": becoming fine, but fog in winter.
5. High and steady, or high and still rising: fine and warm in summer, fog or cold in winter.
6. Slow fall from high: quick change; thunder and rain in summer, and rain after fog, or snow after cold, in winter.
7. Needle moving jerkily: very windy.
8. Quick see-saw motion: frequent periods of rain and wind.

It is always rewarding to discover new symptoms, and what causes them. If they occur regularly, they are

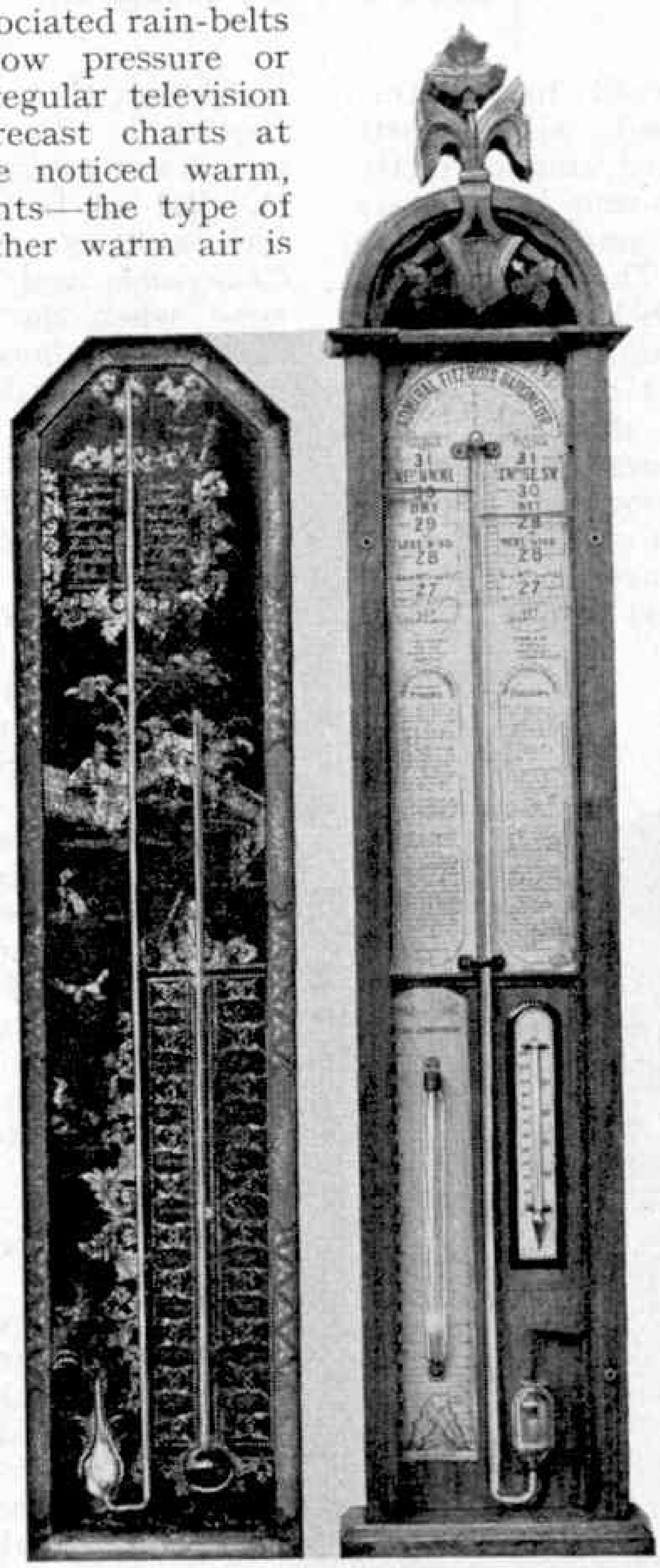
worth noting on a special "Rule Card", which can be hung next to the barometer.

The first two rules are quite well known. A fall in barometric pressure indicates the advance of one of those familiar "depressions," with its associated rain-belts known as troughs of low pressure or "fronts". If you are a regular television viewer, and see the forecast charts at 7.10 p.m., you will have noticed warm, cold and "occluded" fronts—the type of front depending on whether warm air is rising over colder air, at the warm front, or cold air, generally from Polar regions, is pushing under warmer air, at the cold front. An occluded front is simply a warm front followed immediately by a cold one.

Most depressions and fronts bring with them a considerable amount of wind, but no two of them are exactly alike. One might almost say that each has a personality of its own.

Rule 3 is explained by the fact that most of the depressions that affect Britain are formed over the Atlantic Ocean and tend to travel towards us in families, separated by a "ridge" of higher barometric pressure where the weather is much brighter, if not actually cloudless. The finer intervals are heralded by a quick rise of the glass and may last anything from between 3 to 24 hours before the arrival of the next storm. Very often there may be five or six storms in succession, the fiercest ones generally being the second, third and fourth. It is little wonder our coastal fishermen believe that "First rise after low foretells a stronger blow!"

A warning from the Meteorological Office of the approach of an "intense" or "vigorous" depression indicates strong winds, and probably gales. But if the depression is described as merely "large", the reference is to the area it covers on the weather map.



On the right a Fitzroy barometer. Instruments such as this can still be seen in many homes, and their owners are proud of them. They are not accurate enough for modern scientific use. Admiral Fitzroy, the inventor, was the first Director of the Meteorological Office when formed in 1855. Another type is seen on the left. Crown Copyright, Science Museum, London.

Rules 7 and 8 show the qualities of the more vigorous depressions. A jerky barometer needle indicates a great number of fluctuations in the atmospheric pressure within a small local area. So not only are the gales at their height, but the track of the most severe weather is probably quite close to the recording instrument. It may be several days or more before the weather really improves.

A daily see-saw motion of the barometer needle, that is, when it repeatedly covers up to half its complete range, first in one direction and then in another, is again an indication that the storm track is almost overhead.

Mistakes are easier to make when the barometer is comparatively high than when it is falling, with the needle pointing between the position marked *Changeable* and *Stormy*.

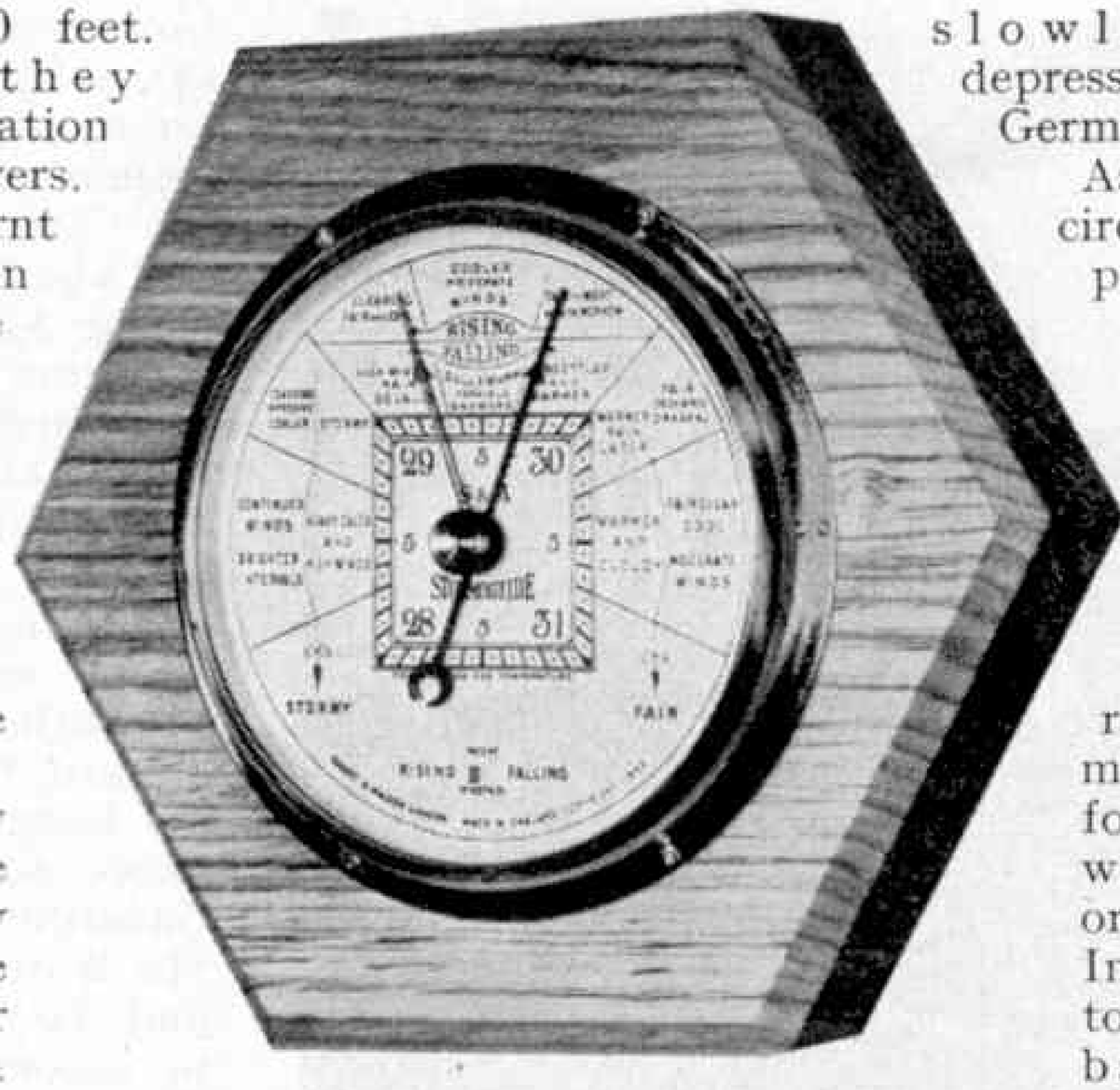
High barometric pressure is admittedly a sign of settled weather in very many cases, and it is well known that the larger anticyclones, the regions of high pressure, are associated with fine, and often very warm weather in spring, summer and early autumn. But in winter, Rule 4, they bring fog to the areas lying near their centres. They prevent the air currents from rising very far above the ground, so that all the smoke released into the atmosphere has to spread out horizontally after it has reached a height of

approximately 1,000 feet.

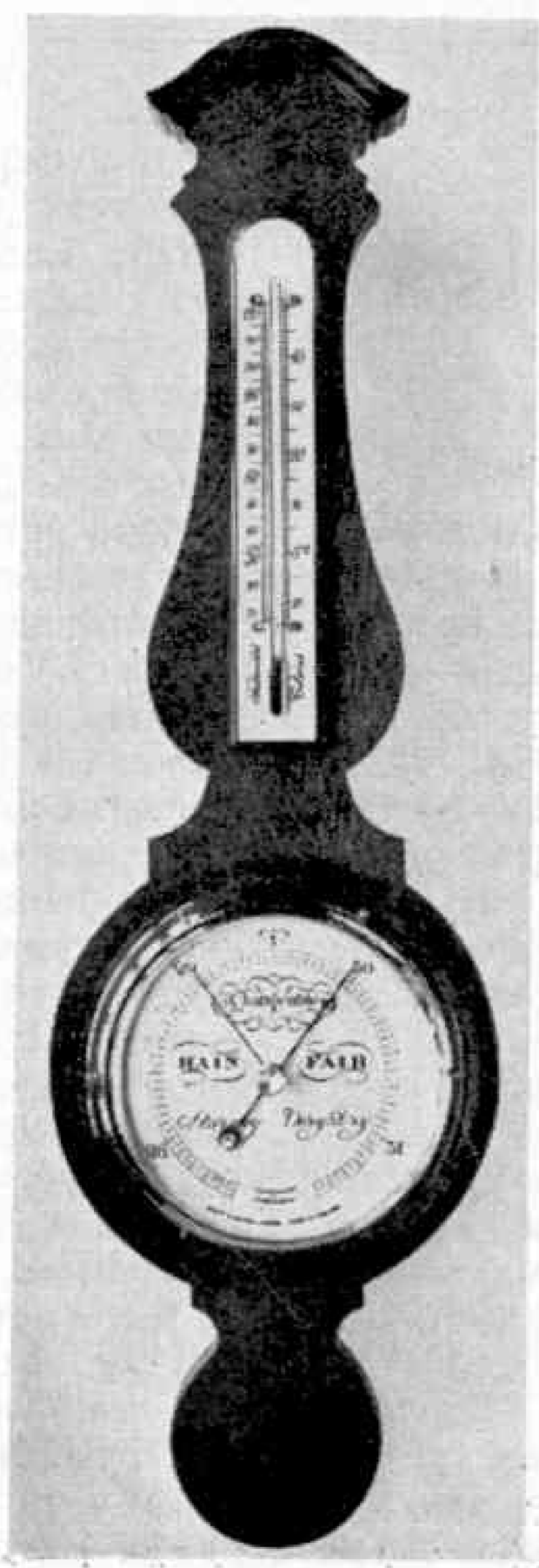
In addition they encourage the formation of thin cloud layers. Although easily "burnt off" by the sun in summer, these remain throughout the day, and from one day to another, in winter, combining with fog to cut out most of the sunlight from reaching the ground.

You will probably have noticed that the barometer rises very considerably before and during our coldest spells in winter, in the same way as at the approach of summer heat-waves, Rule 5. The long rise of pressure to the *Very Dry* position on the dial shows the building up of a very large anticyclone and, while in summer this may approach from either the Azores or from Russia, in winter it will invariably move from the east. There is a saying: "When the wind is in the east, it's neither good for man nor beast!" But the Russian anticyclones with their easterly winds do at least provide us with hot spells as well as freeze-ups, depending on the season. Easterly winds, however, are nearly always very dry and are a cause of drought.

There are usually one or two occasions every year, generally in the spring, when a long period of rain coincides with a steady *rise* of the barometer. (This, by the way, is when many people, believing their instruments to be wrong, bang the dial with their knuckles and do a great deal of damage). It is not that the rise in this case is associated with bad weather, but rather that the improvement arrives later than expected, due to a slowly weakening depression over France or Germany.



Above is a modern hall-type aneroid barometer, and below is one on which a thermometer is mounted. These "Stormoguide" pattern dials facilitate accurate reading, unlike the conventional dials on most modern barometers. Photographs by courtesy of Short and Mason Ltd.

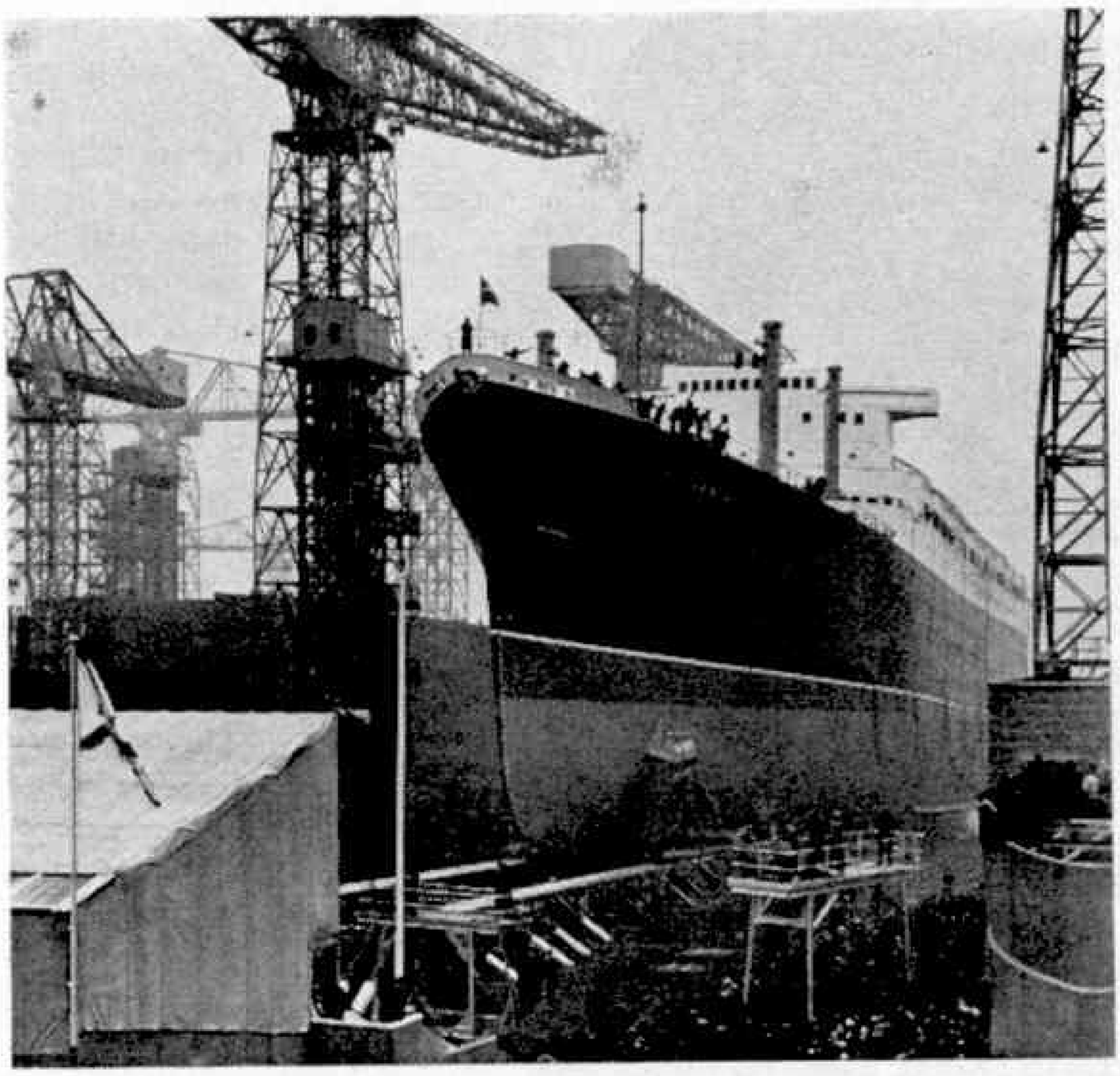


As a guide in these circumstances, the long period of rain will be seen to be brought in from a south-easterly direction rather than from the west or south-west, as is the case with most rain-belts. But it may be necessary to follow the current weather charts in order to discover this. In any case it is safe to assume that if the barometer rises steadily over a period of several days, fine weather will eventually drive the clouds away, and this will probably last for anything between three to seven days or more, depending on the strength of the anticyclone.

Once fine weather has set in the barometer will remain fairly steady, but it must be remembered that a break in the weather may be heralded by a comparatively small movement of the needle towards *Changeable*.

In summer, local thunderstorms can occur with only very little, if any, fall of the barometer, in which case mainly fine weather can be predicted for the following day so long as the needle *remains* steady.

If the barometer and thermometer rise steadily together, fine weather is absolutely certain. Experts have discovered that humans and animals alike are more cheerful when the barometer is fairly high than when it is falling. A sharp fall of pressure is a cause of irritability in many people. But apparently we do our most creative work when the weather is changeable.



The 22,000-ton Cunard liner "Sylvania" takes the water. She is due to make her maiden voyage from Liverpool to Montreal on 5th June next. Photograph by courtesy of Cunard White Star Ltd.

Shipping Notes

The Newest Cunarder Launched

The launch at the yard of John Brown and Co. (Clydebank) Ltd., Stotland, of a 22,000-ton Cunarder has become a regular event of the winter months since Lady Churchill named and launched the *Saxonia* there in February 1954. This vessel was followed later in the year by the *Ivernia* and by the *Carinthia* in December 1955. Now the fourth of this series of Cunarders has been launched. She is the *Sylvania*, which took to the water in November last.

All four of these Cunarders have been built for the St. Lawrence route to Canada. The *Sylvania* will make her entry into this service next June, and then that between Southampton, Quebec and Montreal will be maintained by the *Saxonia* and the *Ivernia*, while the *Carinthia* and the *Sylvania* will sail regularly between Liverpool and the St. Lawrence ports. Between them they will make an average of six sailings a month to Canada, three from Southampton and three from Liverpool. The programme for 1957 also includes calls in the Clyde by the *Saxonia*, the *Carinthia* and the *Sylvania*.

The *Sylvania* is the second Cunarder to carry this name. Her predecessor was a twin-screw cargo liner built in 1895, which ended her service in 1910, when she was sold to Italian shipbreakers.

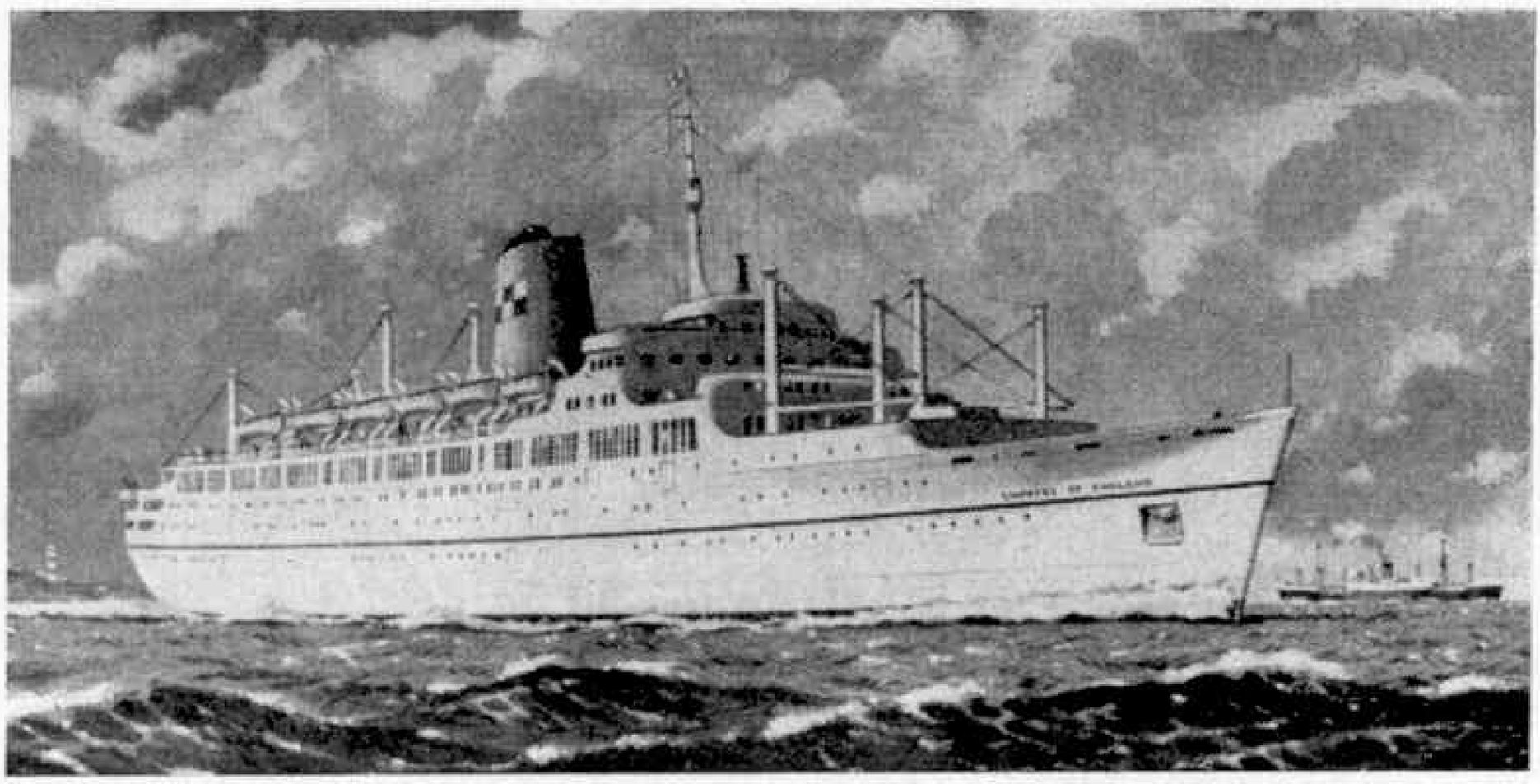
The new *Sylvania* is the fifteenth ship added to the Cunard fleet since 1946, and her completion will bring the gross tonnage of post-war Cunarders to almost 200,000. She is designed to carry First and Tourist Class passengers in accommodation of up-to-date comfort, and her spacious air-conditioned public rooms will include a balconied cinema. Her service speed will be 19 knots, and she will have a large cargo carrying capacity.

"Empress of England"

An article in the *M.M.* for August of last year described the new Canadian Pacific liner *Empress of Britain*, which had completed her maiden voyage from Liverpool to Montreal earlier in the year. This fine vessel will shortly be joined by a sister ship, the *Empress of England*. The latter was launched in May of last year at Vickers-Armstrongs' Naval Yard, Walker, Newcastle upon Tyne. The machinery for this new vessel is being constructed at the works of Vickers-Armstrongs at Barrow-in-Furness, and will be shipped from there to Newcastle for installation.

As the artist's impression at the head of the opposite page shows, the new liner will be handsome in appearance. A noteworthy characteristic is that she will be lower in silhouette than any new vessel of comparative size. This is due to the avoidance of the modern tendency to design vessels with a piled-up superstructure. In this respect she is similar to the *Empress of Britain*, as comparison of the illustration reproduced here with that on page 395 of the August 1956 *M.M.* will show.

There are other resemblances between the two vessels, one of which is provided by their funnels. Like that of the liner already in service, the top of the funnel of the *Empress of England* takes the form



An artist's impression of the Canadian Pacific Liner "Empress of England," launched on 9th May of last year and now fitting out at the Naval Yard, Newcastle upon Tyne, of her builders, Vickers-Armstrongs (Shipbuilders) Limited.

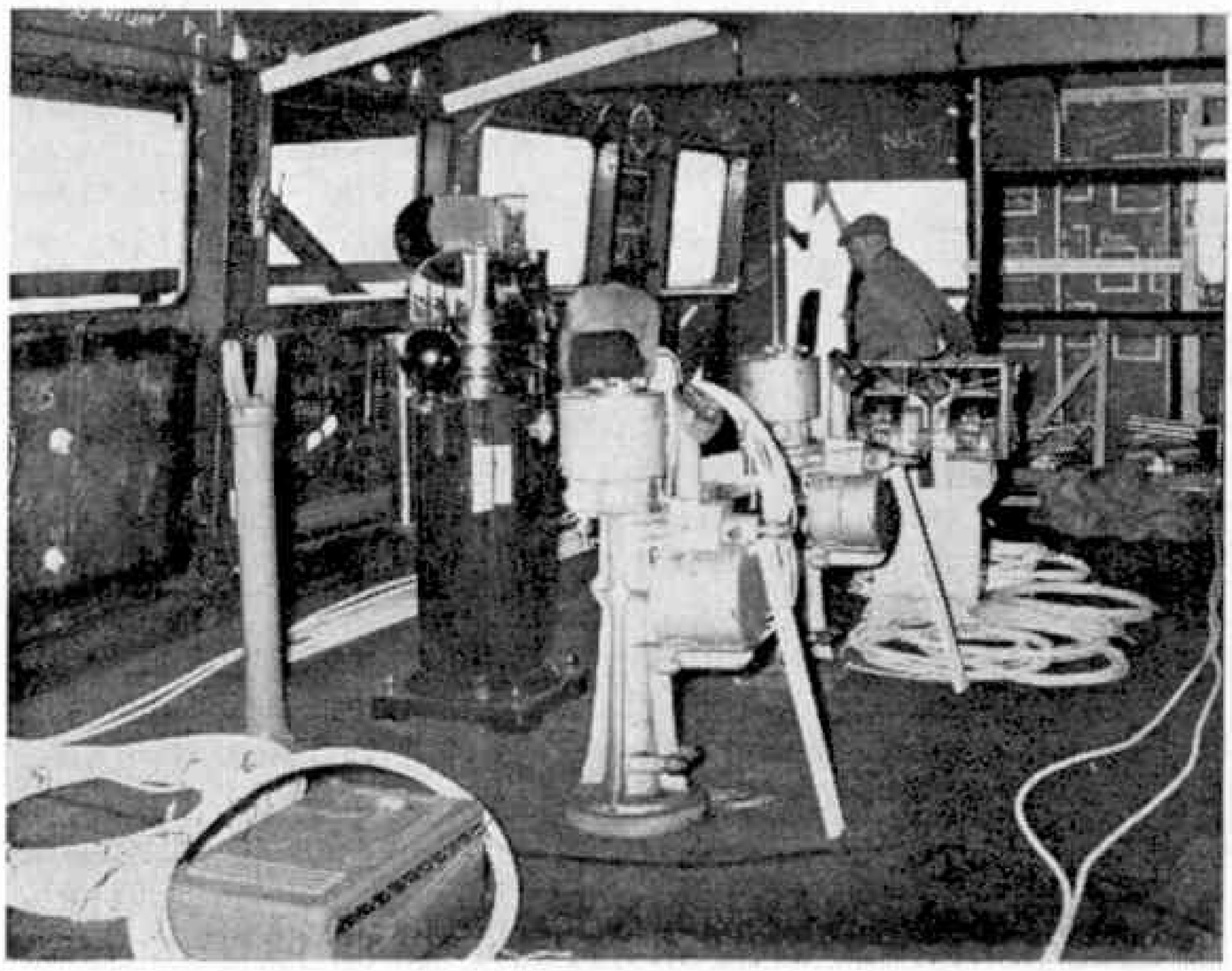
of what has become known as a fireman's helmet, a shape that was decided on after exhaustive tests. It is 51 ft. high and 28 ft. across. Aluminium alloy has been used in its construction, and it is effective in carrying smoke clear of the decks at a speed of 20 knots with a 20 knot wind blowing, and an output velocity of 80 ft. per second.

Bridge Equipment

The lower illustration on this page shows work in progress on the navigating bridge of the *Empress of England*. The equipment includes twin steering wheels, and an S. G. Brown gyro compass in addition to the usual standard compass, with a repeater in the wheelhouse, on each bridge wing and in the steering gear compartment, while there is also a display repeater in the Sun Lounge of the vessel. There are of course telegraphs for the engine room, with similar equipment for other purposes, and other fittings include radar, Decca Navigator and echo sounding gear.

The overall length of the *Empress of England* is 640 ft., her moulded breadth is 85 ft. and her moulded depth 48 ft. She will have a maximum draft of 29 ft., and her speed will be 21 knots. She will be equipped with the now well-known Denny-Brown stabiliser, which in rough weather will reduce a roll of 18 degrees to one of less than 6. Accommodation is provided for 150 first class passengers and 900 tourist passengers.

Like her sister ship, the *Empress of England* will be driven by two independent sets of double-reduction geared turbines with a maximum of 30,000 shaft horse power. Steam will be supplied at a pressure of 600 lb. per sq. in. and a temperature of 850 degrees F. and after passing through the high pressure ahead turbine the steam will be re-heated to its initial temperature of 850 degrees F. before entering the intermediate pressure turbine. Electric power at 225 v. D.C. is provided by two turbo-generators of 1,200 kW. each and three 500 kW. diesel generators.



Work in progress on the navigating bridge of the "Empress of England." The illustrations on this page are reproduced by courtesy of Vickers-Armstrongs (Shipbuilders) Ltd.

Air-Sea Rescue Devices

They Make "Ditching" Safer

By Ward J. Rutherford

AT the R.A.F. Institute of Aviation Medicine at Farnborough, Hampshire, a doctor recently was given an anæsthetic, put into a life jacket and dropped into a tank of water. After being allowed to remain there for some time he was taken out and fitted with another life-jacket, and then, still unconscious, he was returned to the tank.

The doctor, who had volunteered for this experiment, wanted to find out what happened to an unconscious person when he was in the sea.

This is just one example of the exhaustive and hazardous tests that have to be made to modern life-saving equipment for airmen. In these volunteers frequently risk their lives to ensure that devices to be used will work efficiently even in the most dangerous conditions. Survival suits and collapsible rubber dinghies have to be given trials in conditions varying from those where the intense heat of the sun has to be faced, to others in which the temperature is so low that if the equipment did not work the experimenters would be dead in a short time.

The result of this work has been to bring about enormous improvement in the apparatus supplied to airmen and to give them a much better chance of survival if they are forced down into the sea.

It has now been found, for example, that the greatest danger is not of drowning, but of death from exposure and lack of water. Survival suits have accordingly been developed that are automatically inflated by means of a cylinder of gas. These will protect the flyer even in the severest cold by keeping him both dry and warm.

Fast launches such as this R.A.F. craft are used in air-sea rescue operations. This vessel has a maximum speed of 25 knots and a continual cruising range of 640 miles.

At the same time added protection is given in rubber rafts and dinghies whether large or small, by means of a covering that fits over the user or users. In one instance the covering provided was so good that even in Arctic conditions the passengers had to open its flaps for extra ventilation!

In the case of single seater fighter dinghies, an inflated covering that looks rather like a quilt entirely covers the user from head to feet, leaving only his face and his hands exposed.

For the larger 15 to 20 man dinghies the covering is in the form of a tent. The whole dinghy packs into a small

valise, from which it emerges as it automatically inflates itself on hitting the water. Even the canopy-covering is self-inflating and the whole dinghy is ready for use in under 60 seconds.

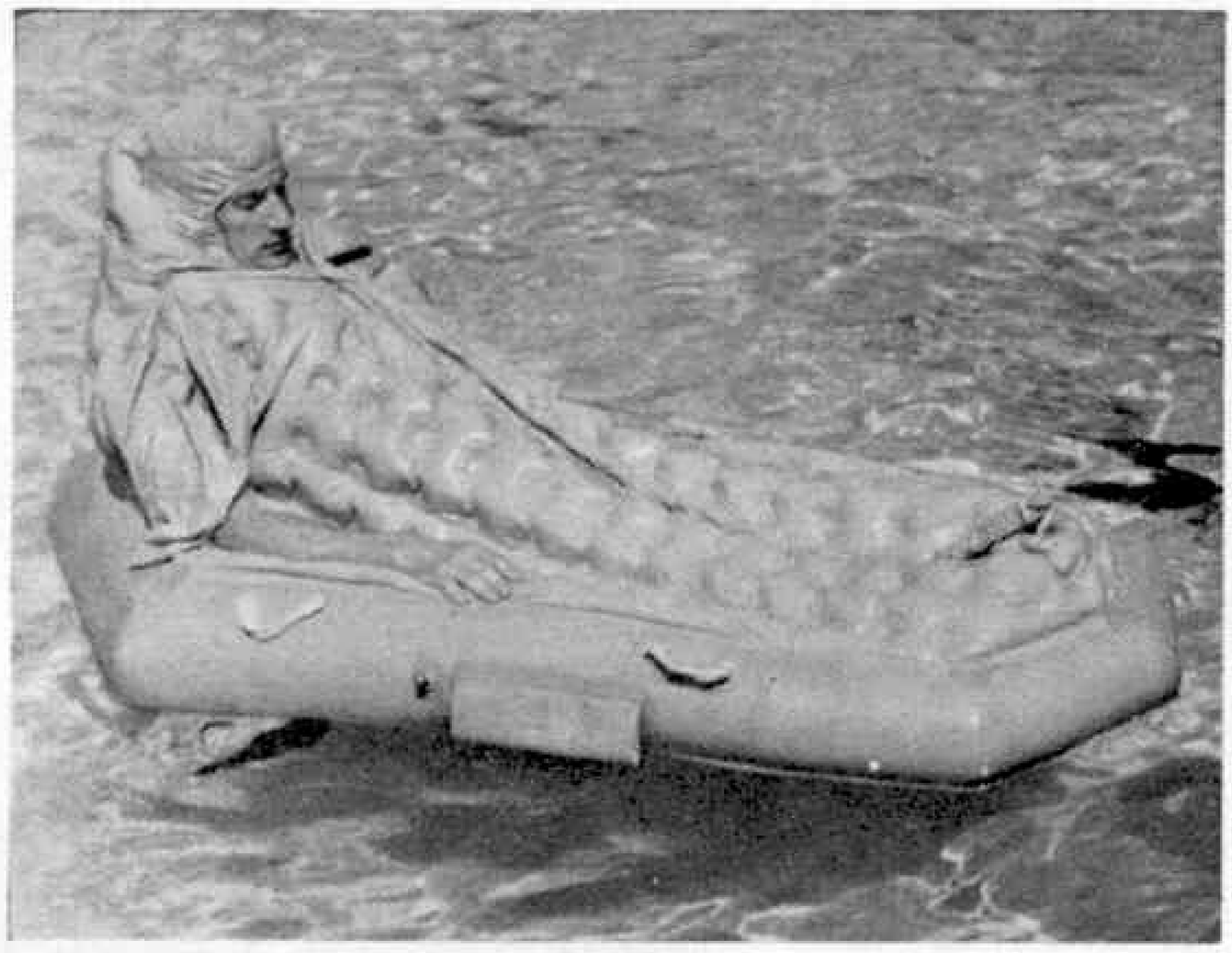
The dinghies are designed so that they virtually cannot capsize, but if they should happen to overturn for any reason during launching they can easily be righted by one man.

In this way the problem of exposure has been overcome, and the present day rubber dinghies are so efficient that not only are they used by airline companies and the R.A.F., but their use is also being considered by both the Navy and the Merchant Service as auxiliaries to the normal type of life-boat.

The remaining problems are those of water and food supply. Most rafts carry a wide variety of foods that have been planned scientifically as the best to meet the needs of survivors, and fishing equipment is also included as a means of extending their "larder."

But the most pressing problem is that of water. Tins of fresh water are carried as part of the supplies, and besides these there are tablets for de-salting sea water, and many rafts are fitted with a funnel in the roof that collects dew and rainwater. A device for distilling sea water to take out the salt is being developed, but although several of these are already available, there are many difficulties to be overcome before thay can be supplied as standard equipment.

Even with the best rafts and a freely available supply of food and water, however, the work of air/sea rescue has only begun when survivors are in their rubber craft. The next thing is to find them as soon as possible and bring them to safety. To help searchers, and to explain their plight, the rafts are fitted with small radio transmitters. Other signalling devices include Verey lights, sea-markers and heliographs, while all types of equipment from the life-jacket upwards are fitted with "sea-cell" lights, which are actuated by wetting in water. Furthermore the rafts themselves are coloured bright yellows and oranges to make them more easily identifiable.



A victim of the sea in a single seat life-raft with an inflatable canopy for protection from exposure.

Besides aircraft, which play an important part in searching for survivors, high speed launches are used and these maintain radio contact with the searching planes, so that when survivors have been located the launch can go quickly to the spot. Amphibious aircraft have also been used successfully, but the problems of landing and take-off in rough water limit their application.

But however efficient modern life-saving equipment might appear to be, work on its development must go on ceaselessly, for each new development in aviation brings with it new problems.

A life-raft dropped in the sea beginning to burst from its casing or valise on inflation.

Railway Notes

By R. A. H. Weight

Development Plans Forging Ahead

Improvements in British Railways' services are taking shape in many directions. More plans for electrification, diesel trains, new and improved passenger and goods stations, track widening to provide more lines at congested points, modernised signalling, and so on, have been announced, continuing the schemes already in hand.

Automatic train control is to be introduced at distant signals on principal main lines. The system is somewhat similar to that in use for a considerable time on the former Great Western Railway, whereby warning is given electrically to drivers if the signal is at caution, with an application of the brake if action is not taken promptly in the normal way. Alternatively, automatic notification is given that the signal is clear. Both features are of special value in fog. The latest form of A.T.C., as it is known, has been laid down and successfully tested on the East Coast main line between King's Cross and Grantham, whence it will be extended gradually.

Some remarkable figures have been published showing the extent to which numbers of passengers, and fares paid, have increased since the introduction in many local areas of diesel trains, providing in most cases faster and much more frequent services. Light railcars having a single underfloor diesel engine are to be tried on certain branches; of a much more luxurious type, high speed diesel trains are proposed connecting large cities; and diesel-electric multiple unit main line sets will soon be ready for the London-Hastings direct route.

For intensive trial service on the London Midland and Eastern-North Eastern Regions, and also to a lesser extent on the Western and Southern, 174 main line diesel locomotives suitable for hauling almost any kind of train, are under construction.

Locomotives in the News

Steam locomotives will be a mainstay of many routes for quite a while yet, and the construction of standard types, particularly for freight or mixed traffic haulage, will go on to a limited extent during the present year and perhaps for a time after that.

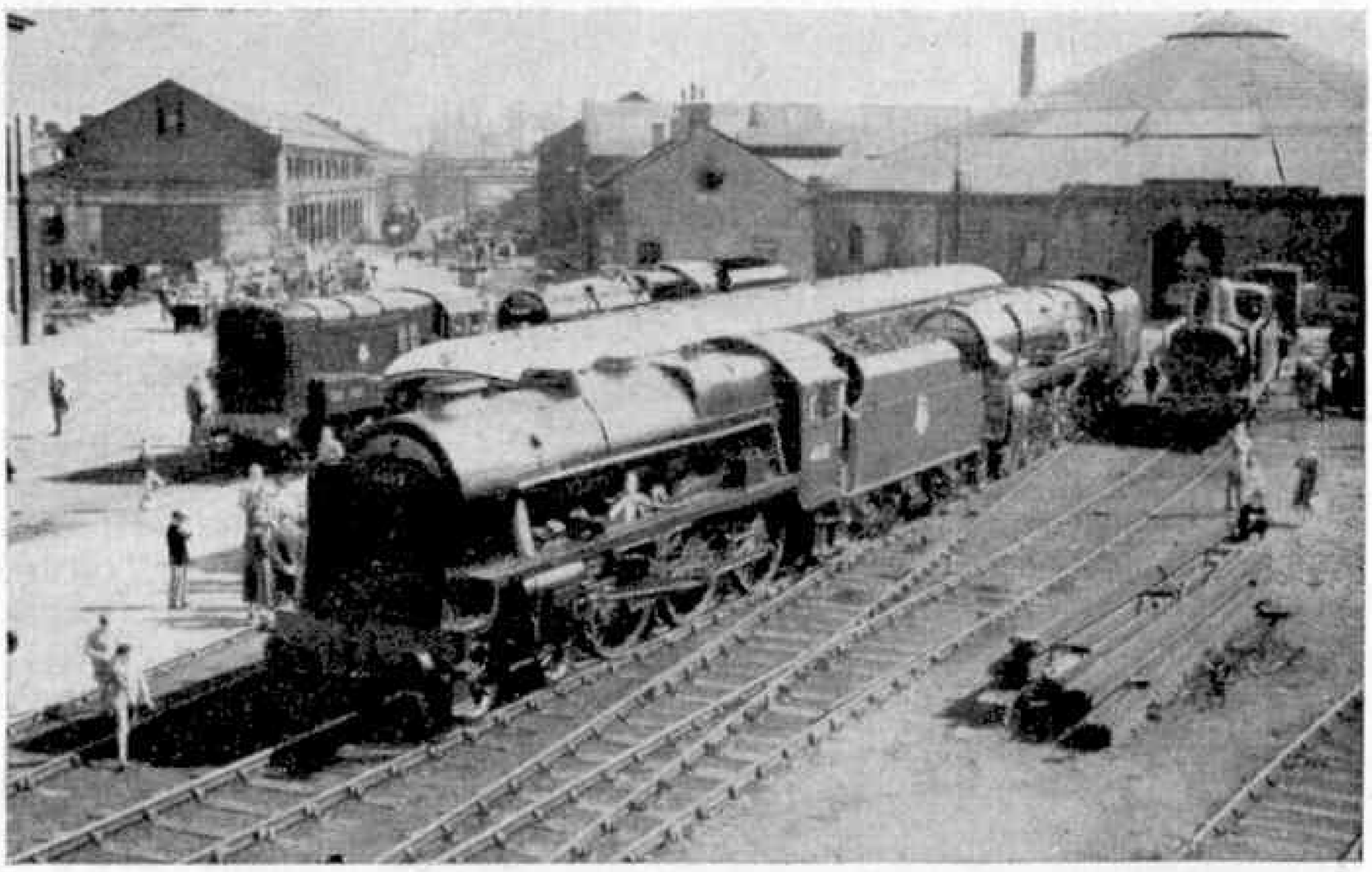
New ones lately placed in service include class 9 2-10-0, No. 92091, stationed at 36A, Doncaster; Nos. 92108, 92110-12, 14A, Cricklewood; and No. 92109, 18A, Toton, L.M.R. Class 5 4-6-0s No. 73135-9 are allocated to 6J, Holyhead, and No. 73140, 15C, Leicester. Class 2 2-6-0s No. 78060-4 go to 27D, Wigan (ex-L. & Y.) depot, and Class 4 4-6-0s Nos. 75050-1, to 6G, Llandudno Junction and 6A, Chester, respectively.

Thirty class 5 4-6-0s are now in service or on order, numbered 73125-54. They are fitted with British Caprotti valve gear, having inlet and exhaust poppet valves working at each end of the two cylinders, and controlled from the reversing wheel in the cab through gear and cam boxes, with shaft connections. The first 10 are stationed at Shrewsbury. The remainder are to be allocated to the L.M., and Scottish Regions.

Nos. 11214-5 of the 200 h.p. diesel-mechanical shunting type have been added to stock at 50B, Leeds, Neville Hill. Of the standard, more powerful, diesel-electric design, Nos. 13278-87 have been completed for the Scottish Region; and Nos. 13322 and 13324 are allocated to 52E, Percy Main Shed, No. 13323 to 53A, Hull, Dairycoates, No. 13325 to 34A, King's Cross and No. 13326 to 35A, Peterborough.

The very powerful *Deltic* main line diesel locomotive, after tests over the steeply graded Settle-Carlisle route last autumn, reappeared on Liverpool-Euston expresses at the head of the *Merseyside* and *Shamrock* non-stop trains.

In hand at the extensive works of the North British Locomotive Co. Ltd., Glasgow, are a gas turbine locomotive, to be fired with pulverised coal, and 2,000 h.p. engines having diesel-hydraulic propulsion on the Voith transmission principle.



A motive power miscellany on show at Derby. Among the exhibits are a converted Royal Scot, a diesel car unit and a diesel shunter and, on the right, "Cecil Raikes," a relic of steam days on the former Mersey Railway. Photograph by P. J. Lynch.

London Midland Miscellany

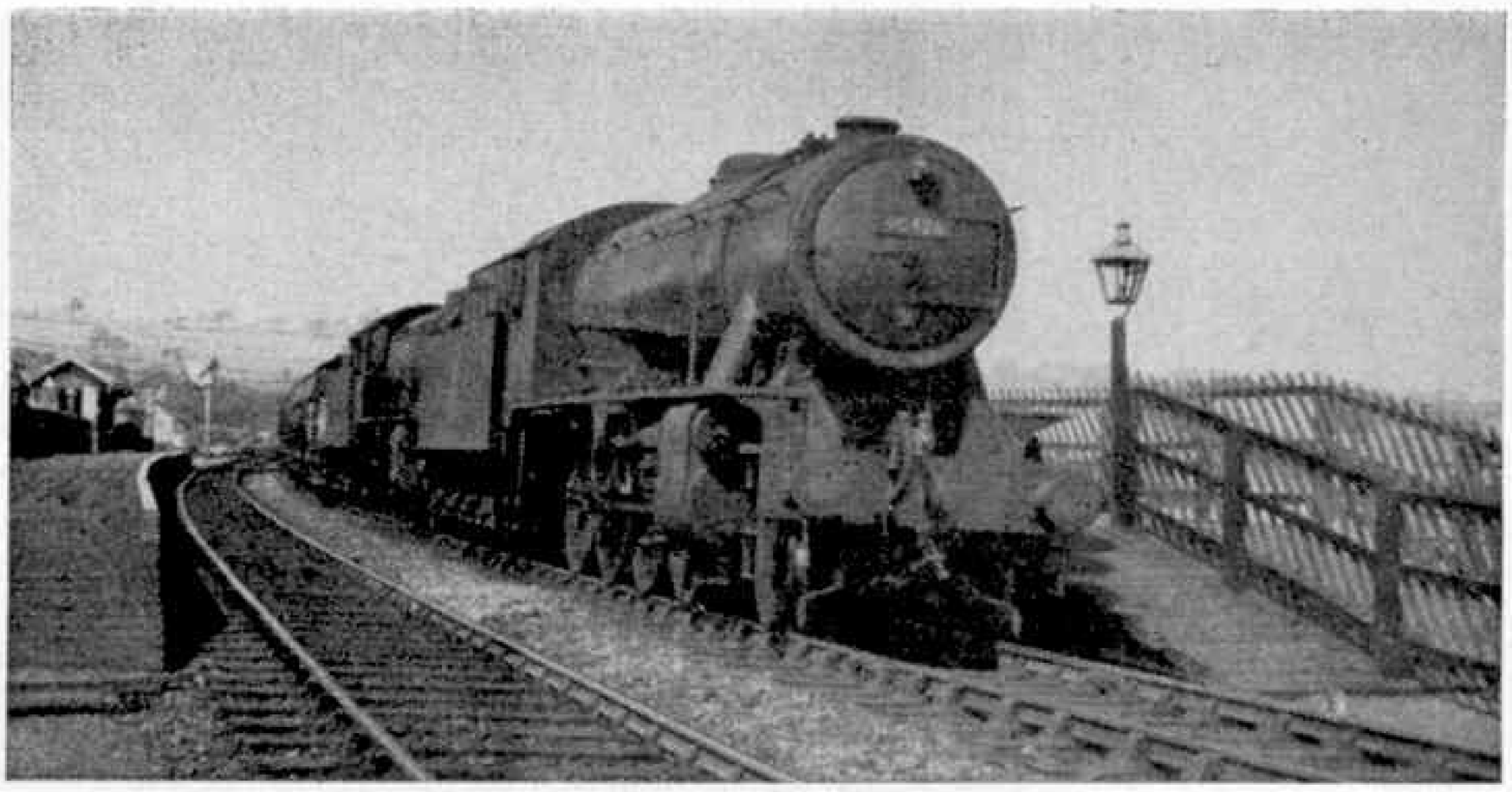
Two more W.R. 0-6-0 pannier tanks recently joined the hard working and assorted little band of banking engines on the Lickey Incline, L.M.R.

The Jubilee 3-cylinder 4-6-0 No. 45722, *Defence*, was recently on trial at the Rugby Testing Station. Standard class 4 2-6-4Ts have taken over a number of duties operated from Chester and Bangor sheds. The Cromford and High Peak mineral line in Derbyshire, which has some tremendous climbs as steep as 1 in 14, received two Ministry of Supply type 0-6-0 saddle tanks numbered 68013 and 68030 from ex-L.N.E.R. stock.

The *Duke of Rothesay*, the third of the fine new steamers for the Heysham-Belfast service in connection with the *Ulster Express* made her maiden voyage in December.

New Electric Trains

Comfortably equipped new corridor sets are being introduced for the S.R. London-Sussex express and semi-fast services. They are lighter, and are expected to be steadier in running, than the present multiple-unit main line stock.



A through train of tank wagons from N.E.R. to L.M.R. via Otley, Ilkley and Skipton. The engines are both "Austerity" 2-8-0s Nos. 90426 and 90016. Photograph by J. C. W. Halliday.

Underground electric railways are rare outside London. The Mersey-Wirral urban system connecting Liverpool, through a Mersey tunnel, with towns and residential districts in the Wirral Peninsula of Cheshire, is having 24 new three-car sets of steel, lightweight design. These lines provide frequent trains. They are under L.M.R. administration and third rail method of conduction is now universal. The Mersey Railway was an old established private concern and one of the first to change from steam to electric propulsion over 50 years ago.

Many new trains are in operation on the E.R. Liverpool Street outer suburban services now extended to Southend-on-Sea.

Fine Pacific Running, North and South

The *Atlantic Coast Express* is the fastest Southern long-distance train, providing the best service of the day between Waterloo and Exeter and beyond. Some of its start to stop schedules on the main line, such as the 83 min. allowance for 83¾ miles Waterloo-Salisbury, or the 79 min. one—less than appearing in the public time-table—over the very difficult 75¾ miles forward to Sidmouth Junction, do not appear sometimes to allow any margin at all, though the Merchant Navy engines were fully masters of the situation on the runs now reported.

No. 35014 *Nederland Line* (rebuilt) with the usual winter 11-coach load, about 390 tons in all, from London at 11 a.m. did very well up the gradually rising grades to Basingstoke. Without exceeding 80 m.p.h. downhill, and including a slowing within the last mile, Salisbury was reached almost 3 min. early at an overall average of 60¾ m.p.h.

New Zealand Line, No. 35021, on another occasion was twice up to 84 m.p.h. and with no delays ran into Salisbury nicely within booked time. The Nine Elms crew were then succeeded by Salisbury men, with one coach less, to tackle the steep ups and downs that provide such exciting and sudden variations of speed. There was one track repair slack at Gillingham, Dorset. Maxima were up to 87-88 and the minimum at the top of the severe Honiton climb was 32 m.p.h., Sidmouth Junction being reached before time in 76¾ min. There was another high speed burst on the tightly timed short run on to Exeter, so that during this 172-mile journey no less than eight 80's or more were logged!

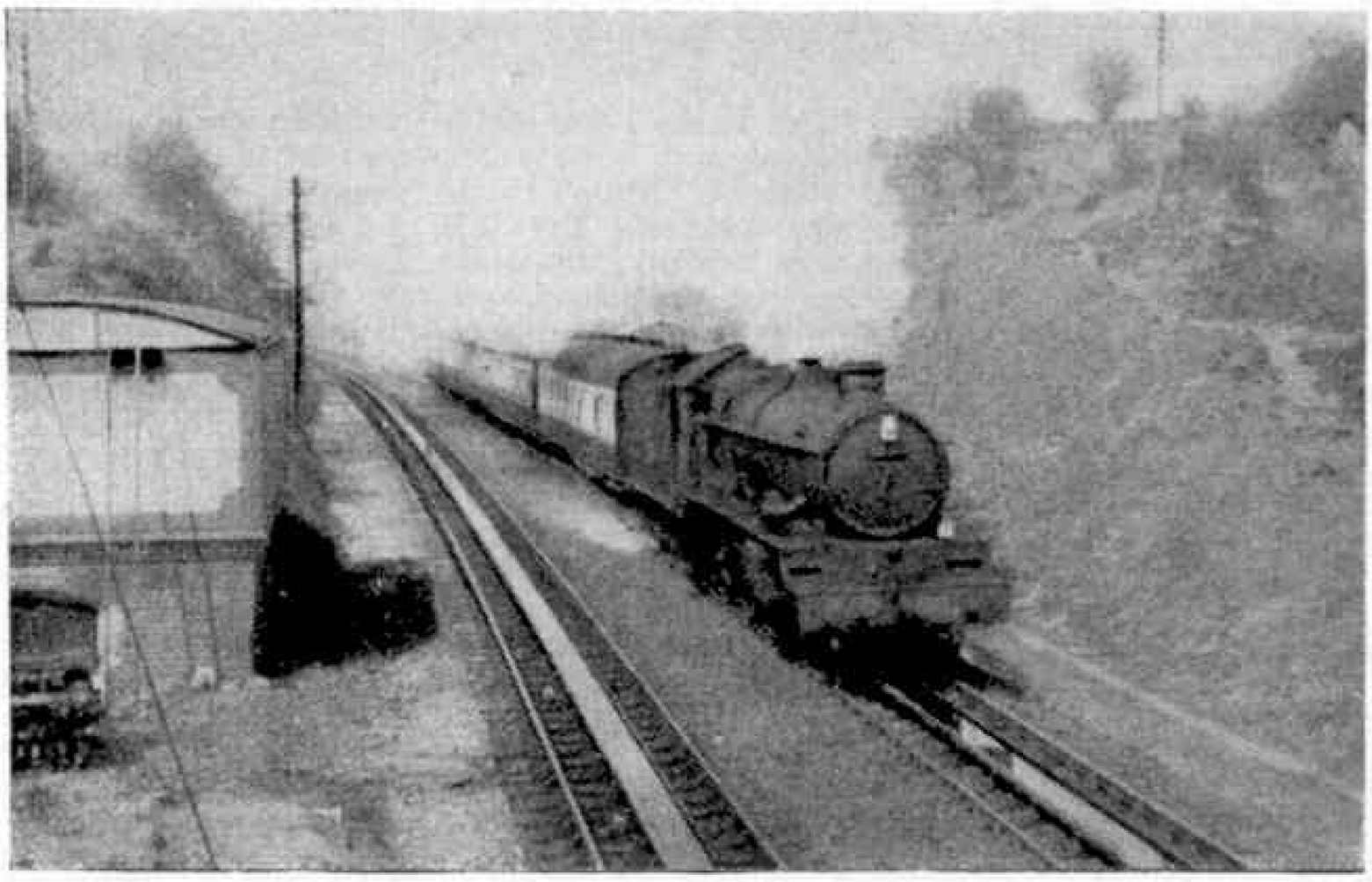
In the opposite direction rebuilt No. 35013 *Blue Funnel* had also done very well up to Salisbury. Thence to London with the normal heavier 12-coach train, about 430 tons full, having a clear road and allowed a little more time, 2 min. were gained and an early arrival at Waterloo secured at 3.38 p.m. There was very high speed ranging from 81 to 92 m.p.h. between Brookwood and Esher past Woking and Weybridge.

Light Pacific No. 34075 *264 Squadron*, on the 5.45 p.m. fast train from Cannon Street to the Kent coast, reached the first stop, Chatham, a minute early despite several signal checks as well as regular slowings and the sharply changing gradients of the Chislehurst-Swanley-Rochester route, having attained 84 m.p.h. in the Farningham Road dip. There was some lively travelling between checks on to Faversham.

The runs quoted this month were recorded by Messrs. Clay, Nash and Harvey.

On the E.R., A3 4-6-2 No. 60047 *Donovan* (built 1924) last summer regained over 5 min. on the 33-mile Retford-Grantham start to stop run with an almost maximum load of 15, weighing over 510 tons full, with the evening Leeds-Bradford-Hull-King's Cross express. There was some stirring uphill work and a maximum speed of 75 down from Tuxford.

Going north with the 1.5 p.m. King's Cross-Leeds as then scheduled, the rather sharp booking of 33 min. for the 29 miles Peterborough-Grantham start to stop was kept exactly, although A1 No. 60157 *Great Eastern*, with 12 on, had to slow severely over track under renewal at Essendine near the foot of the long climb to Stoke Box, close by mile post 100. After a grand acceleration the summit was passed at 64 m.p.h.



No. 5027 "Farleigh Castle" with an up semi-fast train taking water at Keynsham Troughs. Photograph by R. E. Toop.

Air News

By

John W. R. Taylor

The Vickers Valiant jet bomber in its new all-white anti-radiation finish. Illustration by courtesy of Vickers-Armstrongs Ltd.

White-Painted Valiant

Vickers Valiants now being delivered to R.A.F. Bomber Command have an all-over coat of glossy white paint. The main purpose of this is to protect both aircraft and crew from heat radiation when atomic bombs are dropped, but the white top will also reflect the fierce heat of the sun at the cloudless height at which these bombers fly.

The aircraft illustrated above is one of the latest Valiant B.K.Mk.1's, with cameras mounted forward of its bomb-bay so that it can be used also for photographic-reconnaissance duties. It has a probe on its nose for refuelling in flight, and can itself be converted quickly into a flight refuelling tanker by slipping a one-piece hose-reel unit, pump and fuel tank pack into its bomb-bay.

America Buys the Britannia

Like the Comet and Viscount, the turboprop Bristol Britannia has now broken into the American market, with an initial order from Northeast Airlines for five series 305 aircraft, worth more than $17 million.

Northeast's Britannias will carry 92 first class or 133 tourist passengers and will be the first aircraft to cruise at 400 m.p.h. on airline routes in the United States. A big selling point was that those ordered will be ready for service two years before any comparable American-made airliner. In fact, the first three are already structurally complete in Short's Belfast factory, where a second Britannia production line has been laid down.

Including the Northeast contract, there are about 70 Britannias on order, of which 33 are for B.O.A.C., three for El Al Israel Airlines, five for Canadian Pacific Airlines, two for Hunting-Clan Air Transport, four for the Ministry of Supply and 13 for R.A.F. Transport Command.

More Powerful Bristol 173

Another item of news from Bristol's is that the third prototype of their Type 173 tandem-rotor helicopter made its first flight on 9th November last, powered by two 850 h.p. Alvis Leonides Major piston-engines. The earlier prototypes have Leonides motors of only 520 h.p. each.

All three aircraft are being used for research into the military and civil uses of multi-engined helicopters, and are forerunners of the larger and faster Type 192 that has been ordered for troop and freight carrying, ambulance and search and rescue duties with the Royal Air Force. Both piston and turbine-powered versions of this aircraft are planned, and Bristol have designed a basically-similar civil type capable of flying 20 passengers over stage lengths of more than 100 miles at a cruising speed of about 140 m.p.h.

Church Painted from a Balloon

Proof that balloons still have their uses even in a jet age was given recently when a captive balloon, with a wooden platform built onto the top, was used for painting the ceiling of a newly-built church at Yvetot in Normandie. Borrowed from the French Army, it enabled the painters to reach the ceiling in comfort without any need for scaffolding.

Flying White House

President Eisenhower has flown 225,000 miles in the one Lockheed Constellation and two Super Constellations which he has used as commander of the Allied military forces in Europe and as President of the United States. He has, in fact, spent so much time aboard the latest Super Connie that he refers to it as a "flying White House." But, officially, all three aircraft have been named *Columbine*, after the state flower of Colorado, Mrs. Eisenhower's home district.

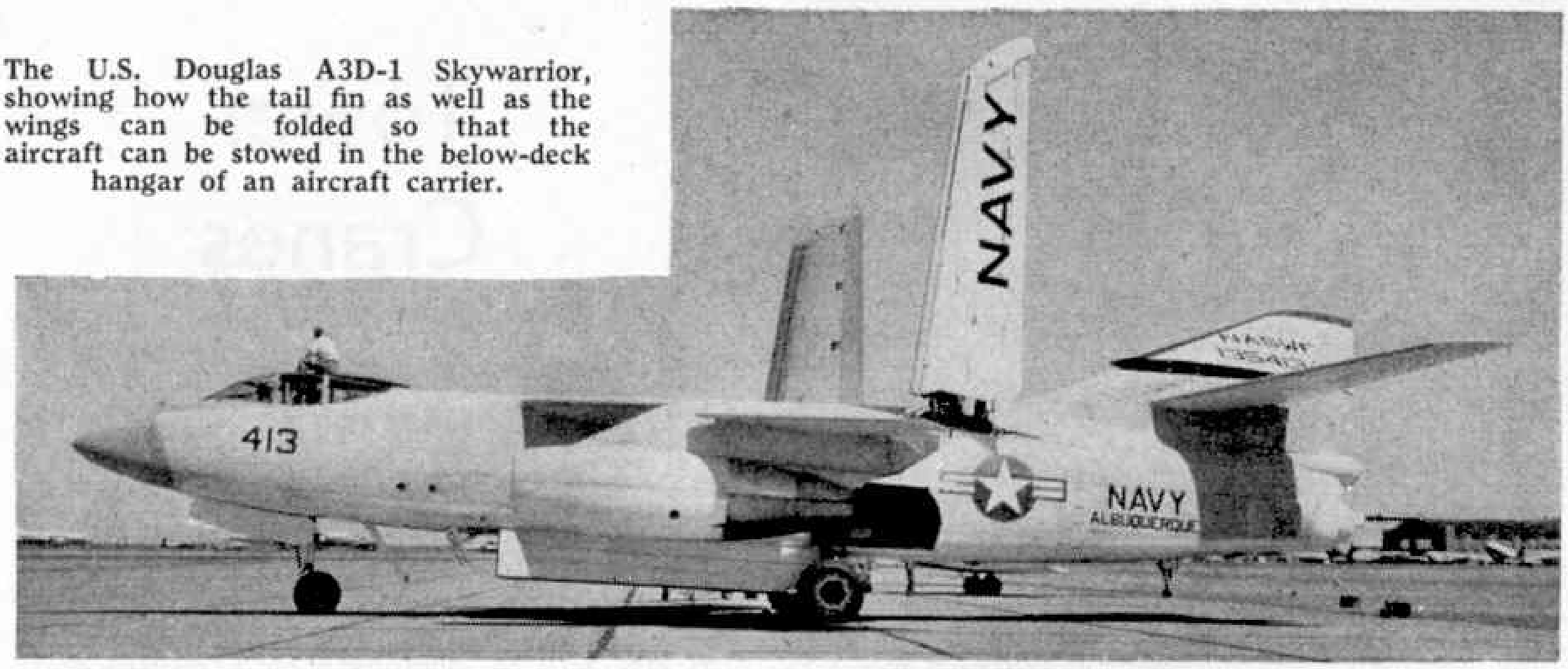
First Polar Parachutist

U.S. Air Force Technical Sergeant Richard J. Patton became the first Polar parachutist on 25th November last, when he jumped to the assistance of eight men who are manning the U.S. base only eight miles from the South Pole. The jump was made in a temperature of 17 deg. below zero after several batches of supplies had buried themselves 15 ft. deep in ice and snow because their parachutes had failed to open or had become detached.

Gnats Beginning to Swarm

As a reward for their pioneering work on light fighters, Folland Aircraft of Hamble, near Southampton, now have orders for 58 Gnats. Of these, 12 are for Finland, 25 complete and 15 partly-built airframes are for India, and six for the British Ministry of Supply. Many more will be built under licence in India.

In addition to the standard single-seat Gnat Mk.1 fighter, which is supersonic in a dive, Folland have designed a 1,000 m.p.h. Gnat IV, and two-seat training and carrier-based versions of this versatile little aircraft.



The U.S. Douglas A3D-1 Skywarrior, showing how the tail fin as well as the wings can be folded so that the aircraft can be stowed in the below-deck hangar of an aircraft carrier.

Folding Bomber

The Douglas A3D Skywarrior has a loaded weight of about 31½ tons, a wing span of 72 ft. 6 in. and height of 22 ft. 9 in., which is a lot of aeroplane to try and cram into the below-deck hangars of even the U.S. Navy's big *Essex*, *Midway* and *Forrestal* class aircraft carriers. As a result, its designers have had to give it a folding fin, in addition to the usual folding wings, as shown in the illustration above.

The extra effort is well worthwhile, because the three-seat A3D, which has two 10,000 lb. thrust Pratt & Whitney J57 turbojets, is the most powerful aircraft ever built for carrier operation and can carry the largest types of bombs, including nuclear weapons, at around 650 m.p.h. Its great range was demonstrated at the 1956 U.S. National Air Show, when two A3D's flew non-stop from the carrier *Shangri-La* off San Diego to Oklahoma City and back, a total distance of 2,390 miles.

T.W.A. Choose Scottish Names

Scottish readers will be particularly interested to know that Trans World Airlines have named five of their new L.1049G Super Constellations after cities or castles in their country. The first was given the name *Star of Edinburgh* by the City's Lord Provost at a special ceremony last year. Now it has been joined by the *Stars of Aberdeen*, *Inverness*, *Stirling Castle* and *Balmoral*.

As a result, T.W.A. now have more aircraft bearing Scottish names than any other airline in the world. They are used on transatlantic routes between the United States and Britain, and on coast-to-coast services within America.

Anti-Tank Helicopter

Yet another military use for helicopters has been demonstrated by the French Ouest-Aviation company, who have completed successfully a series of trial firings of the Nord SS.10 anti-tank rocket from one of their little Djinn two-seat ultra-light jet helicopters.

Hovering a few feet above the ground, the pilot had no difficulty in launching the missiles, which are guided by radio through two wires that unwind from reels attached to the rockets as they streak towards their target. It is claimed that 80 per cent. of the SS.10 missiles previously launched from the ground hit their target over ranges of up to 1¼ miles. They weigh only 35 lb. each.

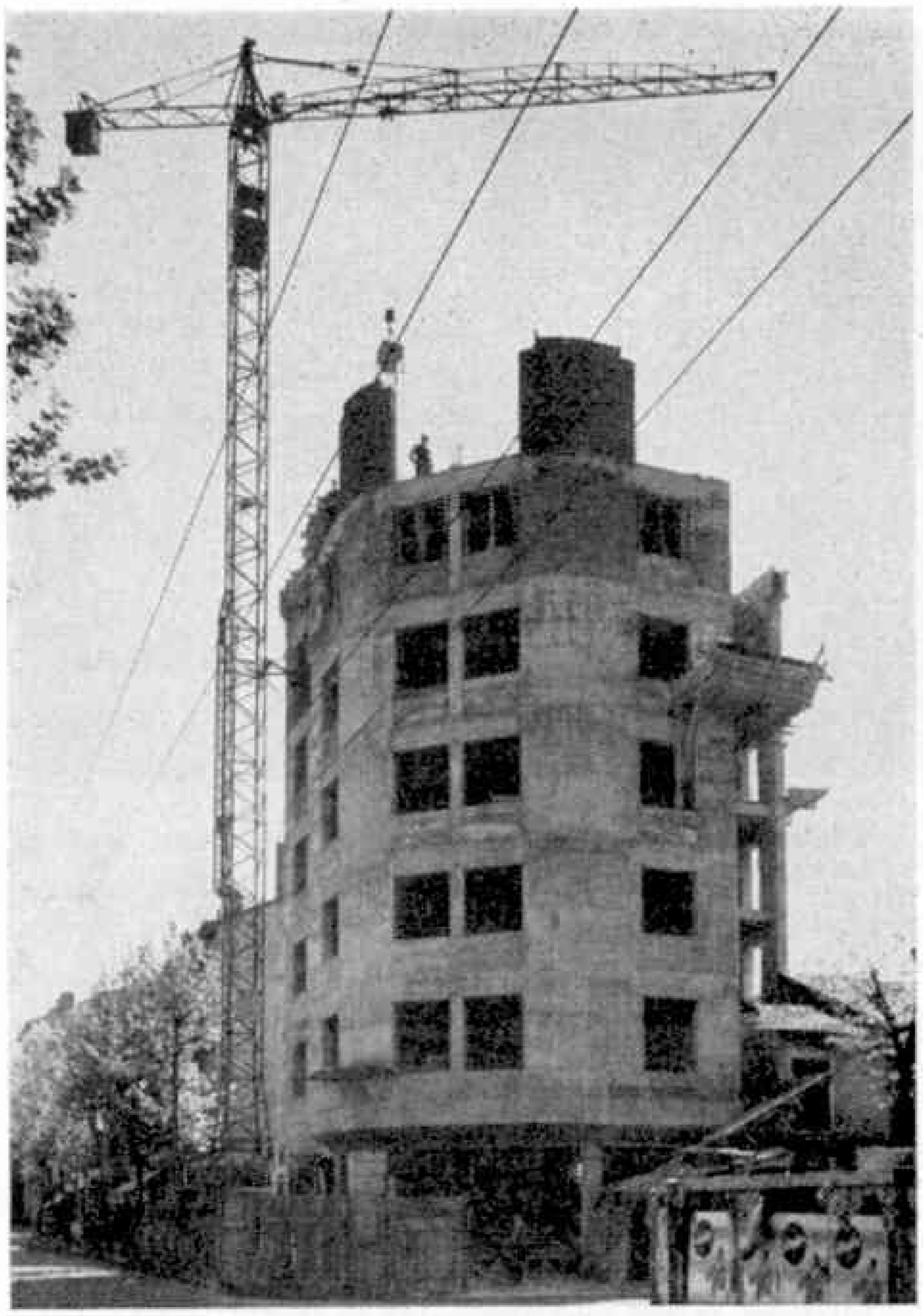
Neptunes on Skis

The ski-equipped Lockheed Neptune patrol-bomber shown in the lower illustration on this page is not heading for a winter sports centre, but for a South Pole rendezvous with Rear-Admiral Richard Byrd's Operation Deepfreeze expedition. It is one of four similar aircraft which will be used for aerial reconnaissance duties, and is fitted with the largest skis ever built for this class of aircraft.

Each main wheel ski measures 16 ft. long and 5 ft. wide, and a smaller ski is mounted beneath the nosewheel. All three can be retracted flush with the bottom of the engine nacelles and fuselage nose in flight, and can be raised sufficiently to permit a normal landing on the wheels when the ground is hard enough.

The wingtips and tail of the Neptunes are painted a glowing red to aid rescuers if the aircraft should be forced down in the Polar regions.

One of four Lockheed Neptune patrol-bombers for service with Rear-Admiral Byrd's Operation Deepfreeze Antarctic expedition. It is fitted with the largest skis ever built for this class of aircraft.



A modern tower crane in action. This picture shows a Sheepbridge Jules Weitz crane in use during the building of an office block on a main road. The tower is anchored to the building for working at extended heights. The illustrations to this article are reproduced by courtesy of Sheepbridge Equipment Ltd.

Tower Cranes

By the Editor

CRANES have always been favourite subjects with Meccano model-builders, and here is one that will provide them with excellent ideas for building examples of this type. It is the tower crane, which is becoming prominent in cities and other places where large buildings of many storeys are being erected, for which it is specially suitable. The design I am dealing with, an example of which is seen in the picture at the head of this page, is French in origin. It is made there by the Jules Weitz Company of Lyons, and is now being manufactured under licence in Great Britain by Sheepbridge Equipment Ltd., of Chesterfield.

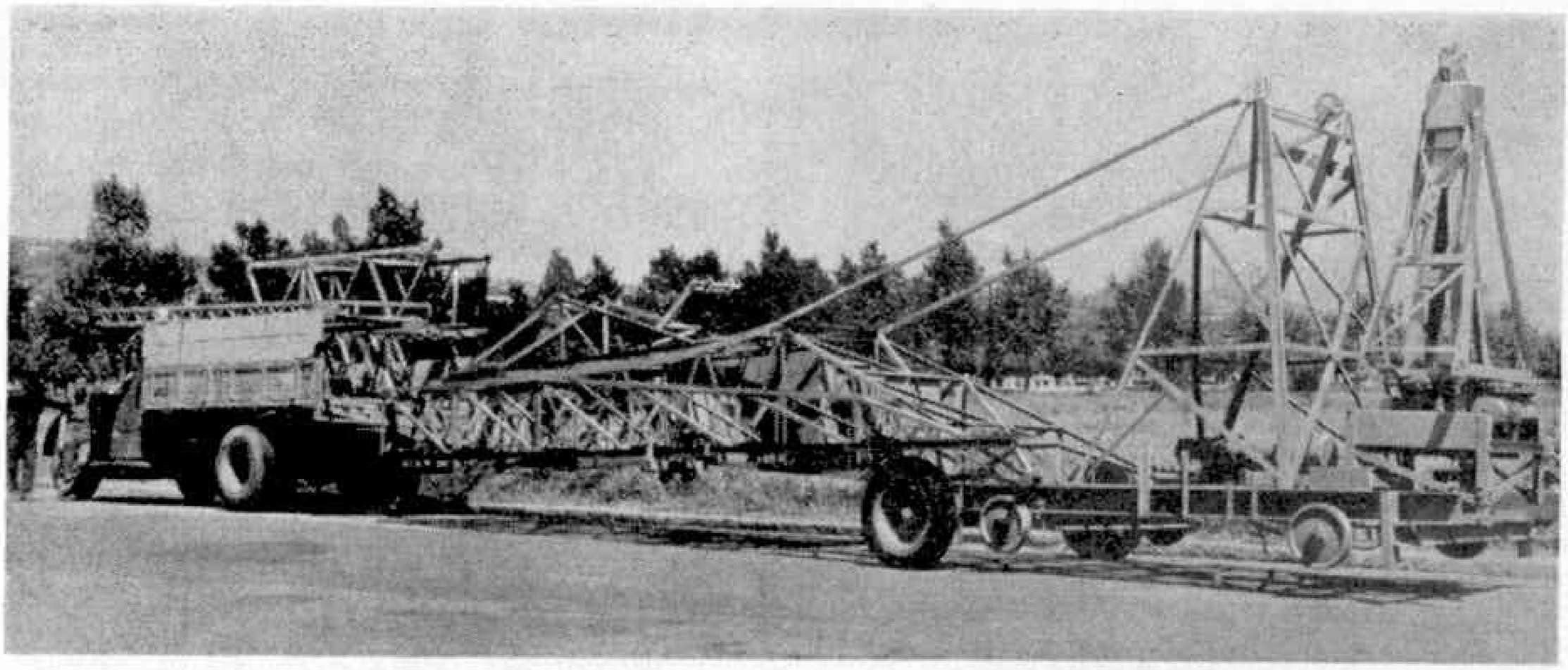
The Sheepbridge Jules Weitz tower cranes are ingenious in design, and they are proving especially useful in building operations because they can be used in comparatively narrow spaces. In the picture above the crane is seen erected just outside the building line, and it will be seen at a glance that it does not get in the way at all, while being able to carry out all the work of lifting and depositing material where it is required. In fact, a space only 10 ft. wide from the face of the building to the boundary of the site is sufficient to accommodate the crane.

An extremely valuable feature that will be a surprise to many readers is that it can easily be assembled in the lift shaft of the building and there used during erection. This of course is a consequence of the small area covered by its base. The tower occupies the lift shaft, with its jib well above the building and it can be easily lifted to higher levels as building proceeds. It can readily be dismantled when building construction is completed, and the parts lowered over the side of the building by means of a system of pulleys and the use of the main hoist motor of the crane itself.

A wide range of these tower cranes is to be produced. The lifting capacities will vary from 12 hundredweight to 20 tons, and the tallest crane will be about 300 ft. in height. This crane will have a jib radius of 78 ft. 10 in.

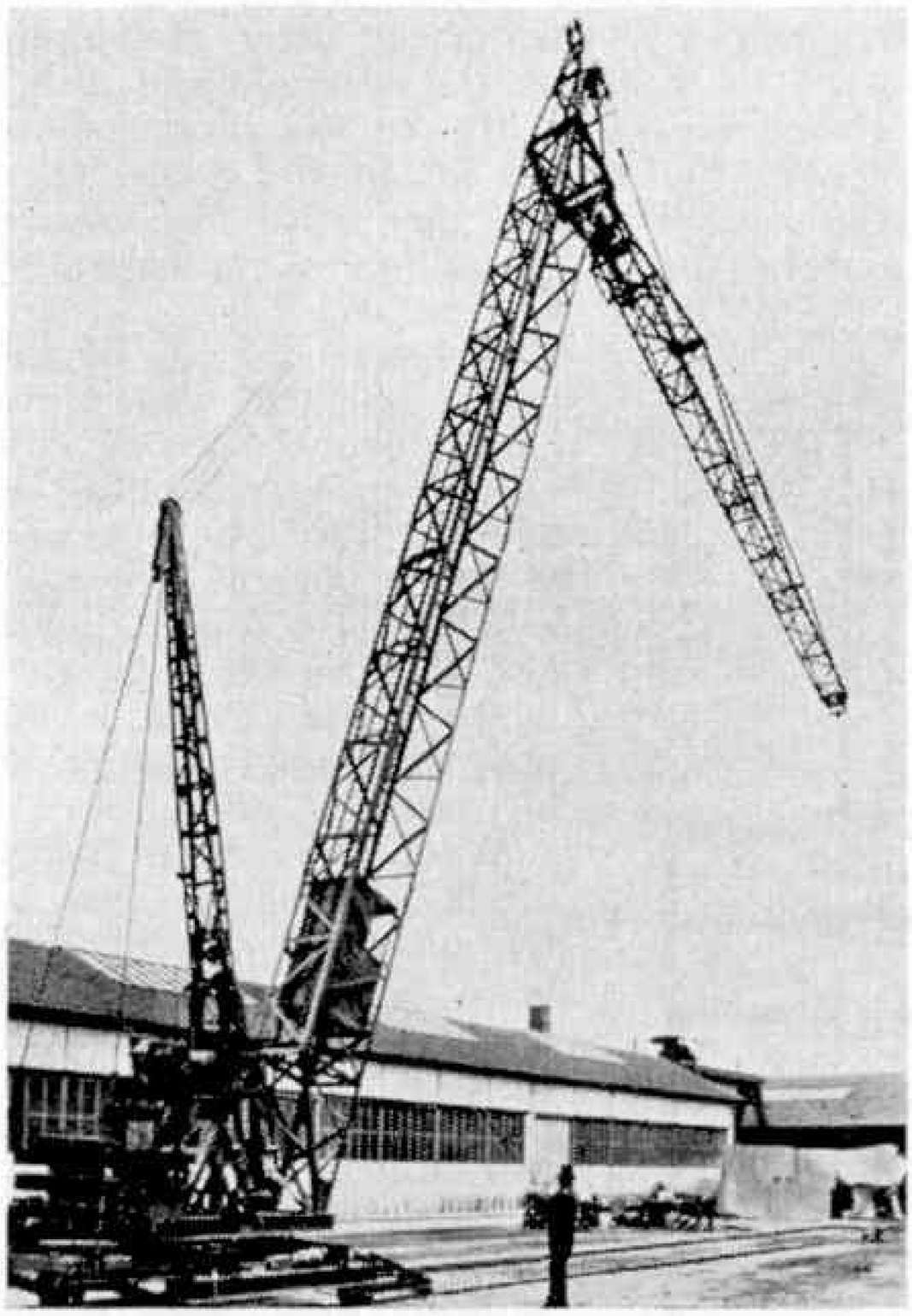
The framework of the base of the crane is built up of deep section steel channels and is mounted on four bogies, which are protected by means of steel plate stone guards. This base can be seen in the lower illustration on the opposite page, which shows a crane in course of erection on the site where it is to be used. As will be seen, the crane has a square section lattice tower, and the jib can be fixed horizontally or in two other inclined positions as required. Both tower and jib are built up from sections that can easily be handled and put together by means of fitted bolts.

The drivers' cabin is inside the tower and it can be fixed at any height to suit the level at which work is in operation, so that the driver always can be given a good view, an essential in crane operation.



It is easy to move a tower crane to the site on which it is to work, the assembly being towed by one ordinary lorry.

It is moved up and down the tower as required by means of a hand-operated winch on the cabin roof. In the illustration on the first page the cabin can be seen nearly at the top of the tower, whereas in the lower one on this page, showing the crane in course of erection, it is of course almost at the foot. The crane travels on its bogies on rails 7 ft. 7 in. apart, so that it can be moved when required by simply laying additional rail tracks.

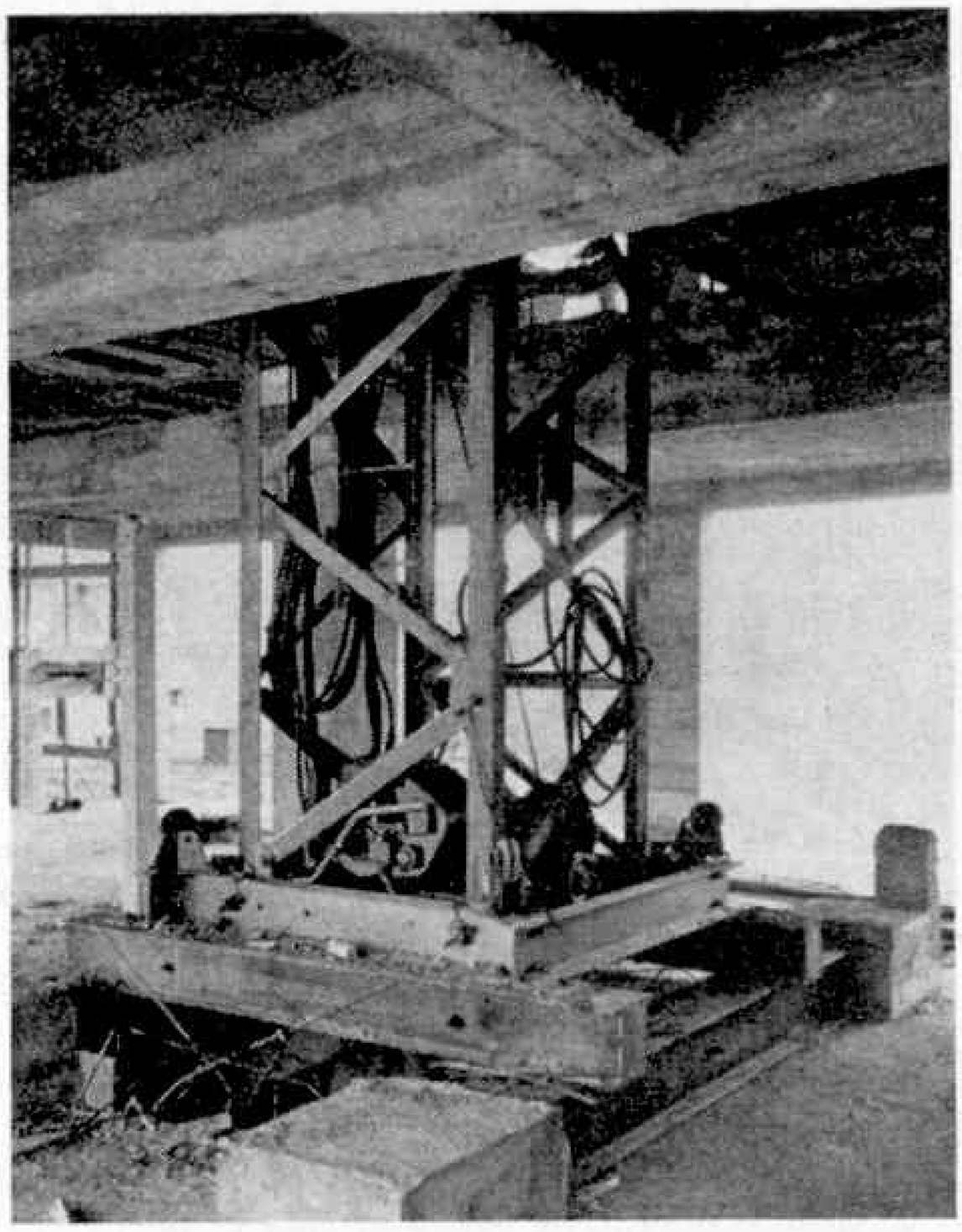


The crane is erected in a very simple manner. Here the main hoist motor is being used with a supplementary jib to haul the tower up. During this operation the motor controller in the cab is remotely operated by means of ropes.

The crane is electrically operated. The equipment was specially designed by British Thomson - Houston Ltd., and includes motors and control gears for all movements. The load is suspended from a trolley that runs on the lower members of the jib, and a safety device in the trolley prevents the crane from lifting too large a load at an excessive reach outward from the tower itself, or from travelling too far out on the jib for safety with the load that may be already on the hook.

When the crane is in use concrete ballast is loaded on its base. A first look at it, with its tall tower and the long reach of the jib, suggests that it would be unstable, but it is so designed that it is perfectly satisfactory with a full load on the hook suspended from the jib trolley even when the wind is blowing at 57 miles an hour, and this without the use of stays or jacks to steady it. When it is not in service, the crane can be anchored or guyed in order to prevent damage by even stronger winds. An additional means of security when working at great heights is a means of anchoring the tower to the building itself, as can be seen in the illustration on page 72.

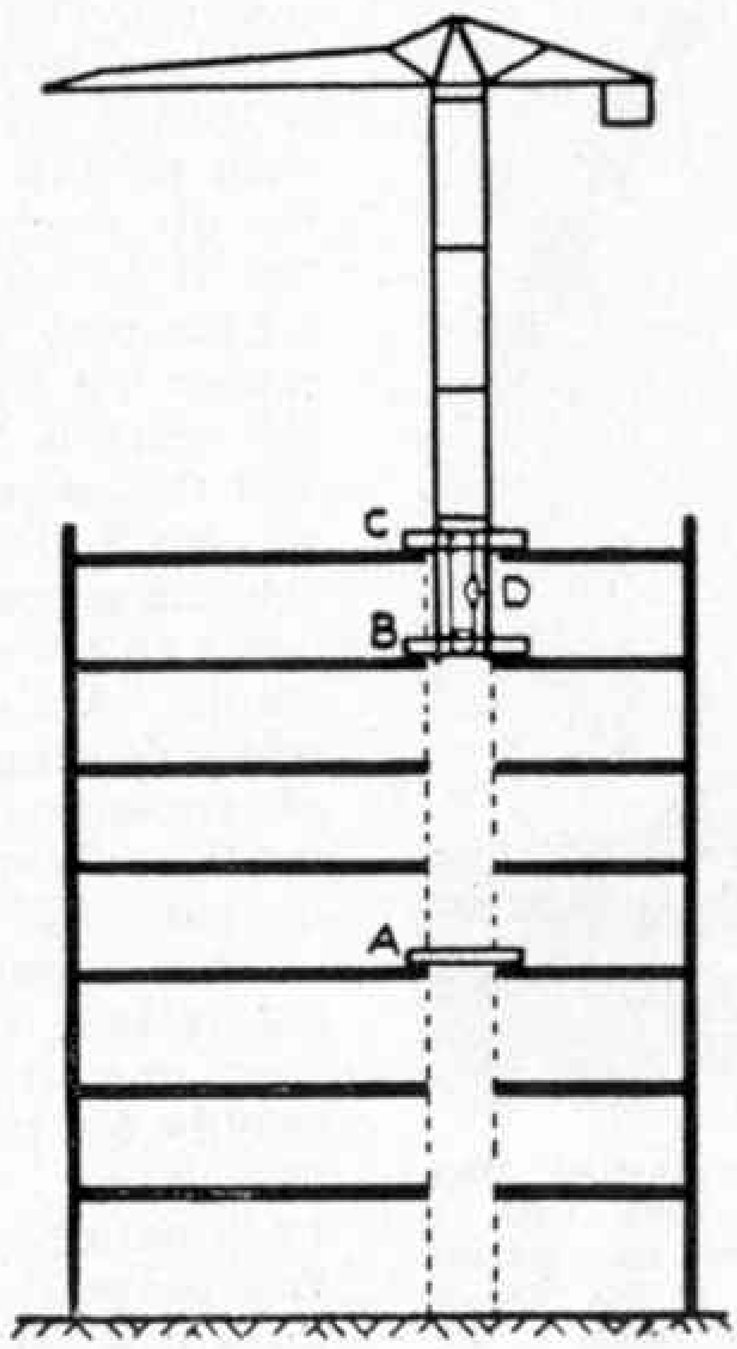
The upper illustration on this page shows how easy it is to move the crane from one site to another. It breaks down readily for transport and with one end on the bogie, which can be fitted with pneumatically tyred wheels available for this purpose, and the other on an ordinary lorry, the assembly can be moved readily.



A tower crane can be erected in the lift shaft of a very tall building that is being constructed with its aid. Here is the base unit of a crane accommodated in this manner.

Erection is just as simple, and the tower crane can be prepared for work within a short time of the carriage being placed on the rails. In this process the power and machinery of the crane itself only is required. First the tower is raised into the vertical position, using cables hauled by the hoist motor of the crane, and a supplementary jib. The latter is part of the main equipment, and is stowed at the base of the crane tower. The jib of the crane itself is next hoisted to the top of the tower by similar means, the cables being attached to one end, so that the jib appears to slide up the tower. Then a similar operation pulls up the jib to take up its horizontal position.

The construction of buildings of many storeys provides interesting examples of the versatility of this type of crane.



How the crane is raised as a building grows upward. In this drawing the base of the crane has been lifted from the third floor of a building to the sixth.

The fact that it can be easily assembled and used in the lift shafts, in which it can be raised to any height required, is a specially valuable feature. In the upper illustration on this page is the base of a Sheepbridge crane in use as a climbing crane in the lift shaft of a building. The hoist unit can clearly be seen, and it is apparent at once how small an amount of space is required. Large lift shafts are not necessary for such a crane, the minimum requirements being 3 ft. 10 in. square.

The diagram at the foot of the page shows how the crane is handled within the lift shaft. Here operations have gone on up to the seventh floor, and the base of the crane has been raised to the sixth floor for its next operation. At C, on the seventh floor, is a spare framework. Frameworks of this kind are used to keep the lift in position, for which purpose guides are fixed to them. This height has been reached by the crane after beginning with its base on the ground, and being given successive lifts to the intermediate floors. The actual lift of the crane when the necessity for this arises is carried out by means of pulleys in its base and a hand winch.

A special feature of the crane is the complete character of the precautions to prevent overhoisting or overloading. The overload indicator system comprises a series of coloured lights and a bell system, mounted in the driver's cabin, where they are clearly visible at all times.

When the load being lifted approaches close to the maximum safe working load an amber light appears, and this indicates to the driver that he should proceed with caution.

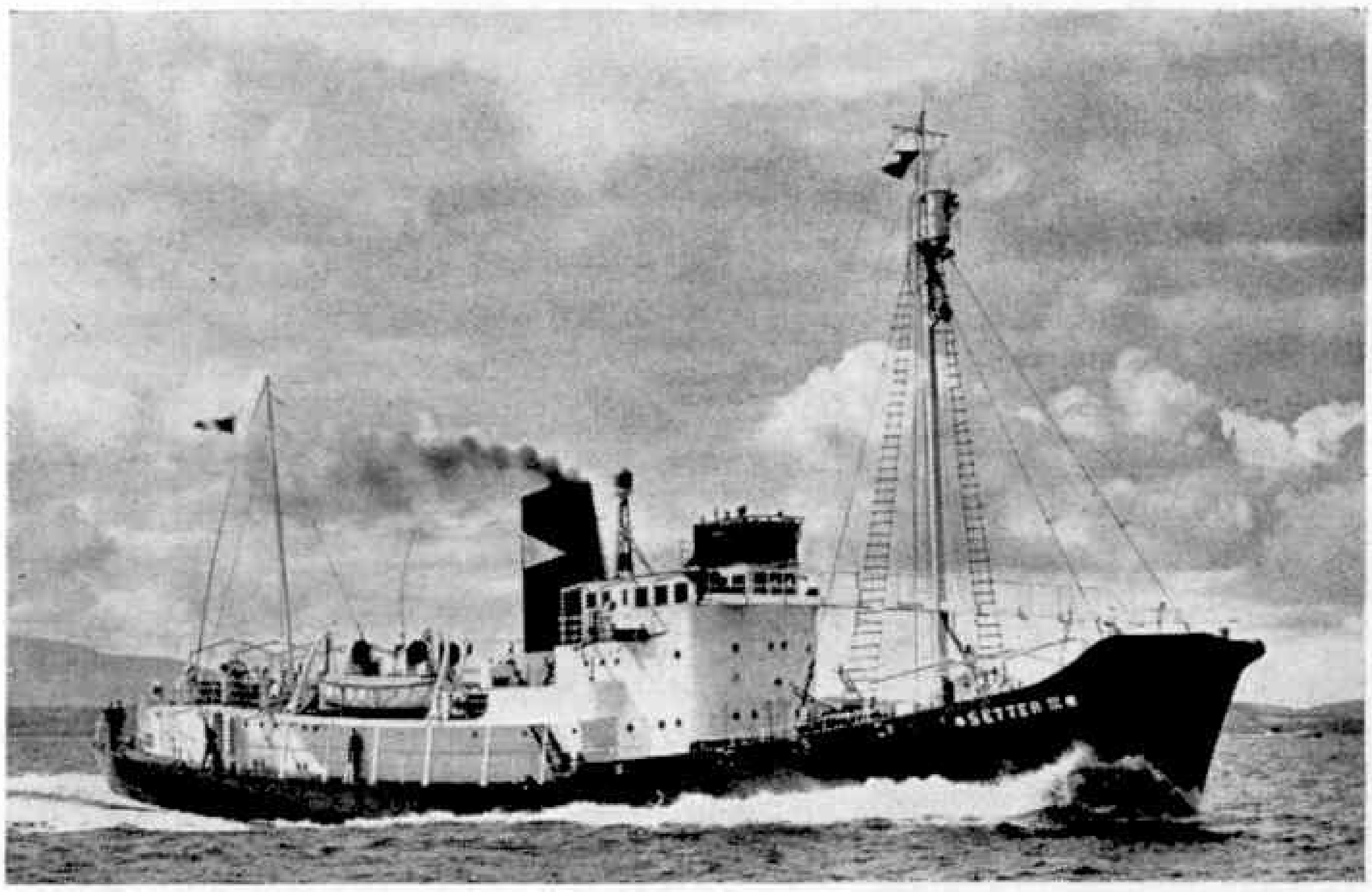
If the driver allows the load to exceed the safe working load, then a red warning light appears and a loud electric bell warns the driver that he is over-

(Continued on page 106)

Aluminium at Sea

By Ian B. Roy

ALUMINIUM is today being used more than ever before as a building material in the shipyards of Britain and the rest of the world. The great advantages this wonder-metal has over the more conventional materials are its lightness and durability, its non-magnetic properties, and low maintenance costs. These three factors combine to make aluminium a highly suitable metal for use in ship construction.



This whale catcher, "Setter III," built by A. & J. Inglis, for United Whalers Ltd., has deckhouse, funnel and bulwarks made of the aluminium alloy Birmabright. Photograph by courtesy of Birmetals Limited, Birmingham.

Aluminium life-boats have been in use for a good number of years. The first all-aluminium ship's life-boat, affectionately known as *Barnacle Bill*, was built as long ago as 1934 by Birmal Boats Ltd., of Southampton. For more than four years this life-boat underwent a series of rigorous tests both in this country and in Holland. After 20 years service as a marine engine test-bed and general work boat, *Barnacle Bill* is still in good condition. Her career is indeed a tribute to aluminium!

Since these tests were carried out, many famous passenger liners have been equipped with aluminium life-boats. *Caronia*, the Cunard luxury cruise liner, the two Union-Castle ships *Edinburgh Castle* and *Pretoria Castle*, the Royal Mail Lines *Andes* and the Dutch liners *Nieuw Amsterdam* and *Willem Ruys* are only a few of the many liners to be so equipped.

But the use of aluminium is not confined to life-boats. Masts, funnels, and deckhouses, often the whole superstructure is made of this alloy. One ship with a superstructure made entirely of aluminium is the Norwegian cargo freighter *Byfjord*, built by Messrs. Hall, Russell and Co. Ltd., Aberdeen. Another is the Hong Kong ferry *Electric Star*. The aluminium superstructure of this vessel is built to withstand a wind velocity of over 170 m.p.h. during the typhoon season!

The three new Cunard sister ships *Saxonia*, *Ivernia* and *Carinthia* all have aluminium funnels, and the Canadian Pacific liner *Empress of Britain* also is fitted with one. The Christian Salvesen's whale factory ships *Southern Harvester* and *Southern Venturer* have aluminium aircraft hangars built between their twin funnels for housing the helicopters carried with the whaling fleets. The same firm's fish factory ship M.V. *Fairtry*, the world's first specially built stern-trawling vessel, described and illustrated in the *M.M.* for December 1954, has an aluminium navigating bridge and trawl bridge. In many refrigerated ships, including the entire fleet of the Port Line, the holds are lined with aluminium alloy.

But probably the greatest example of all of the use of aluminium in shipbuilding is the American liner *United States*, the present-day holder of the Blue Riband of the Atlantic. In this ship almost everything, from cutlery and curtain rails right up to the ship's life-boats and the majestic funnels, is of aluminium alloy.

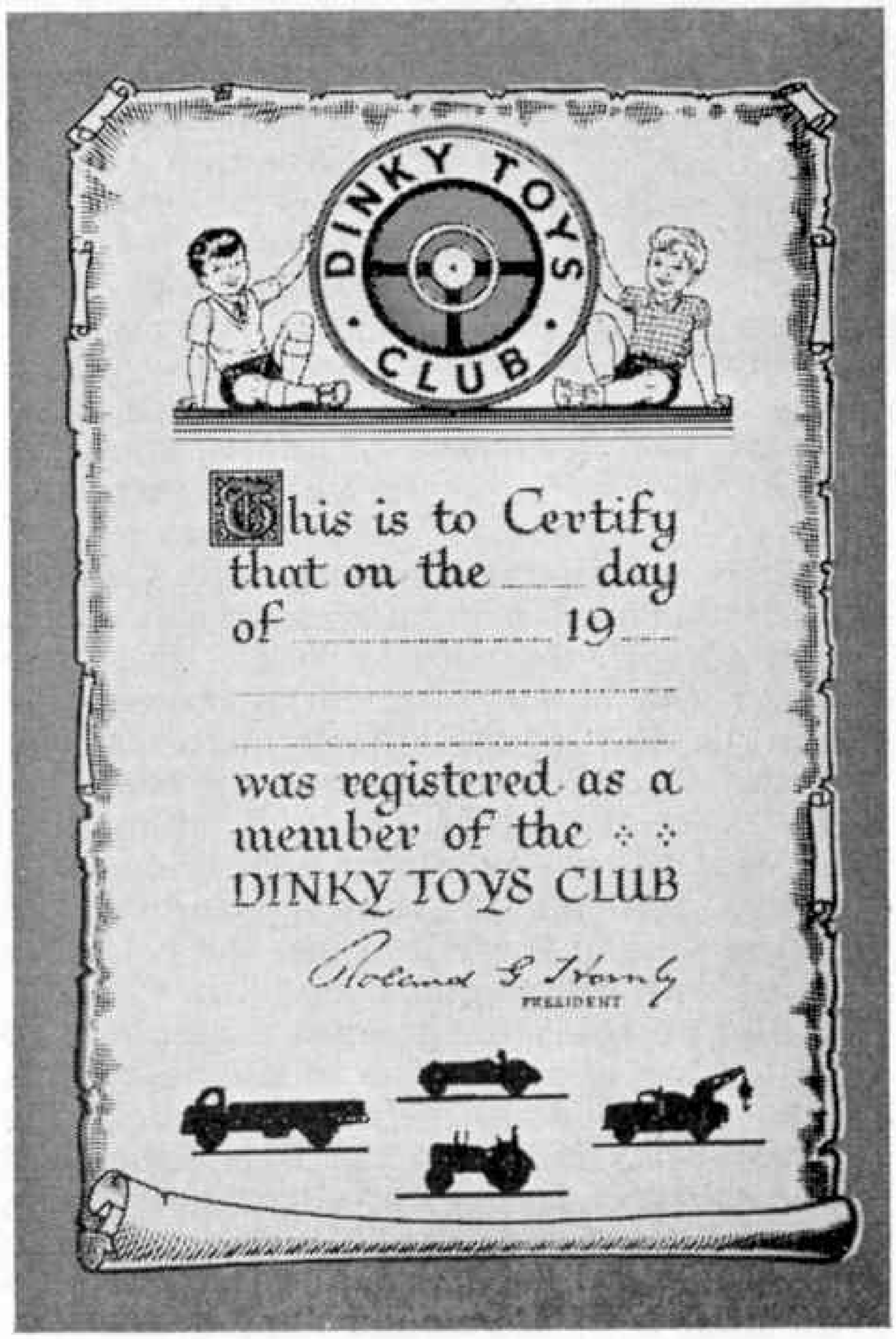
HAVE YOU JOINED YET?

THE DINKY TOYS CLUB

Founder and President : ROLAND G. HORNBY

Any Dinky Toys and Supertoys enthusiast can become a member. All that he has to do is to write to the Secretary, Dinky Toys Club, Binns Road, Liverpool 13, declaring that he is the owner of one or more of these famous miniatures, and enclosing a Postal Order for 1/– with his letter, when he will be immediately enrolled.

To mark his election as a member of the Club, the Dinky Toys Club Badge is sent to every applicant, together with a Certificate of Membership. The Badge is beautifully enamelled in red and white, with the lettering "Dinky Toys Club" in gilt round its circumference. In its centre is a fine representation of the steering wheel of a car, also in gilt. The Certificate of Membership too is a handsome one in black and orange, and carries the name of the member and that of the place in which he lives.



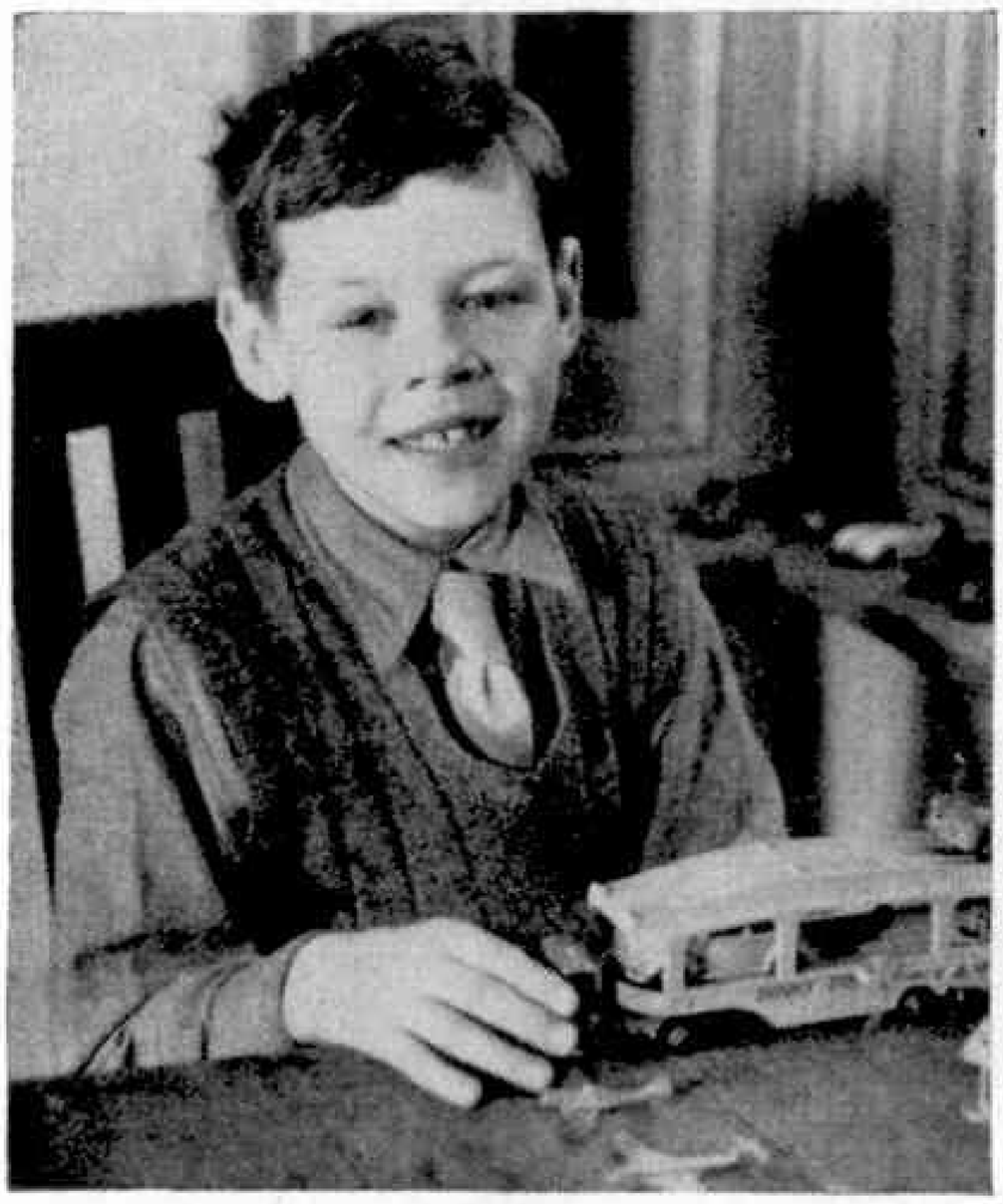
Every member derives a double benefit from his connection with the Dinky Toys Club and his correspondence with Headquarters. In the first place, he is able to exchange news and views with the Club experts, who will help him to get more fun from his hobby. In the second place, he can write directly to the Secretary of the Club to tell him what he would like to see included in the Dinky Toys or Supertoys range.

Members can also pass on any good ideas they may have for ways and means of using Dinky Toys, or playing with them, particularly in road layouts, the variety and interest of which are endless. These will be brought to the notice of other members through the Club and through its organ, the *Meccano Magazine*, a special section of which is devoted to Dinky Toys and Supertoys.

Every member should wear his Badge regularly, so that he and other members of the Club can recognise each other as Dinky Toys enthusiasts when they meet. They can then tell each other what Dinky Toys they have, how they display them and, above all, how they use them in their playing hours. From such a meeting it is but a step to the formation of small local clubs, the members of which can build larger and grander layouts.

MECCANO MAGAZINE

Junior Section

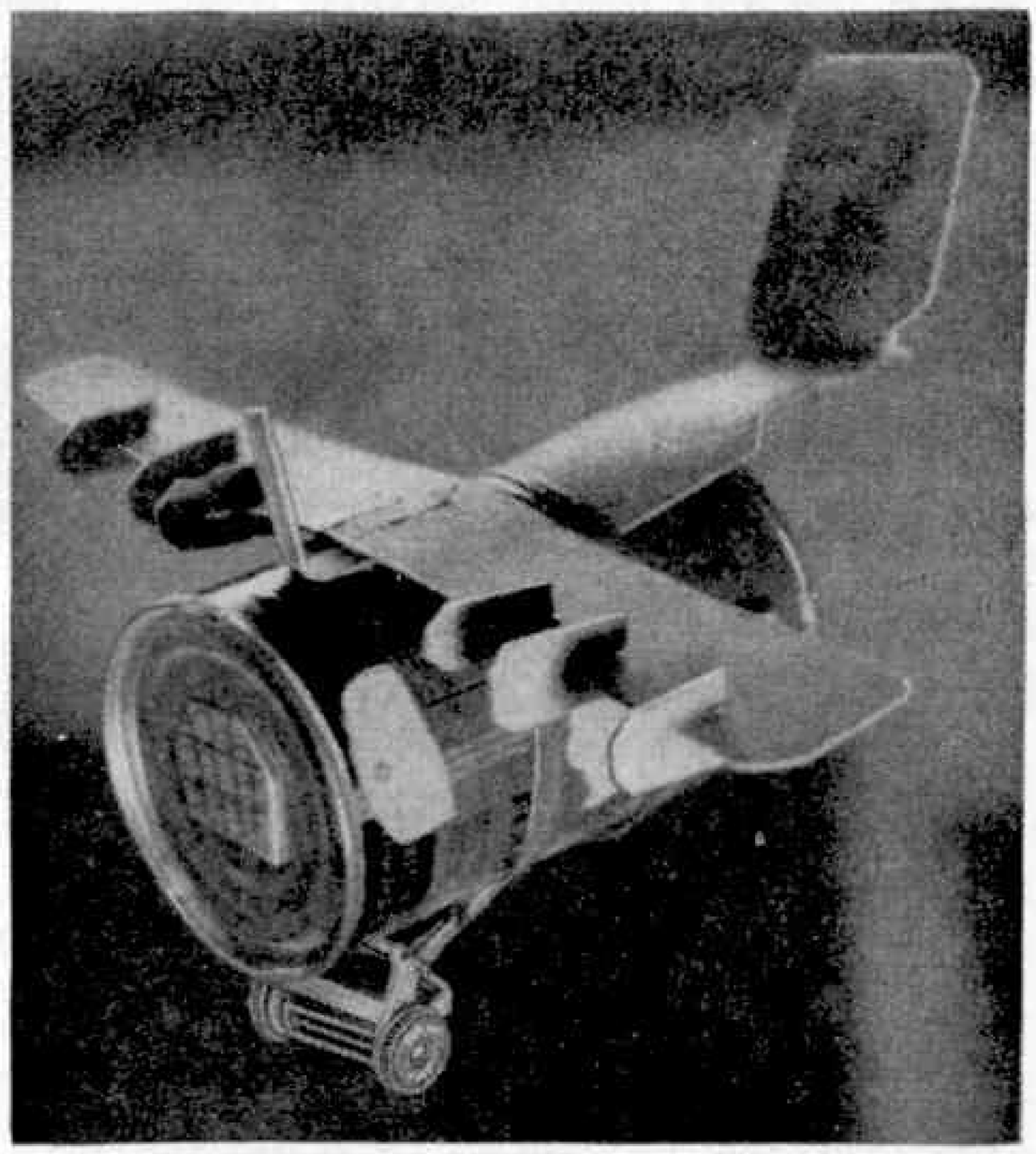


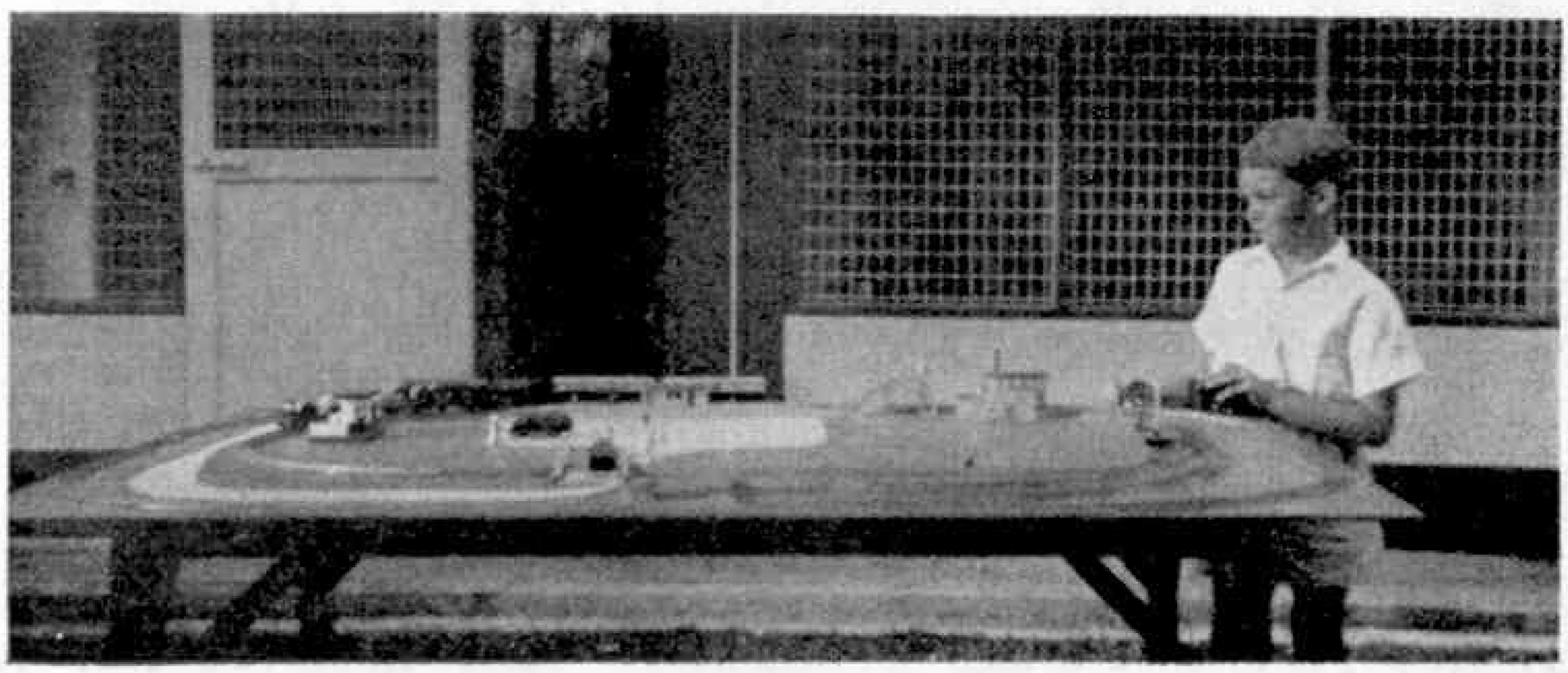
Nicholas Heath, of Reading, is the "inventor" of the wonderful transport plane seen on the right, which mows its own airstrip on landing.

ON the right is a picture of an "advanced design" of transport plane. Its main interest lies in the undercarriage, which is a Dinky Toys Grass Cutter! When the plane lands on grassland it simply cuts itself a suitable swathe, so that in a sense it makes its own landing strip.

This great plan was evolved by Nicholas Heath, who is only 8 years old, but whose work already gives promise of great originality. I wonder what next he will invent. At any rate, his portrait shows that he is on a good line.

At the foot of the page is a picture of Michael Officer, who is also 8 years of age, enjoying himself with his Hornby-Dublo railway. Michael was fortunate in having plenty of room for developing his line, for at the time the picture was taken he was living in Singapore, and the railway was erected on a table in the grounds of his home there.





Here running his Hornby-Dublo railway at his former home in Singapore is Michael Officer, Sheerness.

Easy Model-Building

Spanner's Special Section for Juniors

Three-wheel Tipping Barrow — Sports Car

YOU should begin building the Three-Wheel Tipping Barrow shown in Fig. 1 by making the main frame, which consists of two 5½″ Strips 1 bolted to the lugs of a 2½″ × ½″ Double Angle Strip. Fix a Flat Trunnion 2 to the centre of the Double Angle Strip and use the same bolt to hold in place two Angle Brackets, arranged to form a U-shaped piece. Now fix a 2½″ Stepped Curved Strip 3 to each Angle Bracket, and connect the upper ends of the Curved Strips by two more Angle Brackets bolted together. Use the bolt that connects the Angle Brackets to fix in position a Fishplate 4.

The single front wheel is a Bush Wheel and you must fix it by its set screw on a ⅜″ Bolt passed through the lower end hole of a 2½″ Strip 5. Bolt this Strip to one of two Trunnions 6 fixed together. Use a ⅜″ Bolt and a nut to connect the two Trunnions, then pass this Bolt through the Fishplate 4. Now screw a nut on the Bolt, but do not tighten it. Leave the nut sufficiently loose to allow the Bolt to swivel freely in the Fishplate. The next step is to place a 2½″ Strip 7 on the Bolt, and screw another nut tightly in place to fix the Strip 7 in position. You should bend the Strip slightly as shown, as it forms the steering control and it must clear the head of the bolt that joins Fishplate 4 to the Angle Brackets.

To make the tipping body you require a 5½″ × 2½″ Flanged Plate fitted at one end with a Flat Trunnion and a Fishplate 8. Bolt a 2½″ × ½″ Double Angle Strip 9 to the third row of holes from the rear end of the Flanged Plate, and attach a Fishplate tightly to each lug of the Double Angle Strip. Now pass a 3½″ Rod through the Strips 1 and through the Fishplates, and hold the Rod in place by the rear wheels, which are 1″ Pulleys fitted with Tyres. Mount a Crank Handle in the Strips 1 and use Spring Clips to hold it in place. Tie one end of a length of cord to the Crank Handle, pass the cord under the rear axle and fasten its other end to the back of the Flanged Plate.

Parts required to build the Three-wheel Tipping Barrow: 2 of No. 2; 2 of No. 5; 4 of No. 10; 4 of No. 12; 1 of No. 16; 1 of No. 19s; 2 of No. 22; 1 of No. 24; 2 of No. 35; 18 of No. 37a; 15 of No. 37b; 4 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; 2 of No. 142c.

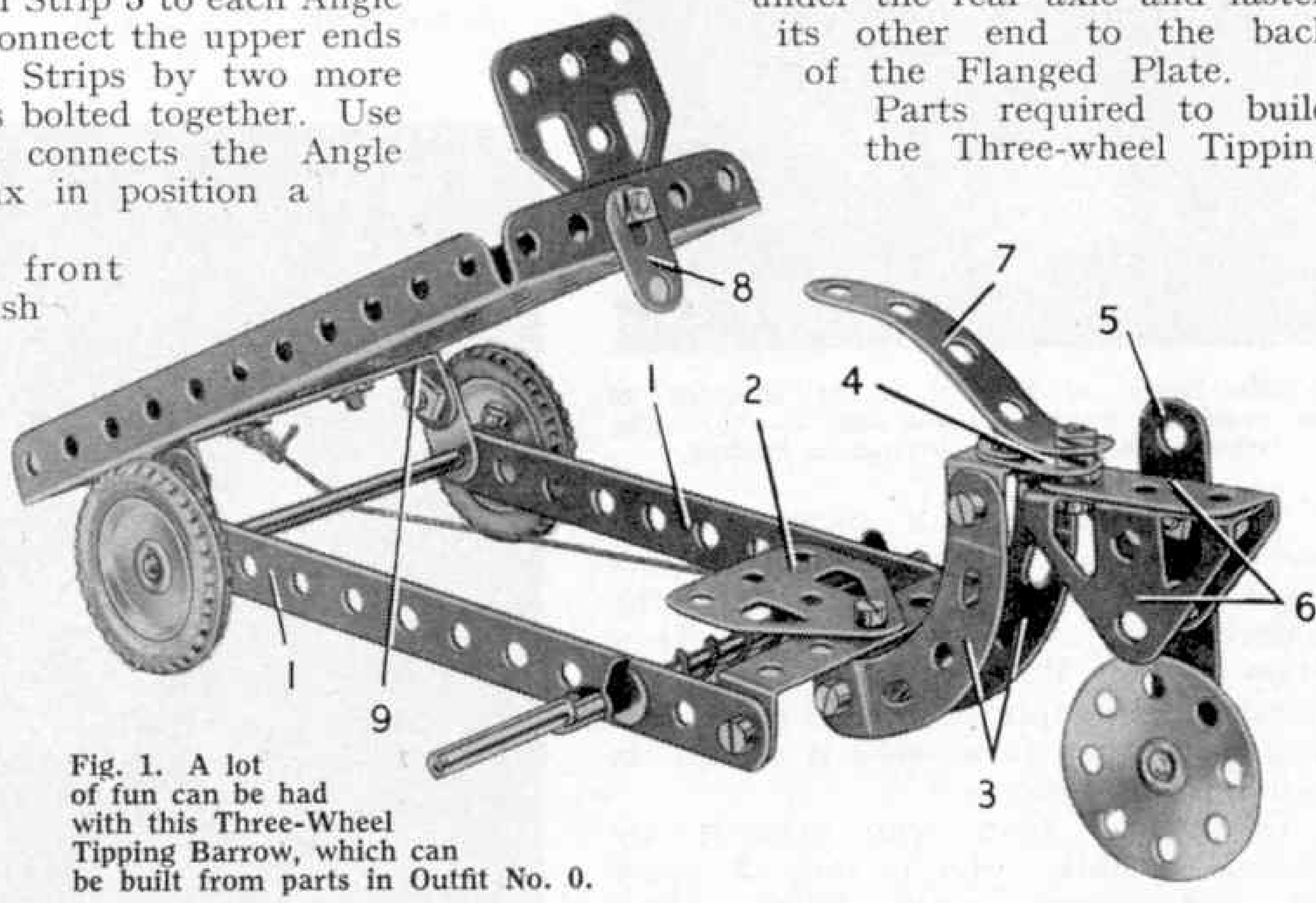


Fig. 1. A lot of fun can be had with this Three-Wheel Tipping Barrow, which can be built from parts in Outfit No. 0.

Sports Car

Figs. 2 and 3 show a Sports Car that can be built from parts in Outfit No. 2. You should begin building it by bolting a 5½″ Strip 1, a 2½″ Strip 2 and a 2½″ Stepped Curved Strip 3 to a 5½″ × 1½″ Flexible Plate to form each side of the car. The sides are joined together at the front by the radiator, which you can make from two Flat Trunnions bolted

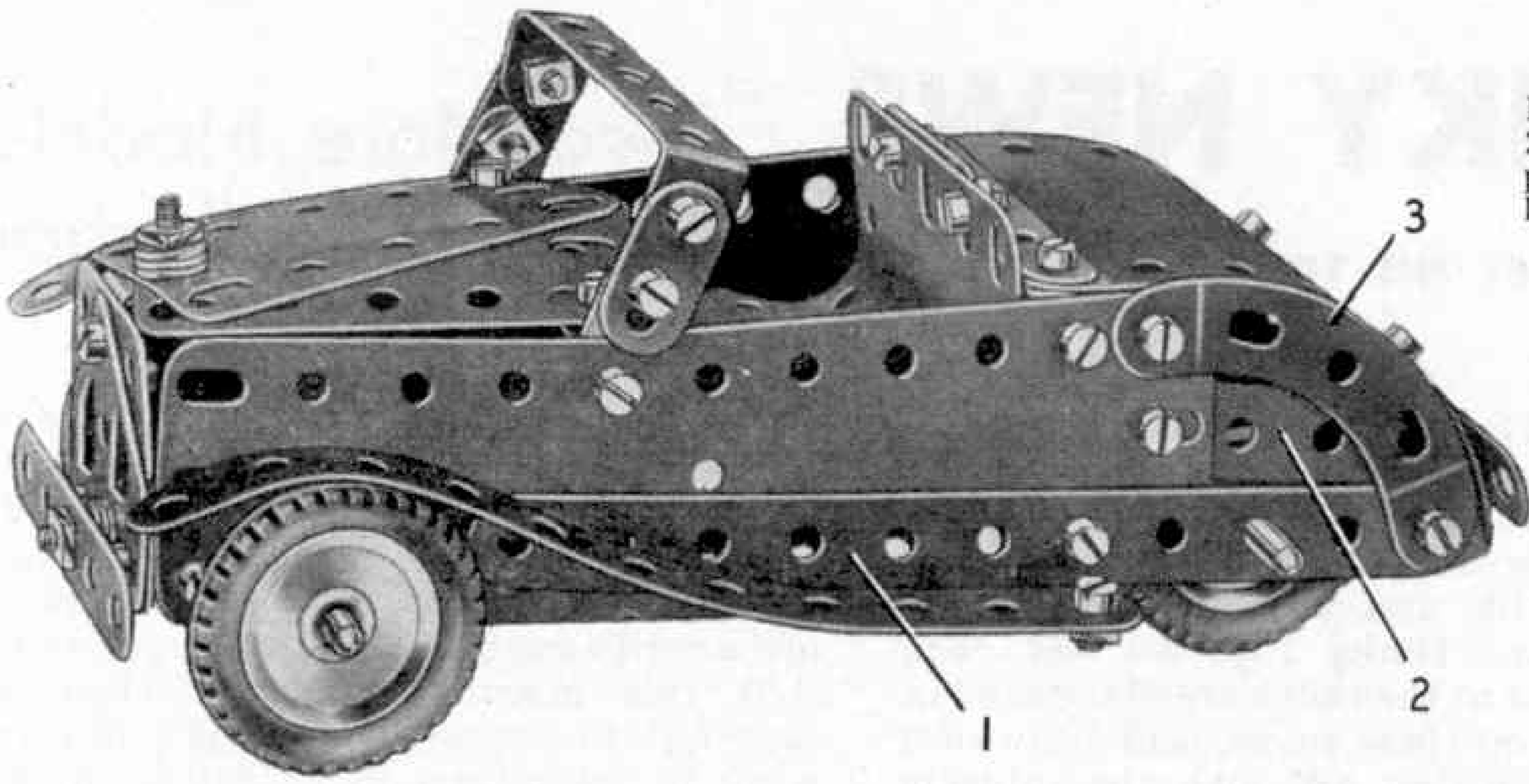


Fig. 2. Outfit No. 2 contains all the parts needed to build this Sports Car.

together. Attach the radiator to the sides by two Angle Brackets.

To make the curved tail of the car you require two $1\frac{11}{16}''$ radius Curved Plates. Bolt these together, then attach the upper Plate to Angle Brackets fixed to the sides and fix the lower Plate to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 4. Use $\frac{3}{8}''$ Bolts for the last-mentioned job and place on them a $2\frac{1}{2}''$ Strip spaced from the Curved Plate by a Spring Clip on each Bolt.

You can make the top of the bonnet with two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates. Bolt these to an Angle Bracket attached to the radiator and support their rear ends by Angle Brackets connected by a $2\frac{1}{2}''$ Strip 5. You should curve this Strip slightly before you bolt it in place. The windscreen support on each side consists of two Fishplates bolted together and attached to the side by the same bolt that fixes the Angle Bracket in place. The supports are connected at their upper ends by a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip.

You should make the seat by opening out a U-section Curved Plate slightly and bolting it to the small flange of a Trunnion 6 fixed to the body. The front wing and the step on each side are formed by a $5\frac{1}{2}''$ Strip curved as shown. One of these Strips is attached to the side by an Angle Bracket and the other is supported by a $\frac{1}{2}''$ Reversed Angle Bracket 7. The front bumper is a $2\frac{1}{2}''$ Strip and it is spaced from the radiator by Washers on a $\frac{3}{8}''$ Bolt.

The wheels are 1″ Pulleys fitted with Motor Tyres and they are fixed in pairs on $3\frac{1}{2}''$ Rods passed through the sides of the body. The front axle is held in place by Spring Clips.

If you have a *Magic* Clockwork Motor you can put it to use in the model Sports Car. You can bolt the Motor underneath the bonnet and connect it by a Driving Band to a $\frac{1}{2}''$ Pulley on the rear axle.

Parts required to build the Sports Car: 4 of No. 2; 6 of No. 5; 4 of No. 10; 8 of No. 12; 2 of No. 16; 4 of No. 22; 4 of No. 35; 36 of No. 37a; 32 of No. 37b; 6 of No. 38; 2 of No. 48a; 2 of No. 90a; 4 of No. 111c; 1 of No. 125; 1 of No. 126; 2 of No. 126a; 4 of No. 142c; 2 of No. 188; 2 of No. 189; 1 of No. 199; 2 of No. 200.

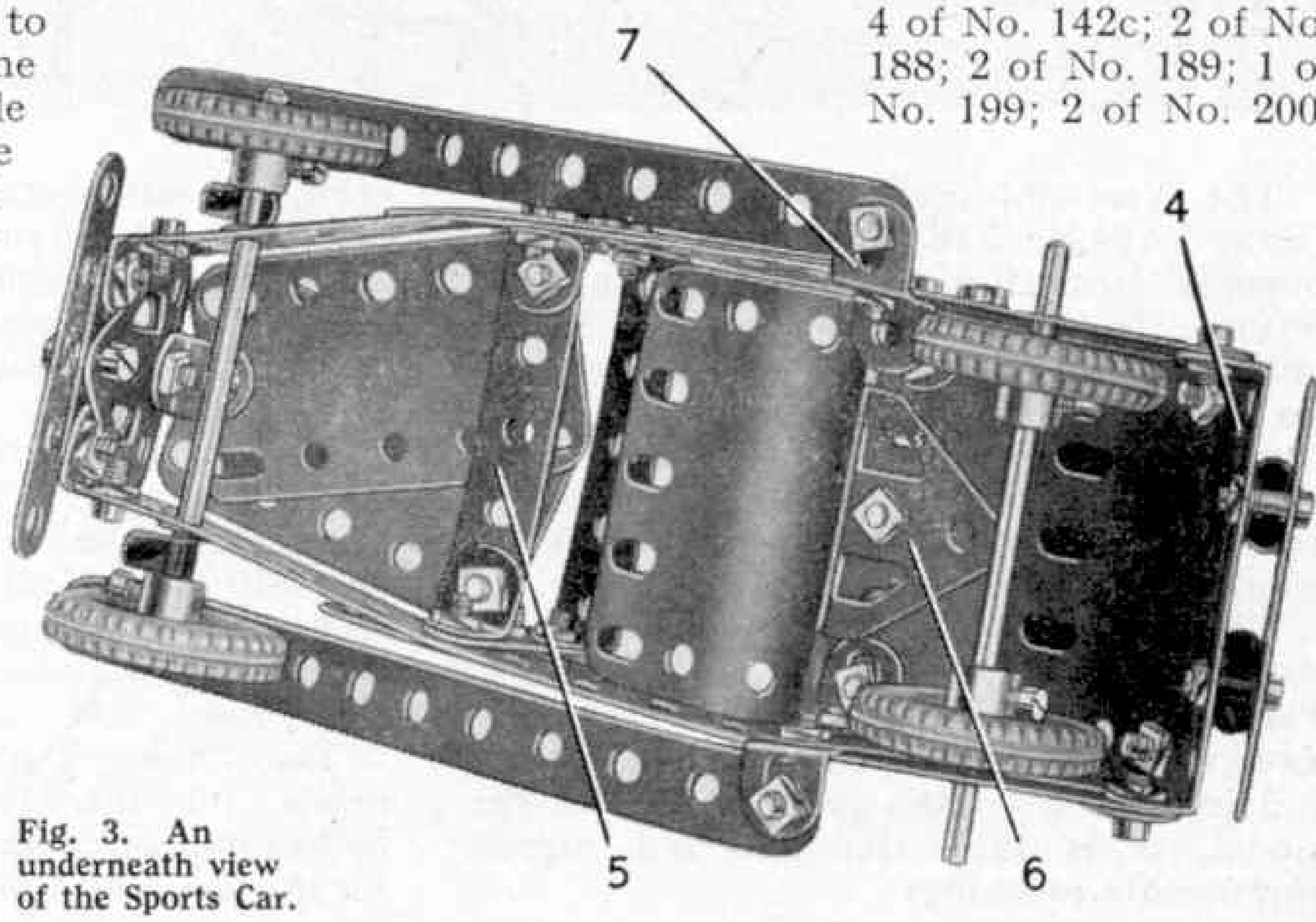


Fig. 3. An underneath view of the Sports Car.

DINKY NEWS

Two More Models For Your Collection

By **THE TOYMAN**

THIS month I am again in the happy position of having two new items to bring to your notice. These are the Westland-Sikorsky S.51 Helicopter, Dinky Toys No. 716, and the Trojan 15 cwt. Van "Cydrax", Dinky Toys No. 454. The new additions to the range are illustrated in my pictures on these pages, and I am sure you will agree that although the subjects of the models are very different, they are equally attractive and will make valued additions to every Dinky Toys collection.

Help at hand! A Dinky Toys Westland-Sikorsky S.51 Helicopter brings relief to a snow-bound village.

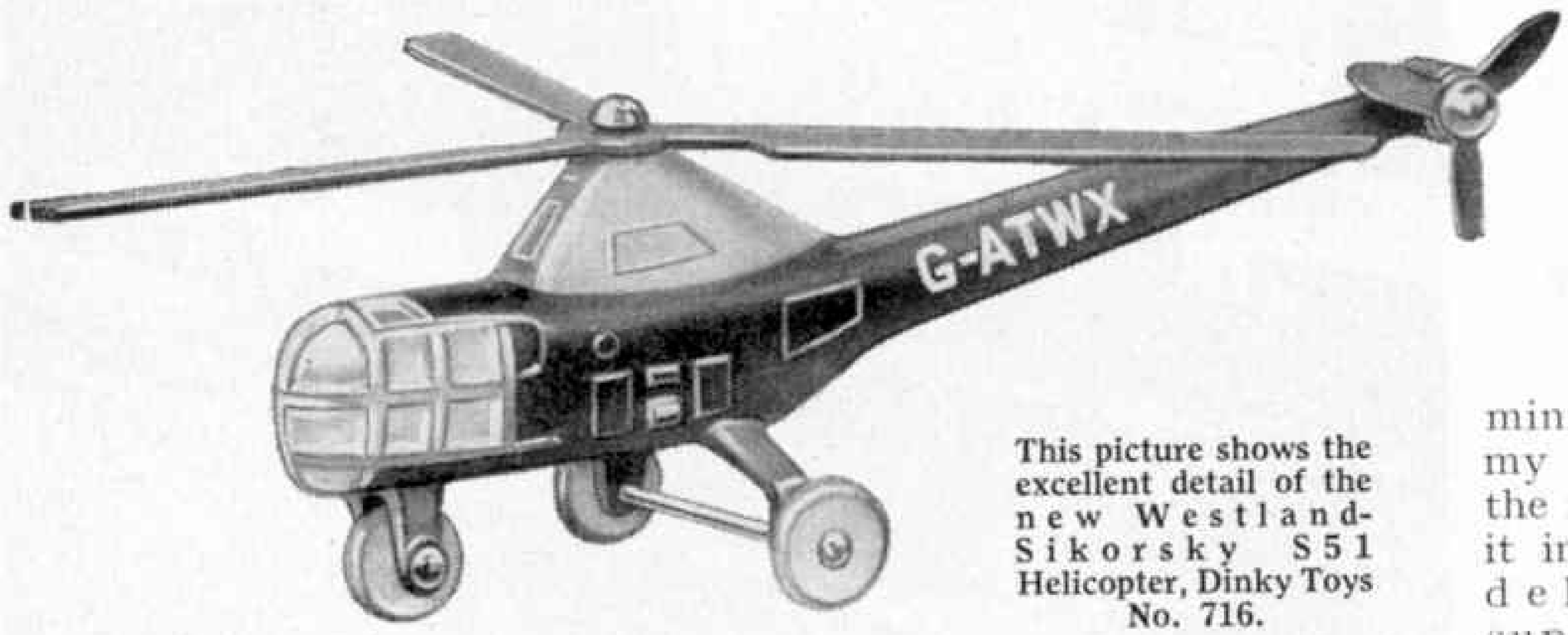
The Westland-Sikorsky S.51 Helicopter, Dinky Toys No. 716, is based on a "general purpose" aircraft in both civil and military service. In the British services the S.51 is known as the "Dragonfly", and it is used for ambulance, observation, search and rescue work. The civil version has seating for a pilot and three passengers. The S.51 has a three-bladed main rotor 49 ft. in diameter and a three-bladed tail rotor. It is 57 ft. 0½ in. from the nose to the tip of the tail, and its top speed is 103 m.p.h. The Dinky Toys model is a really attractive miniature, finished in red and cream. As you can see from the general view of the model, it is fully detailed and carries appropriate markings.

In my notes last November, when I discussed the Bristol 173 Helicopter I touched briefly on the use of helicopters for bringing relief in the form of supplies to the inhabitants of snowbound villages. It occurred to me that the introduction of the S.51 this month was an excellent and appropriate opportunity to try this relief work in miniature. So I set to work to arrange the snow scene you can see in one of my pictures. It represents a small community in a bleak moorland setting and I made use of the usual materials in constructing the scene. A basecloth spread over blocks was laid first of all, leaving a flat area in the centre on which I placed the houses. I sprinkled salt liberally over the ground and buildings, and arranged a group of Dinky Toys Gauge 00 figures round a black cross marked on the ground. This cross is to identify the landing area to the helicopter pilot.

Before you start to arrange a similar scene, let me give you a friendly word of warning. Take care where you sprinkle the salt! It is ideal for use in snow scenes as long as it is confined to the layout, but it can be a nuisance in other parts of the house!

The Dinky Toys Trojan 15-cwt. Van needs no introduction to enthusiastic collectors, for it has been a popular model for quite a long time. The latest version of

the Van is particularly interesting, and it is sure to appeal just as strongly as the Esso, Dunlop and Chivers Trojan Vans already available. The new model is finished in an attractive shade of green and it carries the lettering and signs of the makers of Cydrax.

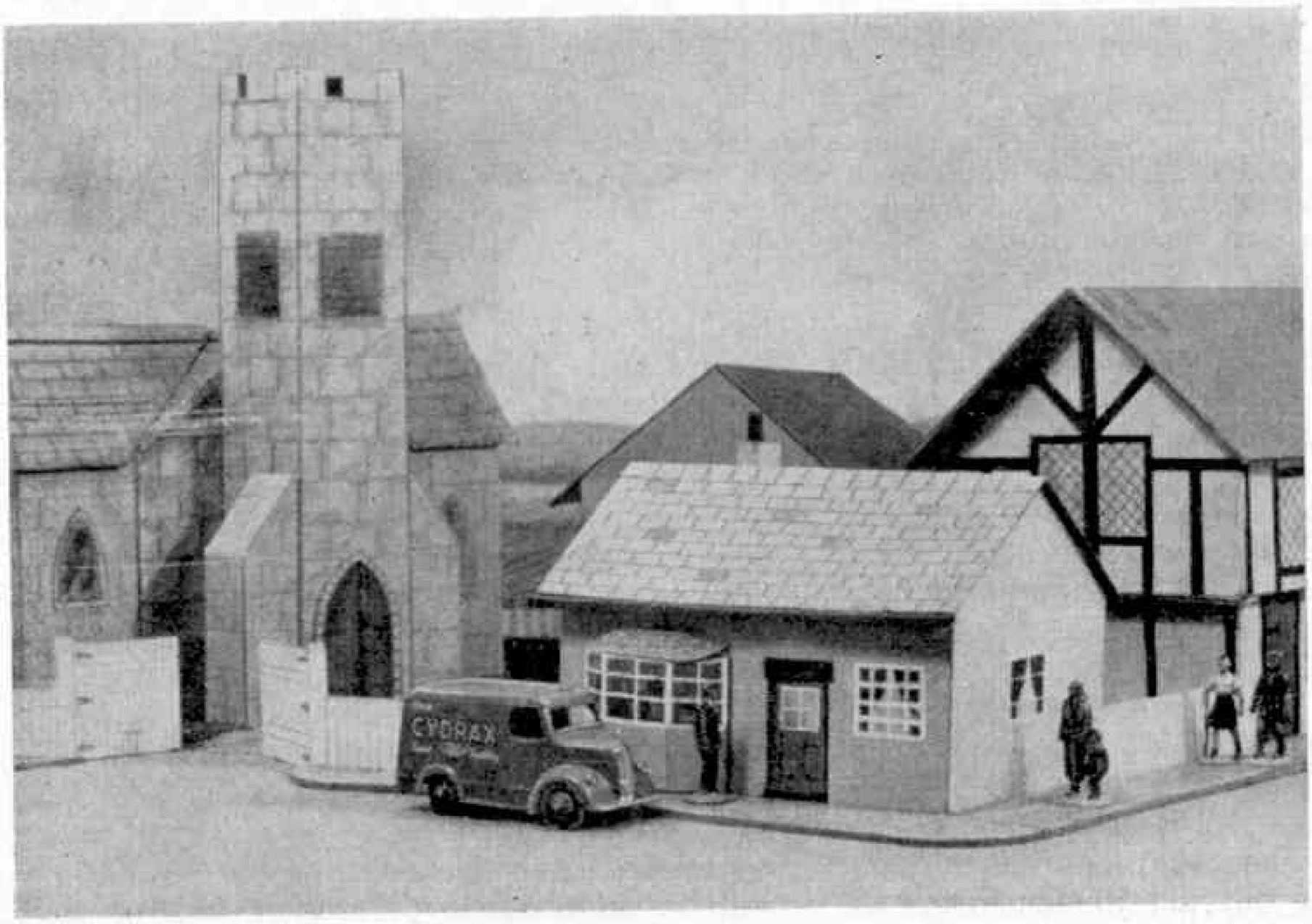


This picture shows the excellent detail of the new Westland-Sikorsky S51 Helicopter, Dinky Toys No. 716.

Although summer and long hot days seem far away at this time of the year, I think most of us are looking forward already to holidays and hoping that good weather will enable us to get out into the open air and enjoy visits to the seaside, country walks or cycle rides. There is something extra special in a cool, sparkling drink after a day in the open, and we all enjoy a brief rest in a wayside cafe. Every collector tries to make his layout as realistic as possible, and although Dinky-land people are not likely to be thirsty, in the interests of realism we should ensure adequate facilities are available for refreshment!

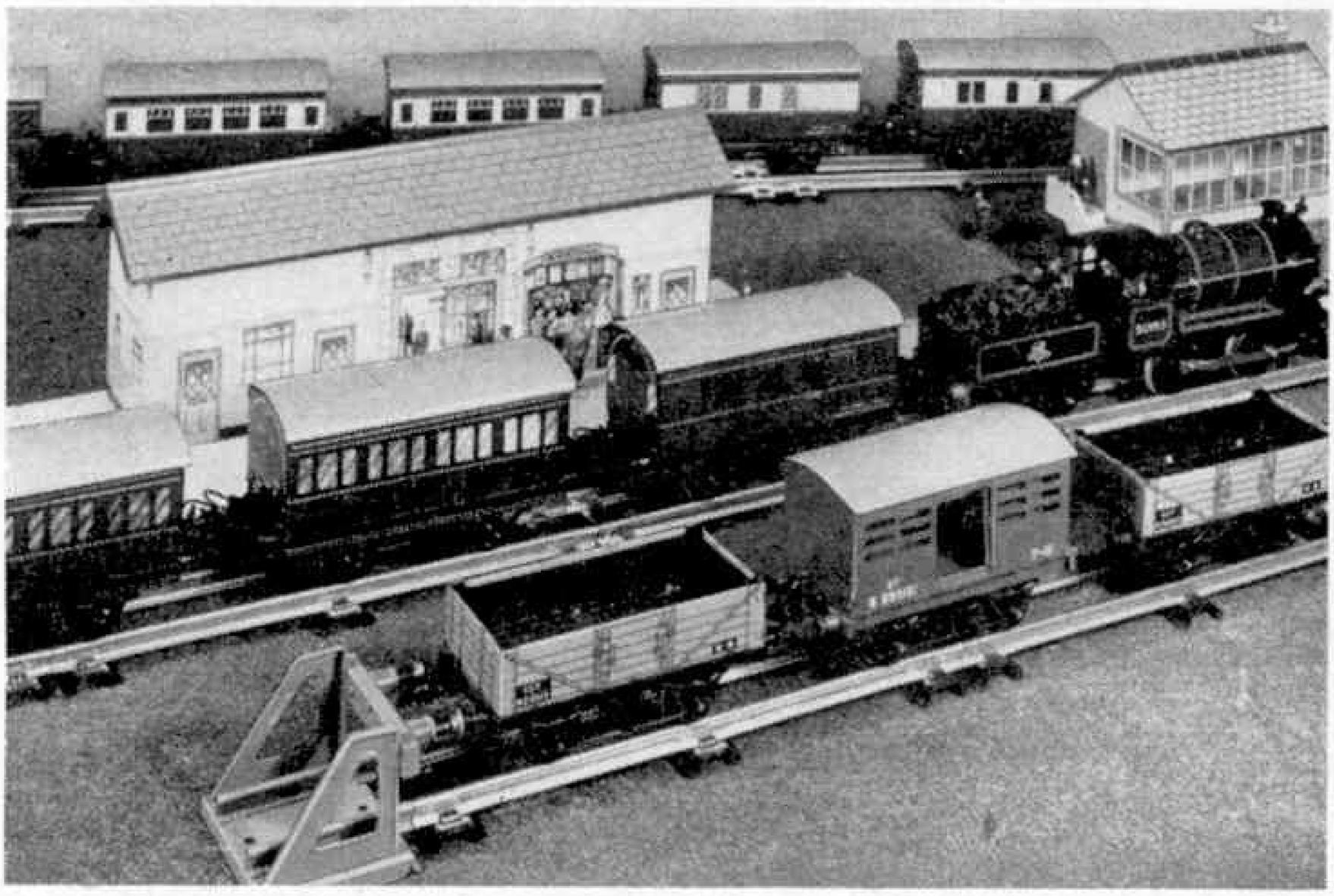
With the Cydrax Van we can arrange a good distribution of this popular drink in miniature, and my picture of the model shows it in the act of delivering supplies to a typical general store in a small village. You will notice that two hikers are approaching the store, and no doubt they will be glad to find evidence that a cooling drink can be obtained inside when they turn the corner!

It is good fun to arrange a scene such as the simple village shown in my picture, and then provide the many deliveries and other services necessary to the well-being of the community. I have already touched on the use of the Cydrax Van in this connection, and there are many other important services to be arranged. For example the Heinz, Nestlés, Ovaltine and Chivers Vans can look after food deliveries.



The new Trojan 15 cwt. Van "Cydrax," Dinky Toys No. 454, delivers supplies to the village general store.

"Tommy Dodd" writes about:



Building Up Your Railway

I SUPPOSE that at the moment many of you are busy building up the Hornby railways that you began at Christmas time. Doing this gradually is one of the things that make miniature railways so fascinating. There is always something more that we can add, either at the lineside, in the track or on it.

If the actual track is extended we need a Station, perhaps, or more Signals, and we are almost sure to want some further Wagons or Coaches to increase the train services. On the other hand if we start out by adding more rolling stock, then we soon find that we will have to provide more track, if only for the storage of the new items when they are not actually running.

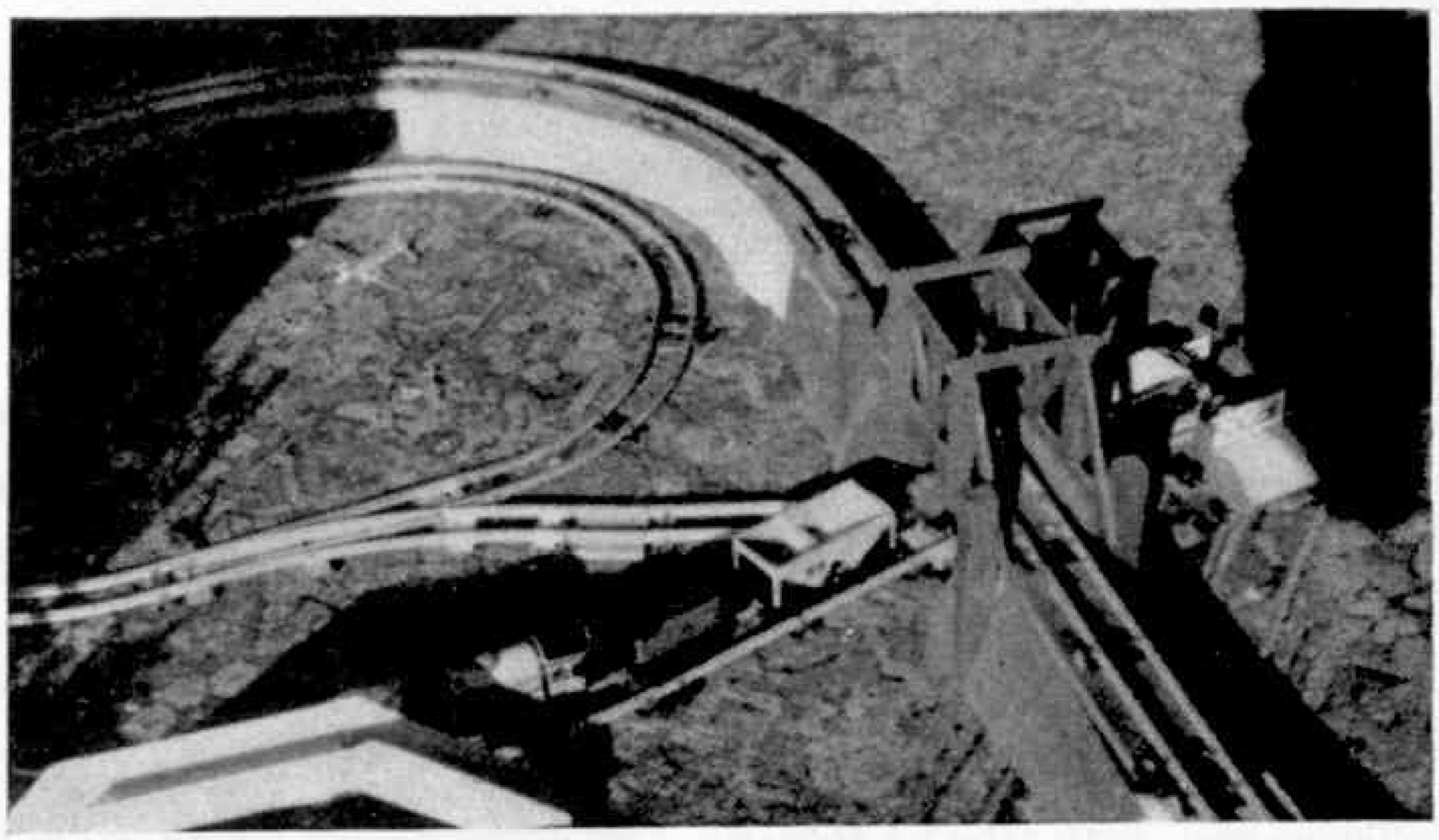
Above is a busy scene on a Hornby layout. A train of No. 41 stock with a No. 51 Locomotive is at the Station.

So the development goes on and the little oval layout begins to take on more and more of the air of a real railway, on which trains come and go busily. Their departures and arrivals take place at the right spot, that is at the Station, as you will see in the picture above. The train shown is a stopping one made up of No. 41 rolling stock and headed by a No. 51 Locomotive. This of course carries the correct stopping train indication, a single lamp being carried in the front of the chimney. The Signal Cabin is a building that is almost always associated with the Station, and we have spoken before about the uses of these two together.

Notice the Wagons, and the Van in the foreground siding. The Van door is left open, just like real ones are sometimes, and this and other similar simple little touches add a lot to the railwaylike air of our train operations.

Quite often it is the smaller details of the miniature railway that add so much to general realism. In our talk last month we said a little about the use of lamps at the tail end of the train and now a specially interesting example of lamping is seen in our lower picture on the next page. In the yard we have a No. 50 engine running down the line tender first and to it is coupled a Goods Brake Van. Now the headlamp indication for this sort of thing is easy to remember, a single lamp on the centre bracket being correct. And the indication is the same if the engine is simply running light, without the Goods Brake.

The reason for the latter being attached is, I expect, that there is a train to be made up further along the line. Wagons will be collected in turn from this or that



The bridge and approaches constructed by Mr. C. W. G. Kinipple on the layout of Mr. R. Hazelhurst, by whom the photograph was taken.

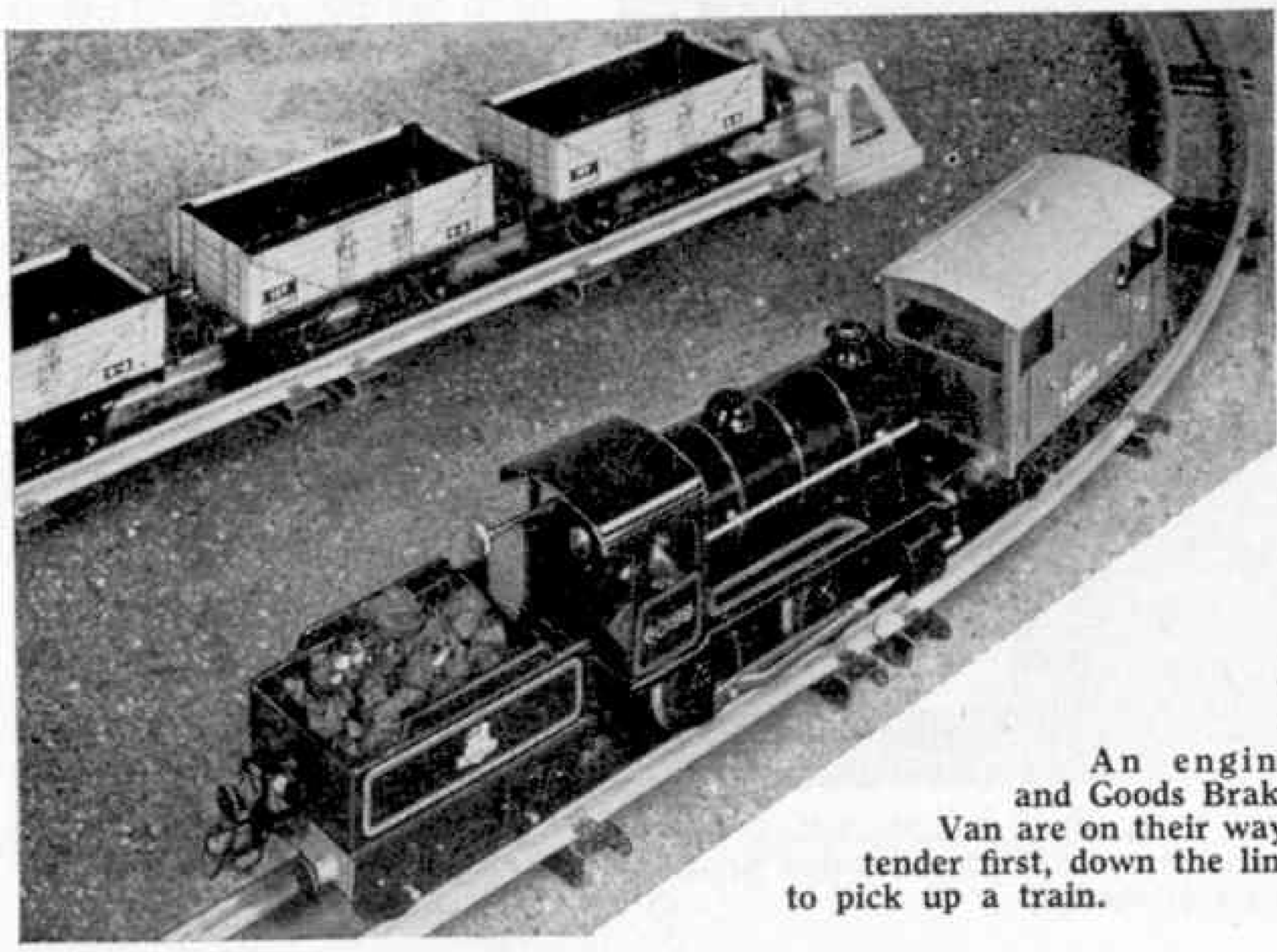
siding, or even from the same siding on successive circuits of the track if the layout is a small one. You can be sure that the goods guard has placed the tail lamp at the rear of the Van, although it is not visible in the picture, and you will notice too that he has been careful to attach the side lamps on the brackets provided. These fittings form a special feature of the Hornby Goods Brake Van that is found very attractive by those keen on the smaller but important details of operation.

Good train running is what we all aim at, and this is made all the more enjoyable if the layout has some of the surroundings and details of real practice. With this in mind therefore I am specially glad to be able to include in our illustrations the effective girder bridge and approaches on the layout operated by Mr. R. Hazelhurst and his son. Actually this civil engineering work has been carried out by their friend Mr. C. W. G. Kinipple, with the effective result that you can see in the picture. The side girders of the bridge are cut out from plywood, but the base is of metal, stout battens being arranged along each side of this and to these side girders are screwed.

The sloping approaches are unusual in being curved, but this has been necessary because of layout conditions. Here again plywood has been used in their construction, with effective "banks" formed of card. Painting of the latter was a special operation in which Mr. Kinipple was joined with enthusiasm by his young daughter.

The layout itself is worthy of attention, as it is a good example of the way in which a simple outfit of 1 ft. radius type can be built up to give variety in running. *The Bridge*, to give it its official title, takes part of the main line across the tracks serving a terminus that is situated on a branch off the main line. Broadly speaking the whole track consists of a "figure 8" layout, with developments, there being an oval consisting of the original 1 ft. radius equipment joining the main "figure 8" by means of two points by the Bridge itself.

The rolling stock consists principally of the smaller Hornby types and motive power is provided by two M1 Locomotives, one red and the other green. So it is easy to tell which is which, a point of importance on a fairly small layout when there is much traffic about.



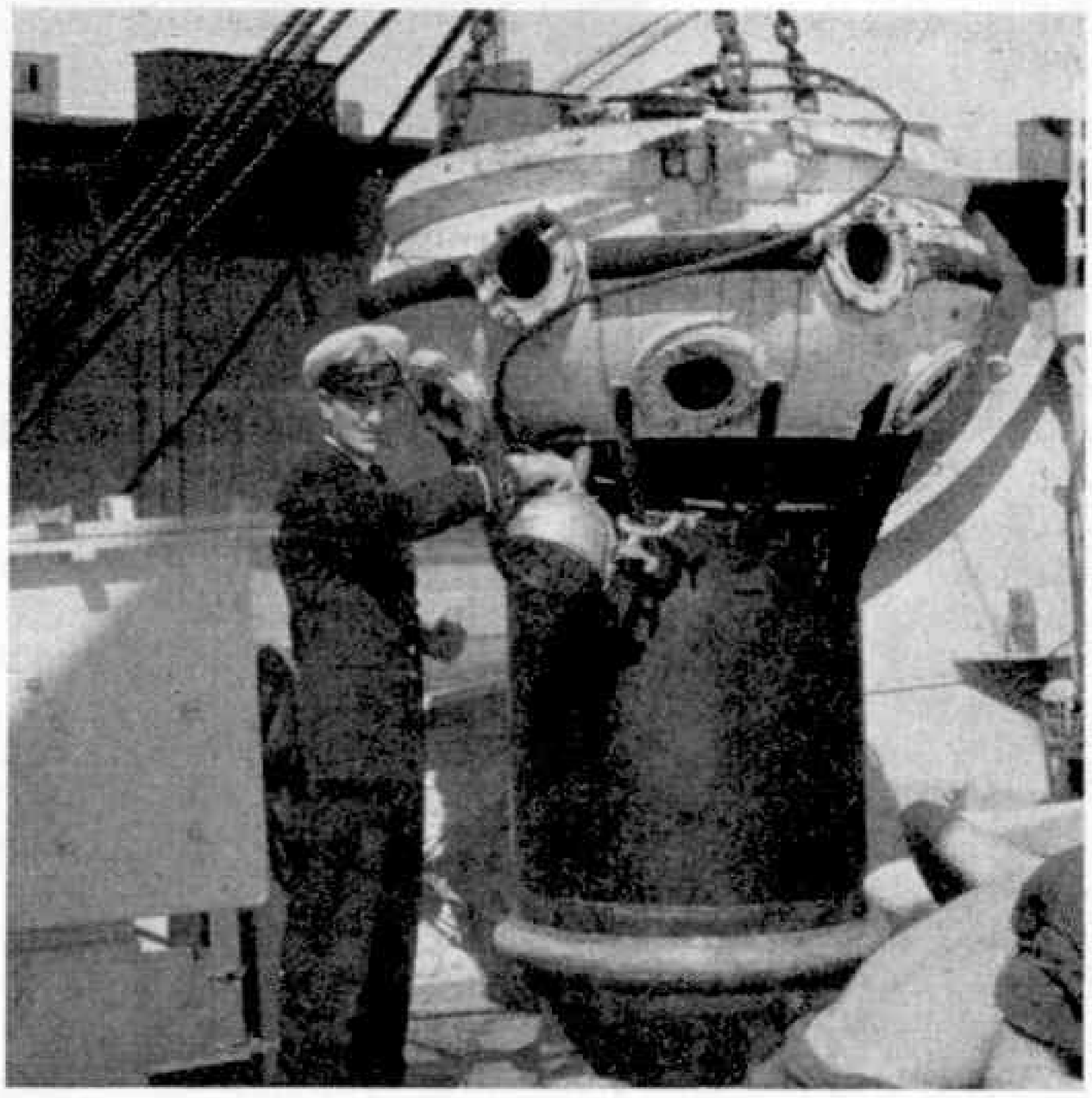
An engine and Goods Brake Van are on their way, tender first, down the line to pick up a train.

Of General Interest

WITH the introduction of modern diving equipment, underwater activities are rapidly expanding, and this has meant the provision of efficient transportable lighting equipment. For this a new Osram underwater lamp with the bulb in direct contact with the water has been developed by the General Electric Company Ltd., in collaboration with the Admiralty Research Laboratory.

Although the glass of one of these free-flooded lamps, as they are called, has to resist the pressure of water at great depths, it is surprisingly thin. It is indeed only about a millimetre thick, but this, in conjunction with a specially shaped bulb, is sufficient to withstand a pressure of 650 lb. per sq. in., which is that reached at a depth of about 1,300 ft. The lamp is effectively cooled by the contact of its outer surface with water.

The accompanying picture shows one of the new lamps being mounted on an underwater observation chamber. It can also be used for underwater television.



Senior Commissioned Boatswain G. Wookey, the holder of the world's deep diving record, fixes a new Osram underwater lamp to an observation chamber from which he helped to supervise its deep sea tests. Photograph by courtesy of the General Electric Co. Ltd.

Honouring a veteran steam roller. Mr. R. W. Birch, M.I.Mech.E., Chairman of Eddison Plant Ltd., with a roller built in 1893 that is being preserved after 63 years of service.

From the new we turn to the old, a representative of a dying race. This is the 10-ton steam roller, made by Aveling and Porter at Rochester 63 years ago, that is seen in the lower picture on this page. It has been withdrawn from the steam roller fleet of Eddison Plant Ltd., Belton, Grantham, and has been selected for preservation. The withdrawal was commemorated by fixing to the road roller a plate recording the occasion and giving a brief description of the machine. It is interesting to find that there is still a limited demand for steam rollers.

From Our Readers

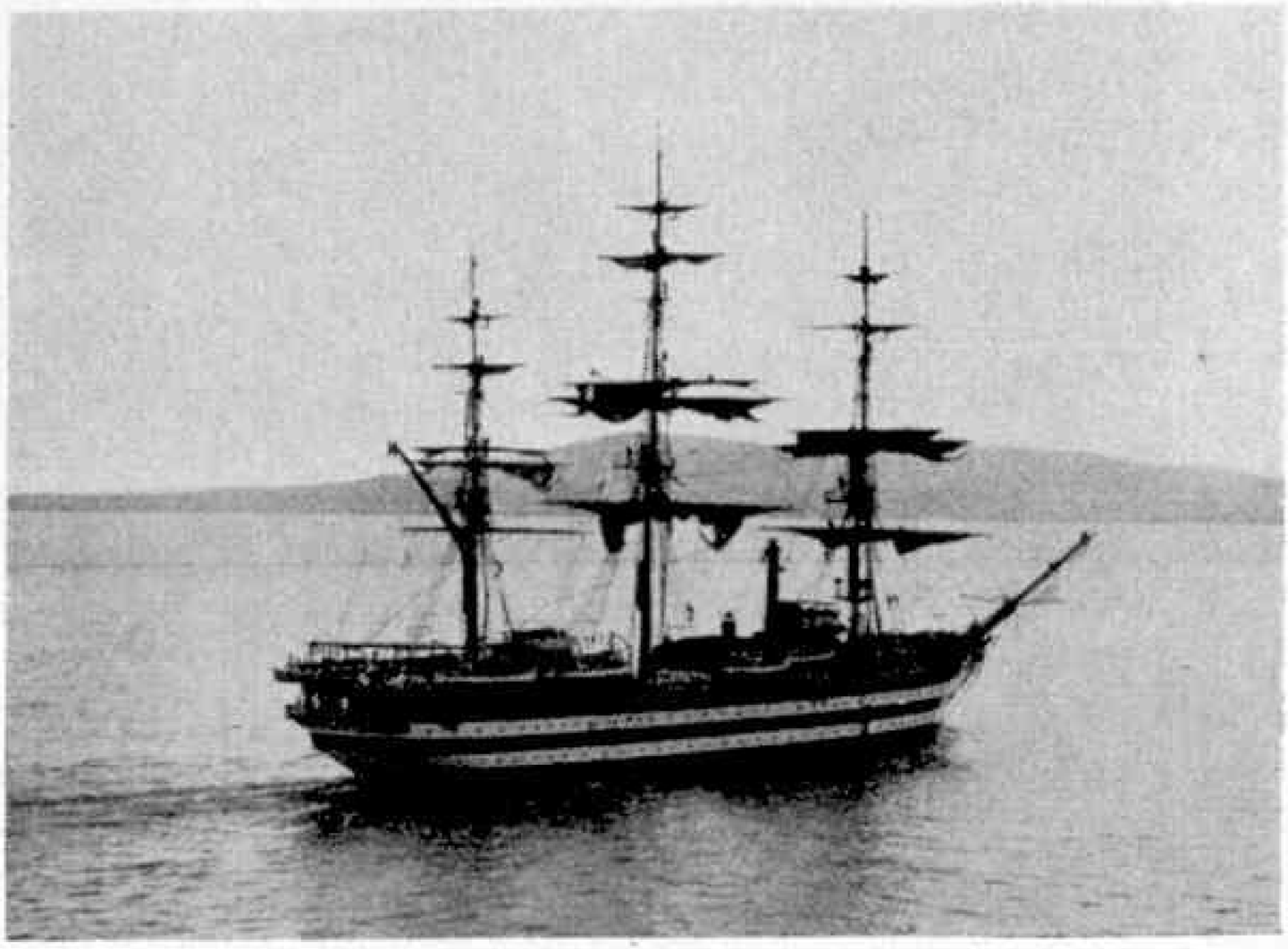
This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs 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.

A Sailing Ship in Dublin Bay

Imagine my surprise on going to work one morning—the road runs beside the Liffey for about 3 miles—when I saw a genuine sailing ship in the middle of the river. She was the Italian Naval training ship *Amerigo Vespucci*, a three-masted schooner of 3,543 tons.

I quickly decided to go all the way down to Poolbeg Lighthouse, which is at the harbour mouth, and try to persuade the light keeper to let me up to the balcony. From there I obtained the photograph reproduced here, showing the sails being set as she heads out to sea, with Howth Head and Candlestick (Bailey) Point in the distance.

G. F. WOODWORTH (Dublin).



The Italian training ship "Amerigo Vespucci" in Dublin Bay. Photograph by G. F. Woodworth, Dublin.

Raising a Bank

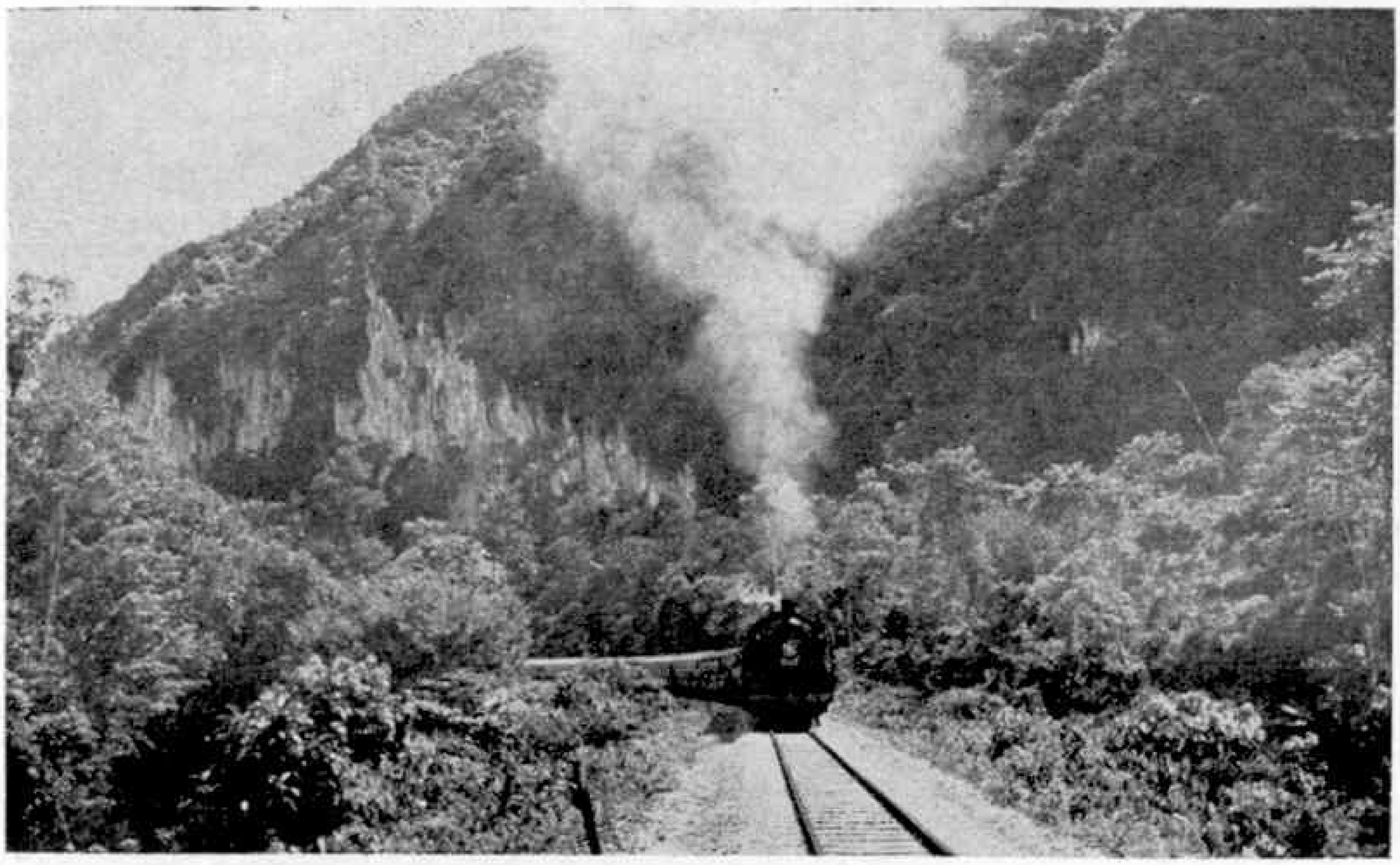
An interesting event that took place in Northwich, Cheshire, during last spring was the lifting of the large Westminster Bank building, erected in 1927. The work was carried out by the Cheshire Brine Subsidence Compensation Board, as the building had started to lean over to one side due to subsidence.

To facilitate the work there are timber frames built into the buildings in the subsiding areas. The operation was performed by coupling the hydraulic jacks in series of six to a master pump manifold, allowing each jack to be raised a greater or less amount than its neighbour. The jacks were distributed under the building walls, so that each took a load of 50 tons. As soon as the lift was completed the jacks were fixed mechanically at the required extension. Then the foundation was built up beneath and the jacks were removed.

The part of the whole task that proved to be the most difficult was the raising of the strong room. This is built of reinforced concrete and alone has a weight of 850 tons.

D. MACLAREN CATHCART, B.Sc. (Northwich).

A house at Northwich raised on jacks after subsidence. Photograph by courtesy of the Chester Chronicle.



The East Coast Railway of Malaya

By G. B. Beath

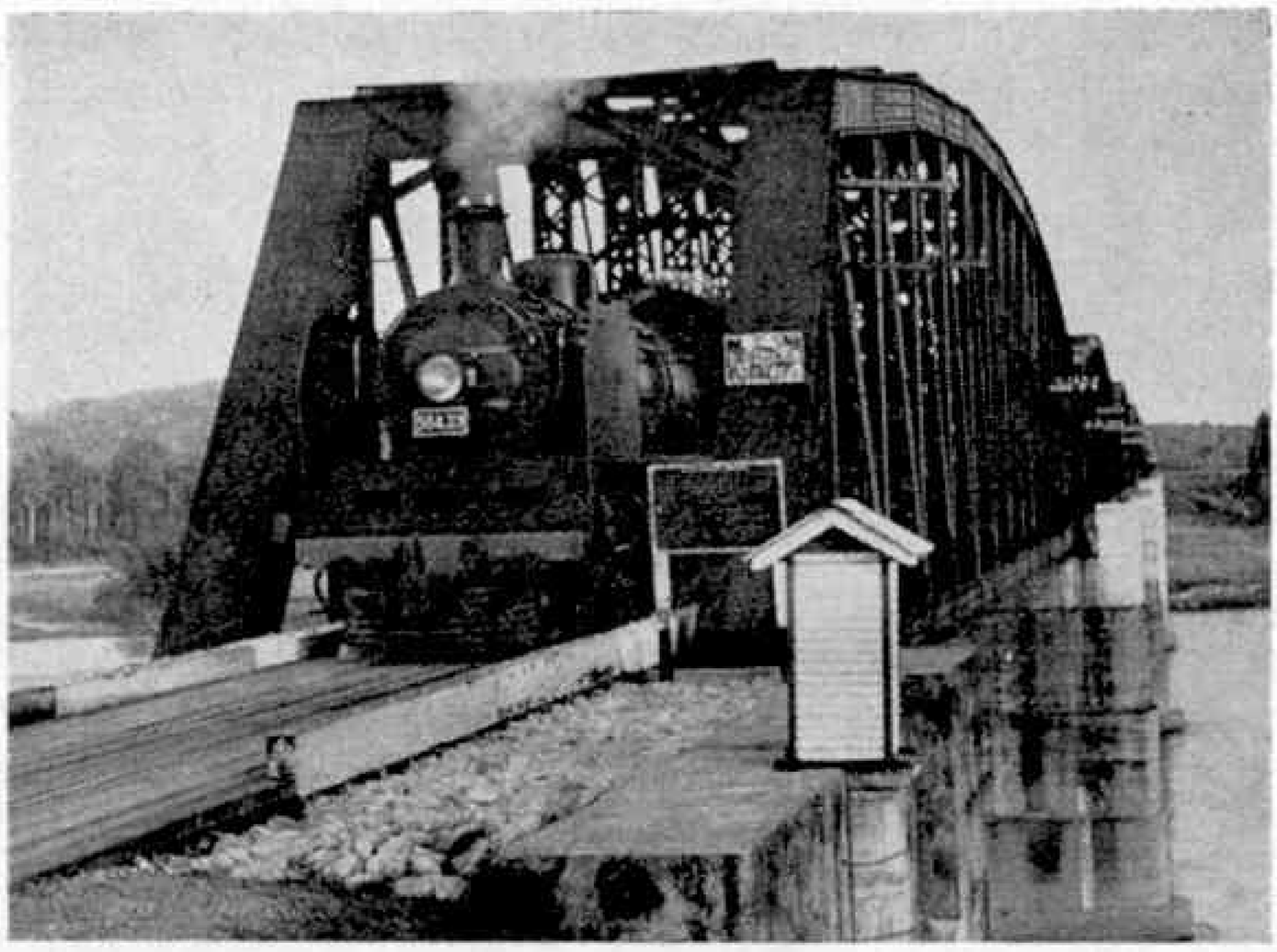
A RAILWAY that deserves greater appreciation from the tourist and the railway enthusiast is the East Coast Railway of Malaya. Its construction presented almost insuperable challenges to the planners and engineers. Apart from the expected difficulties of pushing a line through mountainous jungle terrain, using untrained local labour, this railway has had to face severe flooding from exceptionally heavy monsoon rains, it has suffered from the effects of two wars, and since 1948 it has borne the brunt of determined terrorist attacks. Now that these difficulties are behind them, except for the constant problems of maintenance in the face of possible further flooding and jungle encroachment, the officers of the Malayan Railways Administration provide an extremely high standard of modern rail service and comfort.

The reconstruction of the East Coast Line of the Malayan Railway has recently been completed and trains are now running over its whole length. The reconstruction was necessary because of the immense damage the line sustained during the Japanese occupation of Malaya during the war. The picture at the head of the page shows the Sumpitan Emas express, which runs each way daily over the line, with magnificent bush-capped limestone cliffs in the background. Malayan Railways Photograph.

The East Coast line branches from the main line at Gemas, 137 miles from Singapore, and runs in a northerly direction east of the main highlands for another 327 miles through the States of Negri Sembilan, Pahang and Kelantan, where it terminates at the port of Tumpat on the east coast close to the Thailand border.

There are many points besides these special engineering problems to excite the attention of the public to this railway. Generally rail travel to Thailand from Malaya is by the western approach, the Malayan Railway connecting with the State Railway of Thailand at the frontier town of Padang Besar. Now, however, the East Coast Railway offers an alternative route, for a branch line from Pasir Mas, 16 miles south of the northern terminus at Tumpat connects with Thailand's State Railways at Sungei Golok.

For almost 300 miles the line passes through some of the densest jungle in Malaya, so that from the comfort of a railway coach the tourist can experience some of the excitement of jungle travel without the usual dangers and annoyances. At any rate there are no leeches on the carriage floors, or tigers lurking behind the nearest seat. The tourist whose



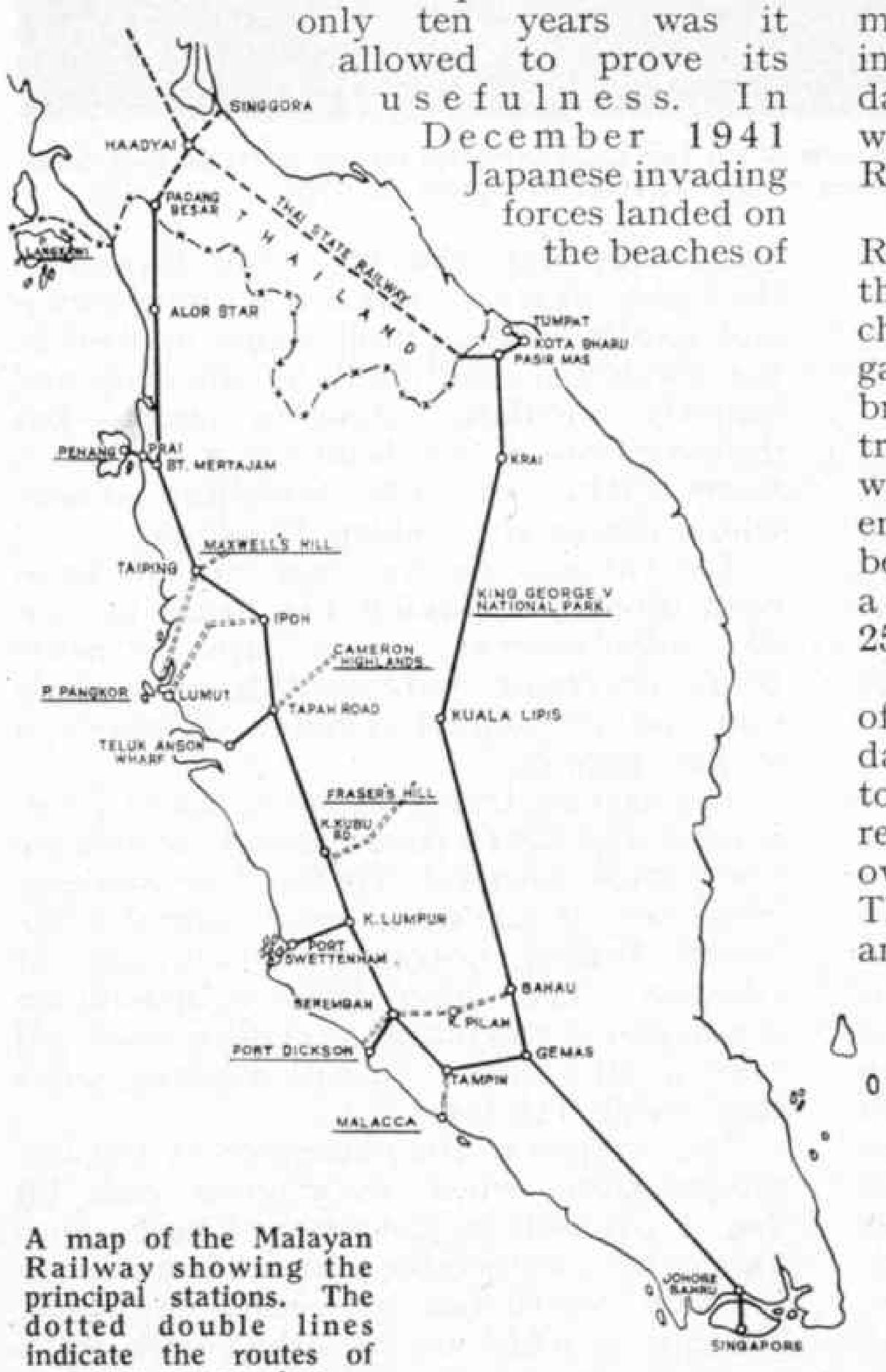
An express crosses the Guillemard bridge, Malaya's largest, over the Kelantan river. The near 250 ft. span is the one successfully raised by engineers during reconstruction of the line after the war. Malayan Railways Photograph.

appetite is whetted by this scene can alight at Kuala Lipis, gateway to the King George V National Park, a park of glorious mountain, jungle and river scenery. Here the salt-licks and clearings offer unique opportunities for observing and photographing the fascinating animal life of Malaya, in a nature lover's paradise that is virtually untouched and unmolested by Man.

The East Coast Railway was planned before World War I, but this and unprecedented monsoonal floods in 1926 slowed down the work and it wasn't till 1931 that it was completed. Then for only ten years was it allowed to prove its usefulness. In December 1941 Japanese invading forces landed on the beaches of Kelantan and began a drive southwards along the line to cut off the opposing forces on the west coast. As the small British force retreated down the east coast, it destroyed all the major bridges on the line. The Japanese ripped up 200 miles of track, and these filched rails and indeed much of the steelwork from the damaged bridges, were transported northwards to help build the infamous Death Railway in Siam.

When the war was over the East Coast Railway lay derelict and overgrown. All that remained was a rough jungle path choked with subsided embankments and gaping with battered and demolished bridges. Along some stretches the original track had completely disappeared. This was the picture that confronted the engineers when in 1947 they courageously began the colossal task of reconstruction—a task that was to take six years and cost 25 million dollars.

The greatest difficulty was the replacing of the ten thousand feet of bridging, damaged or missing. The major problem to the engineers in the north was the reconstruction of the Guillemard bridge over the Kelantan river at Sungei Kusial. This bridge of ten spans, five of 250 feet and five of 150 feet, is the largest in Malaya. Nine of the ten spans had been restored during the Japanese occupation, but the northernmost span of 250 feet had defeated all their attempts at restoration. It rested with its northern end on the original bearings, but the southern end lay in the deepest channel of the river, tangled with masses of pier concrete, distorted steelwork and river debris.



A map of the Malayan Railway showing the principal stations. The dotted double lines indicate the routes of motor car services.

It was decided to do all the lifting from the top to neutralise the danger of floods. As it was, rises of fifteen feet in the river level overnight were met with. Most of the labour was untrained, but the engineer in charge later paid tribute to these willing Kelantan workmen. Engineering plant was hard to come by. Some of the hand-operated jacks were damaged Japanese stock, with many of the gears handcut by local Kelantan artisans. A cantilever was erected out from the free end of the second span, and the actual lift was provided by eight 50 ton jacks set up on this cantilever and connected to the end of the fallen span by sixteen massive tie-bars.

The first effort at lifting was unsuccessful because of the suction of the river sands and clay, and obstruction resistance. These troubles were mitigated by pumping away the binding clay and getting initial added lift by using pontoons.

Once the span had broken free from its river-bed prison, the high 88 feet lift began. Jacking commenced with four men to each of the eight jacks, which lifted the span at the rate of a hundredth of an inch per stroke, and by ringing the changes with nearly a hundred tough Kelantan Malay labourers, the free end could be lifted ten feet in 24 hours.

Before the actual lifting began, the Malay workmen were anxious to call in the local Bomoh or medicine man to bless this undertaking, for they were convinced that without his spiritual aid the span would remain forever in the grip of the surging river. They grudgingly accepted the engineer's refusal to allow the Bomoh near the job, but obviously many still felt that if by some unexplained circumstance the span was raised, then perhaps it wouldn't stay in position long. For weeks after the final rivets had been driven, fixing the span in its final required position, groups of local folk sat by the river bank waiting patiently for it to fall.

Restoration of the whole line was completed on 31st May, 1953, when the joint was made at Kuala Lipis, but before normal train services could be run again there was still a great deal of ballasting and fettling to be done.

The first through passenger train ran from Gemas to Tumpat on 4th April, 1954.

The down Sumpitan Emas, one of the two daily expresses on the Malayan East Coast line, waiting at Gua for the up express to arrive.

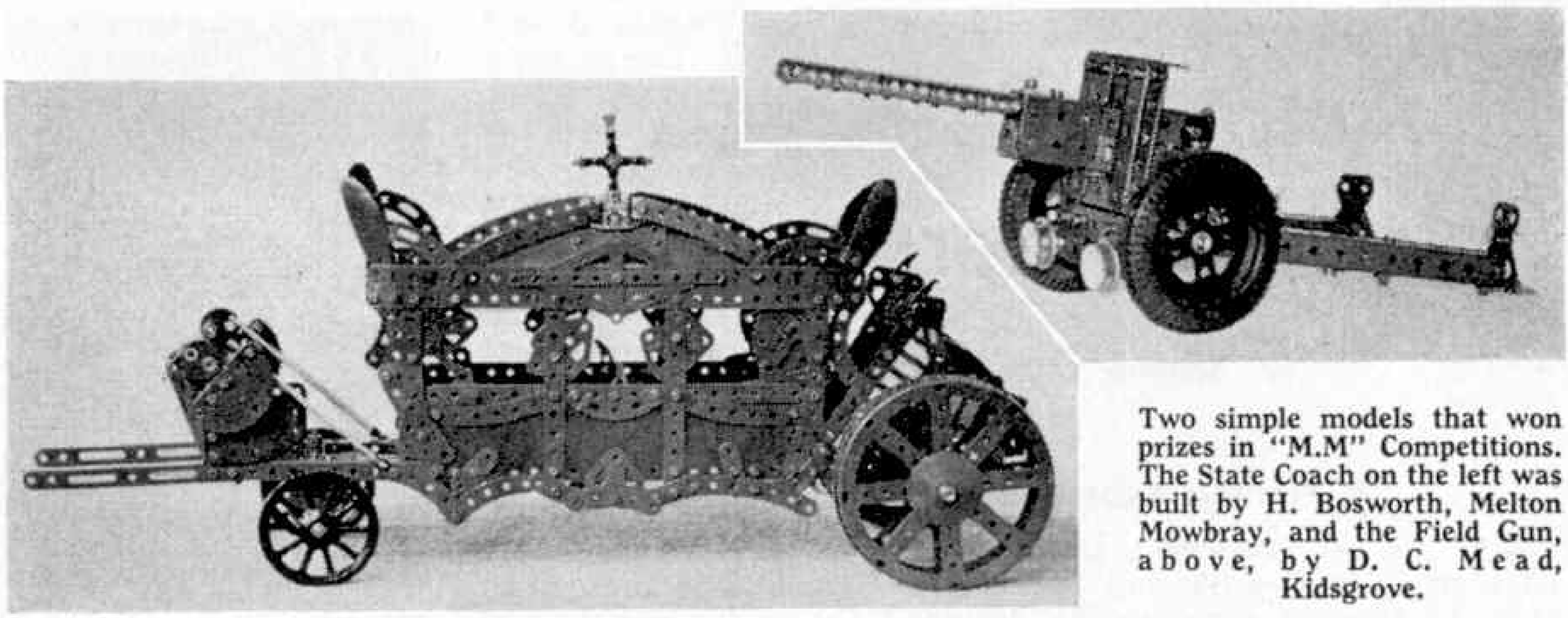
Before the war, this train was known as the *Sakai Express*—Sakai is an ungenerous and locally unacceptable name applied to the aboriginal inhabitants of the deep and sparsely populated Malayan jungle—but since the war it has been given the much more attractive title *Sumpitan Emas*, which means the Golden Blowpipe.

The through express now runs daily in both directions, taking 13½ hours for the 327 mile journey. There are 40 other trains operating daily on this line, which now has an annual revenue of nearly a million pounds.

The express trains are made up of First, Second and Third class coaches, hauled by "56" class General Traffic Locomotives. These are Pacifics and were built by the North British Locomotive Company at Glasgow. They have three cylinders, an arrangement calculated to reduce wear and tear on the track. In full working order they weigh 115 tons.

The comfort of the passengers in tropical temperatures, which may hover near 90 deg. F., is well looked after. The coaches have very comfortable seats and are either pressure ventilated or cooled by fans. Sleeping coaches are furnished with latex

(Continued on page 106)



Two simple models that won prizes in "M.M" Competitions. The State Coach on the left was built by H. Bosworth, Melton Mowbray, and the Field Gun, above, by D. C. Mead, Kidsgrove.

Meccano Competition

Cash Awards for Prize-winning Models

TAKE a look at the simple but attractive models shown in the pictures at the top of this page. They are well planned and make excellent use of Meccano parts, and for these reasons they were both awarded prizes in Meccano model-building competitions. Yet there is nothing complicated in their design or construction, and they serve as good examples of a point we have mentioned very often—that it is not necessary to own a big Outfit, or to build a large model with a mass of mechanism, in order to win a prize in a Meccano competition.

Simple models made with small Outfits, or with a few well chosen parts have just the same chances of success as the big models that the fortunate owners of large Outfits can build. Quality, not size, is what is looked for. We hope every model-builder will keep this point in mind and send in an entry to the new competition we are announcing this month.

The contest is another of the popular general model-building type, with no restrictions whatever on the subjects you can choose for your models or on the number of parts you use to build them. Cranes, aeroplanes, ships, vehicles, machine tools, all of these subjects and many more are suitable for entry in the competition, which is open to readers of all ages living in any part of the world.

All you have to do is to choose a subject that interests you and build a model of it. When your model is completed you should obtain photographs or prepare sketches of it, and send these to the *February General Model-Building Competition, Meccano Limited, Binns Road, Liverpool 13.* Please note: the actual model must not be sent, and you must write your age, name and address clearly on the back of each print or sketch submitted.

Entries will be divided into two Sections, A, for competitors under 12 years of age on 31st May next and B, for competitors aged 12 or over on that date. The judges will make full allowance for the age of each competitor when they award the prizes, so that young and old alike will have equal opportunities of success.

A point to watch is the range of parts you have available to build the model you select. Choose a subject that you can reproduce really well rather than one in which you will be forced to skimp some of the features in order to bring it within the scope of your Meccano collection.

Cash prizes will be awarded in each Section to the competitors sending in the models judged best, and details of these are given in the panel below. The closing date for receipt of entries is 31st May next.

THE PRIZES

The following prizes will be awarded in each of the Sections A and B.

	£	s.	d.
First Prize, Cheque for	4	4	0
Second Prize, Cheque for ..	2	2	0
Third Prize, Cheque for	1	1	0
Ten Prizes, each of		10	0
Ten Prizes, each of		5	0

Among the Model-Builders

By "Spanner"

A Transfer Gear-Box

Mr. F. J. Kaysor, Livingstone, N. Rhodesia, has sent me details of an unusual type of gear-box he designed for use in a coil winding machine. In this machine the transfer gear-box is used in conjunction with a variable speed drive and enables ratios of between 36:1 and 1:36 to be obtained between the chuck and the lead-screw. The transfer gear-box has two input and two output shafts, numbered 1 and 2 and 3 and 4 in Fig. 1. The drive from input shaft 1 can be transmitted in a straight line to output shaft 3, or it can be arranged to drive the output shaft 4. Similarly the drive from input shaft 2 can be transmitted to either one of the output shafts 3 and 4.

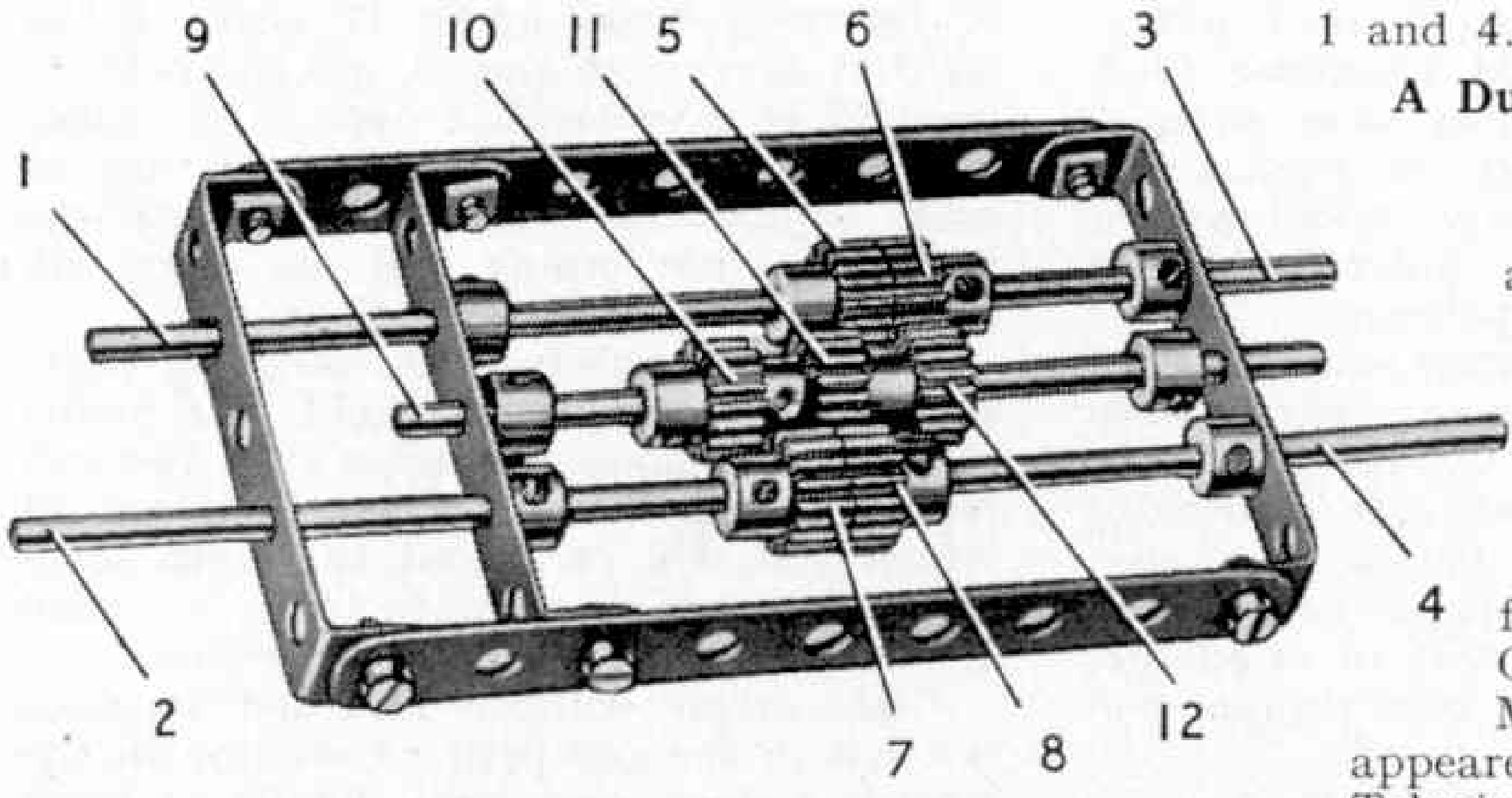


Fig. 1. A novel type of gear-box designed for use in a coil winding machine by Mr. F. J. Kaysor, Livingstone, N. Rhodesia.

The framework for the mechanism consists of two $5\frac{1}{2}''$ Strips connected by three $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. The input shaft 1 carries a $\frac{1}{2}''$ Pinion 5, and it projects halfway into the bore of a $\frac{1}{2}''$ Pinion 6 on the output shaft 3. The shafts 2 and 4 carry $\frac{1}{2}''$ Pinions 7 and 8 arranged in a similar way to the Pinions 5 and 6. The transfer shaft 9 is fitted with $\frac{1}{2}''$ Pinions 10, 11 and 12, and is free to slide about $\frac{1}{8}''$ in its bearings. Pinions 10 and 12 are fixed on shaft 9, but Pinion 11 is free to rotate.

When shaft 9 is moved to the left, Fig. 1, Pinion 12 engages both the Pinions 5 and 6 and Pinion 11 meshes with the Pinions 7 and 8. This results in straight through drives between the shafts 1 and 3 and 2 and 4. When shaft 9 is moved to the right, Pinion 7 engages Pinion 10 and Pinion 12 drives Pinion 6. At the same time Pinion 11 completes a drive between Pinions 5 and 8 on shafts 1 and 4.

This cheerful young man is R. A. Hine, Tean, Staffs. He has designed several useful mechanisms including a simple suspension system for model vehicles and is keenly interested in the "Among the Model-Builders" pages of the "M.M."

A Dutch Reader's Talking Robot

One of the main attractions at a "People and Their Hobbies" Exhibition held in Holland a few months ago was a fascinating talking robot built mainly from Meccano by Theo Olfers, Best, Holland. Mr. Olfers has also appeared with the Robot in a Television broadcast, when with the aid of his friend Jack Tielemans he gave a demonstration that was most attractive. Mr. Olfers and his friend are seen with the Robot in the studios in the upper illustration on the opposite page. The Robot can walk and move its arms up and down and talks through a small loudspeaker fixed inside it. We have no constructional details of the model but we understand that it took Olfers nearly three years to build and perfect it ready for exhibition.

Theo Olfers, who is only 15 years old, is now planning to build a man size

Theo Olfers and his friend with the Meccano Robot in a Dutch T.V. studio. The model is referred to in these pages.

robot that he will be able to operate by radio control. We wish him every success and hope we shall be able to illustrate the model in the *M.M.* when it is completed.

An Adjuster for Clock Escapements

Model clocks are among the most interesting of all models to build, and some very fine examples have been illustrated in the *M.M.* The actual assembly of a clock mechanism is quite simple, especially since the introduction of the $\frac{7}{16}''$ Pinion and the 60-tooth Gear, as these parts greatly simplify the gear train between the minute and the hour hand. Probably the most difficult part of the mechanism to arrange is the escapement, as absolute accuracy is essential if the clock is to keep time and run steadily. The escapement wheel usually employed in Meccano clocks consists of a Face Plate with eight Fishplates bolted to it as shown in Fig. 2. To ensure a smooth escapement movement these Fishplates must all be set at the same angle, and it is not always easy to do this without many experiments and adjustments.

Mr. Hylton Smith, Port Elizabeth, South Africa, has sent details of a simple device that enables the escapement wheel to be built up quickly and accurately. The Fishplates are bolted to the Face Plate, but the bolts used for the purpose are tightened just sufficiently to hold the Fishplates in position. The wheel is mounted on a Pivot Bolt attached to a Flanged Plate, and an Angle Bracket 1 and a $\frac{1}{2}''$ Reversed Angle Bracket 2 are bolted to the Plate. The parts are attached by bolts passed through their slotted holes, and the slots are used to adjust the positions of the Angle Bracket and the Reversed Angle Bracket so that they just clear the Fishplates of the escapement wheel. The wheel should be rotated and the angles of the Fishplates adjusted so that each Fishplate brushes lightly against the Angle Bracket and the Reversed Angle Bracket. A $\frac{3}{8}''$ Bolt fixed in the Reversed Angle Bracket by two nuts should be adjusted so that it is just clear of the Fishplates, and can be used to ensure that the wheel runs accurately on its shaft. When the necessary adjustments have been made the bolts holding the Fishplates can be tightened fully to fix them in place. Then the wheel can be removed from the adjuster and fixed in its appropriate position in the actual clock mechanism.

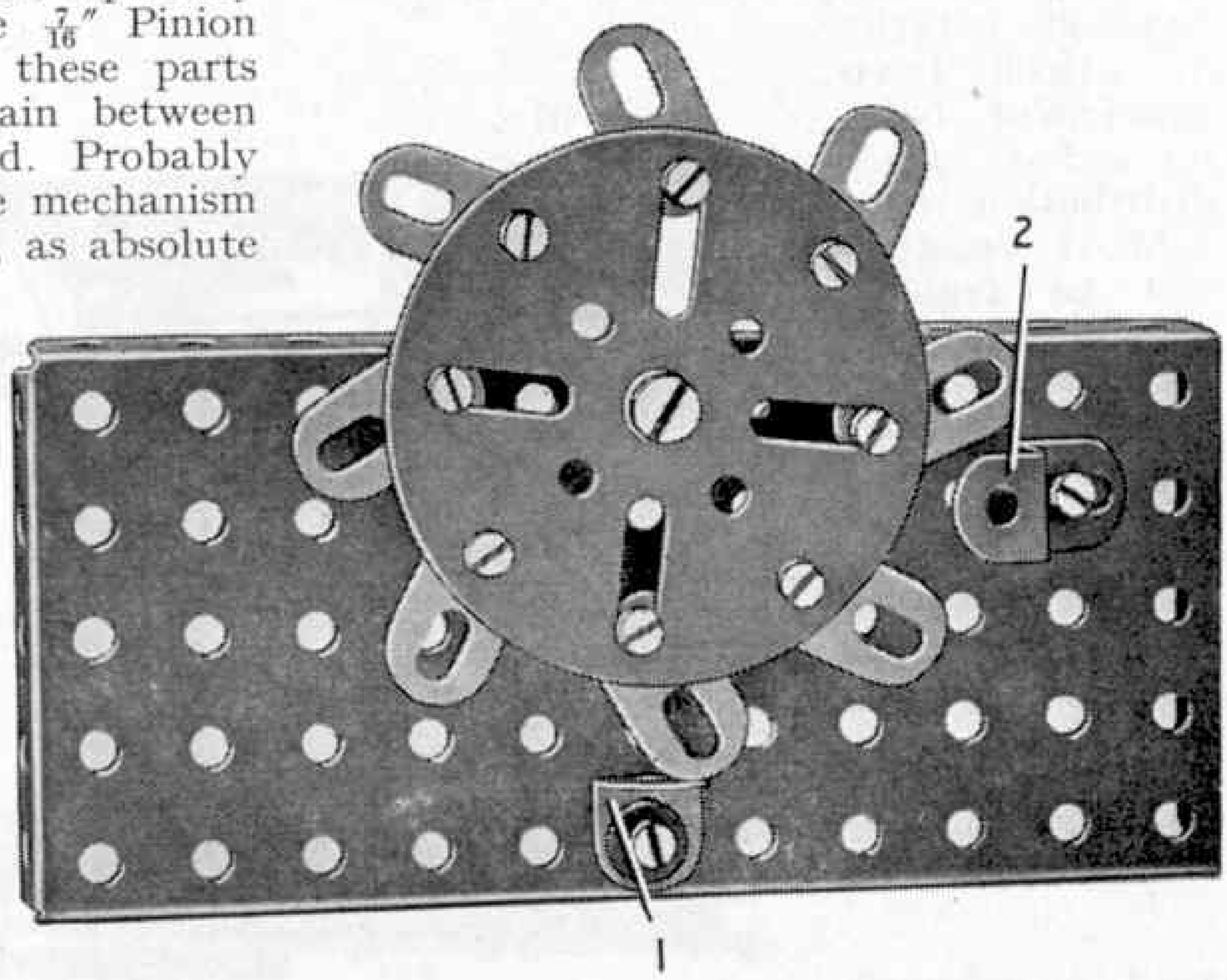


Fig. 2. The adjuster for clock escapements that is described on this page.

MODEL OF THE MONTH

Cloth Folding Machine

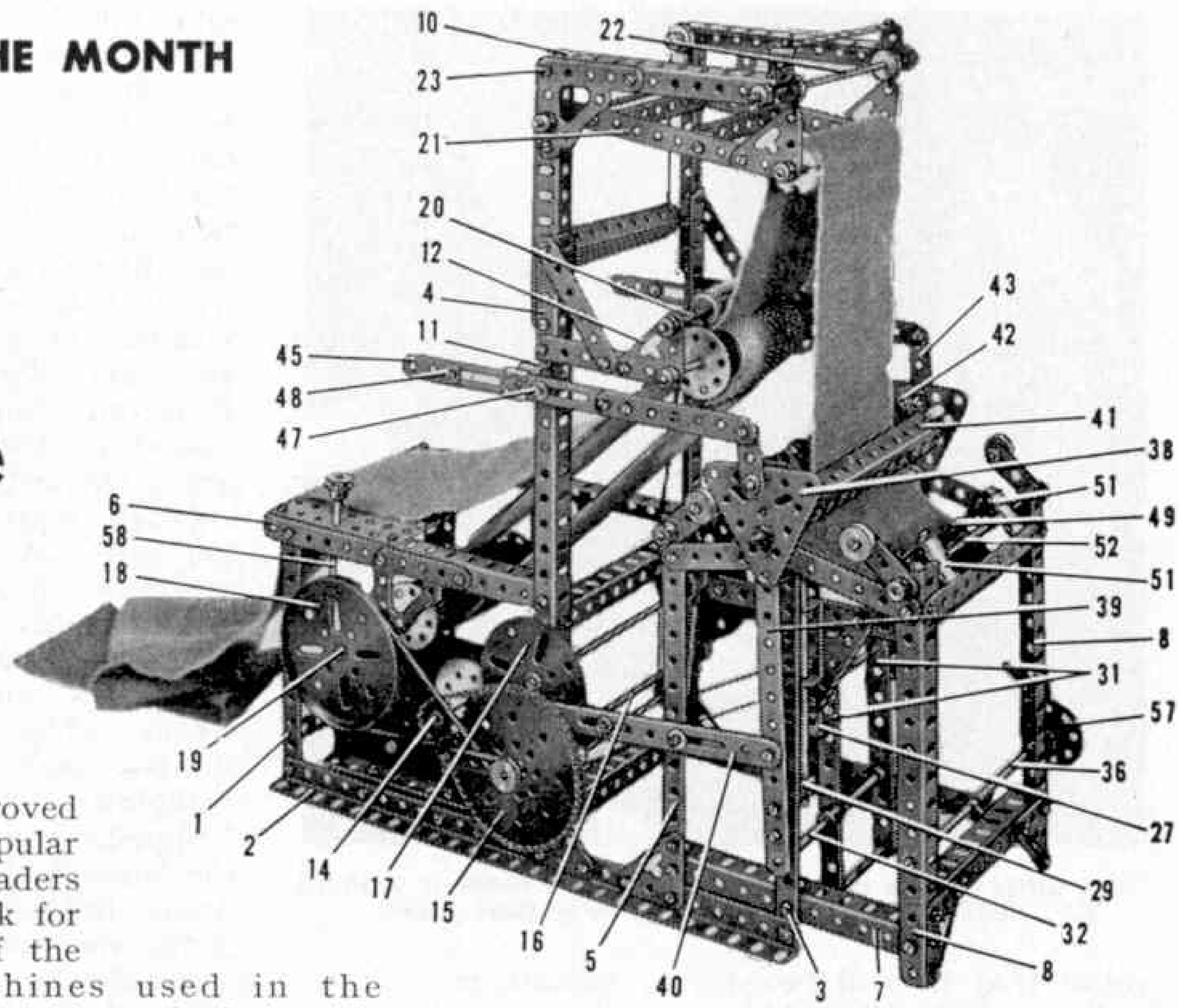


Fig. 1. An attractive machine for folding completed cloth into bales ready for despatch from the mills to the customer.

THE Thread Twisting and Knopping Machine featured in the September *M.M.* proved an exceptionally popular model, and many readers have written to ask for models of more of the fascinating machines used in the preparation and finishing of cloth. To meet these requests this month we turn again to the textile industry for our subject for the "Model of the Month."

The Cloth Folding Machine shown in the pictures on these pages differs from the textile machine we have described previously in that it is not used in the actual making of cloth. It is a machine designed to carry out the folding of finished lengths of cloth into convenient bales ready for distribution.

Most readers will be familiar with the bales of cloth displayed by drapers and tailors, which have to be unrolled in order to cut off the lengths of cloth required by customers. The cloth to be folded in the warehouses of textile manufacturers is in lengths of approximately 60 yards, and our model is based on a special machine that has been developed to carry out the job quickly and conveniently. The machine folds the cloth concertina fashion, which

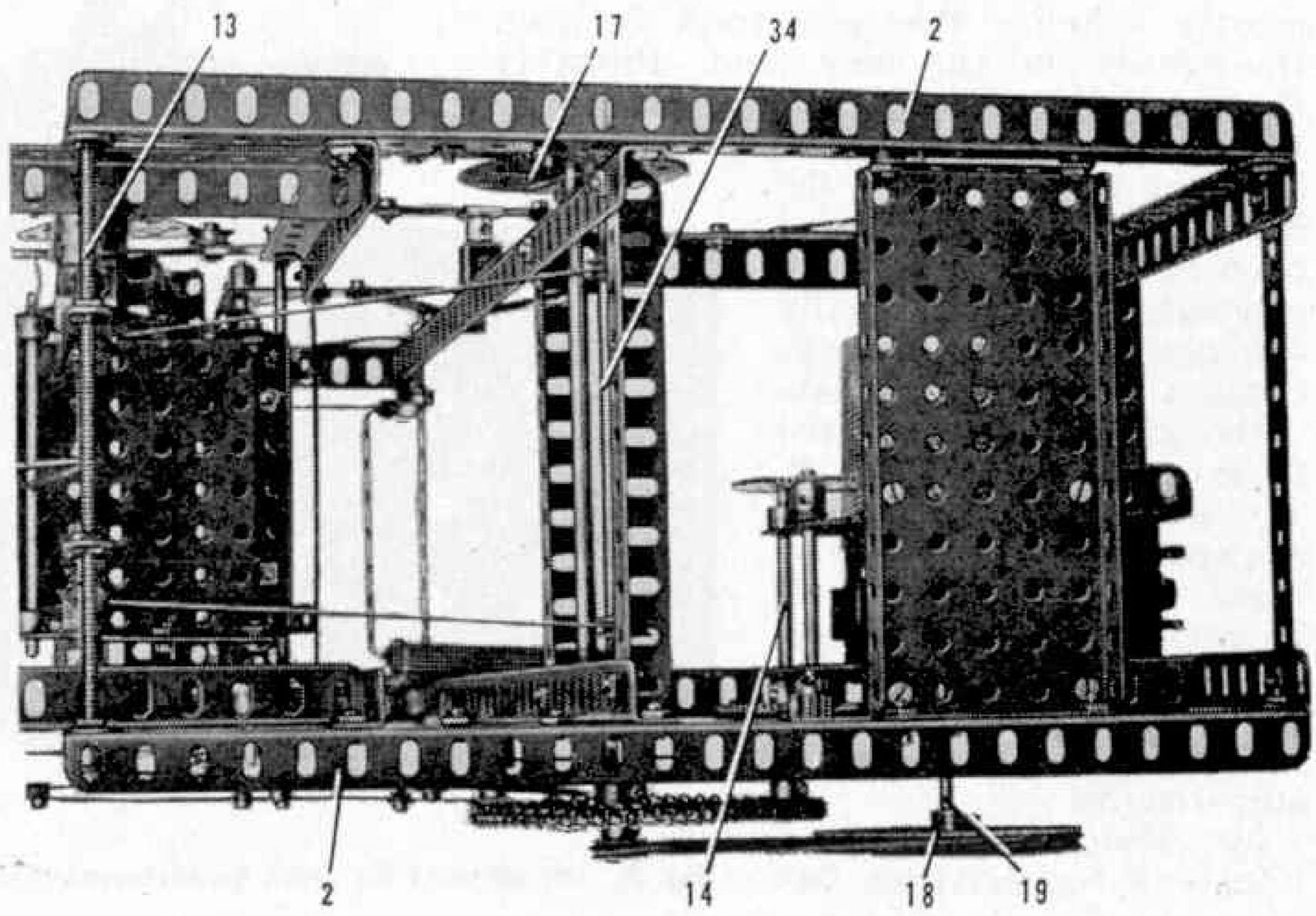


Fig. 2. An underneath view of the Cloth Folding Machine.

allows it to be unfolded and cut to required lengths much more easily than is the case in a bale of cloth rolled round a board.

The folding is carried out very quickly, a length of 60 yards of cloth being completed in less than five minutes, and the resulting bale forms a neat, almost square package that is easy to handle. These packages are wrapped in paper for delivery in this country, or are boxed in crates for despatch overseas.

The model carries out the essential movements of the actual machine, and it is exceptionally interesting to watch in action. The folding mechanism is operated by levers, which are actuated by cranks driven by an E20R(S) Electric Motor. Once the cloth has been fed into the machine and the Motor switched on, the action is automatic until the complete length of cloth is folded. The folded cloth is supported on a specially shaped spring-loaded table, which presses the material against the operating bars of the folding mechanism. The table can be lowered by operating a hand wheel, so that the package of cloth can be withdrawn from the machine.

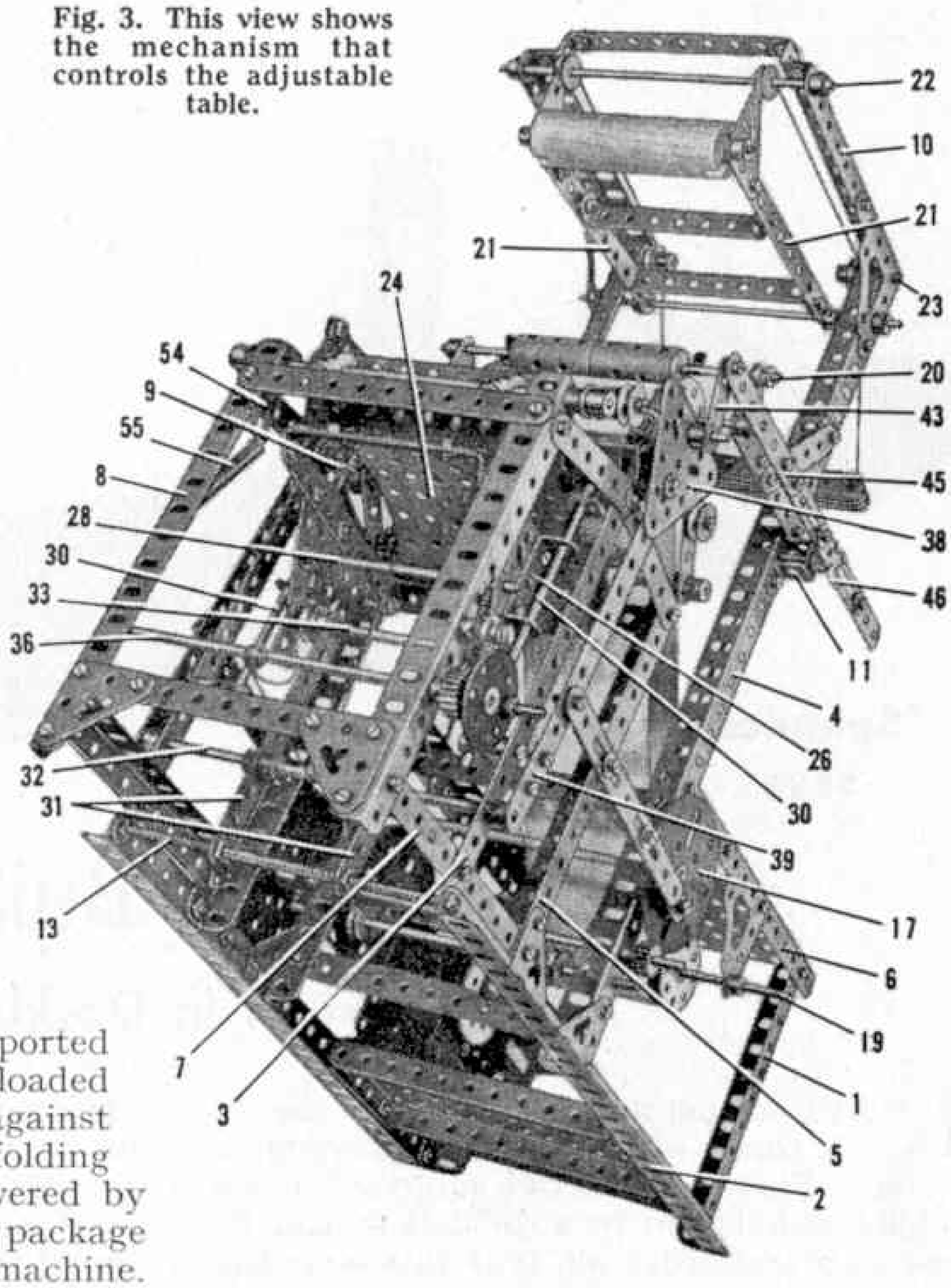


Fig. 3. This view shows the mechanism that controls the adjustable table.

The action of the Cloth Folding Machine is fascinating to watch, yet the machine itself is comparatively simple to assemble and it is easy to adjust the mechanism. There is sure to be a big demand for details of this model, so make sure of obtaining your copy of the instructions by writing for them now. The instructions contain full constructional details of the Cloth Folding Machine and a list of the parts required to build it, and they can be obtained by writing to the Editor enclosing a 2d. stamp for postage.

Readers living in Canada, Australia, New Zealand, South Africa and Ceylon can obtain copies of the instructions for the *current* "Model of the Month" by writing to the main Meccano Agents for those countries, enclosing suitable stamps for return postage.

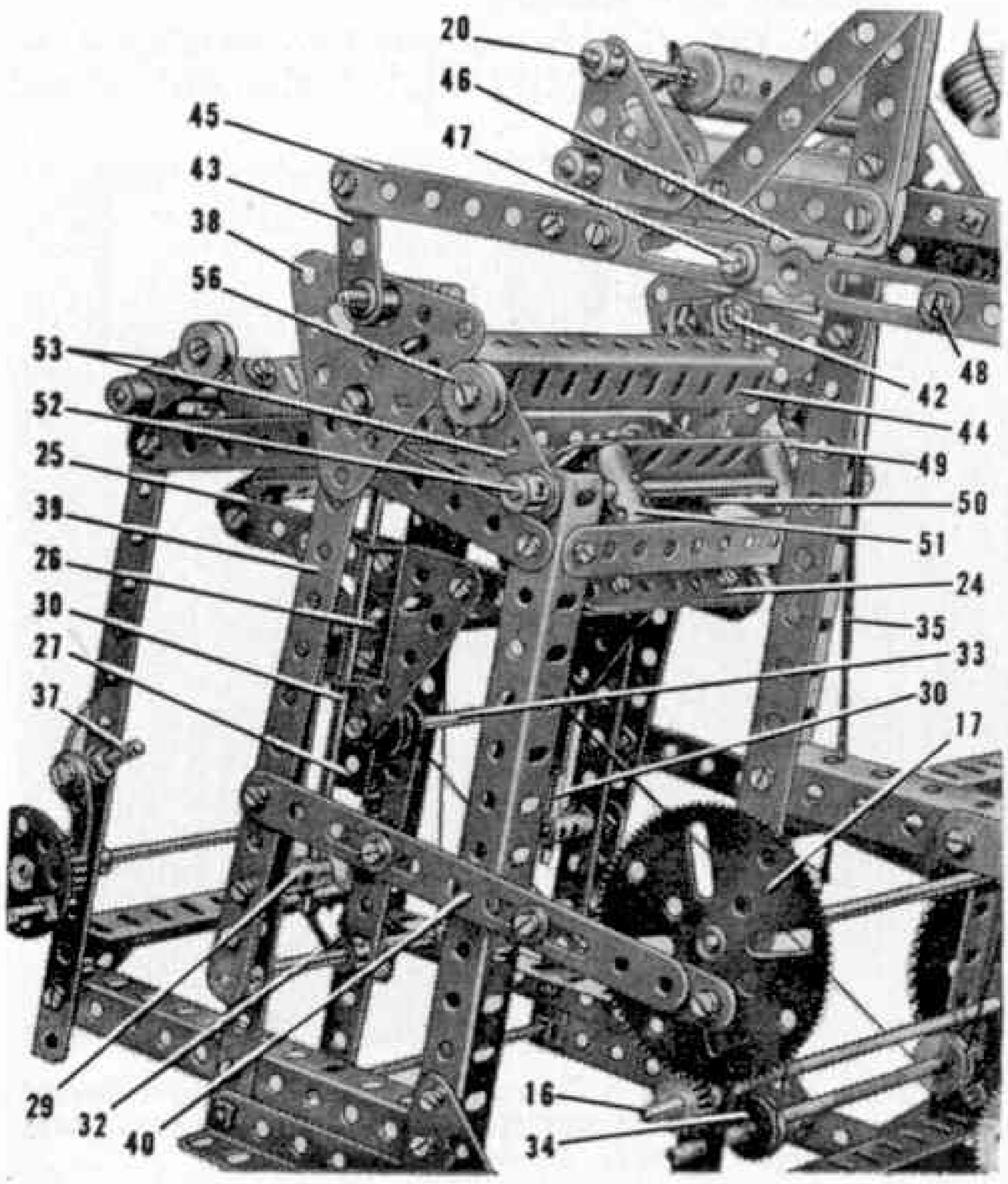
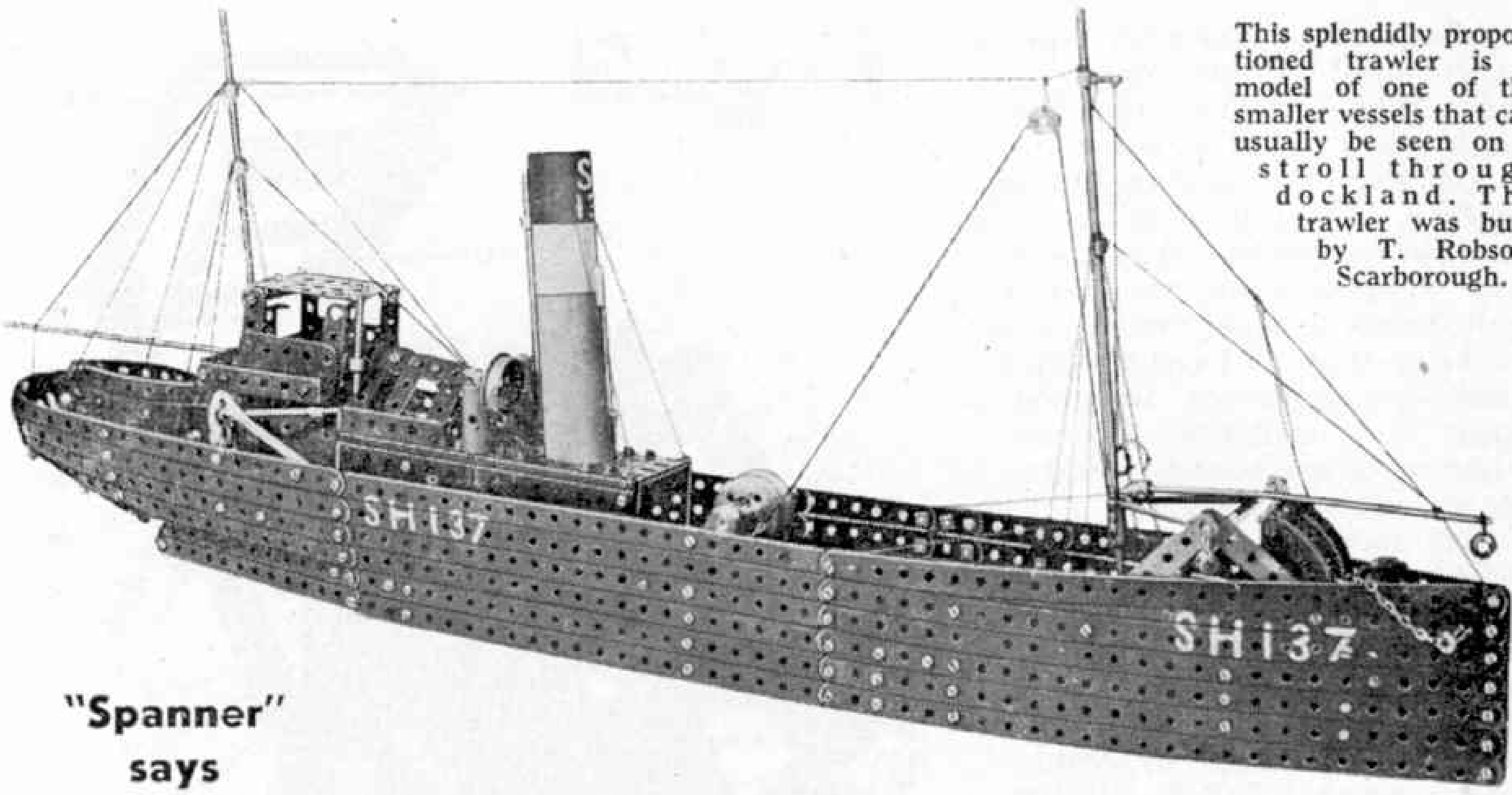


Fig. 4. Most of the main operating mechanism of the Cloth Folding Machine is seen in this side view.



This splendidly proportioned trawler is a model of one of the smaller vessels that can usually be seen on a stroll through dockland. The trawler was built by T. Robson, Scarborough.

"Spanner" says

What Shall I Build Next?

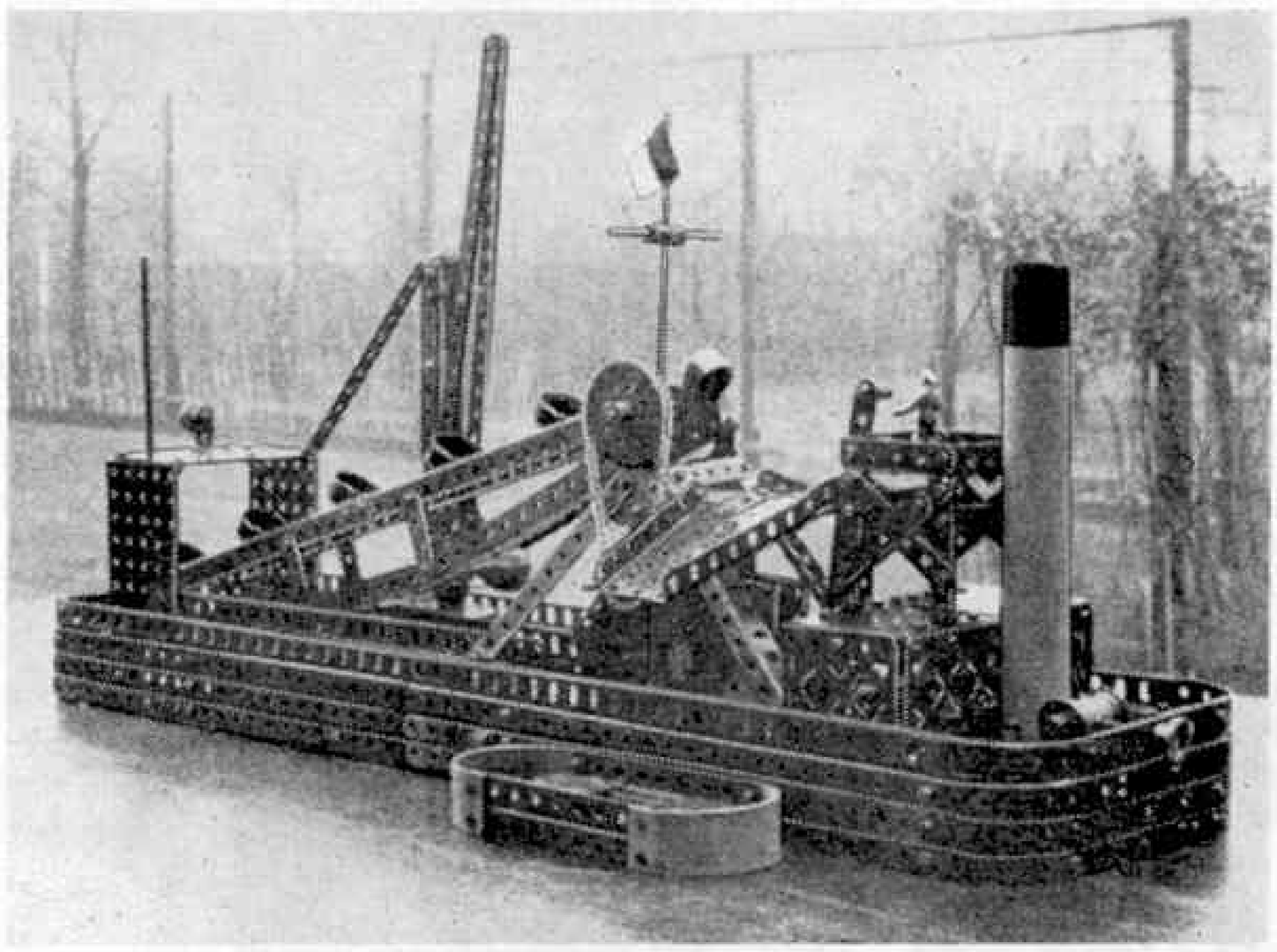
A Stroll in Dockland

I HAVE sometimes heard boys say "I can't think of anything interesting to build." Finding attractive subjects for new models should not be a difficult matter for any boy and, after all, it is this inventive power, with a touch of originality, that marks out the Meccano enthusiast.

In my early Meccano days I always wanted to do more than build the fine models illustrated in the Instructions Books in my Outfit. After I had learned how to build and how to use the parts correctly I began to work out and build in detail new movements for various mechanisms, and from these I obtained any amount of enjoyment and satisfaction. Sometimes I ran short of ideas. What I usually did then was to go for a walk with the sole intention of finding something new to reproduce in Meccano, and in this I seldom failed.

I remember that on one of these hunting expeditions I got no further than the garden gate! I happened to notice that the gate seemed to be quite a cumbersome arrangement. Surely I could improve upon it! So I went indoors again and proceeded to make a new type of gate in Meccano! It was quite a success, and I was very proud of the special self-closing and locking device when I exhibited the model to my parents and friends.

In my rambles I usually managed to discover something that I thought would



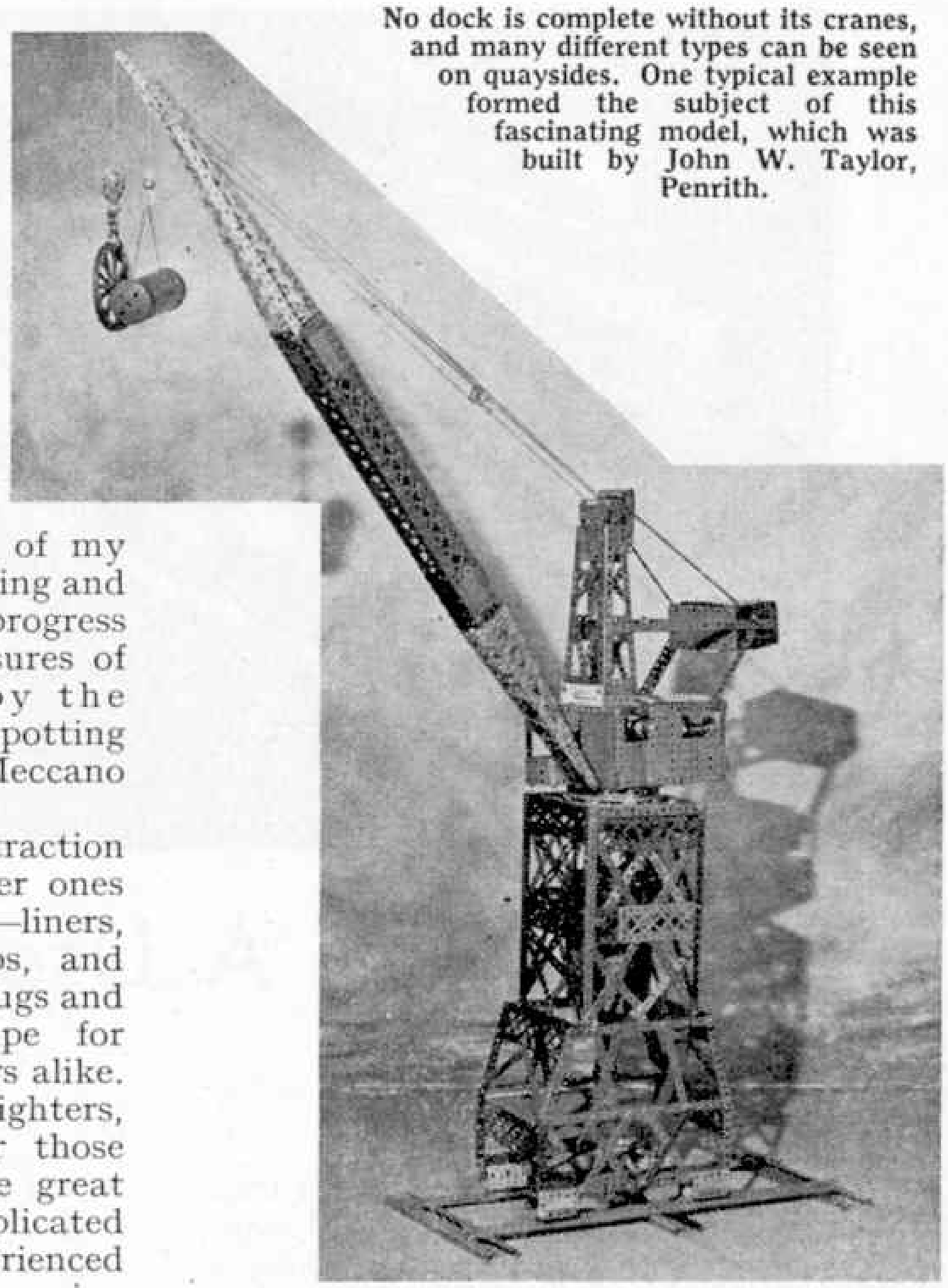
Why not try building a dredger for a change? There are many different kinds and they are great fun to build and operate. This fine example was built by Peter Fairfield, Bowden, Cheshire.

provide me with a really interesting model. Some of my happiest memories are of the days when I used to make miniatures of the bridges, cars, railway stations, trams and 'buses that I saw in the course of my trips around the neighbourhood! And on one occasion a band of street musicians inspired me to create a really comical and unusual model.

I was fortunate in living near a large port and the quays and warehouses of dockland were one of my happiest hunting grounds. The loading and unloading of vessels that I saw in progress there fascinated me, and the pleasures of my strolls were increased by the opportunities given me for spotting interesting subjects for my future Meccano models.

Ships of course form the main attraction at any port. At most of the larger ones many types of vessels can be seen—liners, trawlers, tankers and tramp ships, and these together with the fussy little tugs and even rowing boats, provide scope for advanced constructors and beginners alike. The smaller craft, such as tugs and lighters, naturally make good subjects for those with only small Outfits, while the great ocean giants, trawlers and complicated dredgers will give the most experienced model-builders fine opportunities for using their larger Outfits and wider knowledge of the Meccano System.

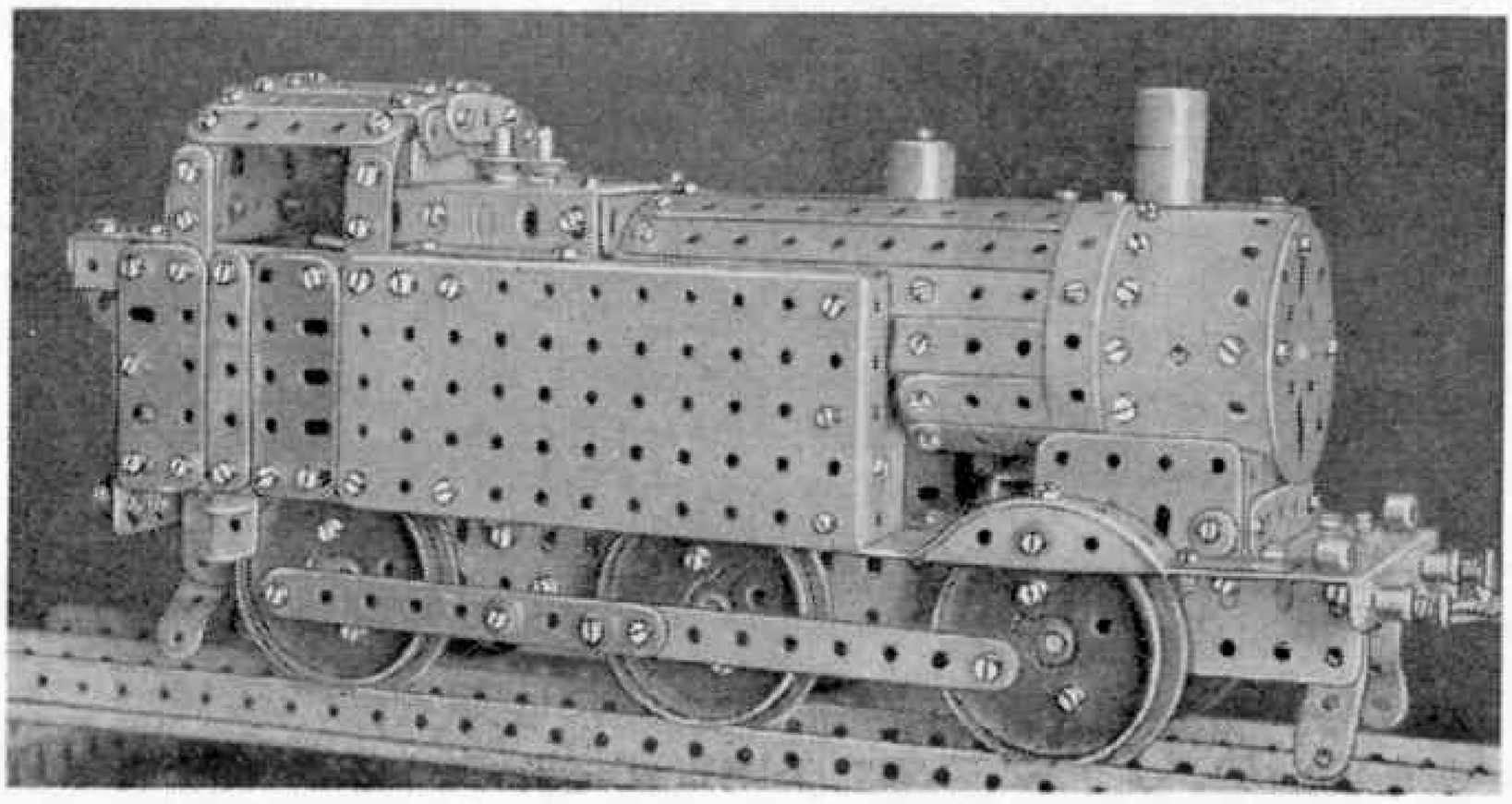
Apart from ships, however, there are other good subjects in dockland. For example, most of the modern warehouses are equipped with both mobile and static cranes, and other types also are usually to be found on the quayside. A few notes and a rough sketch or two made on the spot will give the model-builder all the details he requires to reproduce the main external features of such cranes when he returns home.



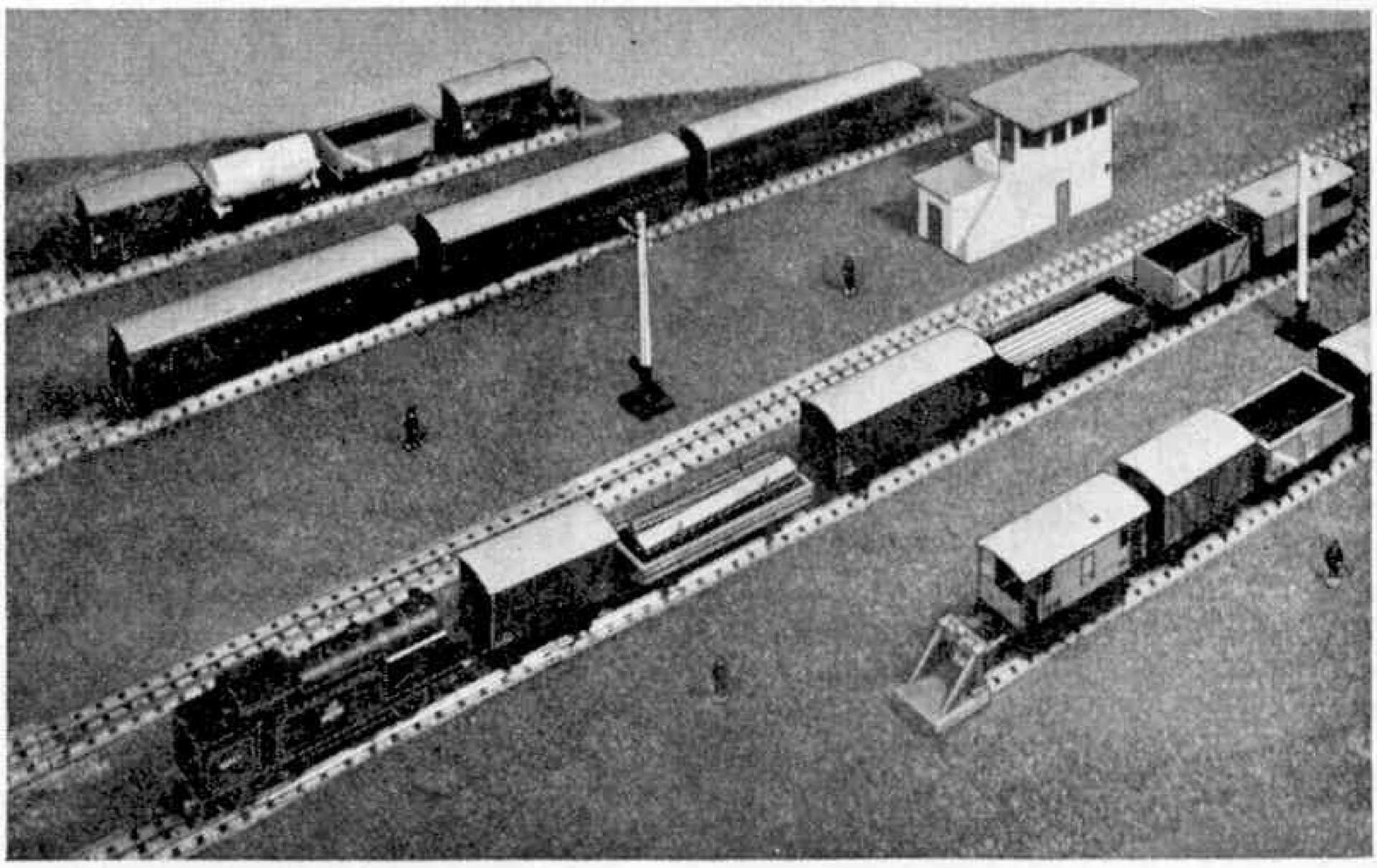
No dock is complete without its cranes, and many different types can be seen on quaysides. One typical example formed the subject of this fascinating model, which was built by John W. Taylor, Penrith.

There are the automatic coaling plants with which most ports are equipped, although nowadays oil-fired steamships as well as diesels are growing more and more numerous. I well remember the thrill I got when I first saw one of these giant machines busily at work, picking up coal from railway wagons and conveying it to the mouth of the great chute down which it tumbled into the fuel bunkers of vessels tied up at the quay. I pictured it in my mind as a fine working Meccano model, and

(*Continued on page 106*)



Fussy little dockland locomotives make excellent subjects for attractive models. This example is the work of Michael H. Bryant, Birstall, Leeds.



HORNBY RAILWAY COMPANY

A Useful Turntable Scheme

By the Secretary

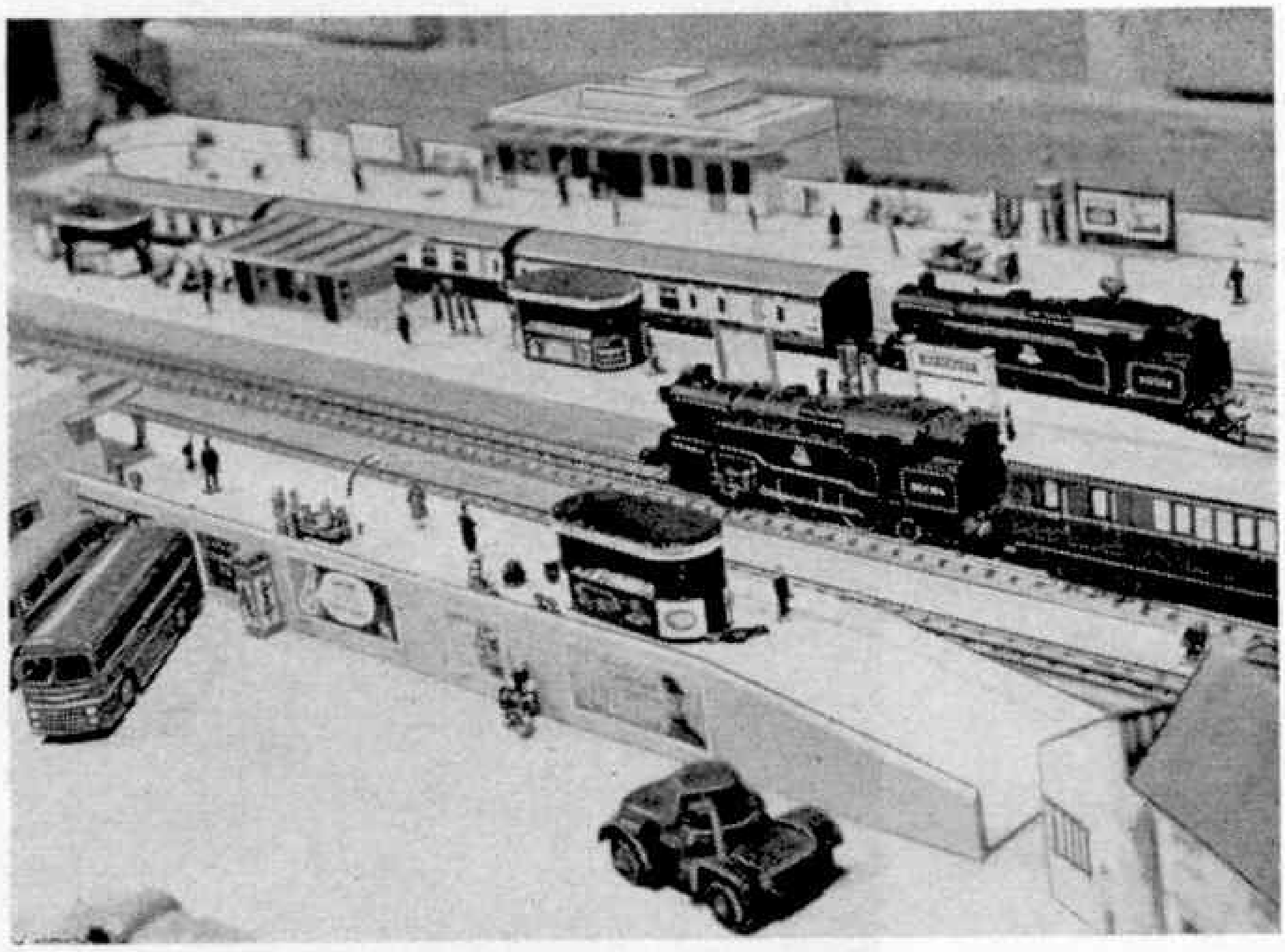
IT is always interesting to hear from those of you who have been able to add some, if not all, of the latest introductions in Hornby-Dublo to your own layouts. Many of you have now told me what you think of the long wheelbase stock represented by the Tube Wagon, Ventilated Van and the Double Bolster Wagon after trying them out for yourselves and what you have to say bears out my own experience that these vehicles ride easily and well.

The Ventilated Van has made its appearance in many Hornby-Dublo passenger train formations, as well as in freight trains. One correspondent sums things up very simply by saying that *The Ventilated Van just goes, wherever you happen to attach it in the train, either passenger or goods.*

The freight train shown in the picture at the head of the page is a noteworthy one, for it includes one each of the long wheelbase vehicles recently introduced into the Hornby-Dublo system. The Double Bolster and the Tube Wagon, each carrying a suitable load, can readily be distinguished, and the Ventilated Van can be recognised just as easily by its length.

When talking about the Hornby-Dublo Turntable last month, I mentioned its various possibilities from the layout point of view. Those who have become proud owners of this fine new accessory will not have been slow to find some of these for themselves. Apart from the arrangement of parallel tracks that I mentioned to you, and which is illustrated in the instructions leaflet that goes out with each Turntable, there is the possibility of making quite interesting yard or engine shed layouts with the tracks simply radiating from the Turntable. An arrangement of this kind is shown in the diagram on the opposite page, and you will see what a splendid opportunity you now have of installing and operating an engine shed of the so-called roundhouse type. The building could be made to cover all five outlet tracks if necessary; alternatively a couple of roads could be left in the open, possibly for coaling and ashpit purposes and so on.

In a system of this kind, or indeed with the arrangement involving parallel tracks, you can arrange to accommodate more than one engine on each individual track. This is done by placing an Isolating Rail at a suitable point, say at the end of the first EDB1 rail length. One engine can stand at the Buffer Stop end on the isolated section and another engine can



A station view on the Hornby-Dublo layout of Mr. A. R. G. Pearce. Four running tracks are provided through the station.

then come from the Turntable along the same road without interfering with it. Care must be taken by the driver not to overshoot the Isolating Rail, of course! The engine standing on the isolated section can be moved, when the way is clear, if the D2 Switch connected to the Isolating Rail is switched on.

An interesting application of the Isolating Rail and Switch appears in the diagram, where an Isolating Rail is attached direct to the Turntable on the centre outlet track. The idea is that this track can be isolated by means of the Switch, and an engine can then stand there without being influenced by the arrival of another locomotive on the Turntable from the opposite inlet track. Without the Isolating Rail and Switch the centre outlet track would of course be live in such circumstances.

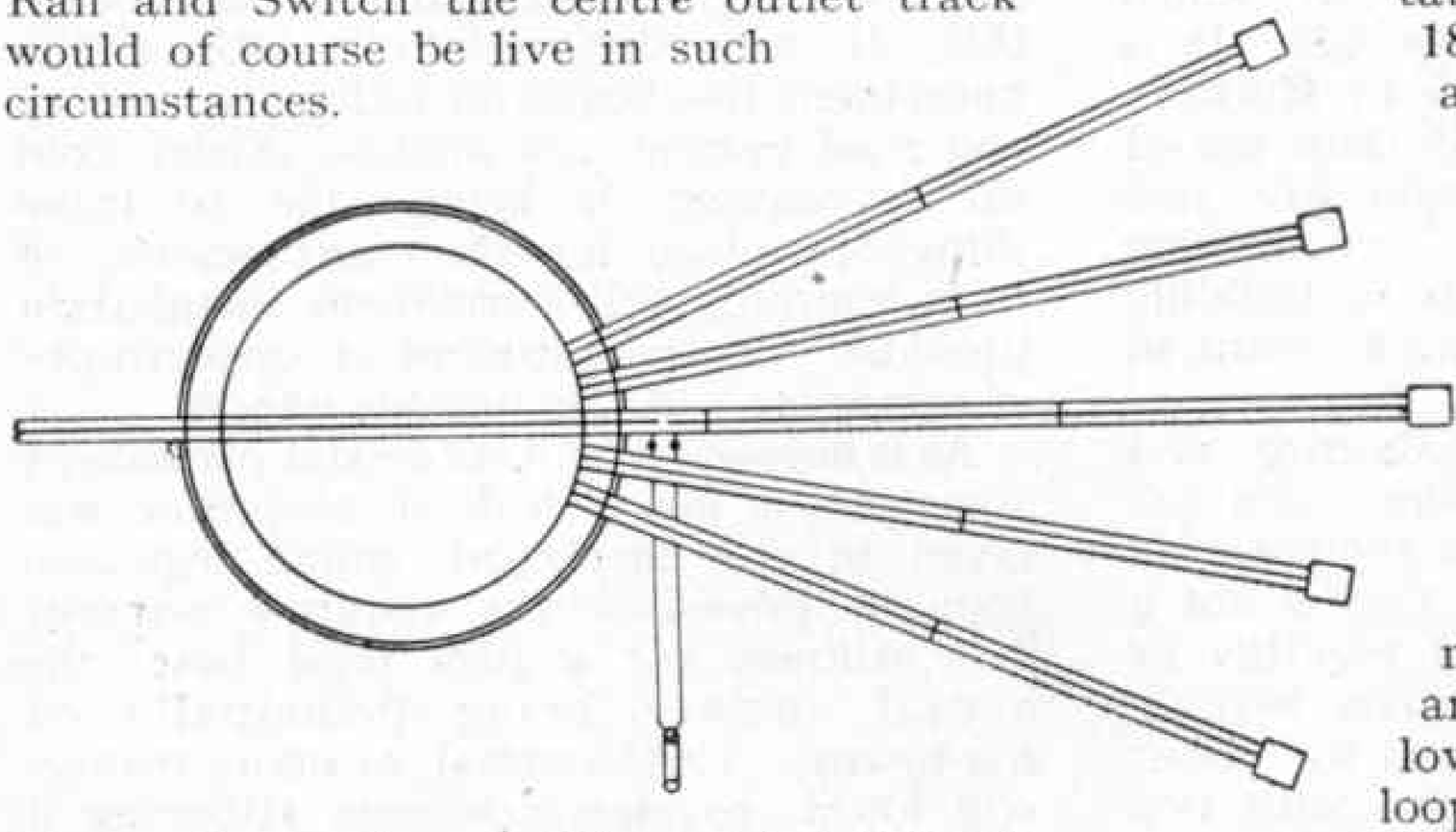


Diagram showing the use of the Isolating Rail and D2 Switch in conjunction with the Hornby-Dublo Turntable.

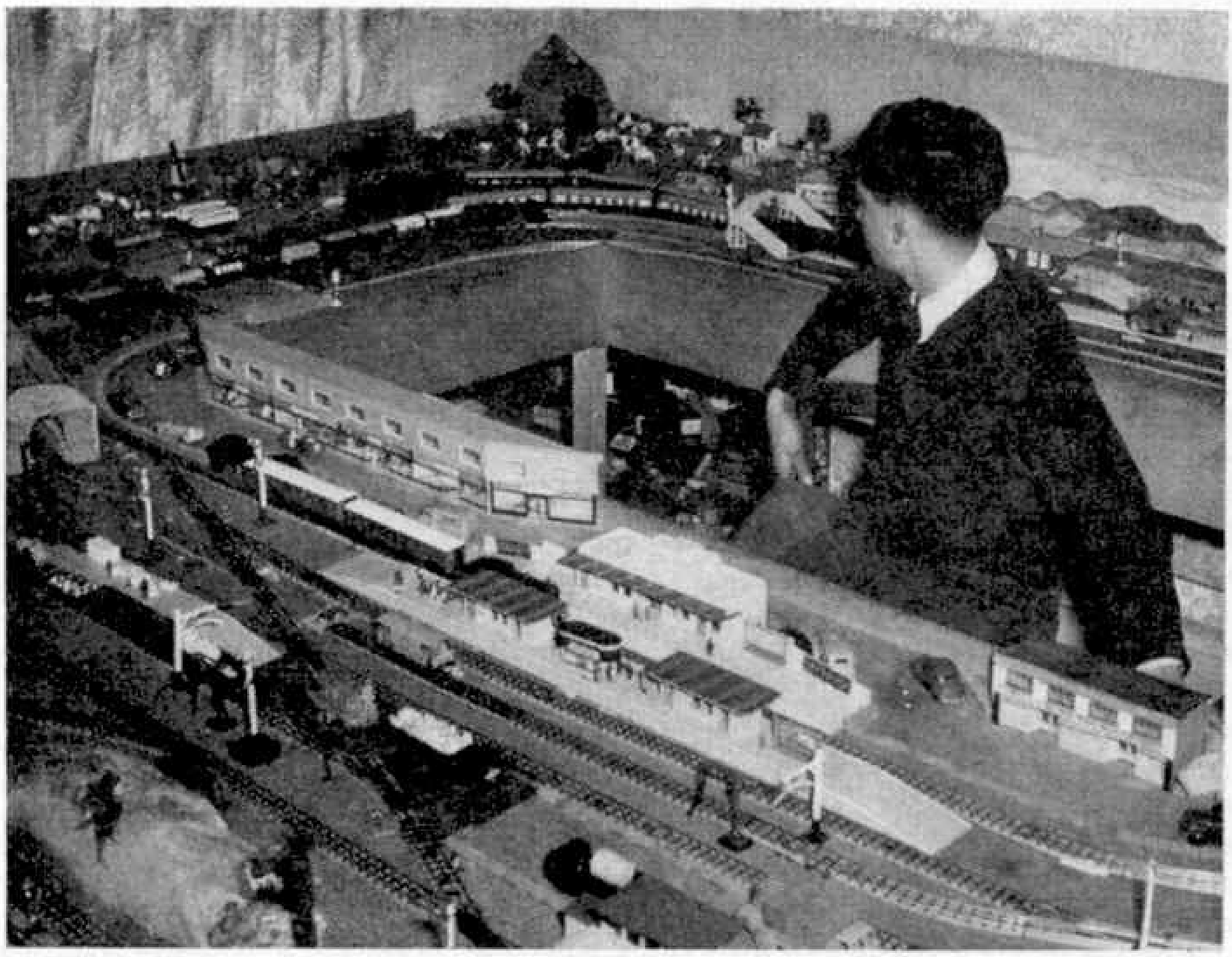
A similar situation would arise if an engine from one of the other radiating tracks were to make its way on to the Turntable and be lined up on the Turntable road to go "off the shed." This again would render the centre track live. As long as this track is not required for engine storage there is no need for an Isolating Rail, but it is a useful refinement that most of you will appreciate.

In the *M.M.* last October we included a picture of part of the layout of Mr. A. R. G. Pearce, showing his son Arthur, a capable 5 year old Hornby-Dublo operator. I am glad to be able to show you another view of the main station, for this is obviously a busy place.

The layout is arranged on tables in a shed measuring 18 ft. by 10 ft., and the track arrangement is such that four trains can be moved at one time. Trains can be crossed from one track to another very readily and isolating and switch arrangements make it possible for one train to be looped round another when necessary.

Although the bulk of the main line and the sidings are at normal level, there are low level and high level return loops. These allow trains to be moved from the outermost track to the innermost track of the four roads that can be seen passing through the Station.

It is interesting to know that although all Points on the main line of this layout are electrically operated, by means of the usual D1 Switches, the siding Points are worked by hand. This arrangement works out quite conveniently, and the operator can manage without difficulty to keep traffic moving from the control position.



Maurice Cohen surveys his Hornby-Dublo layout, an extensive system with effective lineside arrangements.

An Effective Rail-Road Layout

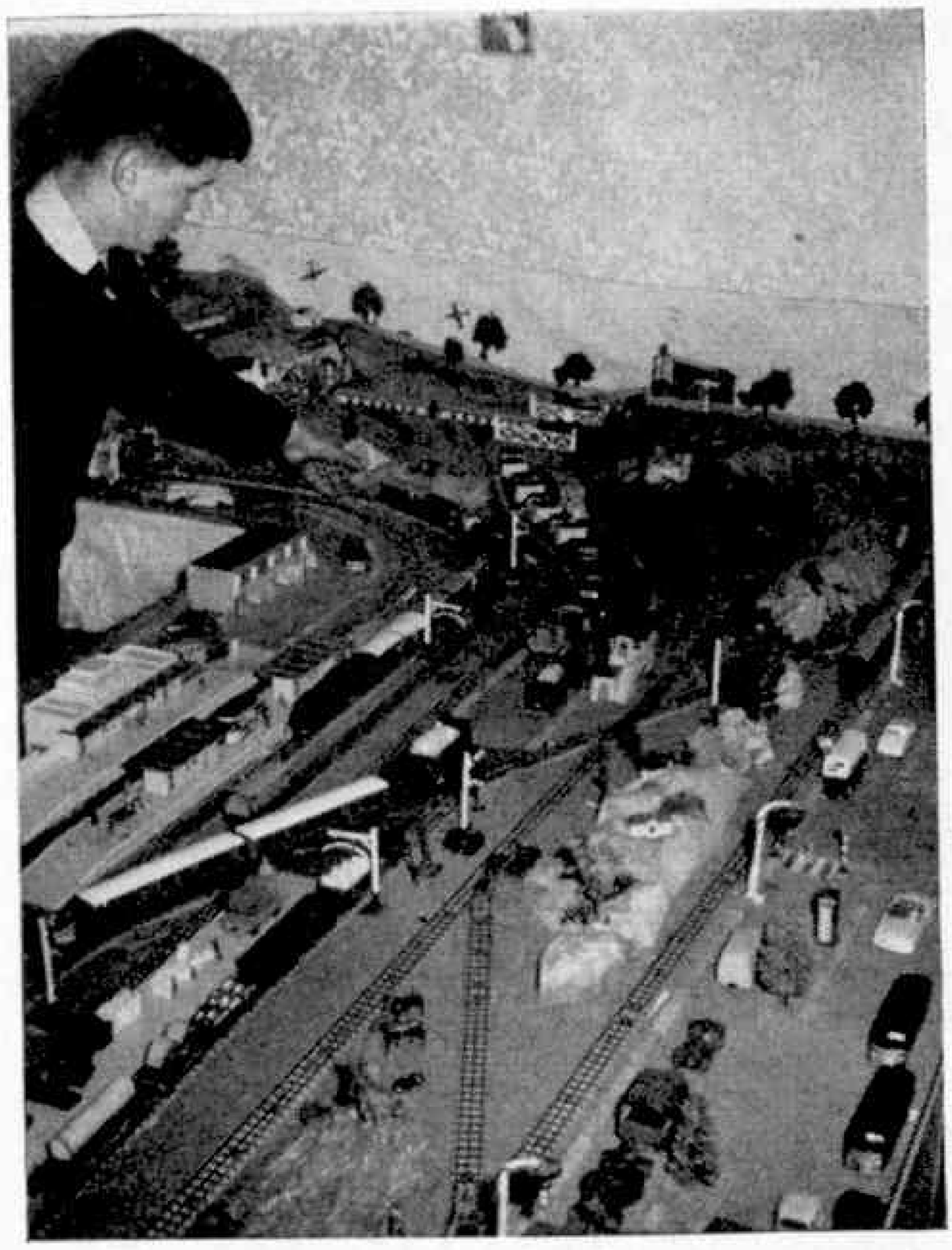
THE illustrations on this and the next page show parts of an attractive Hornby-Dublo layout, details of which reached the Editor some time ago. It is certain that they will appeal to Hornby-Dublo owners generally, and they are of special interest to those who are just beginning their railways in showing something of the possibilities in building up a good layout where a fair amount of space is available.

The system is run by Maurice and Terry Cohen of Kidderminster, who are surely to be congratulated on the splendid effects they have obtained. This is not a layout that has been rushed together or acquired quickly. In fact it has been in process of gradual development for about eight years. The system began with two Hornby-Dublo Train Sets, which were simply run on the dining room table when required and without any scenic effects. Then came a house removal, which provided the eagerly-awaited chance of installing the railway in a room that could be devoted entirely to the trains and to Dinky Toys.

With the addition of further equipment, both Hornby-Dublo and Dinky, the cleaning and packing up of every item at the end of each school holiday became a major operation occupying practically a whole day. After some experience of this, it was decided to construct the permanent baseboard on which the railway and road system now stands. Apart from the advantage of being able to leave things in place for the next session of train running, this permanent installation provided the long-dreamt-of opportunity of arranging suitable lineside effects.

As is necessary for a successful permanent structure a good deal of attention was given to the baseboard, sound legs and framing providing the requisite support and stiffness for a firm level base, the actual surface being principally of hardboard. This material, as many readers will know, requires adequate stiffening if it is to remain permanent and level. The overall dimensions of the baseboard are 13 ft. by 10 ft., the operators being accommodated in a central space 6 ft. by 3 ft. This central situation has the advantage that practically any part of the system can be reached easily, which is a great convenience not only during operations but also in the course of cleaning, maintenance and so on.

The railway consists of approximately



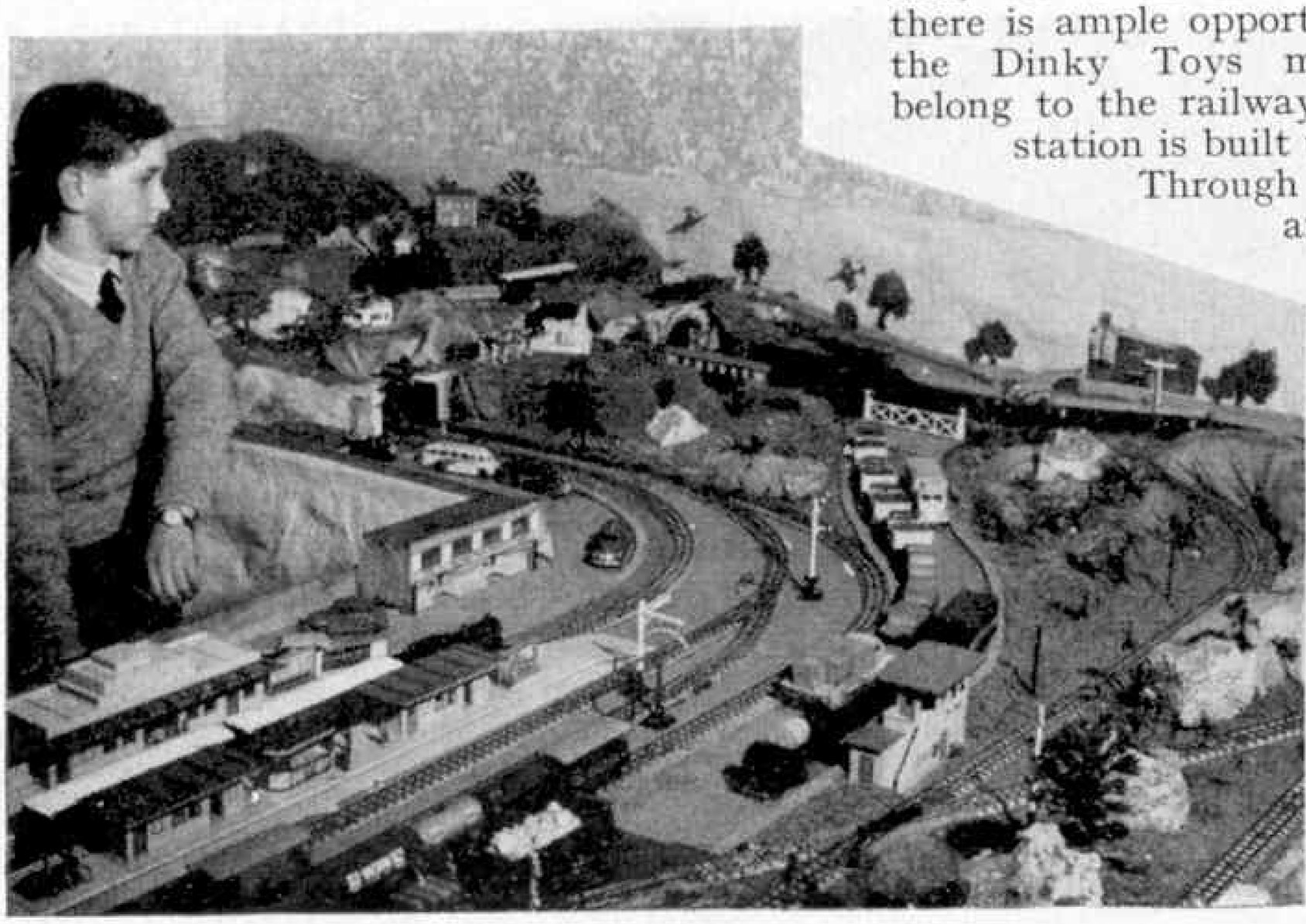
Another corner of the layout. The passage of the train over the Level Crossing has caused a considerable queue of Dinky Toys vehicles on the road.

140 ft. of Hornby-Dublo track, including 16 Points and several Crossings. There are four main running tracks, each with separate power and control, so that it is possible to have four trains running at once, with another standing by. The various tracks are linked for through running purposes by a useful diagonal connection involving two Diamond Crossings and various Points. Of course, on a layout of this description some Electrically Operated Points are a necessity and in some instances these are wired to operate in conjunction with the appropriate Signals. This is a useful feature, which saves Switch levers, and the aspect of the signal arms is a useful indication to the operator of the way in which the Points are set.

The scenic effects were begun by painting a background on paper, which was then fixed to the wall in lengths. This background is simple, which is a good point, as over-elaboration in background scenes spoils the effect. In order to justify the tunnels through which all four main tracks run, a hill section was built up in one corner. The hill surface consists of dyed cloth spread over a suitable framework, sawdust of varying colours being applied here and there to help the natural effect of the surface.

There are rocks and cliff faces too, either of actual stone or simulated by means of bark from birch trees. The little trees on the layout were not made at home, the railway engineers having found miniature tree construction something of a problem. They are not alone in this of course, and there are in any case plenty of miniature trees about nowadays.

The track runs partly through highland and partly through lowland type scenery and, as is obvious from the pictures, there is ample opportunity for the use of the Dinky Toys motor vehicles that belong to the railway owners. The main station is built up with the standard Through Station on one side and a combination of two Island Platform centre sections placed end to end without the intermediate ramps. Behind it there is a street with a block of shop property on the opposite side.



Terry Cohen, joint owner of this Hornby-Dublo layout, lends a hand in managing the traffic by rail and road.

Lineside Extras

Little Things That Count

AS many readers know, a railway consists of a great deal more than track and trains, stations and signals and so on. There are many smaller details that play an important part in the general operation and maintenance of the system. Some of these can become so familiar to us that we hardly notice them, whether we travel regularly or whether we do most of our railwaying by train watching at the lineside. It is such lineside features of various types that we are going to talk about now. No doubt the simple example shown in the picture below will encourage you to look for others and to reproduce some of them in miniature for your own Hornby Railways.

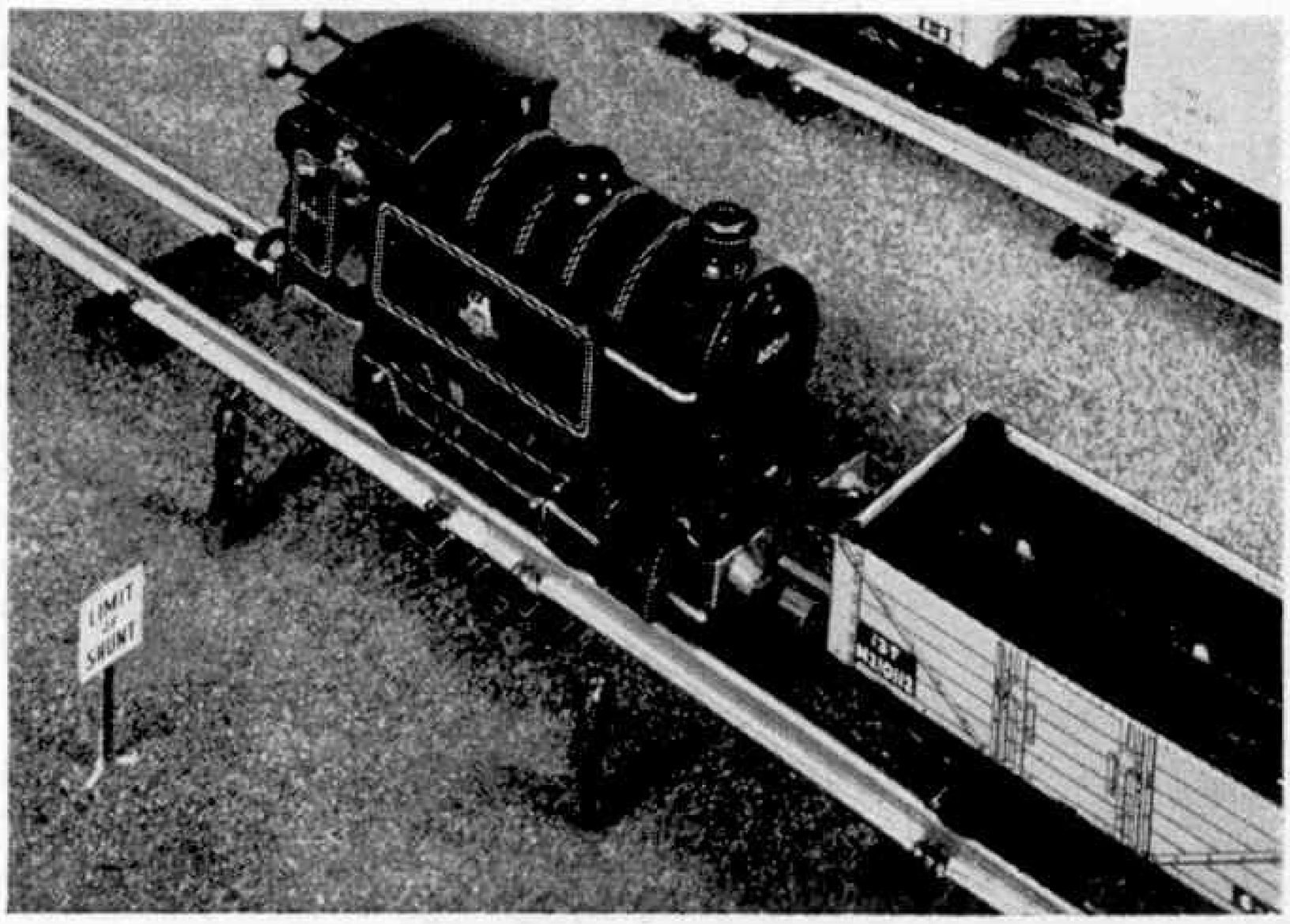
Lineside signs such as the warning board in our picture provide the *Do It Yourself* enthusiasts with plenty of opportunities for exercising their ingenuity and skill. Before fixing up any particular warning board or sign it is of course necessary to make sure that the board is used correctly.

Boards such as that shown in our picture are found alongside the main line in situations where a train that is being shunted in and out of sidings has to draw out on to the main line in order to make the necessary movements. Wherever possible a spur or head-shunt road is provided for this purpose, so that such movements can be made clear of the main line. But this cannot always be done. As the main line is divided into signalling sections, a board is placed to indicate the shunting limit in order to prevent a shunting train moving from one section to another.

In miniature practice it is not often possible to include a shunting spur, most goods yard Points being approached directly from the main line. Hence the wording used on the miniature board shown here. This was made, in one piece, of card. If white card is used for the purpose the wording can be written on to it directly in Indian Ink. Alternatively a white adhesive label or a piece of paper can be attached to the board.

A more satisfactory job will be to make the post and board separately. A length of thin wood, round or square in section, can be used for the post, and the board itself can be thin wood too, if preferred. On a permanent railway with a baseboard the post can be planted into a hole in the baseboard, but on a temporary layout a suitable stand will have to be provided. This can be a small square of wood to which the post is attached, or there may be some little oddment at hand that will do.

Many other types of notice can be made up. For instance, one may carry to trainmen such instructions as *British Railways Locomotives Must not Pass this Board*, sometimes seen in private sidings. Again, notices to passengers, such as the familiar *Passengers Must not Cross the Line Except by the Footbridge*, can be provided. You will find many other suitable notices about.



Whoa! The Driver of the shunting engine has just gone past the warning board at the lineside. The engine is a No. 40 Tank.

Club and Branch News

WITH THE SECRETARY

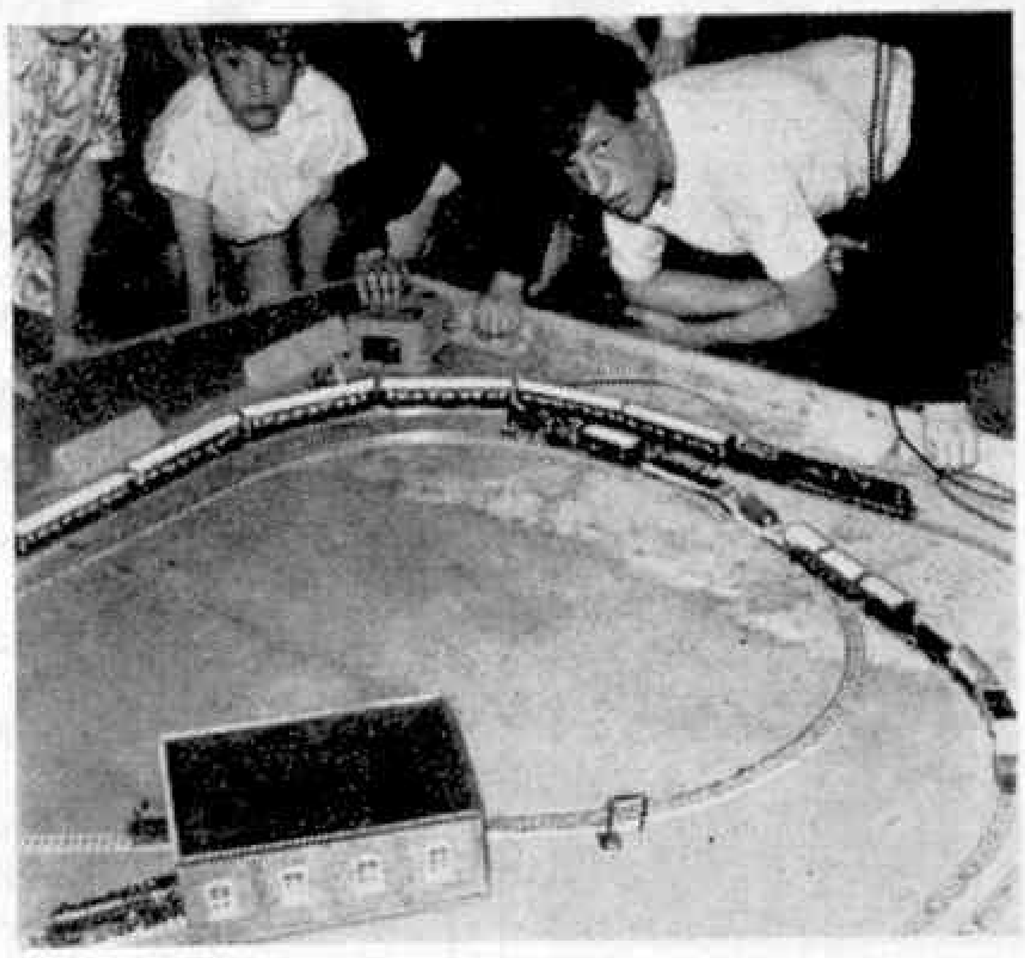
MERIT MEDALLIONS

This is the month when I publish the annual list of Merit Medallion awards, and below I give the names of Club members who have gained this distinction during the past twelve months. The list is slightly longer than that of a year ago, but I should like to see more Leaders availing themselves of the Merit Medallion as a means of giving official recognition and appreciation of good work done by their members.

There is no narrow definition of what that good work should be. It may consist of bringing in new members, helping to organise meetings, suggesting new schemes of interest, or loyal service in some capacity over a long period. The judge of the work that merits a Medallion is the Leader, who is in regular touch with the members, and therefore best placed to assess the value of their work for the Club.

For the benefit of new Clubs I mention again that two Merit Medallions are available for each Club in each Session, for award in the way outlined above. The Merit Medallion is greatly prized by those members who gain it, and I hope therefore that a year hence I shall be able to publish an award list of record length. In the meantime I congratulate the Club members named below:

Cape Peninsula (South Africa) M.C.—Borden, R.; Cohen, C. Christchurch (New Zealand) M.C.—Mulsard, B. Consett and District M.C.—Bell, I.; Ducksfield, N.; Oram, K.; Whitfield, D. Exeter M.C.—Baker, K.; Catsell, J.; Hancot, D. F.; Manning, P. L.; Saunders, K.; Sibborn, M.; Slack, R.; Wills, D. Launceston M.C.—Dringle, A.; Hutchings, E.; Keast, K.; Screech, R.; Toms, J. Maylands (Western Australia) M.C.—Halliday, J.; Jones, B.; Jones, R.; Miles, H.; Peterson, L.; Taylor, R.; Westlund, R.; Wylie, K. Mile End (Portsmouth) M.C.—Firman, Mrs.; Hudson, Mrs.; Young, A.; Young, R. St. Thomas District (Exeter) M.C.—Bennett, B.; Blackmore, R.; Denford, D.; Haydon, J.; Luxton, P.; Milton, E.; Southard, A.; Webber, M. Strensall (York) M.C.—Nurse, R.; Powell, J.



A corner of the Hornby-Dublo layout of the Hale End (London) H.R.C. Branch No. 551, with a few of the members visible wholly or in part! The layout is mounted on a large baseboard, arranged in two halves that can be folded one on top of the other after use.

CLUB NOTES

Parks County Secondary School (Belper) M.C.—A Meccano competition has increased enthusiasm at model-building meetings. Interesting Talks on aircraft, locomotives and Meccano have been given by members. Club roll: 18. *Secretary:* C. R. Charlton, "Overdale," Mount Pleasant Drive, Belper, Derbys.

Mile End (Portsmouth) M.C.—A new Leader has been appointed and a speech of welcome to him was made at a Social. The "Overhead and Underground" railway being constructed in Meccano by the members of this Club and its associated H.R.C. Branch was tried out at a recent meeting, and proved very successful. Lighter activities have included a Games night and a mock trial. Preliminary discussions have been held regarding a proposed three-day Exhibition to be held next Easter. Club roll: 30. *Secretary:* Mr. A. J. Nicholson, 213 Sultan Road, Buckland, Portsmouth.

St. Thomas District (Exeter) M.C.—Steady progress is being made, and some good Meccano model-building accomplished. Table tennis and billiards, each in charge of a senior member, have become very popular. Club roll: 25. *Secretary:* E. Milton, 17 Beaufort Road, St. Thomas, Exeter.

AUSTRALIA

Maylands M.C.—Our Annual barbecue—now becoming regarded as a fixed event in the Club calendar—was held in November last year and was greatly enjoyed. The boys grilled their steaks and toasted their bread over a bed of hot coals, with the aid of the Club's own barbecue forks. We made these forks 4 ft. long because we cannot afford asbestos suits! The recently formed book-binding section is doing good work rebinding some of the Club library books, and the new woodwork section have completed some useful accessories for the Club's gauge 0 railway. Club roll: 44. *Secretary:* W. Miles, 6 Piaggio Street, Bayswater, Perth, Western Australia.

NEW ZEALAND

Christchurch M.C.—The excellent Club display of Meccano models at the Shirley Parish College Show included various types of ships, a 4 ft. working robot, Meccanograph and a windmill. A Social and reunion was attended by over 60 ex-members, parents and members. Models brought by the members to a "Home Model Night" were of a wide variety, and later were used for a display at the Christchurch South Intermediate School Fair, and exhibited in a Hobbies Show in a large store. Club roll: 21. *Secretary:* R. Boundy, 49 Evesham Crescent, Spreydon S.W.1, New Zealand.

BRANCH NEWS

Armley (Leeds)—Track operations have been the main feature of recent meetings. The members have been grouped into teams to operate the Branch layout, each member doing a particular job. A start has been made on constructing an extension to the layout. Meccano model-building gives variety to the programme, and occasionally a Quiz is held. *Secretary:* L. Blakey, 21 Arley Street, Armley, Leeds 12.

Kidderminster Model Club.—Meetings have been devoted to model railway activities and model-building. At one meeting a Quiz on model railways, especially Hornby layouts, was much enjoyed. *Secretary:* G. Steward, 360 Stowerbridge Road, Kidderminster.

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For other Stamp Advertisements see also pages 104 and xvi

Stamp Collectors' Corner

By F. E. Metcalfe

A KGVI COLLECTION

TWO months ago I wrote about the stamps of the present reign, and now it is the turn of the stamps issued during the one previous. Attractive as are thematic collections, I think these stamps are even more popular, at least in our British Commonwealth. The great vogue they have in the United States must not be overlooked, either, in summing up that popularity, with all that this implies as far as investment possibilities are concerned.

What are the reasons behind this popularity? As one collector put it to me, it is the fact that there is always something new turning up that makes KGVI stamps so interesting. Even though most of them are already obsolete, there is still a great deal to be learned about them, and the philatelist will find in the group material that will keep him occupied for years to come.

Now I am aware that I am writing for readers among whom are many beginners—I always try to keep that important point in mind indeed—so the philatelic angle may be a bit beyond them to start with. But it is much better to go in for stamps that still present unsolved problems, for as time goes on the beginners will become the specialists, and then they will have the stamps on which they can exercise their knowledge.

Don't be frightened off by this talk of philatelic research. Its meaning will come later or not, according to one's taste. All anyone need do is to buy sets, according to the capacity of the pocket, and mount them carefully in the loose leaf album. If you do this you will be forming a quite nice little property.

The same advice applies to the more advanced collectors. You will be doing anything but throwing your money away if you form a KGVI collection. Mind, it is not claimed that these, or any other stamps, are good investments. But I do not know of any stamps that are likely to yield a bigger percentage of one's expenditure when sold than the stamps of the reign previous to the present one.

It was for the use of KGVI collectors that the Commonwealth Catalogue was specially compiled, and its growing sales prove how popular KGVI stamps continue to be. They have everything that any class of collector can want. Suppose you are a junior, who can only spend a shilling or two a month. Then you must get busy right away, for while most of the sets are now obsolete, yet those that have been replaced during the past few months are still being sold, in many instances at prices very little above those charged for current issues.

If you can afford to spend 5/- a week, you could soon pick up a number of sets up to a 1/- face. If you only want to spend a couple of shillings a week, then go in for sets to 3d. Get as many of these sets as you can. Nicely mounted, in an album with plain leaves, and with space left below so that higher values can be added later if necessary, you will be surprised what a nice show you will soon have. And don't forget, such a collection has a real re-sale value.

Then there are the more advanced collectors, those who like to study their stamps and have a good knowledge of the hobby. These will find KGVI stamps right up their street. The second World War occurred during the reign of King George VI, and this meant a shortage of stamp making materials. Inks and papers were in short supply, and all kinds of substitutes had to be found.

Take ink, for instance. Around 1953 it was apparently difficult to get a real black ink, so stamp printers had to use in some instances ink that had a slate-purple tinge about it. Gibbons have listed one of these stamps separately, but actually there were a number, and an examination of the Commonwealth Catalogue shows that not only Fiji had a printing where this slate-black ink was used instead of jet black, but also British Solomons, Gilbert and Ellice Islands and Kenya. A knowledgeable collector can often pick up these stamps as normal printings, which is very nice for the finder, for they are worth several times the normal price.

Then there is the question of paper. Before the war a number of stamps, such as Bermuda high values, etc., were printed on what is called chalk surfaced paper. A way to detect this paper is to get an old coin that is pure silver, and rub it gently over the front of the stamp. Only the tiniest rub is called for, and if the paper is chalk-surfaced, a pencil-like mark will remain. This can be erased with an ordinary rubber, but again do not forget to rub *very* lightly. Now during the war a substitute paper had to be used. This had no coating of chalk, and some of the stamps printed on it are quite rare. The Commonwealth lists all these varieties, which collectors are so keen to get hold of.

One stamp printing firm had their works damaged, and another had to perforate their stamps for them. This produced what are known as blitz perfs. They are New Zealand stamps, incidentally.

In 1943 there was a new printing of the Grenada 10/- value. Two perforation machines had been used, and some dealers got stamps perforated 14 while others had stamps perforated 11¾. A certain dealer got a sheet of the latter, but sent it back to be changed for a sheet with the finer perforation, stamps of which are now worth about £1 each. Those returned are not a bad buy at £20 apiece!

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For other Stamp Advertisements see also pages 102 and xvi

Stamp Gossip

MUTUAL HELP

WE humans are a strange mixture. We fight and kill one another, as happened recently in Hungary; yet if anything happens that arouses sympathy, we will go to endless trouble to set things right.

A few Sundays ago I went down to the market at Shoreditch, and under one of the railway arches was a crowd of people staring anxiously at a budgerigar that had escaped from one of the cages on a stall. The budge was gazing around calmly, but not so those looking at it, and there were plenty of remarks about the poor little bird that would surely die if not captured.

During the summer there were many cases of polio in Argentina, and several countries, including Great Britain, rushed over what help they could give, quite naturally. And now Argentina has issued one of the most beautiful stamps ever printed to show its gratitude for the help given in its time of need.

The heading of the stamp reads in English, "Gratitude of the Argentine children to the countries of the world." A nice gesture, and one that shows to what useful purposes stamps can be put. We should have more issues for such causes, and fewer to commemorate wars and suchlike events, which generally get the philatelic publicity.

BASKET BALL

We are still talking Olympic Games, and anything to do with sport just now is proving of great interest, so no wonder that the attractive stamp issued recently by France, with basket-ball as the motif of the design, is proving a best seller.

Great Britain is now taking to this sport, but we have a long way to go before we can compete on equal terms with those teams of American giants who make the game look so easy. Still we are coming on, and in the meantime we have at least got a nice stamp for our sports collection, and a cheap one, too, for even a mint copy will only cost a copper or two.

ALBUMS

I have noticed that when most people set about buying a loose leaf album, the first thing they ask is how many extra leaves it will hold. That should be the very last question. In fact, such a question should never be asked at all, for though an album without stamps looks as though more leaves could be added comfortably, it is a very different thing when the album fills up with stamps.

Take a tip from one who has had a lot of experience in such matters. When you buy an album, remember that it already has as many leaves as the binder will hold, without putting too much strain on the springs.

VARIETIES

Recently I received a letter from a reader who had bought a copy of the Commonwealth Catalogue, and was disappointed not to find mention in it of a striking shade variety, as he thought, of the current New Zealand 3d. stamp. The normal stamp is vermilion, but the variety of my correspondent was of a deep brick red, and I was asked bluntly why such a variation of the normal colour was not in the catalogue.

Well, to be quite candid, the colour of the stamp had been affected by something or other.

I am afraid that many collectors treasure shade varieties that are not genuine. Red stamps seem to be the ones that change most by outside agency. For instance I was once shown a mint 2½d. stamp of Great Britain that was almost brown instead of the normal red. I asked the owner where he had kept the stamp, and it had been in a leather pocket wallet, which caused oxidation.

All this was accident, of course, but I have copies of stamps on which a chemist has changed the colours without even affecting the gum. It is because this can be done that shade variations are only catalogued when the actual printing to which the stamps belong is known. It is easy nowadays to keep track, for the Crown Agents announce all new printings of colonial stamps, and so they can be checked at the source.

WATER, WATER!

Ascension issued a fine set of stamps on 19th November. The top value is 10/–, but a nice little set up to 3d. can be bought for just over a shilling by those who have been doing a bit of overspending lately.

This short set will contain a copy of the ½d. value, which shows how the people of Ascension get water.

NEW ZEALAND

One of the New Zealand "Health" set issued towards the end of September is illustrated—and my word, do those apples remind us of anything! I am sure that those youngsters had permission to gather the fruit, as of course we always had. Yes?

THE MONTH'S TIP

This month I am going to refer to quite a number of stamps, in fact, all issues of both Israel and the Vatican. If you have any of these, hang on to them. If you haven't, and any come your way, tuck them away, especially the earlier issues.

Tower Cranes—(*Continued from page 74*)

loading the crane and that he must travel the trolley in closer to the tower to adjust the working radius.

If the above warning system fails to operate for any reason, or if the driver ignores the warning light and bell and proceeds to increase the overload still further, then an automatic electric trip will operate and isolate the hoist and trolley "out" motions, apply the brakes, and so render the crane incapable of further abuse. The lowering and trolley "in" motions, however, are not isolated and therefore the driver has full control to enable him to back out from the overload position.

The overhoist safety system comprises a screw operated limit switch mounted on the hoist unit which automatically cuts out when the lifting hook approaches its maximum height.

To guard against any failure of this system an additional safety feature is incorporated whereby if the hook is raised further, then the complete hoist unit, which is flexibly mounted, will rise and so trip the motor and apply the brake.

The East Coast Railway of Malaya—

(*Continued from page 88*)

foam mattresses. Meals and refreshments to the tastes of all races are available when required.

The maximum speed allowed at the moment is 40 m.p.h. on metre gauge permanent way built up of 80 lb. B.S.A. rail laid on timber sleepers and metal ballasted.

A train journey of over twelve hours through uninterrupted jungle would undoubtedly be monotonous and boring. But although this East Coast Railway penetrates a dense wilderness of massive forest and tangled undergrowth, it is not a continuous wall of tropical jungle. The forest scene is relieved by glimpses of carefully and neatly cultivated padi fields. There are kampongs whose houses set up on high piles peep out from the surrounding trees. These houses are built of soft atap thatch with its restful hues of grey and brown.

For almost the entire length of the journey from Gemas in the south to Tumpat in the north there are stretches of glorious river scenery, with perahus anchored along the calm gravelly beaches. Other evidence of riverine life is the large number of houses built on floating bamboo rafts.

A town of particular interest in the northern section is Gua Musang. Here the Communist terrorist flag flew for a few days in July, 1948, as the centre of a vain hope for a Malayan Communist republic. From Gua Musang onwards the scene is almost alpine in character—but without the snow. Purple mountain masses and towering bush-capped limestone cliffs press in on the line. Rapid successions of tunnels and bridges increase the alpine illusion. Surely few of the world's jungle railways can match the East Coast Railway of Malaya for excitement, interest and varying beauty.

What Shall I Build Next?—(*Continued from page 95*)

lost no time in making a start to make this dream come true.

Coalers are of many types. In one the coal is brought along the quayside in railway trucks. On reaching the coaling plant the trucks run into an elevator that carries them to the top of a high tower, where they are automatically tipped to discharge their contents down inclined chutes leading to the ship's bunkers. At very large ports more elaborate plants are often used, some of them afloat. These pick up coal from barges by means of huge grabs, raise it to whatever height may be required, and then release it on to a travelling belt conveyor by which it is carried to the ship's hatchways.

Quite different subjects for models that can be seen in any dock area are the fussy little tank locomotives used for hauling trains of wagons along the quaysides. These powerful little engines are quite easy to model, and a really large Outfit is not essential for their construction, unless of course it is desired to incorporate all their details and fittings.

A subject of a more unusual type is the portable automatic luggage elevator that usually forms part of the equipment of quays where passenger ships are berthed. These are used for transporting heavy luggage from the quay to the ship, or vice-versa, and are self-contained units. They consist of a slotted conveyor belt running in a trough supported by a steel girder structure that is mounted on wheels, so that it can be moved to the appropriate loading point on the quay. Sometimes the conveyor can be extended as necessary, and it is hinged or pivoted to its supporting structure, so that its angle can be varied to suit individual ships. Usually the conveyor and the travelling wheels of the unit are driven from the same electric motor.

Many curious vehicles also are sometimes met in dockland, including those used for transporting giant logs, motor vehicles and massive steel girders.

"'THE AEROPLANE' PICTORIAL REVIEW"

(Temple Press, price 7/6)

Here is a feast indeed for the keen collector of aeroplane pictures. The striking air-to-air and ground photographs of military and civil aircraft range from bombers, fighters, reconnaissance types and trainers to transport and general purpose types, and helicopters. In addition there are portraits of famous personalities of, and scenes of important recent events in, the aeronautical world. In all the Review contains over 280 half-tone illustrations, the pick of a year's pictures in the well-known periodical *The Aeroplane*.

"ABC MODEL RAILWAYS"

By K. N. Jeffries (Ian Allan, 2/6)

This new ABC will appeal both to the newcomer and to the more experienced model railway enthusiast. The author reviews the various scales and gauges most used today, and makes clear the differences that are possible between locomotives and rolling stock of about the same general size. Layouts, the application of prototype practice, and permanent way are considered. Power supply and control systems are dealt with and then we come to engines, coaches and wagons. Useful notes on signalling, lineside effects of various kinds, and hints on operation and the necessary maintenance conclude this attractive booklet. Illustrations are plentiful.

THIS MONTH'S CONTENTS

	Page
Oxygen by the Ton .. .. by the Editor	56
America's Big Stick .. .. by John W. R. Taylor	58
Fun with your Barometer .. .. .. by David Bowen	61
Air-Sea Rescue Devices .. .. by Ward J. Rutherford	66
Tower Cranes .. .. by the Editor	72
Aluminium at Sea .. .. by Ian B. Roy	75
The East Coast Railway of Malaya .. .. by G. B. Beath	86

Air News, 70. Club and Branch News, 101. Fireside Fun, 107. From Our Readers, 85. Hornby Railway Company pages, 96–100. Junior Section pages, 77–84. Meccano Competition, 89, Among the Model-Builders, 90, Model of the Month, 92, What Shall I Build Next? 94. Railway Notes, 68. Shipping Notes, 64. Stamp Collecting pages, 103, 105.

Fireside Fun

Magistrate: "You say you are a locksmith by trade. Then what were you doing in the gambling house when the raid took place?"
Prisoner: "I was making a bolt for the door."

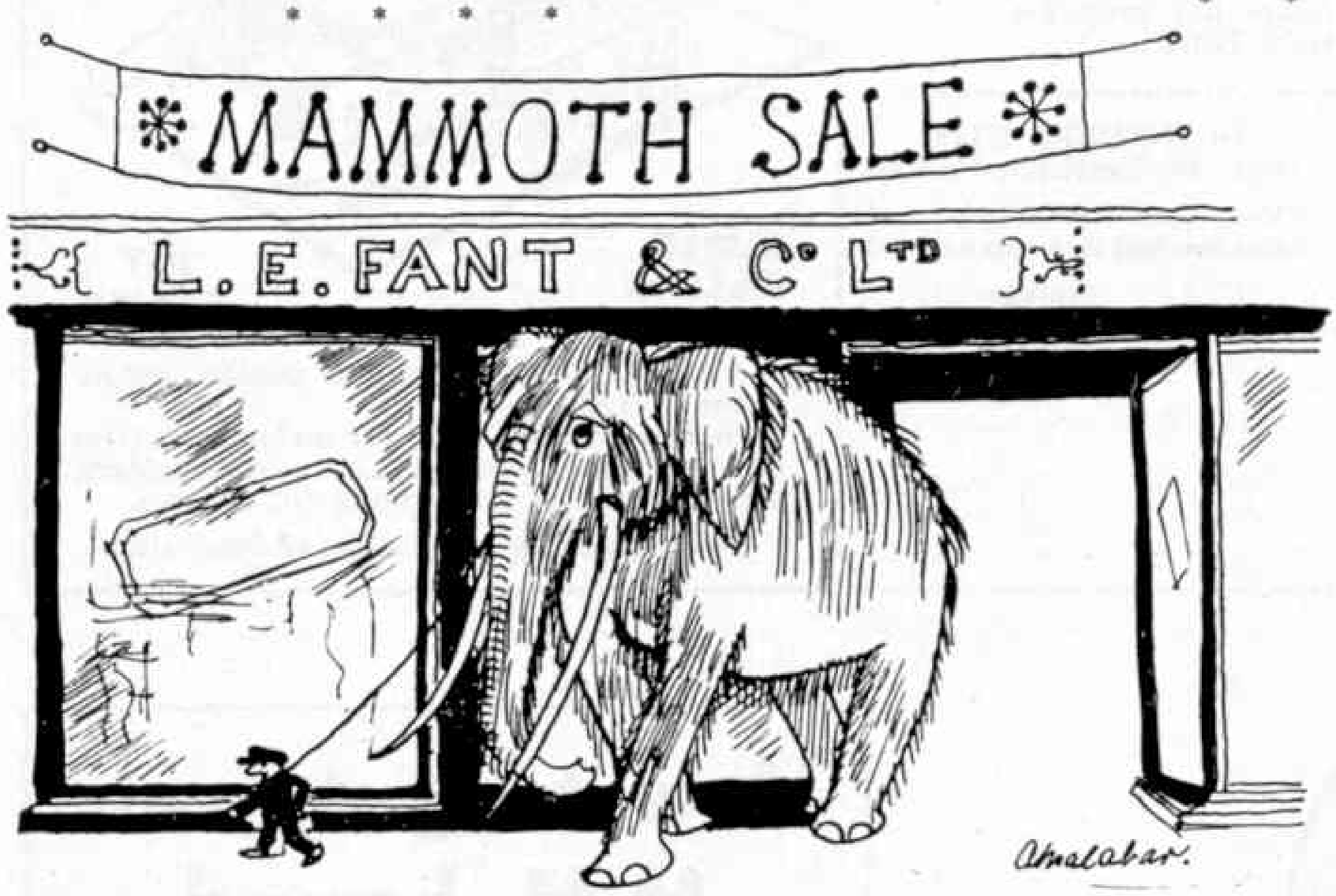
* * * *

Sergeant (to negro sentry): "If anything moves you shoot."
"Yes, Suh—an' if anything shoots I moves."

* * * *

"I once had a beard like yours, and when I saw how terrible I looked, I got it cut off."
"I used to have a face like yours, too, and when I saw how terrible it was, I grew a beard."

* * * *



* * * *

Circus Manager: "All you have to do is look the lion in the eye and show him you are not afraid."
Assistant: "Yes, but the lion would know I was just being deceitful."

* * * *

"Why were you discharged from your last place?" asked the employer.
"For good behaviour," said the applicant.
"What on earth do you mean by that?"
"They took three months off my sentence," said the applicant.

* * * *

A tourist in India was on his way to visit some country friends. The way led through a swamp.
"I say," he asked his elderly guide, "is it true that a crocodile won't hurt you if you carry a torch?"
The guide thought for a moment. "Depends on how fast you carry it, I reckon," he said.

* * * *

"How often did you punch the plaintiff?"
"Once, your honour."
"He says you punched him five times."
"It was one punch, your worship; but, taking his weak constitution into consideration, I gave it to him in five instalments."

* * * *

"Tommy, can you tell me one of the uses of cow-hide?"
"Yes, teacher. It keeps the cow together."

AIN'T IT THE TRUTH

They find fault with the Editor,
And say he should be shot;
That columns are as peppy
As a cemetery lot.
They say he shows poor judgement.
The jokes, they say, are stale,
On upper floors they holler,
On lower floors they wail,
But when the magazine's issued,
(We say it with a smile),
If someone doesn't get one
You can hear him yell a mile.

* * * *

Mistress: "Why is it I've had to wait half an hour for my water?"
Maid: "The first lot took too long to get hot, so I put a fresh lot on."

* * * *

Teacher: "A fool can ask questions that a wise person cannot answer."
Alexander: "No wonder I didn't pass my exam!"

* * * *

Guide: "That is a skyscraper, Madam."
Old Lady: "Oh my! I'd love to see it working."

* * * *

Boxing Instructor: "That was what is called a half-hook."
Novice (rubbing his jaw): "Really? Well you can keep the other half!"

* * * *

BRAIN TEASERS

A CURIOUS SUM

The following is an addition sum. Can you solve it?

	£	s.	d.
Stone			
King			
A Pig of Sorts			
Singer			
Head Wear			
Bicycle			
North and South Poles			
A Trade			
Total:	£26	6	7¾

* * * *

THREE IN A ROW

A gardener planted nine apple trees in such a way that they formed ten straight rows each containing three trees. How were the nine trees arranged?

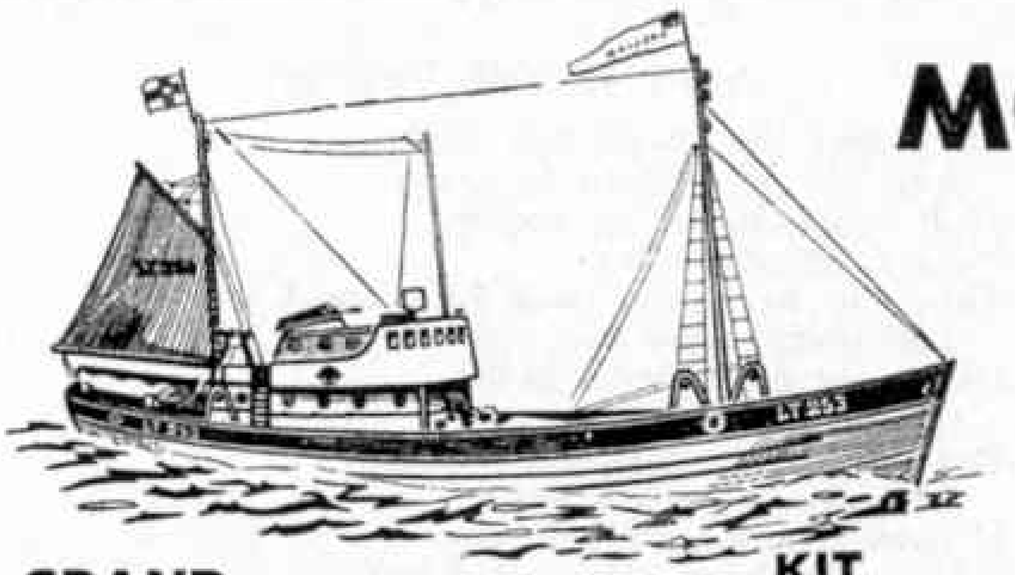
* * * *

ANSWER TO LAST MONTH'S PUZZLE

Five Minute Crossword

The solution to the five minute crossword is shown alongside.

1 S	■	2 H	■	3 U
4 S	5 C	O	6 O	P
■	O	■	U	■
7 B	O	8 U	T	9 S
E	■	N	■	O



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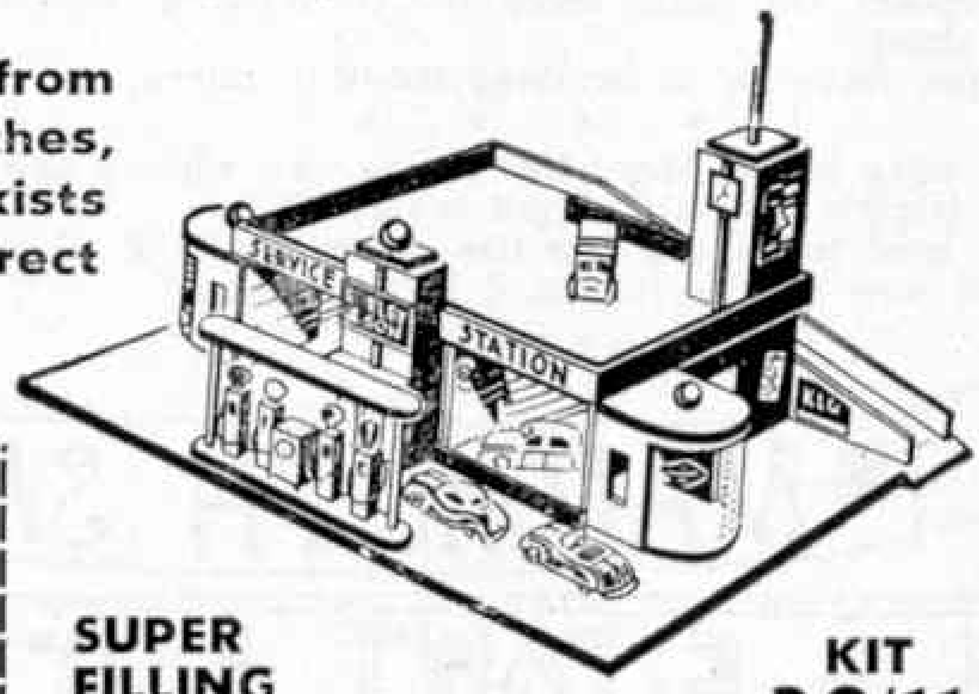

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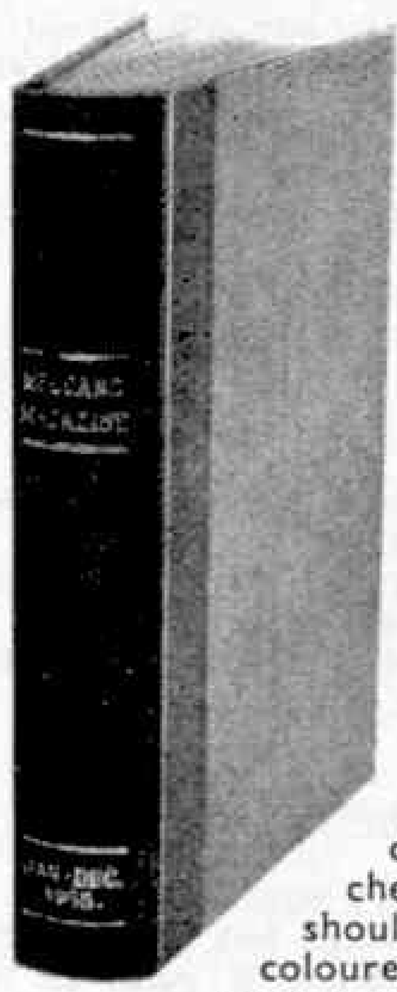

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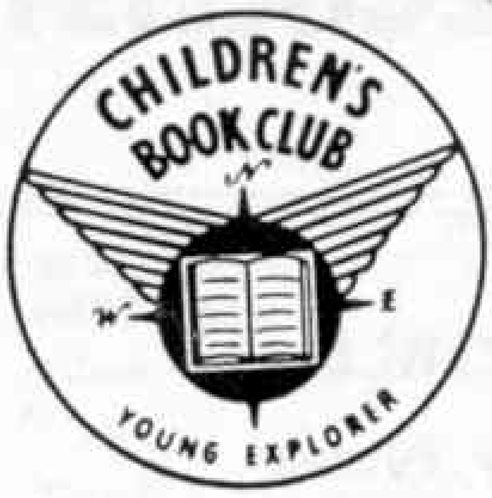

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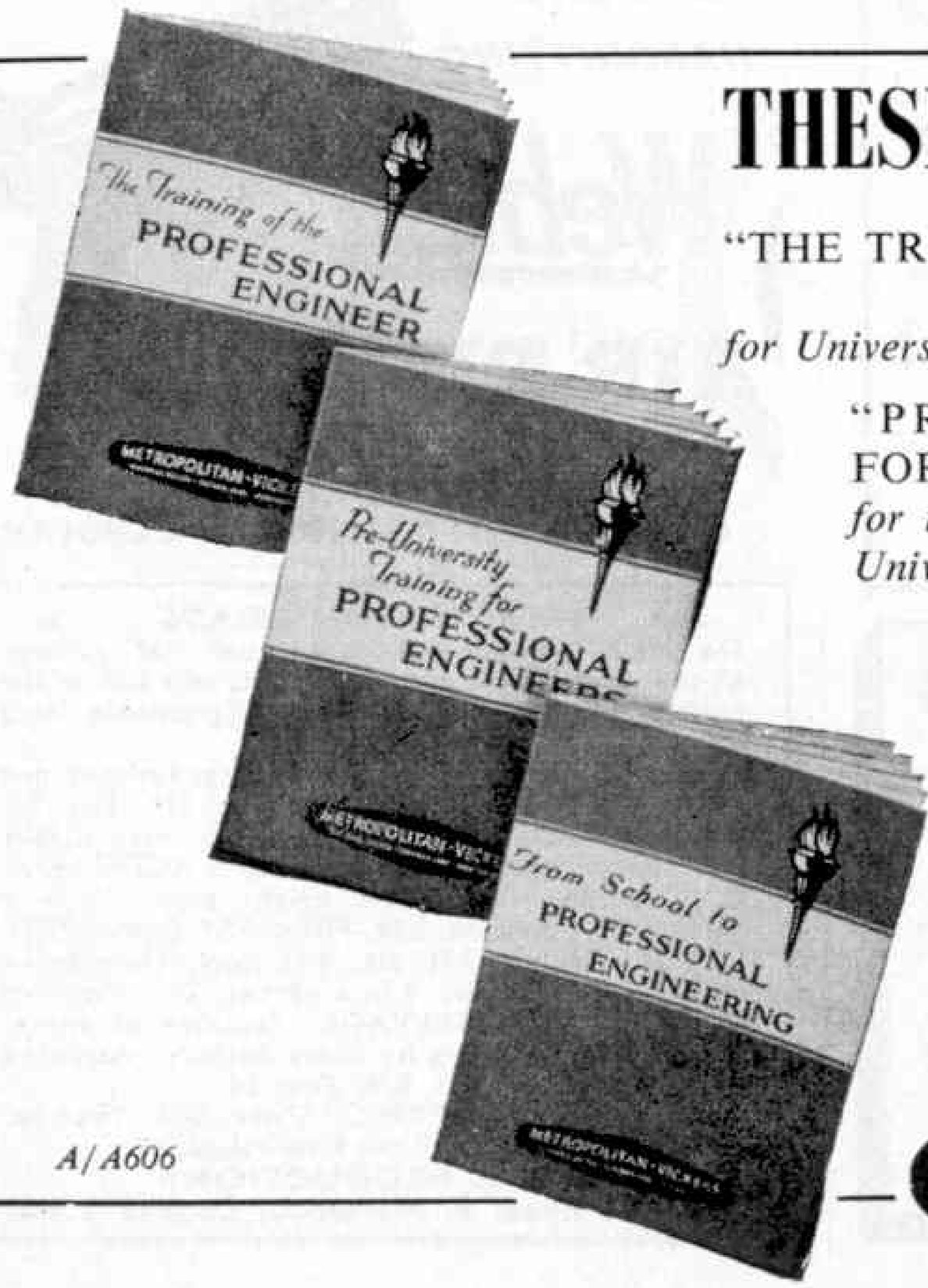

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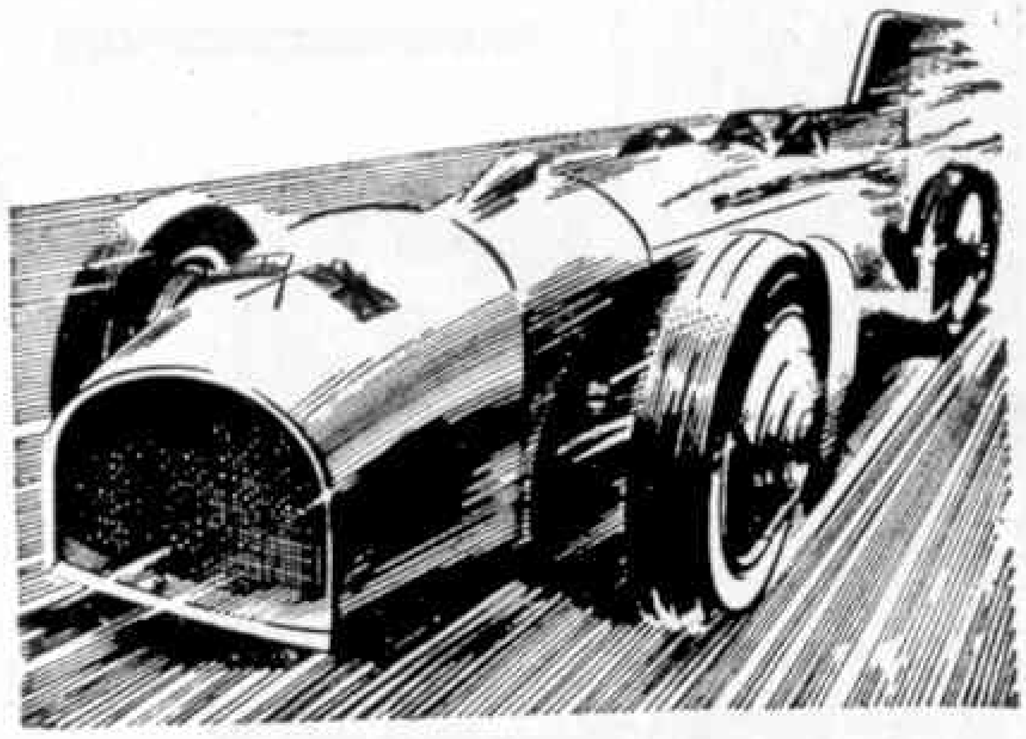

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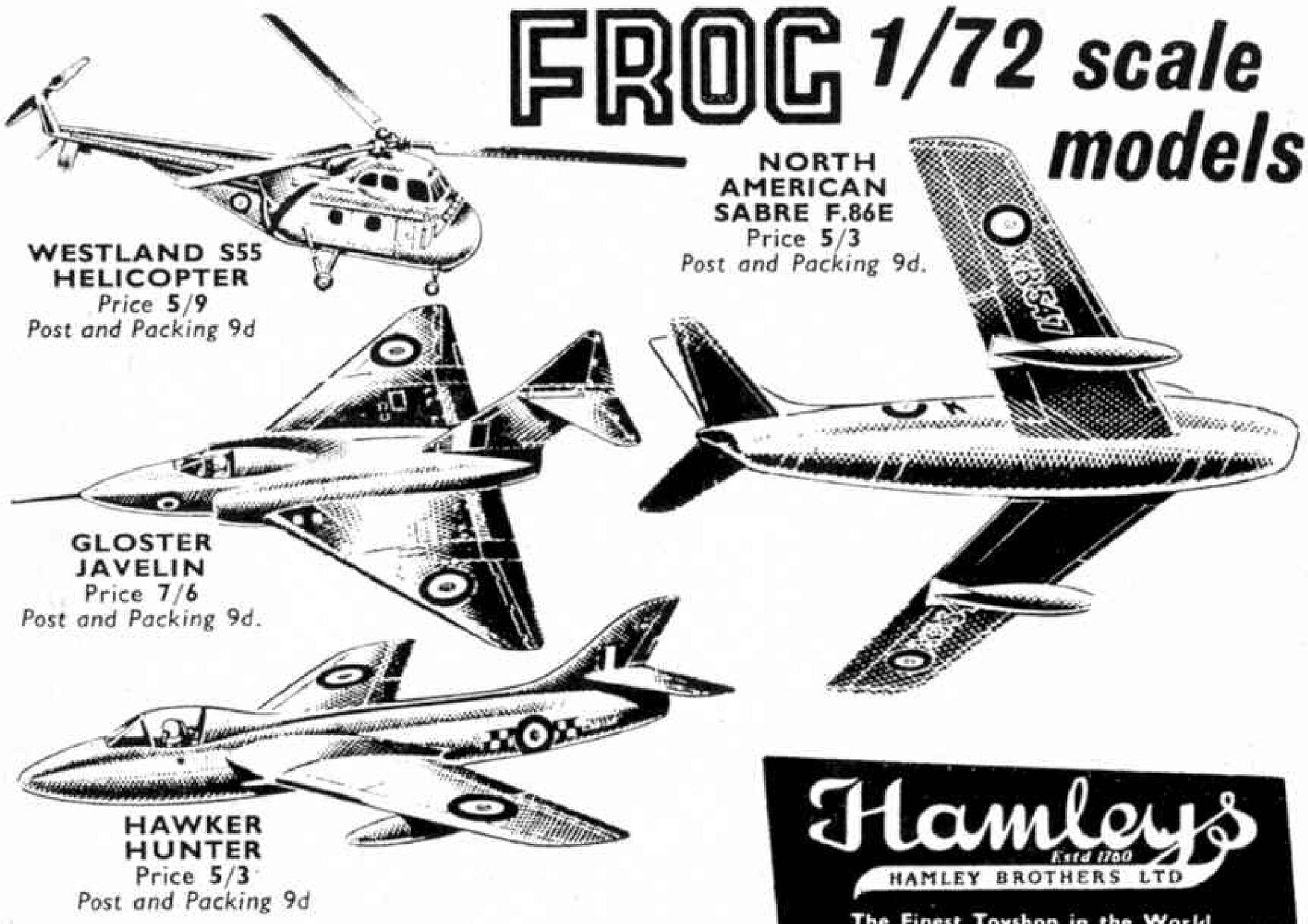

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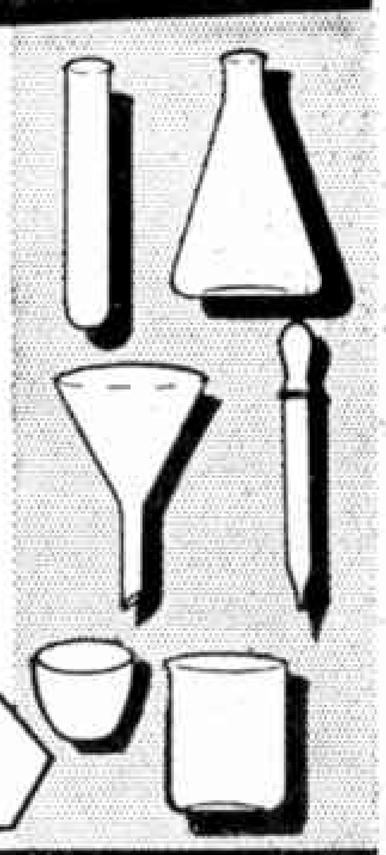

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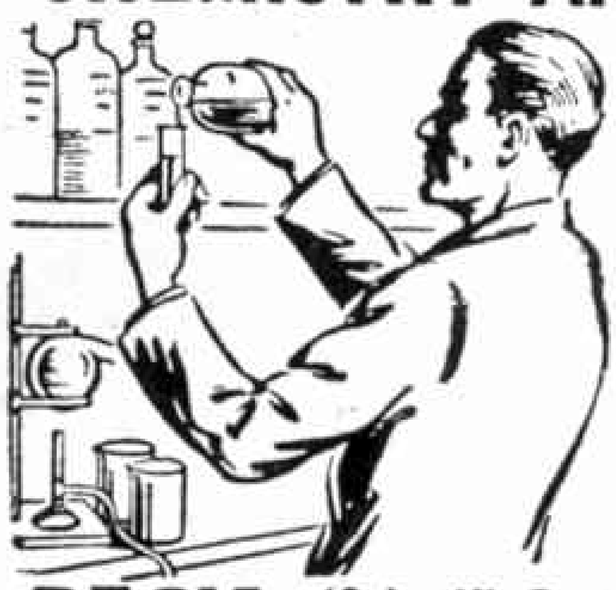

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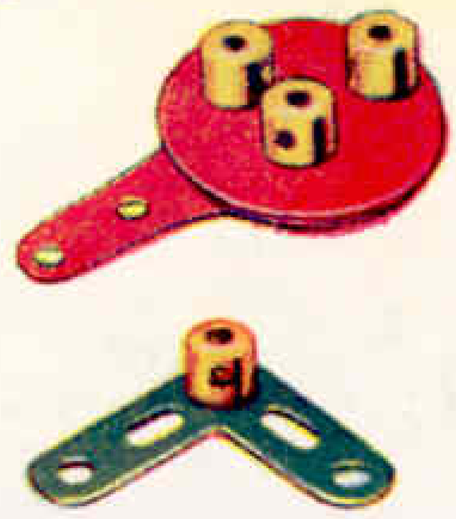

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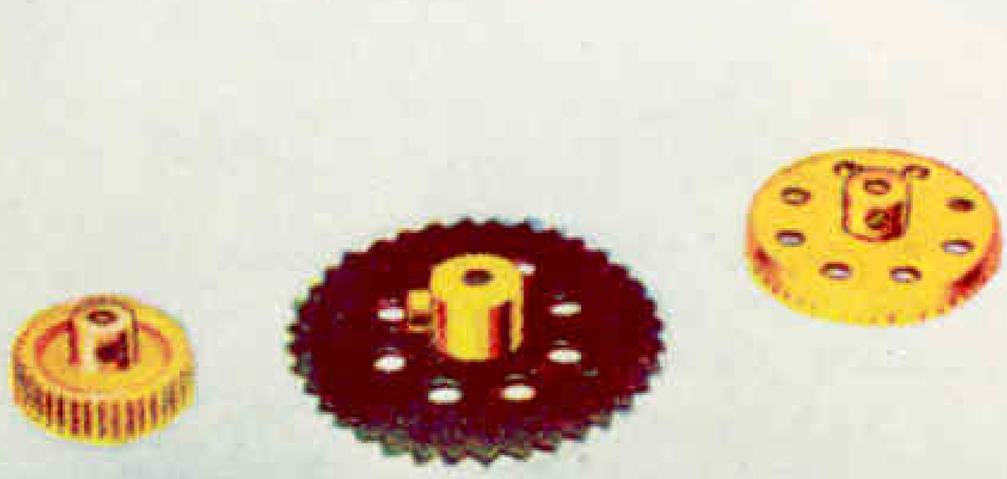

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MODEL OF THE MONTH

CLOTH FOLDING MACHINE

Illustrated in the February 1957 issue of the "Meccano Magazine"

Construction of the Frame

Each side of the frame is made by bolting a 5½" Angle Girder 1, a 7½" Strip 3, a girder 4 made from a 12½" and a 5½" Angle Girder overlapped four holes, and a 7½" Angle Girder 5 to a 12½" Angle Girder 2. The Girders 4 and 5 are braced by 1½" Corner Brackets. A 7½" Angle Girder 6 is bolted between the Girders 1 and 4 as shown, and a 5½" Angle Girder 7 is fixed to the Girder 5 and the Strip 3, and this supports a 7½" Angle Girder 8. A 3" Strip is bolted in the next to top hole of each of the Girders 5 and 8, and the other ends of these Strips are connected to Strip 3 by a ⅜" Bolt. The Bolt secures also an Angle Bracket 9, which is spaced from the Strips by five Washers. A 5½" Angle Girder 10 is connected to the upper end of girder 4 and is strengthened by a Corner Gusset. A Double Bent Strip 11 and a 3½" Strip that supports a 1½" Corner Bracket 12 are attached to the girder 4, and a 3" Strip is bolted between girder 4 and the 3½" Strip to brace the assembly.

The two sides of the frame are connected by 5½" Angle Girders and Strips, a 5½" x 2½" Flanged Plate, a 5½" x 3½" Flat Plate and a 6" Screwed Rod 13.

Driving Mechanism.

An E20R(S) Electric Motor is bolted to the 5½" x 2½" Flanged Plate and a 7/16" Pinion is fixed on its armature shaft. This Pinion drives a 60-tooth Gear on a 2½" Rod mounted in the Motor side-plates, and a 7/16" Pinion on the same Rod meshes with a 60-tooth Gear on a 3½" Rod 14. Rod 14 is supported in the Motor side-plates and it carries a ¾" Sprocket placed outside the frame of the model. This Sprocket is connected by Chain to a 3" Sprocket 15 on an 8" Rod 16 mounted in the girders 4. Two ½" Pinions on Rod 16 drive two 2½" Gears 17 set with their slots exactly in line on a 6½" Rod, which is supported in the girders 4.

Rod 16 carries a ½" fixed Pulley connected by a crossed Driving Band to a 3" Pulley 18 on an 8" Rod 19. This Rod is fitted with a Wood Roller held in place by two Bush Wheels, and it is mounted in Corner Gussets bolted to the Girders 6. A second Wood Roller and two Bush Wheels are placed on a 6½" Rod supported in the end holes of the 3½" Strips and the Corner Brackets 12. The two Rollers should be connected by an endless belt made from thin rubber, flexible emery cloth or brown paper. This bolt helps to feed the cloth into the machine and keeps it clear of the operating mechanism. A guide roller on a 6½" Rod 20 is made from two Sleeve Pieces and three Chimney Adaptors.

An End Bearing is lock-nutted to an arm of the Motor switch, and a 4½" Rod 58 held in it is passed through the frame and is fitted with a ½" fixed Pulley at its upper end.

Details of the Balancing Roller

Two 5½" Strips 21 are connected by two 3½" x ½" Double Angle Strips, with a Washer on each of the bolts to space the Strips further apart, and a 1½" Corner Bracket is bolted to each Strip. The Strips

pivot on a Rod held in the girders 4 by Collars, and a Wood Roller is mounted freely on a Rod supported in the Strips. Two $\frac{1}{2}$" loose Pulleys are placed on a Rod 22, and two similar Pulleys are mounted on Adaptors for Screwed Rods attached by bolts 23. The Pulleys are held in place by Collars. A length of Cord is tied to each Corner Bracket, is passed over the Pulleys and is fastened to a balance weight formed by 15 $4\frac{1}{2}$" Strips.

Adjustable Table.

A $5\frac{1}{2}$" x $3\frac{1}{2}$" Flat Plate 24 is curved to a 6" radius and a $3\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strip is bolted to each end of it. The Double Angle Strips are connected by $4\frac{1}{2}$" Strips 25, each of which supports a $2\frac{1}{2}$" Triangular Plate. A $1\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strip 26 is bolted to the outer face of each Triangular Plate and a 1" x $\frac{1}{2}$" Angle Bracket 27 is fixed to the inner face. A 4" Rod 28 is held in the Triangular Plates by Collars. A Threaded Coupling 29 is screwed on to a bolt passed through each of the Strips 3, and a 5" Rod 30 on each side is held in the Threaded Coupling and in the Angle Bracket 9. The Double Angle Strips 26 must slide freely on the Rods 30.

Two $4\frac{1}{2}$" Strips 31 are fixed by nuts on the Screwed Rod 13 and are held between Collars on a $6\frac{1}{2}$" Rod 32. These Strips support a 3" Rod 33 fitted with two $\frac{1}{2}$" fixed Pulleys. A length of Cord is tied to each of the Angle Brackets 27, is passed over one of the Pulleys on Rod 33 and under a $\frac{1}{2}$" loose Pulley on a Rod 34 mounted in the girders 4. The Cord is tied to a 6" Driving Band 35, which is stretched slightly and is looped over a $\frac{1}{2}$" Bolt in one of the girders 4. These Driving Bands pull the table to its highest position.

The table can be lowered by turning a Rod 36, which has a handle formed by a Threaded Pin in a Bush Wheel. Cord tied to a Cord Anchoring Spring on Rod 36 is passed under Rod 32 and is fastened to Rod 28. A Pawl engages a Ratchet Wheel on Rod 36 and is held in engagement by a short piece of Spring Cord arranged as shown. A Threased Pin 37 in the Pawl, which is mounted on a Pivot Bolt, forms a release handle.

The Folding and Locking Mechanism

At each side a $2\frac{1}{2}$" Triangular Plate 38 is attached to a $7\frac{1}{2}$" Strip 39, which is fixed to a Crank on the end of Rod 32. Two $5\frac{1}{2}$" Slotted Strips 40 are connected together by bolts through their slotted holes and are lock-nutted to the Strip 39 and to the Gear 17. The Slotted Strips on each side must be adjusted to exactly the same length. A $1\frac{1}{2}$" Rod is passed through each of the Triangular Plates 38 and is fitted with a large Fork Piece 42 and a Crank 43. Two Obtuse Angle Brackets are fixed to the lugs of each Fork Piece and these support $5\frac{1}{2}$" Angle Girders 41 and 44. A built-up strip 45, made from a $3\frac{1}{2}$" Strip and a $5\frac{1}{2}$" Slotted Strip, is lock-nutted to Crank 43 and is passed through a Slide Piece 46. The Slide Piece is fixed on a $1\frac{1}{2}$" Rod mounted in the girder 4 and in Double Bent Strip 11. Bolts 47 and 48 in the strip 45 serve as stops and limit the sliding movement of the strip.

A $3\frac{1}{2}$" Rack Strip 50 is bolted to a $4\frac{1}{2}$" Flat Girder 49, which is attached by bolts to two Threaded Couplings 51 on a Rod 52. Each end of Rod 52 is fitted with a Crank 53, which carries a $\frac{1}{2}$" loose Pulley 56 on a $\frac{3}{8}$" Bolt. A Crank 54 is fixed on Rod 52 inside the frame, and a Tension Spring 55 attached to the Crank is stretched slightly and is bolted to the Girder 8. The cloth locking assembly described above is duplicated at each end of the cloth folding table.

Adjusting the Machine

The mechanism should be adjusted with a length of cloth in

position. Turn the Gears 17 towards the rear. As the Triangular Plate 38 bears against the Pulleys 56 it will start to raise the mechanism that holds the cloth on the table, and the Angle Girder 44 will turn upward. The mechanism must be set so that when strip 45 is prevented from moving by the bolt 47, the Girder 41 passes under the Rack Strip 50 of the inner locking assembly. As the Gears 17 are rotated the Angle Girder 41 will be drawn from underneath the Rack Strip 5 0, just as the Spring 55 returns the mechanism to press the Rack Strip against the cloth. Care must be taken to prevent the Girders 41 and 44 from touching the Rack Strips.

Operation of the Model

A length of cloth 3" wide should be used. It is passed between the feeding rollers, over the balancing roller and between the Angle Girders 41 and 44. The cloth is led over one end of the table and is clamped in place by the Rack Strip 50 at the same end. When the machine is set in motion the cloth will be carried to each end of the table alternatelyby the Angle Girders 41 and 44. At each end the Rack Strip 50 is raised by the mechanism to allow the cloth to pass beneath it, and then returns to clamp the cloth in place as the Girders 41 and 44 return to the opposite end of the table. To remove the cloth from the machine after folding, the table is lowered by operating the hand wheel 57.

PARTS REQUIRED

4	of	No.	1b	5	of	No.	24	1	of	No.	94
5	"	"	2	2	"	"	26	1	"	"	95b
20	"	"	2a	2	"	"	26c	1	"	"	96a
4	"	"	3	2	"	"	27c	2	"	"	103c
6	"	"	4	2	"	"	27d	3	"	"	106
4	"	"	8	6	"	"	35	4	"	"	108
6	"	"	8b	166	"	"	37a	2	"	"	110
13	"	"	9	144	"	"	37b	4	"	"	111a
2	"	"	12	64	"	"	38	10	"	"	111c
2	"	"	12b	1	"	"	40	2	"	"	115
4	"	"	12c	2	"	"	43	2	"	"	116
2	"	"	13a	2	"	"	45	2	"	"	125
10	"	"	14	2	"	"	48	10	"	"	133
2	"	"	15	4	"	"	48b	1	"	"	147
2	"	"	15a	2	"	"	50	1	"	"	148
1	"	"	15b	1	"	"	52	2	"	"	163
1	"	"	16	2	"	"	52a	4	"	"	164
1	"	"	16a	6	"	"	55	1	"	"	166
1	"	"	16b	1	"	"	58	2	"	"	173a
2	"	"	18a	29	"	"	59	1	"	"	176
2	"	"	18b	10	"	"	62	2	"	"	186a
1	"	"	19b	6	"	"	63c	1	"	"	186c
10	"	"	23	4	"	"	76	1	E2OR(S) Electric Motor.		
4	"	"	23a	1	"	"	79a				