VOL. XLI. No. 10 OCTOBER 1956

MECCANO MAGAZINE

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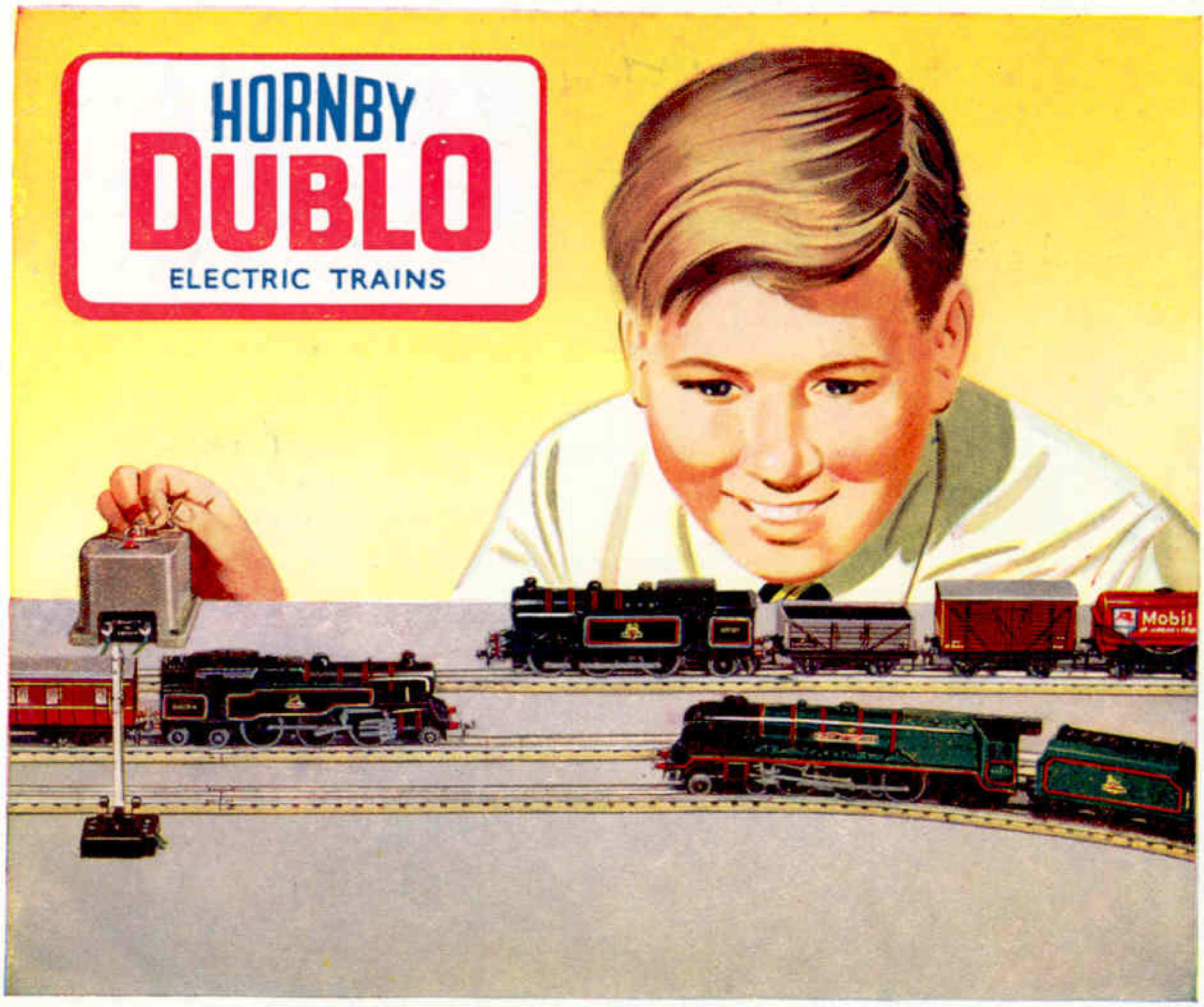

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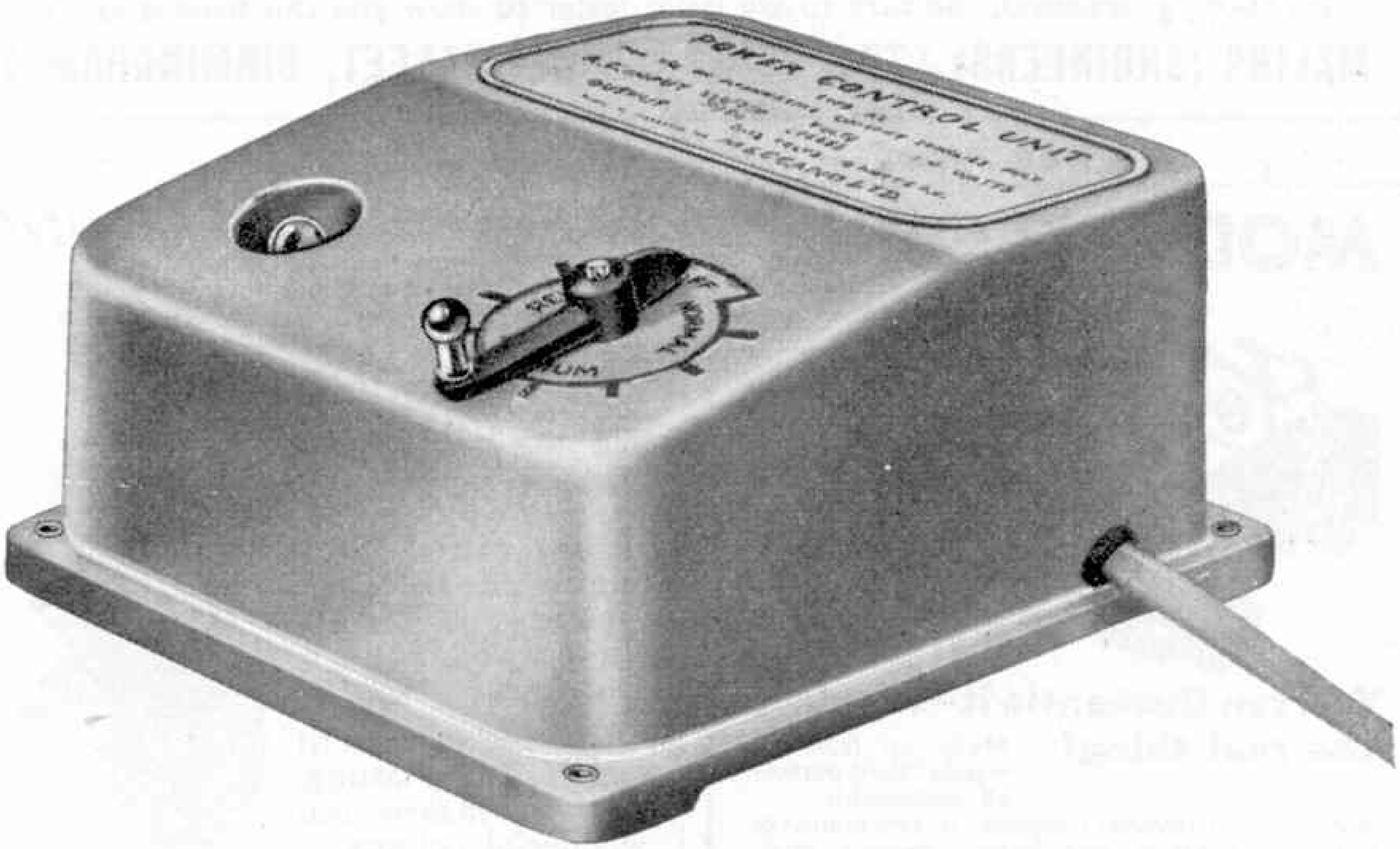

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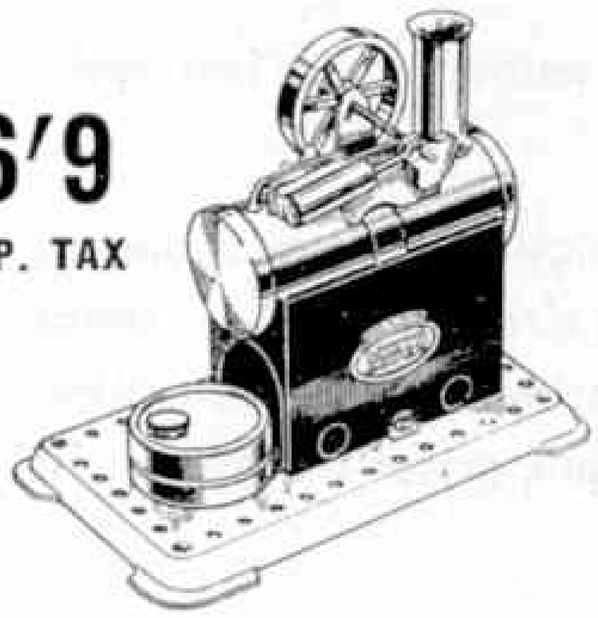

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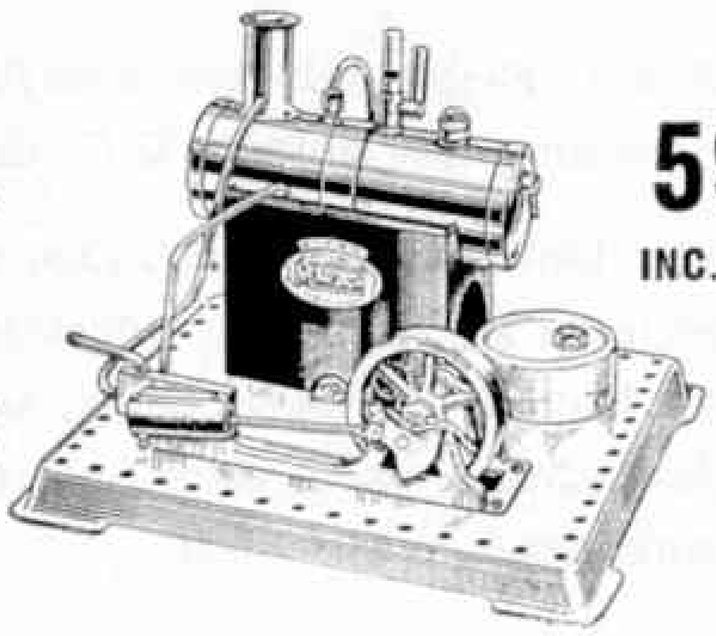

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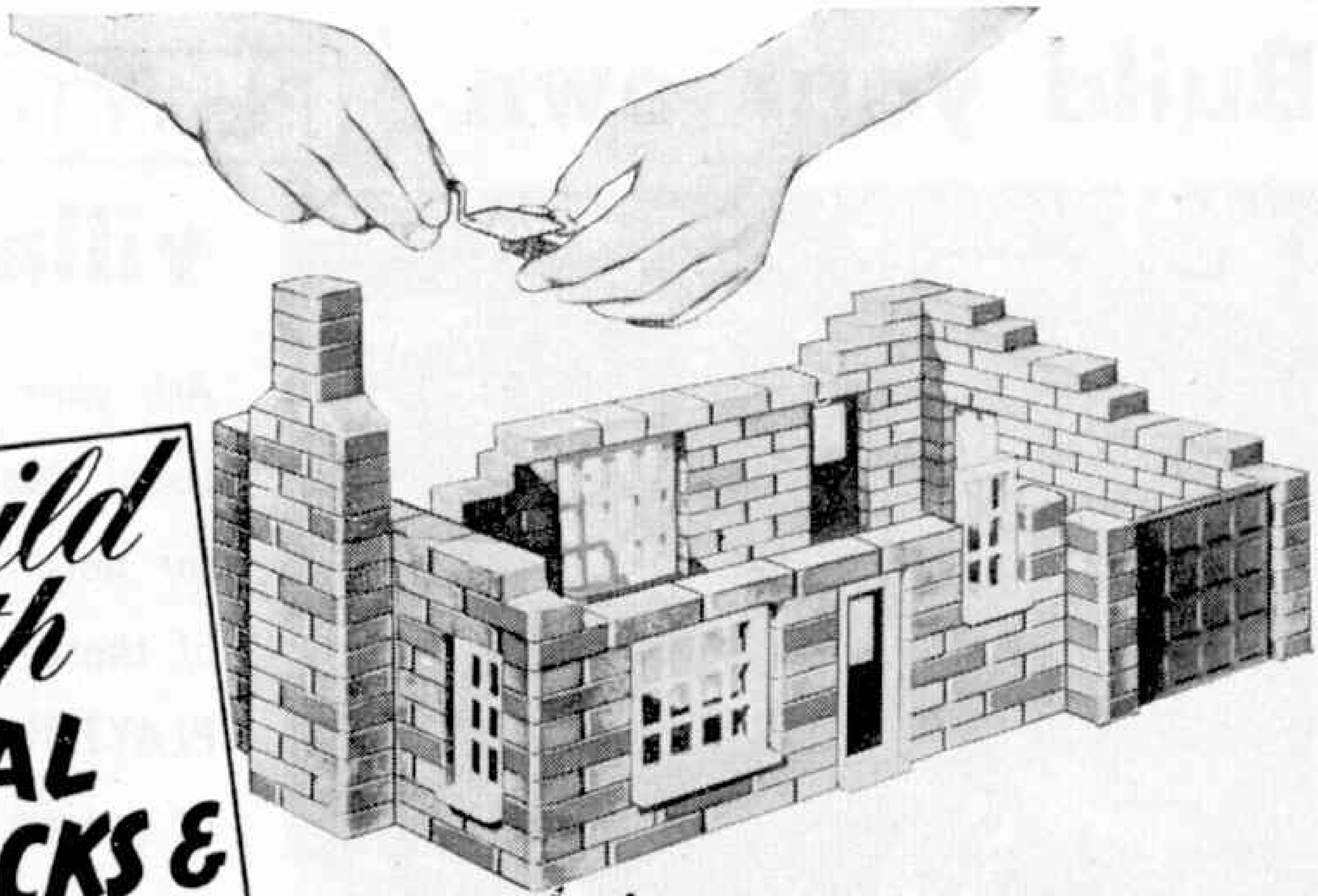

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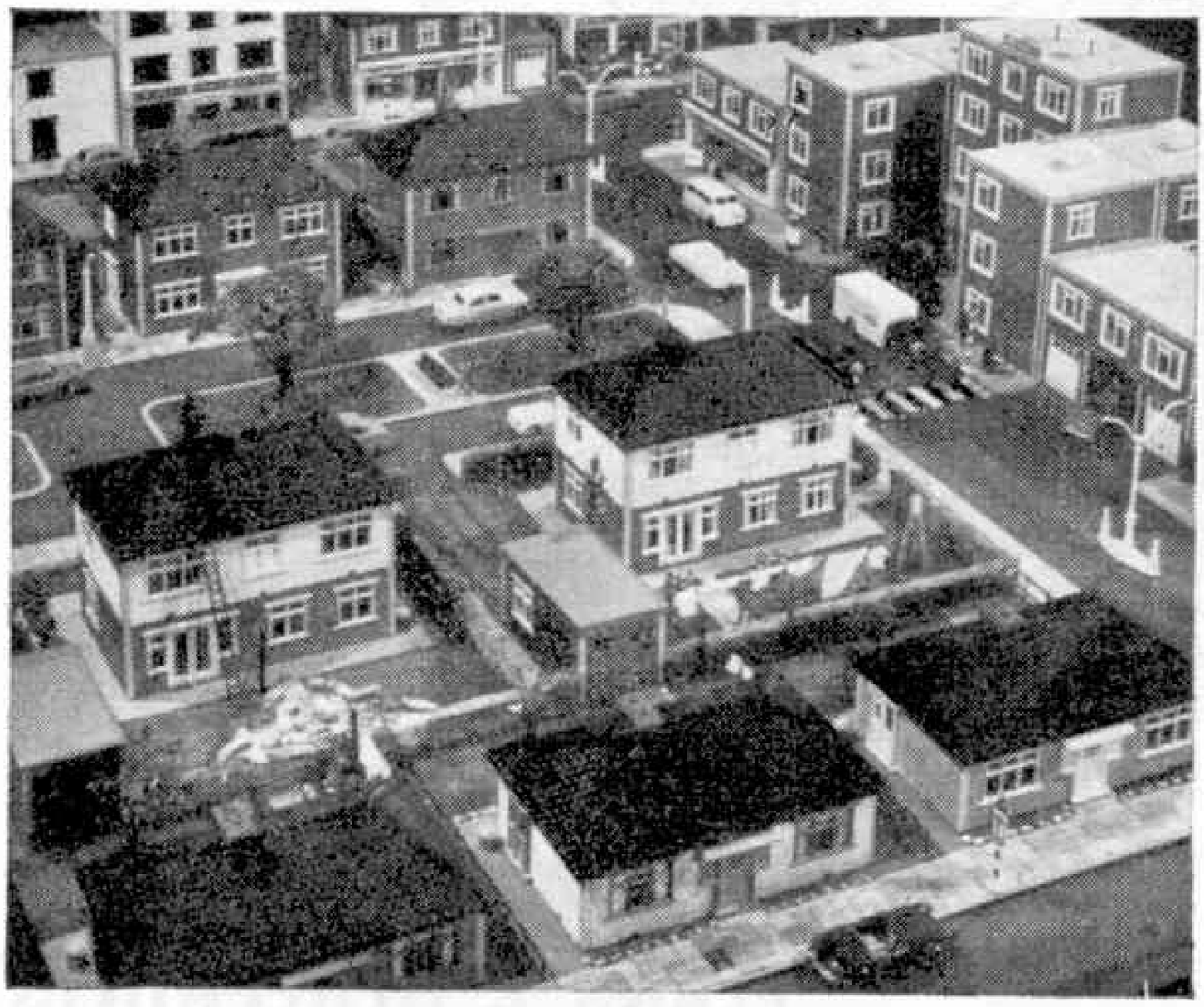

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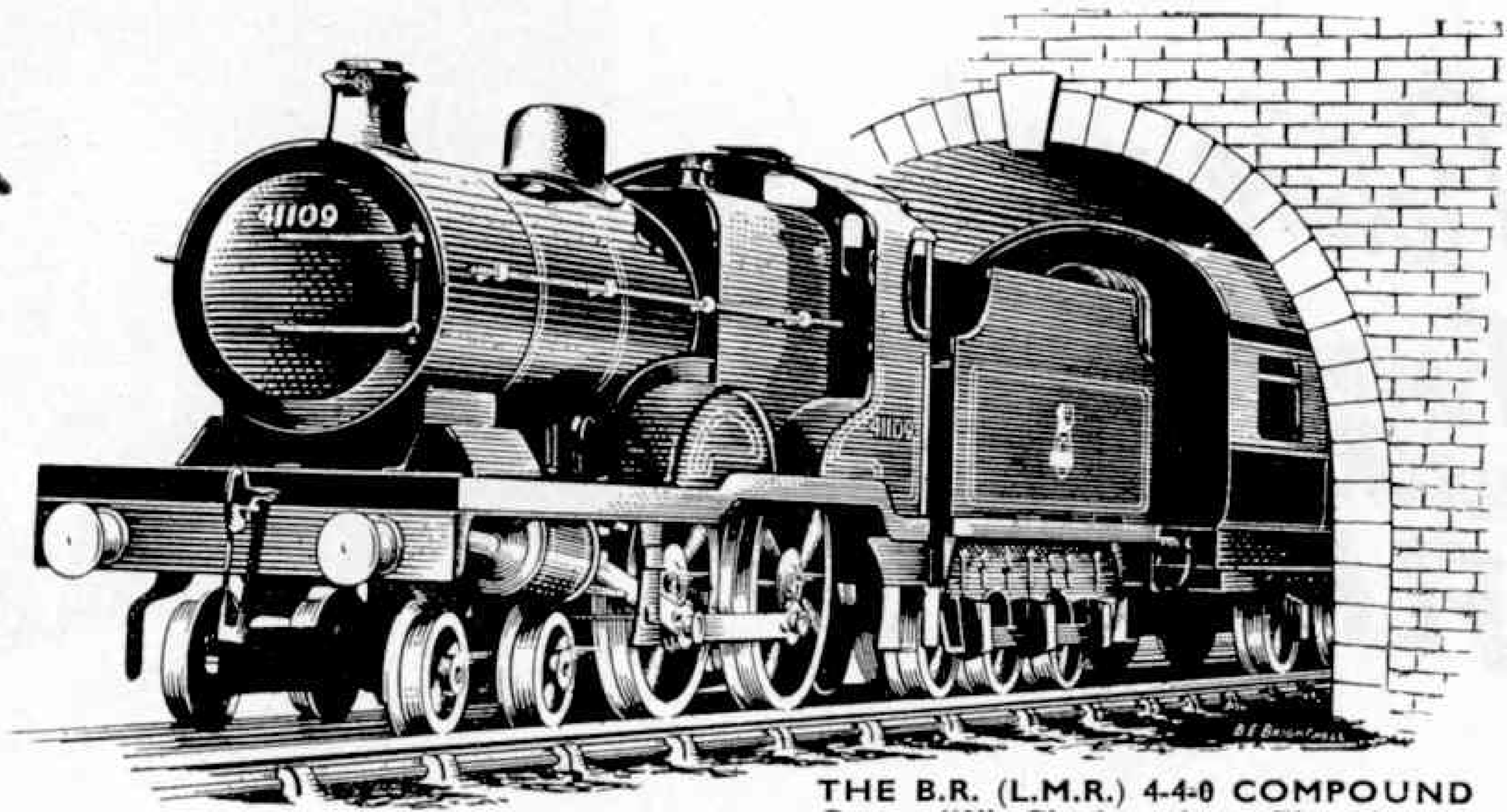

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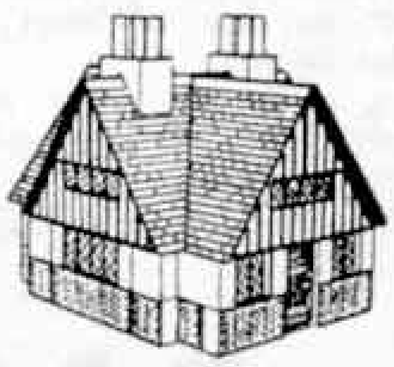

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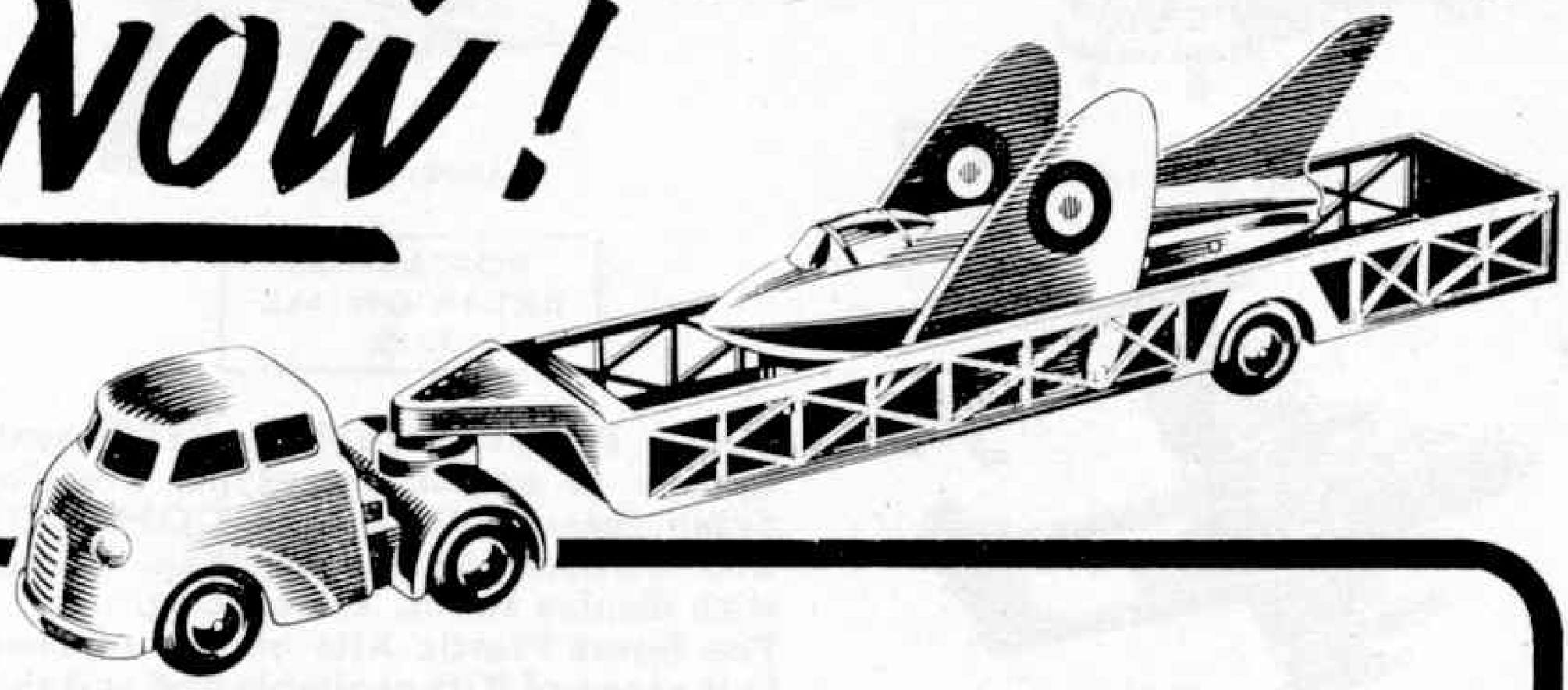

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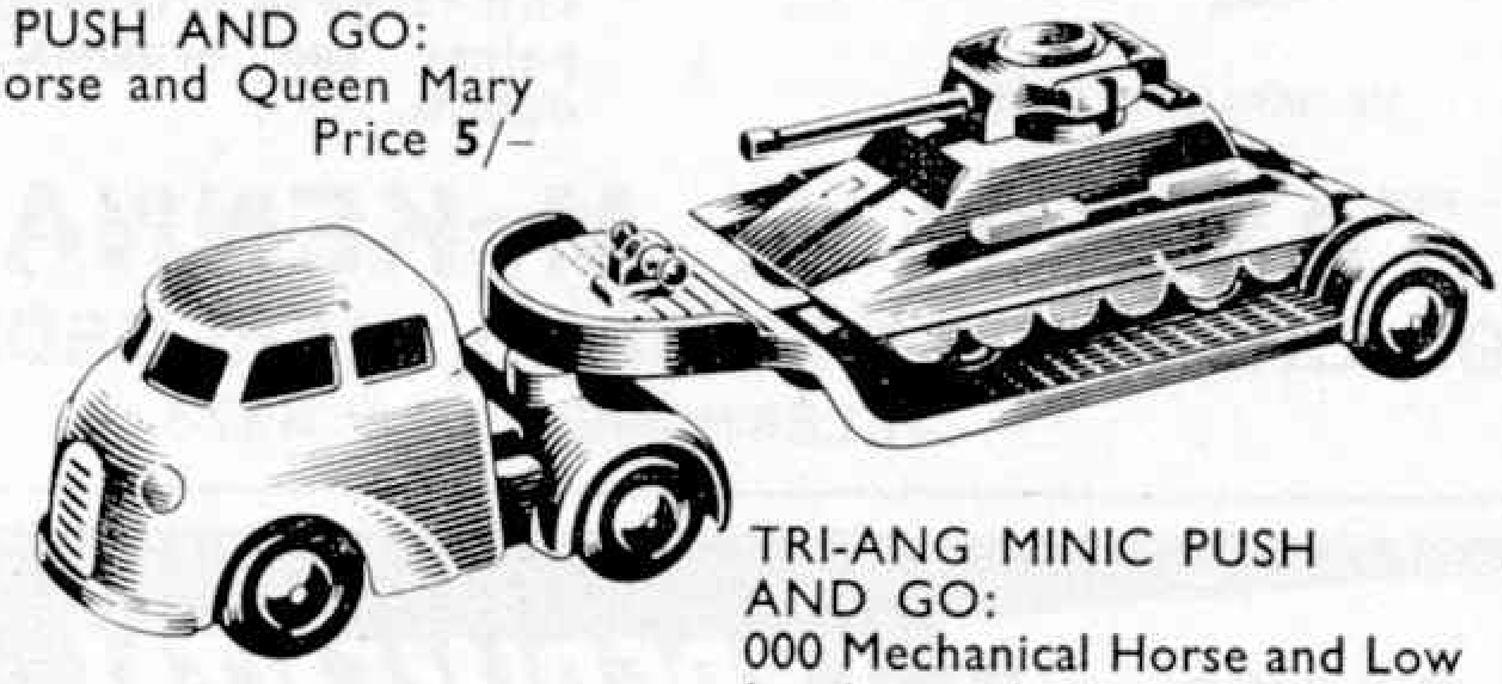

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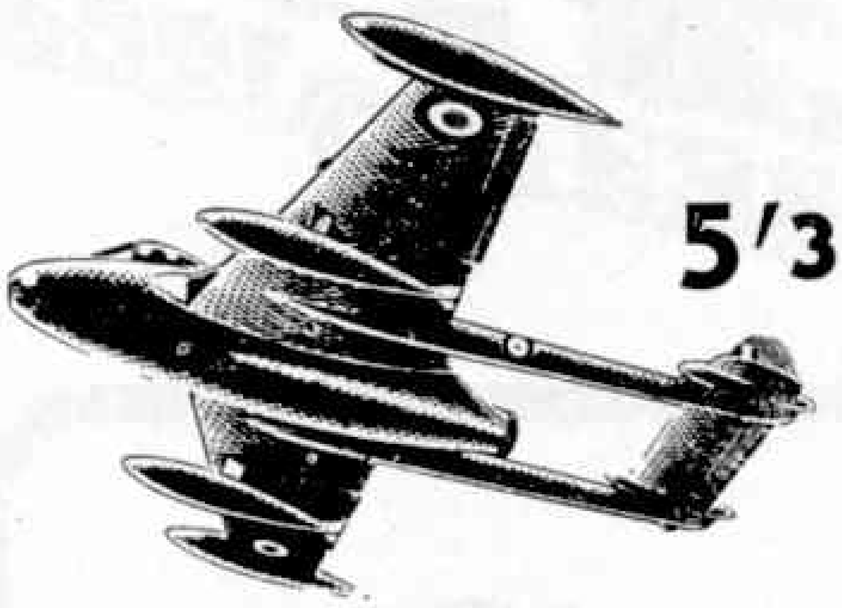

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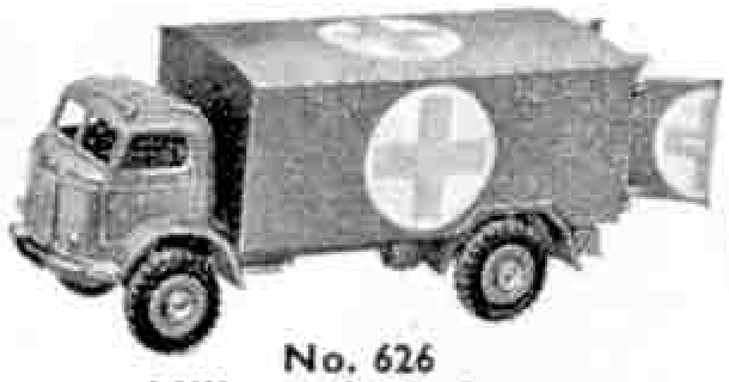

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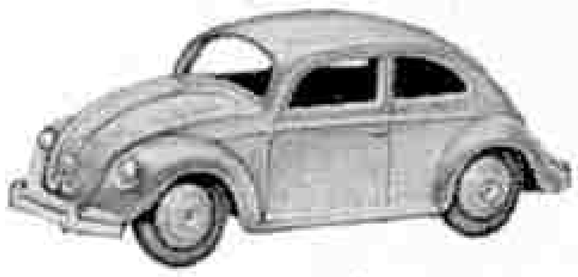

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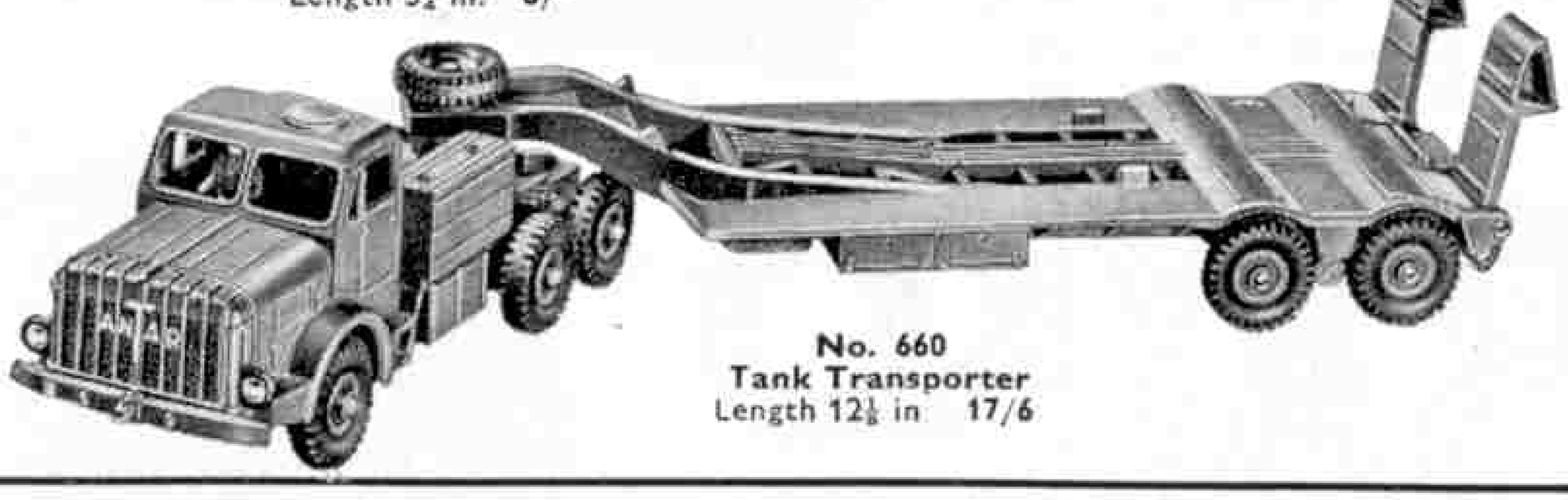

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Editorial Office:
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EDITOR : FRANK RILEY, B.Sc.

Vol. XLI
No. 10
October 1956

A Joyful Occasion

Next month I have a real novelty for you—an article on the re-opening of a railway line. There would be nothing strange in an article dealing with the closing of such a line, for branch lines have been closed right and left all over Great Britain, and in Northern Ireland. The explanation of course always is that the money coming in is not enough to pay expenses.

The driver's name now figures on the side of the cab of some locomotives of the Eastern Region. Here is the name plate of Driver P. E. Heavens on a locomotive hauling "The Elizabethan" from King's Cross to Edinburgh.

The line with which next month's article is concerned was one of these and was closed well over a year ago. It connects East Grinstead and Lewes, in Sussex. It does not pass through an industrial area, but runs through a beautiful countryside that has earned it the delightful name of the Primrose and Bluebell line. Passengers can see fishermen trying their skill on the Sussex Ouse, and the surroundings teem with animals and birds. There is a sporting interest about the line, too, for it runs not far away from Sheffield Park, the scene of the first unofficial Test Matches between an Australian team and an England Eleven. The latter was selected by Lord Sheffield. I should think that the Primrose and Bluebell line did very good business when these games were played, but alas, that was a long time ago.

And now this line has achieved what may be a record by starting a service again. It seems that in this case there was a definite injunction in the Act of Parliament that brought it into existence that at least four trains a day should be run on the line, and this must go on until another Act cancels it.

So the weed killer was brought out, the coaches were cleaned and polished up to a more than usual extent, and a company of enthusiasts rode in the first restored train. One of them has written his impressions of this triumphal ride and it is this that will appear in next month's *M.M.*

The Editor

Acorn Bank

Britain's Deepest Opencast Coal Mine

By the Editor

The first task at Acorn Bank was to form what is known as a "box cut" 3,200 ft. long above the deepest seams. The cut's greatest depth is 230 ft.

IT has been remarked that Great Britain is an island built on coal. There is certainly plenty of coal under the surface in this country, and it is extracted in greater quantity than in any other country in Europe. In 1954 nearly 228 million tons of coal were dug out of the earth in the United Kingdom, the nearest approach to this for a European country being the 128 million tons mined in Western Germany.

Until the last war practically all the coal mined in Great Britain had been dug out by deep mining, the miners and all their equipment being lowered down shafts, and digging their way outward along underground roadways, and the coal produced being transported to the shaft bottom to be hoisted to the surface. The need for as large an output as possible in wartime led to the introduction also of opencast mining, a plan then new to this country, but one that had already been followed for a considerable time in the United States and in Germany. There giant excavators of various types had been developed for this form of coal mining in which the earth, or overburden, as it is called, over a coal seam is dug out to expose it, so that the coal itself can be mined directly.

The first coal seams worked in this way in the United Kingdom were only up to 40 or so feet below the ground, but in the last few years opencast workings have gone much deeper. There are several of these where an overburden 200 feet in depth has been removed in order to get at the coal, and recently opencast working has begun at Acorn Bank, in Northumberland, on a site where the coal seams to be worked are up to 230 feet in depth. This is certainly deep, as a glance into the gigantic pit seen in the illustration on this page will show. This pit is the first that was dug at Acorn Bank in order to reach the black diamonds buried there.

The gigantic cut at Acorn Bank could hold quite a good sized building without any part of this appearing above the surface. The cross on St. Paul's cathedral would stand up about 135 feet above the surface if the cathedral itself were sunk in the excavation. But there is a further opencast mine in prospect, at Westfield in Fifeshire, that will be deep enough almost to hold two St. Paul's cathedrals, one placed on top of the other, for there it is expected that a coal seam 700 feet below the surface will be worked by this method.

The Acorn Bank site is already being worked at restricted output, but will produce coal at an average of 16,500 tons a week, so that it will yield over five million tons of coal in the next seven years, which is the life the pit is expected to have. The experience gained in this deep working will help to make the even

deeper opencast mining at Westfield and other sites possible with high efficiency. The National Coal Board expect to raise 15 million tons a year in this way, but there seems no reason why this output should not be doubled if full advantage is taken of the excavators and other machines now available.

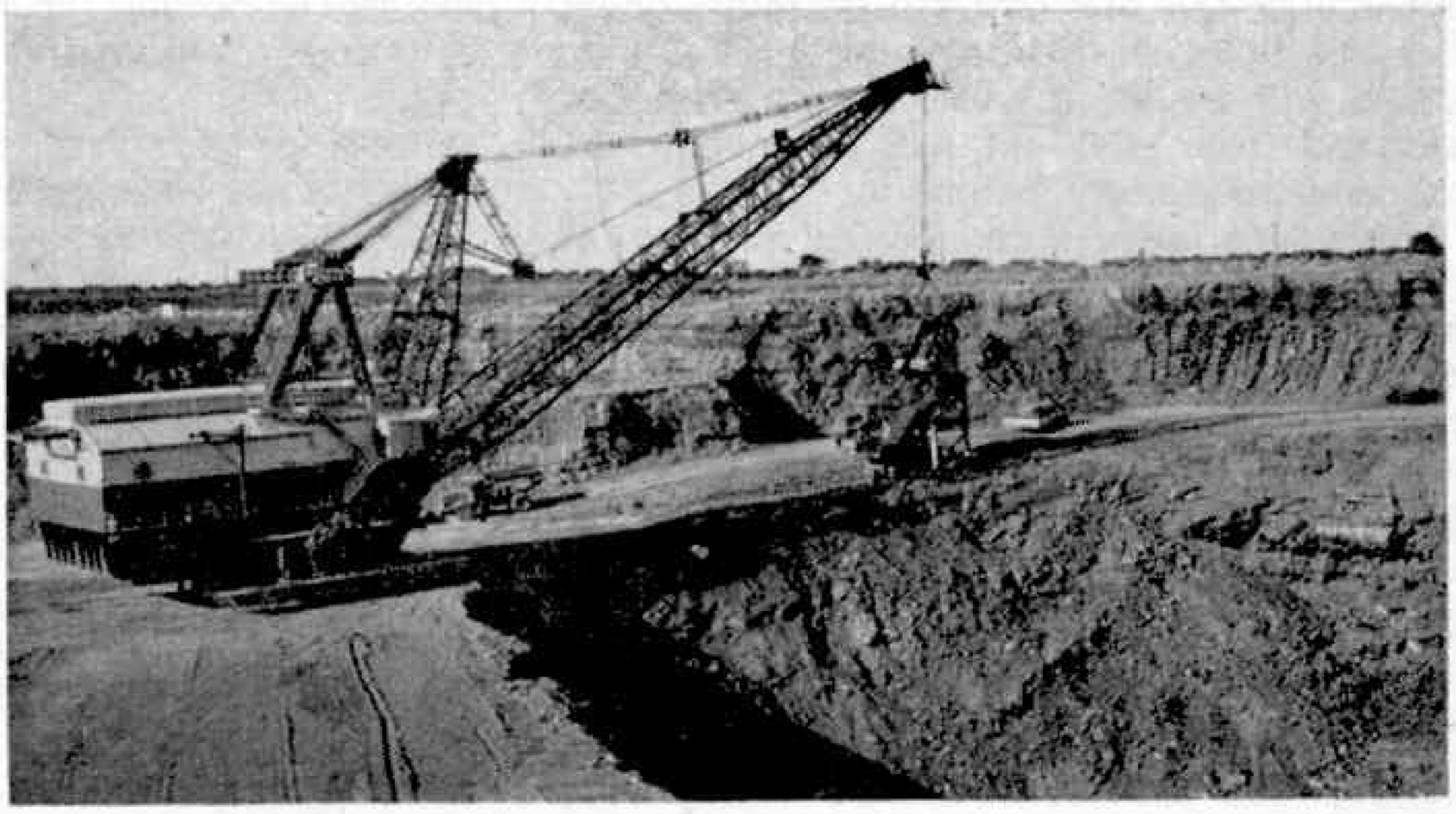
In working the Acorn Bank site 95 million cubic yards of overburden will be moved. Here is a picture showing the direct loading of 22-ton Euclids by 22 cubic yard buckets on a dragline excavator.

Acorn Bank is about a mile south of Bedlington, and covers 440 acres of agricultural land. There is certainly plenty of good coal on the site. The three coal seams to be worked have the picturesque names of High Main, Top Grey and Bottom Grey. The Bottom Grey has four layers, or leaves, separated by bands 6 in. to 9 in. in thickness. The top and bottom of these are of solid coal 3 ft. 1 in. and 2 ft. 10 in. in depth respectively, and the middle two are 8 in. thick. The Top Grey has two leaves, averaging 2 ft. 7 in. in thickness, with a 2½ in. band between them, while the High Main is 3 ft. 3 in. thick, with a thin band of shale in it.

The seams are not conveniently flat, and the spacing between them varies considerably. Between the High Main and Top Grey there is an interval of 40 ft. in the west, which decreases rapidly to 6 in. in the east. That between Top Grey and Bottom Grey is only about 15 ft. along the northern boundary of the site, but reaches 120 ft. in the south-east. The greatest depth of the Bottom Grey is at the north-east corner of the site, and it is there that the actual covering of soil and rock is 230 ft. in depth.

Opencast coal mining prevents a large area of land from being used for growing crops, so whenever it is started on any site the material dug out has to be returned after the coal has been extracted, with the soil on top so that farming can begin again. Something like seven years seems to be necessary before the returned soil is fully productive again, although grazing can begin earlier, but there is the advantage that the top soil can be freed from stones before it is put back. Another interesting feature is that in many instances the new surface can be given better gradients than the old one.

At Acorn Bank the ground has to be restored for farming progressively, that is as the working proceeds, and not all at



Here is the Bucyrus-Erie 1150B dragline used for stripping the overburden at Acorn Bank.

once at the end of the digging. For this reason it was decided to begin by excavating the gigantic box cut, as it is called, seen in the first illustration to this article. The cut is about 3,200 ft. long, which is considerably more than half a mile, and about 100 ft. wide, and its greatest depth is 230 ft.

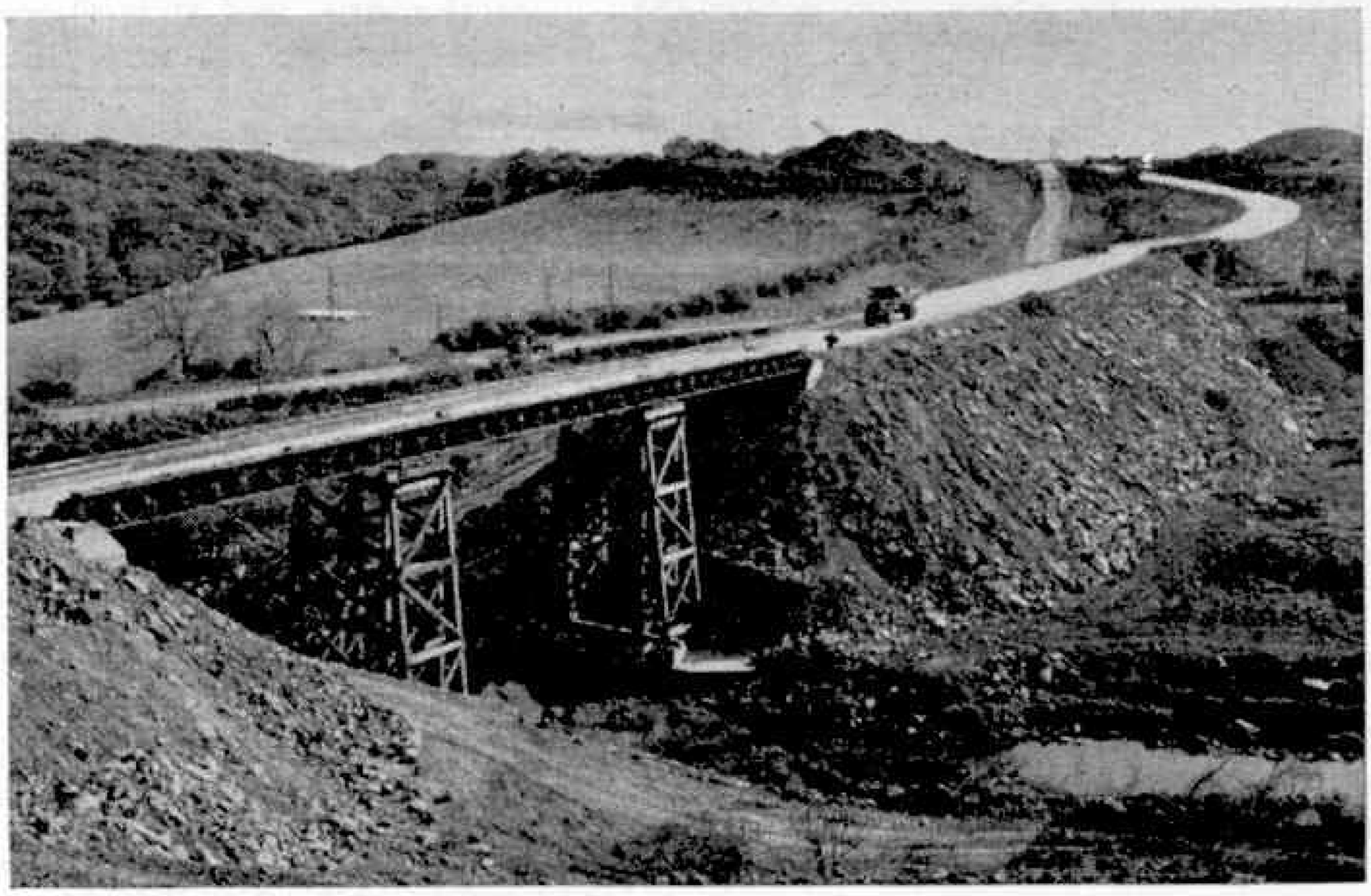
A more dramatic idea of the size of this gigantic gash is given by the picture of it on page 496, in which the huge vehicles used to carry away spoil give some idea of scale. They look really tiny at the bottom of the cut. In making it about nine million cubic yards of material had to be removed. Some of this was used for restoring another opencast site not far away, and the rest was stored on the Acorn Bank site for use in filling the final cut when working is completed.

In covering the whole of the site cuts parallel to the box cut will be made when the coal beneath this has been worked out. These will be 80 ft. wide, and overburden and soil from each cut will be used to fill the one imediately before it.

Although at Acorn Bank working is carried out at a much greater depth than in the earliest examples of opencast mining, the cost is practically no higher than it was then, because the enormously powerful excavating machines now employed have very much larger capacity than those first used. It is indeed the possession of these modern excavators that has made possible this great extension of the system.

Let us see how the working is being carried out at Acorn Bank. In opening the box cut top 12 inches of soil and 3 feet of the boulder clay under it were removed by a fleet of five Tournapulls and a Euclid Scraper. Then came the removal of overburden down to a line about 140 feet above the bottom coal seam and parallel to it. This was carried out by three Ruston-Bucyrus electric shovels, each of five cubic yards capacity. The remaining overburden was then removed by two giant draglines, which had booms of 180 feet and 215 feet respectively.

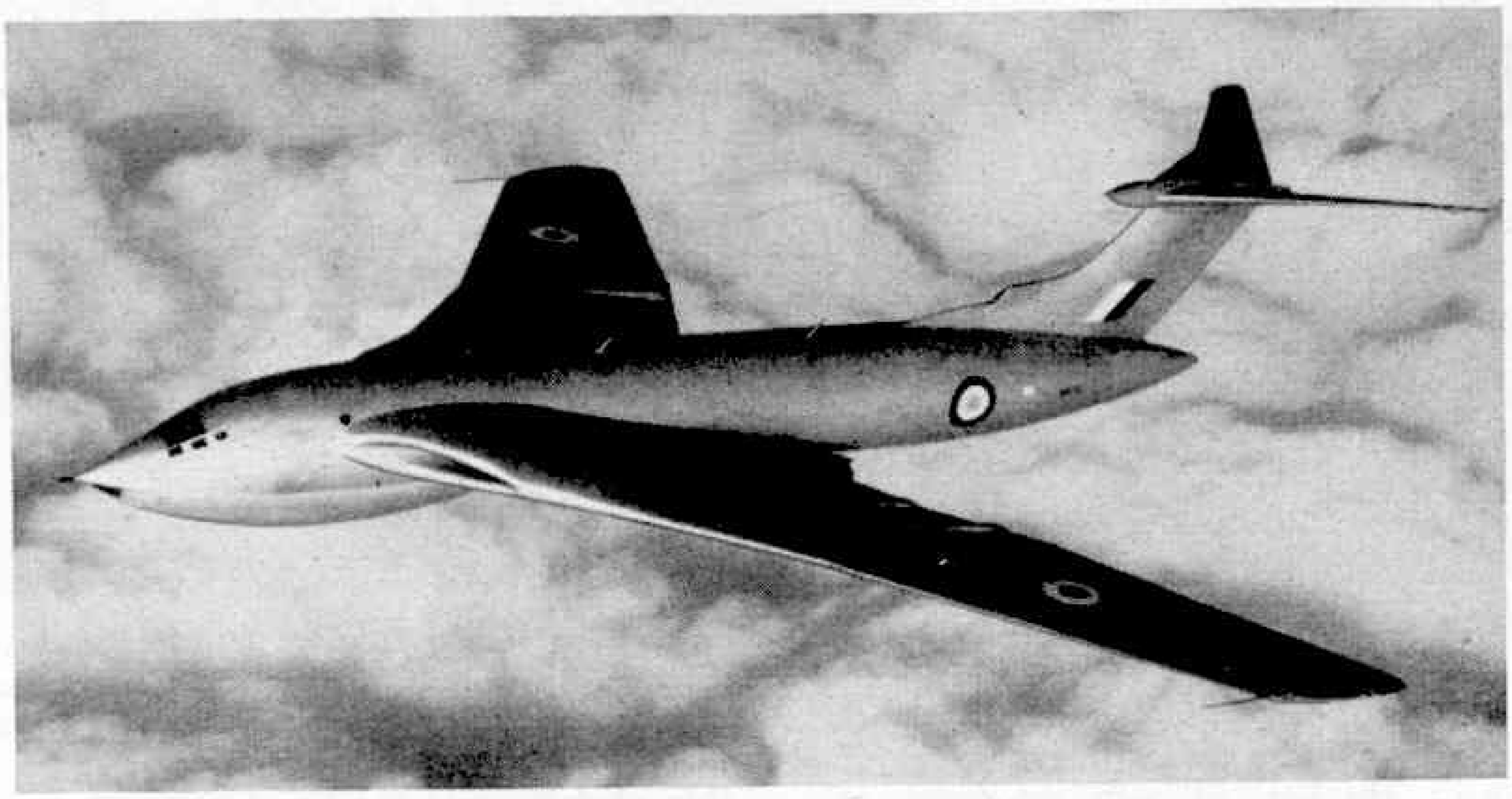
During this excavation to form the box cut, the spoil dug out by the draglines and the three shovels was loaded into a fleet of 60 Euclid Rear Dump Trucks, some of 22 and others of 15 tons capacity. The larger Euclids were loaded direct; the smaller ones were filled by means of a hopper, mounted on skids so that it could be moved when necessary, in order to protect them from damage. To carry the weight of traffic good roads were required, so those on the site on which the Euclid Trucks ran were formed of 3 feet of sandstone rock and kept well graded.



It was necessary to build a new motor road from the Acorn Bank site to the plant where the coal was screened. This picture shows two of three Bailey bridges forming part of it. The nearest crosses the River Blythe, and that in the background the main Bedlington-Hertford Road.

Another point of interest is that the material to be removed, except the drift near the surface, had to be blasted to break it up, and rotary air blast drills were used to make 6 in. diameter holes that were afterwards charged with explosive and fired.

Coal mining has now begun in the box cut. It is dug out by 1½ cubic yard electric shovels, which load it direct into 10-ton capacity skips that are hoisted to surface level by high speed electric derrick cranes travelling along the high wall at the side of the excavation. There the coal is discharged into the (Continued on page 544)



New Shapes in the Sky

By John W. R. Taylor

THREE years ago I described in *M.M.* some of the "Strange Shapes in the Sky" that were appearing over the United States, Britain and France. There was a flying saucer, aeroplanes with long narrow wings, flapping wings, U-shaped wings and no wings at all. Unfortunately, instead of proving that their inventors knew how to build safer, cheaper-to-run, faster or slower flying aircraft than the men who produce ordinary-looking designs, most of them seem to have faded from the picture, leaving us with aircraft in service that look much the same as before.

Yet, is this true? Or does it simply mean that we have become used to odd shapes in this jet age? A few years ago, delta-wing aeroplanes were regarded as very strange and new. To-day they are in service with the Royal Air Force and U.S.A.F. and cause little excitement when seen by young "spotters". Nor are they any longer the plain, straightforward "paper darts" of 1953. The Vulcan bomber has a kinked wing leading edge, the Javelin a cranked leading edge and the Swedish Saab-35 Lansen an unusual shape that can be described best as "double delta".

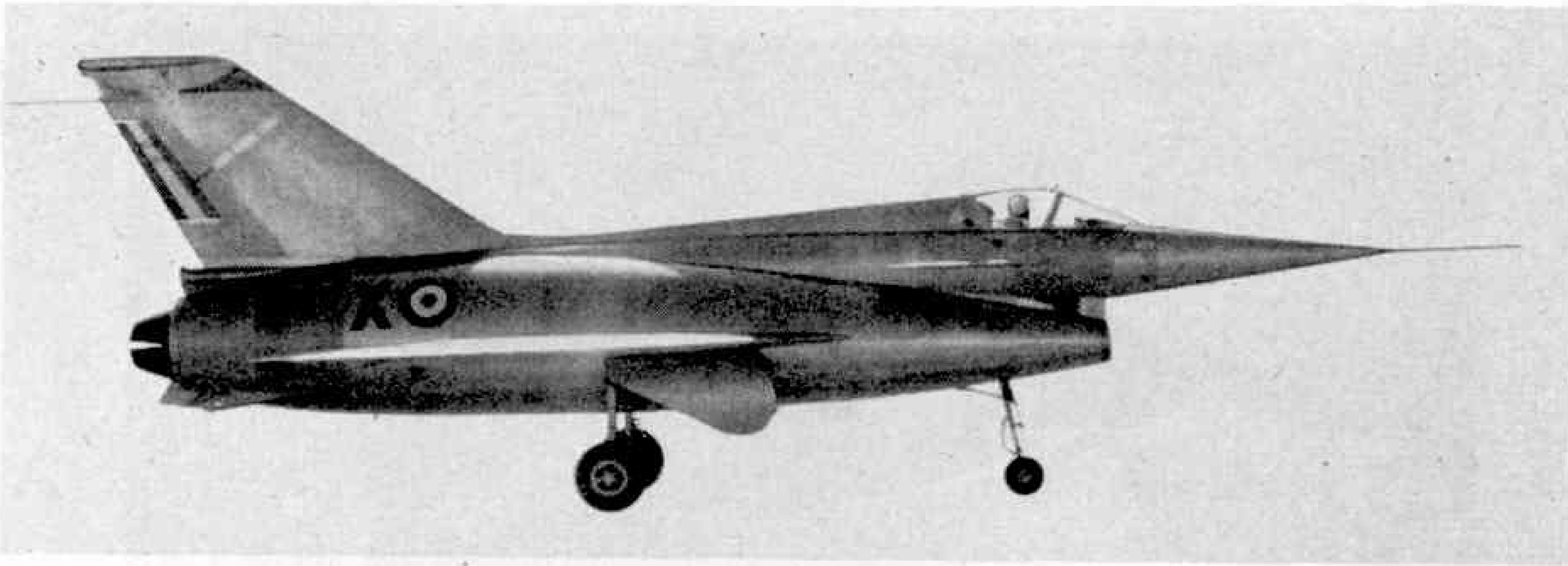
Although we have become accustomed to it, the Victor's crescent-wing might well qualify as a strange shape, especially when combined with its pointed bulbous nose and high-set crescent tailplane. And even the Supermarine N.113D and Swift have odd "sawtooth" wing leading edges.

Perhaps the strangest thing of all is that these different kinks, cranks, crescents and sawteeth have appeared on the scene for much the same reason; and we can expect many other peculiar developments, because designers are finding that nice simple streamlined aircraft are not always the best in the battle against the sound barrier.

The picture above of a prototype Handley Page Victor bomber gives a good view of the crescent-shaped, sweptback wings.

Ordinary sharply-swept wings tend to twist at the tips when an aircraft pulls out of a steep dive or turns sharply at high speed, and this can cause serious loss of control. The reduced sweep at the tips of a crescent wing and the aerodynamics of a sawtooth wing help to prevent this.

In addition, as you know, thin wings are better than thick ones for high-speed flight, and very fast aircraft like the Fairey Delta 2 have a thickness/chord ratio of as little as 4 per cent. This means that, if the distance from the leading edge to the trailing edge (known as the chord) is 100 in. at a certain distance out from the fuselage, the greatest thickness of the wing at that point will be only 4 in. (*i.e.* 4/100ths of the chord). So, obviously, if a designer increases the chord on the outer portions of

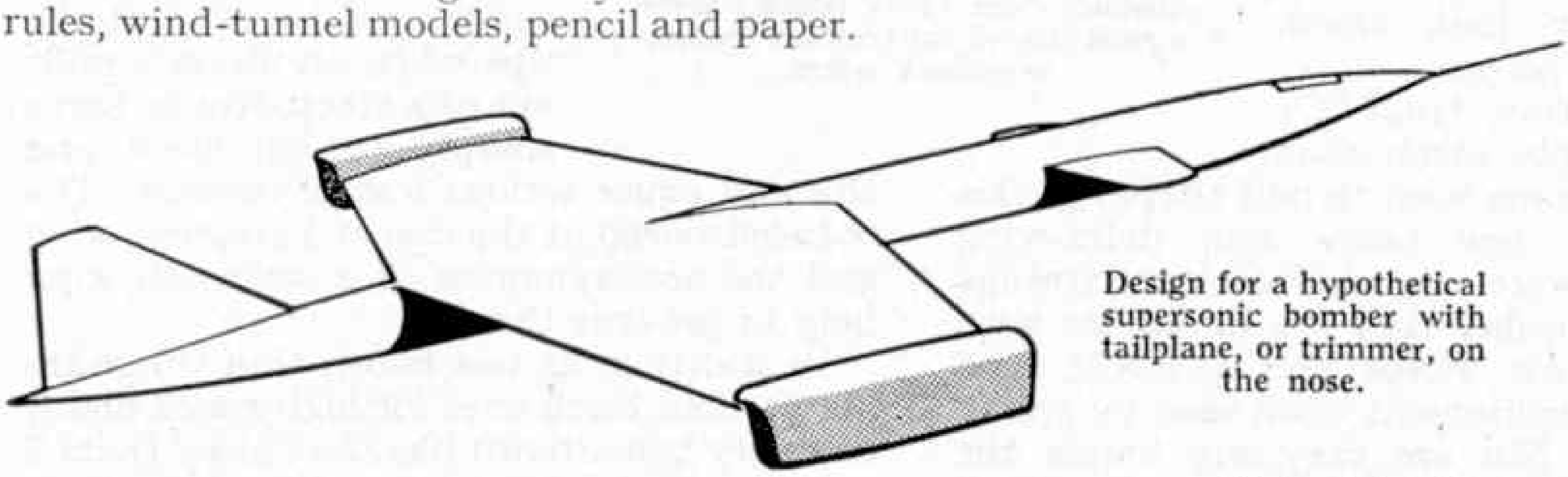


Nord Griffon, the latest French design for a 1,200 m.p.h. interceptor aircraft.

an aircraft's wings without making the wings any thicker, it will decrease the thickness/chord ratio and keep the air flowing smoothly over the wing tips at higher speeds than before. Aileron control will be improved—and that is another reason for the sawtooth leading edges, the Javelin's crank and the Vulcan's kink, all of which improve control at high speeds.

Unfortunately, thin wings and an enormous jet engine are not enough by themselves to guarantee an aeroplane a smooth passage through the sound barrier. Convair discovered that with their F-102 delta-wing interceptor which, with a J57 jet engine developing well over 10,000 lb. of thrust (20,000 h.p. at 750 m.p.h.), should have romped past Mach 1. Instead, the airflow over its smooth shape became so broken up at high speeds that the sound barrier proved to be a very solid one for the F-102.

An army of aerodynamicists, designers and mathematicians got busy with slide-rules, wind-tunnel models, pencil and paper.



Design for a hypothetical supersonic bomber with tailplane, or trimmer, on the nose.

The result was what is known as the Area Rule. Without going into technical details, this proved that it was not enough to have a normal streamlined fuselage, because the added cross-sectional area of the wing had to be taken into account. Where the wing span was greatest, the fuselage diameter had to be made smaller to compensate for it and this led to the F-102's unusual "wasp-waist", curving inwards where the wings are attached to the fuselage. After this change was made, it slipped past the barrier to about 900 m.p.h. without difficulty.

Surely this aircraft, with its delta wings, wasp-waist and queerly-bulged tail can be regarded as a strange shape? If not, let us look at another new delta that has been built not to test the fantastic ideas of a crackpot, but because it is the best way of building a safe, controllable aircraft to do its particular job.

The Nord Griffon is the latest design for a 1,200 m.p.h. interceptor from France. It looks as if it were the work of two designers who could not agree and finally decided to combine all their ideas in one aeroplane.

The Griffon has two noses, one above the other, and tailplanes at both nose and tail: but there is a good reason for these things. The ideal way of ensuring that a jet engine gets all the air it needs without breaking up the smooth flow, is to have a "straight-through" duct, with air ramming into the front, passing through the engine and straight out of the tail. It is a pity to break into such a duct to make room for the pilot's cockpit, and difficult to know how to mount an airspeed indicator pitot tube or radar equipment for gunsight and missile control in the nose. It is much simpler to have two noses, as on

the Griffon, if the air can be kept flowing smoothly round them. Then the cockpit, pitot tube and radar can have a nose to themselves, and the engine its own separate "straight-through" duct.

The explanation of the tailplane, or trimmer, on the nose is just as simple. When they pass through the sound barrier most aircraft tend to drop their noses. This has to be offset by moving the tailplane and, if the tailplane is at the rear, it causes a considerable loss of lift. By shifting the tailplane to the front, where it is moved in the opposite way to raise the nose, no loss of lift results. It also works in much smoother air at high supersonic speeds, ensuring better control.

This "flying platform" is the de Lackner Aerocycle described on this page.

Nor is it sufficient any longer to get the air flowing smoothly over the outside of an aeroplane. On a jet fighter, a great deal of air often goes through the inside, past the engine. This accounts for the apparently unstreamlined shape of the fuselage of the new 1,000 m.p.h. Chance Vought Crusader fighter, because it has some unusual bumps inside its long air duct that work in the same way as the F-102's wasp-waisting.

The drawing on the previous page shows what might be the effect of some of these new ideas on the design of a supersonic bomber. It is based on an illustration that appeared in Handley Page's house magazine, and the broad straight wings, tip-mounted engines and tail-first layout may not look at all strange to us in ten years' time.

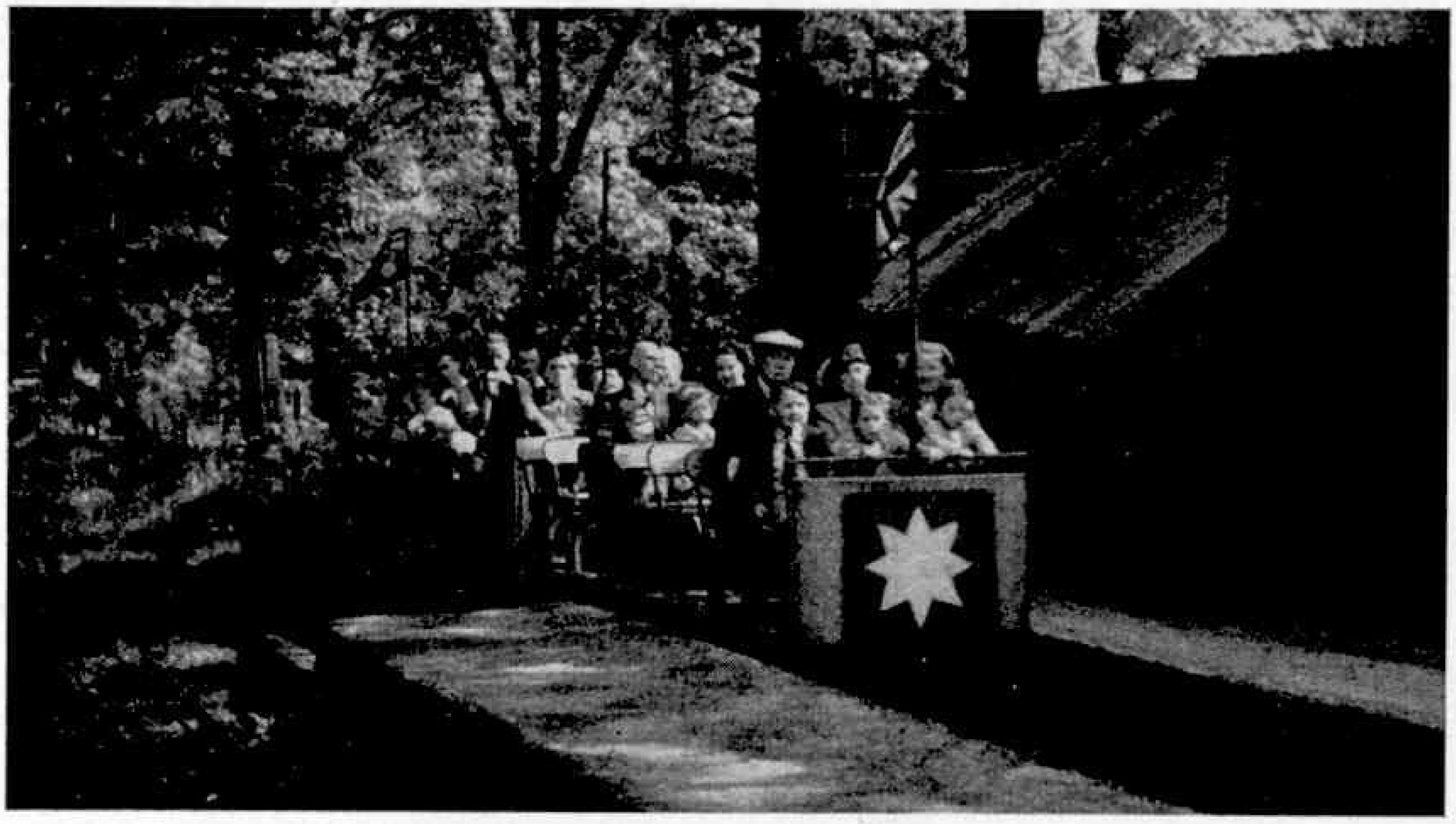
Nevertheless, we must not think only in terms of supersonic fighters and super-bombers. Very little seems to be happening to change the shapes of lightplanes or air liners in the near future, unless we count the M.L. Aviation "Flying Mattress" and American Goodyear Inflatable, with rubber-fabric wings that are inflated with air to give them shape. But there are some interesting new vertical take-off aircraft on the way.

One, already flying, is the de Lackner Aerocycle, illustrated on this page. Perhaps the simplest aircraft ever built, it consists of a platform on which the pilot stands and which carries also a 44 h.p. Mercury outboard engine and steering column, mounted above two contra-rotating helicopter rotors and a pontoon undercarriage which enables it to operate from either land or water.

To steer the Aerocycle, the pilot simply leans in the direction he wants to go, and the only control is a twist-grip throttle on the handlebars. Ordinary soldiers are said to have learned to fly it in 20 min., and the U.S. Army has ordered twelve to see if they could be used to replace motor-cycles. Top speed is 75 m.p.h. and the Aerocycle will fly 15 miles on the one gallon of petrol carried inside the steering column. An extra 5 gall. can be carried for longer journeys.

Hiller Helicopters have produced a somewhat similar machine named the "Flying Platform." It is controlled in the same way and the main difference is that, instead of helicopter rotors, it has two fans turning inside a 6 ft. diam. flanged ring under the platform. Known as a ducted fan, this produces as much lift as unducted rotors of much greater diameter.

Of all the new shapes in the sky to-day, these are perhaps the strangest, and the most exciting, because they are the nearest any designer has approached to an aircraft simple enough, easy enough to fly and cheap enough for almost anybody to own.



Tramway in a Glen

A Yorkshire Holiday Light Railway

By Arthur Turner

ALTHOUGH a number of cliff escalators hauled by cables are to be seen around the coast of Britain, an inland passenger tramway service operated by that means is certainly a rarity. Yet an example has been running in the West Riding of Yorkshire since 1896, and it is still at work regularly during the better months of the year.

It is estimated that in the last sixty-odd years the railway has carried some 15,000,000 people! The record for a single day's working is not definitely known, but is believed to be in the region of 17,000.

This unique line is to be found near Shipley, in Middle Airedale, and it runs through part of thickly wooded Shipley Glen, carrying holidaymakers from the valley to the fringe of the moors above. Though it was built in the days when Shipley Glen was a more popular resort for trippers than it is today, the tramway is still well patronised.

Ordinarily it runs only on Saturdays and Sundays in summer, but is usually busiest at Easter and Whitsuntide. Except at rush periods, the service is operated by a staff of three. They not only take the twopenny fares "up"—reduced to one penny for the "down" journey—and keep the cars shuttling back and forth at frequent intervals, but also attend to the mechanical maintenance of the tramway.

There are two cars, each on its own narrow gauge track, and these run in opposite directions. While one car is being hauled up the incline, the other is descending on the opposite track. The weight of the descending car, in fact, helps to pull the ascending one to the upper station where the power house is situated.

The illustrations on these pages, from photographs by Walter Scott, Bradford, show scenes on the Shipley Glen tramway, an inland passenger line that resembles a cliff escalator of the type familiar to visitors to many seaside resorts. The open cars are hauled by ropes driven by an electric motor and the weight of the one descending helps to haul up the ascending car.

The slope of the tramway nowhere exceeds 1 in 12, but a 37 h.p. electric motor is needed. It takes current from the mains, and since it was installed in 1927 it has proved more reliable than the two gas engines previously used. The first of those earlier engines produced its own gas from anthracite; the second ran from the gas mains.

The present electric motor turns an 8 ft. drum, round which are wound the

This fine vista through the trees is seen by passengers on the Shipley Glen tramway line.

cables attached to the cars. One cable is being wound in while the other is being paid out.

The two stations are connected by an electric bell signalling system, so that the operator in the control cabin at the upper station beside the power house can be notified when the car at the lower station is ready to leave. Such a signalling system is essential, since neither station can be seen from the other, though the total length of the tramway is less than a quarter of a mile.

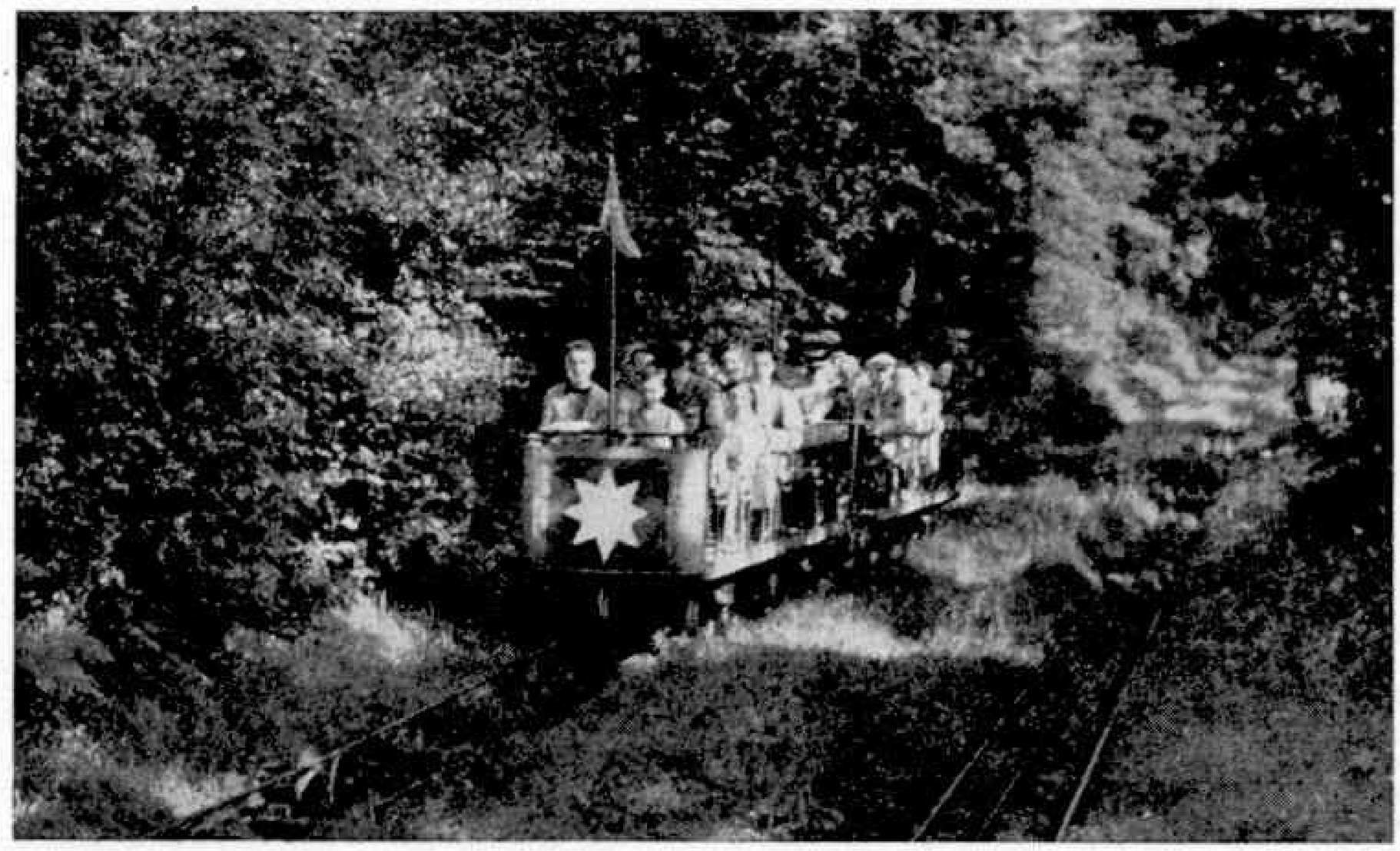
Each car is in two sections and has reversible seats for about 30 passengers. Small revolving drums resembling horizontal capstans are fitted at intervals between the rails to keep the cable clear of the ground and reduce wear. Each of these drums is oiled weekly.

A curious circumstance which puzzled the staff in the early days of the tramway was that the cars did not always come to a halt at the same point alongside the platform, as much as 2 ft. difference sometimes being noticed. The error was eventually traced to expansion of the cable on hot days, and to counteract this a movable drum held down by a 400 lb. weight was fitted, this automatically taking up the slack in the wire.

As a further safety precaution, the whole cable is replaced every 3-4 years, and each car is equipped with automatic brakes designed to come into action if the cable breaks—a mishap, however, that has never occurred.

The run takes just over one minute, and the average speed is 15 m.p.h. The maximum speed, reached at the middle of the journey, is 20 m.p.h. From the control cabin at the upper station the motorman controls the speed of the car approaching the platform there, and the car out of sight is automatically controlled at the same speed as it approaches the lower station.

This unique tramway is owned by a group of local businessmen, and after 60 years now has its own traditions of service.



A car on another section of the Shipley Glen tramway.

Secrets of Stonehenge

By Leslie E. Wells

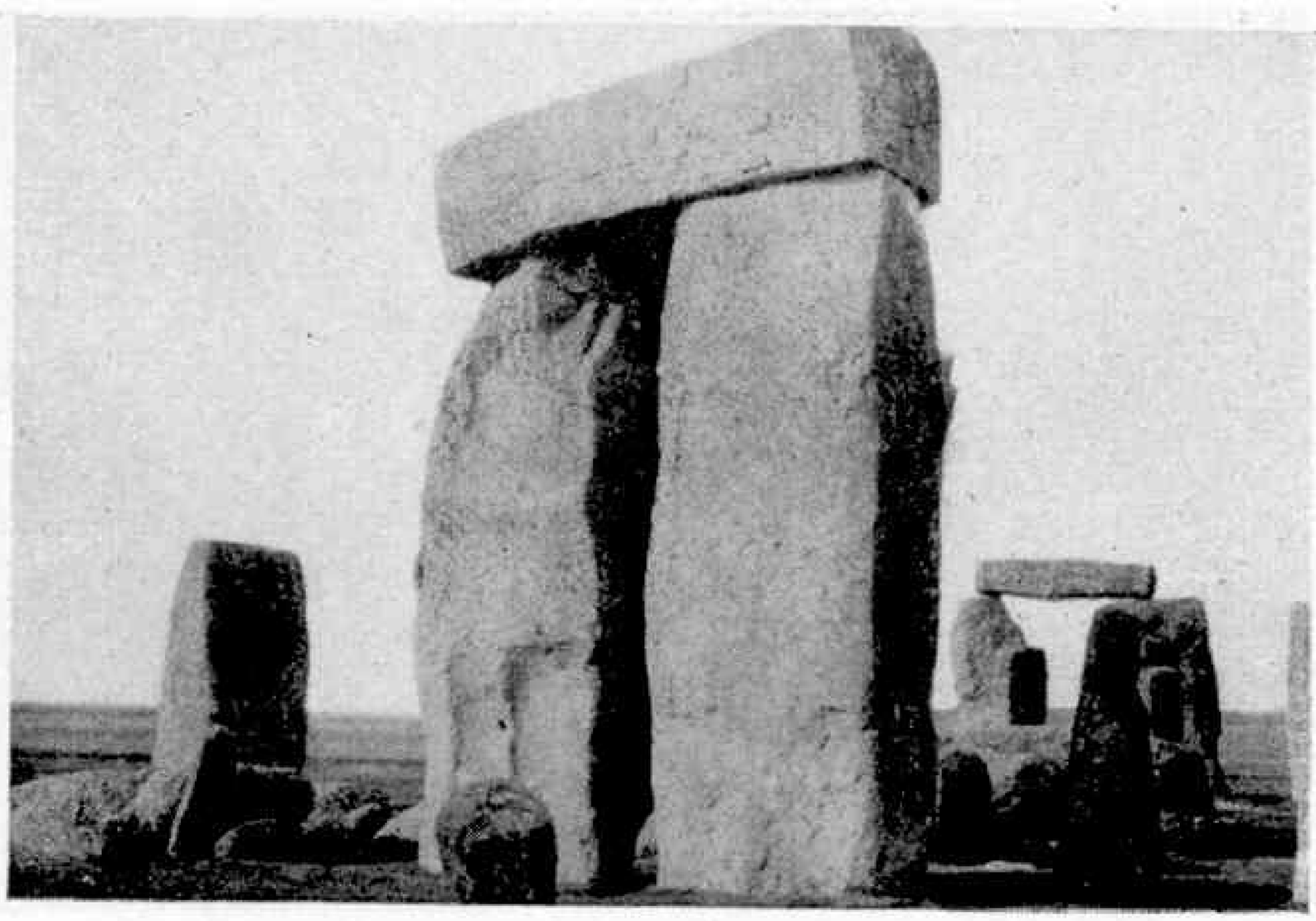
EVERY year, on 24th June, Midsummer Day, the Order of Druids gathers at Stonehenge outside the circle of great stones. Just before sunrise the Druid Bards, clothed in white and purple robes, move in procession into the circle, and as the Sun appears above the horizon the sacrament is administered from a golden cup placed on the Altar Stone. Then special prayers are said. The Order of Druids claim that in this they are performing a ceremony that has been observed without a break for some 4,000 years.

Stonehenge is the oldest megalithic or stone monument in Britain. In fact, it is unique, for nowhere else in the world is there a stone circle that possesses such unusual features. The monument stands upon a circular earthwork 300 feet in diameter. Within it there is a circle of trilithons, which are upright stones supporting a lintel, or stone laid upon them. At one time there were thirty of these trilithons, arranged in a circle measuring 100 feet from side to side.

The lintel stones are not just balanced on their uprights. They are skilfully joined by tennons and mortices; that is, by projecting pieces of stone that are fitted into holes called mortices. The ends of some lintels are joined to others by a sort of dovetailing known as a "toggle joint." It is this kind of joining which explains why so many of the stones have remained in place for thousands of years.

Next to the outer ring of trilithons is a circle of Prescelley stones, that is stones taken from the Prescelley Hills in Pembrokeshire. Few of these, however, are now in their original position. Within this circle is a horseshoe of five huge trilithons. The central pair are the tallest, standing 22 feet above the ground. But there is another pair 30 feet long and sunk far into the ground. This pair has a thickness of three feet and a width of seven feet, and weighs about 50 tons. The open part of the horseshoe faces the sunrise at the summer solstice, that is, on the longest day in the year.

Inside this horseshoe is a second circle of



At the head of the page is a general view of Stonehenge, and on the right a closer view of an impressive section of this great monument.

upright stones, and within these is a flat stone called the Altar Stone.

Beyond the earth circle that surrounds the stones is a great monolith, or pillar of stone, called the Friar's Heel. This marks the direction in which a person standing at the centre of the horseshoe can see the sunrise on Midsummer Morning. It then appears to him like a brightly shining golden disc poised on the tip of the Friar's Heel.

There is a legend about the Friar's Heel. It is said that the Devil noticed a heap of huge stones while travelling through Ireland. Moved by a spirit of mischief he picked up the stones and carried them to Salisbury Plain, telling himself that their presence there would puzzle men for centuries to come. But as he was setting them down he was seen by a wandering friar, who fled on recognising him. The Devil hurled a stone after the friar, and struck him on the heel. And a curious mark on the stone is said to have been caused by its striking the friar.

The remains of the temple within the stone circles of Stonehenge.

It is not easy to say for certain who built Stonehenge. Many people believe that it is the work of the Druids, but this seems unlikely. For scientists say that it was built about the year 1,800 B.C., well over a thousand years before there were Druids at Stonehenge.

It is very probable, however, that the Druids used it as a place of worship, although it is more than likely that it was first built as a pagan temple.

The Greek historian Hecatæus, writing about 320 B.C., stated: "Opposite the land of the Celts, there is an island, not smaller than Sicily, inhabited by the Hyperboreans . . . They honour Apollo more than any other deity. A sacred enclosure is dedicated to him in the island, as well as a magnificent circular temple adorned with many rich offerings."

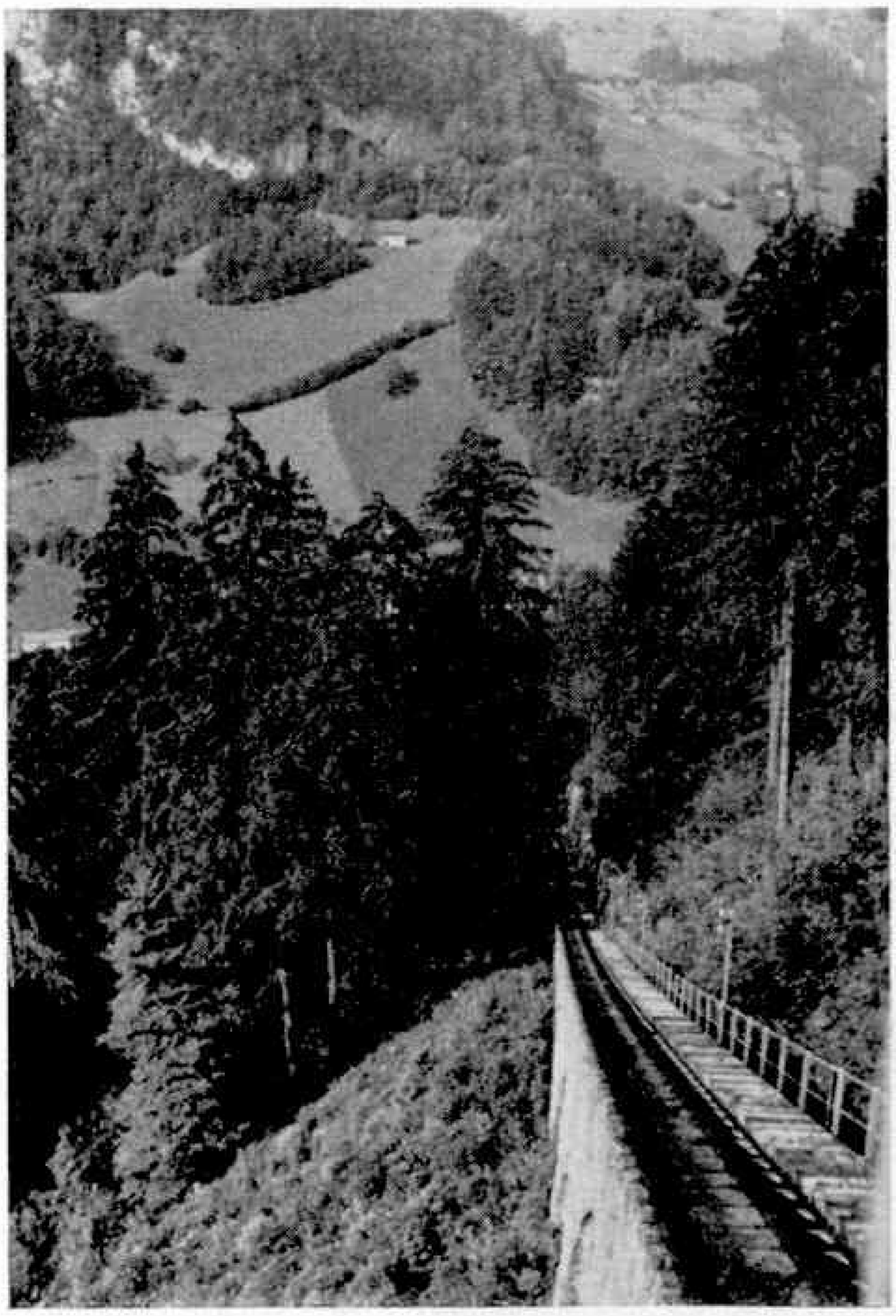
The "Land of the Celts," of course, is France, and Apollo was the Sun-god. This, it seems, therefore, is a reference to Stonehenge.

Recent discoveries suggest that Stonehenge was the work of Neolithic men, that is, of men of the New Stone Age. But nowhere else in Europe have these people left anything which is at all on the same grand scale. Stonehenge is so wonderfully made, in fact, that it must have been built by a people who reached a high degree of civilisation.

It is thought that the men of the New Stone Age appeared in Europe some 20,000 years ago. They flourished for thousands of years, until they gave place to a new race of men who came from Asia. These new arrivals understood how to make bronze weapons, and were the Celts, among whom were the Ancient Britons, and the Gauls, who lived in France. Thus it seems that Stonehenge was built by a race of New Stone Age men who understood arts that the men of the Bronze Age had not mastered.

It is still a mystery as to how a primitive people, who had no kind of metal tools, could shape such huge pieces of stone. The tools they did use they dropped into holes when they became unfit for further use, and many have been dug up and examined.

Thus we know that the tools used in building Stonehenge were axes made of flint and Sarsen stone; hammer-axes edged on one side and flat on the other, and rounded and flat (*Continued on page 544*)



Swiss Mountain Railways

By Cecil J. Allen, M.Inst.T., A.I.Loco.E.

THERE is no other country in the world which offers the traveller so many and varied ways of being transported to the skies as Switzerland. In addition to the main lines, which can be classed as mountain railways because of the altitudes they attain, there are something like 150 independent Swiss mountain railways of all kinds—rack-and-pinion, rope-worked funiculars, and the modern téléphériques, or suspension lines, and chair-lifts, further examples of which are being built and put into service every year.

The illustration above shows the view passengers have on the Schlattli-Stoos funicular railway, in Switzerland, when they look down while on the 1 in 1¼ gradient. At this angle the country below is spread out as though it were a map. Photograph, Cecil J. Allen.

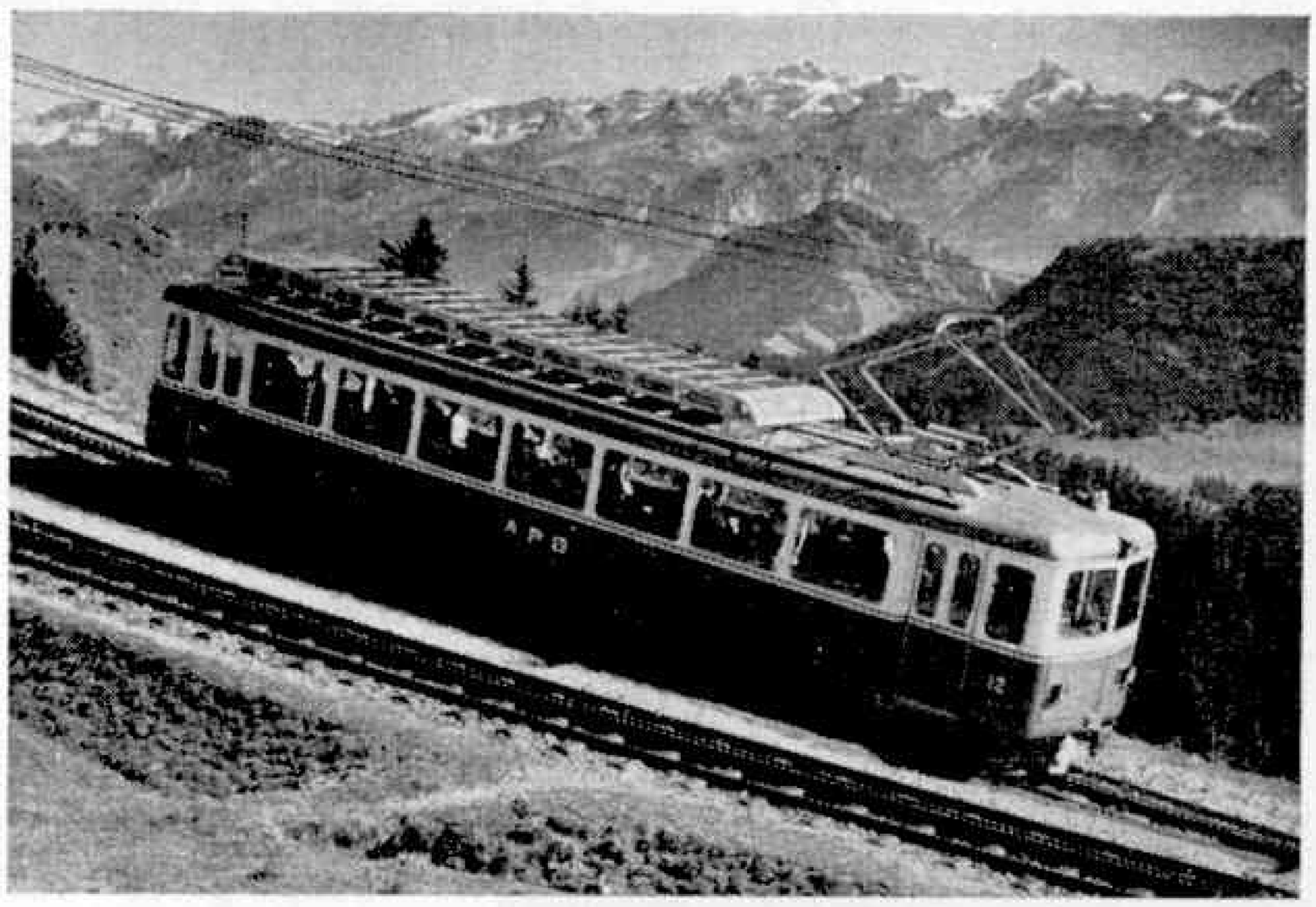
First of all, a word about the main lines. The famous Gotthard line, part of the Swiss Federal Railways system and the main artery of traffic between South Germany and Italy, cuts straight across the main chain of the Alps from north to south, reaching a maximum altitude of 3,786 ft. in the 9¼-mile Gotthard Tunnel; and not far to the west of this is the independent Bern-Lötschberg-Simplon Railway, which penetrates the Bernese Alps at a height of 4,067 ft. with the Lötschberg Tunnel, also just over nine miles long.

The long climbs to both tunnels are on continuous gradients as steep as 1 in 37 to 1 in 40, and in addition both routes need the help of corkscrew or spiral tunnels in order to keep pace with abrupt changes of level in the valleys of which they make use. Notwithstanding the steepness of the climbs, and the constant curvature of the tracks, which keeps downhill speeds to something no higher than those uphill, the principal Gotthard expresses are booked at average speeds of 46 to nearly 48 m.p.h. over the length of the main line, and those of the Lötschberg at 45 m.p.h.—a wonderful tribute to the power of their modern electric locomotives.

The first Swiss engineer to foresee the possibility of laying railways directly up the mountains, to give access to famous viewpoints, was a man named Riggenbach. When in 1871 he opened his first mountain railway up the Rigi, on the shore of the Lake of Lucerne, he had been anticipated by two years in the use of the rack-and-pinion principle by Sylvester Marsh in the United States, but Riggenbach's line was the first of its kind in Europe. To provide safe operation on gradients as steep as 1 in 5, he securely anchored a kind of steel ladder, or rack, between the running rails of his track, and fitted his locomotives with a vertical pinion, driven by the motion, of which the teeth engaged in the spaces between the rungs of the ladder. This in effect locked the locomotive to the track, and obviated any possibility of the locomotive and car sliding down the steeply-inclined running rails.

Some of the Swiss rack-and-pinion lines have been laid down on the later Abt

principle, in which the rack consists of two parallel rows of steel teeth, machined out of solid bar and set up on edge, which are engaged by a double pinion wheel. Over some of the longer Swiss railways using rack-and-pinion traction, like the Brünig, between Lucerne and Interlaken, the Visp-Zermatt and the Furka-Oberalp, complete trains of five or even six coaches are worked up and down gradients as steep as 1 in 8 to 1 in 10, but for safety's sake each coach is provided with its own pinion for rack engagement. On these lines there is ordinary adhesion working over the flatter sections, at speeds which on the metre-gauge Brünig line may reach 50 m.p.h. in places, and the rack-and-pinion operation is required only over the steeper sections through the mountain passes.



A motorcoach on the Arth-Rigi Railway climbing a 1 in 5 gradient with rack-and-pinion equipment. Note the rack between the running rails. Photograph, Central Switzerland Tourist Office.

Even up gradients as steep as 1 in 9 the modern electric locomotives can work five-coach trains—of very light stock, of course—at speeds up to 20 m.p.h. On the through lines the highest altitudes are reached by the Furka-Oberalp, which in 60 miles climbs from 2,224 ft. at Brigue to 7,088 ft. in the Furka Tunnel, drops to 4,710 ft. at Andermatt, is up once again to 6,670 ft. on the Oberalp Pass, and finishes at 3,717 ft. at Disentis—a switchback indeed! But the record altitude is attained by the spectacular group of rack-and-pinion railways in the Bernese Oberland that carry the traveller to the highest railway terminus in Europe—Jungfraujoch, 11,333 ft. altitude—which he could only reach otherwise as a competent Alpine climber.

The steepest rack-and-pinion line in the world is that which climbs Pilatus, near Lucerne, mounting 5,344 ft. in less than 2¾ miles. On this the steepest gradient is 1 in 2, and as neither the Riggenbach nor the Abt track would have been safe to operate on such an inclination, the engineer, Locher, designed a special type of rack with teeth on both sides, which each motorcoach grips firmly with the aid of two pairs of horizontal pinion wheels.

One 35-passenger car of the Säntis luftseilbahn as seen from the other in mid-air. The next pylon and the lower station are seen far below at the top of the picture. Photograph, Cecil J. Allen.

This 30-minute journey, with the cars crawling in places up the face of a sheer precipice, like flies on the wall, is one which the traveller is not likely to forget in a hurry.

But there are even steeper gradients than that fearsome 1 in 2 slope. These are on the funicular railways, which depend on wire ropes for their haulage. The working principle is similar to that used on many cliff railways round the coasts of Britain, with two cars, connected by a wire cable round the winding wheel at the top of the line, balanced against one another, so that the weight of the descending car helps to pull up the car making the ascent.

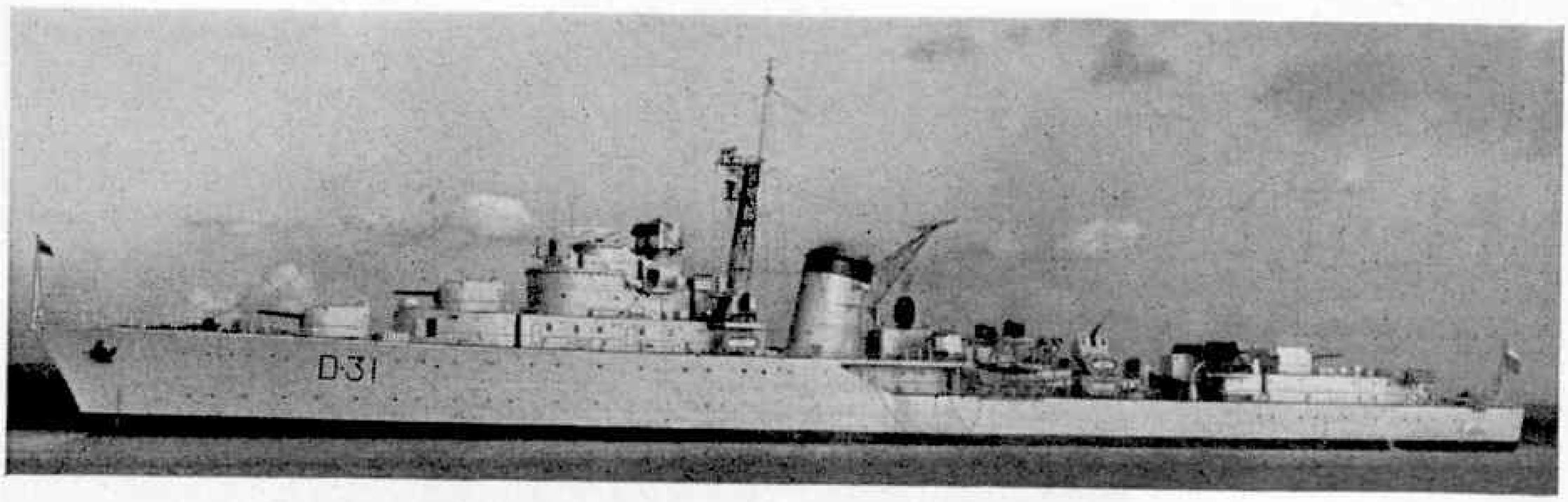
A double chair-lift—on a fine day one of the most delightful forms of mountain travel. This one runs from Flims up to Alp Naraus, in the Grisons. Photograph, Grisons Tourist Office.

The longest of these Swiss lines that is in one section has over 1¼ miles of moving cable when the cars are in motion; on even longer lines there are two or three independent sections, with change of cars intermediately, both to avoid the use of too lengthy a cable and to increase the carrying capacity. In this connection it must be remembered that whereas a rack-and-pinion railway can send up a number of motor coaches in succession to cope with a rush of traffic, the funicular is limited to its two cars, one up and one down simultaneously, with a capacity of perhaps 60 or 70 passengers apiece; and no fresh journey can begin until the previous one has been completed. The steepest gradient on any Swiss funicular of this balanced type is 78 per cent.—1 in 1¼—on the line from Schlattli up to Stoos.

But all the latest Swiss mountain lines have been built on the suspension principle, and so are not really railways at all, though they may carry the name "bahn." The advantage of the suspension type of line (the "luftseilbahn" or "téléphérique") over a railway is that there is no costly railway track to engineer and to lay. Substantial carrying cables are slung from pylon to pylon, and up or down these the cars slowly make their way, suspended from carriages with grooved wheels that ride on the main cables, and balance against one another like the up and down cars of a funicular railway, and moved by one common haulage cable. If the engineer of one of these lines finds a valley in his way, there is no question of building a big and costly viaduct; he simply swings straight across it.

Some of the spans of cable between pylons are of enormous length. In swinging up the popular line from Gerschnialp to Trübsee, above Engelberg, the 35-passenger cars negotiate one clear span of 3,645 ft. The daring line up the well-known peak of the Säntis, in north-east Switzerland, makes straight for the top of the great cliff that forms the western face of the peak with a span of 3,150 ft. Here again 35-passenger cars are used, suspended from double main cables of 2 in. diameter.

More breathtaking still is the line from Kandersteg up to the top of the high bluff that walls in the valley beyond the village; as one passes over the crest of the cliff, it is to leave behind 1,155 ft. of clear space between the car and the valley below! Another startling line of the same description has been opened recently up the towering cliffs that form the east face of Pilatus, and yet another is under construction from Leukerbad up a 1,600 ft. cliff to the crest of the Gemmi Pass. With the Swiss engineers the word "impossible" does not exist! (*Continued on page 516*)



Venezuela's Powerful New Destroyer

By Desmond Wettern

THE destroyer *Aragua*, which left Portsmouth earlier this year for Venezuela, is the latest unit to join the Venezuelan Navy. She was built by Vickers-Armstrongs (Shipbuilders) Ltd., at their yard at Barrow, and is the third vessel of her class; the other two, *Nueva Esparta* and *Zulia*, have already arrived in Venezuelan waters. All three vessels were built at Barrow.

The *Aragua* carries six 4.5 in. guns, which are fully automatic. They can be loaded and fired without any member of the gun crew touching the shells or the guns. She also carries eight 40 mm. Bofors anti-aircraft guns and three 21 in. torpedo tubes.

In design these ships are very similar to British ships of the *Daring* and *Battle* classes. Their Parsons geared turbines give them a shaft h.p. of 50,000, equivalent to a speed of 34.5 knots. Their electrical system is very complete and has two independent ring mains, each with its own generating room. This means that if a cable from the power generating room is cut, or even if one of the generators is hit, the power supply will automatically switch over to either a duplicate cable or the second generating plant. The engines too are installed in two separate compartments, as are the two boilers. Thus if one engine or one boiler is knocked out the ship can still steam. Both engines will work at full power on only one boiler.

The radar and echo-sounding gear fitted is of the latest type manufactured by one of the leading companies in Britain. Below decks fans are fitted in all living spaces, and water-cooling and ice-making machines are installed. The ship is air-conditioned throughout, as the temperature of the regions in which she will operate is usually uncomfortably warm. Much of the lighting is of the fluorescent type.

Compared with some wartime British destroyers the ship is very roomy, and great care has been taken to avoid small, cramped passage ways. Besides being uncomfortable, these can be a very severe handicap when the ship is in action.

In appearance the ship is a little unusual. The bridge front is rounded, and has a "walk-round" round the front of the wheelhouse, and wireless aerials and so on are carried by a lattice structure fitted to the after side of the large raked funnel. Another unusual feature is the dwarf boat deck, which extends from the after end of the forecastle on either side of the funnel.

A glance at the illustration of the Venezuelan destroyer "Aragua" at the head of the page will show that this vessel has many interesting features, such as her rounded bridge front and the lattice structure, carrying wireless aerials, fitted on the funnel. These and other details are dealt with in the accompanying article. Photograph by courtesy of Vickers-Armstrongs (Shipbuilders) Ltd.

The fact that *Aragua* carries a large number of guns, and but two depth charge throwers, indicates that she is mainly designed for action against aircraft or other surface vessels. At the present time the Royal Navy is concentrating on vessels with fewer guns and more anti-submarine weapons, and the decision to arm a vessel of a destroyer type largely with guns is a courageous one on the part of the Venezuelan Admiralty. The *Aragua's* guns, being radar controlled, will be formidable weapons for defending merchant ships or shore targets against aircraft.

Air News

By
John W. R. Taylor

"Sir Samuel White Baker," one of 24 Vickers Viscount 802 air liners ordered by British European Airways, by whose courtesy this picture is reproduced.

New British Air Liners

Three items of news within a single week at the end of July this year showed that Britain is continuing to lead the world in the development of turbine-powered air liners.

First came an announcement that Capital Airlines of America, who had already ordered 75 Vickers Viscounts, have decided to buy 14 Comet jet-liners. This represents a great triumph for de Havilland's in the face of intense competition from U.S. companies, and means that Capital will be the first airline in America to have jet aircraft in service, in 1958–9, just as they were first with turboprop air liners.

Choice of the Comet for operation on their most important routes results, no doubt, from the fact that it can get into and out of much smaller airports than the larger U.S. jet-liners and is more of a money-maker on comparatively short routes. The Capital order, which is worth about £19 million (in dollars), is for four long-range Comet 4's and ten of the newly-announced Comet 4A's. The latter will have a span of 108 ft. (7 ft. less than the Comet 4) and a 40 in. longer fuselage, with room for 70 first-class or 92 tourist passengers. On stage lengths of up to 2,000 miles, it will cruise at 520–545 m.p.h.

Second important event was the first flight of the Vickers Viscount 802 *Sir Samuel White Baker* on 27th July. One of 24 V.802's ordered by B.E.A., it is the first of the "stretched" Series 800 machines, powered by four 1,780 e.h.p. Rolls-Royce Dart 510 turboprops and able to carry up to 70 passengers.

Just four days later, the first of the larger, faster and more powerful Bristol Britannia Series 300 turboprop air liners made a 65 min. maiden flight from Filton. With a fuselage length of 124 ft. 3 in., it is 10 ft. 3 in. longer than the Series 100 Britannias now entering service with B.O.A.C. and, when developed, will be able to carry a full payload of 93 passengers across the Atlantic on year-round non-stop services at a cruising speed of nearly 400 m.p.h.

Rocket Record

A new height record for rockets of U.S. design has been set up by an Aerobee-Hi upper atmosphere research rocket, which climbed 163 miles after being launched from the U.S. Navy's experimental testing ground at White Sands, New Mexico. It beat by five miles the previous record set up by a Martin Viking.

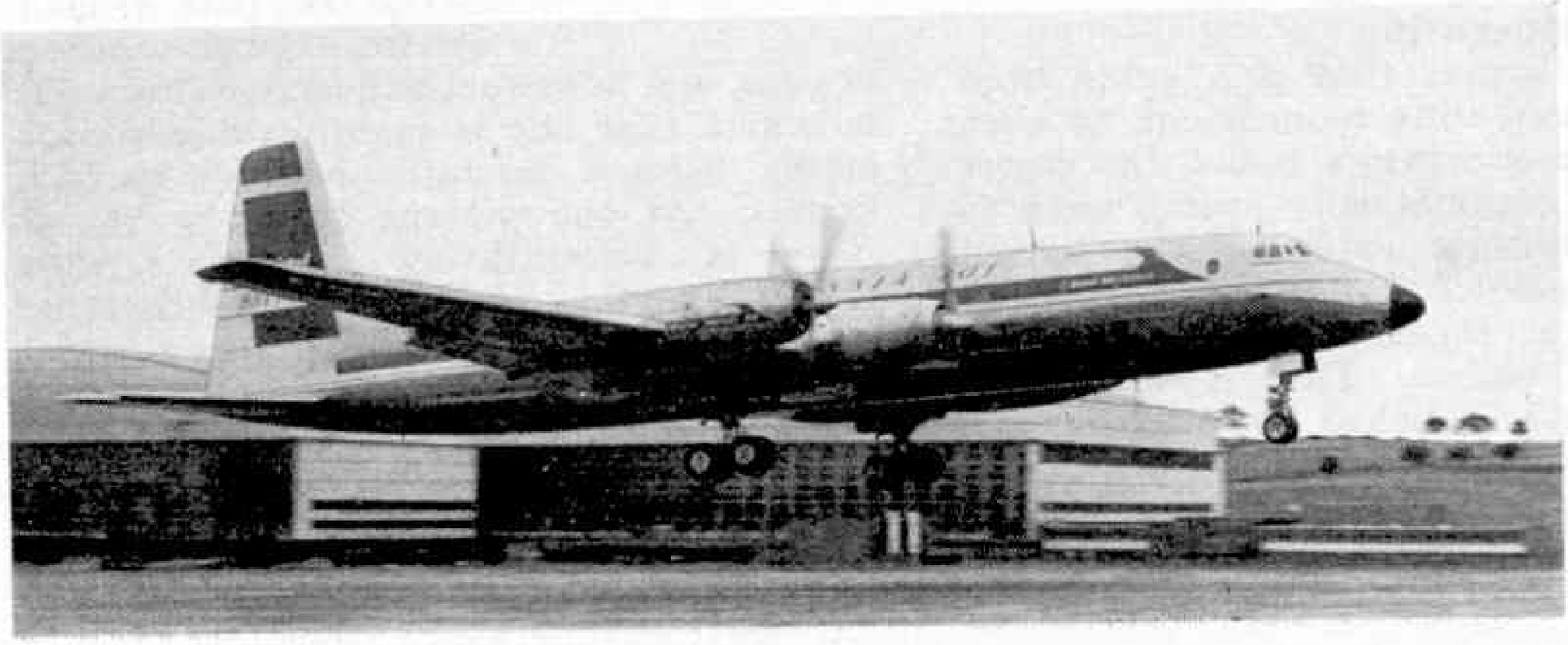
Another Air Ferry

Silver City Airways opened yet another vehicle ferry service on 3rd August, this time on the 60-mile route between Newtownards Airport, Belfast, and Ronaldsway, Isle of Man, with an initial frequency of one return trip each day. Never before has it been possible for motorists to ferry their vehicles between the two islands, and even for motor-cyclists the sea journey has meant 6½ hrs. off the road. By Bristol Freighter the trip will take 25 min.

Following the severe gales which swept Britain on 29th July, Silver City set up a new record by flying no fewer than 246 ferry services to and from Belgium and France on the next day. On average, there was a take-off or landing every two minutes from dawn to midnight, during which time 539 vehicles and 1,700 passengers were flown across the English Channel.

Future for Airships?

A German engineer named Dr. Albert Simon, who was formerly with the Zeppelin company, is reported to be planning the world's biggest airship. He claims that it will make possible the cheapest air travel yet, with fares of less than a penny a mile.



Britannia 301, first of the larger and faster versions of the turboprop Britannia taking off at Filton, Bristol, on its maiden flight. Illustration by courtesy of Bristol Aircraft Limited.

On the other side of the Atlantic, the American "lighter-than-air" expert, Vice-Admiral Charles C. Rosendahl, has said that there is a future for atomic-powered airships. He believes that if giant airships were built, using new lightweight fabrics, helium gas, atomic power plants and the latest ideas on controlling the "boundary layer" which clings to the surface of aircraft and reduces their speed, they would fly at well over 100 m.p.h. and have unlimited range.

Pointing out that one of the by-products of nuclear fission is helium, so that the airships could replenish their own gas supply in flight, Admiral Rosendahl added: "Airships operated the first regular transatlantic air passenger service before World War II and would be doing so today if the pioneers had used helium instead of highly-inflammable hydrogen gas for lift. Those German airships were the most comfortable vehicles for air travel ever devised by man. Their spacious flight deck and dining saloon were even equipped with a piano for the entertainment of passengers."

A Westland Whirlwind helicopter equipped with pontoon undercarriage makes an engine-off landing on the sea at Calshot, Southampton, during trials to obtain Air Registration Board clearance for amphibious operation. Photograph by courtesy of Westland Aircraft Limited.

Water Whirlwind

Westland's have completed tests to obtain Air Registration Board approval for the civil operation of their Whirlwind helicopter equipped with inflatable pontoon landing gear. During the trials, which were made at Calshot, a full range of taxying, take-off, performance measurement and other tests was made, including 48 engine-off landings from heights between 60 and 400 ft. The Whirlwind under test is shown in the upper illustration on this page.

Change-over from the normal wheel undercarriage to pontoons takes only six hours, after which the helicopter can be operated equally well from land or water at its full loaded weight of 7,500 lb. The bottom of each pontoon is fitted with a sprung steel skid of 1½ in. diameter to protect it from puncturing on rough surfaces ashore.

Sarah Joins the R.A.A.F.

Latest safety aid put into service by the Royal Australian Air Force is SARAH - short for Search and Rescue And Homing equipment produced by the Ultra Electric Company. More than 1,000 SARAH beacons have been ordered and one will be strapped to the life-jacket of every R.A.A.F. airman who flies over the sea.

Small enough to fit into a breast pocket, the beacon is watertight, battery-operated and can transmit an S.O.S. message automatically for nearly 24 hrs. from the survivor of a crash or "ditching." Its range is 70 miles to an aircraft or six miles to a surface vessel, and receivers to pick up messages from SARAH beacons will be carried by all R.A.A.F. Neptune, Lincoln and Dakota aircraft and rescue launches.

Atomic Convair

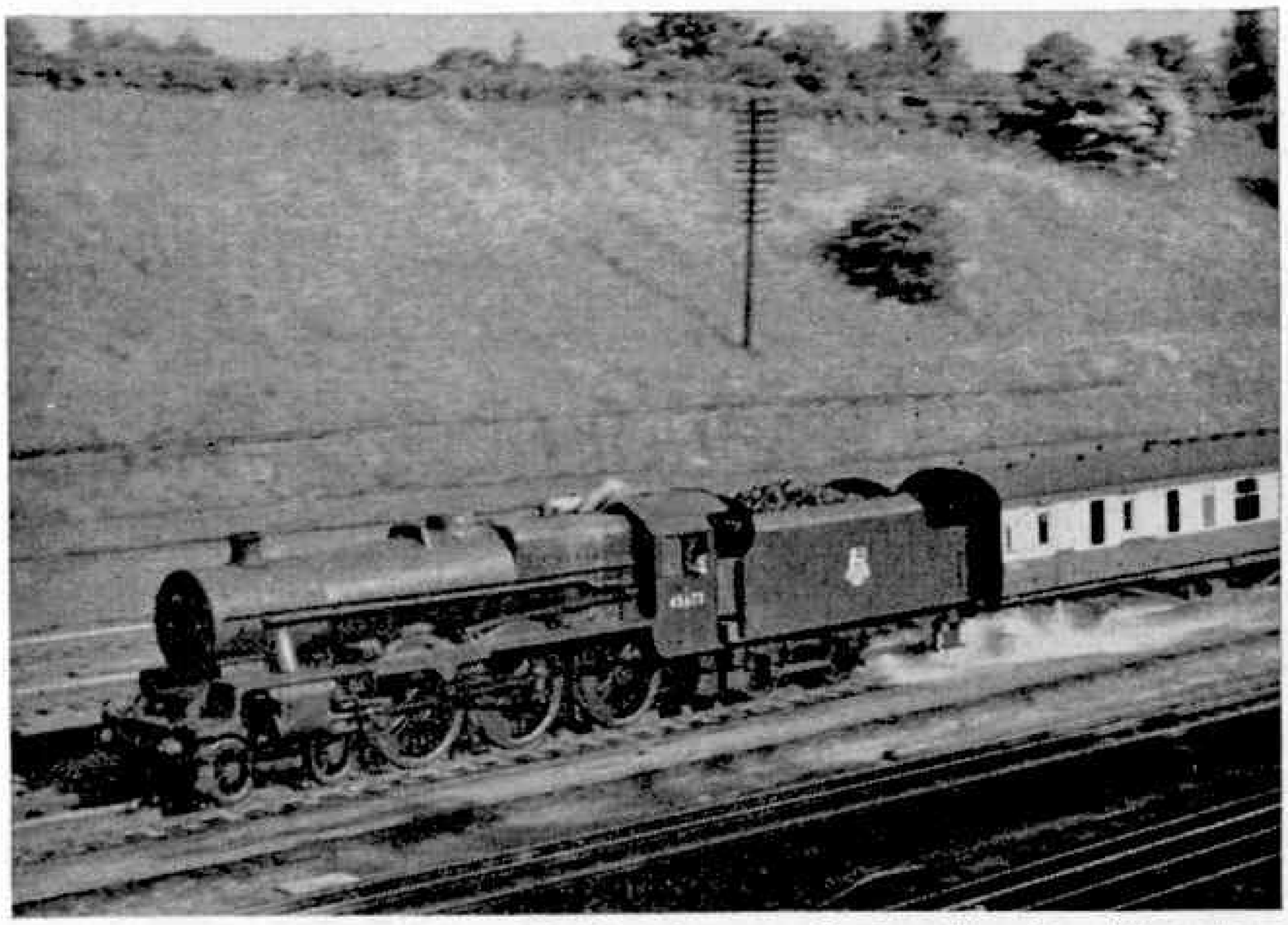
In last month's *Air News* I gave some details of a B-36 ten-engined bomber in which the U.S. Convair company have installed an atomic reactor of their own design. A picture of this aircraft, which is designated NB-36H, appears below. It shows the new nose and, on the side of the rear fuselage, airscoops to cool the reactor, which distinguish this aircraft from normal B-36's.

The low-powered reactor is turned on only when the NB-36H has climbed high over an unpopulated area and then only to measure the effect of radiation on the aircraft's instruments, equipment and airframe, and to develop efficient shielding for the instruments and crew. It does not drive the aircraft; but Convair have a U.S.A.F. contract to develop a proper atomic-powered aircraft.

* * * *

A new unofficial speed record of 1,900 m.p.h. has been set up by the sweptwing, rocket-powered Bell X-2 research aircraft.

Convair B-36 intercontinental bomber, the world's first aircraft to fly with an operating atomic reactor aboard. Convair, U.S.A., photograph.



Jubilee 4-6-0 No. 45673 "Keppel" skimming over Bushey Troughs with a down Liverpool express. Photograph by G. Clarke.

Railway Notes

By R. A. H. Weight

Innovations and New Developments

Three experimental vehicles that may help to determine the future design of British Railways restaurant and buffet cars were recently exhibited at Marylebone and then placed in trial service on different Regions. All are finished externally in the new standard maroon livery, with yellow lining and lettering; the interior decoration is novel and varied, with attractive curtains and carpets.

A combined restaurant and buffet car providing seated and counter service of meals or snacks has become a popular feature, especially on shorter runs such as, for example, between London and the Kent coast. The prototype new coach in this style has been running between Liverpool Street, Cambridge and Ely.

The latest type self-contained restaurant car, comprising saloon seating 33 passengers, compact kitchen, pantry and staff accommodation, has been formed in the *Merchant Venturer* Paddington-Bristol-Weston-super-Mare express. A well designed kitchen buffet car intended for one of the principal St. Pancras-Manchester runs contains a fully equipped kitchen for preparation of meals served in adjoining coaches as well as a buffet counter and bar, being a development of the S.R. Tavern Cars in different style.

For busy trains full size kitchen cars are run between first and second class dining saloons, the latest vehicles being an improvement on the 1951 design. Separate chairs, brightly and well upholstered, are provided for the dining tables. These or similar cars will doubtless be seen on certain other routes.

Diesel passenger train sets are under construction and being brought into use to an increasing extent. Kitchen-buffet cars will be a feature of the main line diesel trains in hand at Swindon Works for the Edinburgh-Glasgow service and later, for that between Birmingham, Cardiff and Swansea, which will be equipped like the latest corridor express carriages. More of the popular local sets are running in N. Wales, East Anglia, the Midlands and elsewhere. An experimental single car, drivable from either end, was lately introduced to attract and develop business on the L.M.R. Banbury-Buckingham branch, where two new halts have been opened.

More mechanised and packing devices have been introduced to aid freight handling; an electronic computer is to calculate and check distances between all stations and depots on British Railways; and new loose-leaf and Roneodex record books will provide easier reference to freight rates and similar detail at stations.

Locomotive News

Allocation of new engines mentioned last month includes Nos. 73125–6, class 5 4–6–0, to 84G, Shrewsbury shed, and diesel-electric shunters Nos. 13258–62, 87F, Llanelly. Continuing those series, Nos. 73127 and 13263 have entered W.R. service from Derby Works, as has 0–6–0T No. 3407, from the Yorkshire Engine Co. More class 4 2–6–4Ts numbered 80139–41 have gone to 34E, Neasden; in August they were temporarily running from Brighton, where they were built. Two more class 9 2–10–0s, Nos. 92097–8, were to be stationed at 54B, Tyne Dock.

Additions to the oil-fuelled shunting locomotive stock also included Nos. 13313–5, diesel-electric, to 50A, York; No. 11142, 32B, Ipswich; No. 11148, 6C, Birkenhead; and Nos. 11177–8, 34A, King's Cross, the last four being diesel-mechanical.

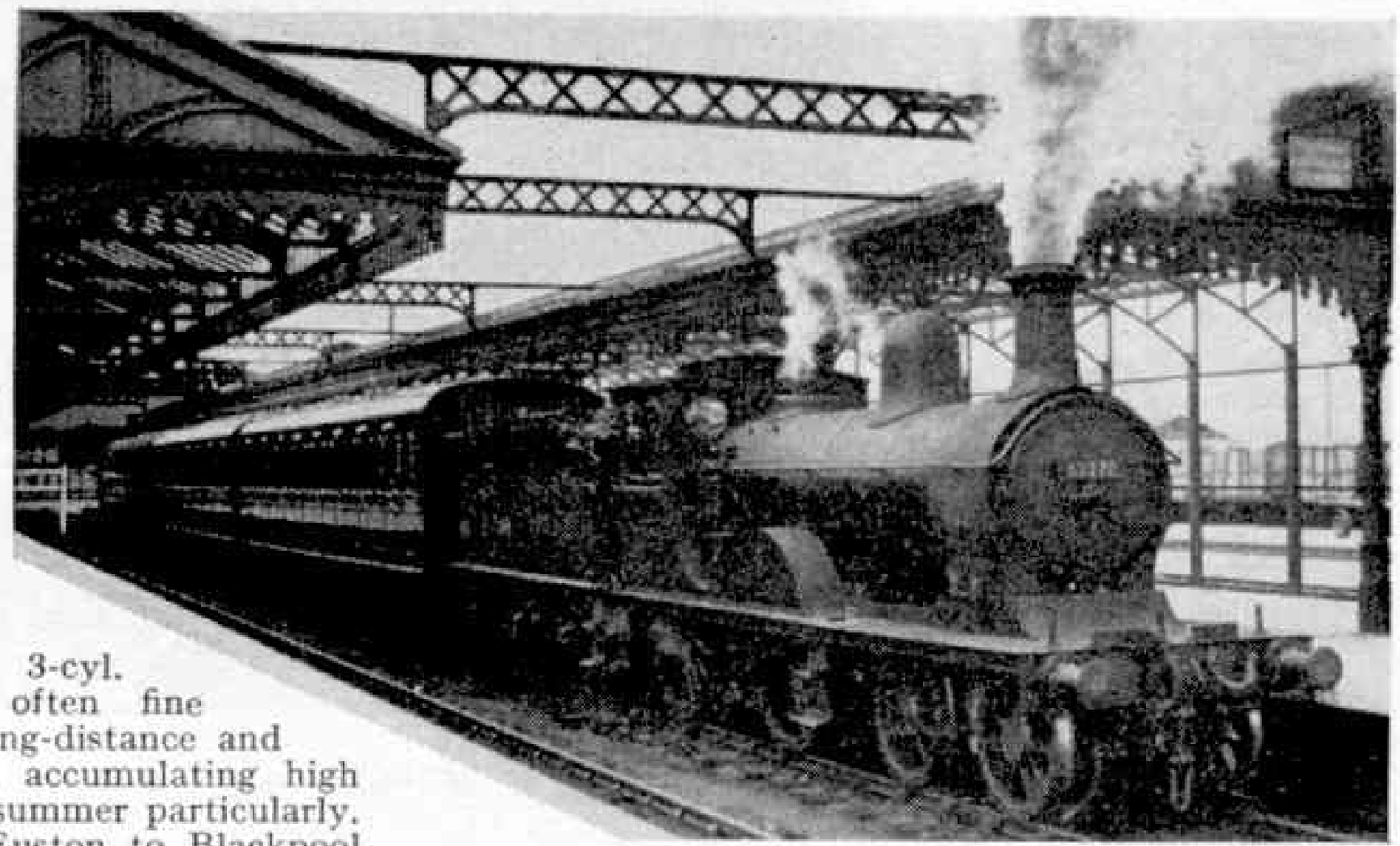
The Southern-built 500 h.p. 0–6–0 diesel-mechanical No. 11001, which has been on trial at various stations, was lately loaned to 34B, Hornsey, E.R. It is understood that a number of motive power depots in the West Riding, Yorkshire, formerly included in the London Midland, and Eastern, Regional numeration, have been renumbered into new N.E. districts and lettered 55A–G and 56A–G.

Southern Tidings

One of the last month's illustrations depicted an H2 4–4–2 locomotive running on the Brighton-Bournemouth through service. These last representatives of the once famous and numerous British Atlantic type on the active list are becoming scarcer. During August No. 32425 *Trevose Head* hauled several substantial boat trains on the Newhaven-Victoria route with apparent success, gaining time despite several delays with 12 corridor coaches weighing over 400 tons full, on a fairly liberal 91-min. schedule as logged by Mr. W. Jackson. I travelled behind No. 32424 *Beachy Head*, in a Hastings-Eastbourne-Sheffield holiday train, made up of 10 ex-L.N.E.R. carriages, without a stop from Polegate to East Croydon, 51½ miles, including a good deal of the busy electrified Brighton main line which, however, on Saturdays at the height of the summer season carries quite a number of steam through Midlands trains travelling by way of Redhill-Reading, or over the West London connecting lines, Clapham Junction-Kensington (Olympia). Other engines used from point to point on the Brighton-Hastings lines, to and from Redhill or the London area this year included Schools, L 4–4–0s and L.M. class 5 4–6–0s on one Manchester-Brighton working; 2–6–0s of various Southern types, also B.R. 76000 and W.R. 4300 classes; West Countries; class 4 2–6–4Ts, etc.

The steeply graded Chatham main line at summer week-ends carries a succession of fast or semi-fast

trains to and from Kent coast resorts, and is on those occasions very much a Mogul route! Almost indiscriminately the locomotives I noted during two recording spells comprised many 2–6–0s of the S.R. 2- and 3-cyl. classes, B.R. 4–6–0s classes 4 and 5, King Arthurs, light Pacifics, Schools and some 2-cyl. 4–4–0s including veteran D1 rebuilds. There were also representatives of the Merchant Navy and Britannia classes on Continental expresses, mostly running via Ashford.



The first two coaches of this train, and the engine, 4-4-0 No. 62270, are former G.N.S. stock, an unusual pre-grouping combination in 1956. Photograph by C. Lawson-Kerr.

More Fine Runs Summarised

The rebuilt Patriot class 7 3-cyl. London Midland 4–6–0s are often fine performers, sharing important long-distance and fast duties with the Scots and accumulating high mileages, as is a general rule in summer particularly. On the 5.5 p.m. express from Euston to Blackpool and other Lancashire towns, No. 45514 *Holyhead* in the hands of a keen Camden crew had a very heavy 16-coach load weighing over 500 tons, receiving banking assistance up the initial sharp rise to the Locomotive Sheds. There was a signal slowing at Willesden, but after that all was clear to Rugby, the first stop, reached in 91 min., two min. before time and in 88 min. net for the 82½ miles. Maximum speeds were 70–72 m.p.h. Southbound from Rugby to Watford with 15 on, including some of the latest, heavier rolling stock, No. 45534 *E. Tootal Broadhurst*, stationed and manned at Edge Hill, Liverpool, on a faster timing did well to lose only about 2 min. on a rough day. Two severe track repair slowings affected uphill performance. A maximum of 80 m.p.h. was reached downhill before the Watford stop.

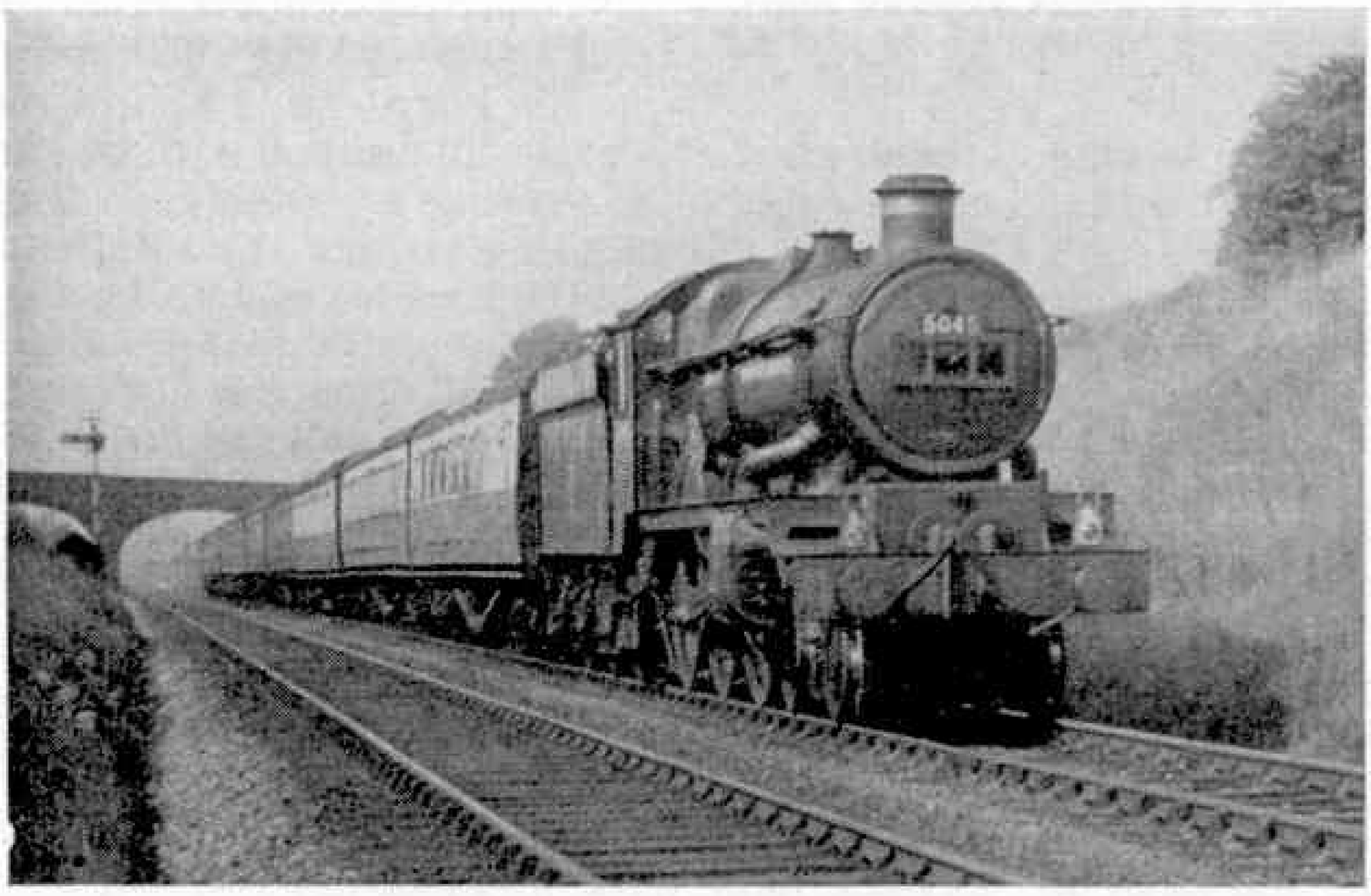
The less powerful class 6 Jubilee 4–6–0s, more numerous and employed over a wider area, are also seen on a number of Euston expresses to and from the north of England. Between Stafford and Rugby, not long ago, I saw three in a short time on fast Liverpool trains, including the non-stop down *Manxman* and an Ocean Liner special.

During the summer season the *Royal Scot* is worked through without passenger stop between Glasgow and London by the same engine, usually a Camden 8P 4–6–2. *City of Glasgow* with a handsome 13-coach train ran into Euston 6 min. before time on a July day, although starting 2 min. late from Upperby, on the south side of Carlisle, where the enthusiastic Camden crew took over from the Scottish driver and fireman, then having to make a special stop to take water at Penrith among the Cumberland hills. From there more than a mile-a-minute was averaged for about 280 miles, including the ascent of Shap and the negotiation of busy junctions and stations with some extra speed restrictions!

On the Bristolian, No. 5055 *Earl of Eldon* ran steadily for over 50 miles on the level or slightly uphill track at round about 75 m.p.h., covering 114 miles from Paddington start in 99 min. With a slow finish the arrival at Bristol was exactly to time at 10.30 a.m. There was a slowing east of Swindon over a bridge under repair, which also applied to the corresponding up flyer hauled by *Donnington Castle*—just then an Old Oak engine was taking the 4.30 p.m. instead of a Bristol one. Nevertheless, the arrival at Paddington was 2 min. early at an overall average of 68 m.p.h., with a maximum of about 90. The normal 7-coach load was carried.

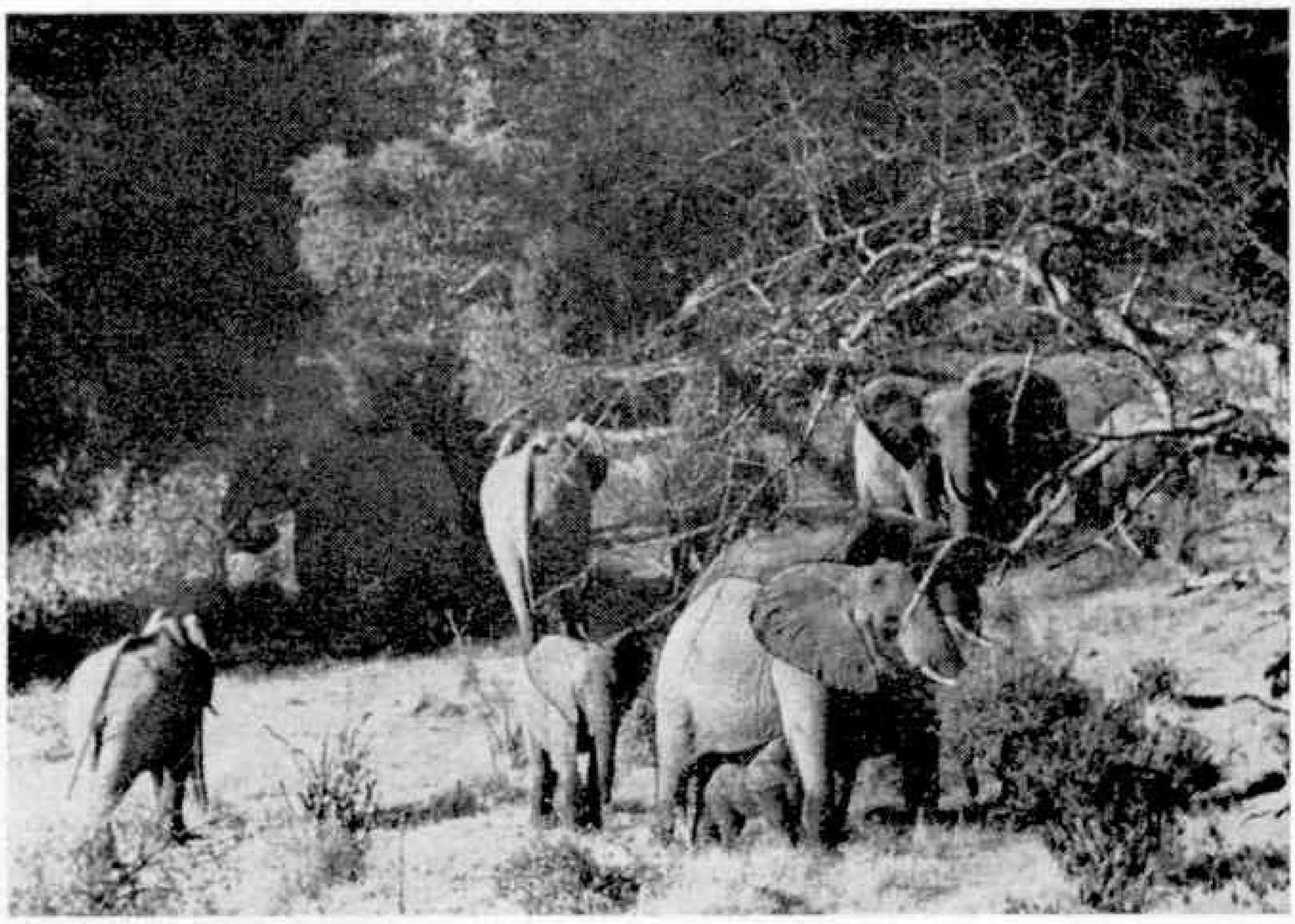
The first Castle fitted with double chimney and other modifications, No. 7018 *Drysllwyn Castle*, transferred to Bristol Depot, is reported to have made the 117½-mile eastbound run in 99 min. or less, and to have attained maxima well over 90 m.p.h. Messrs. B. C. Bending and Norman Harvey have kindly supplied some of the these details.

By courtesy of Messrs. D. S. Barrie, M.B.E., and R. Stephenson, I can report more good runs up from S. Wales. On separate occasions the 8-coach *Pembroke Coast Express*, hauled by *Coity Castle* and *Tresco Abbey* respectively, gained 3 and 2 min. from Newport to Paddington, each arriving to time, some extra slacks included. The *South Wales Pullman*, in charge of *Harlech Castle*, with 8 cars after a fast run was at Paddington 3 min. before time.



An up express of the Western Region near Denham, hauled by No. 5045 "Earl of Dudley" of the Castle class. Photograph by E. R. Wethersett.

The Biggest Thing on Feet



By R. H. Ferry, F.Z.S.

AFRICAN elephants are the biggest land going animals in the world, and runners up to blue whales for the world's heavyweight prize. A large African specimen may have a forefoot boasting a circumference of 68 inches, and each of its tusks may weigh as much as a sack of corn.

No beast is so magnificent as the elephant in pageantry, so awe inspiring in the wilds, or so pleasing to the critical eye of a small child in the Zoo. We have only to see one for our thoughts to be raised from commonplace things, and for the imagination to soar on a magic safari in lands where mighty creatures live, where slow running rivers snake their tortuous ways through virgin forests and towering mountain ranges fence in the tropical valleys.

Above is a delightful picture of domestic life in the African elephant world.

Elephants have always been a popular subject for artists. In the Old Stone Age, drawings of the animals were engraved on ivory and bone and as murals they decorated dens and dark tunnels. Elephants indeed were "pin up" animals in an age of strength before beauty.

As one of the few links we have left to us of the prehistoric ages of mighty beasts, elephants have an undeniable fascination. While the origin of many mammals is totally lost, or remains, at best, conjecture shrouded in the mists of time, the path of pachyderms is clear cut through the incredible time of thirty million years. Successive ice ages, alternating with periods of great tropical heat, failed to obliterate the line of these beasts or to wilt their ancestral tree. This ability to live in a wide variety of conditions, and in extremes of climate, is a faculty retained by the elephants of today.

The elephant's trunk is, of course, its primary feature and most vital organ. It breathes with it, smells with it and gives love pats and kisses with it. So adroit is the beast in using it that it can pick up a pin off the ground—it contains as many as 40,000 nerve endings.

The wild elephant's trunk is not the tender bun-taking structure seen in the Zoo, however, but a powerful weapon with which it is capable of rooting up trees of a ton weight. For scenting powers the elephant probably equals the coyote, said to be the hardest animal in the world to approach. The small pig-like eyes give the elephant poor sight beyond fifty yards, but this is made up for by the giant ears which can be raised in alarm. A herd can hear the snapping of a twig made by an unwary hunter in a quiet forest at the incredible distance of half a mile.

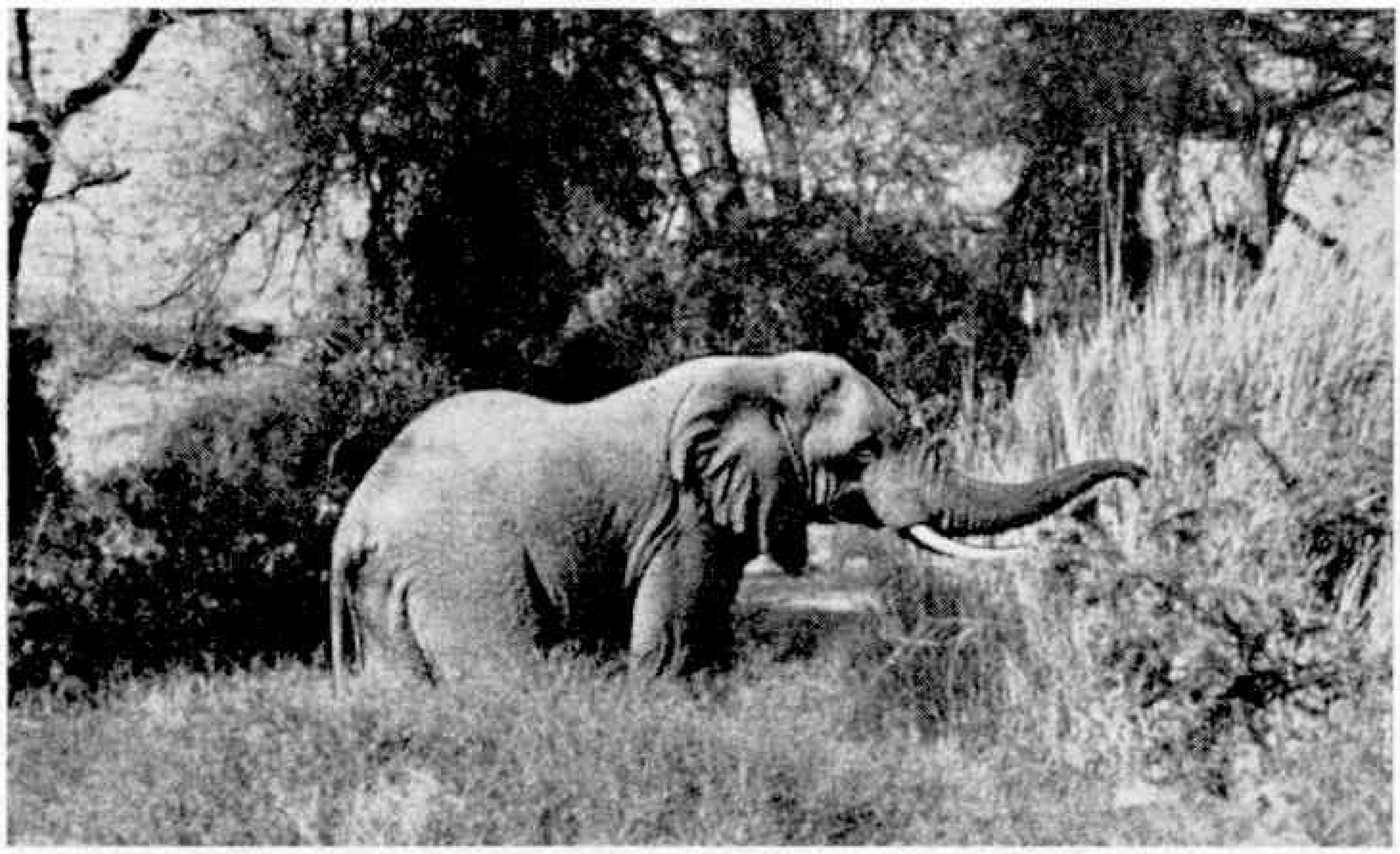
It would be foolish to disbelieve stories of elephant intelligence often told by Zoo keepers and circus hands with long experience. "An elephant never forgets" is an age-old adage. As a hunter, I have on more than one occasion been astounded,

not to say terrified, by an elephant's cunning and apparent brain power. But the elephant's brain is not, in fact, large compared to the overall size of the beast. It would be fair to say that an elephant's reasoning equals that of a small dog—which is saying not a little!

But some stories about elephants do not hold water. The well known story of the elephant giving its unpopular keeper a shower with muddy water is one of these. The act would surely be one of kindness in elephant reasoning, for all elephants love dirty water. In fact baths of mud and water are necessary to an elephant's health.

African elephants are essentially creatures of the wilds, though they are sometimes tamed and trained to do forestry work. Only perhaps in a wild environment can their true character be assessed. There they combine speed, strength and sagacity against their only enemy—man. Coupled with majestic grandeur, these qualities are rarely found together in any one species of wild beast.

Even in this age of excitement and adventure, there can be few greater thrills than tracking elephants with a camera. With cheaper air transport, the cost of safari will be appreciably reduced in the near future, and there seems no reason why many more people should not be able to see elephants in their natural surroundings than ever before.



Feeding time in an African forest.

Though it has been stated that there can be no room for elephants in the modern world, herds are actually on the increase in the Luangwa Valley, in Northern Rhodesia—the elephant's paradise—and Game Wardens report them well behaved. But if you are thinking of buying an elephant it will cost you £2,000! Before the war you could have got one for £700.

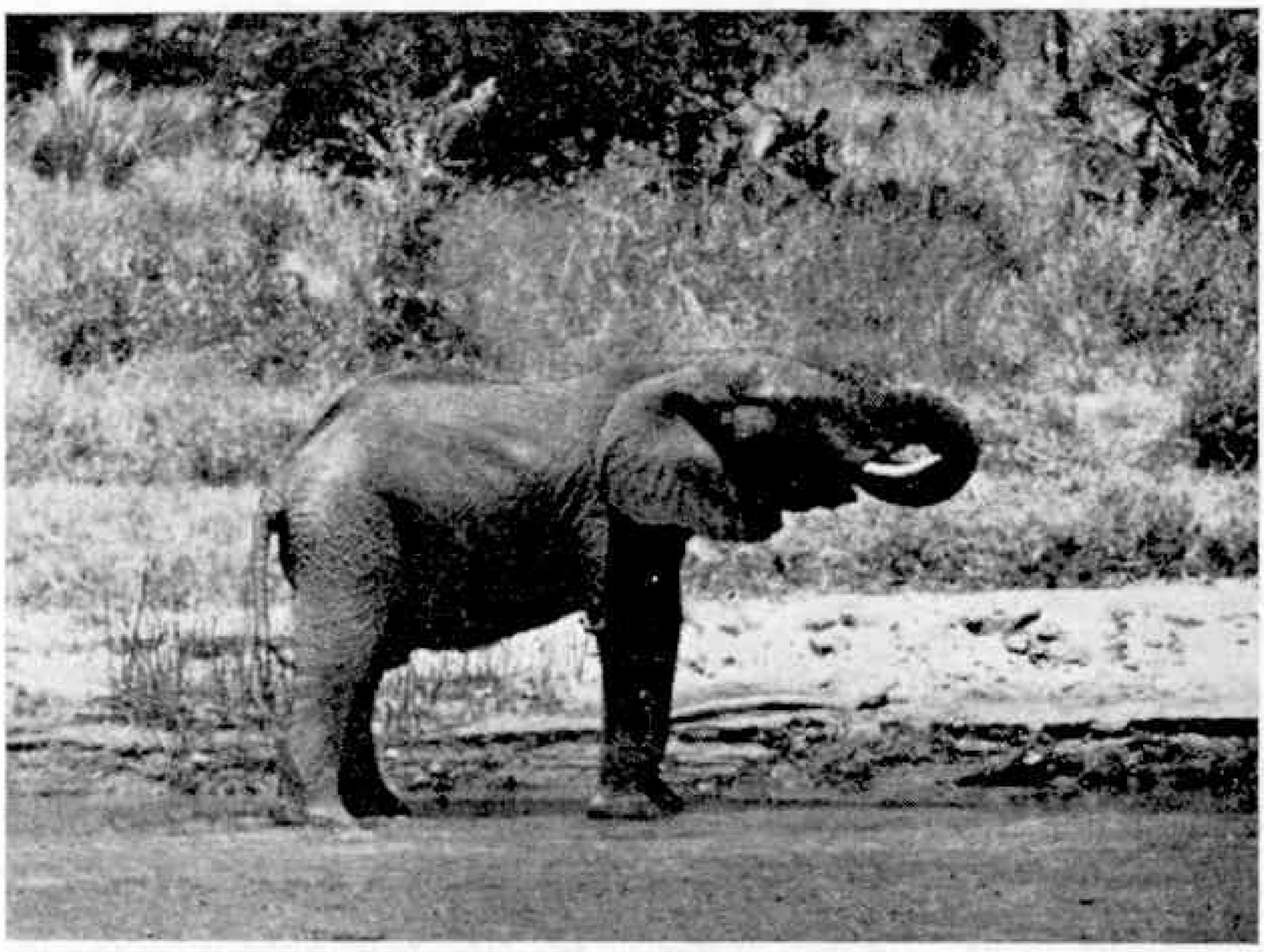
Bad temper in an elephant can often be traced to a rotten tooth. In the Congo some years ago three pints of pus were extracted from the head of a beast afflicted with tooth-ache. Elephants cut their teeth all through their lives—a painful but convenient process. Sets of molars come up from behind as the forward ones wear out. On the other hand, tusks only grow once, and tuskless African elephants are rare. An elephant's life depends directly on the state of its teeth. Coming to maturity at 20 years of age, an elephant has been known to live in captivity for 120 years.

A charging bull elephant is the most warlike sight and hair-raising spectacle that a hunter can encounter. These "boss" elephants charge with their trunks down and extended, and not, as is so often erroneously depicted by artists, with trunks raised and rampant, while the mighty ears when spread to the full extent measure 15 feet.

In contrast to a charging bull, I have never seen a more peaceful sight than a group of young bulls standing in the shade of a "wait a bit" umbrella-like thorn tree. With their eyes half closed in slumber, and the tips of their trunks lovingly crossed, they sway their bodies gently as if a nursery lullaby ran through their day-dreams. It is on these occasions that the hunter is more than paid for his trouble. The nearness of giant beasts, the heat haze and the silence, broken only by the buzzing flies, make the world far distant. Such sights remain quite clearly in the mind throughout a lifetime.

No narrative about elephants would be complete without mention of the age old question—"Where do elephants go to die?" A good deal of light has been thrown recently on this problem. It is said that

elephants die in the forests, but that their bones, and even their ivory tusks, soon decompose under the ravages of ants and exposure to extremes of weather. Luxuriant patches of vegetation remain only to mark the last resting place of fallen giants, and as living monuments to the greatest beasts on earth.



Draining the last drop in the bottle! The end of a long drink.

That some elephants trek long distances to die is proved by the discovery of large bones high up on mountain slopes. Many elephants undoubtedly make for a big river when they feel their end drawing near. There they sink down into the deep engulfing ooze that does not give up its dead or ever again reveal its secrets. This may account for the fact that many hunters have never set eyes on an elephant that has died from natural causes—and this in spite of the 2,000 pachyderms that die annually in tropical Africa.

In direct contradiction to these theories, large caches of ivory in a fair state of preservation have been found from time to time, which could not possibly have been made by human agency.

I have safaried far and wide on the track of elephants, and I like to keep alive the old hunter's belief that elephants make for some far off valley, unknown to man, where they lie down to die in an "elephants' burial ground."

Swiss Mountain Railways—(*Continued from page 508*)

Lastly, there are the chair-lifts, which also adopt the suspension principle, but in general have pylons much more closely spaced and do not travel at above tree-top height. In the single chair-lifts—the simplest type—a series of chairs is attached permanently to a moving rope, which also supports their weight, so that they never stop when the line is in operation. The intending passenger stands on a platform in the line in which the chair is coming until it hits the right part of his anatomy, when, assisted by an attendant, he drops into it. Similarly helped by an attendant he has to get out at the other end without the chair stopping.

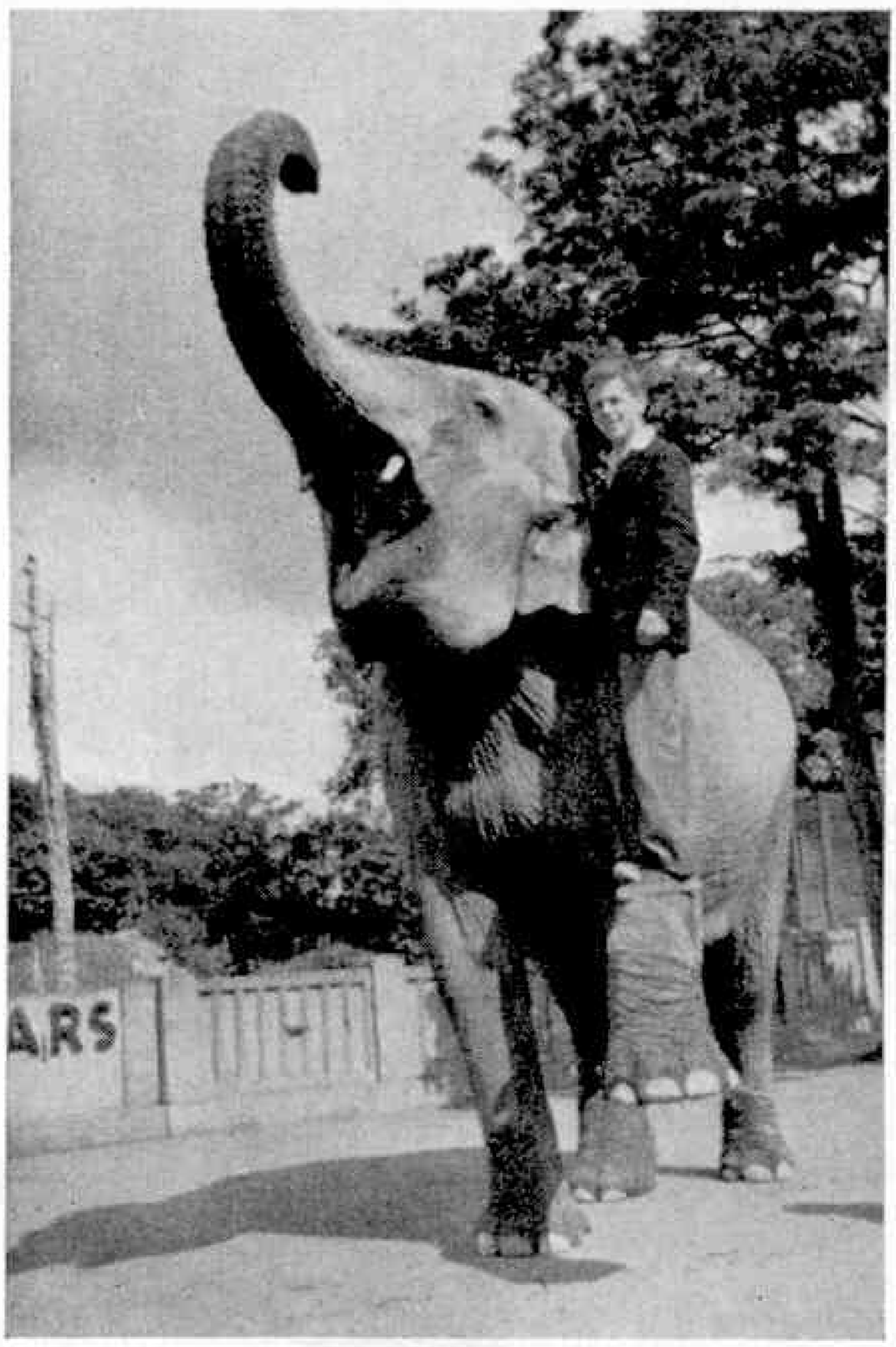
On the more elaborate lines with double chairs, however, the chairs come off on to runways at the lower and upper terminals, so that the passengers can get in and out in comfort while they are stationary. Preserving a certain minimum distance between each pair of chairs, the attendants move them on to the rope at any frequency required by the flow of traffic, up to a maximum, on some of these lines, of 450 passengers an hour, which is more than any funicular railway could carry. The longer lines are built in two or more independent sections, with ingenious junction stations at which through chairs are passed through from one rope on to the next. The record is held by the chair-lift from Grindelwald up to First, which has four sections, is 2¾ miles long, climbs 3,625 ft.—and owns 220 pairs of chairs!

The very latest development is known as the "gondelbahn", and in future construction this seems likely to rival every other kind of mountain railway transport in Switzerland. The working principle is that of the chair-lift, with the chairs moved from fixed runways on to the rope as the traffic demands, but instead of open chairs, dinky little closed cars are used, each made of aluminium and seating four passengers, who thus are given complete protection from the weather.

A number of these lines are now in service, of which perhaps the most important is the new two-section 2¾ mile gondelbahn from Kriens, just outside Lucerne, up to Fräkmüntegg, where it connects with the startling new luftseilbahn up the cliffs forming the east face of Pilatus, to which I have referred already. One of the most spectacular and unforgettable trips that Switzerland now affords is to take the steamer on the lake to Alpnachstad, and the wonderful rack-and-pinion railway up Pilatus, with its 1 in 2 gradients, and then to be swung by the luftseilbahn and gondelbahn from the summit down to Lucerne once again. There is nothing more exciting that I can recommend to readers of *Meccano Magazine* than to go out to Switzerland and to see and try these wonders for themselves.

Finally, a word about this month's cover. On it you can see two different kinds of Swiss mountain travel. In the foreground, one of the electric motor coaches of the Bex-Villars-Bretaye Railway has just made its way up, by rack-and-pinion—the teeth of the rack can be seen in front of the ski-wagon it has been pushing—to the Col de Bretaye, a mountain pass 5,932 ft. above the sea; many of the skiers will have come up from Bex in the Rhone valley, 4,684 ft. below. Behind the train is seen the "funi-ski," which is simply a large sledge for skiers and their skies, worked by ropes after the manner of a funicular railway, up to the summit of the Chamossaire, the 6,950 ft. peak in the background. As the funi-ski is dependent on the snow to enable it to slide, it is only in use during the winter sports season; but the electric rack-and-pinion railway works throughout the year.

Junior Section

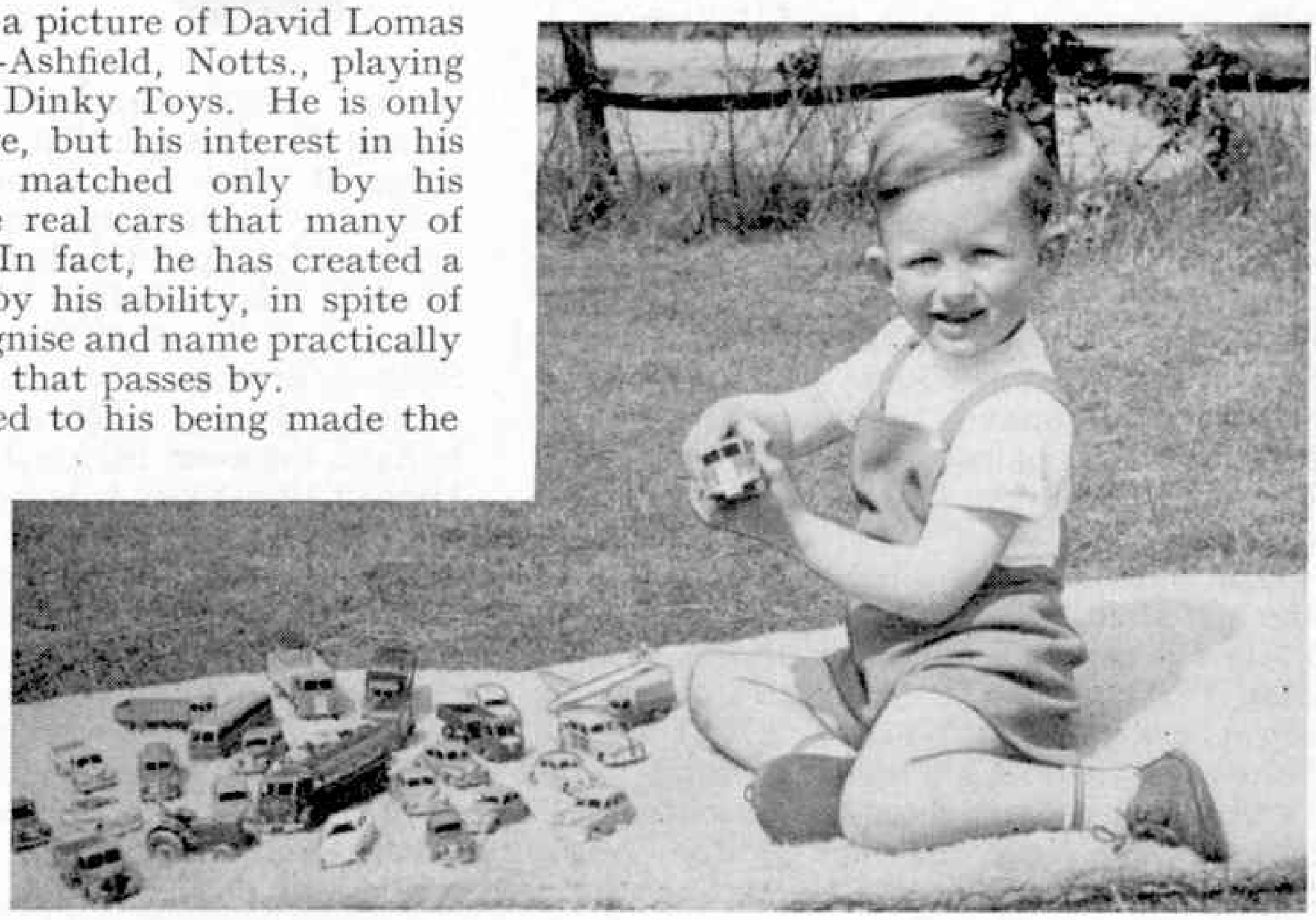


Rodger G. Love, Liverpool, plays tricks with an Indian elephant in Phœnix Park, Dublin.

ON the right is a picture of David Lomas of Sutton-in-Ashfield, Notts., playing happily with his Dinky Toys. He is only three years of age, but his interest in his Dinky Toys is matched only by his knowledge of the real cars that many of them represent. In fact, he has created a local reputation by his ability, in spite of his youth, to recognise and name practically every car or lorry that passes by.

David's fame led to his being made the subject of a test by a representative of Sutton's local newspaper. In this test David began by naming every vehicle pictured in a toy car catalogue, including one that he had not seen, although he is unable to read. Then he was taken outside and stood on the pavement edge to watch passing traffic. One by one he named every car and lorry that came into sight, about 150 yards away. He followed this up by naming every car that could be found in a neighbouring garage, and after half an hour's test, in which he slipped only once, he waved goodbye to the newspaper representative and called out that a Morris was just coming around the traffic island.

This was a wonderful display of brilliance and powers of memory, and David's parents believe that it is through his collection of Dinky Toys that he has come to know so much about real cars and lorries.



David Lomas, of Sutton-in-Ashfield, Notts., although only three years old, can name practically any car or lorry he sees in the streets.

Easy Model-Building

Spanner's Special Section for Juniors

A Fine Gantry Crane

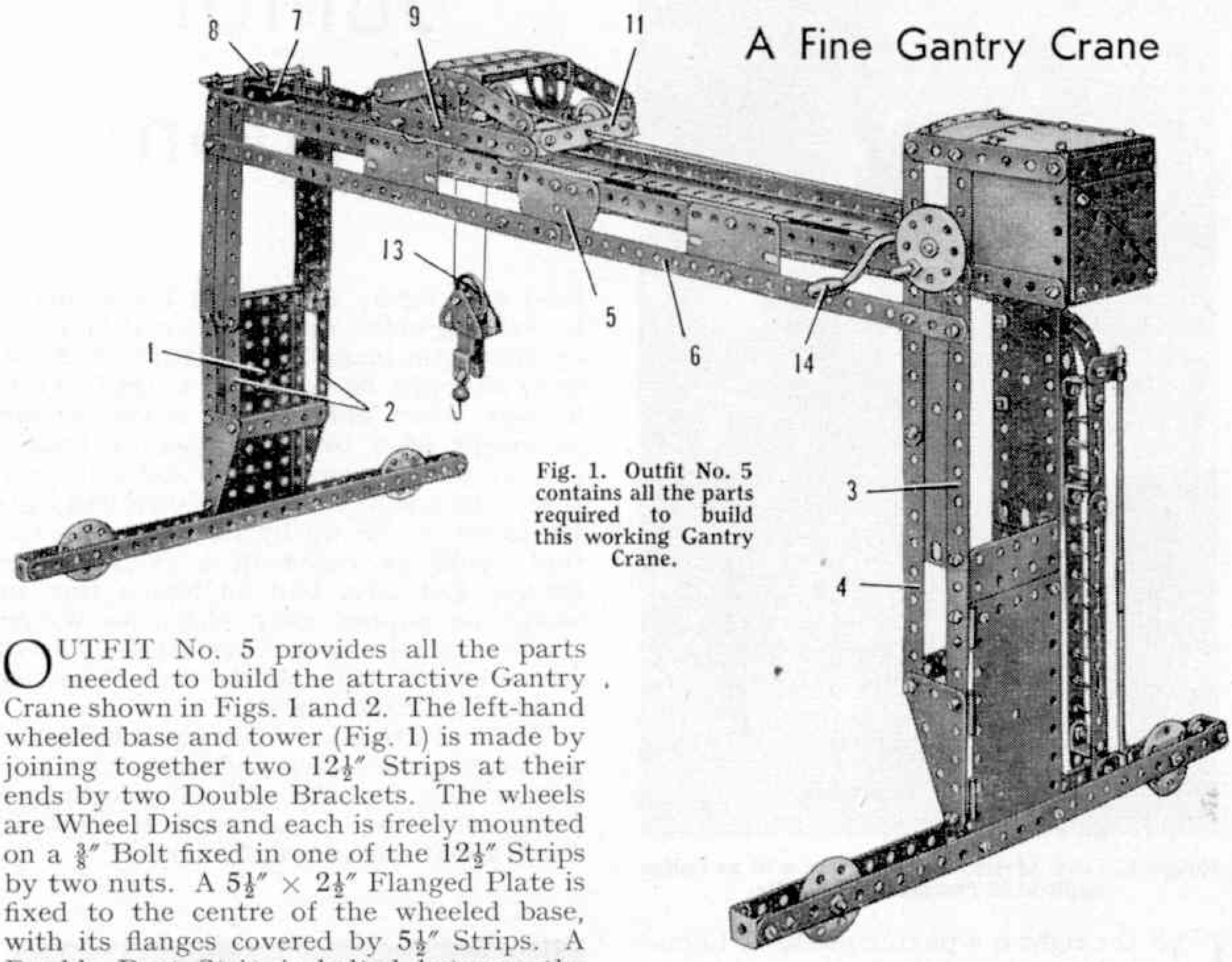


Fig. 1. Outfit No. 5 contains all the parts required to build this working Gantry Crane.

OUTFIT No. 5 provides all the parts needed to build the attractive Gantry Crane shown in Figs. 1 and 2. The left-hand wheeled base and tower (Fig. 1) is made by joining together two 12½″ Strips at their ends by two Double Brackets. The wheels are Wheel Discs and each is freely mounted on a ⅜″ Bolt fixed in one of the 12½″ Strips by two nuts. A 5½″ × 2½″ Flanged Plate is fixed to the centre of the wheeled base, with its flanges covered by 5½″ Strips. A Double Bent Strip is bolted between the Flanged Plate and the inner 12½″ Strip of the wheeled base.

A 2½″ × 1½″ Triangular Flexible Plate is bolted to each flange of the Flanged Plate 1 as shown, and is extended upward by a 3½″ Strip 2. A 2½″ × ½″ Double Angle Strip is placed between the lower ends of these Strips. The Flanged Plate and the Strips 2 are then extended by four 5½″ Strips, arranged in pairs on each side with 5½″ × 1½″ Flexible Plates bolted between them.

The right-hand wheeled base is similar to the one already described, but the Flanged Plate 1 is replaced by one half of a Hinged Flat Plate, and the main girders of the tower are two 12½″ Strips 3. These are bolted at their lower ends to a 2½″ × ½″ Double Angle Strip fixed to the outer 12½″ Strip of the base, and the Double Angle Strip is connected to the inner 12½″ Strip by an Angle Bracket. Two 2½″ × 1½″ Triangular Flexible Plates are bolted to the Strips 3, and each supports a made-up strip 4. Each strip consists of two 5½″ Strips overlapped two holes, with 5½″ × 1½″ Flexible Plates bolted between them and the Strips 3. A 2½″ × ½″ Double Angle Strip is arranged between the lower ends of strips 4, and a 2½″ × 1½″ Flanged Plate is fixed between Strips 3. The half of the Hinged Flat Plate is bolted to this Flanged Plate.

The main girder forming each side of the gantry consists of two 12½″ Angle Girders joined end to end at the centre by a Semi-Circular Plate 5, and a made-up strip 6 formed by two 12½″ Strips overlapped four holes. Two 2½″ × 1½″ Flexible Plates on each side are bolted between the Angle Girders and the strips 6. The main girders are bolted to the towers as shown, and at

the left-hand side (Fig.1), a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 7 is fixed in place. The bolts used to attach this Double Angle Strip support also Fishplates, which carry a $3\frac{1}{2}''$ Rod fitted with a $\frac{1}{2}''$ loose Pulley 8.

The sides of the control cabin are $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates bolted to the projecting ends of the $12\frac{1}{2}''$ Angle Girders. The upper edges of the Flexible Plates are strengthened by two $2\frac{1}{2}''$ Strips overlapped three holes, and these are fixed also to the upper ends of Strips 3 and made-up strips 4. The back of the cabin is made from two $2\frac{1}{2}'' \times 2''$ Triangular Flexible Plates overlapped diagonally and bolted to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip fixed between the ends of the $12\frac{1}{2}''$ Angle Girders. A similar Double Angle Strip is placed between the outer corners of the sides of the cabin. The roof is made from two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates overlapped three holes and strengthened at each end by a $2\frac{1}{2}''$ Stepped Curved Strip. The roof is attached to Angle Brackets bolted to the sides.

Each side of the crab or travelling carriage is made by bolting a Fishplate and an Angle Bracket to each end of a $5\frac{1}{2}''$ Strip 9. Two $2\frac{1}{2}''$ Strips are fixed between the Fishplates and Flat Trunnion attached to the centre of the Strip 9. The sides are connected by two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips 10 and by $2\frac{1}{2}''$ Strips 11 bolted to the Angle Brackets at the ends of Strips 9. The wheels are 1" Pulleys arranged in pairs on $3\frac{1}{2}''$ Rods supported in the Strips 9. One wheel on each Rod is fixed in place, and the other is loosely mounted but is held in position by a Spring Clip. A 1" loose Pulley 12 is freely mounted between $\frac{3}{4}''$ Washers and Spring Clips on a $3\frac{1}{2}''$ Rod, which is then held in the Strips 9 by Spring Clips.

The pulley block is made by bolting together two Trunnions, the bolt being used also to support a Stepped Bent Strip that carries a small Loaded Hook suspended on a Pivot Bolt. A 1" loose Pulley 13 is mounted on a 1" Rod, which is held in the Trunnions by Spring Clips.

The travelling movement of the carriage is controlled by a Crank Handle 14 mounted in the strips 4 and held in place by Spring Clips. A length of Cord is tied to the Strip 11 nearest to the Crank Handle, is passed round the Crank Handle three or four times, then is taken round Pulley 8 and is tied to a small Driving Band. The Driving Band is stretched slightly and is fastened by a piece of Cord to the Strip 11 furthest from the Crank Handle.

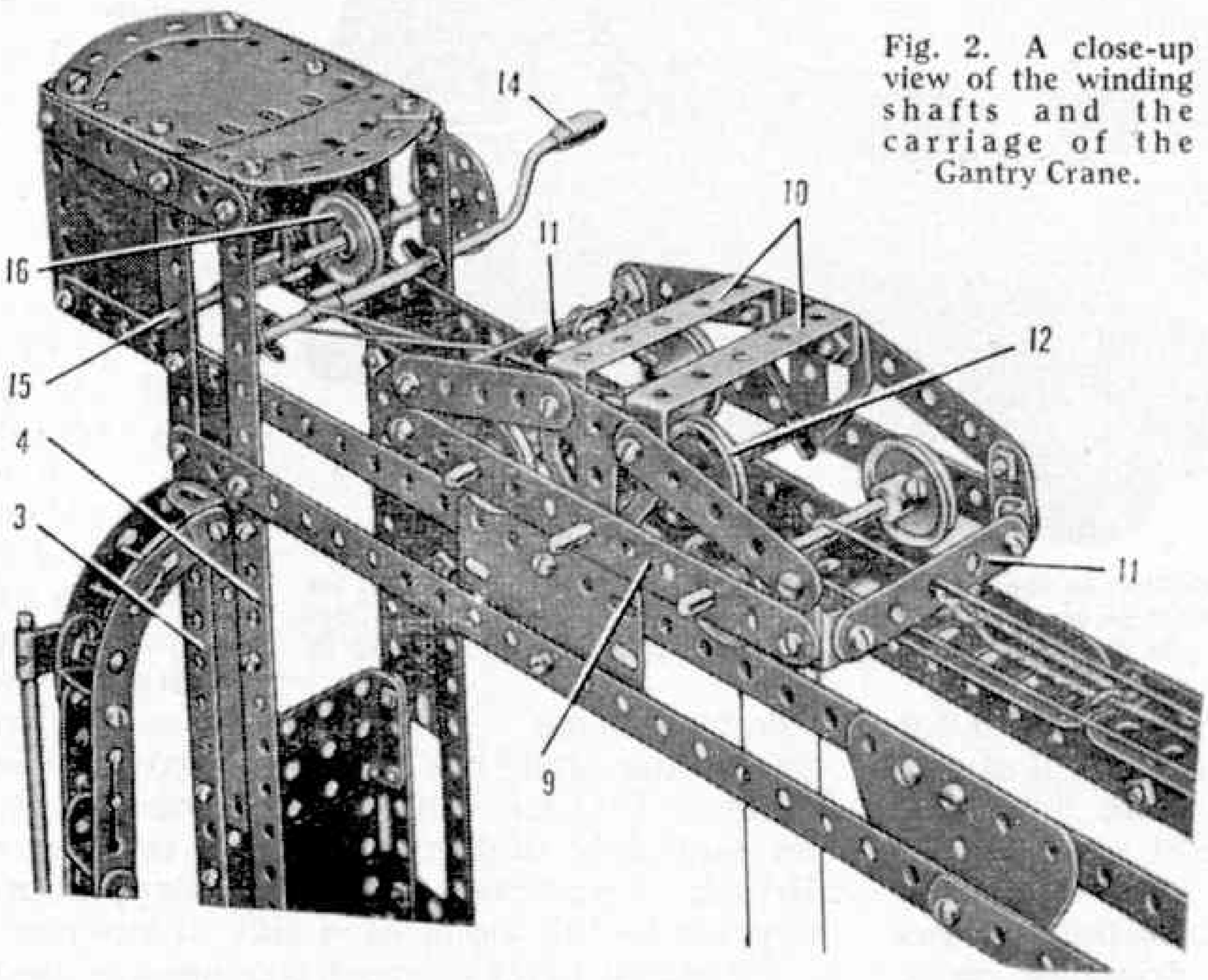


Fig. 2. A close-up view of the winding shafts and the carriage of the Gantry Crane.

Raising and lowering of the load is operated by turning a Bush Wheel on a 4" Rod 15. This Rod is mounted in the Strips 3 and is held in place by a 1" Pulley 16. The Rod is allowed to slide in its bearings slightly, so that the set screw in the Bush Wheel can be engaged with a $\frac{1}{2}''$ Reversed Angle Bracket bolted to the side of the cab to form a simple brake. A length of Cord is tied to a Cord Anchoring Spring on Rod 15, is passed through the centre hole in the nearest Strip 11 and is taken round Pulley 12. The Cord is then passed round the Pulley 13 in the pulley block, is taken over the Rod that carries Pulley 12 and is led through the centre hole of the second Strip 11. The Cord is tied finally to the Rod carrying the Pulley 8.

The model is completed by a ladder between the cabin and the wheeled base. Each side of the ladder consists of a $5\frac{1}{2}''$ Strip, a $2\frac{1}{2}''$ Strip and a $2\frac{1}{2}''$ Stepped Curved Strip. The sides are spaced apart by three $\frac{1}{2}''$ Reversed Angle Brackets and the rungs

(Continued on page 544)

DINKY NEWS

A Real Dinky Toys Van!

By **THE TOYMAN**

THE van pictured here must come first this month, for it is a Dinky Toys Van in two ways. It is a miniature of the Bedford 10 cwt. van that carries the wording "Dinky Toys," and it is also an exact reproduction of one of the actual vehicles used to carry Dinky Toys from our works for distribution all over the world. Its original is also used for bringing castings and finished Dinky Toys from our works at Speke, near Liverpool's airport, to the great original Meccano works at Binns Road. It has carried millions of Dinky Toys while on this service, and there must be few Dinky Toys owners, if any, who do not possess at least one finished Dinky Toy, or Dinky Toys casting, that has had a ride in it.

The real Dinky Toys vans are kept very busy trying to keep pace with the demand for the treaures they carry; and now all of you can have a Dinky Toys Van for your layouts—and you can keep it just as fully occupied in its good work.

The latest addition to the range of Vans will delight every collector, for it is a miniature of one of the actual Bedford vans in which Dinky Toys are carried. Its original must have had millions of Dinky Toys in it.

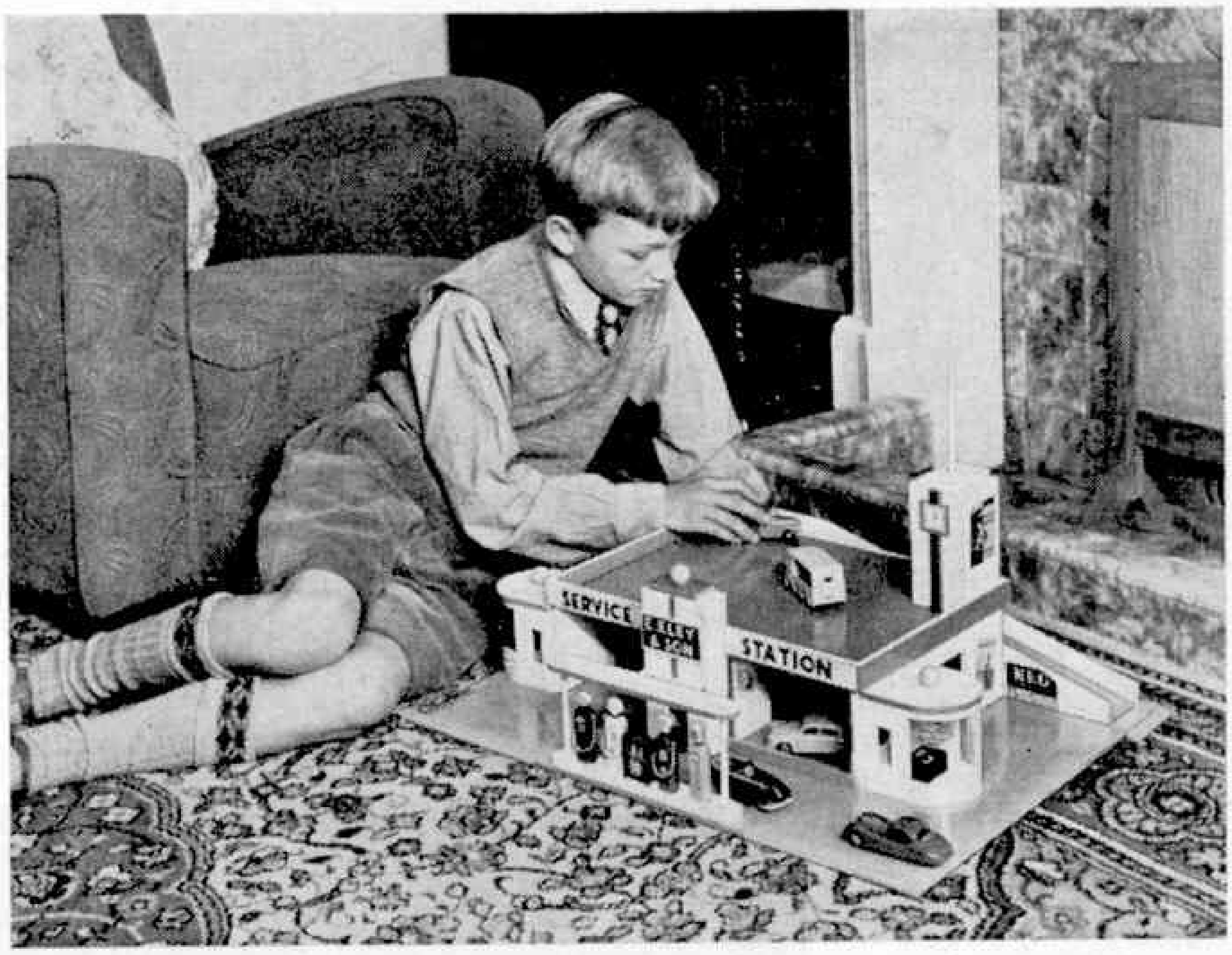
Almost everybody in Liverpool knows these golden yellow and primrose vans, with their lettering in bright red, for they bring quite a sunny splash of colour with them as they run through the streets. The Dinky Toys Bedford 10 cwt. Van looks just like the real thing, as you can see from the fine illustration in colour on the back page of the cover of this issue. The real vans will be very busy for a time now, as there is sure to be a tremendous demand for their Dinky Toys reproduction and that will mean extra work for them. If you want to make sure of having one without delay go round to your usual Dealer as soon as you can.

The second introduction I want to bring to your notice this month is a coach. Public transport vehicles are firm favourites with collectors, and any new coach is sure of a good reception on this point alone. But here is one that has been suggested by a large number of enthusiasts and is associated with one of Britain's airways corporations, so it is certain to arouse widespread interest and create a tremendous demand. It is the B.O.A.C. Coach, No. 283 in the range.

The new model is extremely smart in design and finish. It is based on a Harrington Contender Coach built on a Commer chassis, and it is finished in the attractive British Overseas Airways Corporation colour scheme. The body is enamelled dark blue and the roof is white. The familiar B.O.A.C. letters and flash appear on each side of the body, and the name British Overseas Airways Corporation appears in full along each side of the roof.

In actual practice these coaches are used to convey airline passengers from the centres of towns to the airports and to bring arrivals at the airports into the towns. Very often there are several recognised picking up and alighting points, usually based on the airline booking centre, large hotels and other points where groups of passengers are likely to assemble. The new Dinky Toy opens up many interesting and exciting play schemes, especially if you have a miniature airport as part of your layout.

In my picture, at the foot of the next page, the B.O.A.C. Coach has arrived outside a

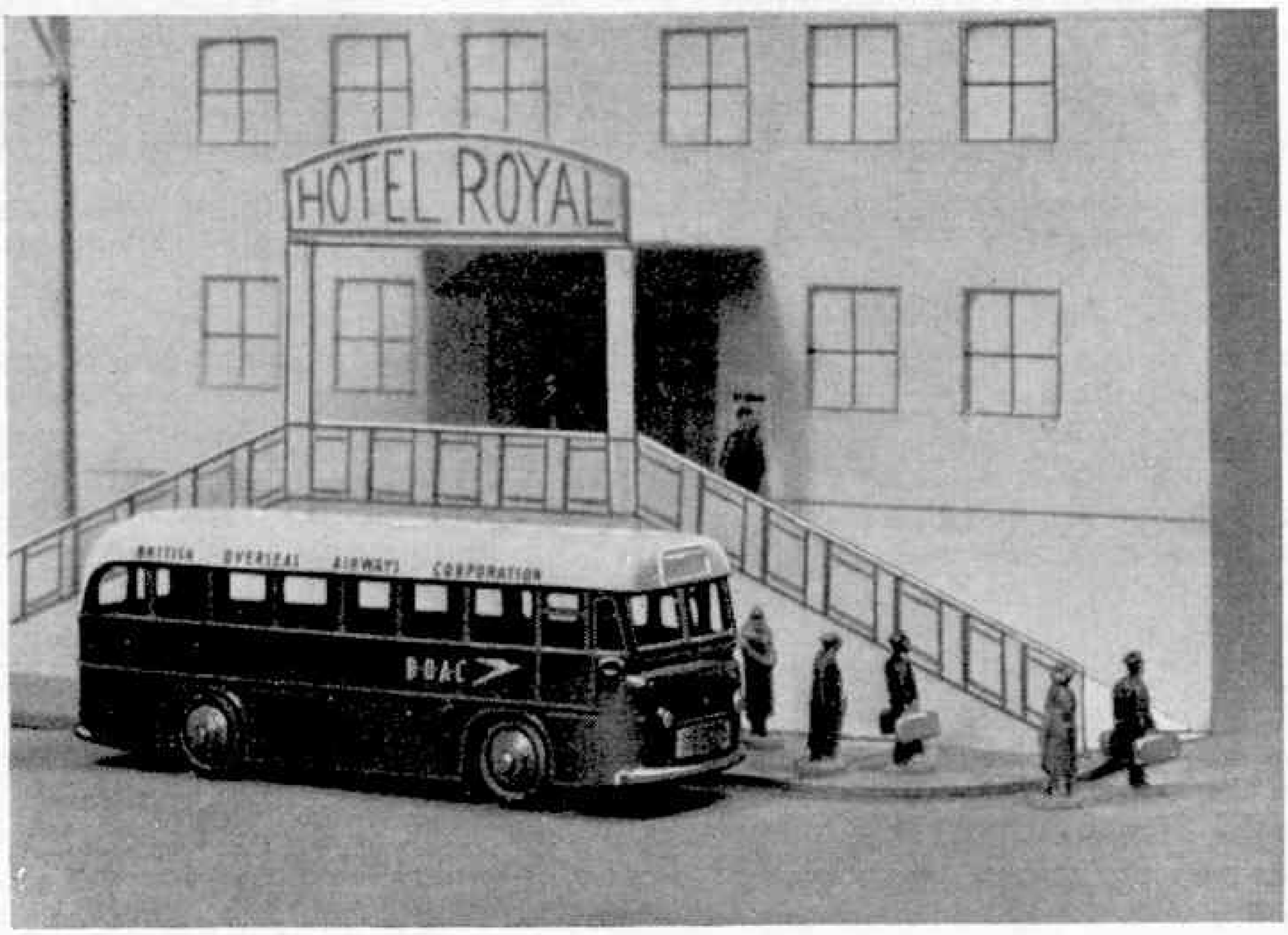


This splendid miniature garage is available in kit form, and is just the thing for a keen Dinky Toys collector.

large hotel and the passengers have alighted and are being ushered into the hotel by porters. The miniature Station Staff and Passengers for Hornby-Dublo Trains are ideal figures for use with the new Coach.

In a miniature town the Coach can be made to operate a regular service, starting by making several calls round the town to pick up passengers, and then making a swift journey to the airport. A return trip from the airport can follow to bring arrivals into the town. If your layout has a town and an airport you can operate the scheme in full, but even if you have no space to arrange an airfield you can have a lot of fun with the town end of the service, running the Coach between the airways terminal and an imaginary airport outside the boundaries of the layout.

My third picture this month shows a model garage that will appeal to every collector who is interested in making an accessory of this kind. As you can see, the model is thoroughly modern in design, with many attractive features. These include spacious showrooms and offices, a clock tower and all the usual servicing facilities of an up-to-date garage. There is ample storage space for vehicles on the flat roof of the model, to which access is gained by a ramp at the rear. This garage was designed by Hobbies Ltd., who have produced a special kit for building the model. It is a really attractive building and I am sure many Dinky Toys enthusiasts will welcome the introduction of the kit for making the garage as it is just fine for use with Dinky Toys vehicles.



The new Dinky Toys B.O.A.C. Coach, No. 283, brings its passengers from the airport to a hotel in a Dinky Town.

What You Can Do in Hornby-Dublo

By "Tommy Dodd"

WE usually talk about Hornby Gauge 0 Trains in these two pages, but this month for a change we will say something about Hornby-Dublo. Many of you begin your railwaying with Hornby Clockwork equipment and sometimes this is developed to quite a large extent, as articles and illustrations in previous issues have shown. In many instances, sooner or later, the change to Hornby-Dublo Electric Trains is made, often because the amount of space available for railway purposes has become filled up and the owner considers that Hornby-Dublo would offer better possibilities for the particular developments that he has in mind.

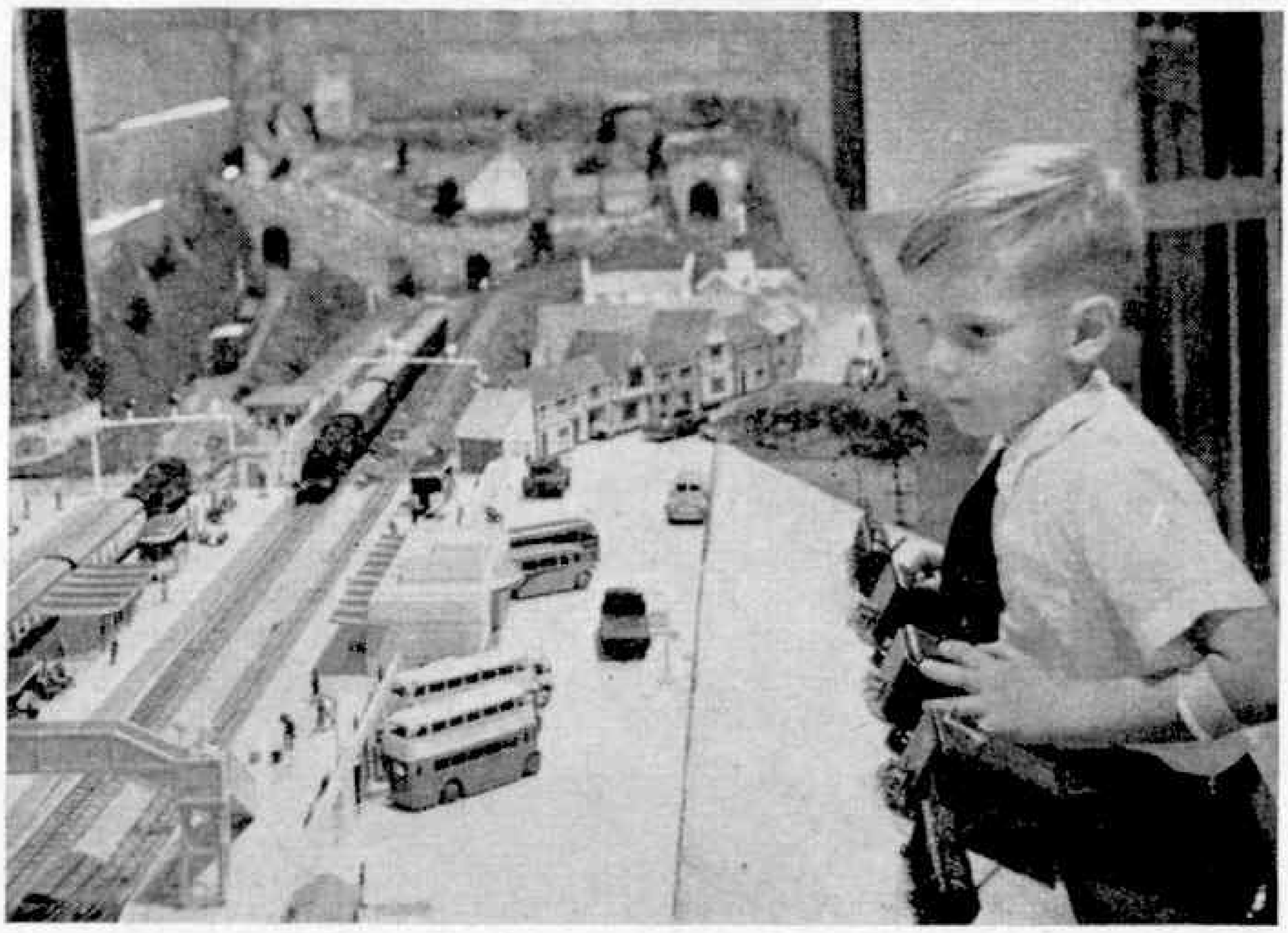
It is quite correct that where space is restricted—and it usually is—the Hornby-Dublo System has special advantages. The layout as a whole can be more complete. The Hornby-Dublo System offers complete remote control so that the operator feels that he really is in charge of things and an interesting system of working can be built up.

Although the Hornby-Dublo beginner has a number of things to learn, his previous experience with Hornby Clockwork Trains will be of great value. All railways are basically the same whatever their size and therefore layout planning follows broadly the same lines in any scale. In Hornby-Dublo the scale employed means that a system can be more complete and station layouts, loop lines and so on can be effectively arranged so that train movements can be carried out in a realistic and satisfying manner.

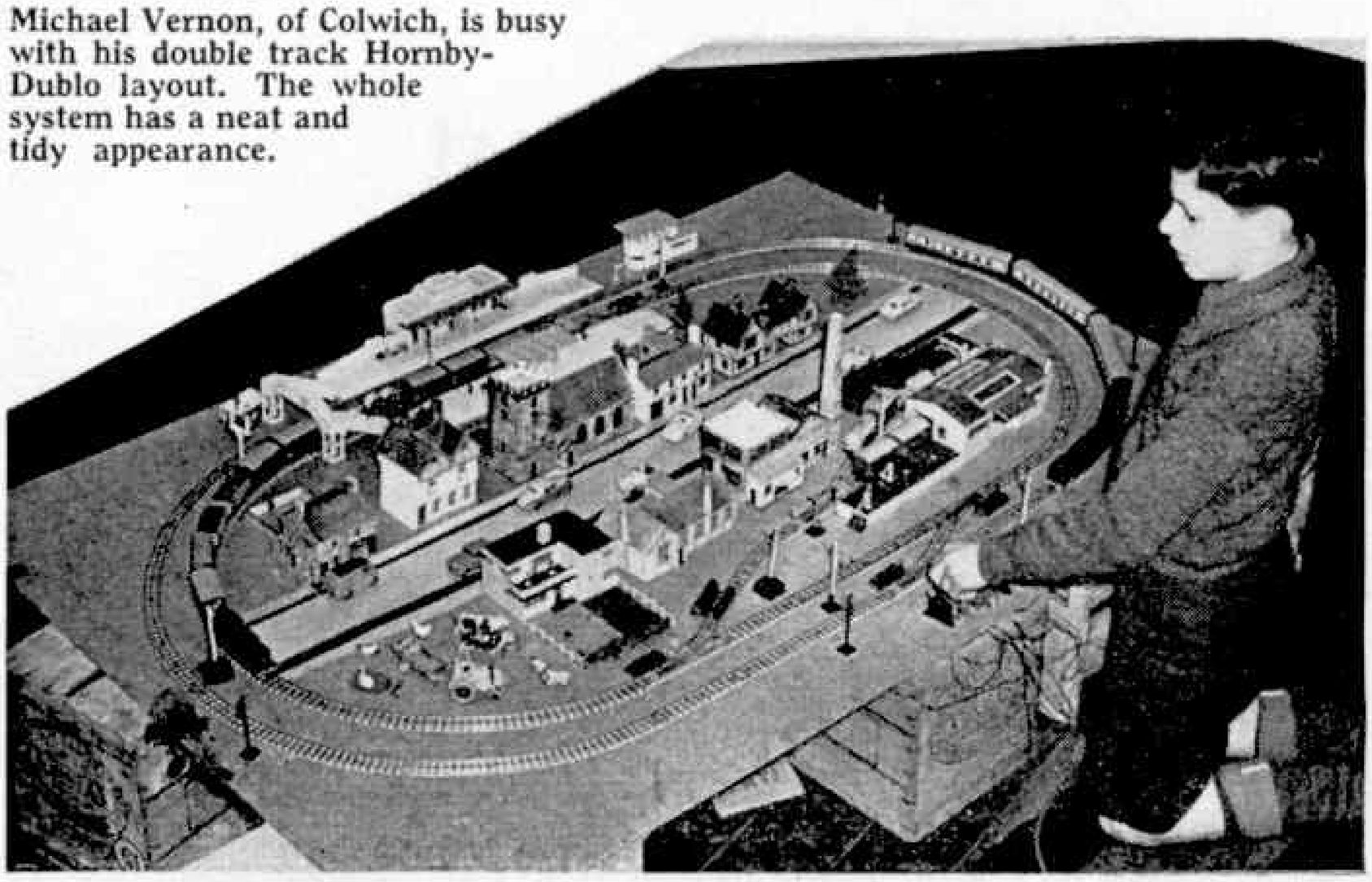
The remote control that is a strong feature of Hornby-Dublo means that there is no need to touch the trains themselves when operations are in progress. Coupling up is automatic when an engine backs on to its train, or when the vehicles themselves are pushed together. Uncoupling can be controlled too, by means of the Electrically Operated Uncoupling Rail and its press-button Switch, which gives literally finger-tip control.

Careful placing of Uncoupling Rails in relation to Points and Isolating sections makes possible a series of realistic operations. Suppose you have a train moving into a Station. The engine can be uncoupled, run round its train and be re-coupled at the other end ready for another trip, all by remote control. Alternatively, it can stand in an isolated section while another engine is brought on to the train to take it away.

In a similar manner, Coaches can be attached or detached at intermediate stations, while the possibilities of goods shunting and marshalling are never-ending. I expect that many of you have seen



Arthur Pearce, at the age of 5, is a capable operator of Hornby-Dublo Trains. He gets plenty of practice on this layout, in Pakistan, developed by his father, Mr. A. R. G. Pearce.



Michael Vernon, of Colwich, is busy with his double track Hornby-Dublo layout. The whole system has a neat and tidy appearance.

Photograph by Jones, Photographers, Rugeley.

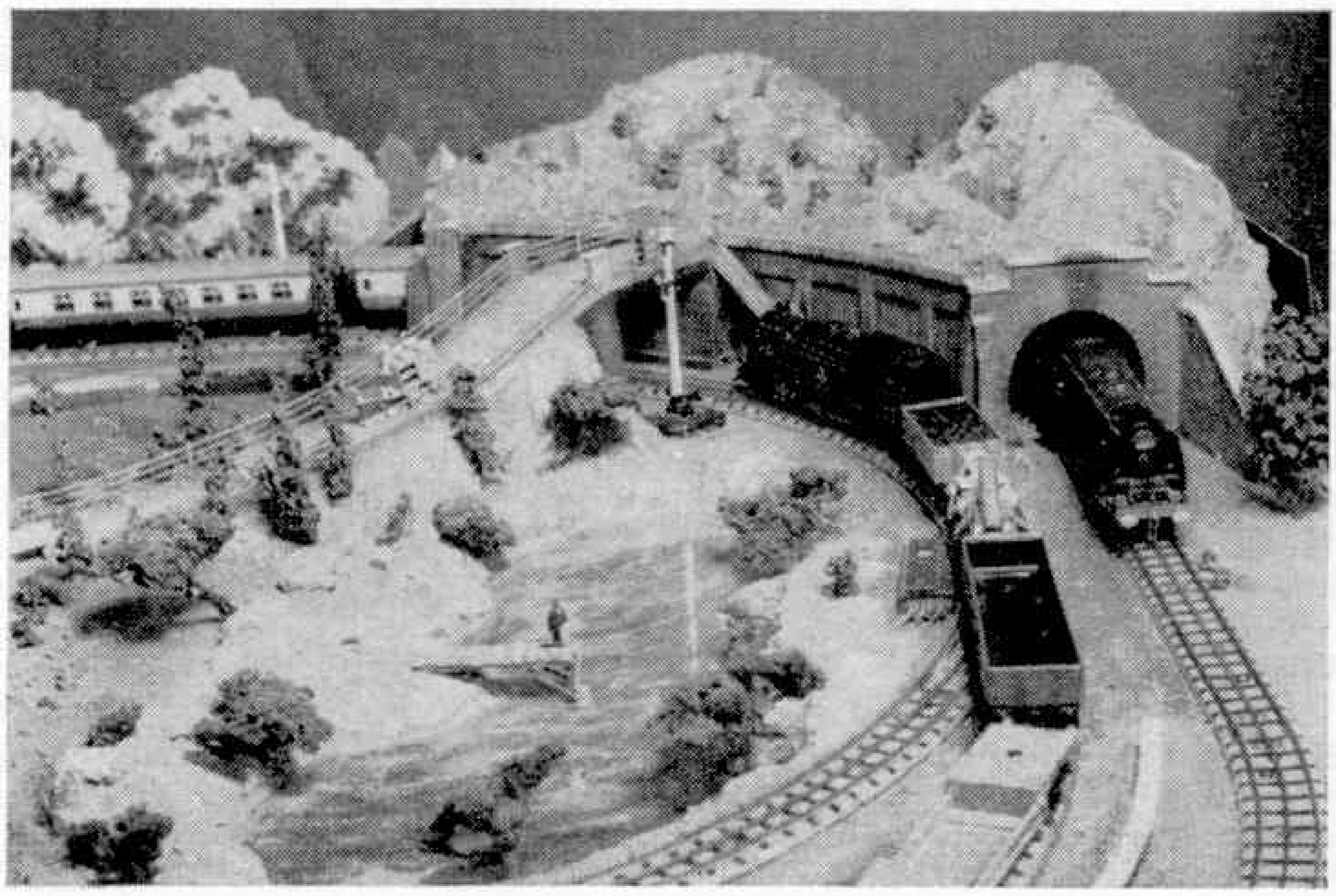
Hornby-Dublo layouts in operation at exhibitions, and must have a pretty good idea of the possibilities of the System.

Control of a Hornby-Dublo layout is a simple matter really. The beginner soon gets the "feel" of the Controller handle and the way in which the engine responds to it. Once the necessary touch is acquired, it is easy to back your engine on to the train without shaking the "passengers" and to start the train off just as smoothly. Similarly nice control of the engine is necessary when uncoupling operations are required, particularly if a definite number of wagons are to be shunted off together, the necessary cut in the train then having to be made at a specified point in the formation.

Practice makes perfect in these respects and it is the same with the working of Points, Signals and Uncoupling Rails. A particular working will require a definite sequence of movements and the operator soon gets used to the routine required for the different "episodes" that are included in the working arrangements.

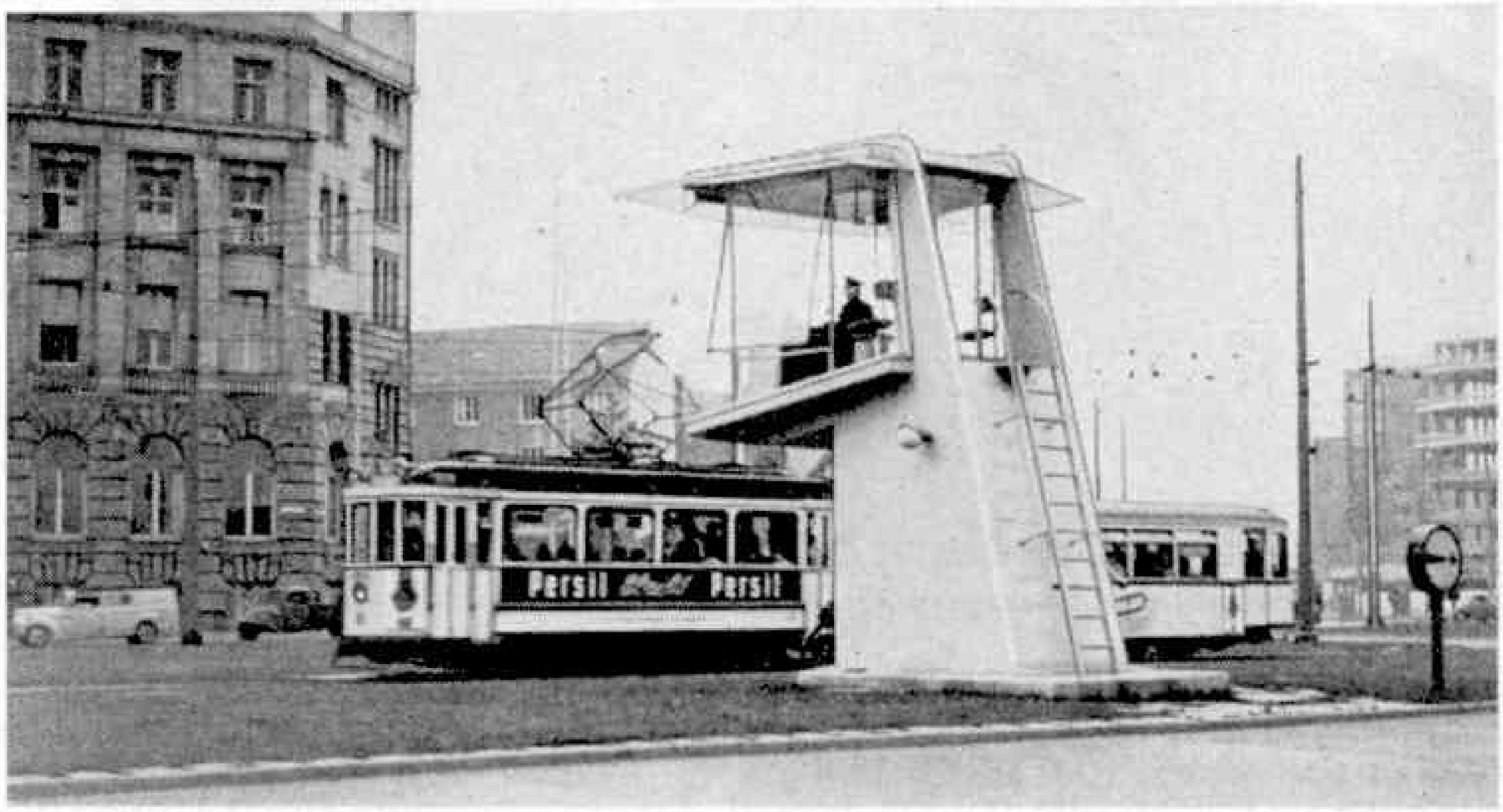
Obviously the operators shown in two of the accompanying pictures are not only having no difficulties, but also are thoroughly enjoying themselves. In the first illustration, young Arthur Pearce is carefully bringing to rest the train on the extreme left. He is watching the tail of the train in order to be sure that the end vehicle stops correctly alongside the level part of the platform. As a practised operator, he knows that the length of the train will fit the platform properly. Arthur has a fine layout to work on and I hope that we may be able to say something more about it in a later issue.

In the second picture Michael Vernon's line is seen to be a compact affair on its own special baseboard. This layout began a little over two years ago and has been steadily developed.



A scenic section on the Hornby-Dublo layout of Mr. Idris Lloyd, California. The 2-6-4 Tank takes the avoiding line skirting the tunnel out of which the "Duchess of Montrose" is just running. Photograph by Jack Howard, Los Angeles.

Of General Interest



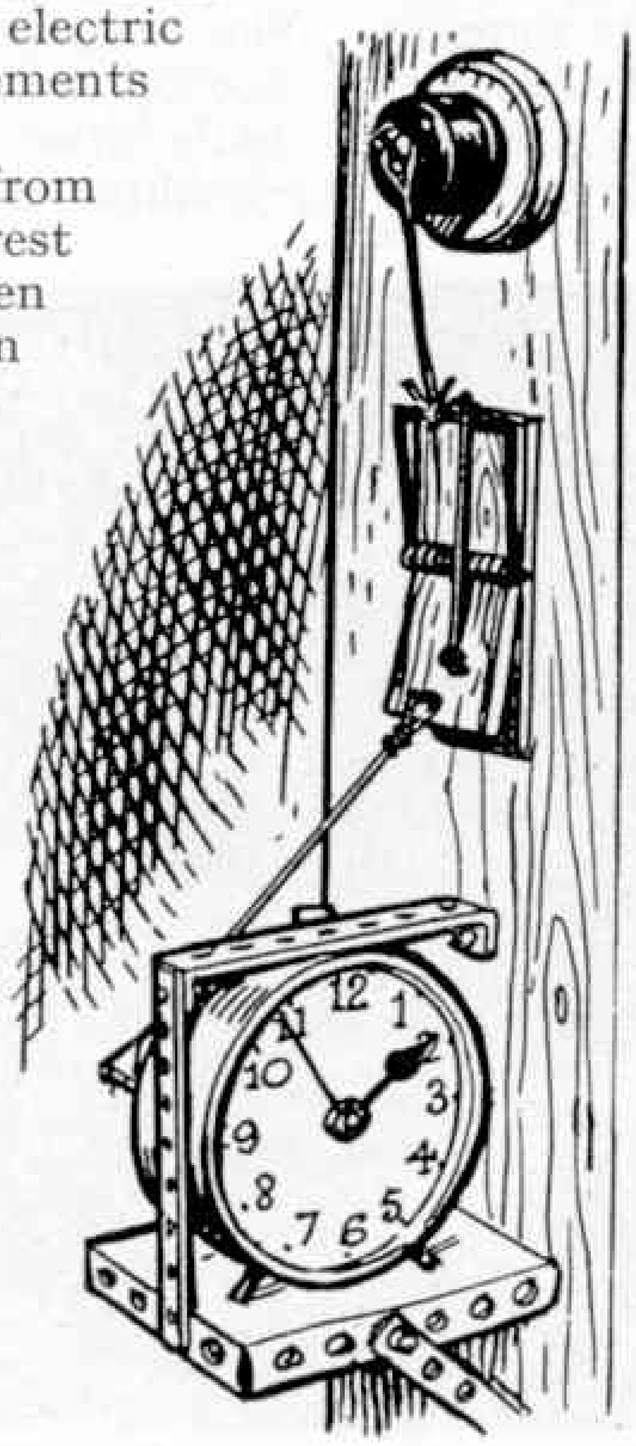
A traffic control police box in Hanover, photographed by the Rev. Bernard Croft, Cranleigh.

THE photograph reproduced above shows how traffic is controlled at one point in the rebuilt city of Hanover in Germany. The police officer on duty has an excellent view in all necessary directions, and from his perch in the traffic control box he directs not only road traffic, which will be seen to include electric tramcars, but pedestrian movements as well.

All this he does apparently from a comfortable seat. The nearest approach to this I have seen myself is a traffic control box in Liverpool, from which a policewoman controls traffic along one of the main streets, and pedestrian traffic across the street just below her box. The Liverpool example is by no means as high or as elaborate as the one seen in the picture, and I should be interested to know if readers of the Magazine have any knowledge—and pictures—of anything similar to this German example.

For once in a way, this page includes, on the right, a diagram of a Meccano model, but I feel that it is one on which *Spanner* would look down with contempt! It has its amusing side, however. Just look at the picture before reading further, and see if you can guess what it is for.

The Meccano parts used in this gadget are there to provide a platform for an alarm clock. A mouse trap nailed on the wall above the alarm clock completes the apparatus. The spring of the trap is connected to the tumbler of a light switch by a boot lace that has a loop at each end, while the pin on which bait is placed is connected by a piece of thin wire with the winding key of the clock. For use the trap is set, as seen in the diagram. Then, when the alarm goes off the key turns and pulls down the thin wire, setting off the mouse trap. This pulls down the tumbler and switches on the light.



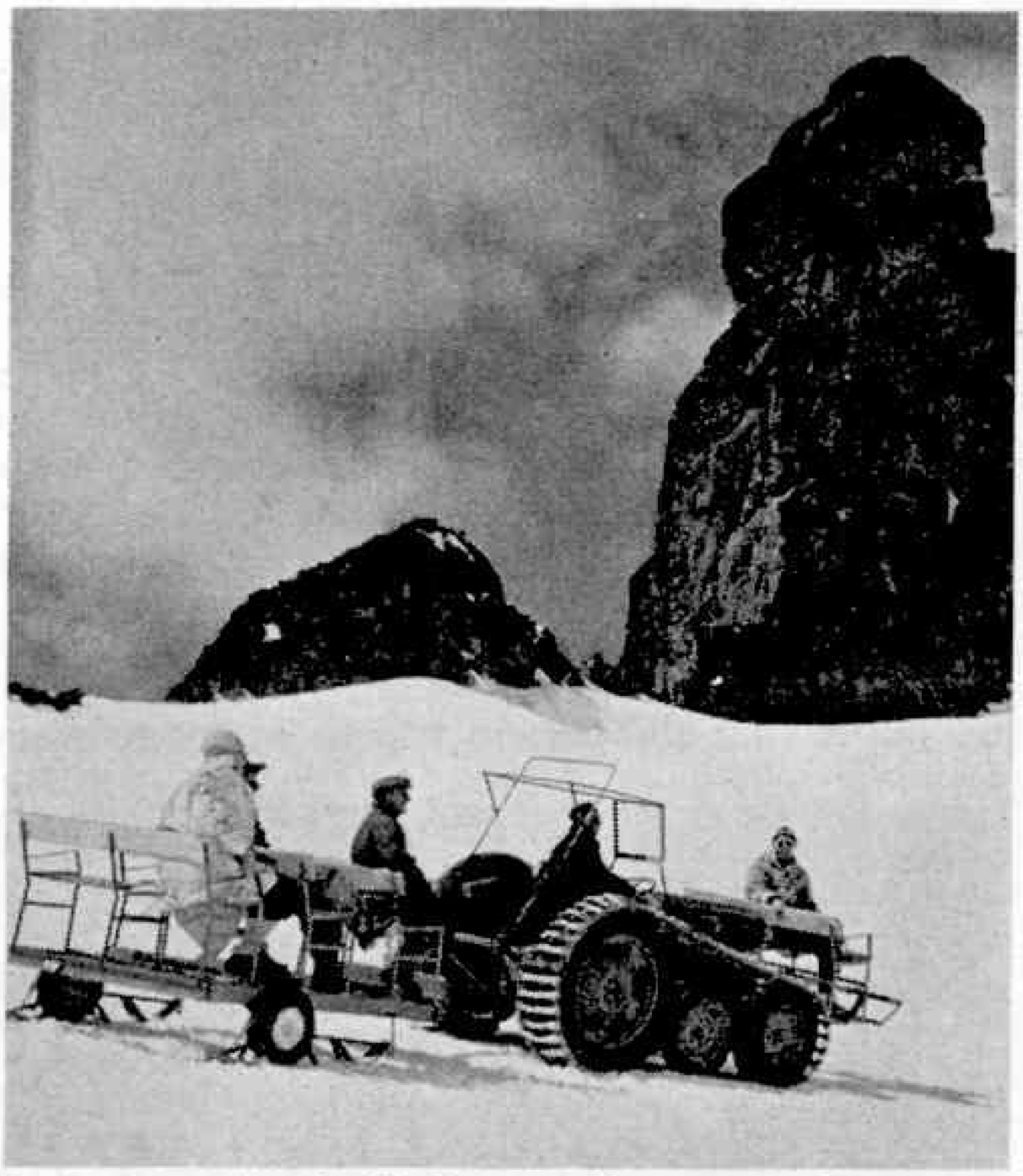
What for, you ask? To encourage the inhabitants of the poultry house in which it is installed to get up and get busy.

Illustration by courtesy of the "Farmers Weekly."

New Tracks for Tractors

MANY different ways have been tried of driving tractors and other vehicles on snow and ice, through thick mud or over boggy ground. Creeper tracks are perhaps the most usual of these, and are often seen on dragline excavators, mechanical shovels and similar machines that have to work on soft ground.

The latest developments of this kind are the Ferguson tracks, which can readily be fitted to the tractors made by Massey - Harris - Ferguson, Coventry. Tractors equipped with the first production sets of these are now being used in the Antarctic by the Commonwealth Expedition that is to attempt a march across the Antarctic continent from Vahsel Bay to the shores of the Ross Sea. The tractors were first put to use in unloading the *Theron*, the vessel in which the members of the expedition to winter at Vahsel Bay went south during the last Antarctic summer, and they will have to face working conditions unparalleled in other parts of the world.

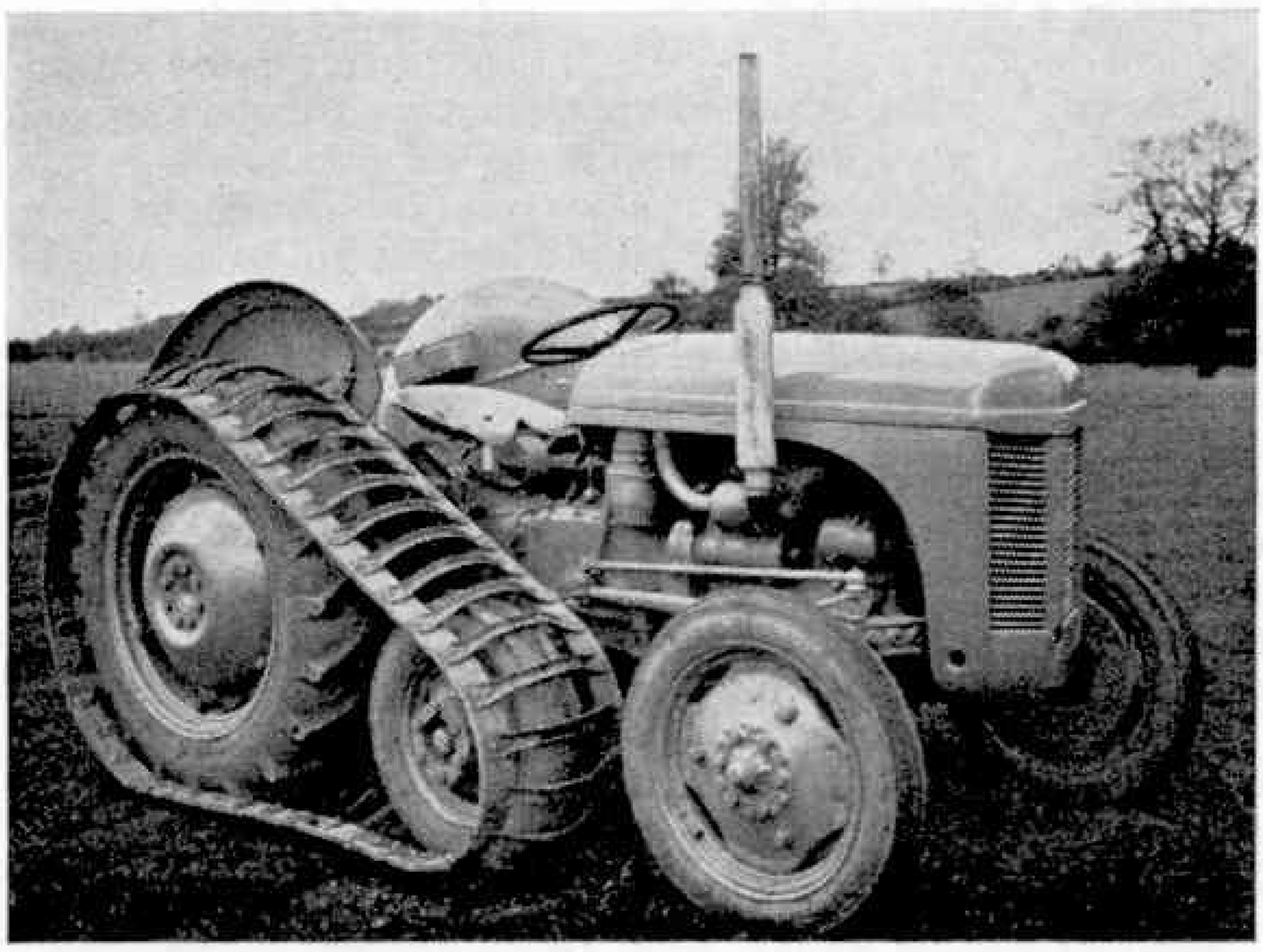


A tractor equipped with the new Ferguson tracks at work on snow amid the mountains. The illustrations on this page are reproduced by courtesy of Massey-Harris-Ferguson.

The picture below gives a good idea of the new device, which is best described as reinforced rubber tyre track. What it does in effect is to lay down an endless mat on which the tractor wheels can run.

Each track consists of two rubber bands joined by a series of steel cross members, and it fits over the tyre on one of the rear wheels of the tractor and that on an additional idler wheel. The latter is mounted on an arm or bracket attached to the rear axle housing of the tractors. There are compression springs that push the idler wheels downward and forward, to give adhesion and to stretch the track.

To fit the new tracks to a suitable Ferguson tractor, its rear is raised on a jack, after which the brackets to carry the idler wheels are fitted to the rear axle housing. Each idler wheel is next mounted on its bracket and the compression springs are placed in position. Then the tracks are stretched out on the ground and the tractor is reversed on to them. The tracks can then readily be passed over the wheels and their ends joined.



This picture shows how the Ferguson tracks are built up.

Speedwalk and Carveyor

Automation in Transport

By Trevor Holloway

PASSENGER handling problems in congested towns and cities throughout the world have become progressively more acute every year since the end of the war. It is not surprising therefore that great interest has been aroused by a new and revolutionary system of passenger transport introduced in America recently. There are hopes that the system will be adopted in this country also and the well-known British firm of conveyor manufacturers, Richard Sutcliffe Ltd., of Wakefield, has already been appointed licencees.

A Speedwalk passenger conveyor as it would look if installed in Chicago. The Speedwalk would pass along side streets and would only occasionally cross main streets. Foot passengers on it would be carried by a travelling belt.

As most *M.M.* readers know, the conveyor system has long proved its sterling qualities in factories, mines and other industrial establishments for carrying components and products from one point to another. Two large American companies, working in co-operation, have now succeeded in adapting the conveyor belt system to the field of passenger transportation.

The system is being developed along two lines by the Stephens - Adamson Manufacturing Co. and the Goodyear Tyre and Rubber Co. In the version known as the Speedwalk, passengers step on to a moving belt and are transported along the level, or up and down gradients, to their destination. Unlike the escalators, or moving stairs on London's Underground, the Speedwalk system does not make use of steps for elevating purposes.

Obviously, the Speedwalk, carrying standing passengers, must operate at a low speed, about 1½ m.p.h. being the normal. Although this is a safe and sufficiently speedy figure for standing passengers making short trips, it is far too low for more ambitious layouts covering longer distances and serving a number of stations. It was in view of this limiting factor that from the Speedwalk was developed the second version, called the Carveyor. In this system, passengers will take their seats in small cars carried on a conveyor and rolls, which permit the speed to be stepped up from 1½ m.p.h. to 15 m.p.h.

To carry passengers by conveyor belt may seem at first thought to be a simple method of transportation, and many readers may wonder why it has been so long in making its appearance. The fact is that the development of the Speedwalk and the Carveyor bristled with problems, not the least of which was that any system for use by the public must cater for elderly people, toddlers, cripples and all who may be "not too steady on their feet," as we say. In other words, the system had to be absolutely safe for everyone.

Actually, this "new" idea in public transport is an old one. A famous American newspaper editor named Horace Greeley

A Speedwalk already in use on the Hudson and Manhattan Railroad, in Jersey City. It is 227 ft. long and has carried four million passengers without mishap.

first raised the topic as long ago as 1863. Since then the moving sidewalk has been the inventor's nightmare and the transport executive man's dream. In America, and in Europe, the elusive phantom of a continuous transportation system for moving people has been taken up and dropped as being impossible on numerous occasions.

It was early in 1950 when engineers of the Stephens-Adamson Co. outlined a system that subsequent development and testing proved foolproof. Behind this success lay a record of half a century's experience in the bulk handling of materials such as coal and ore by conveyor belt methods.

At last the Speedwalk came off the drawing board, and a "mock-up" was made and large groups of people brought in to ride the moving sidewalk.

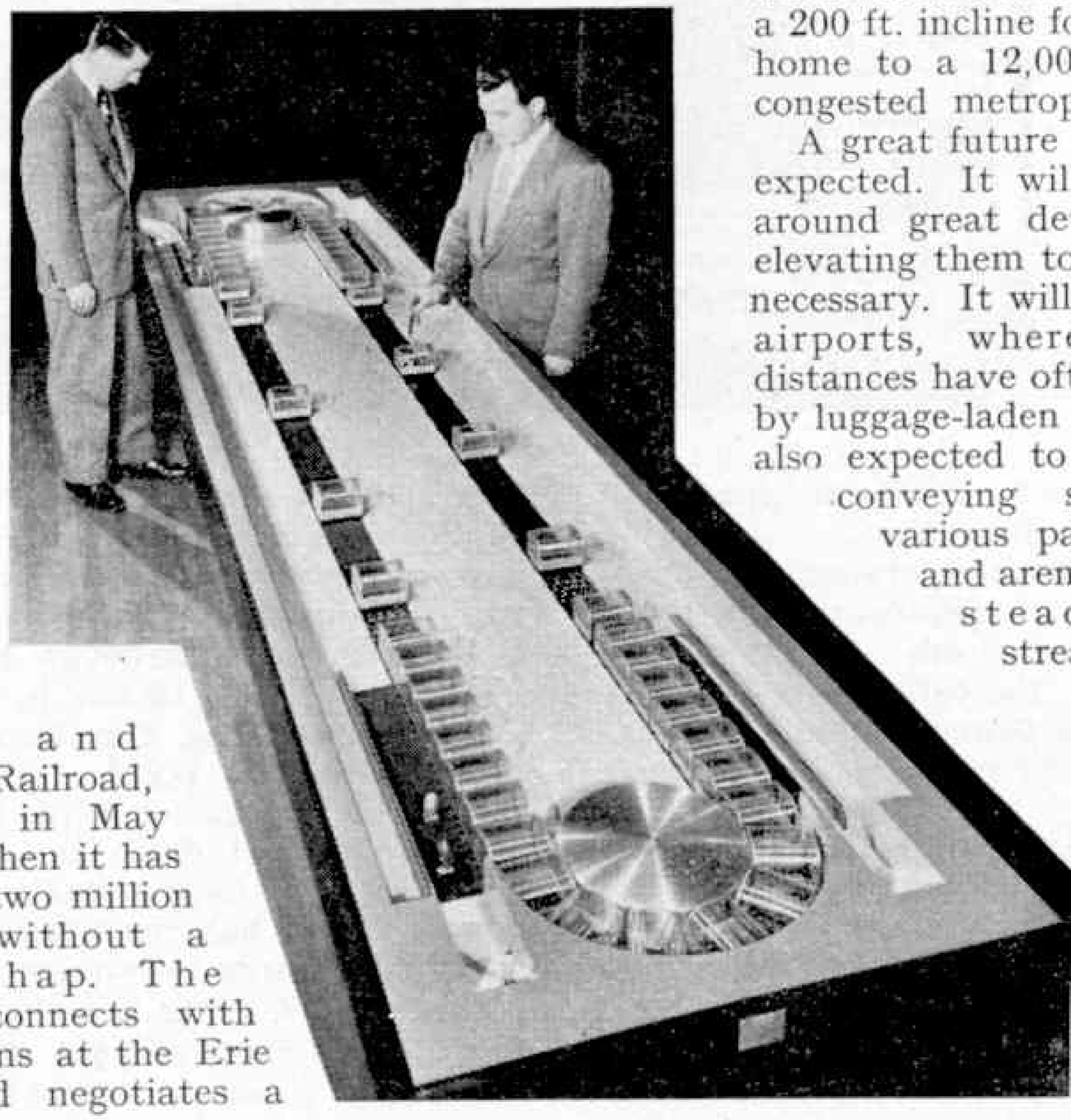
The world's first commercially successful Speedwalk came into operation on the Hudson and Manhattan Railroad, Jersey City, in May 1954. Since then it has carried over two million passengers without a single mishap. The installation connects with the tube trains at the Erie Terminal and negotiates a 10 per cent. gradient for the first 137 feet—a tedious slope nicknamed "Cardiac Ramp" by the weary office workers who until the coming of the Speedwalk had to climb it daily.

The unit operates at a speed of 120 ft. a minute, and its capacity is 10,800 passengers an hour. The flat $5\frac{1}{2}$ ft. rubber belt is $\frac{5}{8}$ in. thick and rolls along smoothly over 600 rollers mounted in ball-bearing pillow blocks. The belt is powered by a 20 h.p. motor driving the head pulley through a speed reducer.

The Speedwalk is already operating in several American cities and at the time of writing 21 other installations are under consideration, ranging from a 200 ft. incline for an old people's home to a 12,000 ft. unit for a congested metropolitan area.

A great future for the system is expected. It will carry shoppers around great department stores, elevating them to a higher floor if necessary. It will prove a boon at airports, where considerable distances have often to be covered by luggage-laden passengers. It is also expected to be widely used conveying sports fans to various parts of stadiums and arenas in orderly and steadily moving streams.

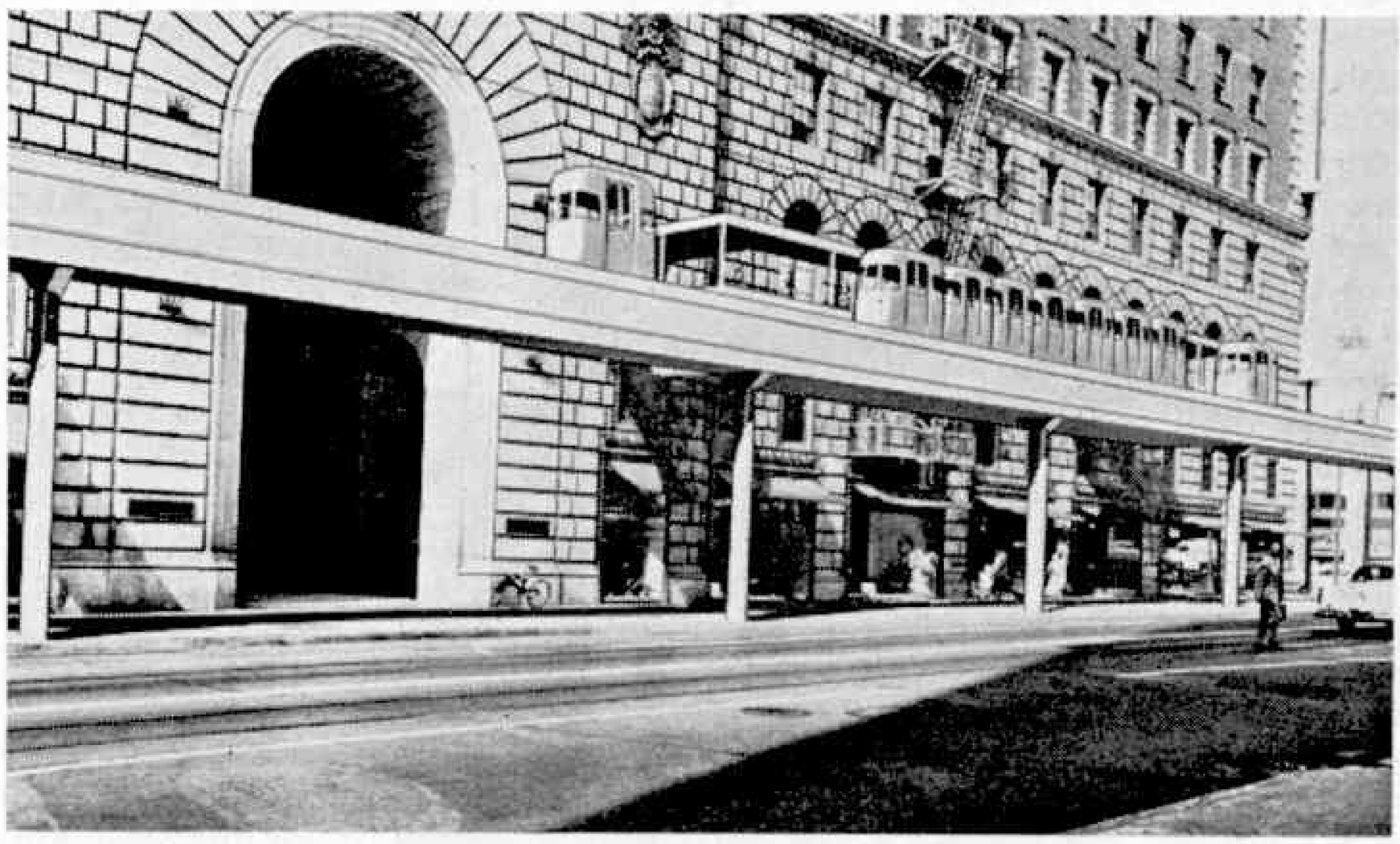
The Speedwalk system could do much to relieve



What the Carveyor will look like. This model shows how the system will operate.

congestion of pedestrians in great shopping streets such as Fifth Avenue in New York, or Oxford Street in London, the idea being to have an enclosed conveyor-way passing along in front of buildings a few feet above pavement level. In many cases, this elevated covered way could span busy thoroughfares, thus preventing many accidents and saving the public a great deal of time dodging traffic, or remaining stranded at the kerb-side in a traffic bottleneck.

In what ways does the new Carveyor system differ from the Speedwalk? The writer had an opportunity of inspecting a working model of this revolutionary system at the recent Mechanical Handling Exhibition, Earl's Court, where it was demonstrated for the first time in this country. The model was intended to represent the five million dollar installation that will shortly be operating on the subway run between Grand Central Station and Times Square, New York. It will be the first Carveyor in the world and will be capable of carrying 36,000 passengers an hour at a speed of 15 m.p.h. It will replace the present shuttle service, which has a maximum capacity of 23,000 passengers per hour.



In Cities the Carveyor can be built above street level, on a structure supported by a single row of columns, as suggested in this sketch.

To visualise this new system one needs to forget all about present-day methods and start thinking afresh. To operate on a continual basis, the cars of the Carveyor must travel in a closed circuit and they can never come to rest unless the whole set-up is halted.

A fundamental precept is that passengers cannot safely or conveniently step sideways on to a moving belt from a stationary surface. How then is it possible to operate a system where speed reaches 15 m.p.h.?

Briefly, this is how the Carveyor in New York will operate. Passengers first step on to the end of a 60 ft. Speedwalk of normal type, moving forward at a constant speed of 1½ m.p.h. This conveyor is in fact a moving platform and it carries passengers alongside another conveyor belt moving in the same direction and at the same speed. This second belt takes the place of rail track, and cars arrive on it at the rate of 19 every minute. The cars will be delivered on to the 1½ m.p.h. belt bumper-to-bumper and will resemble somewhat a row of doors in an office corridor. As they are moving at the same speed as the platform alongside, the passengers will have no sensation of movement. The doors open automatically, the passengers board the cars and take their seats just as they would on an ordinary train.

The cars will continue to travel forward at 1½ m.p.h. for a few seconds until one by one they reach the end of the low speed conveyor. The low speed conveyor delivers the cars on to a 74 ft. bank of tyred accelerator wheels, which in the short time of six seconds progressively steps up the forward speed of the cars to 15 m.p.h. The accelerator rolls also serve to space the cars out before delivering them on to the main belt conveyor running at a constant speed of 15 m.p.h.

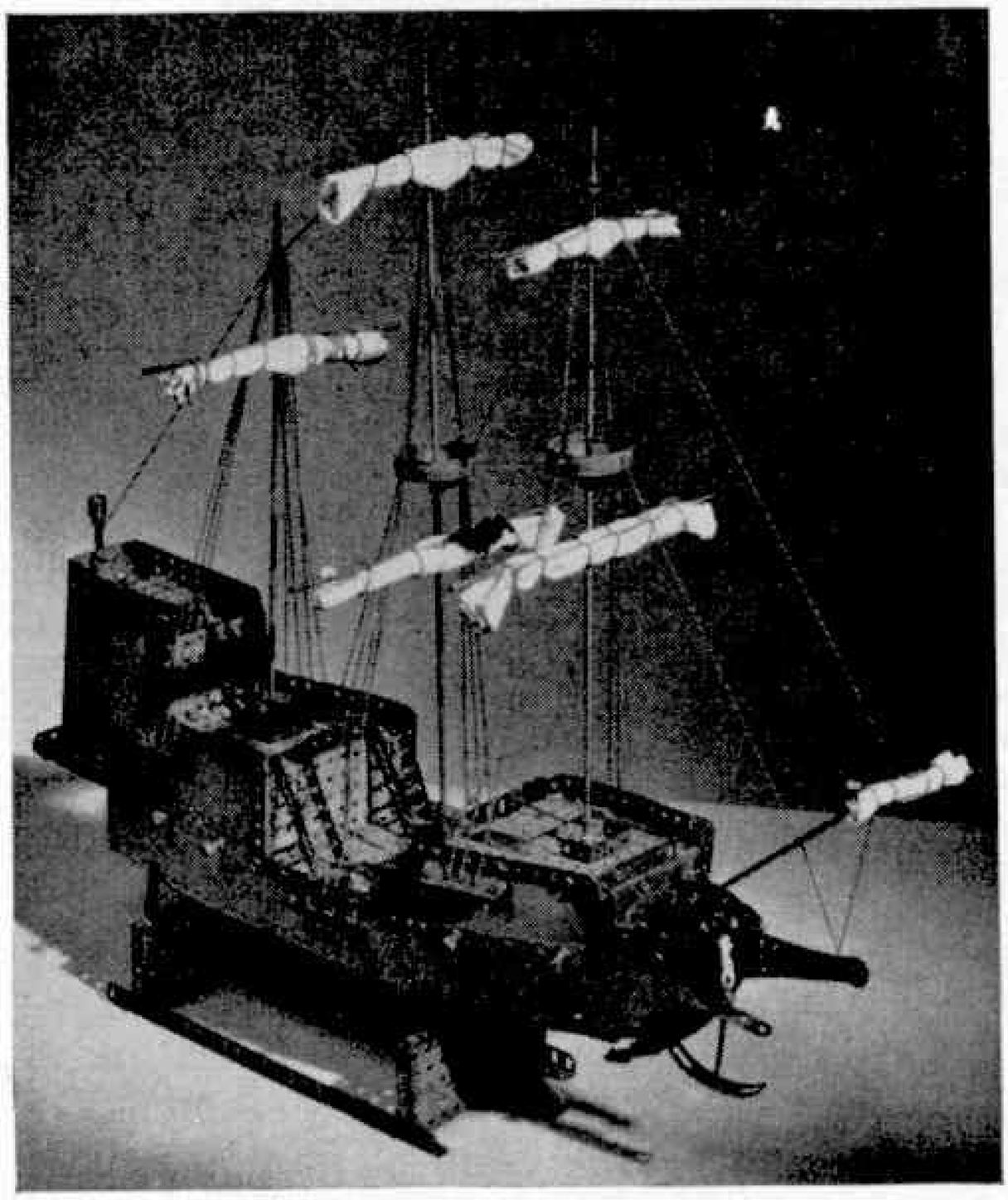
On approaching the terminus, or the next off-loading point, the procedure is reversed. The cars run off the main belt and are slowed down in another 74 ft. run, this time over a bank of decelerator wheels. This has the effect of delivering the cars, bumper-to-bumper, alongside the off-loading moving platform which is moving at a speed of 1½ m.p.h.

(Continued on page 544)

Meccano Competition

A New General Model-Building Contest for the Winter

THIS month sees the start of yet another model-building season and there is no better way to begin the new season's activities than by preparing a model for a Meccano competition. To enable all model-builders to take part we are arranging another of the popular general model-building contests, in which there are no restrictions of any kind on the subjects of the models or the number and variety of the parts used in them. Every model-builder can send in an entry, irrespective of his age, the size of his Outfit or the part of the world in which he lives.



A fine model galleon built by Alan D. Peacock, Chichester. It won a First Prize for this 11-year old boy in the March Competition.

The conditions of entry are very simple and there are no special forms to complete and send in. All you have to do is to build an original Meccano model of any kind, then let us have details of it. Photographs of the model are preferable of course, but if they cannot be obtained readily then clear sketches will do quite well. *The actual models must not be sent.* You must make sure to write your age, name and address clearly on the back of each sketch or photograph you send, and if necessary you can add notes describing any features of special interest or any points that may not be quite clear from the illustrations.

Although model-builders may choose any subjects they like on which to base their models, we advise competitors to select their subjects carefully, bearing in mind the parts they have available. It is better to make a small but neat and sturdy model of a subject well within the scope of your Outfit, rather than build a large model that is flimsy owing to the lack of suitable parts. Mere size alone will not impress the judges, so make sure when you choose your subject that it is one you can model really well with the parts you have available.

Another point worth remembering when you select your model is that the judges will look out for originality in the choice of subjects. Other things being equal, preference will be given to models of an original kind when the entries are judged.

As usual there will be two Sections of the Competition. Readers who will be under 12 years of age on 31st January 1957 are eligible for Section A, while entries from readers age 12 or over on that date will be placed in Section B. All entries must be addressed to *Winter Model-Building Competition, Meccano Ltd., Binns Road, Liverpool 13*, and they must be posted to reach us not later than 31st January next. Details of the prizes to be awarded for the best entries in each Section are given in the panel on this page.

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"

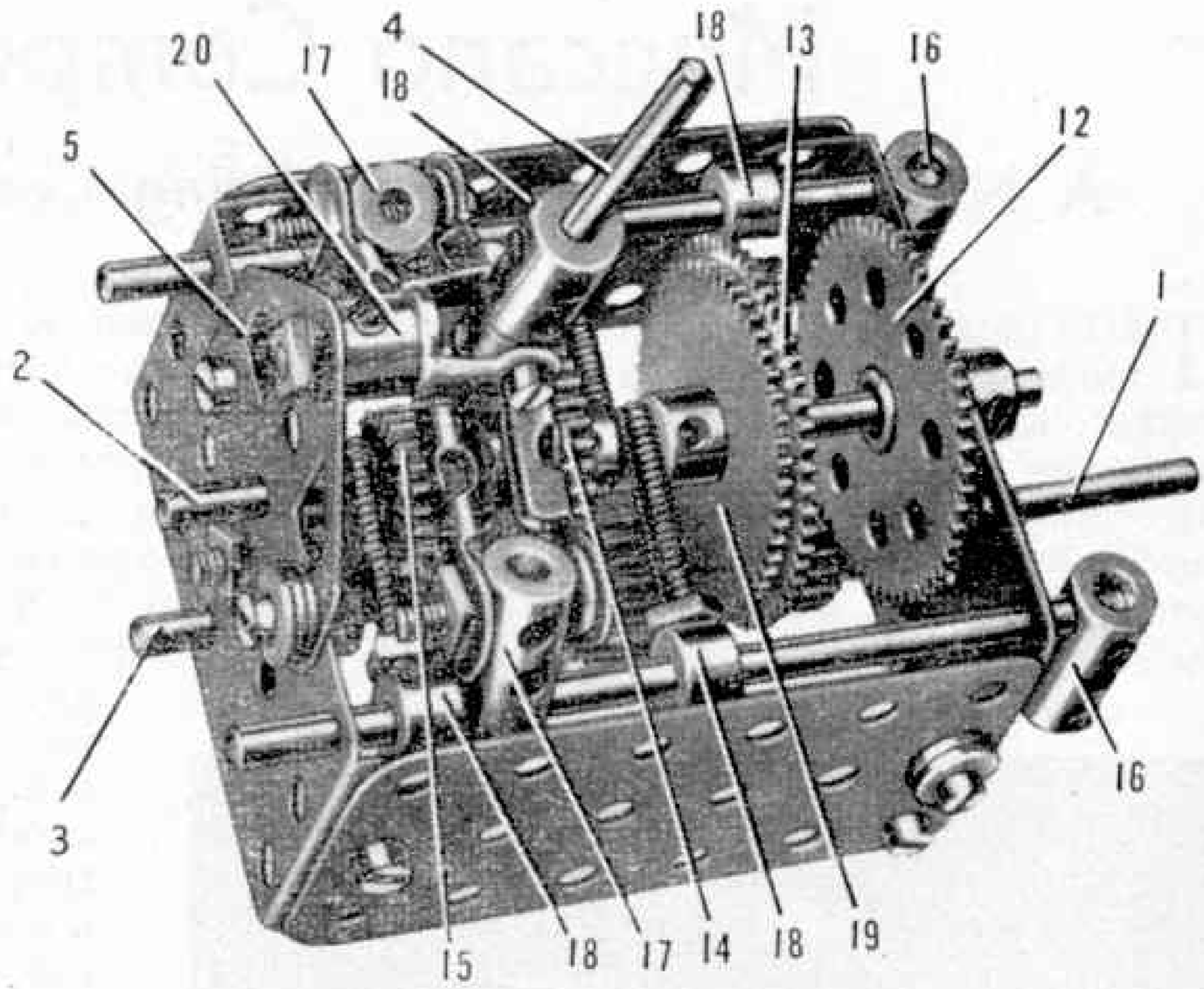


Fig. 1. A three-speed and reverse gear-box that makes use of the new Rod with Keyway, Part No. 230.

A Three-Speed and Reverse Gear-Box

The special article in the August issue of the *M.M.* announcing the new Gears Outfit 'B' included a picture of a gear-box that makes use of the Rod with Keyway, part No. 230. Since the picture appeared several readers have asked for further details of the gear-box, and this month I am including a full description of the mechanism, which is shown in Figs. 1 and 2.

The housing is made from two 3″ × 1½″ Flat Plates connected by 2½″ × 1½″ Flanged Plates, and a Flat Trunnion 5 is bolted to one end. It should be noted that Washers are placed next to some of the bolt heads as shown so that the shanks of the bolts clear the Gears and the Rods. The input shaft 1 is supported in one end of the housing and in a Double Bent Strip, and it carries a ½″ Pinion 6. The end of the input shaft projects slightly into a ½″ Pinion 7 on the output shaft 3. The output shaft carries also a ¾″ Pinion 8, a 1″ Gear 9 and a ½″ Pinion 10. A ½″ reverse Pinion 11 is free to turn on a ¾″ Bolt that is attached to the housing by two nuts, and this Pinion is in constant mesh with Pinion 10.

The layshaft is a 4″ Rod with Keyway 2, and it carries two 57-tooth Gears 12 and 13, a 50-tooth Gear 19, a 1″ Gear 14 and a ½″ Pinion 15. The Gear 12 is fixed on the shaft and is in constant mesh with Pinion 6, but the other gears are free to slide and are made to turn with the shaft by Key Bolts screwed into their bosses.

The selector shafts are 3½″ Rods and each carries two Couplings 16 and 17 and two Collars 18. A 1″ Rod in Coupling 16 is free to slide in a hole in one of the Flanged Plates and serves to prevent the selector shaft from turning. A 1″ Screwed Rod is screwed into one of the holes in each of the Collars 18 and is fixed in place by a nut. The two Screwed Rods on one side are arranged so that they form a fork with two prongs that engage one on either side of the Gears 13 and 19, and the two Screwed Rods at the opposite side are similarly

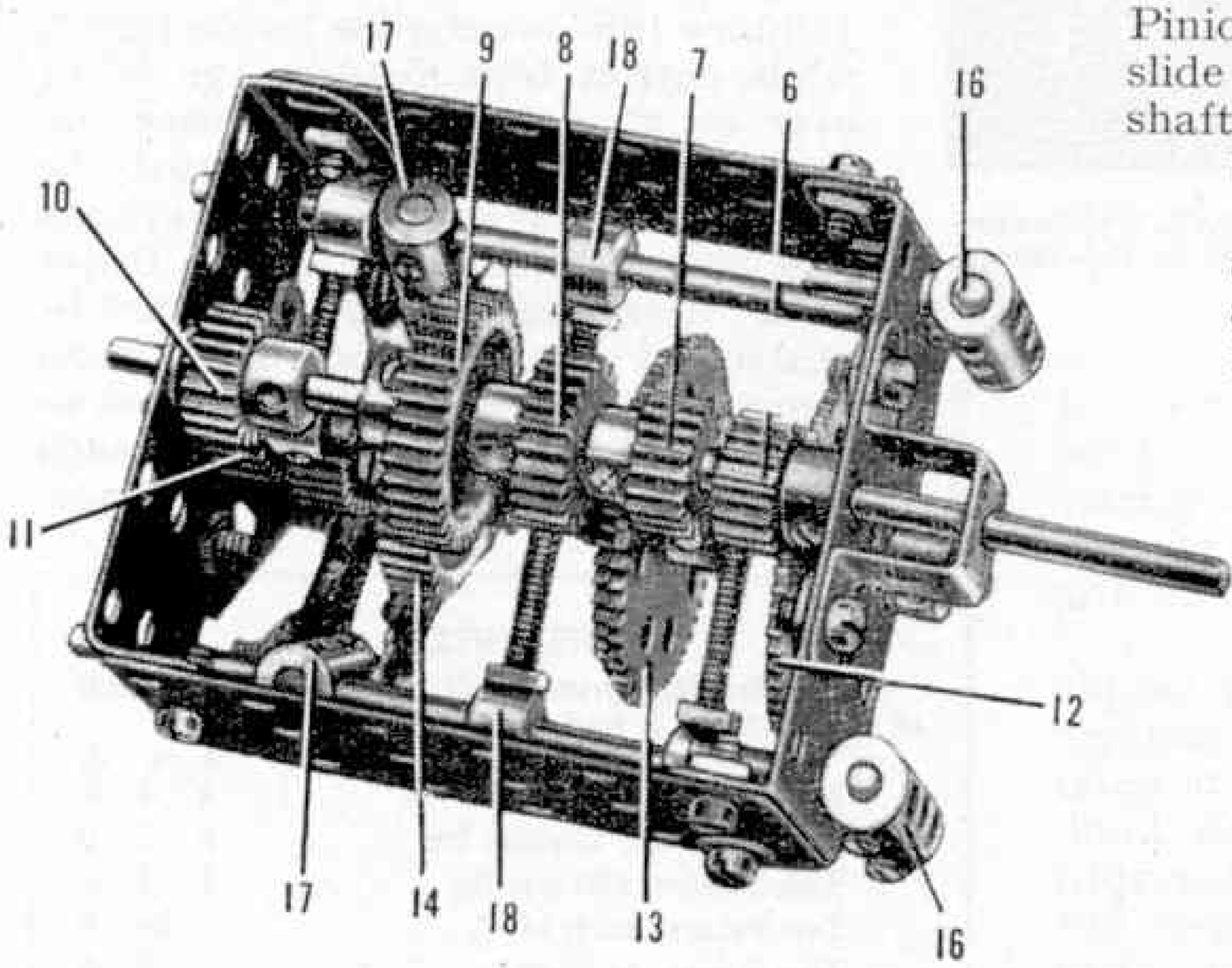


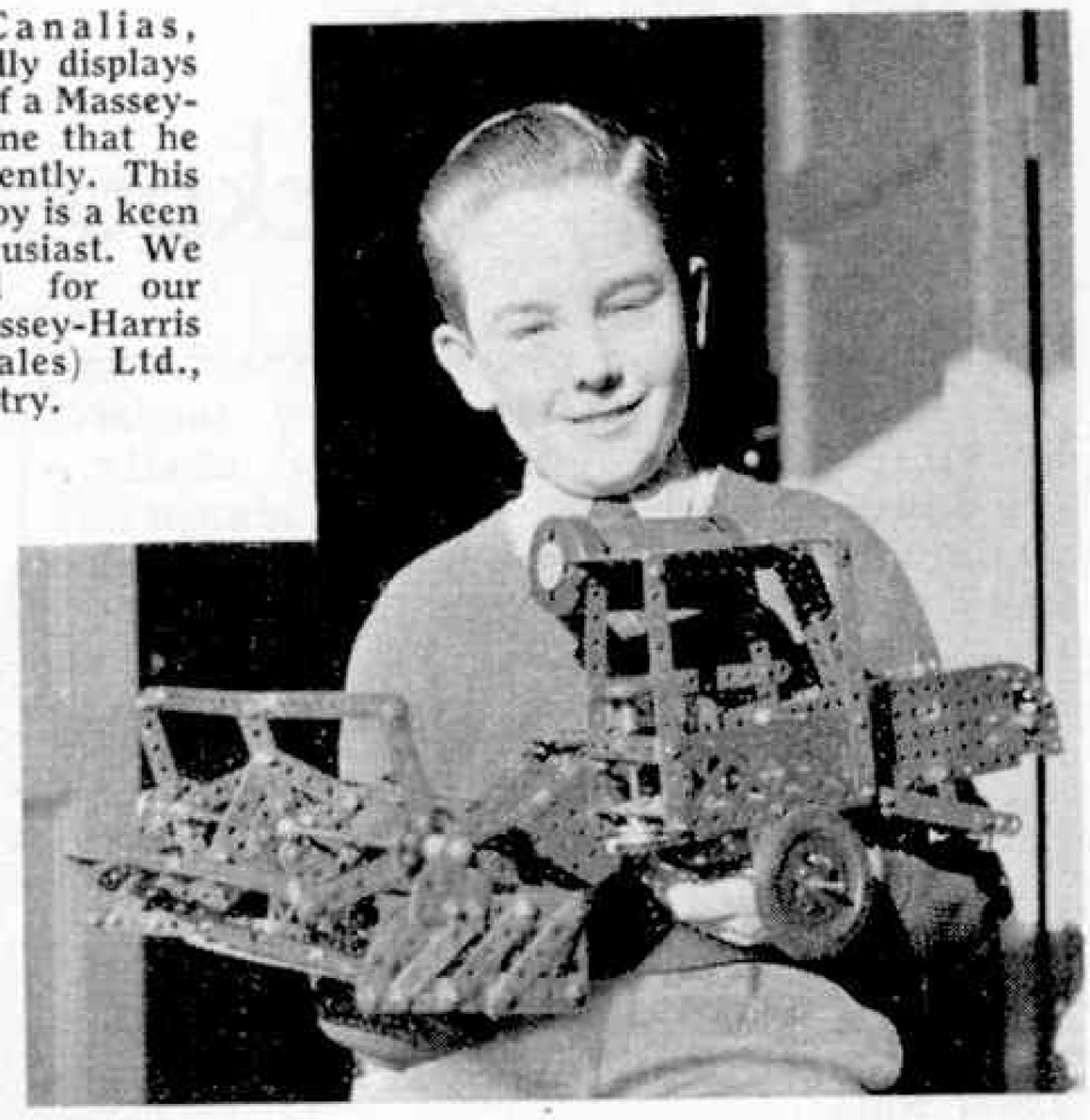
Fig. 2. The three-speed and reverse gear-box seen from underneath.

arranged to engage the Gear 14 and the Pinion 15.

The gear-change lever is a 1½″ Rod 4 fitted in a Short Coupling that is fixed to a Centre Fork held in a Swivel Bearing 20. The Swivel Bearing is mounted on a ½″ Bolt that is lock-nutted to the Flat Trunnion 5. The Centre Fork engages between pairs of Rod and Strip Connectors on each side, fixed by ¾″ Bolts in the Couplings 17.

Low or first gear is engaged by moving the lever 4 so that the Centre Fork engages the lower pair of Rod and Strip Connectors (Fig. 1), then by sliding these to the right the Gear 14 is moved into mesh with the Gear 9. Movement of the lever 4 in the opposite direction results in Pinion 15 engaging Pinion 11 to provide reverse gear.

Second and third gears are engaged by sliding the Centre Fork between the upper pair of Rod and Strip Connectors (Fig. 1). Second gear is engaged by sliding Gear 19 into mesh with Pinion 8, and top gear is provided when Gear 13 engages the Pinion 7.



F. Pares Canalias, Madrid, proudly displays a fine model of a Massey-Harris Combine that he completed recently. This 11-year old boy is a keen Meccano enthusiast. We are indebted for our picture to Massey-Harris Ferguson (Sales) Ltd., Coventry.

Creeper Track for Large Models

One of the points that comes up time and time again in my correspondence concerns the assembly of creeper tracks for tractors, excavators, etc., and it is evident that many model-builders would like guidance on this subject.

The provision of tracks for small models presents no difficulty, as lengths of standard Sprocket Chain can be used with realistic effect, but a wider and heavier track is required for large models. I have previously illustrated one or two examples of suitable built-up creeper tracks. To help model-builders who missed the previous examples, however, this month I am including details of a creeper track arrangement devised by Lt. Col. J. G. M. Keeling, who used this method for making the tracks of a model excavator he entered in a Meccano competition.

The track plates used in this arrangement consist of a series of 2½″ Flat Girders and made-up flat girders formed by 2½″ Strips connected by Fishplates. To assemble the plates to form an endless track of the

(*Continued on page 544*)

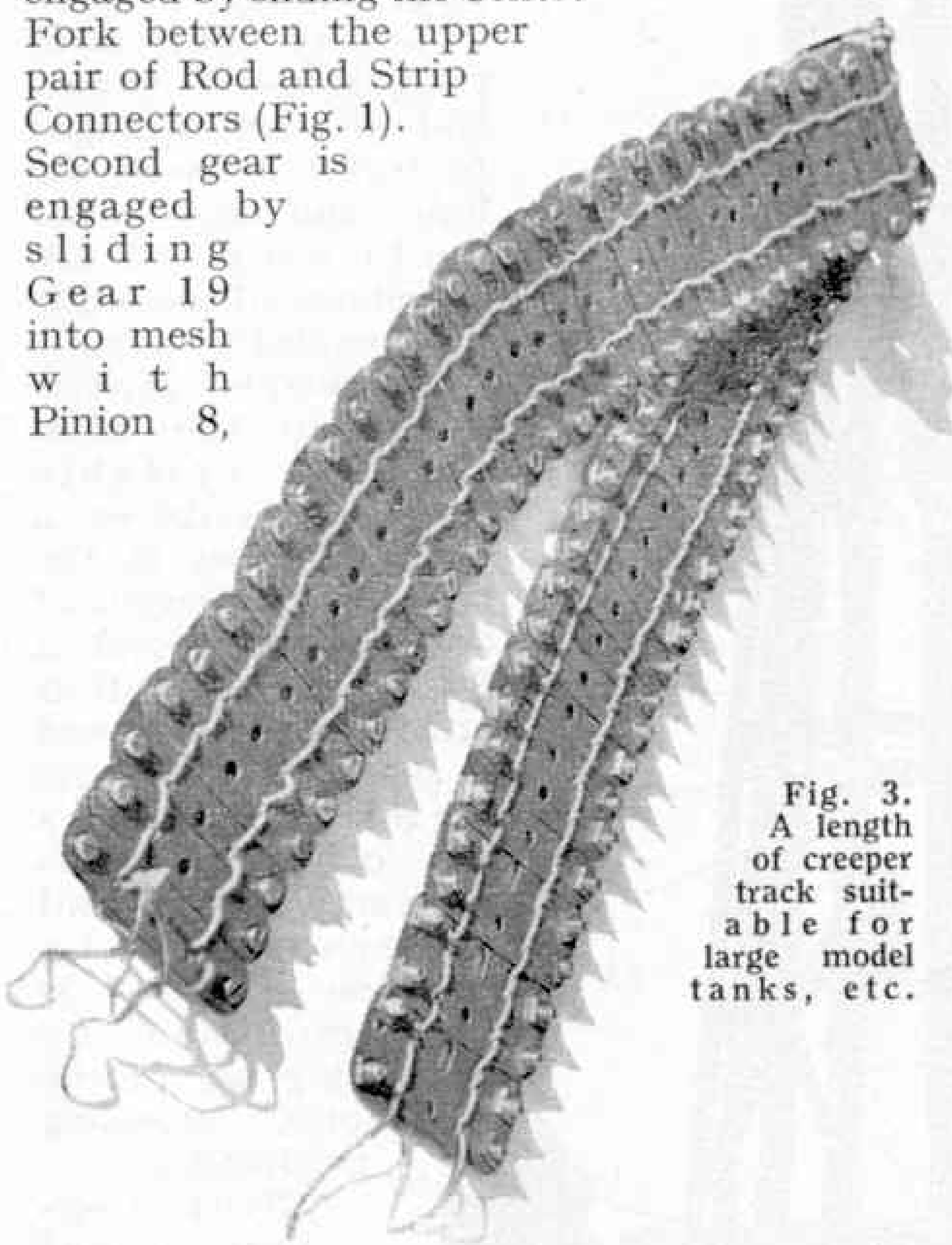


Fig. 3. A length of creeper track suitable for large model tanks, etc.

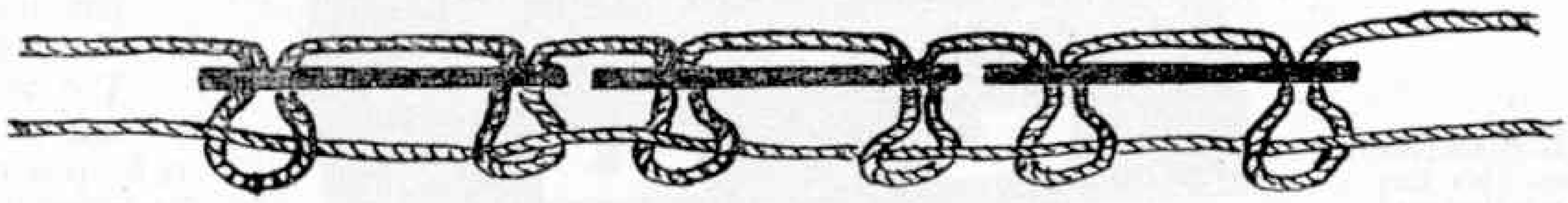


Fig. 4. A sketch showing the arrangement of the cords in building creeper track of the kind seen in Fig. 3.

MODEL OF THE MONTH:

Blackpool Tower

OUR model this month represents an engineering structure every model-builder will recognise quite easily. Blackpool Tower has become almost a trade mark of the famous northern holiday resort, and at least one trip to the top of the Tower is an essential part of the programme for every thrill-seeking visitor. Its height of 518 ft. to the top of the flag pole makes it the tallest tower in Britain. With the lifts and other fittings the tower weighs more than 2,500 tons.

The Tower rises from the centre of a group of buildings that cover an area of more than 6,000 square yards. These buildings form almost a complete township on their own. They include shops, cafes, a theatre, a ballroom, and of course the famous Tower Circus and Menagerie. From the central hall, hydraulically-operated lifts carry sightseers speedily to the lower balcony, from which stairs lead to platforms at 400 and 420 ft. As can be imagined, the views from these vantage points are outstanding. On suitable days a long stretch of the coast, the peaks of the Lake District, the Isle of Man and the Pennines can be seen.

Blackpool's illuminated decorations in Autumn have long been famous. The Tower plays an important part in this colourful scene, for each year it is outlined by hundreds of electric lights that can be seen by approaching visitors from many miles away. A unique distinction of the Tower is that its illuminations were not entirely eliminated even during the war years, for a warning light was kept burning at the top to safeguard aircraft.

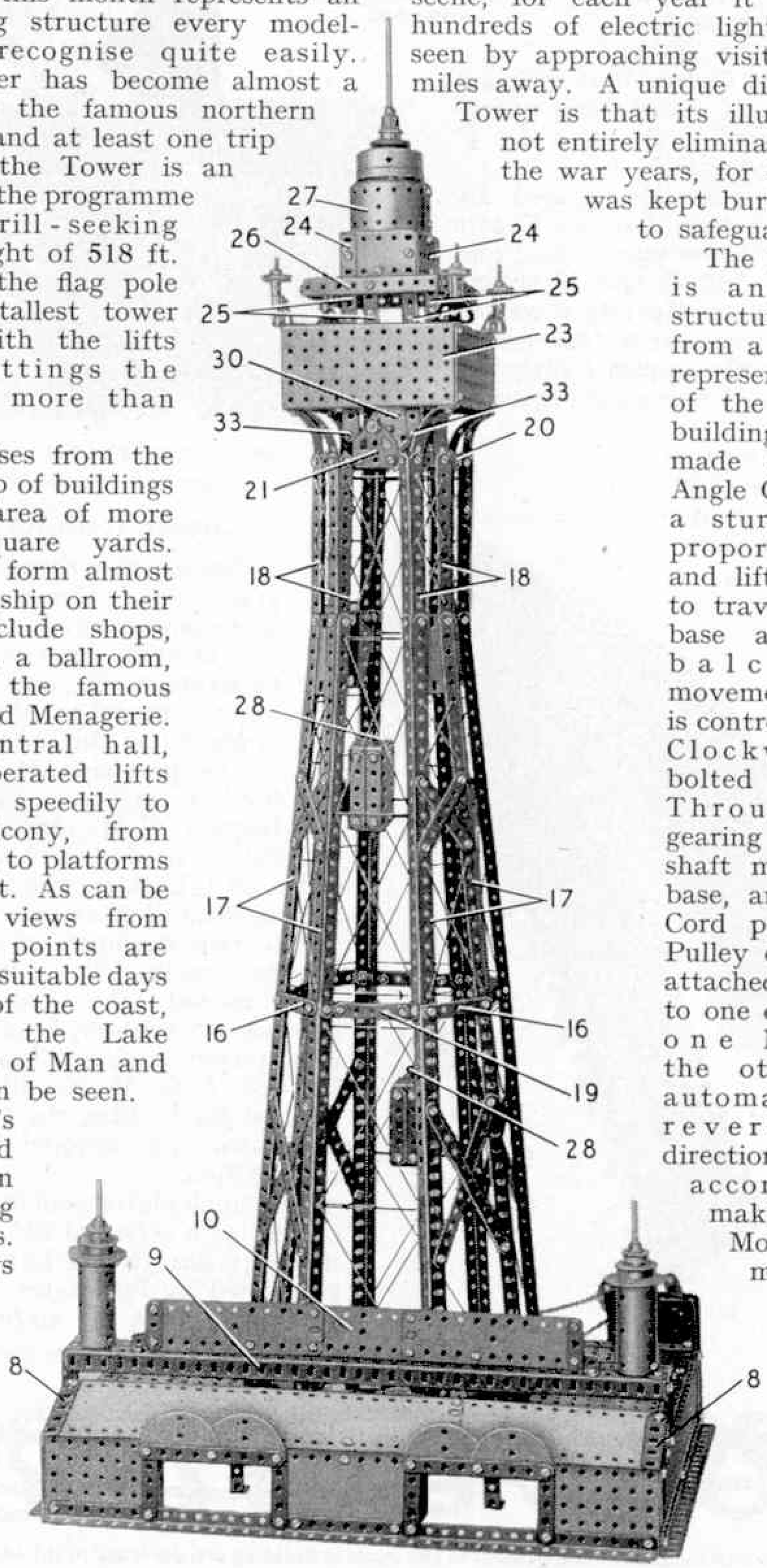


Fig. 1. Blackpool Tower. This fine model is designed for Outfit No. 9.

The Meccano model is an impressive structure that rises from a base shaped to represent the façade of the actual Tower building. Good use is made of Strips and Angle Girders to build a sturdy and well-proportioned tower, and lifts are arranged to travel between the base and the lower balcony. The movement of these lifts is controlled by a No. 1 Clockwork Motor bolted to the base. Through suitable gearing this drives a shaft mounted in the base, and a length of Cord passed round a Pulley on the shaft is attached at each end to one of the lifts. As one lift rises the other descends automatically, and reversal of the direction of travel is accomplished by making use of the Motor reversing mechanism.

Full constructional details of the model Blackpool Tower, and a list of parts required to build it, can

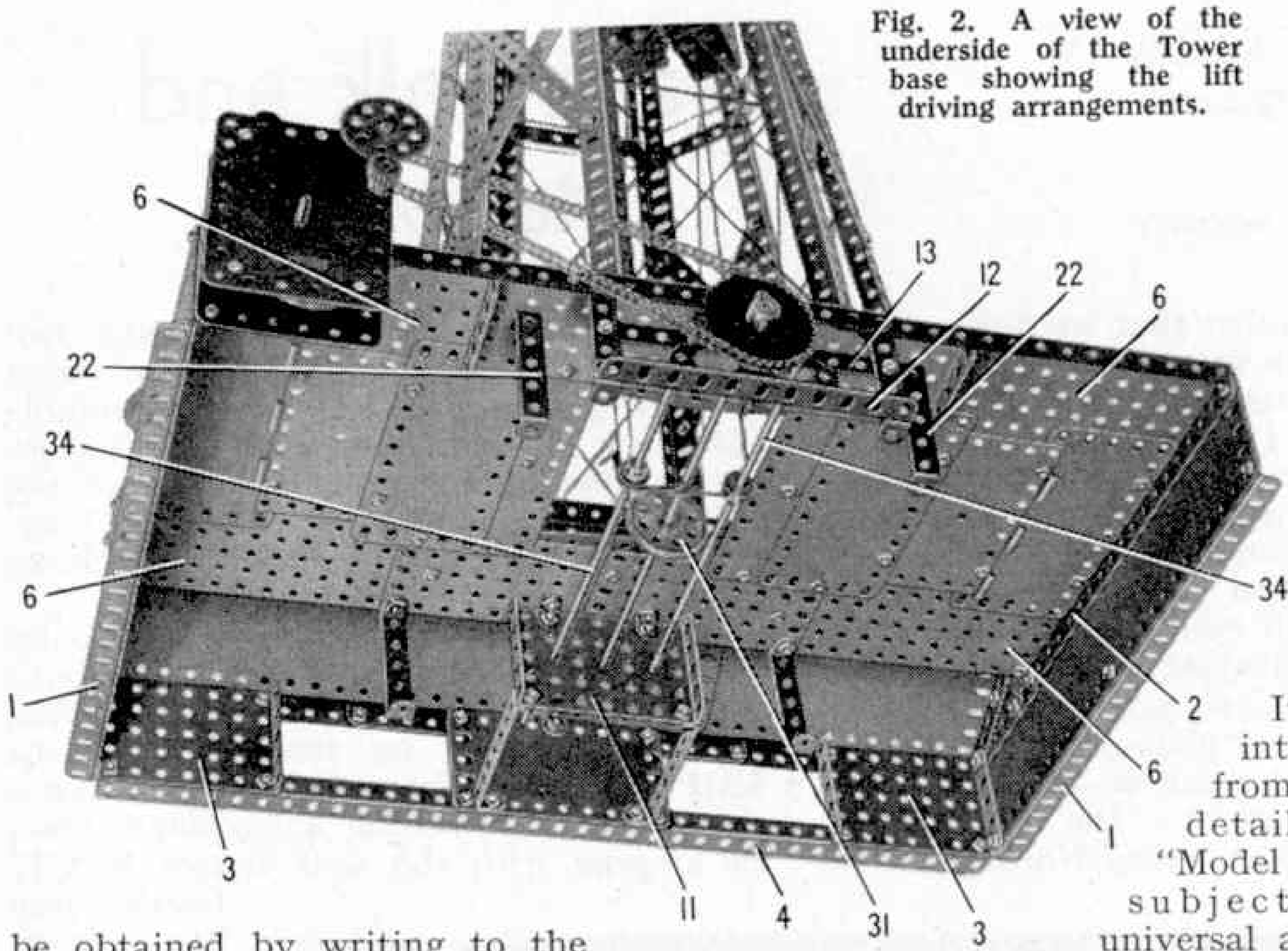


Fig. 2. A view of the underside of the Tower base showing the lift driving arrangements.

be obtained by writing to the Editor. No charge is made for the instructions, but model-builders should send a 2d. stamp with their requests to cover return postage. Write for your copy of the instructions as soon as you can. We will do our best to meet all requests, but we cannot promise to supply readers in this country with copies after the end of this month.

The number of requests for Model of the Month instructions has increased steadily since this feature was introduced last March, and with the approach of the winter-model-building season the demand is likely to rise still further. We have taken steps to increase the number of copies of the instructions to meet the expected increased demand, but if you want to be sure of obtaining your copy of the details of any model in which you are interested, you should write as soon as the issue of the *M.M* announcing it reaches you.

Arrangements have been made to reserve copies of the instructions for Overseas readers.

It has been very interesting to note from the demand for details of previous "Model of the Month" subjects the almost universal appeal of certain types of models. The Motor Chassis published in the August 1956 issue has proved a particularly attractive model, the ease with which the clutch and gear box can be operated as a demonstration of the mechanism being no doubt specially inviting.

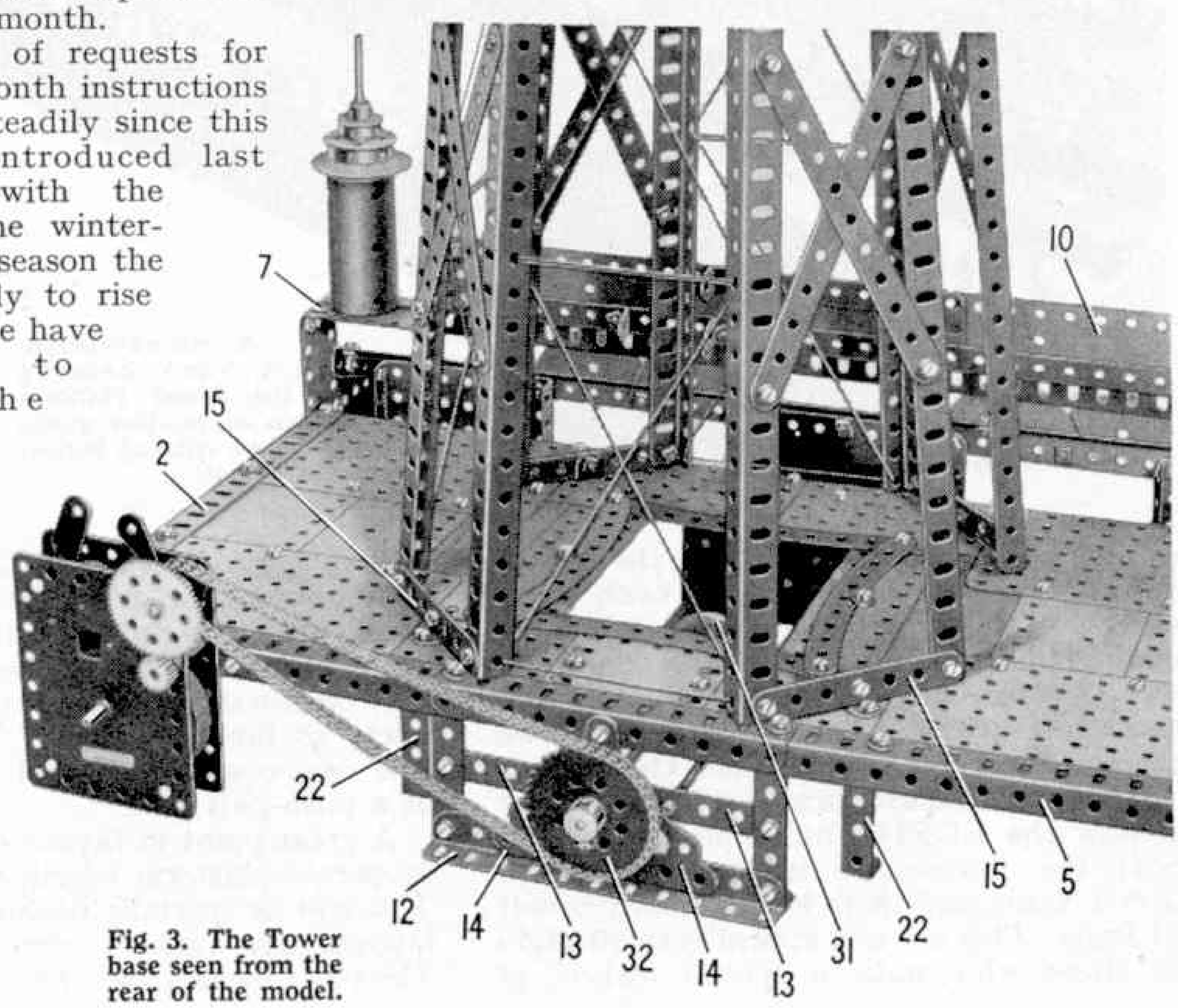


Fig. 3. The Tower base seen from the rear of the model.

HORNBY RAILWAY COMPANY

By the Secretary

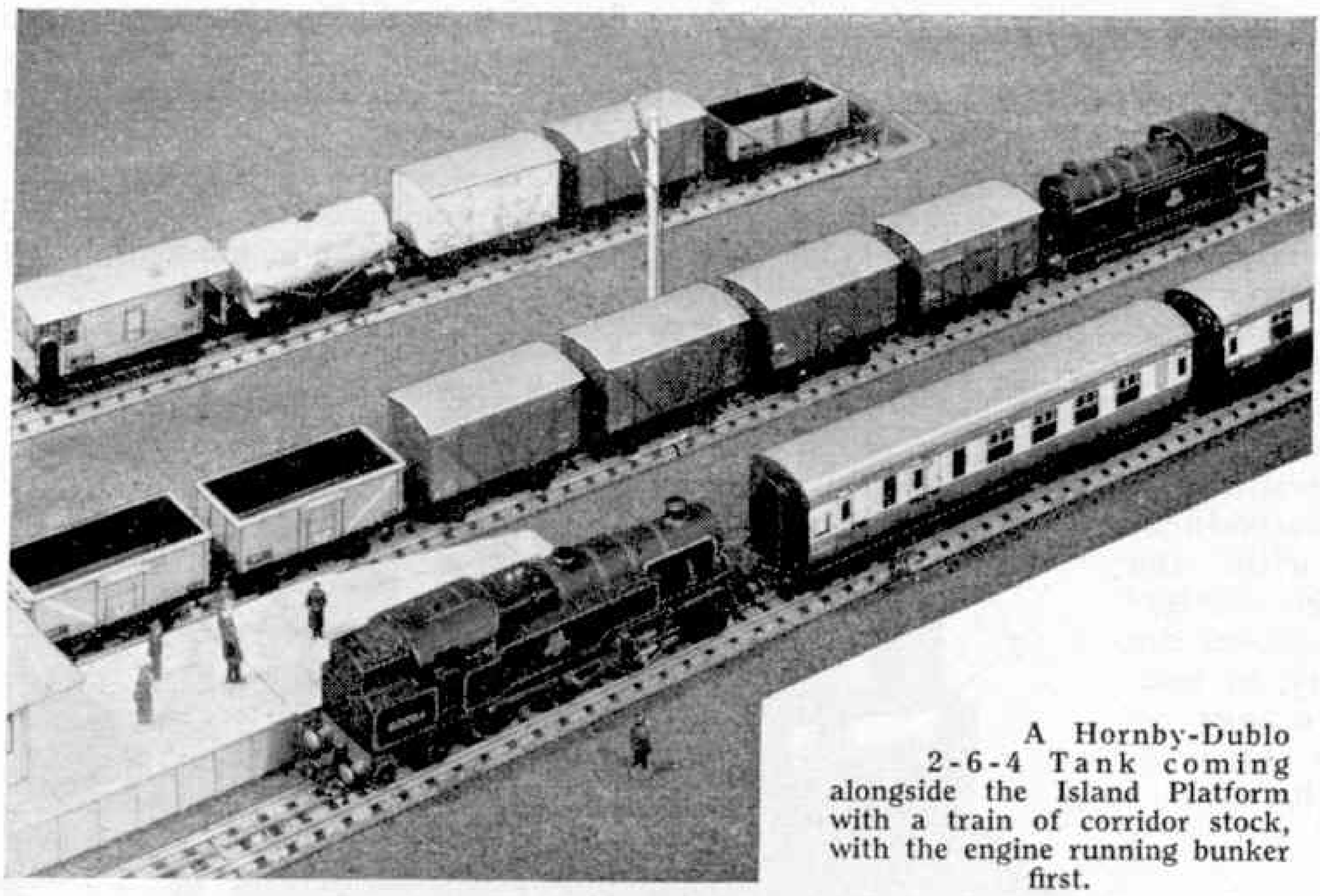
Coach Talk and Stations

YOU will remember that we finished our talk last month with a reference to some of the more recent introductions in Hornby-Dublo. I know that such new things are always popular topics, and few of you will have missed the announcement in last month's issue drawing attention to the D14 Suburban Coaches, which are replacing the D13 type.

The new vehicles are similar in general design, but they have pierced windows with internal "glazing" in place of the tinprinted representations of windows that appeared on the original stock. The latter were always very popular among Hornby-Dublo owners, but I am sure that the newer vehicles will be sought after even more eagerly. They represent typical B.R. compartment coaches, as used extensively for suburban and stopping train services, and they are of course available in two forms, First-Third and Brake-Third.

The new Coaches form the train in what is now the EDP14 Tank Passenger Train Set; the locomotive is the well-known 2–6–4 Tank, and there is a standard circuit of Rails. This Set will appeal very strongly to those who make a special feature of outer suburban and what I may call "residential" train services, some of which in real practice cover quite respectable distances. In their new form the Coaches are in keeping with the character of the D12 corridor stock used for the long-distance trains on so many Hornby-Dublo railways.

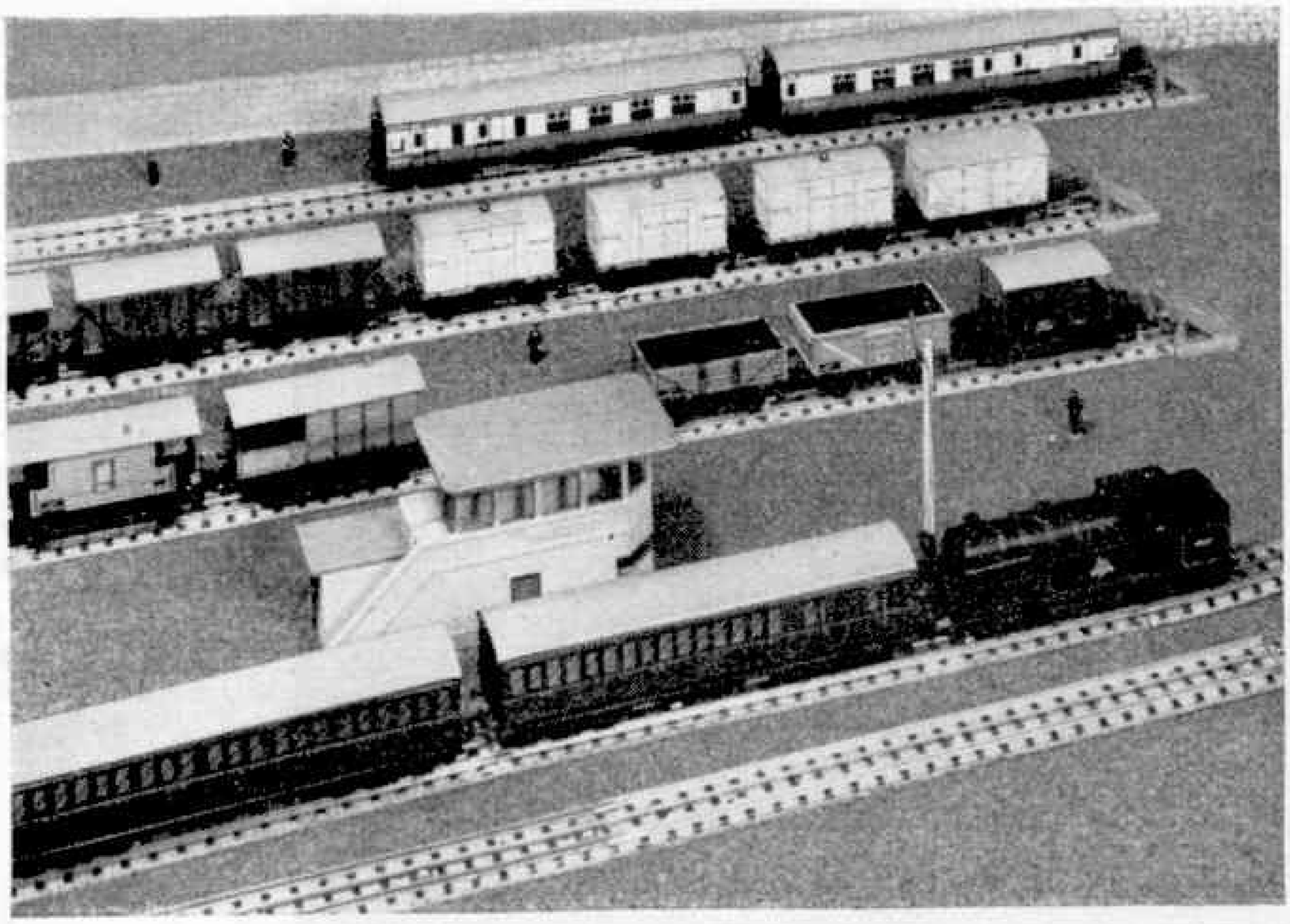
There is further good news, principally for beginners, although I have no doubt that those with fairly well established layouts too will be interested in the EDP10 Tank Passenger Train Set. This is a simple outfit providing a passenger train in keeping with the well known EDG17 Goods Train Set, with which so many Hornby-Dublo systems have begun.



A Hornby-Dublo 2-6-4 Tank coming alongside the Island Platform with a train of corridor stock, with the engine running bunker first.

In the EDP10 Set there is the usual circuit of Rails, and to run on this there is the popular and handy 0–6–2 Tank, with a two-coach train made up of one First-Third and one Brake-Third of the new D14 stock. Here we have the ideal combination for passenger train services on a beginner's railway. It is splendid for branch or local train services and I expect that on the simplest layouts, which are not likely to include running round facilities, this two coach train will be widely used as a push-pull unit.

A great point in favour of this Set is the moderate platform length that it requires. This will be specially useful to those whose layouts are rather restricted for space. The two Coaches have practically the same



A stopping train in charge of a Hornby-Dublo 0-6-2 Tank passing the Signal Cabin. Low-Sided Wagons carrying Containers, and other rolling stock, are in the background.

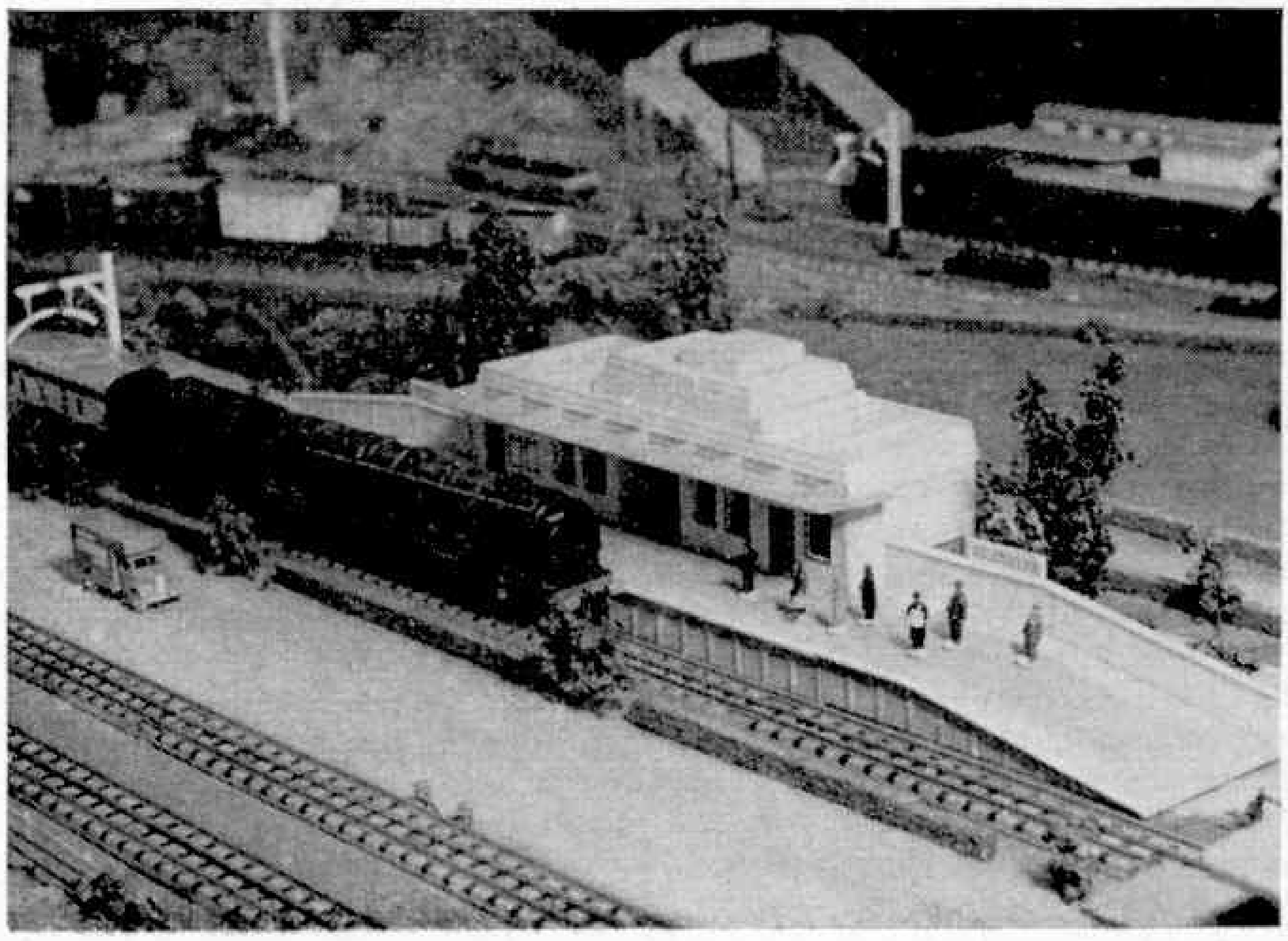
length as the flat section of the Hornby-Dublo Through Station, or Island Platform. When bringing the train to a halt you should aim at getting the rear of the Brake-third Coach level with the end of the flat section. The whole train will then lie neatly alongside the Station or Island Platform.

The fitting of the train to the Platform in this way gives a really pleasing and realistic effect. On layouts where station sites are somewhat restricted, Hornby-Dublo owners sometimes keep their trains short accordingly. An alternative with longer trains is to draw up twice, as sometimes is necessary in actual practice where long-distance trains make a call at a rather short wayside station. Beyond that a station can of course be lengthened by the use of Platform Extensions.

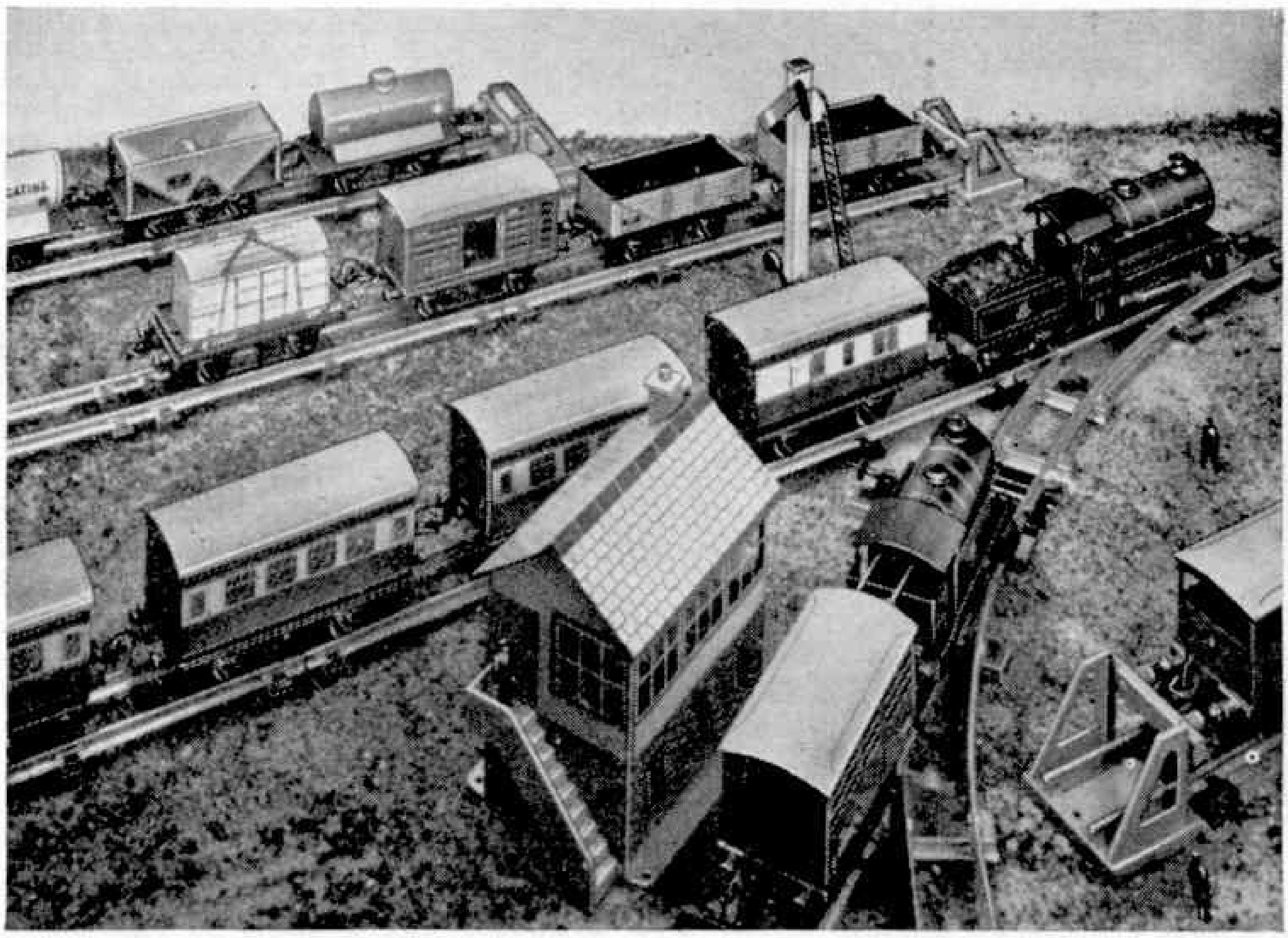
To judge from the letters that so many of you send to me about your railways, I have the impression that more attention is being given nowadays to the actual setting of miniature stations. A station should have a reason for its existence, and if there is no township immediately apparent there should at least be a roadway leading to the station.

I am glad to be able to include as an example the layout seen in the lower illustration on this page, which shows the standard Through Station alongside one of the tracks on the layout of Mr. Idris Lloyd, of Los Angeles, California.

On this system a great deal of attention has been given to natural effects and I am sure you will agree that the general aspect of the Station referred to is very good. Apart from the miniature trees, and the hedged roadway at the rear of the Station, the miniature figures on the platform have been well disposed. These little people really *do* look as though they were waiting for the train that is pulling in behind *Duchess of Montrose*.



An attractive Through Station scene on the Hornby-Dublo layout of Idris Lloyd, California, with the "Duchess of Montrose" entering the platform. Photograph by Jack Howard, Los Angeles.



A Hornby express train of corridor stock passes the Home Signal protecting the Points leading from the goods yard, where a goods train is held for the express to pass.

Sidings and Signals

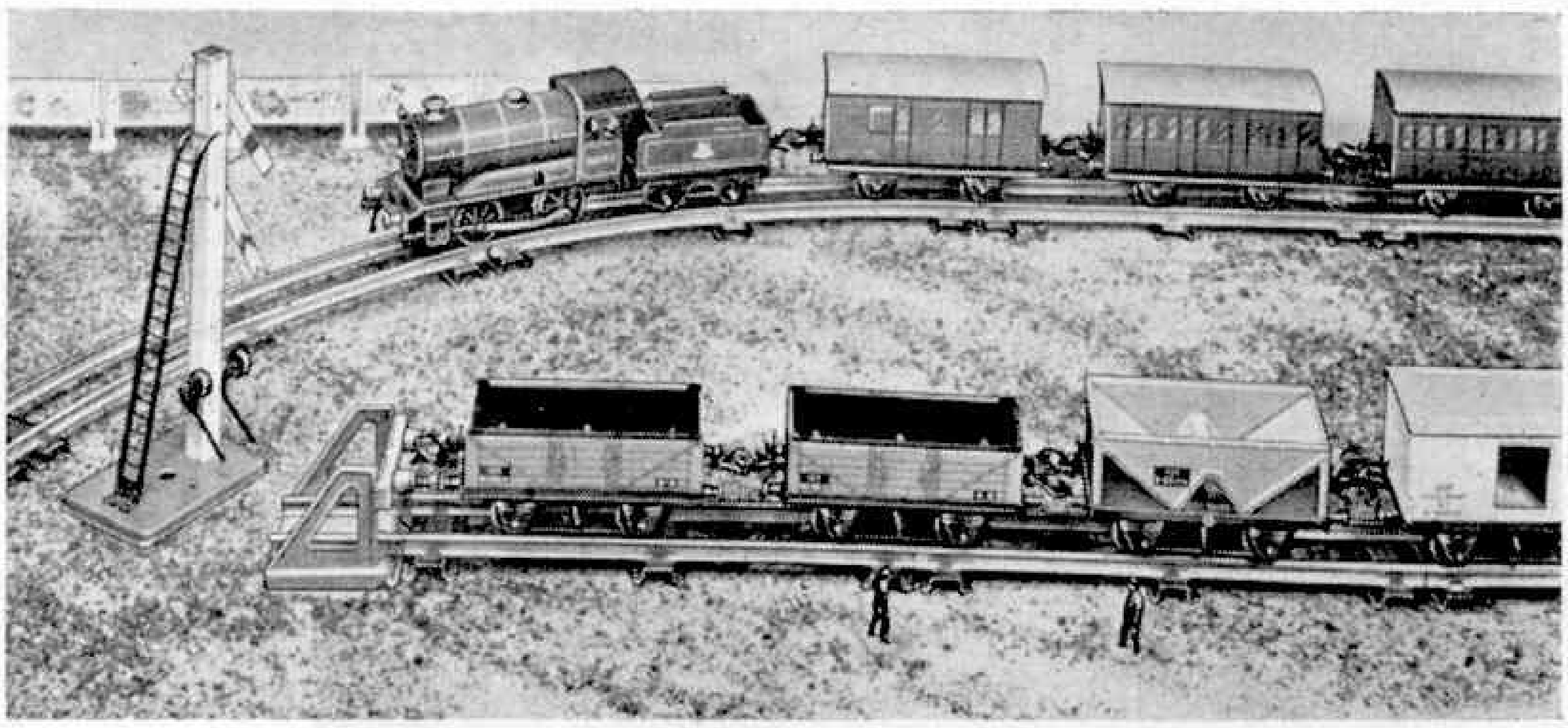
A HORNBY Railway, or any miniature railway for that matter, starts to grow almost from the moment when the oval track in the first Train Set is laid down. Usually the first extensions take the form of further Straight Rails in order to lengthen the railway. Sometimes, too, a Hornby layout can be made wider and this is a great advantage, as it provides a certain amount of straight line in between the curved sections along each side of the layout. Clockwork engines appreciate this, and they run better in such circumstances than where they have to run over a half circle of rails between the main straight stretches.

But a stage is reached when the Hornby enthusiast wants to go further, and then he must add Points to his layout. This leads to real railway fun. With Points he can provide alternative routes for his train, and when he does the additional sections nearly always form loop lines that give him continuous running, whichever way the train is directed. And the addition of Points also allow him to put down sidings, so that he can enjoy shunting and have places where trains or rolling stock can be kept off the main line when they are not in use. He wants Points in fact, to make a goods yard.

Most Hornby railway owners probably spend a great deal of time in the shunting movements necessary in connection with the running of their trains. With several Points branching out from the main track to form a series of sidings, a useful and attractive shunting yard can be brought into being. Hints on actual shunting methods were given some time ago in these pages, and perhaps we may return to the subject again soon for the benefit of newcomers to the Hornby railway hobby.

Points are generally associated with Signals, as in main line practice both are controlled from signal cabins. Although such control is not a feature of the Hornby Railway System, Signals are essential accessories if the best fun is to be obtained from your train running. In the early stages of railwaying Signals may be few and far between, but as a rule the stage is soon reached when the miniature railway owner feels that he must do something more definite about the signalling of his railway.

The placing of Signals in a satisfactory manner is not always easy in miniature, because the distances between Stations or between Points that require protection is very much reduced in proportion to the distances of real practice. As a rule,



Round the curve comes a stopping train with a clear road, as shown by the Double-Arm Signal. On this railway the siding is inside the main line.

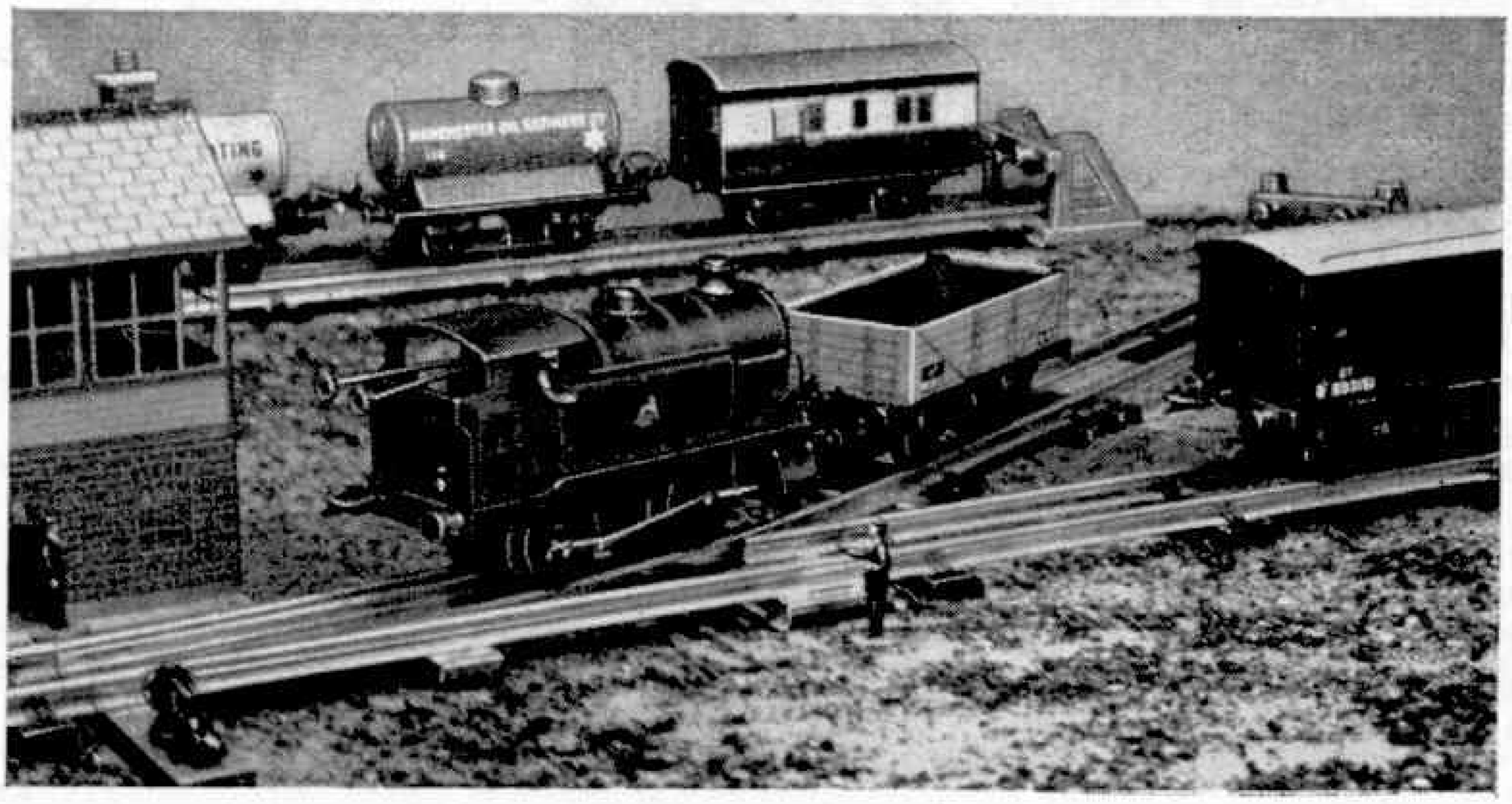
however, the Home type of Signal, that is one with the square-ended semaphore, can be placed in a suitable spot at or near the platform end in order to start trains off from the Station. Points too should be protected by Signals on main lines at least, but in sidings a certain amount of latitude can be allowed.

If every movement were allowed for in placing the Signals on a miniature railway, there would probably be far too many of them for good appearance, or for convenience in managing the trains. It is necessary therefore to exercise a little discretion and as a rule most miniature railway owners manage to do this fairly well. H.R.C. members can always refer to their H.R.C. booklet, which includes a special section on Signals, while most special signalling problems can be settled satisfactorily by writing to the Headquarters of the H.R.C., or to the Editor.

When there are several operators to run the line, one or more can work the Signals and Points, while others manage the trains. This division of the work on the line adds considerably to the fun and realism of operations. A single operator will probably be content with a simpler system of signalling and in this way will probably be able to work both Signals and the train.

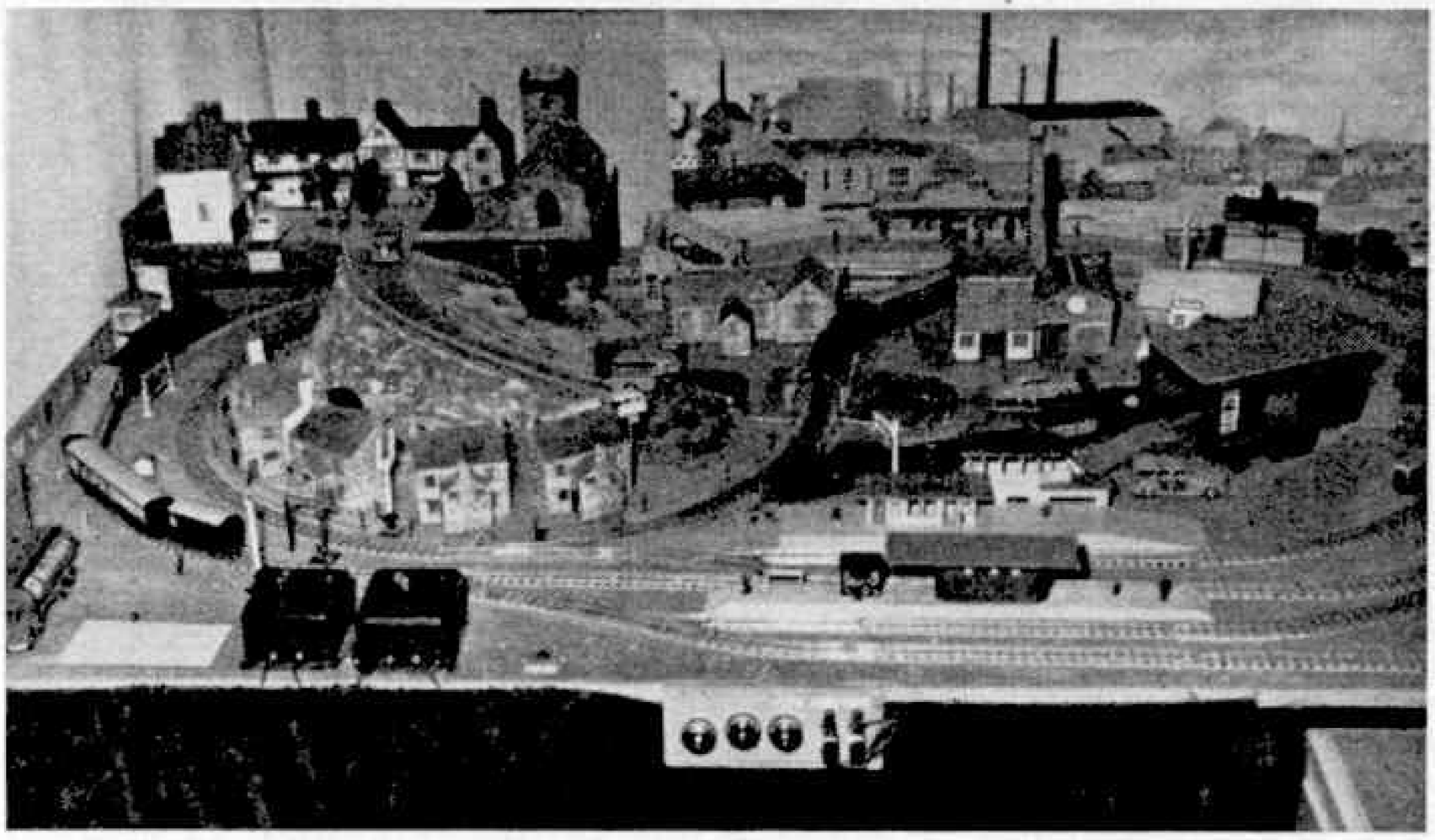
In any case the Signal Cabin of the Hornby system must find a place on the railway. This is a realistic building typical of the ordinary type of "Box", as it is called by railwaymen, and it looks well at the lineside, either near the Station, Level Crossing, or by the Points where a series of sidings join the main line.

A Hornby No. 40 Tank is bringing a Wagon from a short siding at a wayside station, to add it to the train waiting on the main line. The Stationmaster is watching the operation from the front of the Signal Box.



The Town on the Hill

THE layout shown in the illustration on this page is a very good example of the possibilities of Hornby-Dublo within a fairly restricted space. The board on which the railway is situated measures only 6 ft. × 4 ft., but no doubt all readers will agree that Hornby-Dublo enthusiast Brian Minto, of Arbroath, the owner of the system, has made the best use of the space at his disposal, with attractive results.



The Hornby-Dublo railway of Brian Minto, of Arbroath, with the "Town on the Hill" in the top left hand corner.

The diagram below gives details of the rails needed to build up a similar layout. It will be realised that each main track requires its own power and control arrangements. So there is a Curved Terminal Rail on each circuit, and an Insulating Tab separates the centre rail clips between the Points forming the crossover joining the two circuits. This ensures completely independent control on each circuit.

The railway is the result of three years of development since the original Tank Goods Train Set was bought. Of course the original engine is still in service, and its companions now include one of each of the other Hornby-Dublo types. The railway is not overloaded with rolling stock, but the four Coaches used, two L.M.R. and two E.R., are found to be sufficient, together with seven goods vehicles. This is a wise arrangement, as in the space available siding accommodation cannot be very generous and an excess of rolling stock would only be an embarrassment to the operator.

The railway does not follow the popular plan of having the tracks along one side under cover, with town or other features reproduced on top. But there is a spectacular miniature township on the "hill" above the railway, seen in the top left hand corner of the picture. This is served by the nearby Through Station.

As on most miniature layouts, developments are always taking place. Brian now has an engine shed under construction, so that the various locomotives will no longer have to live in the "open," as they have had to do up to now. The engine shed will add a further touch of realism to his layout.

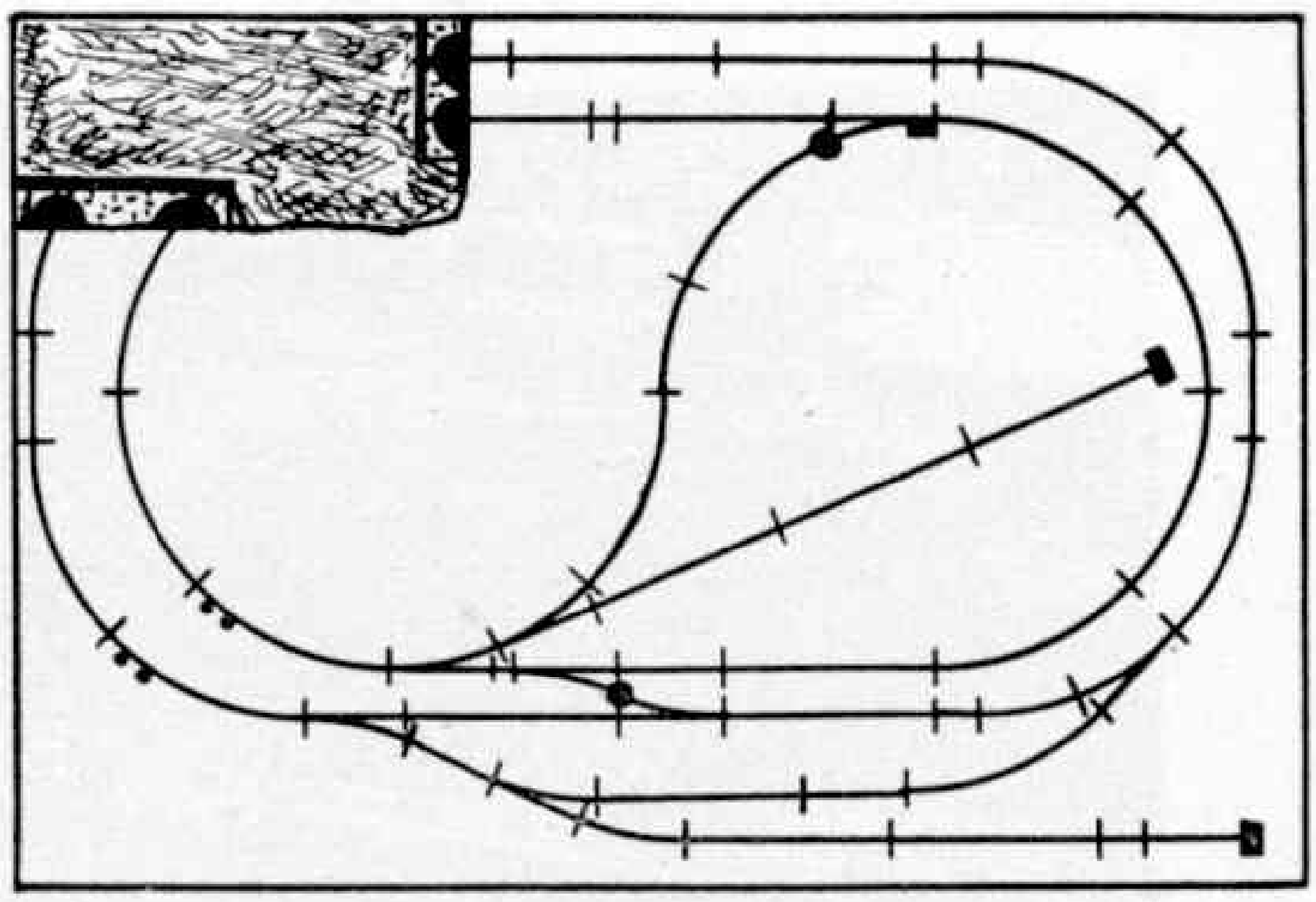


Diagram of the layout, which requires: 16 EDA1, 2 EDAT1, 3 EDA1½, 14 EDB1, 6 EDB1½, 3 EDB1¼, 2 EDBS, 1 EODPL, 3 ISPL, 4 ISPR, 2 IT Insulating Tabs, 1 Switch D1, 2 Buffer Stops.

Club and Branch News

WITH THE SECRETARY

TWENTY-ONE YEARS OLD

The annual Presentation Night, when awards for good Club work are presented, is always a very happy occasion at the Maylands M.C., Maylands, Western Australia. This year it was more so than usual, as the Club has "come of age," and the Night was made the occasion for a surprise "Twenty-first Birthday" party for the Leader, Mr. V. Malmgreen, during which he was presented with an autographed key in honour of his long service for the Club.

Mr. Malmgreen was the founder of the Maylands M.C. and, except for the war period, has been Leader throughout. I have already conveyed to him my personal appreciation of his fine and successful work for the Club and for the Guild, and I gladly place his splendid achievement on record here.

MEMBERS WANTED

A Branch of the H.R.C. is being formed in Potters Bar by R. Woods, 120 The Walk, Potters Bar, Middlesex, who would be glad to enrol Hornby and Hornby-Dublo Railway enthusiasts.

New members are wanted for the Norbury Model Railway Club, which is also a Branch of the H.R.C., particularly older enthusiasts willing to assist in organisation. Those interested should write to Mr. C. B. Chapman, 41 Kilmartin Avenue, Norbury, London S.W.16.

CLUB NOTES

St. Thomas District (Exeter) M.C.—As a variation from normal model-building activities, members have found great interest in drawing, and some excellent drawings have been produced by certain members. Another attraction has been the Secretary's telephone apparatus, which has become exceedingly popular! Club roll: 10. *Secretary:* B. Madge, 42 Duckworth Road, Exeter.

Consett and District Y.M.C.A. M.C.—The poor summer weather resulted in many meetings being held indoors instead of in the open air, so there has been a good deal of model-building activity. Two model-building competitions have been run. Enjoyable outings have been visits to the Traction Engine Derby at Chester-le-Street; Pontop Pike Television Station; and Kemsley House, Newcastle, where members saw the "Evening Chronicle" being produced. Club roll: 30. *Secretary:* B. Ward, 10 Cyril Street, Number One, Consett, Co. Durham.

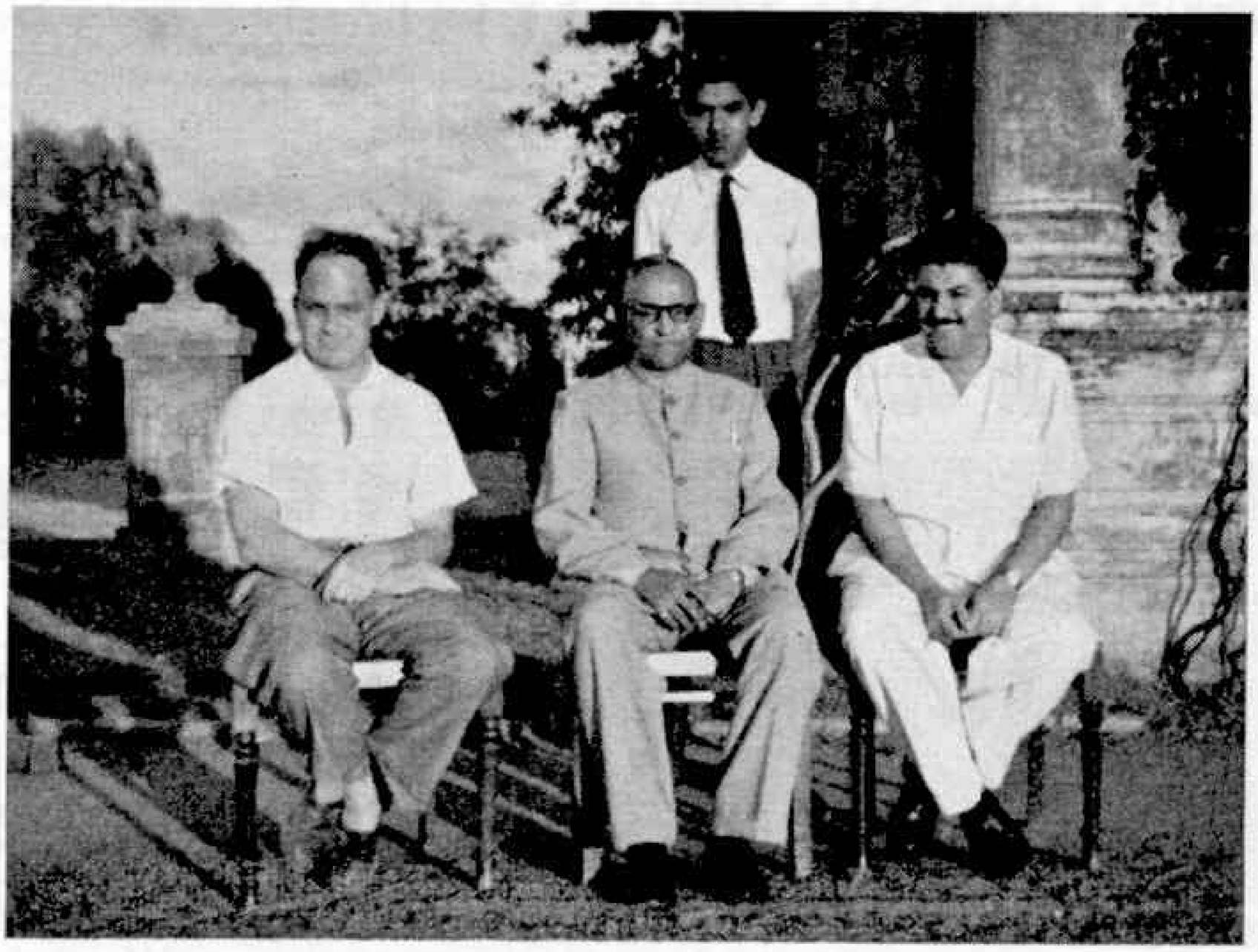
Mile End (Portsmouth) M.C.—A Dinky Toys Night, using the new layout constructed by the Secretary, was much enjoyed. Members have been busy preparing models for the Club's part in a Model Railway Exhibition organised by the associated Mile End H.R.C. Branch. Mr. P. Leggatt, former leader, recently gave an interesting talk on duck shooting with an airgun. Club roll: 30. *Secretary:* Mr. A. J. Nicholson, 213 Sultan Road, Buckland, Portsmouth.

AUSTRALIA

Maylands M.C.—The annual Presentation Night was well attended by members and their friends. Intensive preparations preceded the Club's first exhibition in 18 months, held recently in the Masonic Hall, where the fine display of models was enjoyed by many visitors. In an address to the visitors, the Member of Parliament for Maylands expressed his delight at seeing such constructive work done by local boys and pledged his support to the Club's building venture. Club roll: 44. *Secretary:* W. Miles, 6 Piaggio Street, Bayswater, Perth, Western Australia.

NEW ZEALAND

Christchurch M.C.—Models built at recent meetings have included steam engines, windmills, a helicopter, tractors and motor cars. The Club are taking part in an Exhibition in the Old Art Gallery, and members have been busy preparing models for this display. An indoor Sports Night was very successful. Club roll: 21. *Secretary:* R. Boundy, 49 Evesham Crescent, Spreydon, S.W.1, Christchurch, New Zealand.



Officials of the Mysore (India) M.C. Mr. Warren, Leader, is seated on the extreme left, and next to him is Mr. Sirdar K. Basavaraj Urs, President, and on the right, Mr. F. K. Irani, Vice-President. The energetic Secretary, Mr. M. N. Radhakrishna, is standing behind them. The Club carries out an extensive model-building programme, and excellent film shows also are held.

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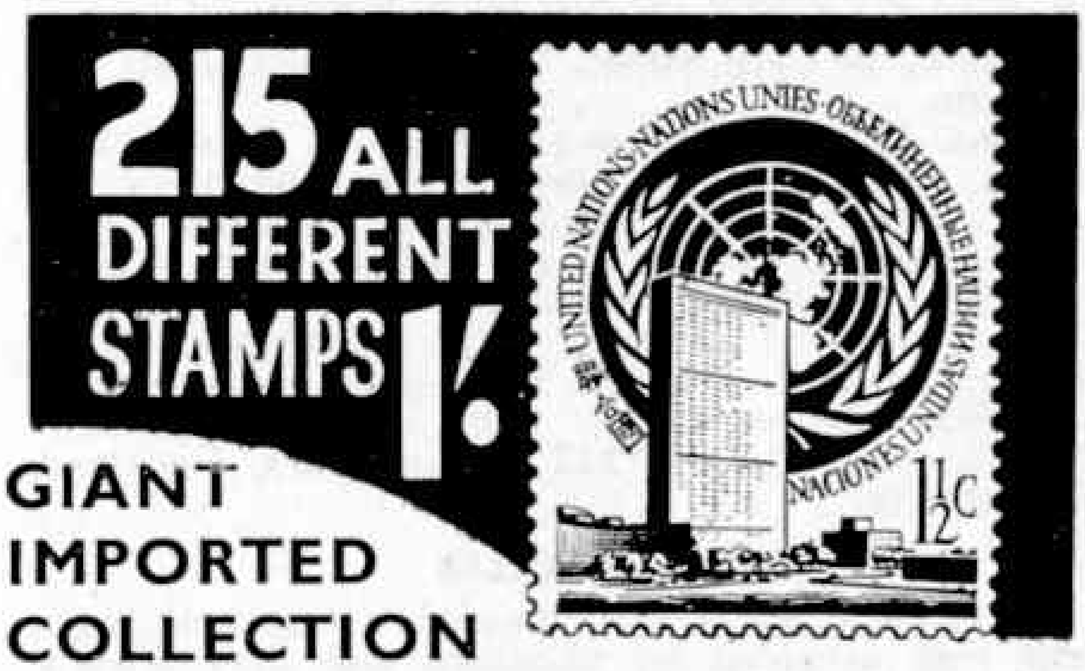

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Stamp Collectors' Corner

By F. E. Metcalfe

GENERAL COLLECTING

In the last article, I referred to the method of collecting that was the rule up to a few years ago, before the flood of modern stamps rendered collections embracing all stamps, of all countries, virtually an impossibility. Why an impossibility? Let me explain by giving my own collecting experiences.

Alas, I have to go back many years. As a young boy, living in a small country town, I was given a handful of stamps by a lady who came for a holiday. As I remember it, she had been a missionary, and apparently had friends overseas. Her present consisted of a few stamps torn off envelopes she had received, and it is a significant example of the change which has come over us during the past half century that I was quite content to wait until the following year, when the lady returned for her annual visit, before I got any more stamps for my small collection!

My first album consisted of a small lined exercise book. I carefully printed the name at the top of each page. By present collecting standards I suppose that the printing would be the best part of the collection, for I took great care.

Bit by bit more stamps were obtained—any country, any kind. Every copy counted, for stamp issues then were few and far between. Even an odd stamp belonging to a country represented something, and that is why, in those early days of stamp collecting, to collect generally meant that one was really getting somewhere, and thus one's interest could be maintained.

I think I have mentioned previously that too many books on stamps have been written from the standpoint of conditions no longer prevailing. What I had in mind had mostly to do with the question of general collecting. All too often we find the advice that the very best method of getting going is to buy the biggest packet one can afford. Such advice was good enough in the writer's early days, but since then it has ceased to be valid, for a hundred thousand or more stamps have been issued.

Just let us suppose that we do buy one of these big packets, say one containing a couple of thousand different stamps. That's a pretty hefty quantity by any standard, yet what do we find? Probably stamps from fifty or more countries. We get a printed album—another recommendation that I do not like—and we set to work. It's grand fun to start with, finding out to which country our stamps belong, and in time all are more or less mounted under the correct headings. Then what?

It is soon evident that one can get nowhere taking the stamps of every country; in fact, substitute stamp issues for water, and you are in the position that Canute was supposed to have faced in vain. More packets are bought. Fine for swops, but who wants swops from packets in these days, when the condition of stamps is of such importance. A newcomer to the hobby won't know anything about this until he is well involved, and when the mistake is realised, it is too late to do anything about the collection already formed. But the futility of it all is clear enough, and if it is not decided to give up altogether, then it is agreed upon to restrict, and to go in for a few countries only, or in for a group like KGVI or QEII. So off to a dealer, with the general collection.

We will take it that about £10 has been spent. Some fun was obtained, so we will knock £3 off for that. What do you think a dealer will offer you? I hate to have to tell you, but you will be lucky if he will take it at all, for he has already as many of the kind of stamps that go into the average packet as he needs. Perhaps by accident you have obtained a few stamps which he can use, and then his price may be anything from a few shillings to perhaps a pound.

There are some people, who have the gift of tranquility, who are able to potter along with stamps. They stick in a book any that come their way. But such lucky people are few and far between, and they are not really what we call stamp collectors in the modern sense.

Those I am interested in are the ones who propose to take up the hobby as a real pastime. A small album costing a shilling or two, and a small packet of stamps, for some youngster are all very well; in fact they make up an excellent gift, but the danger lies in magnifying such a gift and taking it as a start to a real collection.

Many parents like their offspring to collect stamps, because the hobby is supposed to teach geography, etc. Maybe it does, but I once saw a letter addressed by the Editor of a stamp magazine to Buenos Aires, Brazil, and that Editor had been collecting stamps ever since he could walk.

But geography or no geography, we are dealing with a grand pastime. Its world-wide popularity is proof of that, always providing of course that it is conducted on the right lines, and if the method adopted brings a disappointment such as I have already referred to, then general collecting is not the correct line to follow.

The writer himself has more than one collection, but all are restricted in such a manner that it is possible to make progress. I feel with each that I am getting to a goal. So next month I will go into the question of group collecting, and I hope to be able to show that it is by limiting one's scope that the best is to be obtained from the king of indoor hobbies.

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Stamp Gossip

THE NEW SEASON

The appearance of the first catalogues of the season means that those collectors who gave the hobby a go-by during the summer months now have to consider getting those albums out. Let us hope that they will not be too dusty.

Though it is not long since I dealt with the matter, I still get enough letters on the subject of misplaced centres for me to see that many collectors are not at all clear on the why and wherefore of these varieties. Perhaps some of the letters come from new readers. Anyhow, I am told repeatedly of stamps in which the centre is out of place, more to one side than another, and owners of these items always trot out the evergreen "How much is it worth?" The answer is always, of course, not a cent above a normal copy, for it is just a case of where the stamp has been printed in two operations, and the centre has not registered in the right position. That's all there is to it. Sorry, these swans are only geese.

TURKEY TROT

Here is one of the nicest stamps the United States has issued in years, and if such fine designs continue U.S.A. stamps will feature amongst the most beautiful issued. Canada was first in the field with stamps intended as publicity for the protection of its wild life and now America is following that lead.

The first stamp of the U.S.A. "Wild Life" series shows a wild turkey in flight. It will surprise some to find that these birds originated in America. Many think that they actually came from Turkey itself and, believe it or not, after the war it was my job to go to Turkey, for a British Government department, to see if there were any turkeys there, as they had been told! Though I travelled over most of the country, I did not see as many of these birds as are to be found in some backyards here at home. It would be a wonderful sight to see wild turkeys in flight, but why anyone want to shoot such creatures is completely beyond my comprehension. Apparently there are such folk, hence the necessity of stamps as publicity against such uncivilized acts.

CURRENCY

When I mention the pending change of currency in India, I can imagine some collectors asking what this has got to do with stamps. The answer is plenty, as they say in the movies. Our good friend Mr. E. R. Kooka, has sent us cuttings from the *Times of India* that deal with the changes to take place next year in his country. Gone will be the pies and annas, and instead there will be decimal coinage, with 100 naya paisa equal to one rupee.

This is where stamps come in. Those bits of paper that give us all so much pleasure and trouble will change their face values.

India is remaining in the Commonwealth, so that collectors of QEII stamps will be including its stamps in their collections. So I cannot urge collectors to be too quick to get the current set while it is current if they collect mint stamps, for whereas there are always plenty of used about, as soon as an Indian set goes off sale, mint appreciate in value. Somehow or other, collectors overlook buying the stamps while they are still on sale in the Post Office. This current set will be no exception, of that I feel sure. And don't forget the service set, which will also change.

LEEWARD ISLANDS

The stamps of Leeward Islands, which were used by the islands that formed the group Antigua, Montserrat, St. Kitts-Nevis and Virgin Islands, along with their own particular issues, have gone for good, for this confederation is no more.

Leeward Island stamps, which first appeared in 1890, have always been very popular, in spite of the fact that the designs have all been of what are known as the key type, which has merely the head of the reigning monarch as the principal feature of the design. There were plenty of critics who claimed that these stamps were merely produced for sale to collectors, and that they could have done without them. Well, there was one value that was needed, and that was the half cent, for now that this stamp is off sale, all of the four islands thrown back on their own issues have had to rush out one for half cent., which they did not have before.

One of these stamps is illustrated, and in case there are any who wonder why stamps of such low face value are needed it should be explained that according to a West Indian correspondent, it covers the first newspaper rate. There's culture for you. To send a newspaper in Britain, we have to expend at least eight times as much on postage.

THE MONTH'S TIP

This month my tip again covers quite a number of stamps. In 1949 the various Malayan States brought out new sets of stamps, and various fine shades came out later when new printings were released. These stamps have become very popular. Some new values came out in 1952, and the colours of one or two more were changed. These were classified as QEII issues. The 1949 releases were naturally listed as belonging to the KGVI group., but are still current, so they are included also in the QEII section of the Commonwealth Catalogue. There will be a greatly increased demand, and as the sets will be changed in a few months' time, the tip is to fill those blanks as fast as you can.

Acorn Bank—(*Continued from page 498*)

transport vehicles to carry it to the screens. These are eight giant bottom dumping semi-trailers, which hold 40 tons of coal and were specially designed for this task. They are believed to be the largest yet made in England.

Road building on quite a large scale formed part of the operations at Acorn Bank. The semi-trailers carrying the coal were far too heavy for use on the road available, on which they would have encountered other traffic. So the original intention of carrying the coal to the screens over this road was abandoned, and an entirely new motorway was created instead.

This private road is 1½ miles long, and has a 30 feet carriage-way. It crosses the River Blyth on a Bailey Bridge, 190 feet long, that is carried on timber trestles. This bridge is the principal feature of the illustration on page 498, which shows the new road crossing the Blyth and, beyond that, a second Bailey Bridge that carries it over the main Bedlington road. Three Bailey Bridges altogether were used in making the road.

At the screens, which are about two miles from the site, the coal will not be washed, and this means that special attention must be paid to clean digging. The seams will be cleaned before digging, mainly by hand, but experiments are being made with a tractor mounted power brush. The coal is discharged by the rear dump lorries into one of three 40-ton hoppers feeding on to coal belts, each of which has a capacity of about 150 tons an hour. The belts discharge over vibrating screens, or "Niagaras", on to the picking beds, where low grade material is removed by hand and taken by a cross belt into a storage hopper for return to the cut. High quality coal passes direct to loaders that deliver it directly into 20-ton rail wagons. Inferior coal is crushed to a small size for blending with the small coal that falls through the "Niagaras".

The work at Acorn Bank is being carried out by Costain Mining Ltd., a subsidiary of Richard Costain Ltd., to whom I am indebted for the information in this article and for the illustrations on pages 496-8.

Secrets of Stonehenge—(*Continued from page 505*)

hammer-stones, weighing from one to close on seven pounds. They also used mauls—hammers weighing from forty to sixty-four pounds—as well as picks made from deer horn.

It is thought that, the holes for the stones having been dug, the huge blocks of stone were brought to them on rollers made from tree trunks. They were then tipped into the holes, being pulled into an upright position by ropes. Hauling such heavy stones into an upright position must have needed the strength of well over 200 men.

Having got the uprights into position, they were then faced with the problem of lifting the lintels on to the top of them, and these men had no cranes nor even pulley blocks. How then did they raise such heavy blocks to a height of 20 feet and more?

The experts believe that these New Stone Age Men built sloping mounds of earth round the uprights, and that the horizontal stones were then rolled up them on tree rollers. This meant building causeways of earth time after time and to the very tops of the upright stones. When the lintels were in place, the mounds of earth were removed. Then the large mauls were used to ram chalk and rubble into the holes containing the uprights.

There are, of course, other relics of the Stone Age, but they are nothing like so grand as Stonehenge. There are the famous stones of Carnac, in Britanny, but these are simply in a line. Nor are the stone circles of Avebury and Ballynoe, in Northern Ireland, made up of horizontal stones resting on supports.

Each Midsummer Day there is a crowd of people to witness the ceremony at Stonehenge. And they, in the shadows of the huge stones, remember that this wonderful monument was built by inhabitants of these islands who worked with such care and patience thousands of years ago.

Easy Model-Building—(*Continued from page 519*)

are represented by Cord. The ladder is bolted to the base and is connected to the tower by an Angle Bracket. The handrail consists of a 4" and a 4½" Rod joined by a Rod Connector and is supported in Right Angle Rod and Strip Connectors.

Parts required to build the Gantry Crane: 10 of No. 1; 14 of No. 2; 2 of No. 3; 12 of No. 5; 4 of No. 8; 6 of No. 10; 4 of No. 11; 11 of No. 12; 1 of No. 15a; 2 of No. 15b; 4 of No. 16; 1 of No. 18b; 1 of No. 19g; 5 of No. 22; 2 of No. 22a; 1 of No. 23; 1 of No. 24; 2 of No. 24a; 2 of No. 24c; 14 of No. 35; 118 of No. 37a; 111 of No. 37b; 18 of No. 38; 2 of No. 38d; 1 of No. 40; 1 of No. 44; 1 of No. 45; 8 of No. 48a; 1 of No. 51; 1 of No. 52; 1 of No. 57c; 4 of No. 90a; 6 of No. 111c; 1 of No. 115; 4 of No. 125; 2 of No. 126; 2 of No. 126a; 1 of No. 147b; 1 of No. 176; 1 of No. 186; 4 of No. 188; 4 of No. 189; 4 of No. 190; 1 of No. 198; 2 of No. 212; 2 of No. 212a; 1 of No. 213; 2 of No. 214; 4 of No. 221; 2 of No. 222.

Speedwalk and Carveyor—(*Continued from page 528*)

Having unloaded, the cars continue to complete the circuit and describe an arc on banks of powered wheels to pick up passengers for the return journey to the starting point. In the New York installation, the circuit between Grand Central Station and Times Square will be completed every four minutes.

The live roll conveyors that have been developed for the car-type passenger conveyor have rolls consisting of two rubber-tyred wheels on a shaft, and the rolls are spaced at about one-quarter the length of the car bottom. When used for speed changing, each successive roll is driven at a higher or lower speed according to whether the cars are to be accelerated or decelerated.

For carrying the cars around curves, live rolls are used in which the roll shafts are set on radial lines. The rubber-tyred wheels forming the rolls are driven at rim speeds proportional to their distances from the centre of the curve. In this way the cars are propelled around the curves without the sliding of tyres under the cars.

The "train" of 19 cars will need no driver, no guard, no signals or timetables. Thus, the New York installation will represent the world's first example of full automation in public transport.

Among the Model-Builders—(*Continued from page 531*)

required length two lengths of Cord at each side are used. The first piece of Cord is passed underneath each plate, and is then pushed through holes in the plate so that a small loop is formed above each hole. The second piece of Cord is then passed through the loop, and the process is repeated with each plate until the required length of track is obtained. The two pieces of Cord are then pulled tight and the ends tied together. The picture reproduced as Fig. 3 (page 531) illustrates a complete length of track, and the arrangement of the Cords is shown in the sketch Fig. 4.

THIS MONTH'S SPECIAL ARTICLES

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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.

Peat for Heat

Denmark has no mineral deposits, and is obliged to import quantities of coal.

Peat cutting in Denmark. Photograph by G. H. Worton, Nottingham.

Peat, however, is abundant, and although possessing little more than half the calorific value of coal, it is playing an increasingly large part in industry.

I recently visited a large peat bog in Northern Jutland that produces several thousand tons of fuel per year. Cutting is performed by several self-propelled machines, the actual cutting operation being similar to that of dredging. Scoops with keen cutting edges, mounted on an endless chain, bite six feet into the earth while the machine moves slowly forward, and discharge the sods of peat on to a conveyor belt that lays them in neat rows, as shown in the illustration.

After the cutting machines came the stackers, workers who stack the freshly-cut sods on edge into small stooks to dry. At this stage, the peat contains about 80 per cent. moisture and drying in the open takes about 12 days.

When dried, the peat is taken to Works adjacent to the bog, where it is pulped and baled ready for transporting to the works of the cement firm that extracts it from the bog. There, in specially adapted plant it is used to heat the kilns that produce best Portland cement.

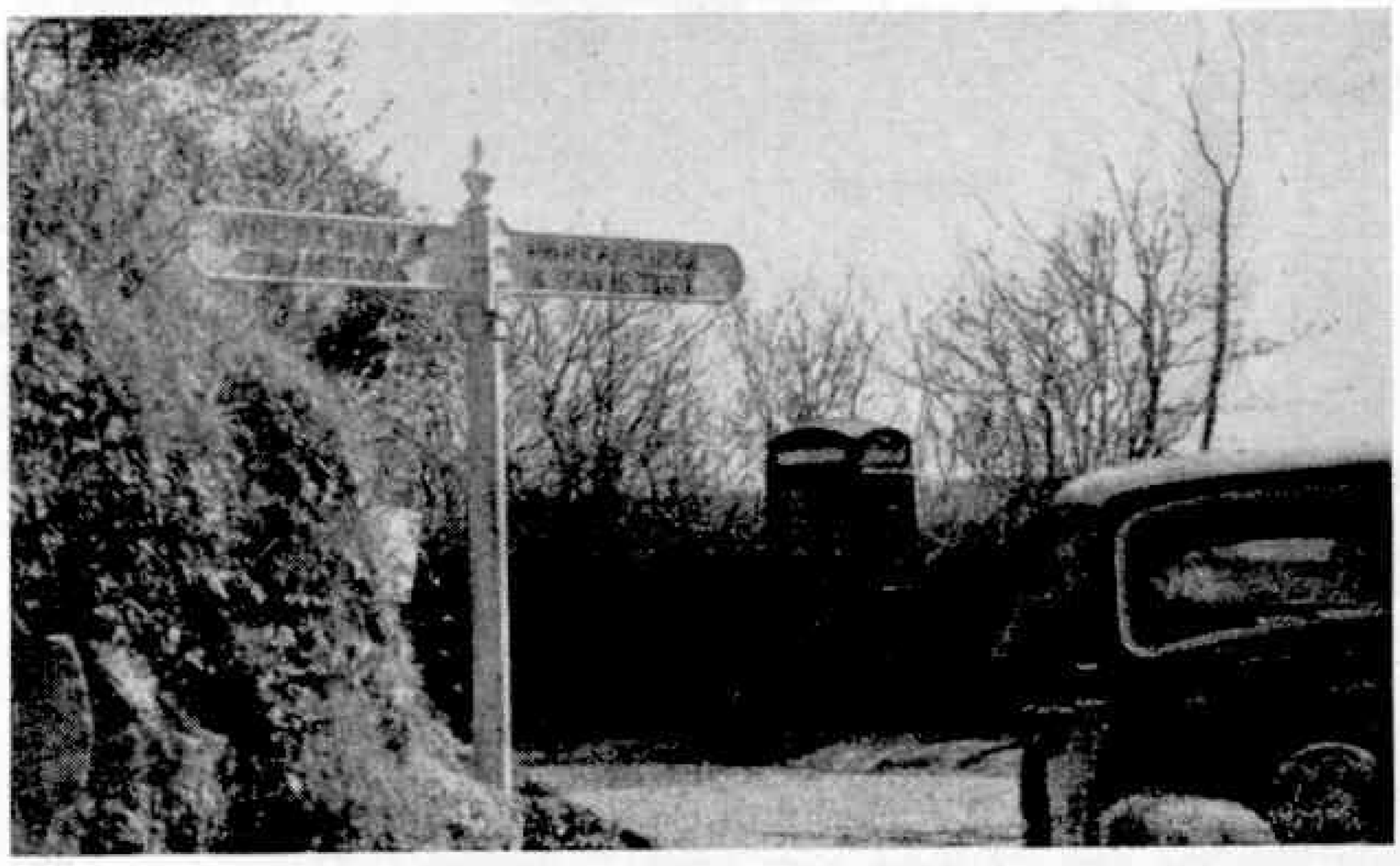
G. H. Worton (Nottingham).

A Strange Signpost

The unusual signpost seen in the accompanying picture must surely have confused many motorists and other road users from time to time. The perplexed holiday motorist seen in it asked me which road would take him to Tavistock, carefully pointing out to me that the signpost directed him to Tavistock by two different ways. He had driven across Dartmoor from Exeter.

As I live in the district I knew that the quickest way to Tavistock was by the fourth road at the crossing, and this is not marked by the signpost!

P. Van de Kasteele (Tavistock).

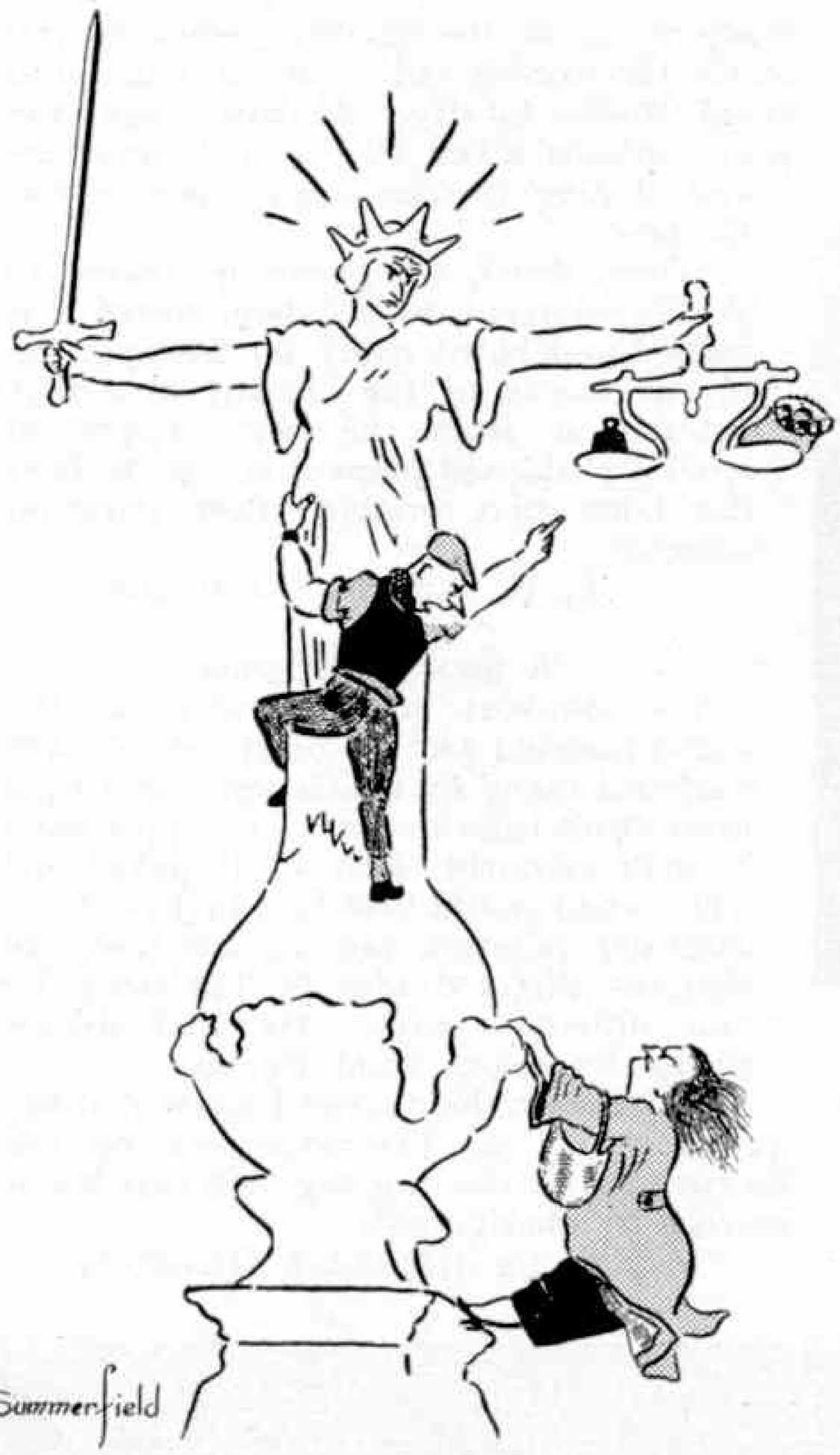


Which way would you go to Tavistock? Photograph by P. Van de Kasteele (Tavistock).

Fireside Fun

Enquirer: "I understand your father is ill. I trust it is nothing contagious."
Lazy One: "I hope not. The doctor says it is overwork."

* * * *



"Satisfied?"

* * * *

Jack: "Let's have some ginger ale."
Tom: "Pale?"
Jack: "No, just a glass will do."

* * * *

A dopey shop-keeper hired a clerk who promptly made a mistake that cost the owner a lot of money.
"Know what I'm going to do?" threatened the shop-keeper. "I'm going to deduct a third of your wages every week until you've made up the loss you've caused me."
"But," replied the clerk, "that'll take a long time!"
"No it won't," said the shop-keeper, "I'll raise your salary so I can get it back quicker."

* * * *

A very stout man approached a weighing machine that bore the sign, "I speak your weight," stepped on the platform, and dropped a coin in the slot. At once, a groan issued from the machine and a voice requested, "One at a time, please."

Professor: "How much morphia does one need for an injection?"
Student: "Eight grammes."
Professor shakes his head and turns to the next student. The first student thinks again and says: "Professor, I made a mistake. I mean an eighth of a gramme."
Professor: "Too late! Your patient is already dead."

* * * *

"And now, friends, continued the politician, "I wish to tax your memories."
"Goodness," muttered an opponent, "Why haven't *we* thought of that?"

* * * *

BRAIN TEASERS

NOT OUT!

If all 10 batsmen in a cricket team are each bowled with 10 successive balls, which batsman of the team would be "not out?"

* * * *

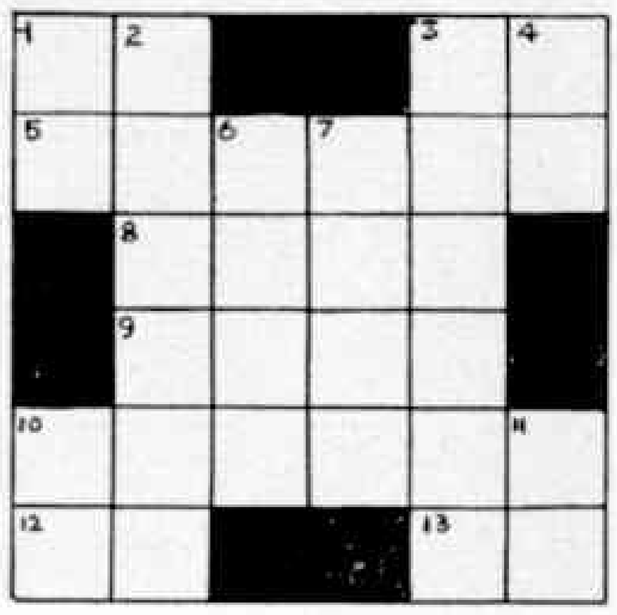
FIVE MINUTE CROSSWORD

Down

1. A curer of ills.
2. Juliets would be lost without these.
3. Put in a container.
4. A mark of Royalty.
6. Stay put.
7. Could be an outing.
10. It's wrong way round.
11. Self esteem minus nothing.

Across

1. An old railway.
3. Exist.
5. Attend to.
8. A place for buying and selling.
9. Throw out.
10. Fall
12. To be.
13. This would be of no use to a smuggler without a "K."



* * * *

ANSWERS TO LAST MONTH'S PUZZLES

A Coin Puzzle

The solution to this puzzle is shown in the sketch below. The three coins to be moved are shown in dotted outline.

* * * *

What Day Is It?

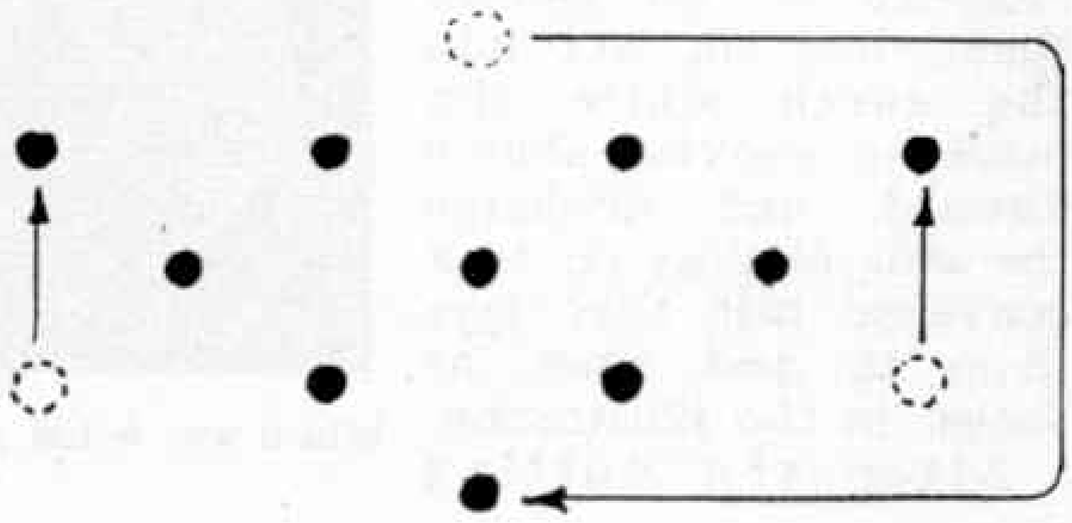
John went to town on Tuesday.

* * * *

How Many Farthings?

The number of farthings is 12,128 and by inserting two colons this can be converted into £12 : 12 : 8.

* * * *



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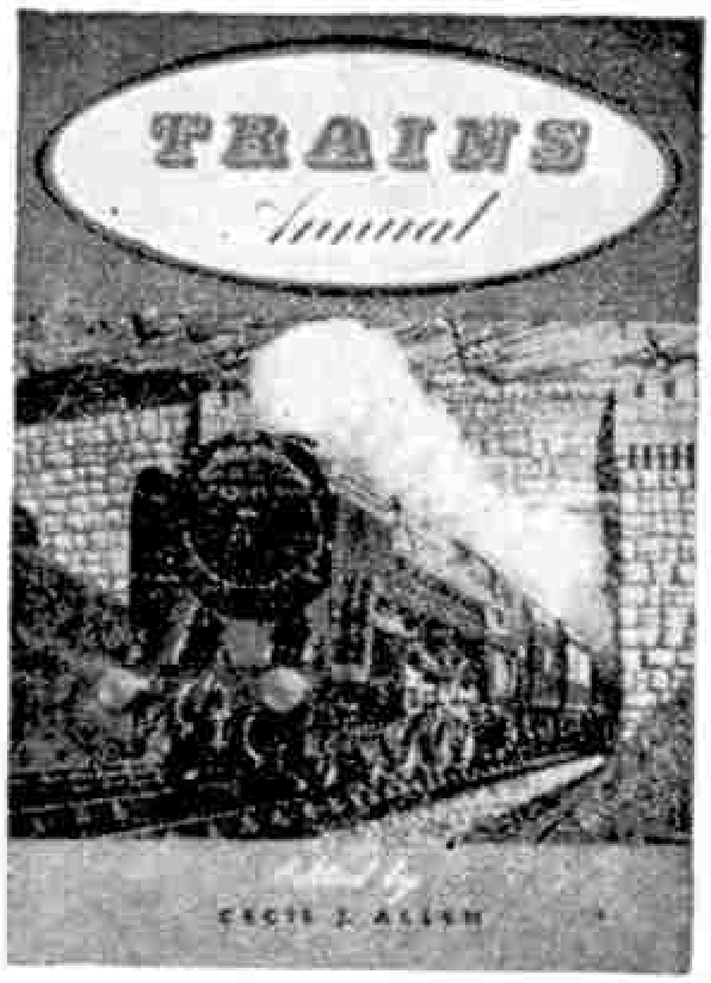

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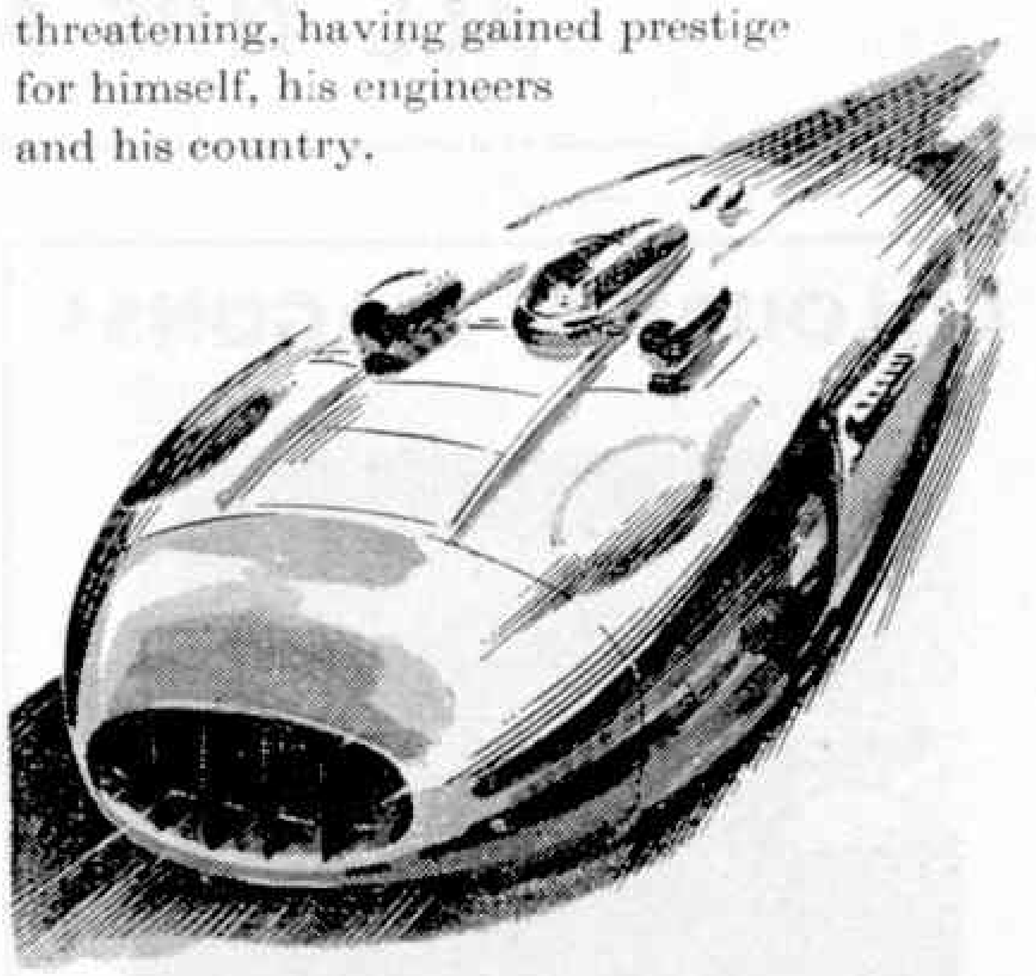

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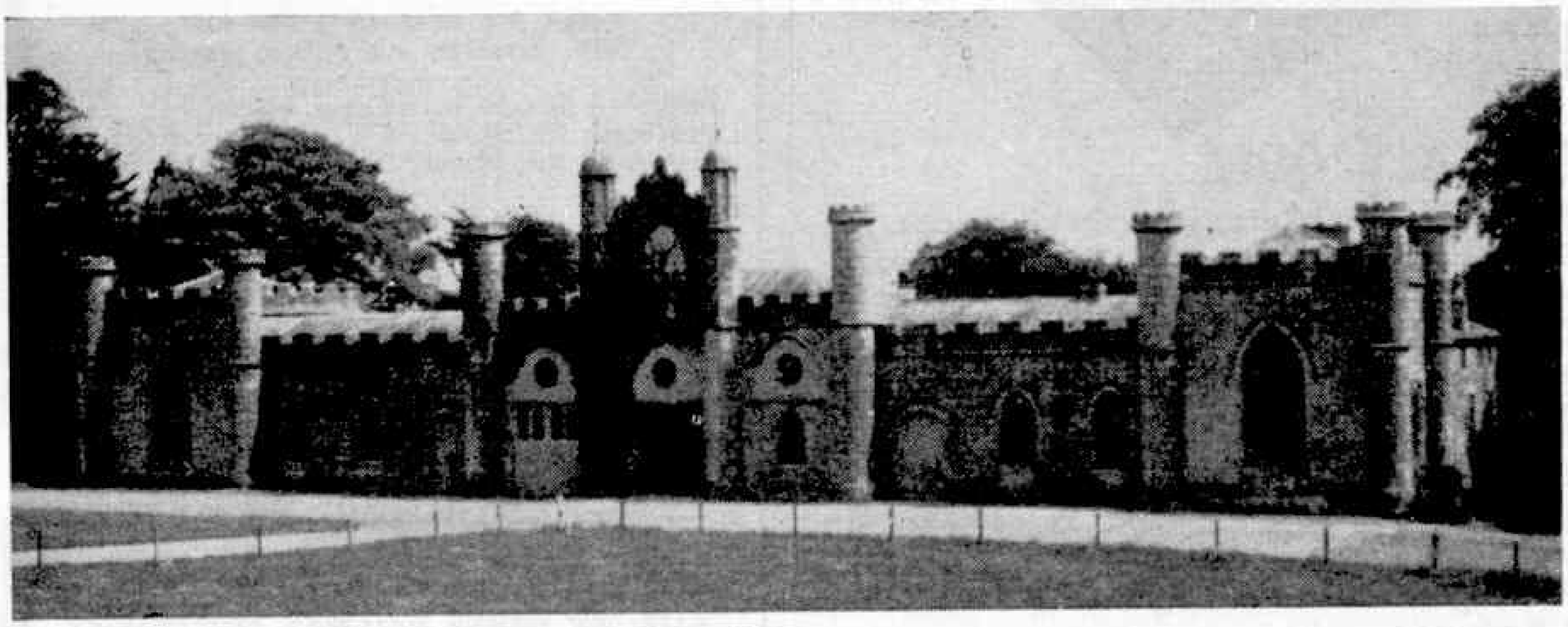

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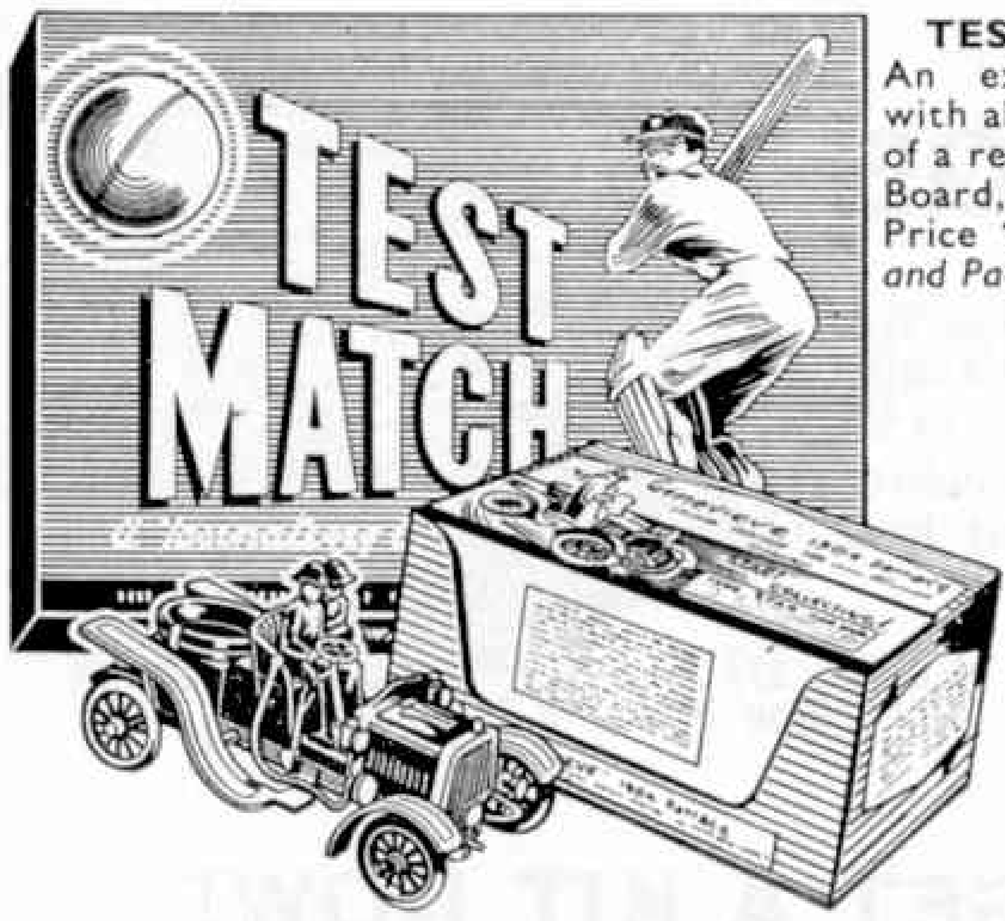

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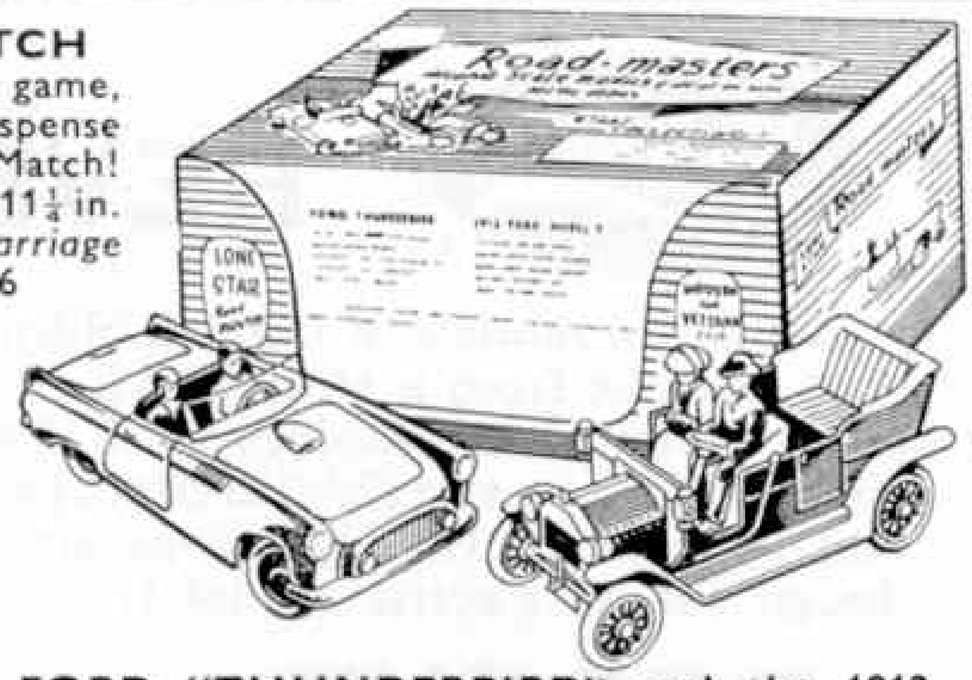

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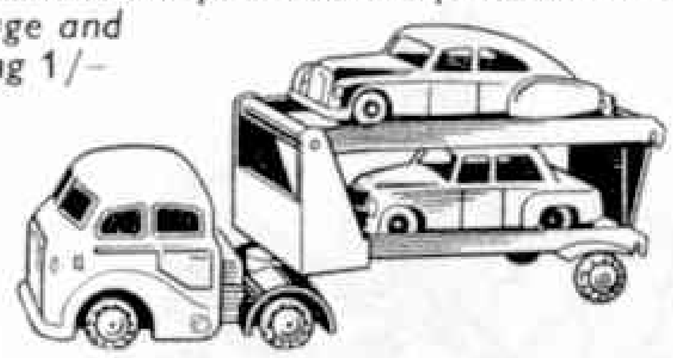

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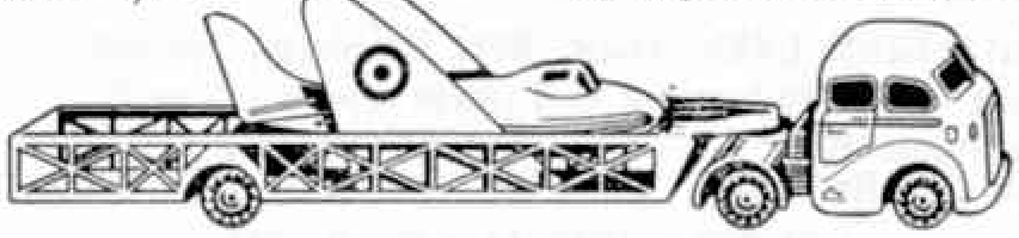

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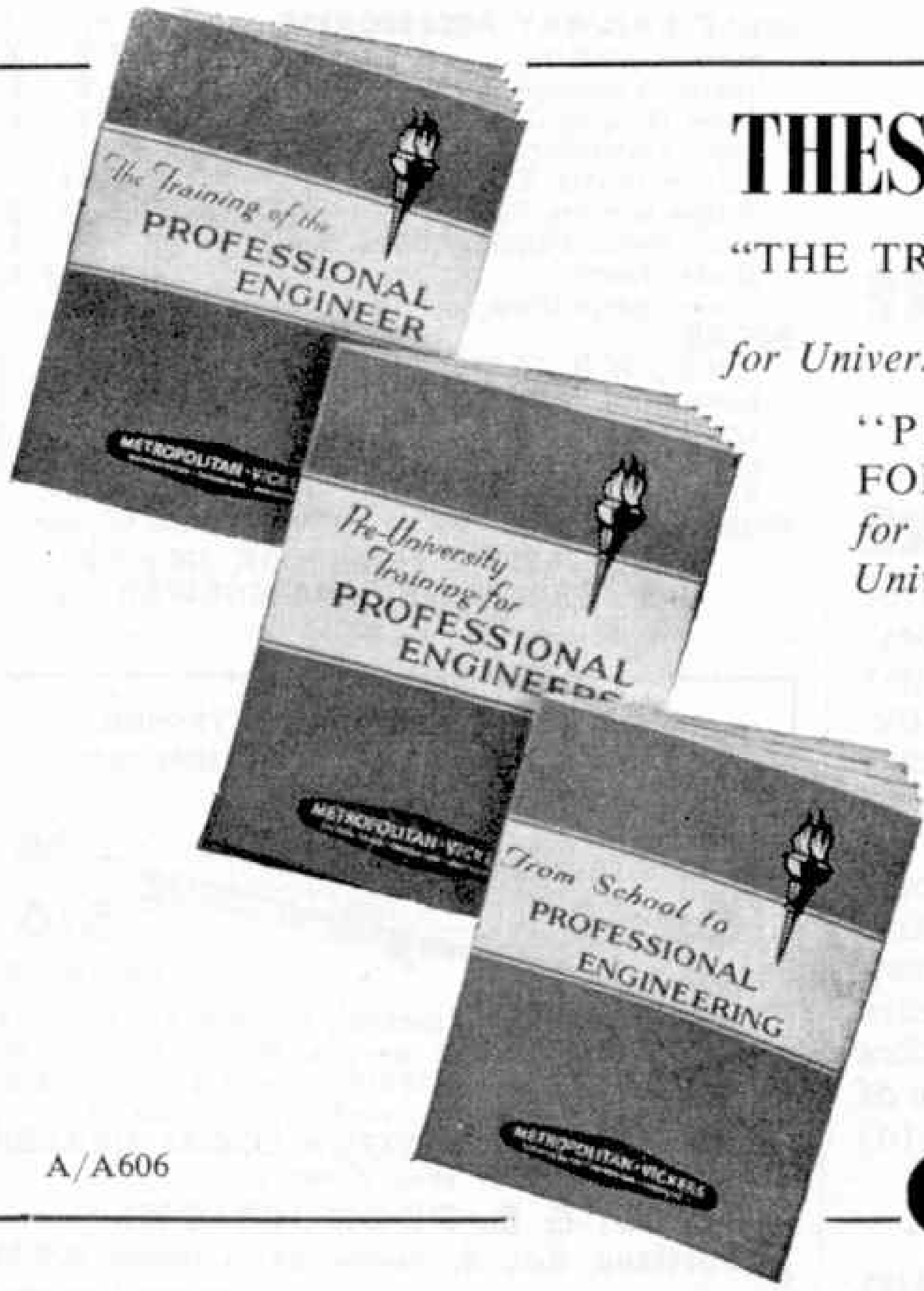

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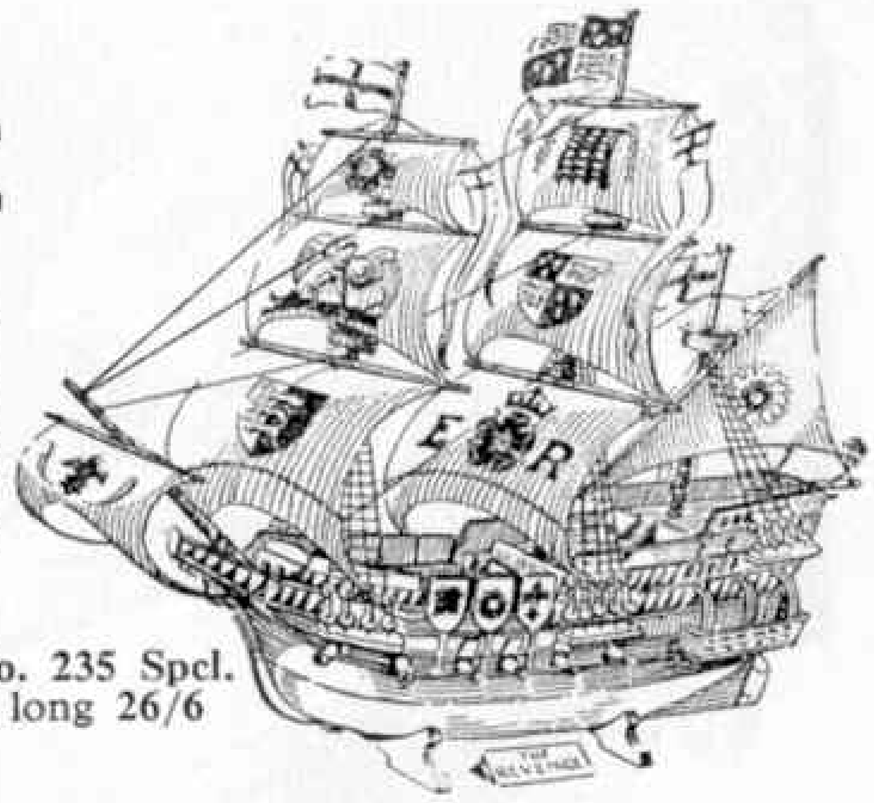

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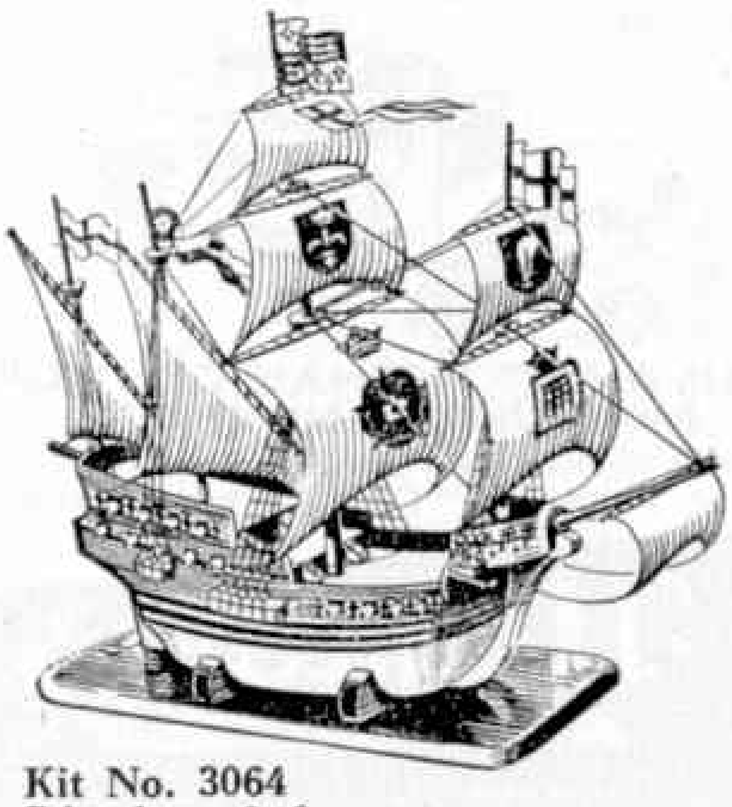

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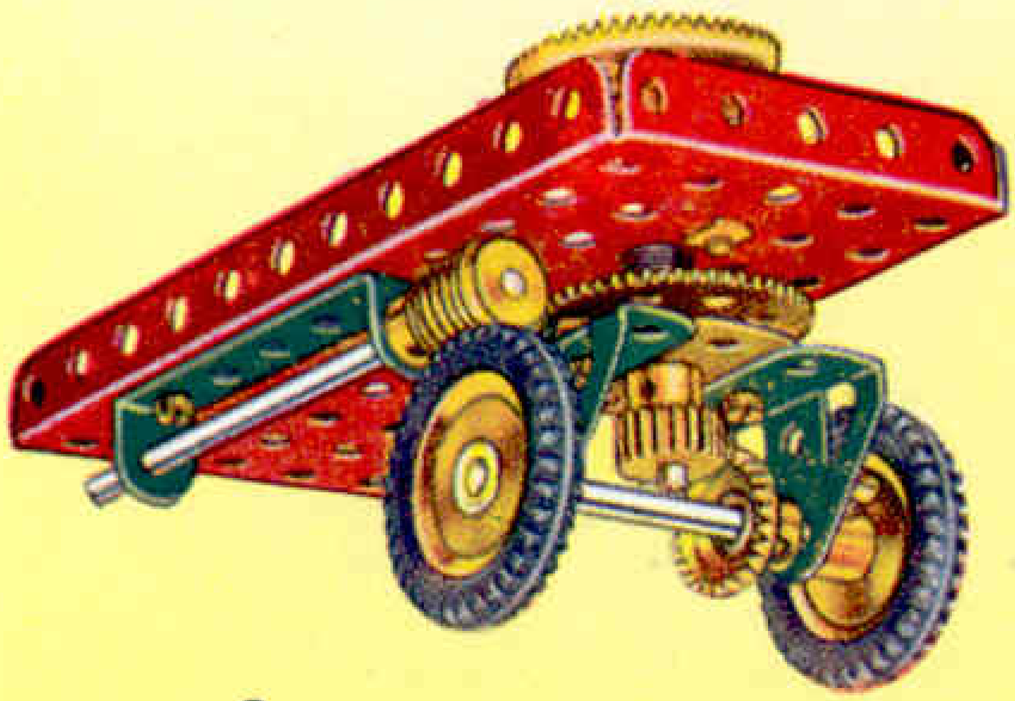

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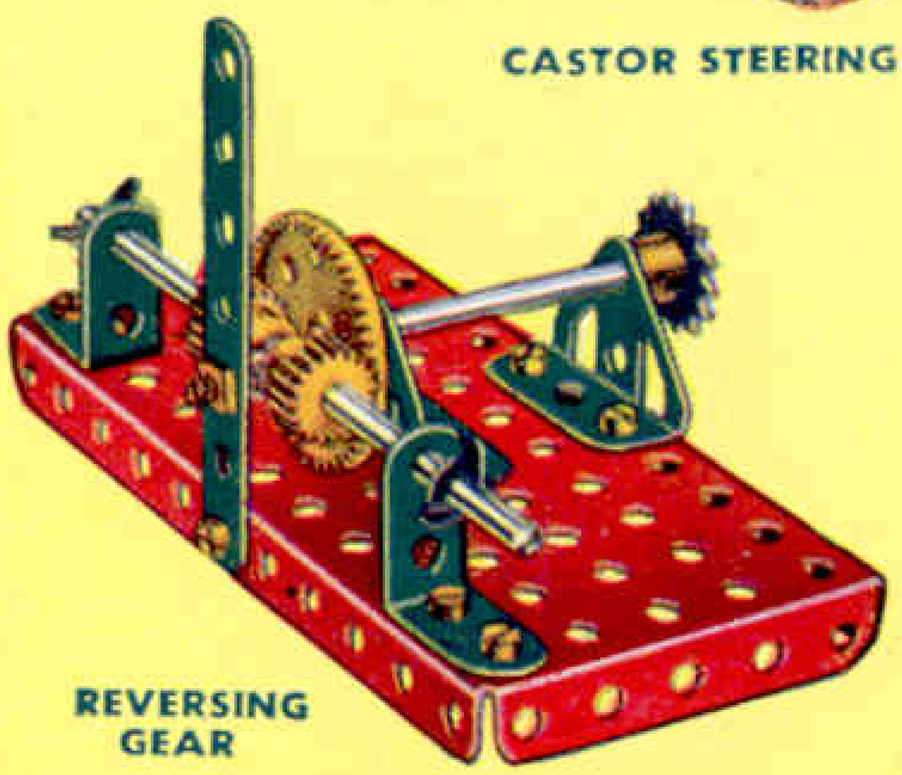

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MODEL OF THE MONTH

BLACKPOOL TOWER

Illustrated in the October 1956 issue of the "Meccano Magazine"

Construction of the Base

Each side of the base consists of a 12½" x 2½" Strip Plate edged by a 12½" Angle Girder 1, a 9½" Angle Girder 2, and a 2½" Strip at each end. A 3½" x 2½" Flanged Plate 3 is bolted to each side and the two are connected by an 18½" Angle Girder 4. The upper rear corners of the sides are joined by a built-up 18½" girder 5 made from a 5½" and two 7½" Angle Girders.

The top of the base between the Girders 2 is filled in by a 5½" x 3½" Flat Plate 6 at each corner. The Plates 6 at the front are connected by two 4½" x 2½" Flat Plates. A 3½" x 2½" Flanged Plate is bolted to each of the Plates 6 at the rear corners, and the Flanged Plates are connected by a 2½" x 2½" Flexible Plate. The centre section of the top of the base is filled in by four 5½" x 2½" Flexible Plates, two 5½" x 1½" Flexible Plates and the separated halves of a Hinged Flat Plate. The opening for the lift mechanism at the centre is edged by four 5½" Curved Strips as shown.

A 4½" x 2½" Flexible Plate is bolted to the centre of the Girder 4, and is connected to each of the Flanged Plates 3 by a 4½" Strip and two Semi-Circular Plates. The Strips and the Semi-Circular Plates are spaced from the front of the base by a Spring Clip on each of the ⅜" Bolts that hold them in place.

A 2½" x 1½" Flexible Plate, braced by a 2½" Strip and a 1½" Angle Girder 7, and a 2½" x 1½" Triangular Flexible Plate edged by a 2½" Angle Girder 8, are bolted to each side of the base. Two 12½" x 2½" Strip Plates overlapped 13 holes are fixed to the Angle Girders 8 as shown. An 18½" Angle Girder 9 is bolted between the Girders 7 and a 2½" x 1½" Flexible Plate is fastened to each end of the Girder 9. At each end of this Girder a Cylinder, with a 1⅛" Flanged Wheel pressed into its upper end, is bolted to a ½" Reversed Angle Bracket. A Rod fixed in the boss of the Flanged Wheel is fitted with a Conical Disc, a 1⅛" Flanged Wheel and a ¾" Flanged Wheel. A plate 10 made from three 5½" x 1½" Flexible Plates is strengthened at the back by two 2½" Strips and four 3½" x ½" Double Angle Strips, and is connected to the Girder 9 by a Corner Angle Bracket at each end.

A 3½" x 2½" Flanged Plate 11 is attached to the top of the base by two Angle Brackets and is connected to the Girder 4 by two 3½" x ½" Double Angle Strips. At the back of the base two 2½" x ½" Double Angle Strips are bolted to a 5½" Angle Girder 12, and to each of these Double Angle Strips a 3½" Strip 13 is fixed. Two Corner Gussets 14 are bolted to the Girder 12 and the upper ends of the Corner Gussets are fixed to the centre of the girder 5.

Assembly of the Tower

The tower consists of four main girders, the lower section of each of which is formed by two 12½" Angle Girders. These are connected by a 3½" Strip 15 and a 2½" Strip 16, and they are braced by crossed 5½" Strips as shown. Each 12½" Angle Girder is extended upward by a built-up girder 17, made from two 12½" Strips. The upper ends of the Strips are connected by an Angle Bracket, and each pair of girders 17 is joined by a

$2\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plate and two crossed 3" Strips. The girders 17 are lengthened by built-up $5\frac{1}{2}$" girders 18. Six of these girders are made from $5\frac{1}{2}$" Strips connected by Angle Brackets, and the other two are each made from one $5\frac{1}{2}$" Strip and a $4\frac{1}{2}$" Strip extended by a 2" Strip. The upper ends of two of the pairs of girders 18 are joined together by $1\frac{1}{2}$" Strips, and the ends of the other two pairs are connected by $1\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips.

The four main tower girders are joined together by four $2\frac{1}{2}$" Strips 19 attached to Obtuse Angle Brackets. At the top of the tower the girders are connected by two $1\frac{1}{2}$" Strips 20 and two Flat Trunnions 21, which are attached to Angle Brackets that are opened out slightly. The tower is connected to the base by an Angle Bracket bolted to each of the Strips 15. The bolts fixing two of the Angle Brackets to the base secure also $2\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips 22.

The Balcony and Pinnacle

Two Formed Slotted Strips are bolted to the top of each main tower girder, and these support $5\frac{1}{2}$" x $2\frac{1}{2}$" Flanged Plates 23. The Flanged Plates are connected by two $5\frac{1}{2}$" x $2\frac{1}{2}$" Flat Plates.

Two $5\frac{1}{2}$" Angle Girders are bolted between the Flanged Plates 23, and these support four $5\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips indicated at 25. The Double Angle Strips are connected by two $2\frac{1}{2}$" x $1\frac{1}{2}$" Flanged Plates 24 and two $2\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plates. Two $4\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips 26 are bolted to two $4\frac{1}{2}$" Strips, and this assembly is supported by two 1" Reversed Angle Brackets and two built-up 1" reversed angle brackets bolted to the Flanged and Flexible Plates mentioned above. The built-up brackets are each made from a 1" x 1" and a 1" x $\frac{1}{2}$" Angle Bracket.

Two $5\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plates 27 are curved and bolted together, and are attached to the $2\frac{1}{2}$" x $1\frac{1}{2}$" Flanged Plates 24 by Fishplates. A Face Plate is connected to the Flexible Plates 27 by Angle Brackets, and a Rod is fixed in its boss. A Wheel Flange, a Boiler End, a 1" Pulley with Rubber Ring, a $\frac{3}{4}$" Flanged Wheel, and a Chimney Adaptor are held on this Rod by a Collar.

A Trunnion is fixed to each corner of the balcony and a Coupling is screwed on to a bolt passed through the Trunnion. Collars and 1" loose Pulleys are placed on short Rods held in the Couplings.

The Lifts

Each of the lifts consists of two $2\frac{1}{2}$" Strips on each side connected at the top by two $2\frac{1}{2}$" x 1" Double Angle Strips and at the bottom by two $2\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips. The pairs of Double Angle Strips are joined by Fishplates, and the back, a $2\frac{1}{2}$" x $2\frac{1}{2}$" Flexible Plate, is attached to Angle Brackets. A Girder Bracket partly fills in the front of the lift. A $\frac{1}{2}$" Reversed Angle Bracket 28 is bolted to the top of each lift and an Angle Bracket is fixed underneath the lift.

The lifts are suspended by Cord passed round a $1\frac{1}{2}$" Pulley 30 at the top of the tower and a similar Pulley 31 in the base. The Pulley 30 is fixed on a $4\frac{1}{2}$" Rod held by Collars in the Flat Trunnions 21. Pulley 31 is held on an $11\frac{1}{2}$" Rod supported in the Flanged Plate 11 and in the Strips 13. The Rod carries a 2" Sprocket 32.

A length of Cord is tied to the Angle Bracket underneath one of the lifts, is passed round the Pulley 31 and is fastened to the Angle Bracket underneath the other lift. A second length of Cord is tied to the Reversed Angle Bracket 28 of one lift, is taken round the Pulley 30

and is attached to a Spring that is bolted to the Reversed Angle Bracket of the other lift. The Spring is stretched slightly to tension the Cord.

The lift guides are provided by Cord tied to 3½" Rods 33 at the top of the tower, and passed round ½" Pulleys on Rods 34 in the base. Each of the Rods 33 is held by Spring Clips in two 1" x 1" Angle Brackets bolted underneath one of the 5½" Angle Girders fixed to the Flanged Plates 23. One of the Rods 34 is an 11½" Rod, and the other consists of an 8" and a 2½" Rod joined by a Rod Connector. They are mounted as shown in the Flanged Plate 11 and the Strips 13. A length of Cord is tied to each of the Rods 33, is passed through one of the lifts, and is taken over the ½" Pulley on one of the Rods 34. The ends of the two lengths of Cord are then tied to a Driving Band which is stretched slightly to keep the Cords taut.

The Driving Mechanism

A No. 1 Clockwork Motor is bolted to the girder 5, and is connected to one side of the base by an Angle Bracket. A ½" Pinion on the Motor shaft drives a 57-tooth Gear on a 1½" Rod supported in the Motor side-plates. A ¾" Sprocket on this Rod is connected by Chain to the 2" Sprocket 32.

Parts Required

14 of No. 1	1 of No. 14	2 of No. 48	2 of No. 126a
2 " " 1b	1 " " 15a	10 " " 48a	1 " " 133a
24 " " 2	4 " " 16	6 " " 48b	1 " " 137
6 " " 2a	1 " " 16a	2 " " 48c	1 " " 154a
6 " " 3	3 " " 18a	4 " " 48d	1 " " 154b
7 " " 4	2 " " 18b	2 " " 51	1 " " 155
30 " " 5	4 " " 20	2 " " 52	2 " " 161
2 " " 6	3 " " 20b	4 " " 52a	1 " " 162
6 " " 6a	2 " " 21	5 " " 53	1 " " 164
2 " " 7a	1 " " 22	2 " " 53a	3 " " 187a
10 " " 8	4 " " 22a	9 " " 59	10 " " 188
2 " " 8a	1 " " 23	4 " " 63	7 " " 189
2 " " 8b	1 " " 23a	2 " " 70	3 " " 190
4 " " 9	1 " " 24	4 " " 89	1 " " 191
2 " " 9d	1 " " 26	1 " " 94	4 " " 192
2 " " 9f	1 " " 27a	1 " " 95	4 " " 197
6 " " 10	12 " " 35	1 " " 96a	1 " " 198
36 " " 12	300 " " 37a	2 " " 108	1 " " 213
6 " " 12a	296 " " 37b	1 " " 109	4 " " 214
2 " " 12b	26 " " 38	9 " " 111c	8 " " 215
8 " " 12c	2 " " 40	2 " " 124	2 " " 216
2 " " 13	1 " " 43	4 " " 125	2 " " 221
1 " " 13a	4 " " 46	4 " " 126	1 No. 1 Clockwork Motor.