VOL. XLII. No. 4 APRIL 1957

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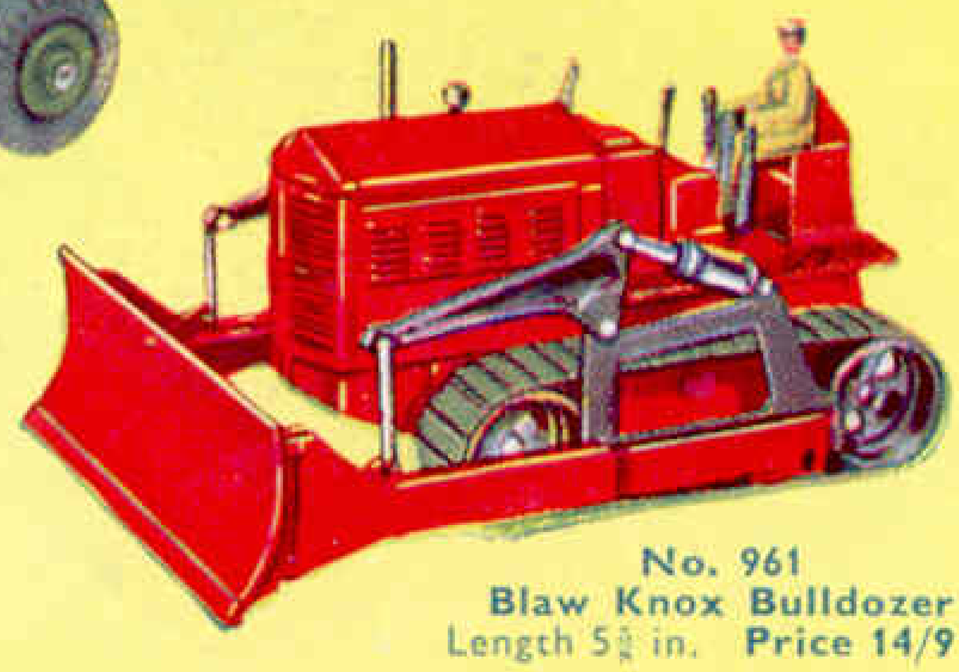

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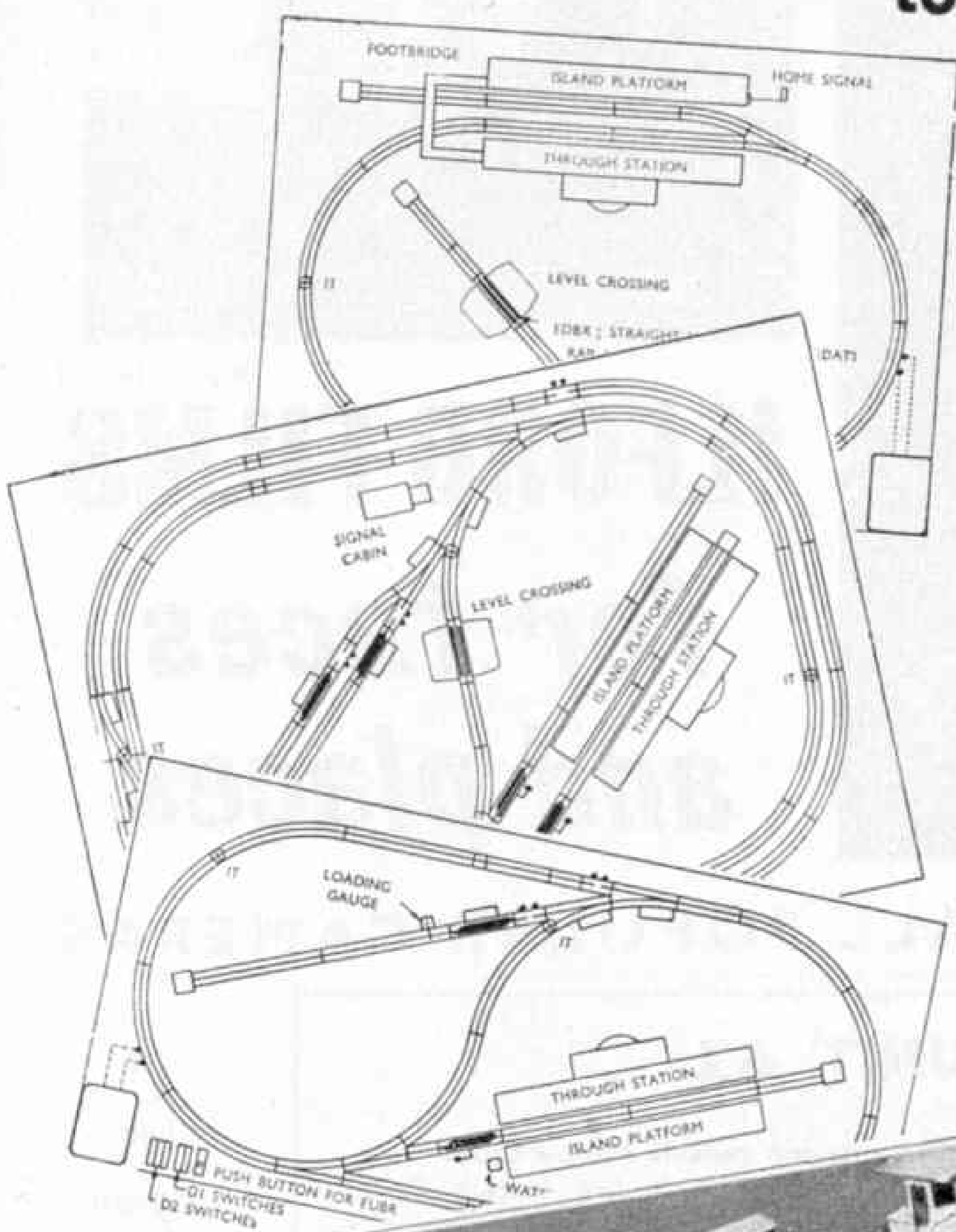

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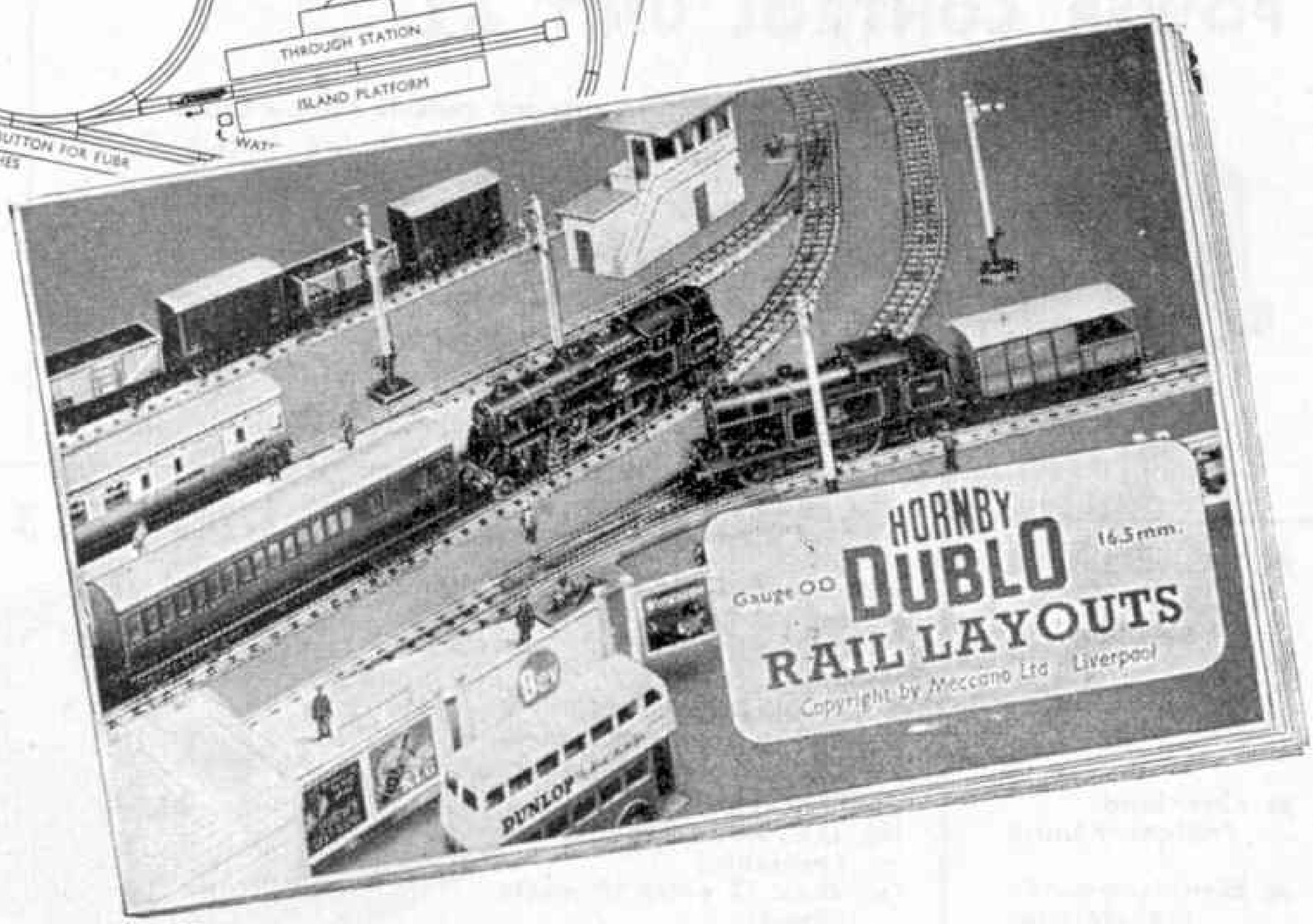

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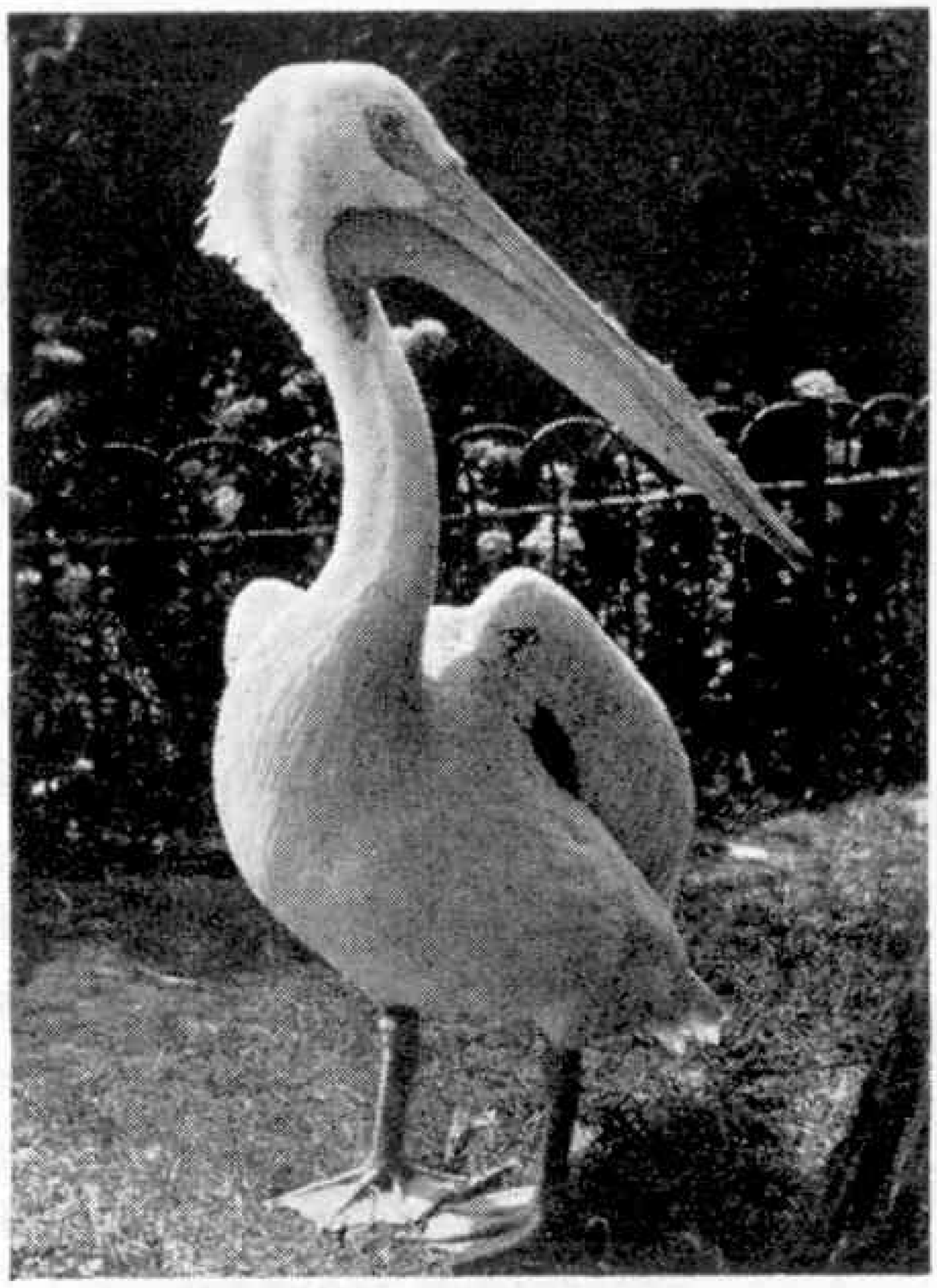

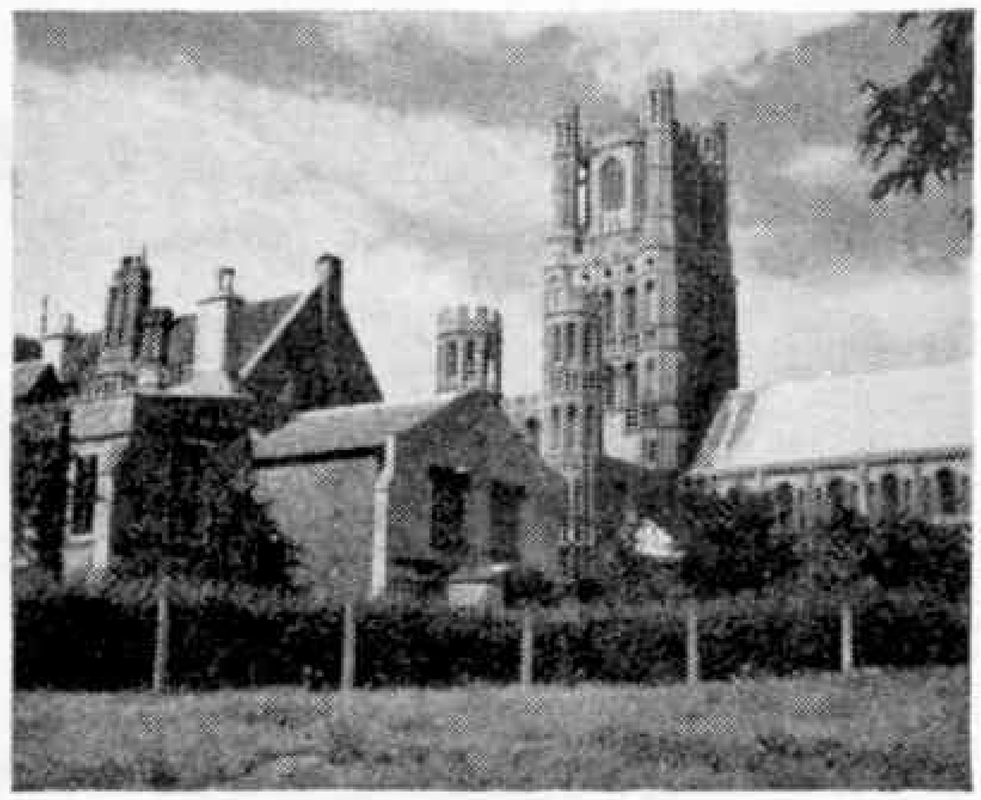

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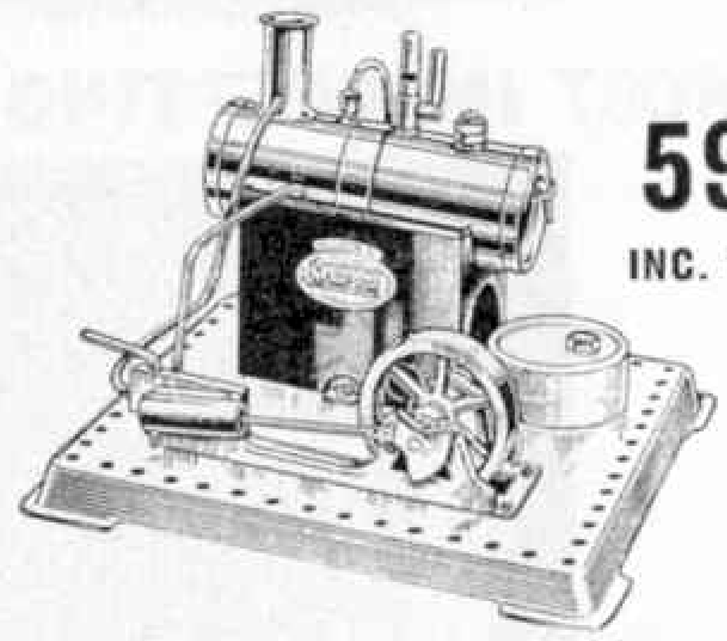

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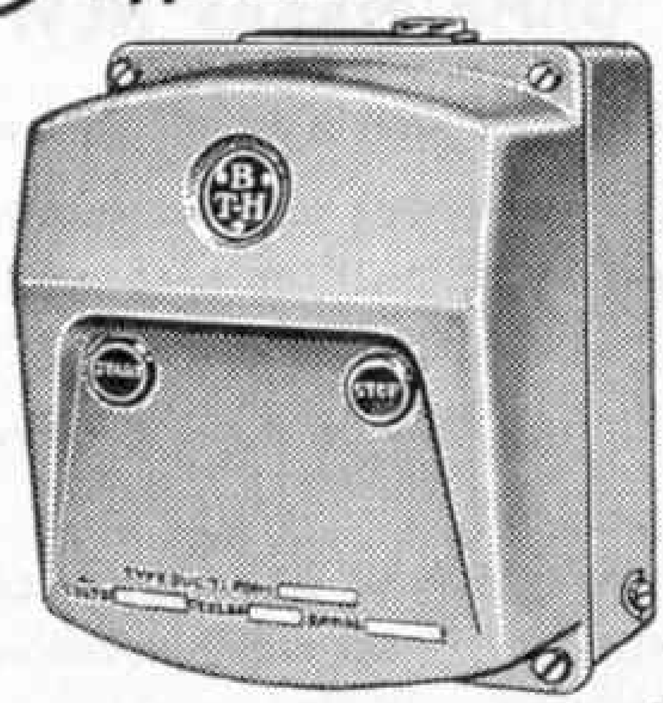

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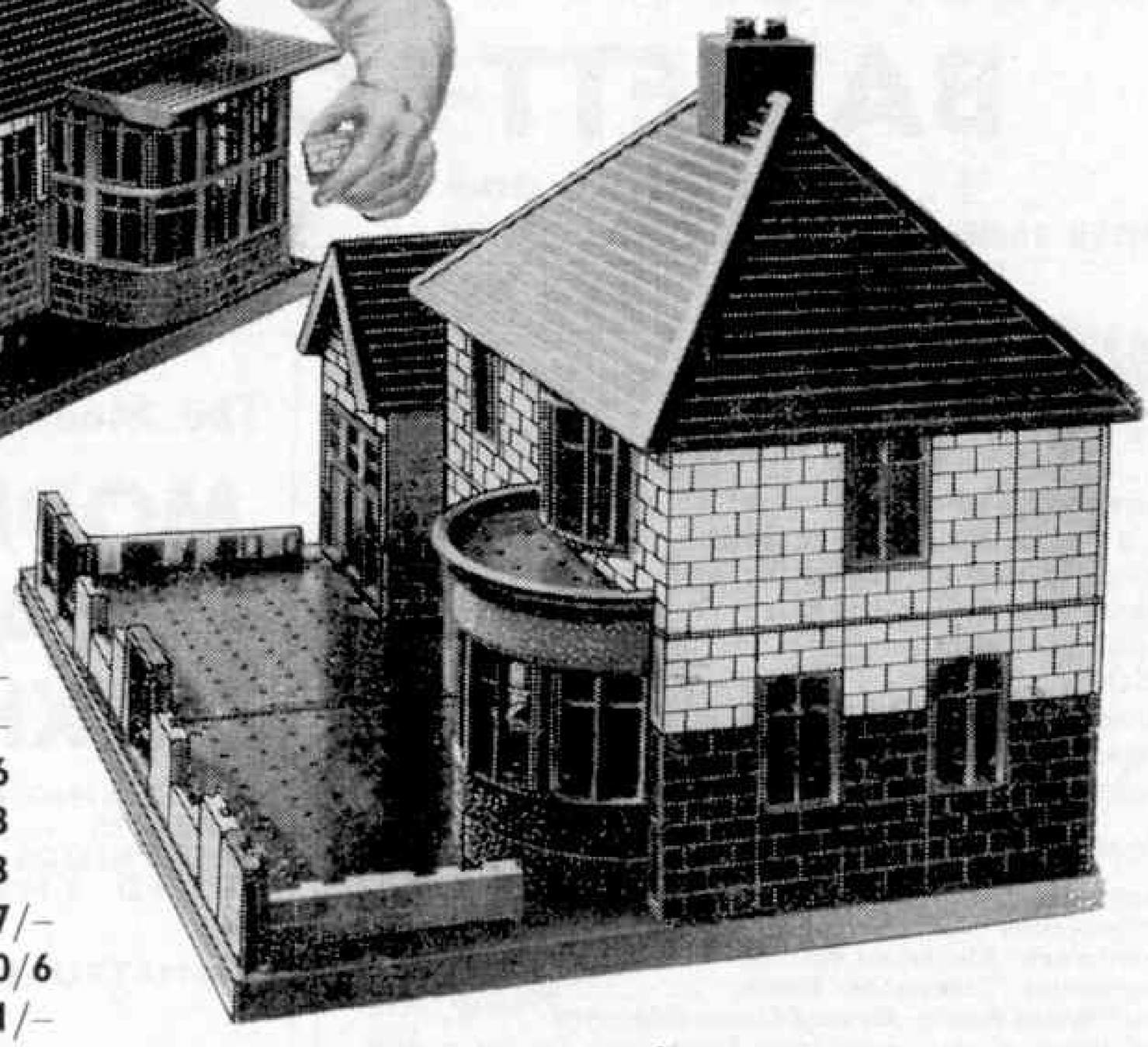

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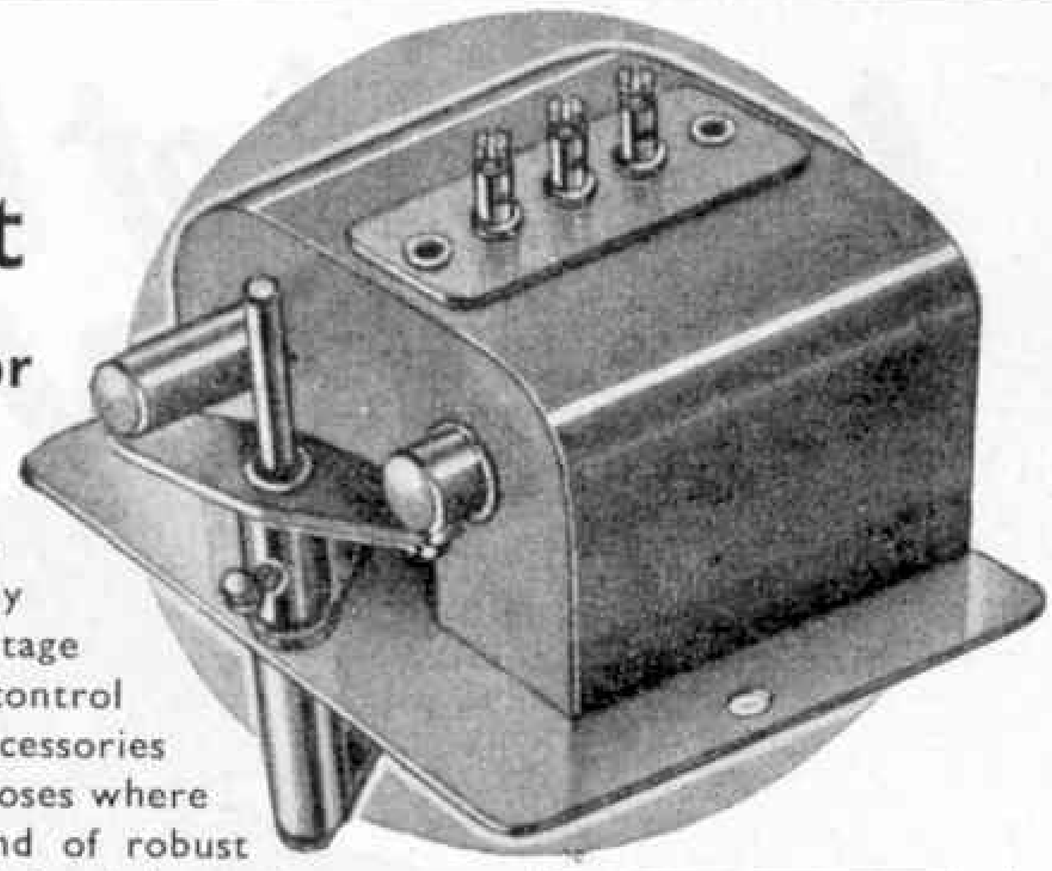

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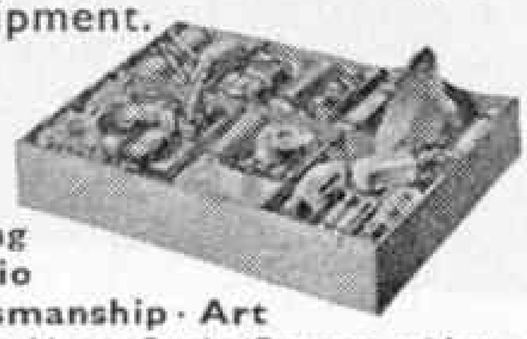

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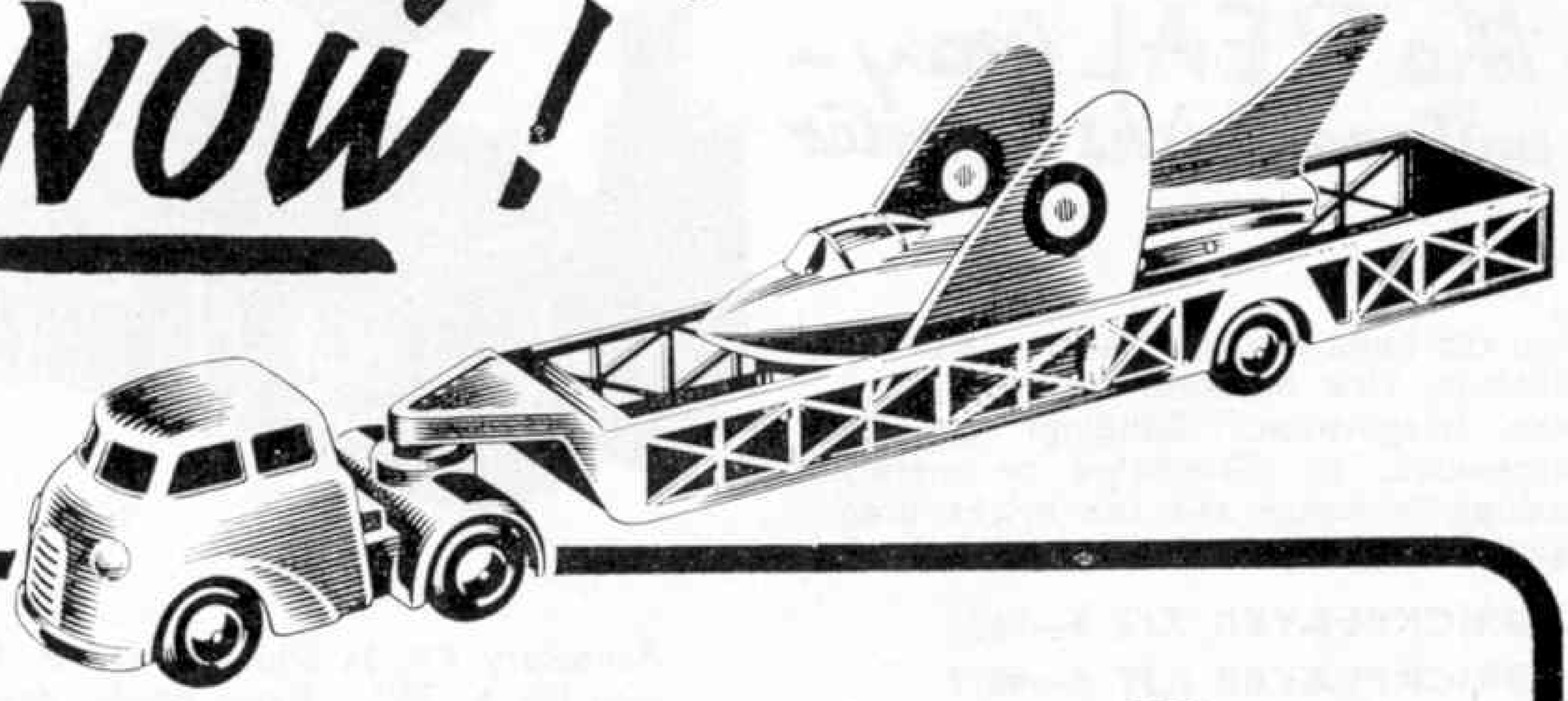

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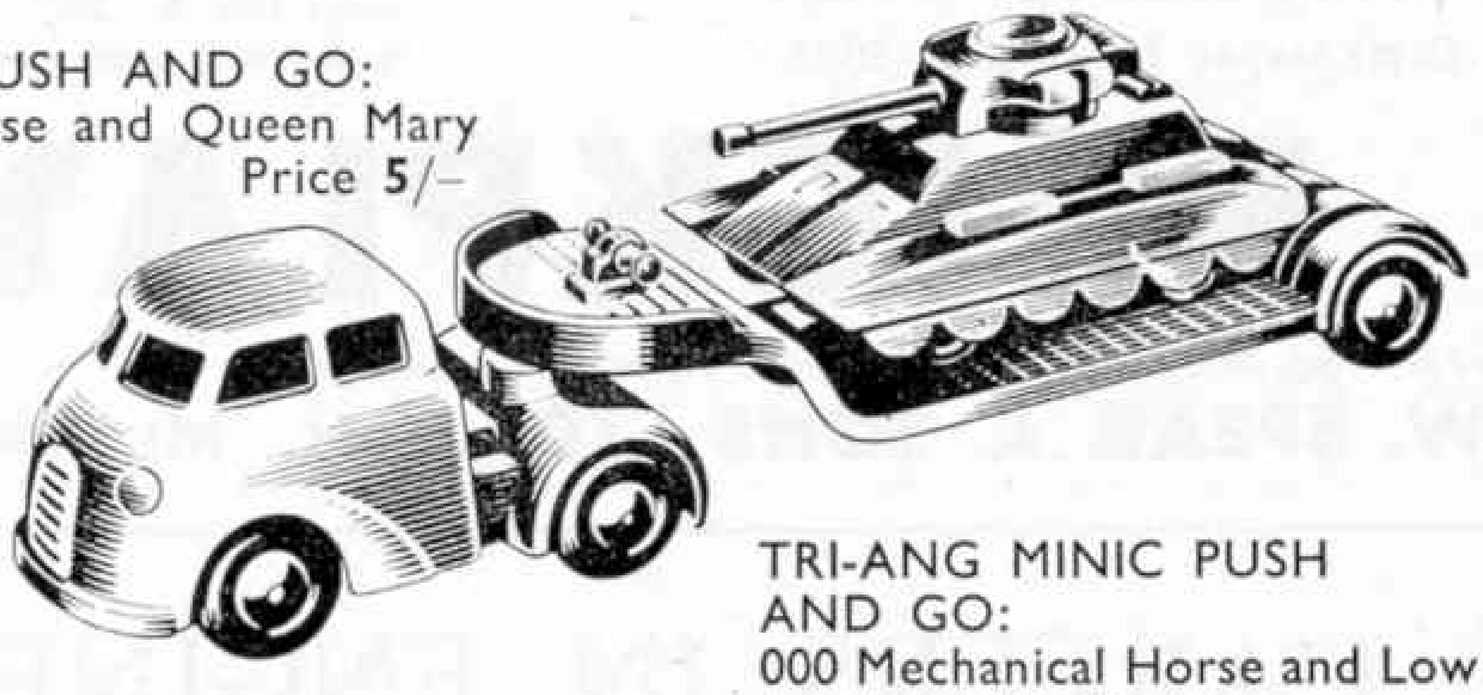

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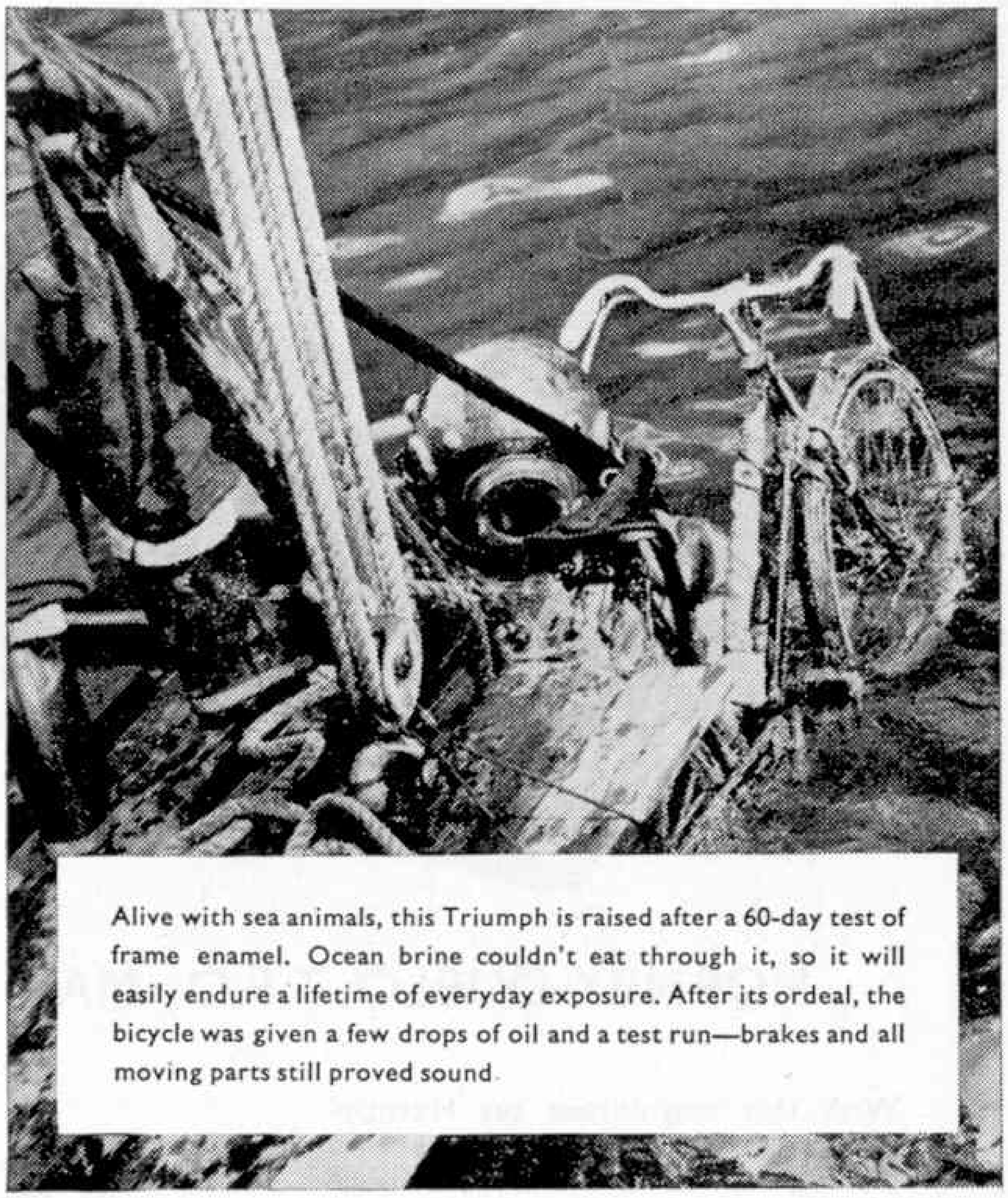

Alive with sea animals, this Triumph is raised after a 60-day test of frame enamel. Ocean brine couldn't eat through it, so it will easily endure a lifetime of everyday exposure. After its ordeal, the bicycle was given a few drops of oil and a test run—brakes and all moving parts still proved sound.

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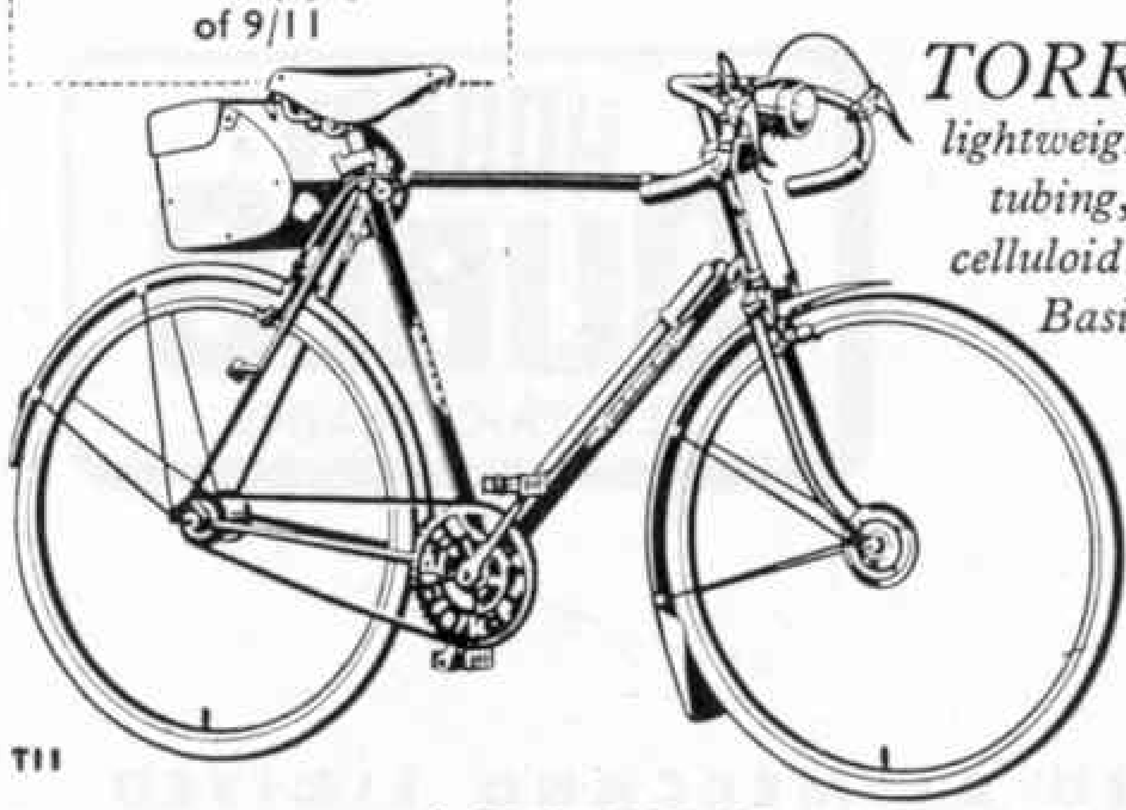

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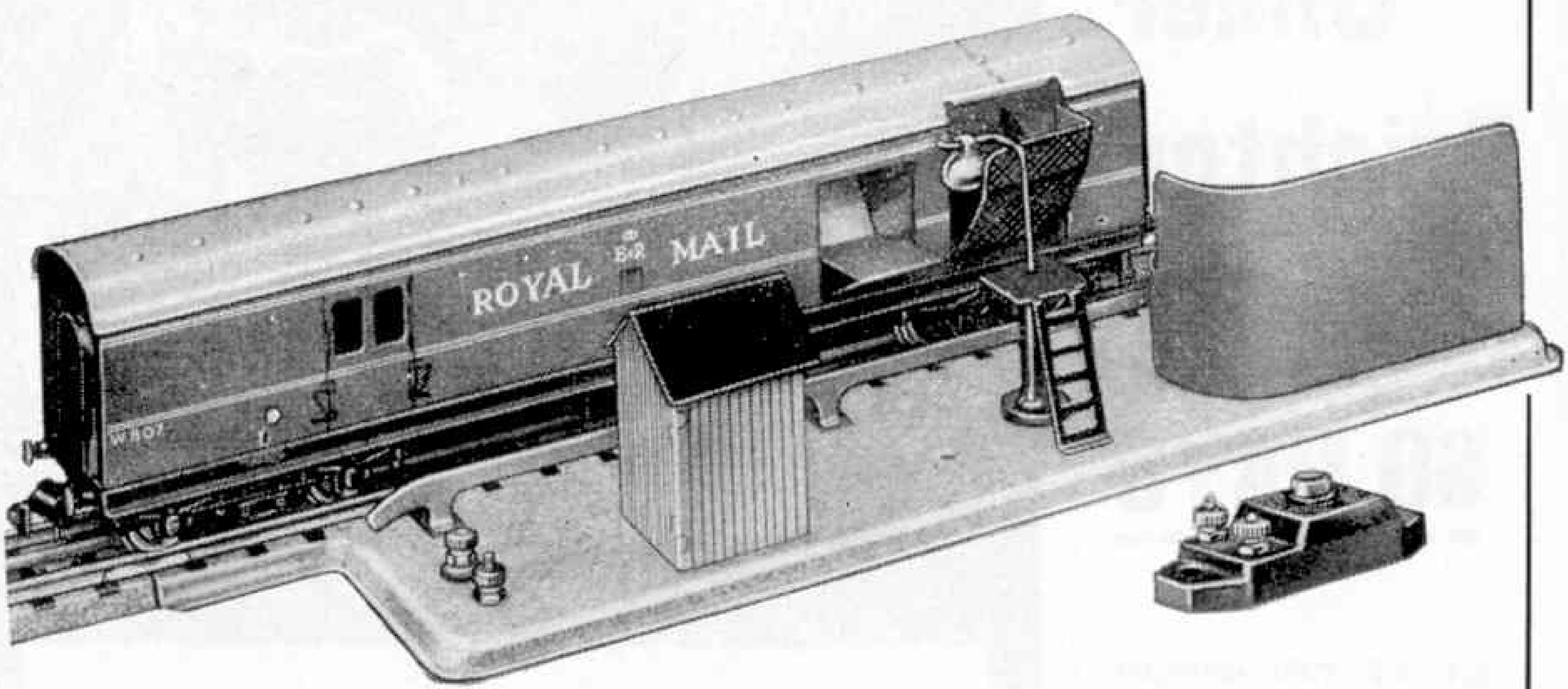

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The source of the current supply for this component MUST be separate from that used to provide current for train driving. A separate 15 volt A.C. output of a power unit can be used, or a separate transformer, if available. Alternatively, 12 volts D.C. from an accumulator, or even dry batteries, can be employed.

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Vol. XLII
No. 4
April 1957

The Oldest Town Hall?

The delightful building seen in the picture on this page would not suggest itself to those living in our large modern cities as a Town Hall. Yet that is what it is. The claim is made for it that it is the oldest in England. Are there any better claimants for this distinction?

The Town Hall at Totnes, Devon, is set in a cobbled courtyard in the shadow of the Church. Photograph by Reece Winstone, Bristol.

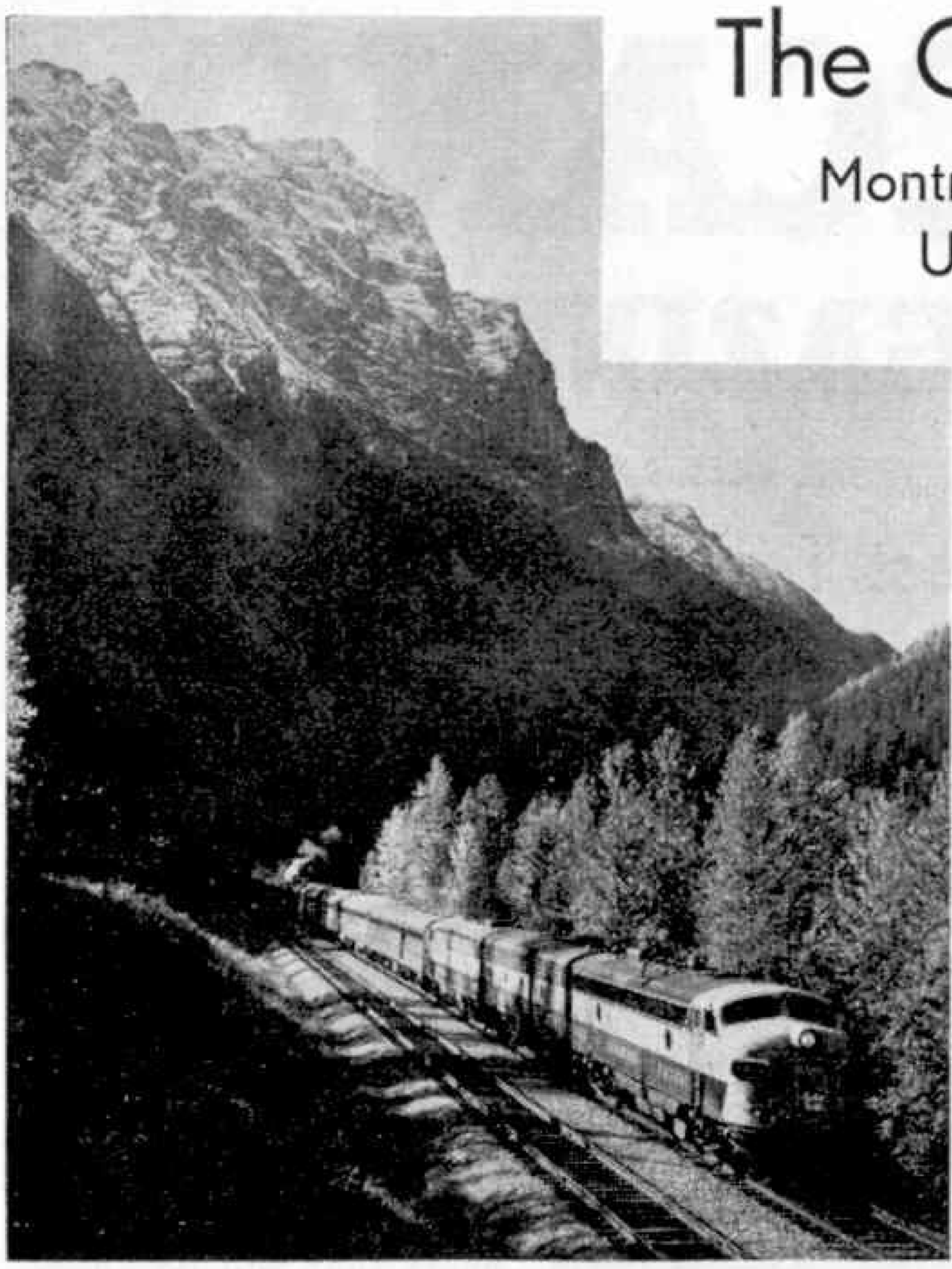
This fine old Town Hall is to be seen in Totnes, Devon, well-known to many *M.M.* readers. The town has a long history, for the hill on which it is built is crowned by a circular Norman keep, all that remains of a castle built on it. The Town Hall itself is on the site of a monastery, and was partly re-built about 300 years ago. Those who visit it now can see relics of old-time punishment inside, among them a gruesome mantrap.

From history I turn now to the making of history in something that was undreamed of when Totnes Town Hall was built—air travel. I suppose some of you have already seen the article on the Battle of the Airways, on page 164 of this issue, and those who have not will probably turn to it very soon. (I often wonder if readers start at the beginning of the Magazine, and read the editorial first—if they read it at all!) John Taylor's article ends by pointing out that some of the American jet air liners that will be among the Queens of the Atlantic air crossing will have British engines.

This seemed to me to be very interesting, and when I looked further into it I found that of the eleven jet and turboprop commercial transport now in production, as many as nine are fitted with British engines, or can be so fitted if required. Here is a testimony to British engineering skill.

And that is by no means the end of the story. The finest designers in our aircraft and aero engine industries are looking well ahead, to the late 1960s indeed. They are now at work planning a jet air liner to travel at a speed of 1,200 m.p.h., which may then give Britain undisputed leadership on the world's airways.

The Editor



The C.P.R. Canadian

Montreal to Vancouver in Under Three Days

OUR cover this month is of special interest for many reasons. One of these is that it shows *The Canadian* of the Canadian Pacific Railway, the fastest train ever to run across Canada from Montreal in the east to Vancouver on the Pacific Coast. This is a journey of 2,881 miles, and it is covered in 71 hours 10 minutes, which is a reduction of 16 hours on the time taken by the previous fastest train of the C.P.R.

The Canadian provides luxury travel between both Montreal and Toronto and Vancouver, for one section of the westbound train starts at Toronto, joining the Montreal section at Sudbury, in Northern Ontario, and the eastbound train is divided at the same point to serve the two cities. The train forms a single unit from the departure from Sudbury westbound to the arrival back at Sudbury on the return trip. There is one train daily in each direction.

Travel across the width of Canada, from the St. Lawrence to Vancouver, in less than three days would seem miraculous to the pioneers who opened the great western regions of the Dominion. The route of *The Canadian* is not new. It was travelled before the first white man set foot on the continent, and is rightly described as the route of the explorers. It follows the valley of the Ottawa River and then runs along the north shore of Lake Superior and through the Lake of the Woods country to Winnipeg, the pioneer city of the great plains. Across the latter it then passes on through Calgary, in Alberta, to the Canadian Rockies, threading its way through the magnificent passes of these mountains and of the Selkirk range nearer the coast, to descend to the Pacific plain.

To make such a journey in comfortable sleeping cars is in violent contrast with the travels of the fur traders and others who penetrated into the interior on foot or in canoes, and later in carts and covered wagons. When the Canadian Pacific Railway was built there were only four million people in the whole of Canada, practically all of whom lived east of the Great Lakes. There were few in the prairie region and beyond the Rockies, and it was the coming of the railway that speeded up settlement in the far west and created this vast region of the Canadian Dominion.

Much of the country through which the Canadian Pacific Railway was built was unknown and it was only after hazardous exploration that a route was found for the C.P.R. through the Rockies. This carries the line through the famous Kicking Horse Pass, so named after an incident in which one of the pioneers was the victim of one of the transport animals, and the no less well-known Rogers and Eagle Passes. Along the banks of swiftly moving rivers and beautiful lakes, and

"The Canadian," the fastest transcontinental train of the Canadian Pacific Railway, is seen above emerging from the East Portal of the Connaught Tunnel, in the mountain region of British Columbia. This train is seen on the cover of this issue, which is based on a C.P.R. photograph, as are the illustrations on these pages.

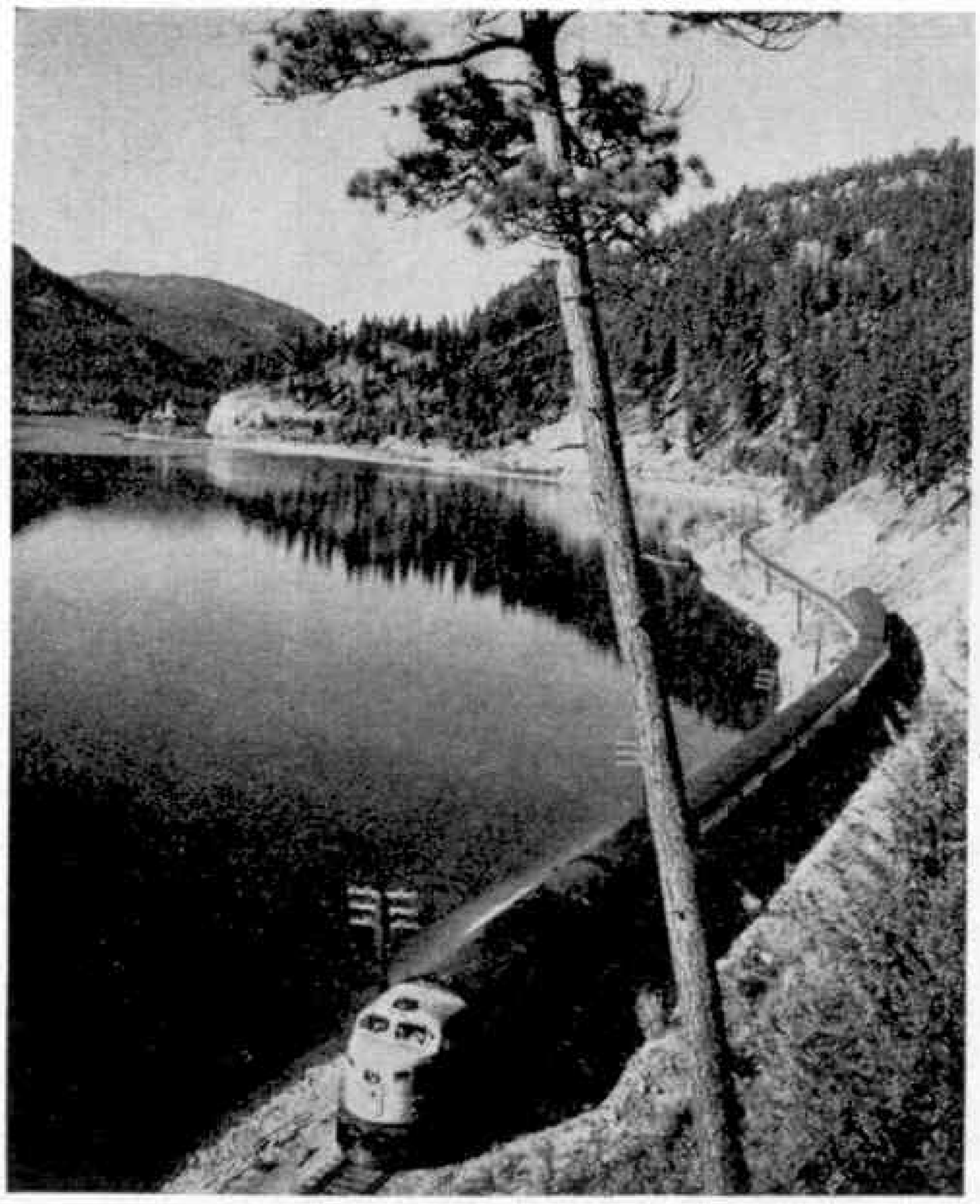
through tunnels cut in the rocky walls of the gorges through which the rivers of the Rocky Mountains run, the line passes through scenery that is simply superb, and justifies the description given to it of "60 Switzerlands rolled into one."

Since those days the pioneer line has been improved in many ways, and its gradients in the mountain section have been eased, chiefly by building spiral tunnels through the mountains in the manner that has become familiar to those who know something of the mountain railways of Switzerland.

Measured by standards in other parts of the world, the speed of *The Canadian* is not high, the average for its westbound journey being slightly over 40 m.p.h. But this speed is maintained over a much greater distance than the runs of the faster expresses of say Great Britain, and it must also be borne in mind that the greater part of the track is single. Further, the speed of the train is governed by the need to arrive at certain stopping places at reasonably convenient hours.

A C.P.R. freight train, hauled by a two-unit diesel, on Ladner Creek Bridge in the Coquihalla Pass District, B.C.

The speeding up of the train has been achieved by the substitution of diesel locomotives for the steam ones that had previously figured on the C.P.R. since it was built. The powerful diesels employed provide faster running times through the mountains, and time also has been gained by reducing stops at Winnipeg and other cities, the diesels requiring less time for servicing than their predecessors. The Rockies provide the greatest scenic effects of the long trip, and this part of the trans-continental journey is made largely in daytime in order to allow passengers to revel in the mountain vistas from the track.



Tulameen Lake, near Princetown, B.C., with a C.P.R. train on the track alongside the lake.

Among the cars included in the train, all of them of modern design and construction, are observation cars named after the national parks of Canada. One of these observation cars is at the rear of the train seen on our cover, its name *Banff Park*. The outstanding feature of these cars is the dome, which is clearly seen on our cover. The rounded end of the coach at the rear is another noteworthy feature, for here too is an observation lounge. Nearer the front end of the train is another type of car with a dome. This is a scenic dome coach in which is what is known as the Skyline Coffee Shop.

Special names are applied to other coaches used in the make up of *The Canadian*. For instance, there are two series of sleeping cars, known

(*Continued on page 210*)

Battle of the Airways

By John W. R. Taylor

THE announcement that Trans-Canada Air Lines had ordered twenty Vickers Vanguard turboprop transports was one of the most interesting and exciting aviation news items for a long time. Financially, it means that Vickers will receive more than $67 million, which is the largest single dollar contract ever placed in Britain. More important is that T.C.A. made their choice only after studying for two years every other medium-range jet and turboprop air liner on the market.

There could be no greater tribute to the quality of the Vanguard, because one of its competitors was the Lockheed Electra, a very fine American design that was offered with the same type of Rolls-Royce Tyne engines as those fitted in the British machine. And it represented a major victory for the people who believe that turboprops are better than pure-jet engines (turbojets), at least on medium-length routes.

It is several years since the battle of the airways between jets and turboprops began. As everyone knows, both were pioneered in Britain, where B.E.A. chose the turboprop Vickers Viscount for their European services, which are comparatively short by airline standards, while B.O.A.C. ordered the turbojet de Havilland Comet for their medium-length routes, with the possibility that, one day, a developed version would be able to operate the north Atlantic route with only one stop en route.

Since then the Viscount has become the most popular and talked-about air liner in the world. More than 360 have been sold, many to the United States, where they are the first non-American aircraft ever used on regular internal services, and they have established firmly the superiority of the turboprop for shortish routes.

The Comet met with one of those tragic setbacks that is often the price of pioneering; but not before it gave passengers a taste of the unrivalled comfort of jet travel in the smooth clear sky above 30,000 ft. Already it is back in service with R.A.F. Transport Command, and in under two years B.O.A.C. and Capital Airlines of America will once again be flying Series 4 Comets, stronger, faster, bigger and better in every way than the Series 1 machines.

Meanwhile, the rest of the world has been surprisingly slow to follow our lead. Only the Russians have put a turbine-powered air liner of their own design into regular service and, good as it is, the Tupolev Tu–104 is only a transport version of the twin-jet bomber that is known in the west as "Badger." Nevertheless, its ability to carry 54–72 passengers 2,000 miles at 497 m.p.h. puts it in the same class as the Comet 4, and its price of £425,000 is almost certainly less than that of any comparable British or U.S. aircraft.

In the turboprop field Britain has been able to gain the experience of hundreds of

An impression of the Vickers Vanguard turboprop transport in the finish of Trans-Canada Air Lines.

thousands of hours of Viscount flying in all parts of the world, and this has helped to make the newer "stretched" series 800 Viscount and the Vanguard the world-beaters that they are. In addition, B.O.A.C. have now got the Bristol Britannia 102 into service, and hope to have the longer-range Britannia 312 on the non-stop Atlantic run within a year, where it should completely outfly its piston-engined competitors.

Many people believe that it may continue to hold its own even when the big American Boeing 707 and Douglas DC–8 jet-liners enter service in 1959-60. It is smaller, with a normal payload of up to 99 passengers, compared with a maximum of 147 in the Model 707–320 and 131 in the DC–8. It is also slower, with a cruising speed of 400 m.p.h., compared with 580–600 m.p.h. for the jets. But, in return, it is quieter, cheaper to operate and can take off and land on existing runways, whereas millions of pounds must be spent on lengthening and strengthening the runways of international airports, including London, to accommodate the 130–ton Boeing 707 and Douglas DC–8.

Nevertheless, they will be lengthened, for speed is the most important, and perhaps the only virtue that airlines have to offer compared with surface travel, and many passengers will demand the extra speed of the jet-liners. This explains why almost all major airlines have had to order the American machines, including B.O.A.C., who will have 15 Boeing 707's, because there are no competitors in this class of aircraft.

Even B.E.A. may be compelled to order a small fleet of jets to supplement the 80 Viscounts and 20 Vanguards that they should have by 1960, because if they do not they might lose passengers to other airlines who will offer jet travel on comparatively short routes, even if they lose money doing so.

Perhaps a jet-powered version of the Vanguard would meet this demand, or the Comet, or the interesting French S.E.210 Caravelle of which Air France have ordered twelve and which will carry 70–91 passengers at 485 m.p.h. on the power of only two Rolls-Royce Avon turbojets, mounted one on each side of its rear fuselage. Nor should we overlook Convair's Model 880 because, although it is a fairly large aircraft, with four very powerful General Electric CJ805 turbojets, it is intended for medium ranges and will carry 80–113 passengers at 545–620 m.p.h.

The Tupolev Tu-104, now in service with Aeroflot, the Soviet national airline. Photograph by Roy Wesson.

There are other contenders in the airways battle, including "junior" developments of the big Boeing and Douglas jet-liners; but in general the course of the battle can now be seen fairly clearly.

Starting at the bottom of the ladder with the small short-range air liner, there is little doubt that the 32–40 seat turboprop Fokker Friendship has the market almost to itself, and it is being built in both Holland and America, by Fokker and Fairchild. Orders total around 100, and the fact that it is powered by two Rolls-Royce Darts makes it particularly attractive to any company already flying Viscounts, with the same engines.

The Viscount needs little comment, except to say that the new "stretched" versions are not replacements, but team-mates, for the earlier Series 700 aircraft. In brief, the Series 700 carries 40–53 passengers at 326 m.p.h. on the power of four 1,740 h.p. Dart R.Da.6 turboprops. The initial Series 800 now in service with B.E.A. will carry 65–70 people at 320 m.p.h. for slightly shorter distances on

Bristol Britannia 301, prototype of the larger, faster and more powerful Britannia Series 300 and 310 aircraft ordered by B.O.A.C., Canadian Pacific Air Lines and El Al Israel Airlines.

the same engines. Later Series 810 and 840 Viscounts will carry the same load as the 800 at 365 and 400 m.p.h. respectively, by the use of more powerful Darts.

Then, for routes of up to 2,600 miles, overlapping the Viscount to a certain extent but intended for extremely busy services, will come the Vanguard and the Lockheed Electra, both of which should fly next year. At the moment, 128 Electras have been ordered, against 40 of the newer Vanguards, but T.C.A.'s contract will have a big influence on those airlines that have not yet made up their minds.

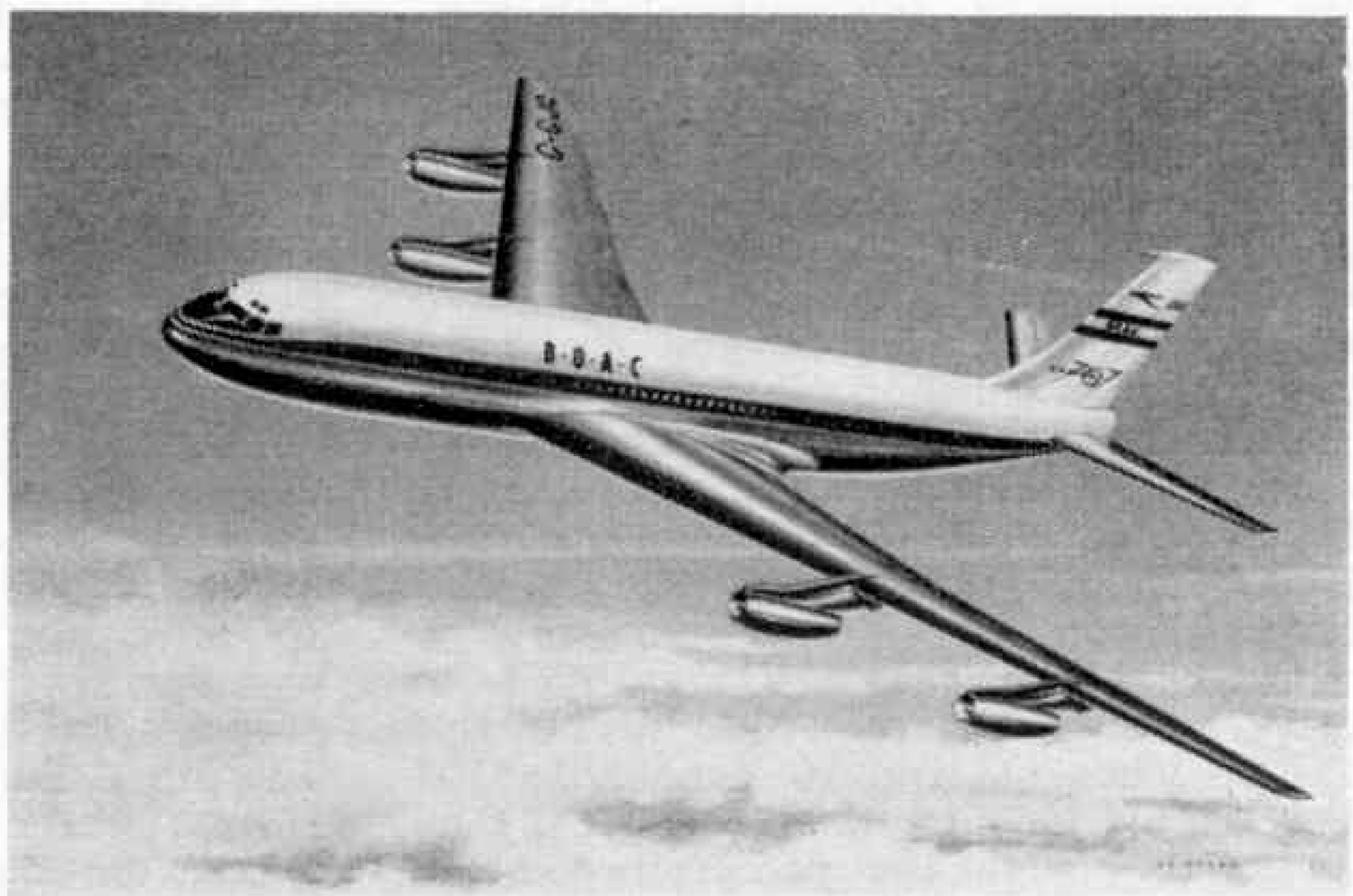
In most respects the two aircraft are very similar. The Vanguard, for example, will carry 76–128 passengers over any range from 200 to 2,600 miles at 410 m.p.h. when fitted with the initial 4,695 h.p. version of the Tyne, and at 450 m.p.h. when the developed 5,760 h.p. Tyne becomes available in 1963. The Electra, when powered by its normal 3,740 h.p. Allison turboprops, will carry 85–91 passengers for the same ranges at 410 m.p.h., but the Tyne-powered version should be considerably better.

One tremendous advantage of the Vanguard is the flexibility it offers as a result of the two freight-holds in the lower deck of its "double-bubble" fuselage. They are bigger than the holds on any other passenger air liner and enable it to carry up to seven tons of freight. As a result, it can still make money by filling up with cargo and mail when only a few of its seats are occupied. And there is an all-cargo version able to carry 18 tons of freight at a lower rate than any other aircraft in the world.

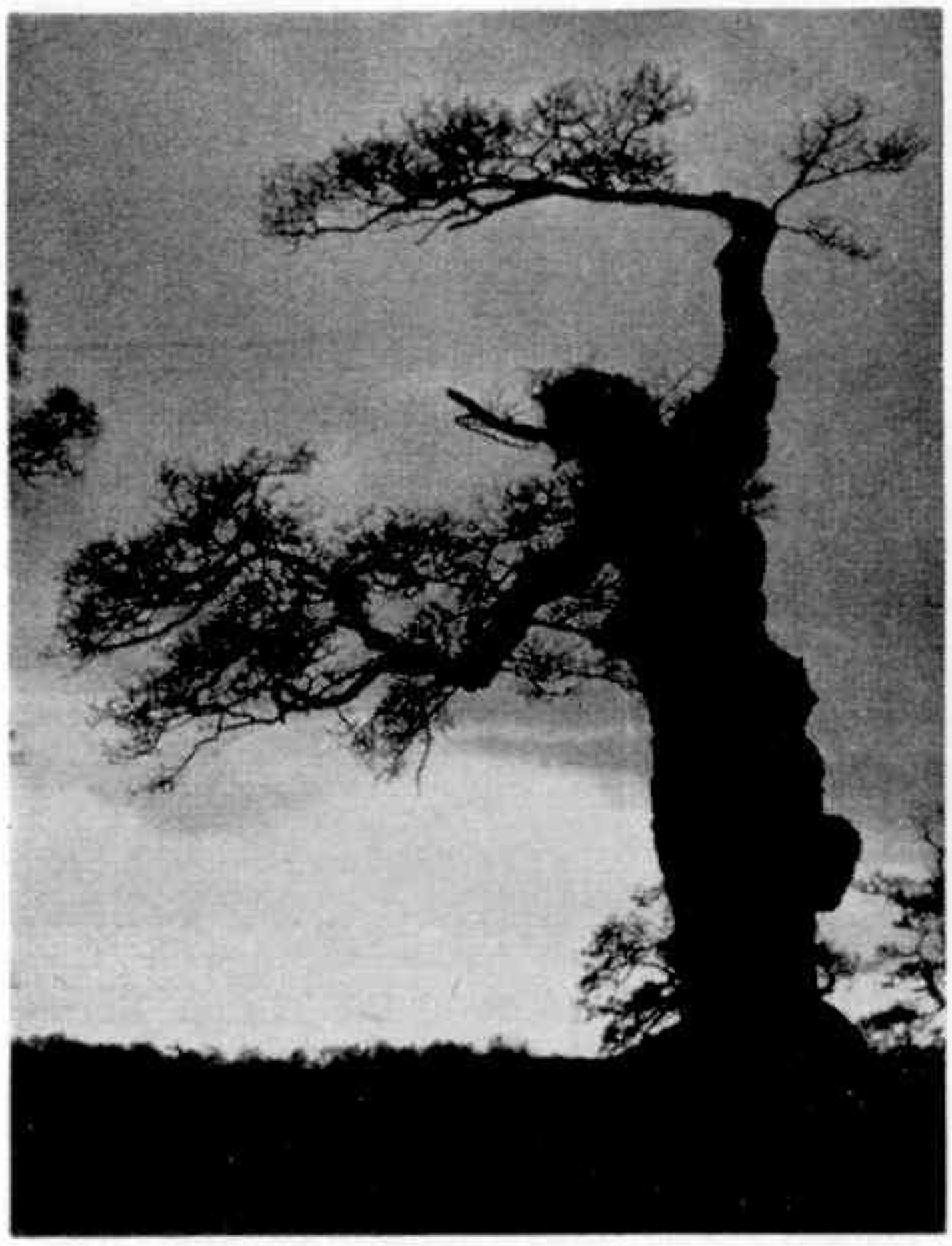
The Comet, Tu–104, Caravelle and Convair 880 jet-liners are in much the same class as these two turboprop transports. But, except where sheer speed is required, they may not meet with the same success.

An odd man out is the Britannia, the only really long-range turboprop air liner, and present orders for 65 may grow quickly when passengers and airline operators have experienced the comfort, reliability and economy of those used by B.O.A.C.

The "Queens" of the Atlantic will, however, be the big jets; and orders for the DC–8 and Boeing 707 already total over 250, at a cost of around £2 million each. Yet Britain will even have a share in their triumph, for the 707's ordered by B.O.A.C., Lufthansa and Air India, and the DC–8's ordered by T.C.A. will be powered by Rolls-Royce Conway engines instead of the usual American turbojets.



This is how the Boeing 707 Intercontinental jet transport will look in B.O.A.C. dress.



A fantastic, almost human silhouette, seen at sunset among the trees near Windsor Castle. The illustrations to this article are from photographs by the author.

Windsor Castle

By
By Reece Winstone, A.I.B.P., A.R.P.S., F.R.S.A.

HOW often we hear in the news that Her Majesty spent the week-end at Windsor. After her weekdays in London, where the arduous duties of the Sovereign are carried out at Buckingham Palace, the Queen is glad to be in the country.

We all enjoy a walk in the woods, away from city traffic, or a ramble beside a river, and we shall find both near Windsor Castle. The Thames is very beautiful there, and the great trees in Windsor Forest are very lovely.

"King Charles Walk for Shooting," wrote Celia Fiennes, referring to The Long Walk at Windsor, which in the days of King Charles II was to be an avenue 240 feet broad in a direct line between the Castle and Windsor and the Great Park there. And so it stretches from the Castle Gates to the Copper Horse, a distance of approximately three miles. George III so liked the Long Walk and its outlook that there is the statue of him mounted upon a horse on Snow Hill. Local legend has it that because of its distance from any striking clock, should one stand on Snow Hill at midnight and hear a clock strike twelve, King George III would dismount from his horse. It is queer that this statue, which is of bronze, is always referred to as "The Copper Horse," the rider being forgotten!

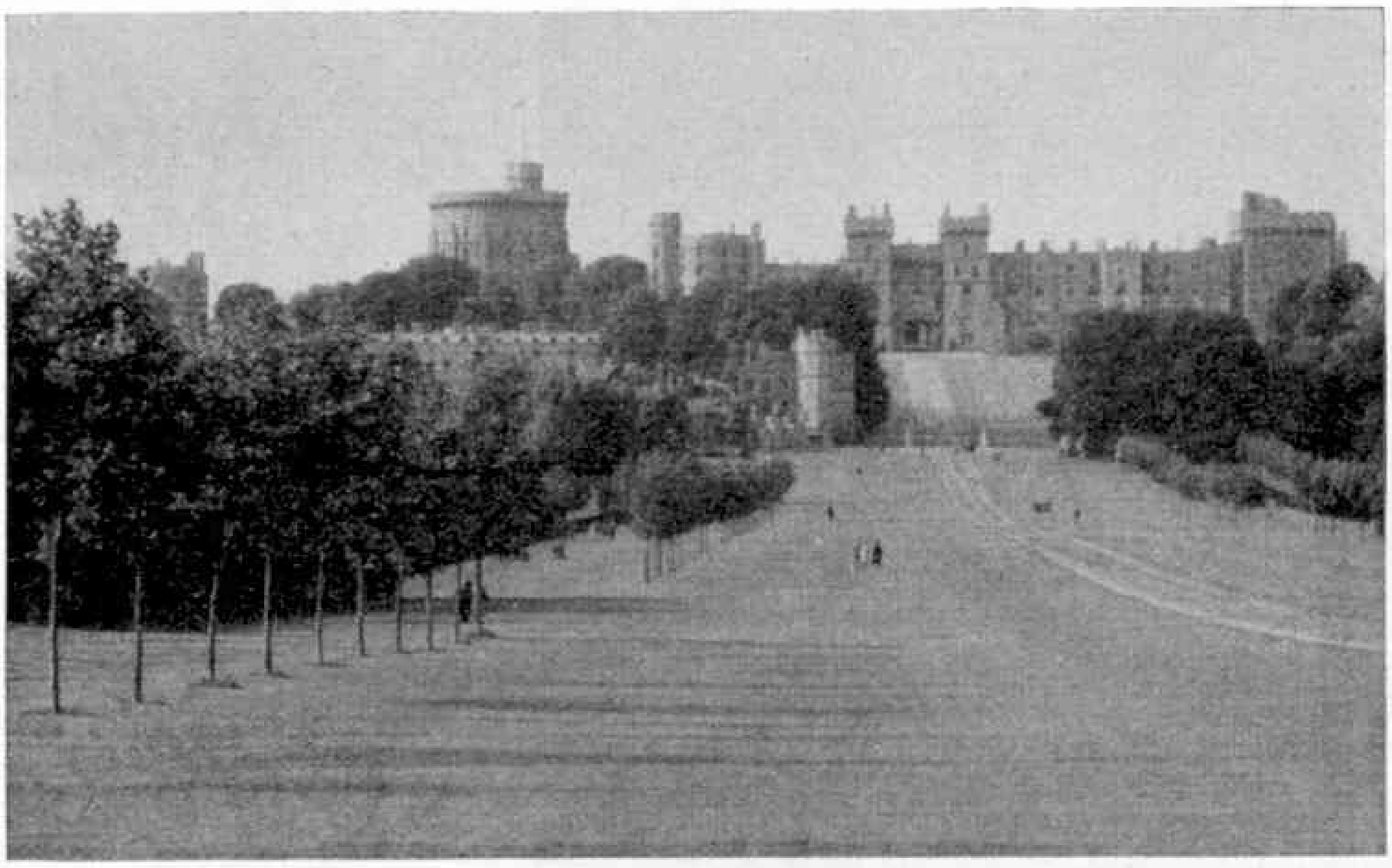
Many tales are told of this old Forest: one of them concerns Herne, the Hunter, a ghostly individual who was believed to haunt one of the oak trees in the reign of the first Elizabeth. Harrison Ainsworth mentions him in his book *Windsor Castle*.

Shakespeare also brings Herne the Hunter into his play *The Merry Wives of Windsor*. The legend brought about Falstaff's undoing. In Act V Scene III, Mrs. Ford asks *Where is Nan now and her troup of fairies?* and Mrs. Page says *They are all crouched in a pit by Herne's Oak*. Later Mrs. Ford and Mrs. Page meet Falstaff there.

In 1863, three hundred years later, the old oak was blown down, and a new young one was planted on the spot by Queen Victoria. But many other old trees remain and, seen in silhouette against the sunset, sometimes make some queer, almost human shapes.

Windsor Castle was one of William the Conqueror's special defences to serve as a fortress in a ring round London. He founded it in 1070, choosing the bend in the River Thames to make a natural obstacle to the north and east. The first building was of wood, to be replaced in stone by Henry II, the third Henry adding various watch towers. As the need for defence lessened through the centuries, so later monarchs made it into a palace. Here Kings have been born and imprisoned, have died and been buried; here Edward III established the Order of the Garter, the highest Order of Chivalry; and here lies Henry VIII.

The Castle covers some 13 acres, and from the top of the familiar Round Tower, 230 ft. above the moat, the view extends to 15 counties if the weather conditions are right. Some 20 towers and gateways are inside a mile of outer walls, and St. George's Chapel reached a height of architectural development and splendour in a Golden Age, unsurpassed anywhere in the world.



A view of the great castle from the Long Walk, which stretches away through Windsor Great Park.

This royal chapel shares with Westminster Abbey the title of "A Royal Peculiar." That is to say, it does not come under the authority of an Archbishop or Bishop. The sovereign herself is its "Visitor."

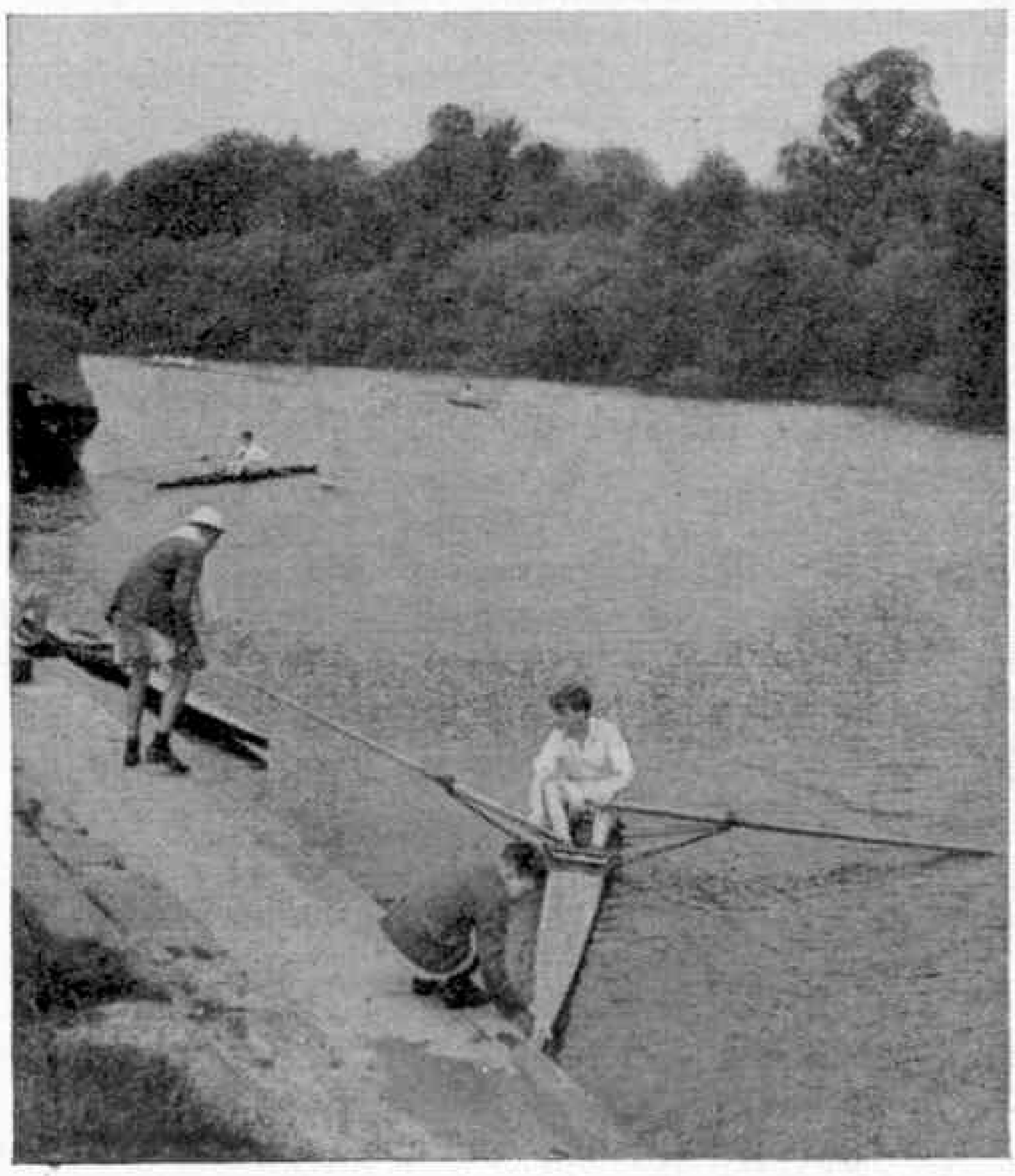
When the Castle is open to the public, 18 State Rooms are shown with their precious contents of paintings and furniture, the Queen's Doll's House, the Curfew Tower, the Round Tower, the 600 yard length of the North Terrace and the Royal Stables. Access is given to the acres of the Home Park and the Great Park.

With just a mention of the Throne Room, decorated in Garter blue velvet, and with carved panelling by Grinling Gibbons, we come to St. George's Chapel, the last resting place of our monarchs in recent times. The only chapel in the world belonging to an Order of Chivalry, it is 230 ft. long.

In the old town, the church has much of the Regency period inside, Wren was responsible for the Masonic Hall, and the Town Hall. A story is told that local people thought pillars and arches were not enough to support the latter building, and to satisfy them the famous architect, Sir Christopher Wren, added rounded columns in the middle as added strength. But he was quite happy with the original design, and left a gap of about an inch between the top of the columns and the beams they are supposed to support. Here is kept, among other historic treasures, the Town's seal, 600 years old.

The way to the Great Park is by the famous Long Walk, three miles of it. It has 1,650 trees, one every 30 feet.

Across the Thames from Windsor lies Eton, a picturesque little town, rather overawed by its world-famous school. Henry VI was its founder in 1440. In his reign 10 priests and 4 clerks taught 6 choristers, 25 poor scholars and 25 poor men. Now some 80 masters instruct 1,200 or



Runnymede, as famous as any place in English history.

more boys, and the school has given us 16 Prime Ministers. The formal dress of the schoolboys, black suits, white tie, top hat, seems strangely old-fashioned today, but it is a custom the greatest school in the world will not easily change. The great courtyard has a statue of its founder in bronze, holding the orb and sceptre—although one day Eton awoke to find the latter replaced by a birch rod.

Eton College, seen from the Cloisters. The statue is that of Henry VI, founder of the school.

In the Long Room some 8,000 names are carved on the walls, Shelley's among them. Around the room are busts of great Etonians, Sir Robert Walpole, Gladstone, Thomas Gray and many more. A curiosity at the main entrance is the corner stone of the wall; it is actually a milestone, the inscription, defaced by drumming heels, and inquisitive penknives, reading *21 miles to Hyde Park Corner 1817.*

Passing along Eton's narrow street to the river, one notices an ancient half-timbered building, outside which are stocks and whipping post. This is known as the "Cock Pit," in connection with the old time practice of cock fighting. The floor inside was originally paved with knuckle bones, presumably of sheep.

The view of the north bank of the Thames shows Windsor Castle stretching for its full length above the town, and boating adds colour to the scene. This part of the river has much liquid history. Three miles to the east is Runnymede, now the property of the National Trust. The historic year of this wooded island on the Thames was 1215, when King John set his seal to Magna Carta.

Many visitors to Windsor will come along Thames side from the west, leaving the traffic-filled Bath road at Maidenhead. The river is very impressive here, especially when seen from the little boating yards below the Bridge, which was built in the 13th century, but re-designed in 1772 by Robert Taylor. This Georgian stonemason's son rose from penury to wealth and left £180,000 to Oxford University. To the south is Brunel's railway bridge, a scene painted by Turner.

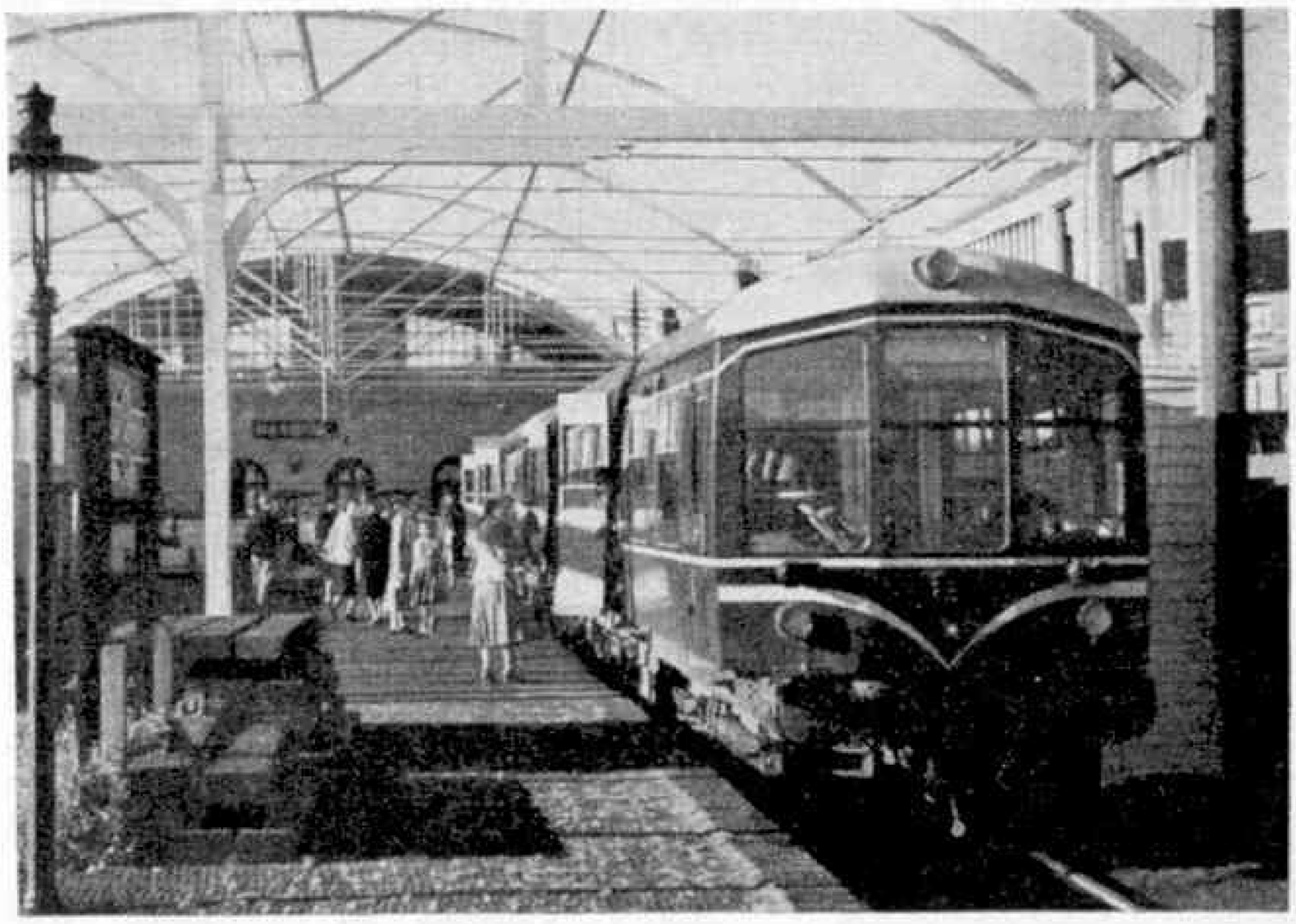
Beyond lies the village of Bray, immortalised by the famous Vicar of the well known song, who held sway over his church through two Catholic and two Protestant regimes of the 17th century, but come what may was determined to "live and die the Vicar of Bray." But there is a doubt as to who actually was the Vicar of Bray of the song. Francis Carswell had to change his views between 1667 and 1709, through various reigns; and Simon Aleyn was twice Catholic and twice Protestant during the reigns of Henry VIII and his three children. Altogether an interesting little town with ancient houses lining irregular streets.

So make your way around Royal Windsor, and you will find quiet countryside, with history and heritage, beside the Thames.

Wide and Narrow Gauge in Wales—(*Cont. from p. 194*)

possible direct running to the Welsh lines or the freight and locomotive yards from the south, the Wellington-Birmingham direction, as well as from the north or Cheshire direction through the station.

On the outward journey we had seen the *Cambrian Coast Express* arrive from the Welsh coast headed by *Barcote Manor*, reverse and leave for London in charge of shining green *Avondale Castle*. During a subsequent morning spell of observation there was considerable locomotive variety including L.M.R. 4-6-2 *City of Nottingham*, unrebuilt Patriot *Giggleswick*, which later took us to Stafford, one of the original Swindon Castles No. 4076 *Carmarthen Castle*, L.M.R. 2-6-4 and W.R. pannier 0-6-0Ts. There were also 0-8-0 and 2-8-0 freight engines and 2-6-2Ts of W.R., L.M.R., or B.R. and W.D. types.



A sunny afternoon at Banbury, with a twin diesel car set just arrived from Buckingham. Photograph by D. M. Hall.

Railway Notes

By R. A. H. Weight

New Exhibition and Museum Opportunities

A fresh and comprehensive historical "Transport Treasures" Exhibition is open daily, at a small charge, in the imposing Shareholders' Meeting Room adjacent to the Great Hall at Euston Station, London, and will continue indefinitely with some changes of contents from time to time. The wide range of models, relics, paintings and lithographs now on view portray early locomotives, steamships, canal boats, omnibuses, and much else, with later examples also. It is well worth a visit.

The distinguished company of retired locomotives housed for visitors' delectation in the large-shed section of the Railway Museum, York, has been joined by the pioneer big Atlantic No. 251, built for the Great Northern Railway in 1902. This engine is larger and heavier than any others preserved there, having since withdrawal in 1947 been in store most of the time at Doncaster. In 1953, in company with the first British 4-4-2, G.N.R. No. 990, of the small Atlantic type that is also an exhibit in York Museum, it hauled a special express train from King's Cross to Doncaster on the occasion of the Works Centenary there.

Another addition at York, also brightly painted in green, is the returned ex-North Eastern Railway 2-4-0 express locomotive No. 1463, built in 1885, of the class that has been likened to a slender Victorian greyhound. This veteran entered the Museum in 1927, but had to be withdrawn for a time owing to lack of space.

Scottish Improvements

Glasgow Central, High Level, station, handling considerable main line and suburban traffic is to have modern colour light signalling. A similar installation facilitating operation of local and freight trains on the Low Level lines has been brought into use.

A new marshalling yard is under construction at Millerhill, Edinburgh, and another is to be put in hand at Perth, with the object of concentrating and accelerating sorting, shunting and distribution of freight trains and wagons. Electrically controlled signalling schemes are planned in connection with each. At Perth, also an important junction and focal point for main line passenger traffic, the work of 13 signal boxes will be concentrated into one power-operated cabin of the latest type. More machines have been ordered for Railway Works and Maintenance Depots.

Coinciding with the introduction of new signalling round about Cowlairs and Eastfield, at the top of the steep rise from Glasgow, Queen Street, and with the completion of track repair or engineering works further east, six express diesel services each way were added in January to the Edinburgh–Glasgow time table, calling usually only at Haymarket, Edinburgh. Two non-stop steam trains including the *Queen of Scots* are accelerated to a 55-min. timing for the 47¼ miles. There are a number of steam and diesel runs in both directions, taking about an hour.

Locomotives in the News

Several of the new class 5 4-6-0s fitted with Caprotti valve gear have been on loan to other depots, but the official allocation of Nos. 73140–4 is to 15C, Leicester, followed by No. 73145 for the Scottish Region. Others built at Doncaster, having normal Walschaerts gear with piston valves, include Nos. 73155–9, to 34E, Neasden shed, and Nos. 73160–1, 52A, Gateshead. Swindon-built class 4 4-6-0s numbered 75053–4, go to 6A, Chester, and No. 75055, to 15D, Bedford. Class 9 2-10-0s lately added to stock were Nos. 92093–4, 36A, Doncaster, and No. 92119, 18B, Westhouses.

Diesel shunting locomotives with electrical transmission were allocated as follows: Nos. 13295–7, 55B (formerly 20B) Stourton, and Nos. 13333–6, 41A, Darnall, Sheffield. Nos. 11184–5 go to 40A, Lincoln, and Nos. 11218–9 go to Percy Main, 52E; these locomotives have mechanical drive.

More V2 2-6-2s working in the E. or N.E. Regions have been painted green, as have more W.R. mixed traffic 4-6-0s as well as some tank engines and additional S.R. Schools 4-4-0s, etc.

The 15 Britannia Pacifics allocated to the Western Region are now all stationed at Cardiff, Canton shed. Castle 4-6-0s have replaced those hitherto shedded at the London and Plymouth depots. At the time of writing at least 16 King and 5 County 4-6-0s have been fitted with double chimneys. W.R. 0-6-0s Nos. 8400–6 are transferred to L.M.R. stock, mainly in connection with Lickey Incline banking work.

Coupled in pairs, L.M.R. type diesel-electric locomotives numbered 10000–1 and the S.R. built ones Nos. 10201–2 have been making a number of through runs hauling the *Royal Scot* express between Euston and Glasgow, with a balancing 401-mile journey at night on heavy sleeping car trains.

Small 0-4-4T No. 55053, withdrawn from service in the far north of Scotland, was the last active engine once belonging to the former Highland Railway. It was built in 1905.

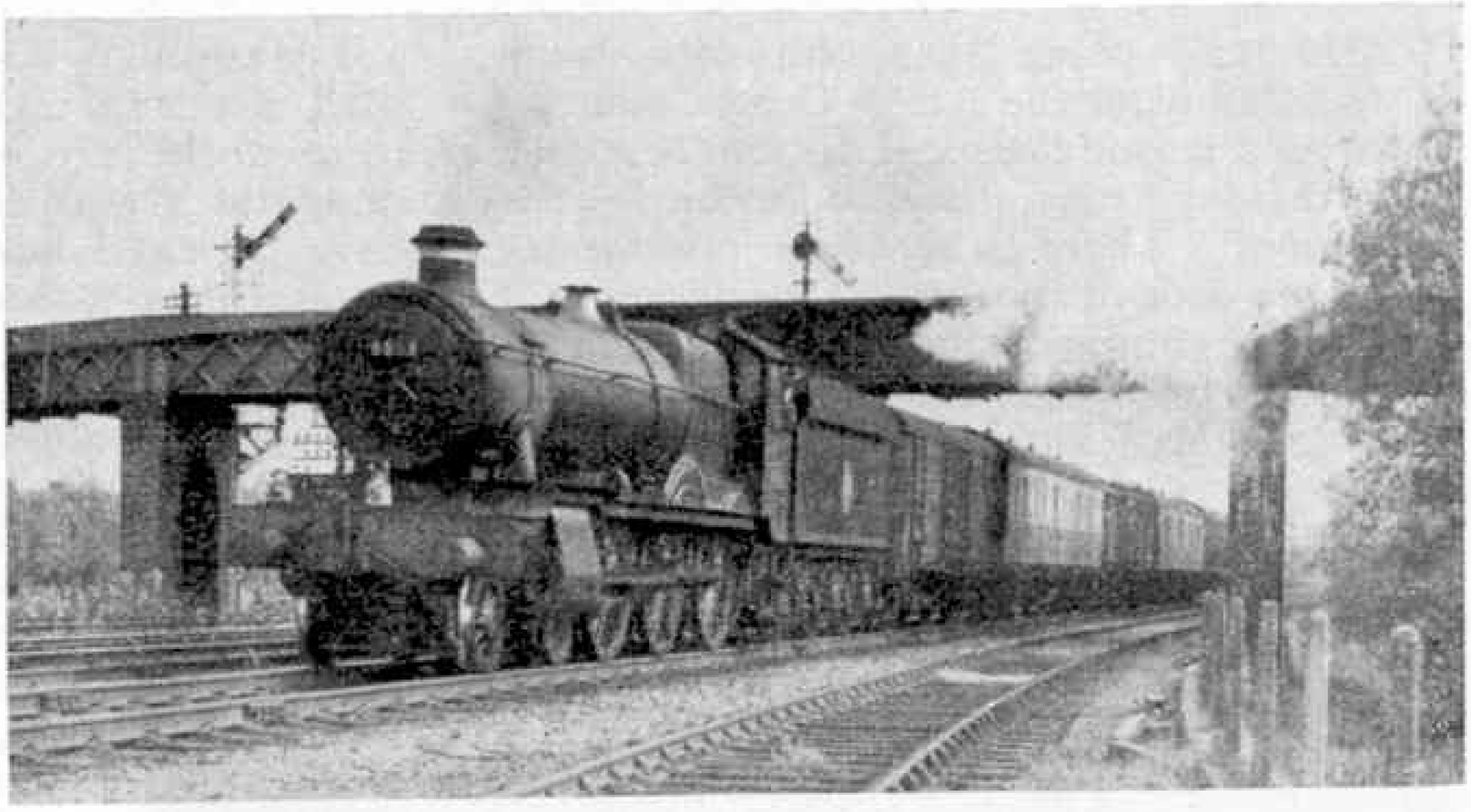
High Speed up to Euston

Among the London termini, on its ordinary daily routine Euston L.M.R. handles the greatest number of long distance expresses running intact to, or serving places say, 180 miles or more from London. In some cases this is done without a stop and with corresponding southbound services.

In this respect Euston is followed fairly closely by King's Cross and Paddington. Over the 82¾ miles between Rugby-Euston there are also the fast Wolverhampton-Birmingham-Coventry trains, several of which each way daily feature 60 m.p.h. timings for the 94 mile run 'twixt Euston and Coventry.

As I have mentioned before when reporting excellent runs on it with diesel-electric locomotives, the quickest start to stop schedule is given to the up Wolverhampton express due Euston at 4.35 p.m. which calls at Rugby, and is booked thence to London in 79 mins. *Indore*, one of the Jubilee 3-cylinder 4–6–0 steam engines long a mainstay of this service, with 9 coaches, about 320 tons, after an enforced severe slowing over Castlethorpe water troughs under repair, costing about 5 mins., made a spirited dash for home, reports Mr. B. Bending. A steady 60–62 m.p.h. was sustained up the gradual rise to Tring, followed by a very fast descent with speeds well up in the 80's past King's Langley and Harrow-Willesden Junction, over 4 mins. being regained on a tight timing. The train came to rest in Euston barely a minute late.

With one of the Britannia 4–6–2s at the head of a much heavier 14-coach, 465-ton train, ex-Manchester, I recorded an average of 72½ m.p.h. over the 54 slightly undulating miles from Roade to Willesden Junction. The minimum near Tring was 63, the maximum beyond 83½ m.p.h. Then signals were against us, though with a clear road the peak timing mentioned above could have been achieved.



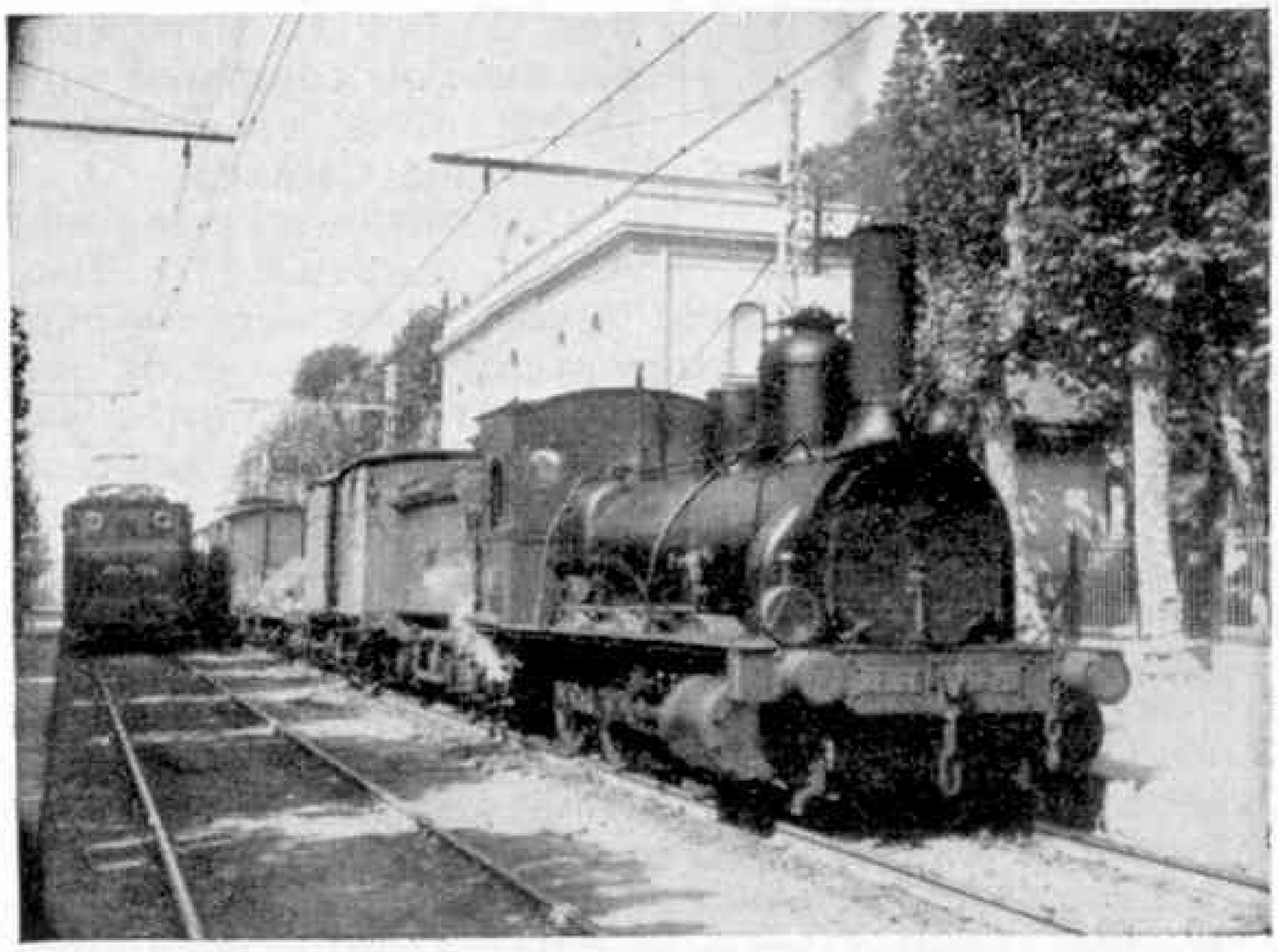
A down parcels train on the Western Region near Oxford in charge of No. 6853 "Morehampton Grange." Photograph by D. Ives.

Corridor Carriages of the Future

New and differing examples incorporating the latest ideas for the best main line railway carriages will soon be appearing from the B.R. Shops at Doncaster, as well as from the works of various manufacturers who are co-operating with designs and suggestions in connection with improved seating, heating, ventilation, insulation against noise, decoration and general equipment. Over 7,000 coaches suitable for running in long-distance trains, whether hauled by steam, electric or diesel locomotives, are expected to be placed in service during the next five years.

The Metropolitan-Cammell Carriage and Wagon Co. Ltd., Birmingham, have completed two prototype coaches of the compartment type, one 1st class, one 2nd. Having one compartment less than usual there is plenty of room; seating, lighting, visibility, provision of small tables, etc., appear first rate. Like several other firms engaged in similar contracts, they were given a free hand respecting internal arrangement and fittings, while having to comply with standard structural dimensions and stability.

Corridor stock for use in multiple unit electric train sets is also under construction.



Ancient and modern motive power on adjacent tracks of the Spanish National Railways at Caldetas, nr. Barcelona. Photograph by B. J. Holden.

European Railway Events

The centenary of the Swedish Railways has been recently celebrated. They cover about 9,500 route miles, a good deal being through sparsely populated mountainous or afforested country. There is a big freight traffic and large scale electrification. Passengers are well catered for. There is considerable sleeping car business on both internal and international services, operated in the latter case through to Germany, France, etc., the cars being conveyed by train ferry ships to and from Denmark.

The European Railways Information Bulletin (C.I.C.E.) reports that 3,250 miles of track are electrified in France, including the main lines from Paris to Geneva, where connection is made with the Swiss State system. This includes the trunk route from Paris to the south of France, Italy, etc., as far as Lyons, 318 miles, with its very fast, heavy expresses hauled by electric locomotives taking direct current, 1,500 volts, with an overhead installation similar to that on the Manchester-Sheffield or Liverpool Street lines in Great Britain. Extensions around southern France are in hand.

The Polar Postman has Wings

Air Mail Services across the Arctic

By Frank Illingworth

THE mail plane turns into the wind blowing from the Arctic Ocean, touches down on a frozen lake and, its single engine still turning over, makes towards the settlement. Then an Eskimo postmaster slams the door of the shack that serves as a post office, climbs on to his sledge, and sets his huskies off towards the plane with a bag of outgoing mail and to collect the incoming mail.

Very soon the ski-plane is off again, heading across perhaps 500 miles of almost uninhabited barrens and tundra to a settlement with an airstrip large enough for, say, a twin-engined D.C.3 or even a Constellation. Fairbanks, in Alaska, has such a strip.

Oldest and newest forms of Arctic transport—dog team and sledge, and aircraft. Polar Photos.

So it is that a letter posted on a Tuesday in the Eskimo village of Kotzebue, on the coast of Alaska opposite Siberia, will reach Britain the following Monday!

We have travelled a long way since the day thirty-two years ago when an American light plane took off into "Interior Alaska," and twenty-two years ago when a Canadian plane left Edmonton, "Gateway to the Canadian North," with mail for settlements in sub-Arctic Canada.

Today the Arctic is literally criss-crossed with air mail services. The latest new trans-world air services flying the new short-cut routes across the polar regions have knocked hours off air mail delivery times. For example, this very article reached London from Vancouver, on the new Canadian Pacific Airlines Tokio-to-Europe schedule via the Arctic in *nineteen hours flying time. It would have taken only 47 hours to reach London from Sydney,* thanks to this exciting new short-cut Great (Arctic) Circle air route.

A glance at a globe confirms that the shortest routes between many of the world's capitals lie across the Arctic. Scandinavian Airlines have proved that the Copenhagen-Winnipeg-via-the-Arctic route knocks 1,000 miles off the old one across the Atlantic to Montreal. More spectacularly, the brand new Scandinavian route between Europe and Japan over the North Pole itself knocks 24 hours off the old route via the Middle East, while it is only 6,000 miles from Peking to New York via the Pole compared with 11,000 miles via London, Rome and Calcutta.

This distance saving was made possible by five developments. Among these were the ever increasing range of airliners, the great new airbases built in the Arctic during the war and subsequently, and the strategical importance of the polar regions and the great drive to broach their natural wealth, both of which points are reflected in the chains of trans-Arctic radar and meteorological networks. In addition, remarkable improvements in navigational instruments accompanied the development of polar aviation.

And what does it all mean to you and me? Savings in mileage means countering the rising operational costs of all air services, ultimately with reductions in

fares and freight charges, quicker travel and faster air mail delivery.

Air mail services have been operating to the very shores of the Polar Ocean since well before the war. In the old days the polar postman used a dog team; today he has wings. In fact, the growing settlements of Arctic Canada and Alaska, some of them quite sizeable—Fairbanks, in Alaska, has a summer population of 25,000 and probably as many troops—rely entirely on aircraft for their mail services.

Canada's North-west Territories are between a quarter and a third the total area of the United States; her Yukon territory is vast; and the U.S. territory of Alaska sprawls to within a few miles of Siberia. This wilderness of rock, ice and summer bog knows temperature changes of 160 deg. F., from 80 deg. F. in the shade in summer—nearly 100 deg. F. has been recorded within the Arctic Circle—*to 80 deg. F. below zero* in winter. Much of it is still to be accurately mapped.

Yet I receive letters from a friend at a settlement locked in the pack ice off the extreme north of Arctic Canada eight days after he has stamped them. And it takes only five days for parcels to reach my home in Britain from a little town on the far shores of Alaska.

The letters from my friend in Arctic Canada are flown 500 miles by bush plane to the gold mining settlement of Yellowknife, in the sub-Arctic North-West Territories. There they are transferred to a Bristol of Canadian Pacific flying between the Eskimo-Indian settlement of Aklavik, the uranium mining township of Eldorado, and Edmonton. From Edmonton mail is flown to Vancouver, thence by the new trans-polar short cut route to Amsterdam, and finally by B.E.A. Vikings to London.

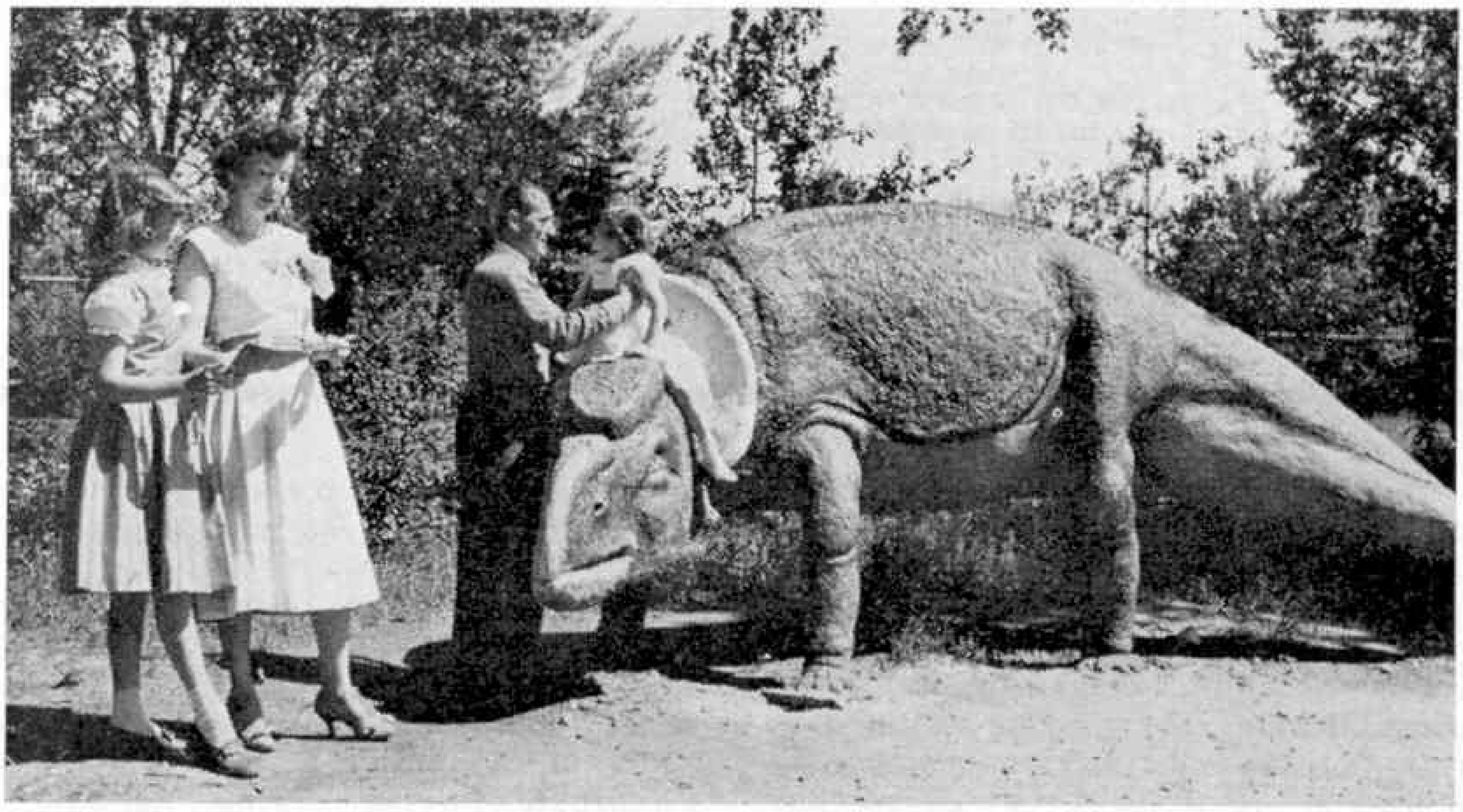
And the parcels from my friend in an Eskimo village in Alaska? How do they reach me in less time than it took to fly a letter to Tokio five years ago?

In the days when Junkers monoplanes were the latest thing an American named Noel Wien flew across Alaska to its most northerly peninsula, Point Barrow. Today Wien Alaska Airlines operate scheduled services to Barrow, the site of a scientific research station and headquarters of oil drilling operations. Indeed its airliners are a major link between the cities and settlements of Alaska and the *Outside*, as Alaskans call the rest of the world outside Alaska itself. Thus it is that letters can take as little as a week to reach London from, for example, Fairbanks, barely fifty miles south of the Arctic Circle in what only ten years ago was the remote heart of a frozen, largely unexplored land.

All told, some fourteen aviation companies are operating mail services in the Arctic, in Alaska, Arctic Canada, Iceland and Arctic Scandinavia. Those of Arctic Scandinavia are fairly typical of the growing polar

(*Continued on page 210*)

Tourists from Ohio in the United States, standing in front of the Post Office in Fort Yukon, in Alaska.



A Day with the Dinosaurs

By Ian S. Balderstone

CALGARY, in Alberta, Canada, has possibly the world's most abundant remains of the giant lizards that roamed the marshy shores of tropical seas many years ago. The city indeed has the only Park in America where 30 life-sized models of these can be seen. It was opened in 1935 through the efforts of the Calgary Zoological Society and is a constant attraction for thousands of people each year.

Here is the story of a unique park in Calgary, Alberta, Canada, in which visitors come face to face with weird monsters and other creatures of the past! But they are only concrete replicas. The one seen in the picture at the head of the page has the tongue-twisting name pachyrhinosaurus, and a "ride" on him, in spite of his looks, is quite safe. The illustrations to this article are from Shell Oil photographs.

The favourite of the dinosaur park is *Dinny*, the mammoth brontosaurus replica, whose prodigious bulk and benign bearing have made him Calgary's biggest pet. In spite of his size, *Dinny* radiates a placid kindness. His name is derived from the Greek *bronto sauros*, meaning thunder lizard, which suggests that his 65 tons of weight shook the earth as he made his leisurely way through the lush swamps and stagnant waters of the Jurassic era in which he lived, probably more than 100 million years ago.

The brontosaurus was a vegetarian and marsh dweller, and it is believed that he spent much of his life wallowing half submerged in shallow lakes and mires. The first fossilized bones of this giant lizard were found in Wyoming. His hide was tough and this, added to his vast bulk—he was about 90 feet long and 35 feet high—leads to the belief that he must have had no enemies. As a vegetarian he had no need to hunt, but probably selected his meals from the tops of the trees, which were fern-like and grew and died rapidly.

Dinny's teeth were grinder-like, similar to those of present day plant-eating animals, and his brain—what little he had—is believed to have done hardly more than work his jaws and filter dim impressions through to his limited senses. It is not known whether he was able to utter any sound or not, as no vocal apparatus remains in fossilized form.

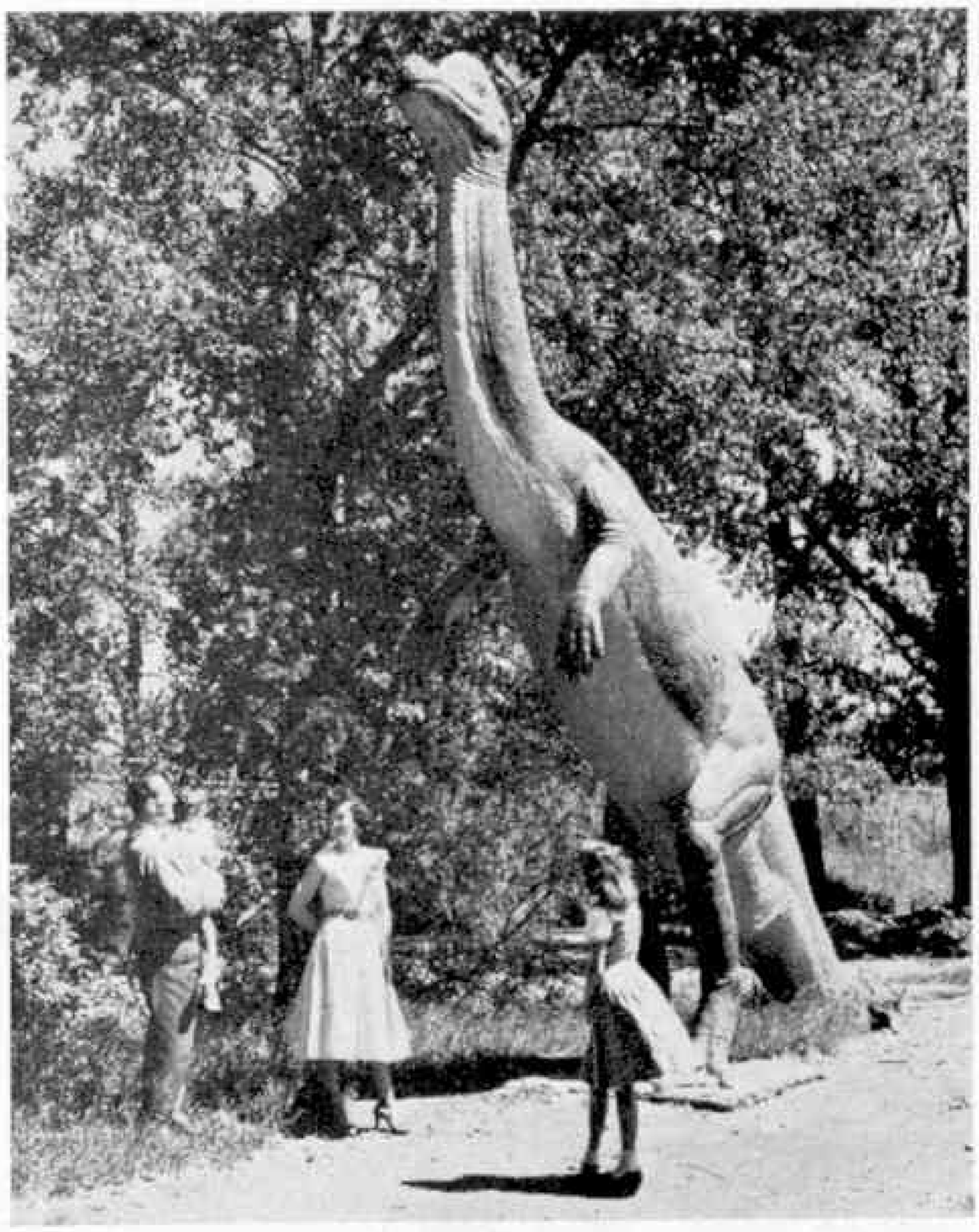
The stegosaurus, a plated lizard, has the doubtful distinction of having had the smallest brain of all the dinosaurs. It is known to have inhabited the United States and Alberta about 130 million years ago. Its weight was 2 tons, its length 24 feet and its height 6 feet.

Another plated lizard is the palæoscincus, remains of which have been found east of

Calgary. Others to be seen are the chasmosaurus, a horned dinosaur, remains of which have been found at Steveville, Alberta, and the protoceratops from the Gobi Desert, a species which finally confirmed the theory that dinosaurs laid eggs. Some of the eggs were found in the Gobi Desert, unbroken, in 1922.

The reptile group consists of casea, naosaurus and dimetrodon. Nearby are the comsognathus, a small type flesh eater, and two specimens of hypsilophondon or flying lizards. All dinosaur names are cumbrous, for we know these creatures only through their fossil remains, and so they have no familiar names.

There is also the ceratosaurus, a giant carnivore that preyed on unprotected plant eating dinosaurs. Other models are the giant duck-bills, corythosaurus and parasaurolophus dinosaurs. Representatives of a later era are the early mammals including eohippus and mesohippus, forerunners of the horse, and still later the mammoth. It is a tribute to the planning and skill that went into these replicas that after over twenty years little criticism is heard as to their accuracy and the fact that they are still all structurally sound.



A towering monster in the park of the Calgary Zoological Society. It is a hooded duck-bill dinosaur known as the corythosaurus.

All the replicas have been built by Mr. John Kanerva, of Calgary, with some technical assistance from Charles Bell, of Banff. With the exception of colour, which is largely a matter of conjecture, all details are absolutely accurate and the models are based on the findings of world famous palæontologists, as experts in fossil remains of prehistoric life are called.

After the bones are excavated, classified and placed in position, a scale model is constructed, and this is usually 12 inches to 20 inches long. When a suitable location is decided on, pegs are placed in the ground, where feet, head, tail, etc., will appear. Concrete foundations for feet are next constructed, iron reinforcing rods protruding above the ground are sunk in these, and other rods are attached to them and fabricated to the approximate shape of the specimen. Next a metal lath is attached to the rods to give more definite shape and substance to the model. Concrete is then placed both in and outside the frame, until the model gradually takes its correct form. Following this, head, tail, toes, etc., are added and finally muscles and outer covering are plastered on and colouring applied. Colours have been estimated from what is known of the creatures' surroundings.

Badland country in Alberta, from which have come many dinosaur fossil bones.

Air News

By John W. R. Taylor

"Folding" Helicopter

A tiny one-man helicopter that can be broken down into a small package, for easy transportation or for dropping by parachute, has been flown successfully by Hiller Helicopters of Palo Alto, California, U.S.A. Known as the XROE-1, it weighs less than 250 lb. and is powered by a 40 h.p. Nelson four-cylinder engine, which drives an 18 ft. main rotor and a small tail rotor carried on a tubular tail-boom. The entire aircraft is held together by quick-release pins and can be assembled by one person in less than ten minutes.

The XROE-1 was designed and built in just over two years to meet a U.S. Marine requirement for a "flying motor-cycle" for observation, liaison and other front-line duties. Its speed is probably around 60 m.p.h.

The Hiller XROE-1 portable rotorcycle in the air, piloted by Richard A. Peck, Hiller test pilot.

Britain's New Research Rockets

A new British rocket designed to reach an altitude of 120 miles has been launched at the Woomera Range in Australia. Known as the Skylark, it has been developed by the Royal Aircraft Establishment, in conjunction with the Bristol Aircraft company, who produce its 11,500 lb. thrust Raven solid-fuel rocket-motor.

The Skylark is 25 ft. long, 17½ in. in diameter and is fired from an 80 ft. high tower. Its nose will eventually contain instruments built at British universities under the supervision of the Royal Society and the Royal Aircraft Establishment, to record information about the upper atmosphere, and will be jettisonable for recovery by parachute after the rocket has reached its peak height. Photo-electric devices will measure temperature and winds at heights between 20 and 60 miles, and "window" (strips of tin foil) will be dropped and tracked by radar to check wind strengths.

Initially, the Skylarks are being fired only to a height of around 70 miles. Later, they will climb to their full height as part of Britain's research contribution to the International Geophysical Year.

Round-the-World Non-Stop by Jet Bomber

The ability of the U.S.A.F.'s Boeing B-52 Stratofortress bomber to deliver atomic weapons to any target in the world was shown in a striking manner when three of these huge aircraft encircled the globe without landing, in January of this year. They arrived back at March Air Force Base, Los Angeles, in perfect formation just 45 hr. 19 min. after taking off from their home base near Merced, California, having covered a total of 24,325 miles at an average speed of more than 530 m.p.h.

Their flight took them across the United States to Newfoundland, over the Atlantic to French Morocco, on to Dharan in Saudi Arabia, along the coasts of India and Ceylon, and over the Malay Peninsula to the Pacific, where they crossed the Philippines and the island of Guam before returning to California. At regular intervals they were met by Stratofreighter tankers which refuelled them in mid-air, and half-way around the world they made a dummy bombing attack on a railway junction that had been chosen as their target before take-off.

Supersonic Air Liners by 1969?

Mr. Whitney Straight, Vice-Chairman of Rolls-Royce, told reporters in Johannesburg recently that supersonic jet air liners may link that city with London regularly in five hours by 1969, and that the same aircraft would make possible a flying time of 2½ hours on the London-New York route. Later, he continued, would come the first atomic-powered air liners.

Soon afterwards it was announced that the Ministry of Supply, in conjunction with our airline corporations and the A. V. Roe, Bristol, de Havilland, Handley Page, Rolls-Royce, Short and Vickers companies, are planning the development of a supersonic air liner for service in the late 1960's.

Radar Nose for Qantas Connies

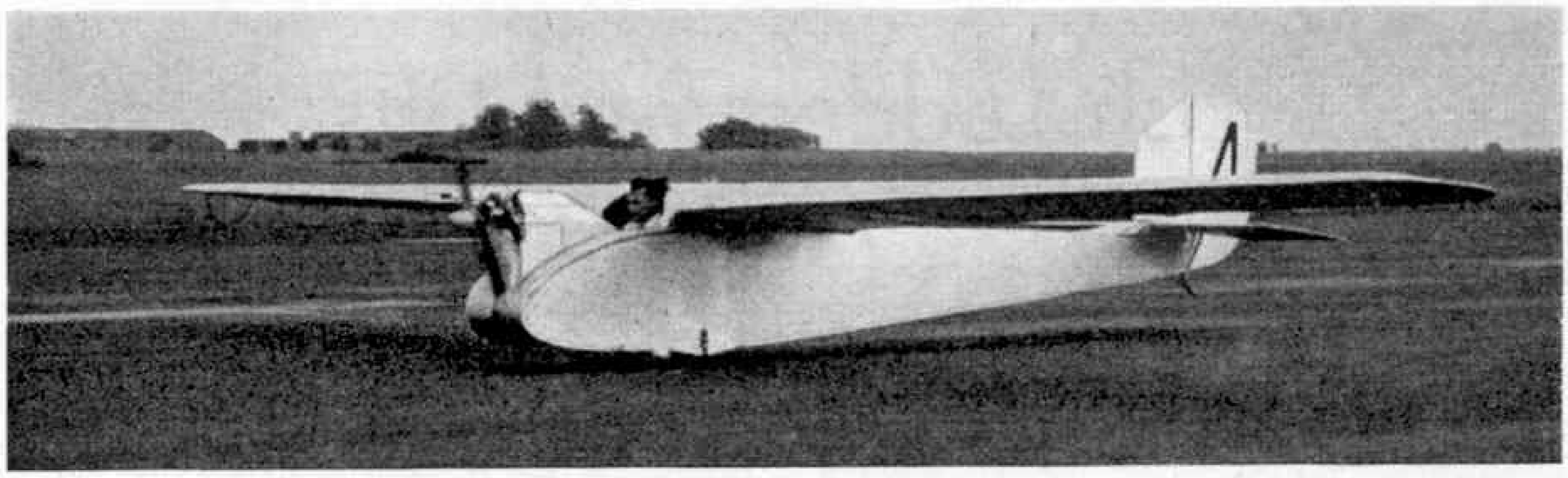
Qantas Empire Airways, the Australian national airline, are fitting weather mapping radar equipment in all 14 of their Super Constellations, and keen spotters at London Airport will have no difficulty in identifying those aircraft already modified by their longer noses which house the rotating radar "scanner".

The new equipment detects storm clouds up to 150 miles ahead of the Super Connies by day or night and displays their size and position on a screen, rather like that of a TV set, on the flight deck. This enables the pilots to fly around the areas of bad weather and so give passengers a smoother ride. It also picks up any other aircraft that may be flying in the path of the air liners.

Automatic Landings

A wonderful new safety aid was demonstrated recently at Niagara Falls Airport, when a Naval jet aircraft was landed perfectly during a blinding snowstorm that grounded all air liners, without the pilot touching the controls.

The new Automatic Carrier Landing System that made it possible was designed by the Bell Aircraft Corp. to ensure a safe touchdown for the U.S. Navy's high-speed jet fighters and bombers on board aircraft carriers, at night or in the worst weather conditions. It is small and comparatively cheap to produce, so



After many years in retirement this little single-seat English Electric Wren has been reconditioned by its builders, and here is shown undergoing taxying trials.

there is every hope that it might one day help to make airline flying even safer.

Heart of the system is a simple, very precise airborne radar set which works out the aircraft's height and position in relation to the carrier deck or airfield. The results, together with the aircraft's speed and direction of flight, are fed into an electronic computer which compares the aircraft's position with what it should be for a perfect touchdown. Its course, speed and rate-of-descent are then controlled automatically by radio signals, with the help of the automatic pilot, while the human pilot sits back to wait for the bump that tells him he is on the deck.

The system works equally well no matter how fast the carrier is steaming, and no matter how much its deck may roll and pitch in a heavy sea. In fact, if the deck is pitching up or down too fast at the moment when the aircraft is about to touch down, the robot pilot opens up the engine and sends the aircraft round for a second attempt.

First Flight for 34 Years

A little aeroplane that won a competition in 1923 by flying 87½ miles on one gallon of petrol has just made its first flight for 34 years. It is the single-seat English Electric Wren, illustrated above, and the pilot was Peter Hillwood, whose more usual mount is the 1,000 m.p.h. P.1 fighter.

Powered by its original 398 cc. A.B.C. motor-cycle engine, the Wren is one of three that were built for the Air Ministry at a cost of £450 each. It was reconditioned by the English Electric Company at Warton aerodrome in Lancashire after spending several years in the Science Museum at South Kensington, and may be flown in air displays this summer.

For the record, it has a wing span of 37 ft., is 24 ft. 3 in. long and weighs just over two hundredweight. Its top speed is only 50 m.p.h.; but the real attraction in a time of petrol rationing is that it has often achieved 100 miles per gallon.

Inside the climatic test hangar at the U.S. Eglin Air Force Base, Florida, engineers check the functioning of a Lockheed Starfighter's equipment. They are working in a temperature of —65 deg. Fah.

Fighter in the Deep Freeze

The ghostly characters wearing electrically-heated snow-suits seen in the bottom picture on this page are not members of an Arctic or Antarctic expedition, but engineers whose job is to put the U.S.A.F.'s latest aircraft through "deep freeze" tests in a climatic hangar at Eglin Air Force Base in Florida. Almost any kind of weather condition can be created in this hangar, to ensure that aircraft will continue to work in service everywhere from the Tropics to the Arctic regions, and the victim visible in the background of the picture is a Lockheed F-104A Starfighter.

Having survived these tests, which included undercarriage retraction, engine run-ups, gun-firing, radar checks and other operations at temperatures down to minus 65 deg. F., the Starfighter has since been sent to Alaska. There it will be parked outside in howling winds and heavy snow, and then taken up on normal test flights, as part of the programme that will prove it is as good as it looks.

Good-bye to the Tiger

The Royal Australian Air Force have said good-bye to the last of their Tiger Moth trainers, but not without a great deal of regret because these little biplanes and their predecessors, the Gipsy Moths, have served the R.A.A.F. well for 30 years.

It was in 1927 that the first Gipsy Moths arrived in Australia and 70 of them were bought by the R.A.A.F. Later, de Havilland's began making the Tiger in their factory at Bankstown, near Sydney, and, when the war started, they contributed 732 of the 861 Tiger Moths that were used to produce pilots in Australia under the Empire Air Training Scheme.

The production of spares for these aircraft ceased some years ago, and Tigers have been kept in the air only by "cannibalising" parts from other Tigers. So, the little biplanes have now given way to the Australian-designed Commonwealth Winjeel monoplane, with a 445 h.p. Wasp Junior engine and a top speed of 186 m.p.h.

Fish Ladders and Lifts

Preserving Salmon in the Highlands of Scotland

By J. C. Welbourn

IN eleven years of activity the North of Scotland Hydro-Electric Board has reached the half-way mark in its constructional programme with the building of 25 large hydro-electric power stations and some 20 major dams, together with many hundreds of miles of aqueducts, tunnels, pipelines and roads.

This constructional work has been complicated by the fact that many lochs and rivers under development contain valuable salmon and trout fishings and spawning grounds. As both salmon and trout play an important part in Scotland's economy, great care has been required to preserve these fisheries, the estimated annual value of which is about £1,000,000.

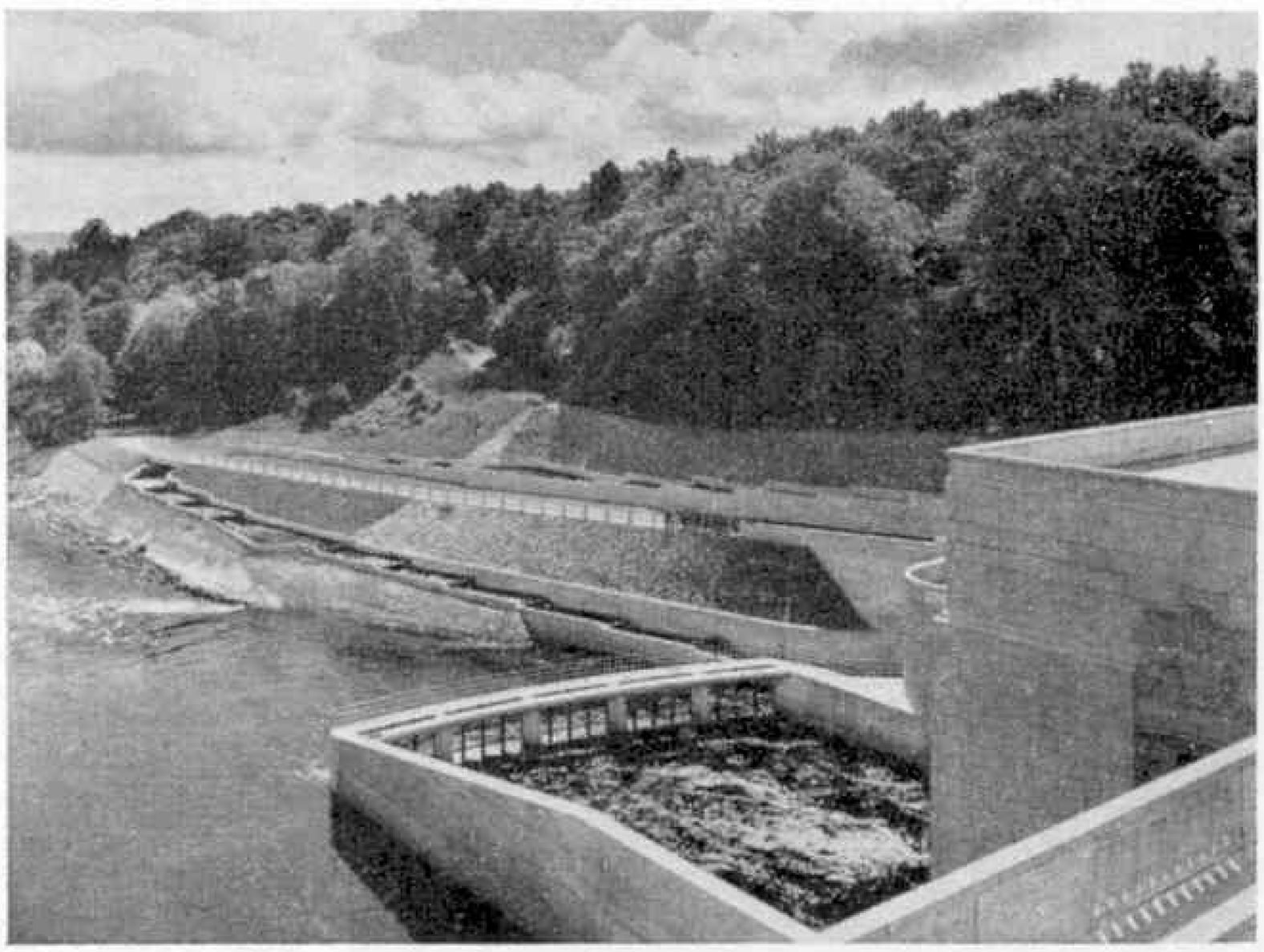
Salmon are migratory fish and hydro-electric schemes could upset the cycle of their lives in at least four ways. Dams can prevent fish moving up and down river; enlarging natural reservoirs by damming can drown spawning beds; diverting water from its natural course may dry up rivers; and, finally, fish may be killed by the turbines of power stations unless means of preventing access to these are provided.

Of these difficulties that of helping salmon to surmount dams is perhaps the most important and is certainly the most spectacular. It is solved in two ways, with salmon ladders and salmon lifts.

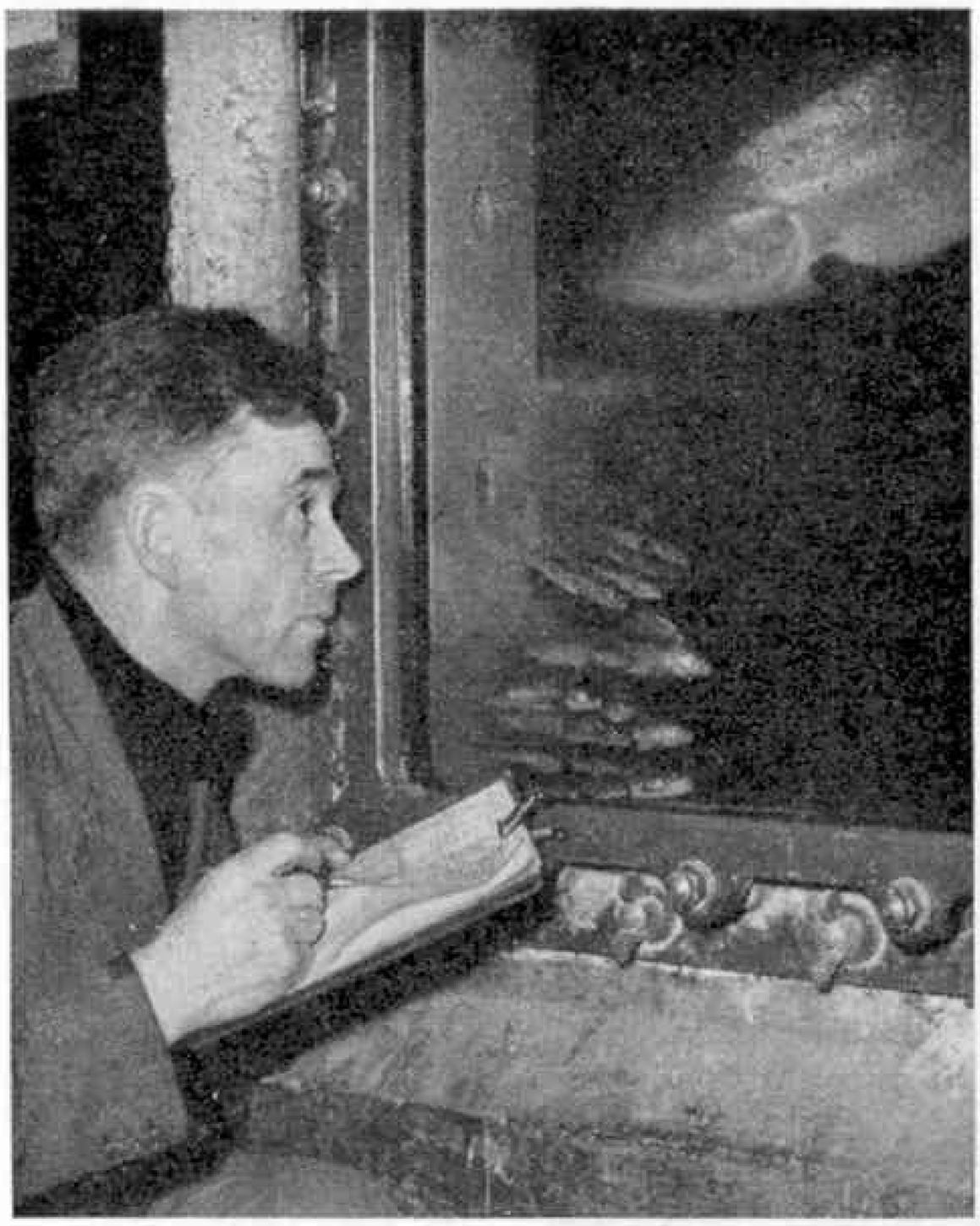
The best-known salmon ladder of the Board is at Pitlochry, part of the Tummel Valley scheme. Here the ladder is 900 ft. long. It consists of a series of pools, 35 in number, each 25 ft. long and 14 ft. wide. Three of the pools are resting pools, larger in size than the others, in which salmon can linger and recoup their strength.

The water level rises 18 in. from pool to pool and each is connected with the next by a submerged pipe through which the fish swim. As the level of the reservoir varies some 10 ft., depending on rainfall, a series of openings has been arranged on the upstream face of the dam so that one is always available through which salmon can pass out of the ladder into the reservoir, against a flow velocity of some 5 ft. per second.

Built into the Pitlochry fish ladder is an observation chamber containing an automatic electric fish counter, which has been in successful operation since the beginning of the 1951 salmon run. The equipment can be adjusted to count fish of varying sizes, and gives records on separate dials of salmon going upstream and kelts—salmon which have spawned—going downstream. If a fish does not complete its passage through the pipe it is not recorded. Further refinements in the mechanism preclude the recording of driftwood, bottles and similar debris passing down the ladder.



Visitors watching the passage of fish up the 900-foot fish ladder at the Pitlochry Dam, part of the Board's Tummel Valley Scheme. The illustrations to this article are reproduced by courtesy of the North of Scotland Hydro-Electric Board.



In the observation chamber at Pitlochry Dam. There fish passing up and down the ladder are checked visually by an attendant on duty during the daylight hours and double-checked throughout the twenty-four hours by an electronic counter.

Several miles upstream from Pitlochry Dam is Clunie Dam, which is also equipped with a fish ladder, some 980 ft. in length. Before work began on this ladder extensive experiments were carried out at the Imperial College of Science and Technology to decide whether an overfall pass, in which fish have to jump from pool to pool, was more suitable than a pass with openings, near the bottom of the wall dividing consecutive pools, through which fish can swim against a water velocity of up to 12 ft. per second. During these experiments a model fish ladder was built in which trout were used.

Still further upstream on the Tummel Valley scheme, at Gaur, the Board has built its longest fish ladder, which is 1,400 ft. in length and has 71 pools. It is many miles from the sea, almost in the centre of Scotland, and as comparatively few salmon penetrate so far inland to spawn, the Board built this ladder of the overfall type to save expense.

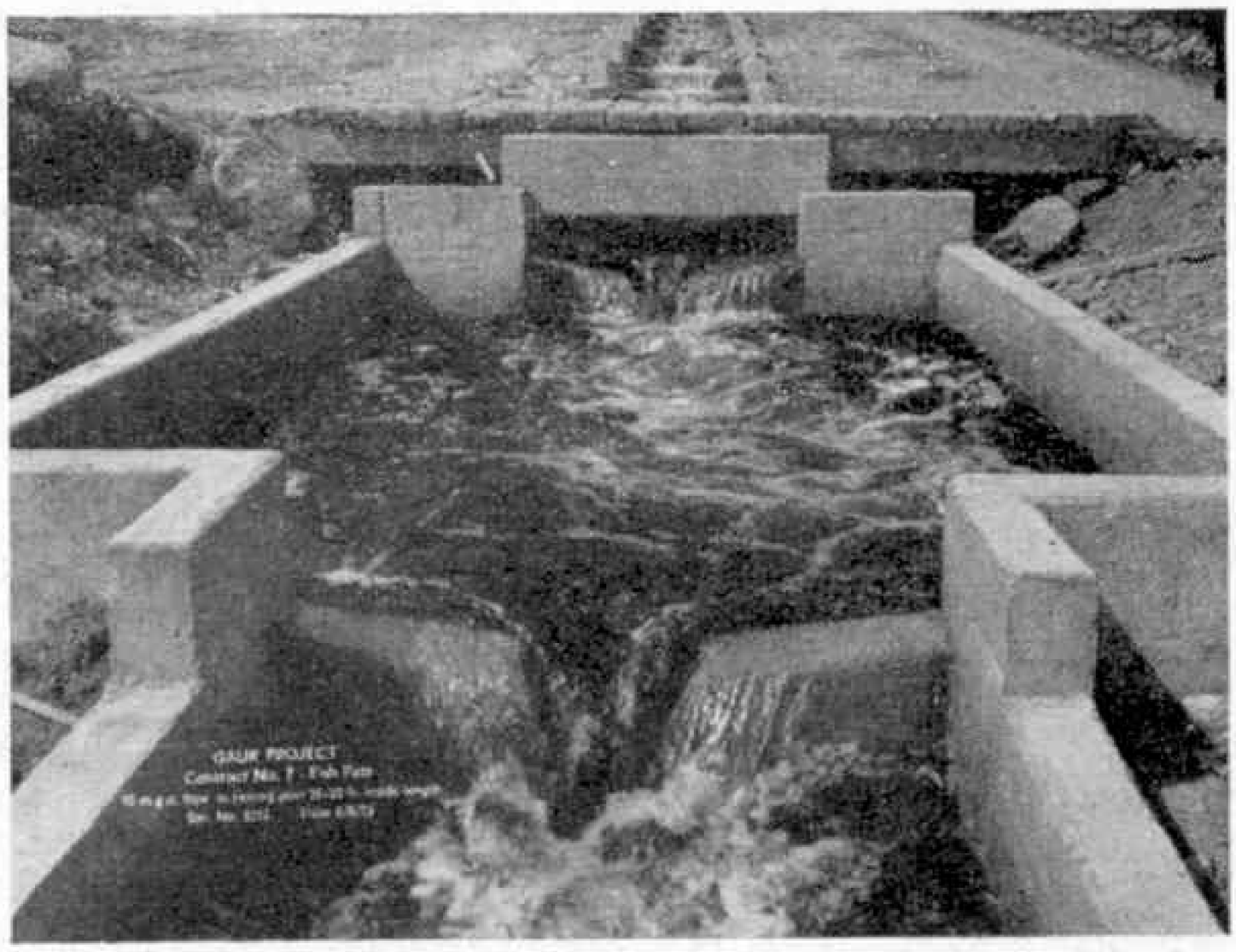
In 1945, Mr. H. J. T. Borland, a Scottish hydraulic engineer, began working on a completely new method of helping fish to surmount dams. The basis of the new method, named the Borland Fish Pass, is a hydraulic lift, and it has the advantage that it cuts construction costs considerably.

At the foot of the dam is a closed chamber, from which a sluiced opening leads out into the tailrace of the power station. From this chamber a closed shaft climbs the face of the dam. The shaft leads into an upper open chamber and pool, with sluices leading out into the reservoir.

Fish trying to get over the dam are attracted into the bottom chamber by a discharge of water through the top sluice at a rate of some 36 cu. ft. per second. This runs down the closed shaft and out via the bottom sluice. In the operational cycle, water is allowed to run down the closed shaft for an hour, attracting fish into the bottom chamber. The bottom sluice is then closed and the shaft fills with water, at a rate of 10 cu. ft. per second.

As the closed shaft fills, so the fish rise, until eventually the water in the top pool is level with the water of the reservoir.

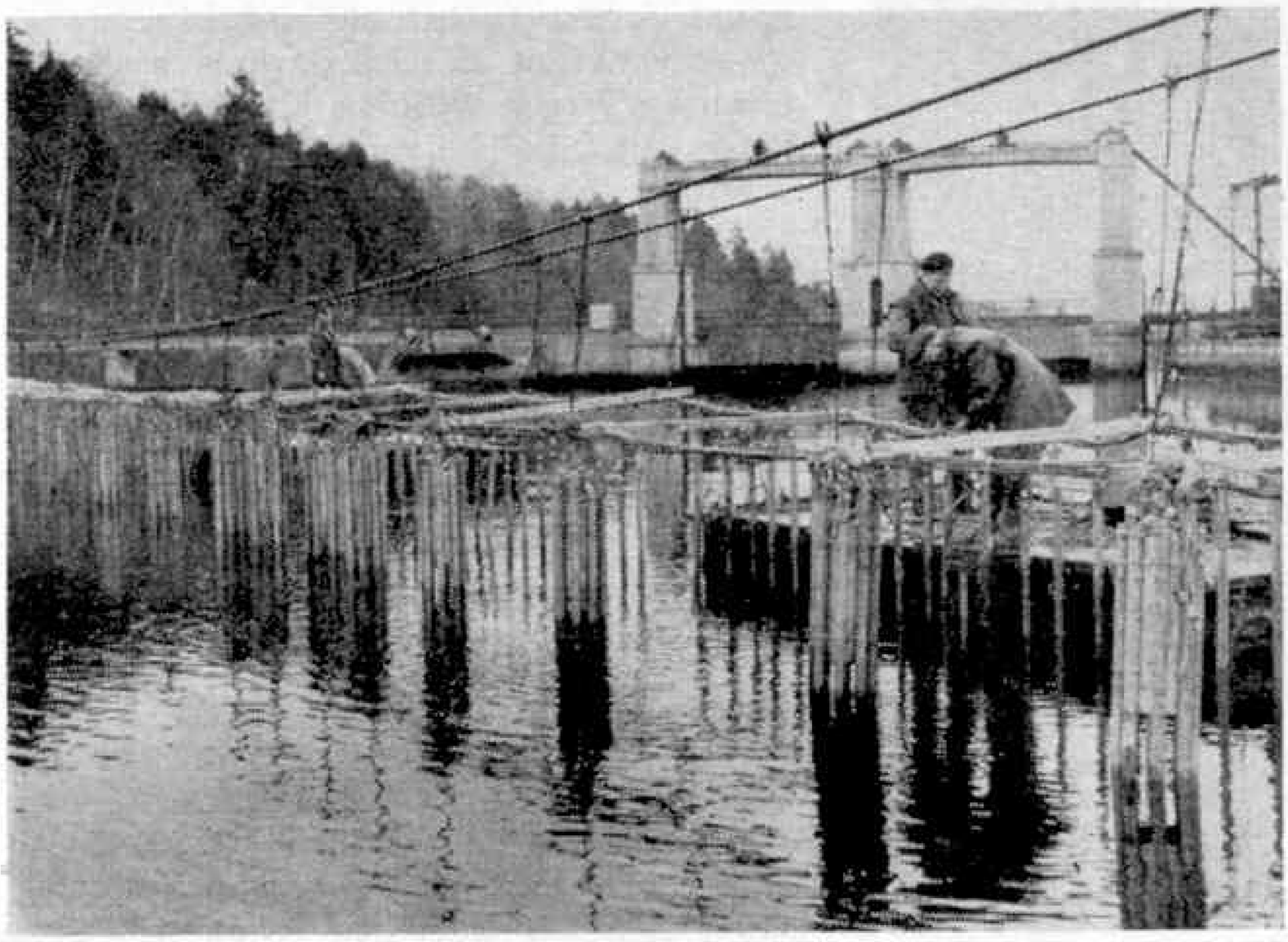
The closed shaft takes about 40 minutes to fill. It then remains full for an hour and twenty minutes, which is considered sufficient to allow all the fish to find their



Close-up of a resting pool in the Gaur fish ladder, the longest in the Highlands.

way out through the appropriate sluice into the reservoir, and so on to their spawning beds. The bottom sluice is then opened, whereupon the shaft empties. The operation is repeated throughout the twenty-four hours.

Several Borland fish passes are now in successful operation in the Board's Conan Valley project, in Ross-shire.



The experimental fish screen at Dunalastair.

To overcome the problem of drowned-out spawning beds, the Board has set up two salmon hatcheries, at Invergarry and Contin, where salmon are reared from the ova stage and then distributed in stretches of suitable water.

When water is diverted from a river containing fish the Board are required, by Act of Parliament, to pass sufficient compensation water down the original watercourse to preserve fish life.

After helping adult salmon to reach their spawning grounds by way of fish ladders and lifts, hydro-electric engineers must then make sure that "smolts," or young salmon, are able in turn to pass safely downstream to the sea. Smolts make this journey when they are two years old, by which time they measure between five and six inches in length.

It is also necessary to make sure that salmon on their way upstream, and smolts on their way downstream, are not sidetracked into the tailraces of power stations and that all tunnel and turbine entrances likely to prove dangerous to fish are made safe.

Surprising as it may seem, smolts can pass safely through the turbines of a power station if the pressure in the turbines is not too high. The flow of the water through the machinery is smooth, after all, and the spaces between the turbine blades and between the vanes of the guiding apparatus are large enough to permit their passage.

At one pre-war hydro station in south-west Scotland smolts have been passing without harm through turbines with a pressure of 120 ft. head of water for some sixteen years. Smolts have also withstood successfully laboratory tests with a pressure equivalent to a 200 ft. head of water.

Where pressure in turbines is high, however, smolts would not survive the passage and screens are then required to help guide them towards the fish pass. Screens protecting tunnel and turbine intakes must be of an area large enough to make sure that the speed of water passing through them does not exceed about 1 ft. per second. This is sufficiently slow to avoid the risk of smolts, and other fish, being pinned against the screens by the speed of the water, and killed.

Electrical screens to control the movement of fish have also been evolved by the Board's engineers. At Morar, for example, there is an electrical screen across the power station tailrace. This consists of a row of aluminium electrodes, each about 14 ft. in length, extending almost to the bottom of the tailrace channel. A further two electrodes spaced some 16 ft. apart are in position seven feet downstream from the main screen.

Salmon experience discomfort when about five, or six, feet from the outer electrodes of the screen, and at that distance turn and swim past the entrance to the tailrace. Careful observation has shown that all fish behave perfectly normally after leaving the electrified zone and that none show any subsequent signs of distress, or inertia.

Experiments have also been carried out at Dunalastair, in Perthshire, with a much larger electrical screen. There the apparatus

(Continued on page 210)

MECCANO MAGAZINE

Junior Section

Michael Sullivan, of Harrow, Middlesex, eagerly looks to see what models he will build with his new Meccano Outfit.

THIS page is one of smiles this month. I like the eager interest with which Michael Sullivan, on the right, is studying the instructions for his No. 00 Meccano Outfit, along with his aunt. Michael is 8 years old, and his Meccano Outfit, which he received last Christmas, is the first that he has owned. He is already thinking of additions to it, and the pleasure of model-building with it will be greatly increased when he is able to put together bigger and better models.

Peter Barnett's smile is broader, and it is the smile of one who has done what he set out to do. It seems that one of his Dinky Toys cars broke down, and outside assistance had to be called in. Naturally this meant the arrival on the scene of another Dinky Toy, in this instance the 20-ton Lorry Mounted Crane. The only point of criticism is that the crane Peter is using is not really intended for the job. This should be done by the special Breakdown Crane provided in the Dinky Toys series. But this perhaps was not available, and it is good to see a display of enterprise in tackling an unusual situation.

A bad break-down is tackled successfully by Peter Barnett, Huyton with Roby.

By a curious chance Peter's mind appears to have run on breakdowns latterly, for a York aircraft he had owned for two years was accidentally broken recently. He seized immediately on the chance this gave him for staging a crash scene. With the aid of Plasticine the York was fixed in the kind of position it would be likely to take in an accident of this kind, and the broken wing, tail and other parts were scattered around as if they had been ripped off. A sad end to a very fine Dinky Toy! Fortunately it was easy to replace.

Easy Model-Building

Spanner's Special Section for Juniors

Electric Truck and Swing Bridge

OUR two models this month are a small Electric Truck built from parts in Outfit No. 1 and a Swing Bridge that makes use of parts in Outfit No. 3.

You should start building the Electric Truck (Figs. 1 and 2) by bolting two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates to a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate so that the Flexible Plates overhang one end of the Flanged Plate by three clear holes. Strengthen the overhanging edges of the Flexible Plates with two $2\frac{1}{2}''$ Strips 1, and then connect the ends of these Strips by a $2\frac{1}{2}''$ Stepped Curved Strip. Bolt a Fishplate to each long flange of the Flanged Plate and use it to support a $5\frac{1}{2}''$ Strip 2.

The next step is to fix two $2\frac{1}{2}''$ Strips 3 to the front flange of the Flanged Plate, and connect them with two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips 4 and a $2\frac{1}{2}''$ Stepped Curved Strip. Bolt a Trunnion to the Curved Strip to form a seat for the driver, and use a $\frac{1}{2}''$ Reversed Angle Bracket bolted to one of the Strips 1 to represent a brake pedal.

The rear wheels are fixed on a $3\frac{1}{2}''$ Rod, which is mounted in Flat Trunnions. Each Flat Trunnion must be bolted to a $5\frac{1}{2}''$ Strip 5, which is attached to two Angle Brackets fastened underneath the Flanged Plate. The front wheel is a 1" Pulley and you should fix it by its set screw on a $\frac{3}{8}''$ Bolt passed through the hole at the pointed end of a Trunnion 6. Pass another $\frac{3}{8}''$ Bolt through the centre hole in the flange of Trunnion 6, and fix two Fishplates 9 tightly on this Bolt by means of a nut. Now pass the Bolt through holes in the $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates and screw a second nut on it. Do not tighten this nut, but screw another nut firmly against it to prevent it becoming too loose. Make sure that the Bolt is able to swivel freely in the holes in the Flexible Plates.

Now pass a Crank Handle through an Angle Bracket 7 and through a hole in one of the Strips 1. Fix a 1" Pulley 8 on the lower end of the Crank Handle. Tie one end of a length

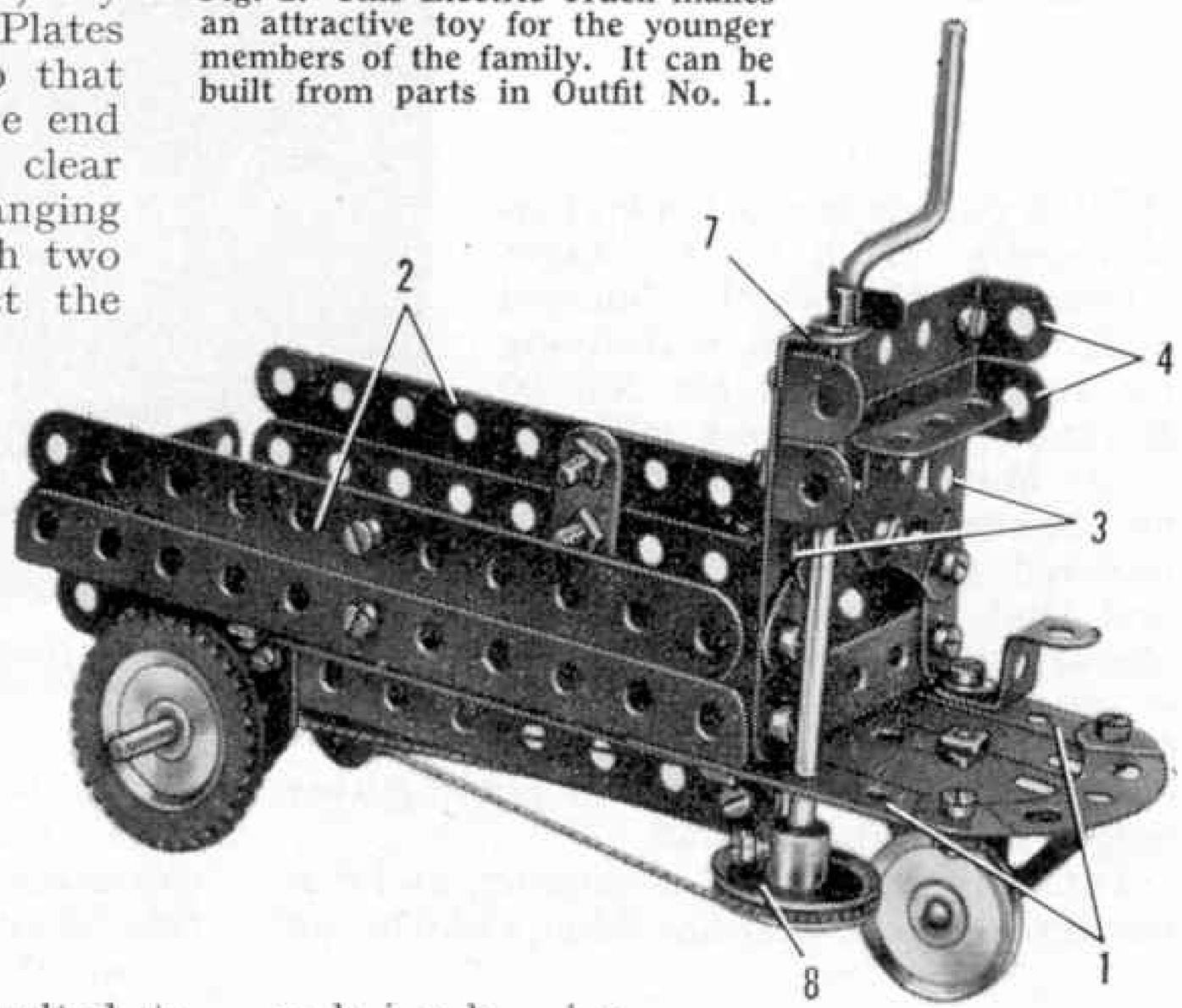


Fig. 1. This Electric Truck makes an attractive toy for the younger members of the family. It can be built from parts in Outfit No. 1.

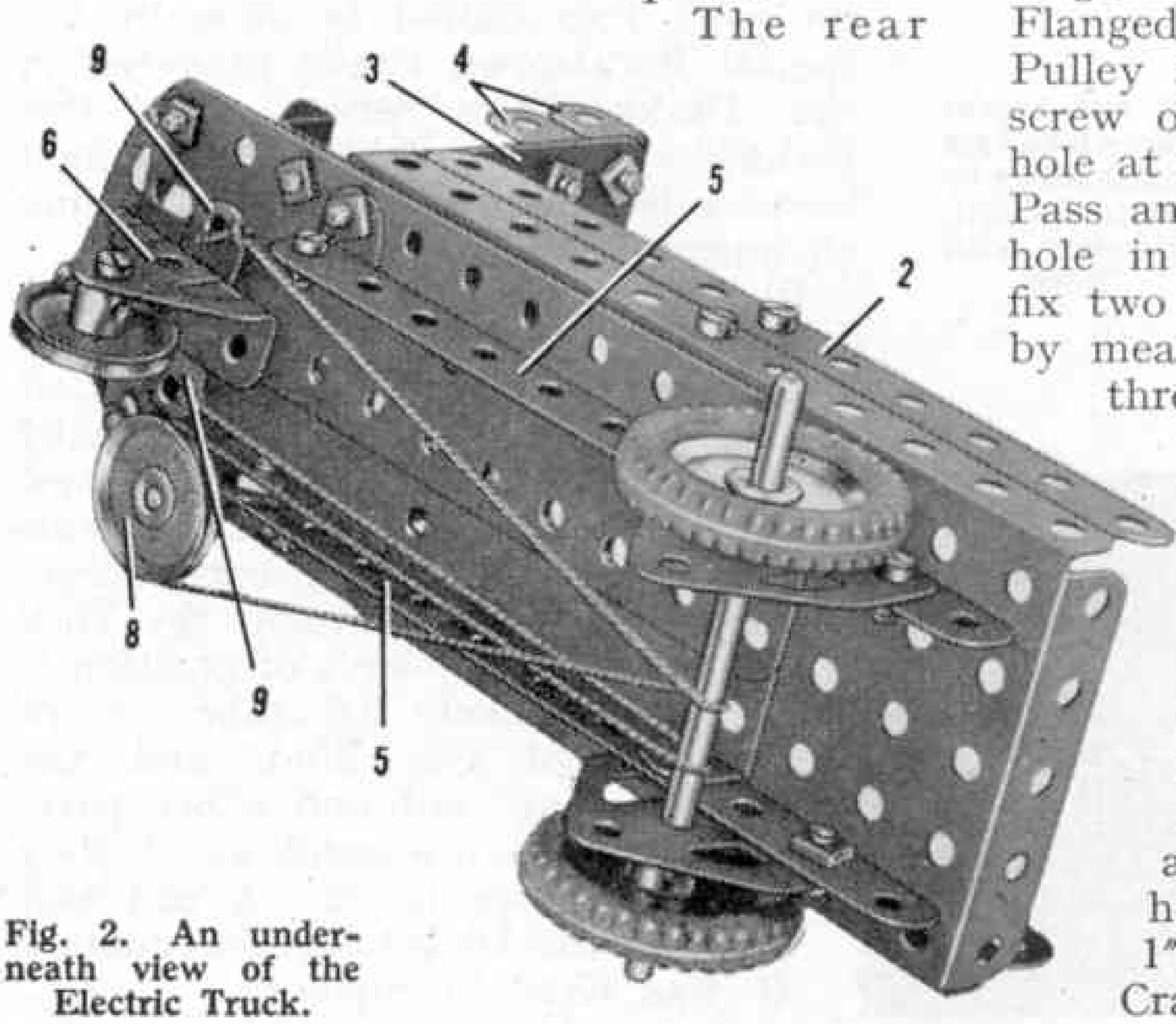


Fig. 2. An underneath view of the Electric Truck.

of Cord to one of the Fishplates 9, pass the Cord round the rear axle and round the Pulley 8. Now take the Cord round the rear axle again, and tie it firmly to the second one of the Fishplates 9, taking care to pull the Cord tight.

A list of the parts required to build this model will be found on page 210.

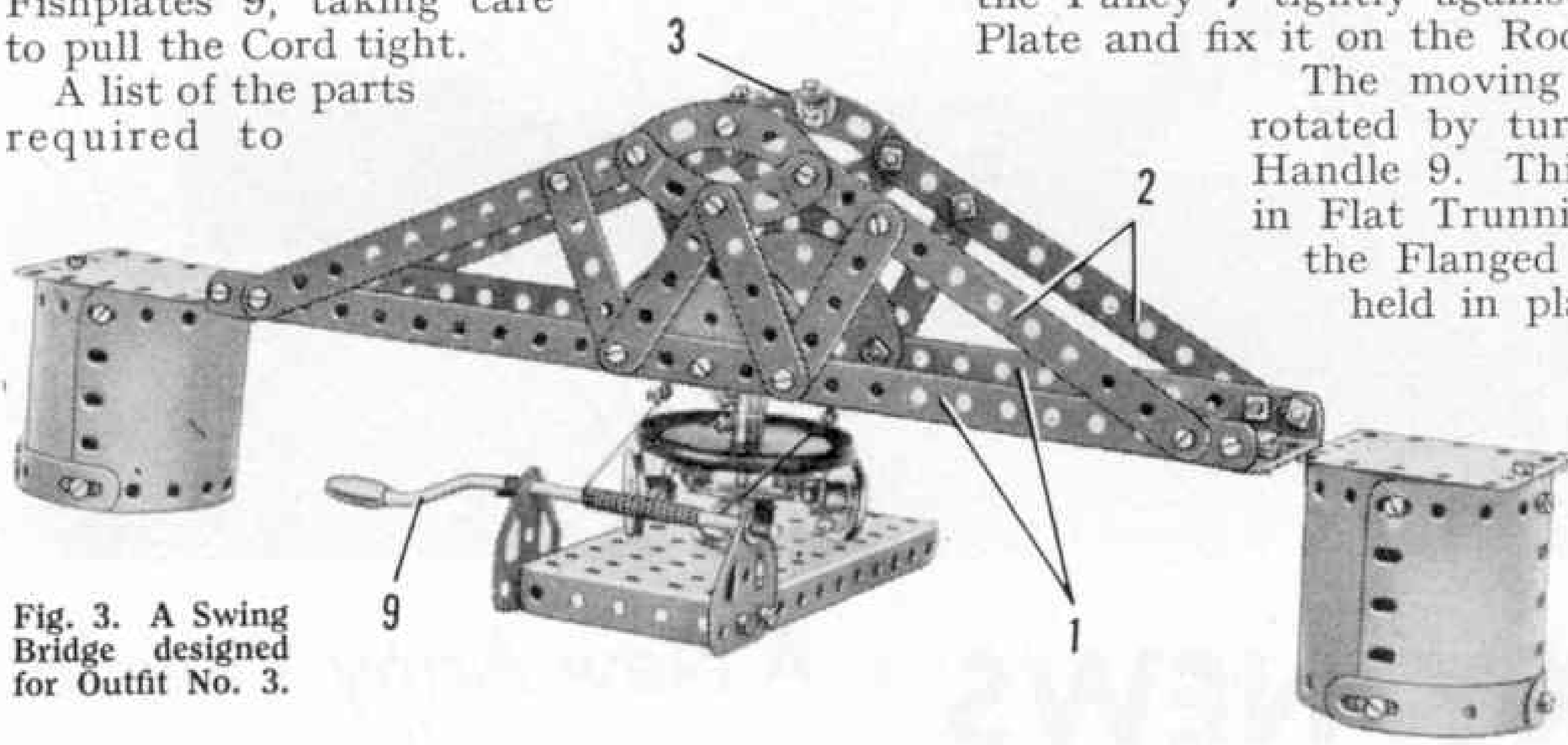


Fig. 3. A Swing Bridge designed for Outfit No. 3.

Swing Bridge

Assembly of the Swing Bridge, which is seen in Figs. 3 and 4, should begin by making the moving span. For this you require two $12\frac{1}{2}''$ Strips 1 connected at their ends by $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. To make the deck or roadway of the span you should bolt a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate to each Double Angle Strip, then bolt together two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates and fix these to the inner ends of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates. Connect the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Plates to the Strips 1 by Angle Brackets and use the same bolts to support a Semi-Circular Plate on each side.

Bolt two $5\frac{1}{2}''$ Strips 2 to each of the Strips 1 and connect the inner ends of these Strips by two $2\frac{1}{2}''$ Stepped Curved Strips. Now arrange four $2\frac{1}{2}''$ Strips between the Curved Strips and the Strip 1 as shown. Fix an Angle Bracket to the upper Curved Strip on each side and bolt a $2\frac{1}{2}''$ Strip 3 to the Angle Brackets.

The moving span is supported by a simple roller bearing unit. To make this unit you should bolt a Bush Wheel 4 underneath the centre of the span, and fix a 2″ Rod in its boss. Now bolt two Angle Brackets to a Wheel Disc 5, but space each Angle Bracket from the Wheel Disc by two Washers on each bolt. Pass $\frac{3}{8}''$ Bolts through the Angle Brackets and fix them in the bosses of 1″ Pulleys. Place a Road Wheel on the 2″ Rod, and arrange the Wheel Disc on the Rod so that the Pulleys bear against the rim of the Road Wheel. Place a $\frac{1}{2}''$ loose Pulley 6 and a 1″ Pulley 7 on the Rod, then pass it through the centre hole in a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate and fix a 1″ Pulley 8 in position. Press the Pulley 7 tightly against the Flanged Plate and fix it on the Rod.

The moving span can be rotated by turning a Crank Handle 9. This is mounted in Flat Trunnions bolted to the Flanged Plate, and is held in place by Spring Clips. Pass a length of Cord round the Crank Handle several times as shown, then tie each end to a $\frac{3}{8}''$ Bolt 10 fixed in the roadway of the span by a nut.

To make one of the approach piers you require a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate and two $1\frac{11}{16}''$ radius Curved Plates, and for the other you need a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate and two U-section Curved Plates, which should be opened out slightly. Bolt the Plates for each pier together to form a cylinder and strengthen the lower edge

(*Continued on page 210*)

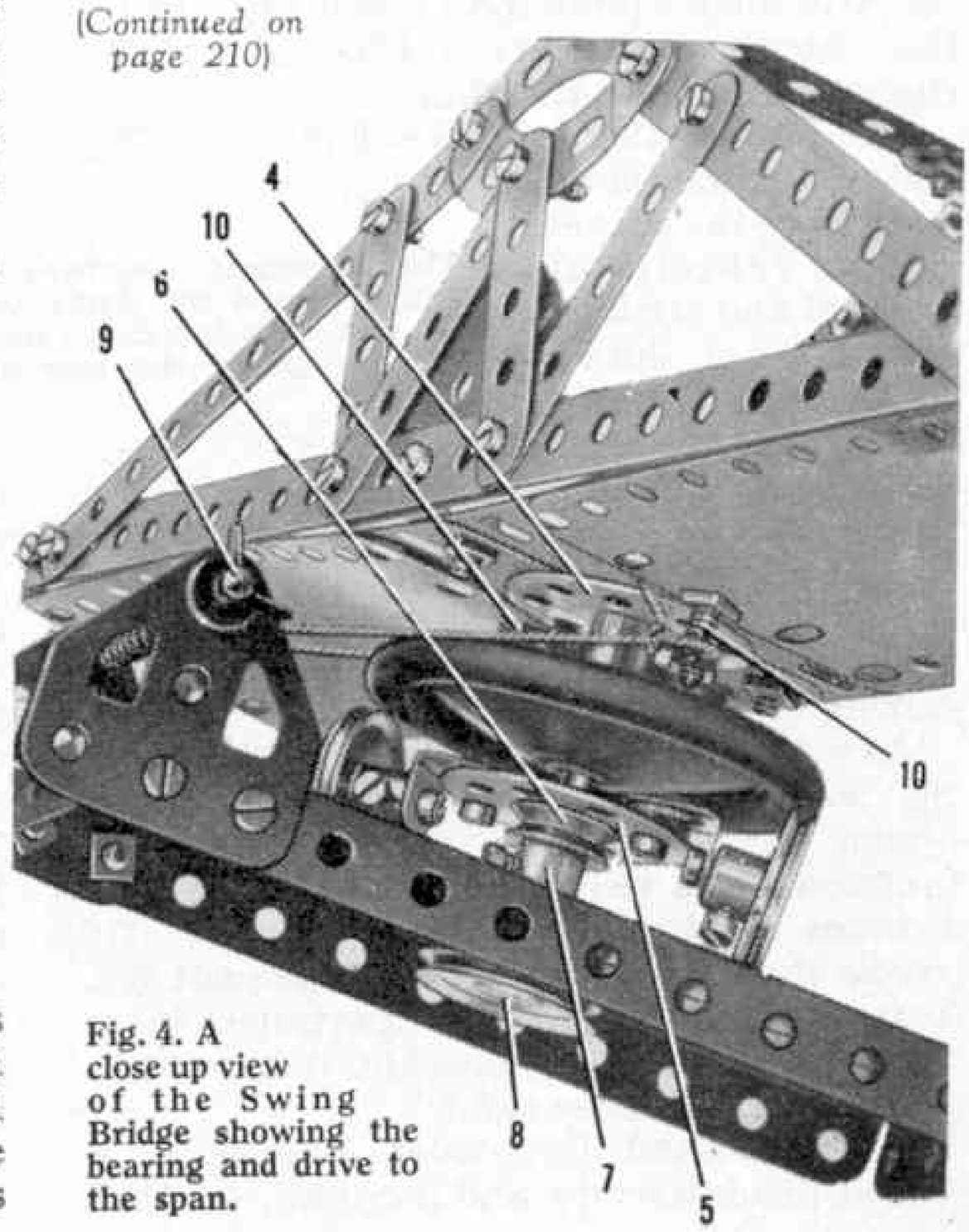
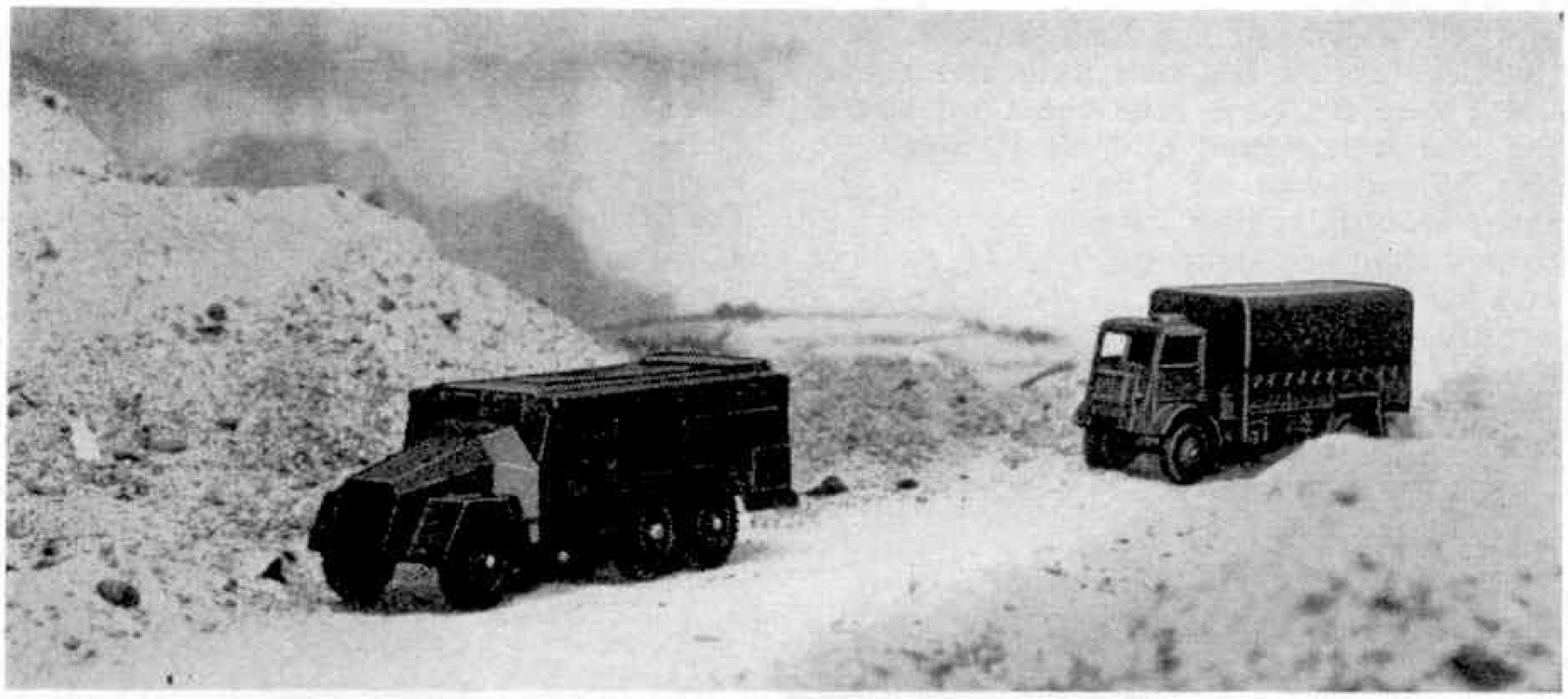


Fig. 4. A close up view of the Swing Bridge showing the bearing and drive to the span.



DINKY NEWS

A New Army Vehicle and a Raleigh Cycles Van

By **THE TOYMAN**

ONE of the most famous campaigns of the second World War was fought largely on the sandy deserts of Libya, and I am sure every Dinky Toys collector has read or heard stories of the exploits of the desert army. Now you have an opportunity to add an exciting model to your collections, for the Armoured Command Vehicle introduced this month represents a type of vehicle engaged in that campaign.

The new model is Dinky Toys No. 677, and it is based on an A.E.C. six-wheel drive vehicle of unusual and striking design. I have included two pictures of the Armoured Command Vehicle in these pages. One of them shows the new Dinky Toy in realistic surroundings, and the other is a close up of the model, showing the vast amount of detail included in the body casting.

The Armoured Command Vehicle (Dinky Toys No. 677) and the Army Covered Wagon (Dinky Toys No. 623) in a desert scene. The former carries the Desert Rat sign in front and rear.

As you will see from the angular lines and the solid appearance of the model, the design of the actual vehicle is strictly functional and well suited for use under the arduous conditions of desert warfare. Of course the six-wheel drive arrangement is a feature of the utmost importance in a vehicle designed to operate over rough ground and on loose sand.

An Armoured Command Vehicle is a mobile headquarters, and it contains all the necessary equipment and fittings to enable the headquarters staff to keep in touch with the units under their control. In the vehicle on which the Dinky Toy is based, provision was made for erecting side tents to extend the accommodation, and the necessary fittings for these, and many other details are clearly marked on the model. The Dinky Toy gives too a striking idea of the strength and rugged characteristics of the real vehicle, and it makes an impressive addition to the Army Series.

A point of special interest in the finish of the model is the sign applied to it. The sign represents a jerboa, or desert rat, on a black rectangle, and it is the badge of the 7th Armoured Division. This formation was first to go into action in the Western Desert in 1940, and its harrying tactics in action so resembled the scurrying and biting movements of the jerboa, that the desert rat symbol was adopted as the badge of the 7th Armoured Division, and the men in the Division earned the familiar and proud title of "Desert Rats." The sign is applied at the front and rear of the Armoured Command Vehicle, and its inclusion adds an authentic and unusual touch of detail to the model.

The second new item this month is the splendid Van shown in the realistic street

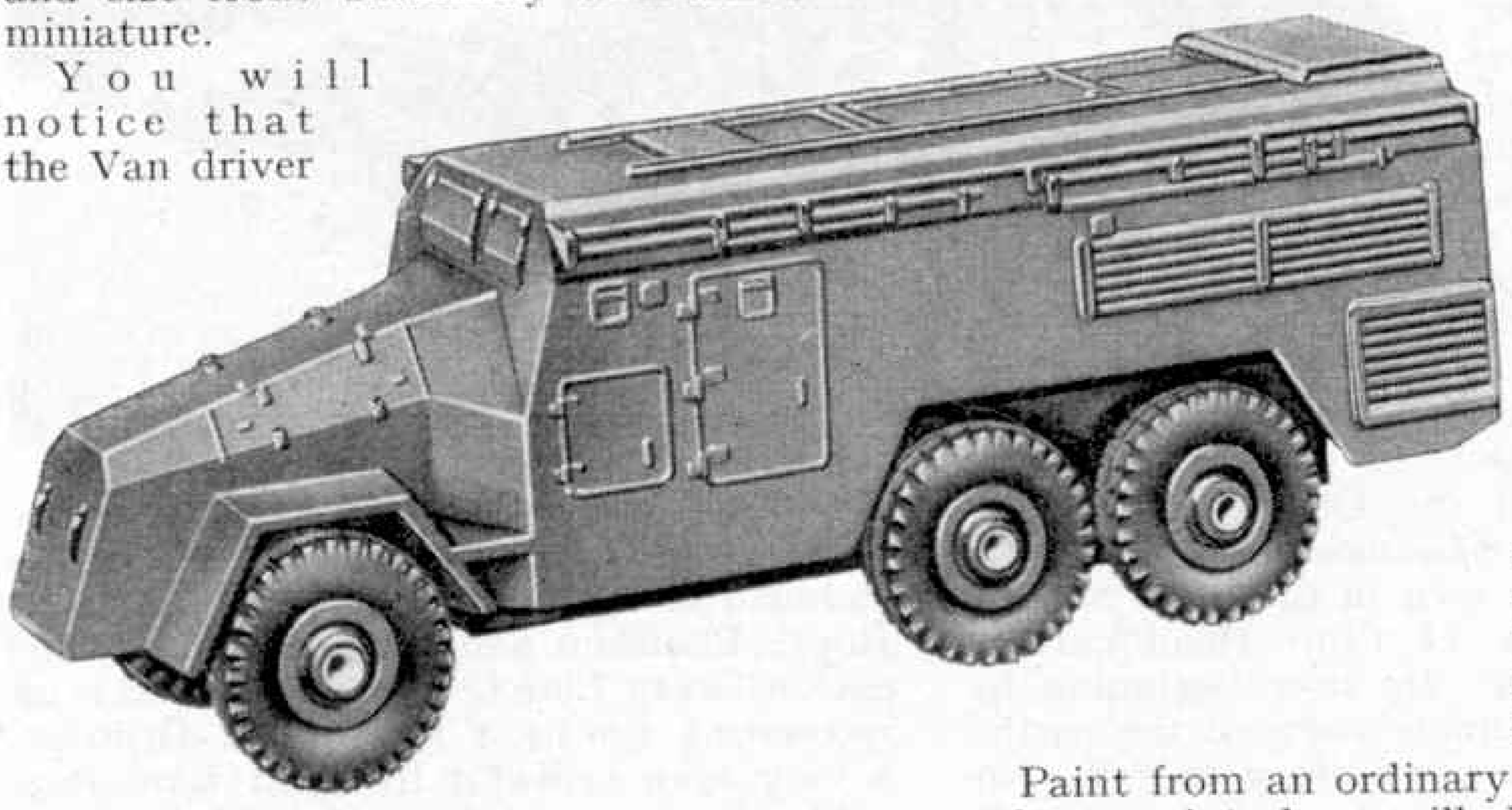
A realistic scene showing the new Austin Van "Raleigh Cycles" (Dinky Toys No. 472) delivering a load of spares to a cycle shop.

scene that forms the subject of my third picture. The model is Dinky Toys No. 472, and it is based on the popular Austin Van, finished in an attractive shade of green and carrying the well known name "Raleigh Cycles." Of course a Van of this kind obviously requires a cycle shop in a scene, and I set to work to provide one.

As usual I used cardboard to make the building, and as a change from the usual type with a sloping roof I modelled a more modern establishment with a flat roof. I found this type of building very easy to make and I think the result is quite attractive. After all, the buildings in a real town vary considerably in design and a regular line of buildings of the same shape and size looks dreadfully monotonous in miniature.

You will notice that the Van driver and his mate are carrying a large box into the shop. Evidently a fresh supply of spare parts and accessories is arriving. The shop window shows the usual display of cycles, and a point that may interest readers who like to assemble their miniature buildings quickly is that the window and its contents are simply drawn and painted on the cardboard.

I have used this scheme on previous occasions and I have found it very satisfactory. If the painting is carried out with reasonable care the result is very realistic and it can be almost as effective as cut out windows and fittings. The plan is certainly a big time saver. I can recommend it to enthusiasts who want to spend as much time as possible actually playing with their Dinky Toys, and I am sure that means all of us!



The new Dinky Toys Armoured Command Vehicle.

Paint from an ordinary scholars' water-colour paint box will be found quite handy and satisfactory for colouring small buildings, etc., but for backgrounds and larger buildings it is best to obtain a few of the small pots of poster paints available from dealers in artists' supplies. Only three or four colours will be required and the pots are quite cheap.

Members of the Dinky Toys Club are entitled to wear this badge

THE DINKY T

FOUNDER AND PRESIDENT:

LIKE myself, no doubt you have noticed the number of boys and girls who nowadays display the attractive and colourful Dinky Toys badge. If you cannot yet do this, send in your application for membership at once, especially if you are comparatively new to the Dinky Toys world. All you have to do is to write to me, addressing your letter *The Secretary, Dinky Toys Club, Binns Road, Liverpool 13,* and enclosing with it a Postal Order for 1/- to cover the cost of the membership badge.

This badge is beautifully enamelled in red and white with the lettering "Dinky Toys Club" in gilt around its circumference, and in its centre is a fine representation of the steering wheel of a car, also in gilt. When you are enrolled this badge will be sent to you, together with an attractive Certificate of Membership, in two colours, bearing your name and that of the place in which you live.

It is now three months since the announcement of the Dinky Toys Club, and enthusiastic welcomes are still flowing in. This is easily seen in the huge piles of mail that arrive at Club Headquarters each day. Letters are now beginning to reach me from remote parts of the earth, and all have the same story to tell. No matter where their writers live they all wish the new Club well, and then tell me all about their Dinky Toys collections—and the new models that they want to see added to the range!

My goodness, what a truly wonderful collection of Dinky Toys would be possible if we could produce even a fraction of the new models members clamour for! Here is an example from one youthful—and hopeful!—member. "I would like to suggest that Dinky Toys make the following new models as soon as possible, as I want to add them to my collection—a Lifting Shovel, a Dragline Excavator, a Police Car, a Combine Harvester, a Space Ship and a Rocket. Will you please make all these in time for next month."

David Moss, of London N.22, is more modest. "I would like to see these models included in the range," he says. "A Rolls Royce Phantom and Wraith and a single decker Green Line Coach." And here is an interesting question from John Grimsey, a very keen collector living in Ramsgate. "Why don't you make models of ships and submarines of the Royal Navy?" Ship models were very popular before the war, John, but we are so busy trying to satisfy the demand for existing Dinky Toys, and to introduce those on our long waiting list, that we cannot think of ships at present.

James Baxter, a Colchester collector,

TOYS CLUB

NT: ROLAND G. HORNBY

The Dinky Toys Club Badge is beautifully enamelled in colour.

makes a very modest request as follows, "I have a large collection of Dinky Toys and I think many layouts would be improved by the addition of a Police Car." He adds that a road sweeper would give a realistic touch.

Of course I am delighted to receive letters such as these, and to the writer of every one of them I send a personal reply.

Alan Yeadon, Leeds, was one of the earliest enthusiasts to join the Dinky Toys Club. He combines interest in Dinky Toys with running a Hornby-Dublo Railway on which his Dinky Toys can be made very useful.

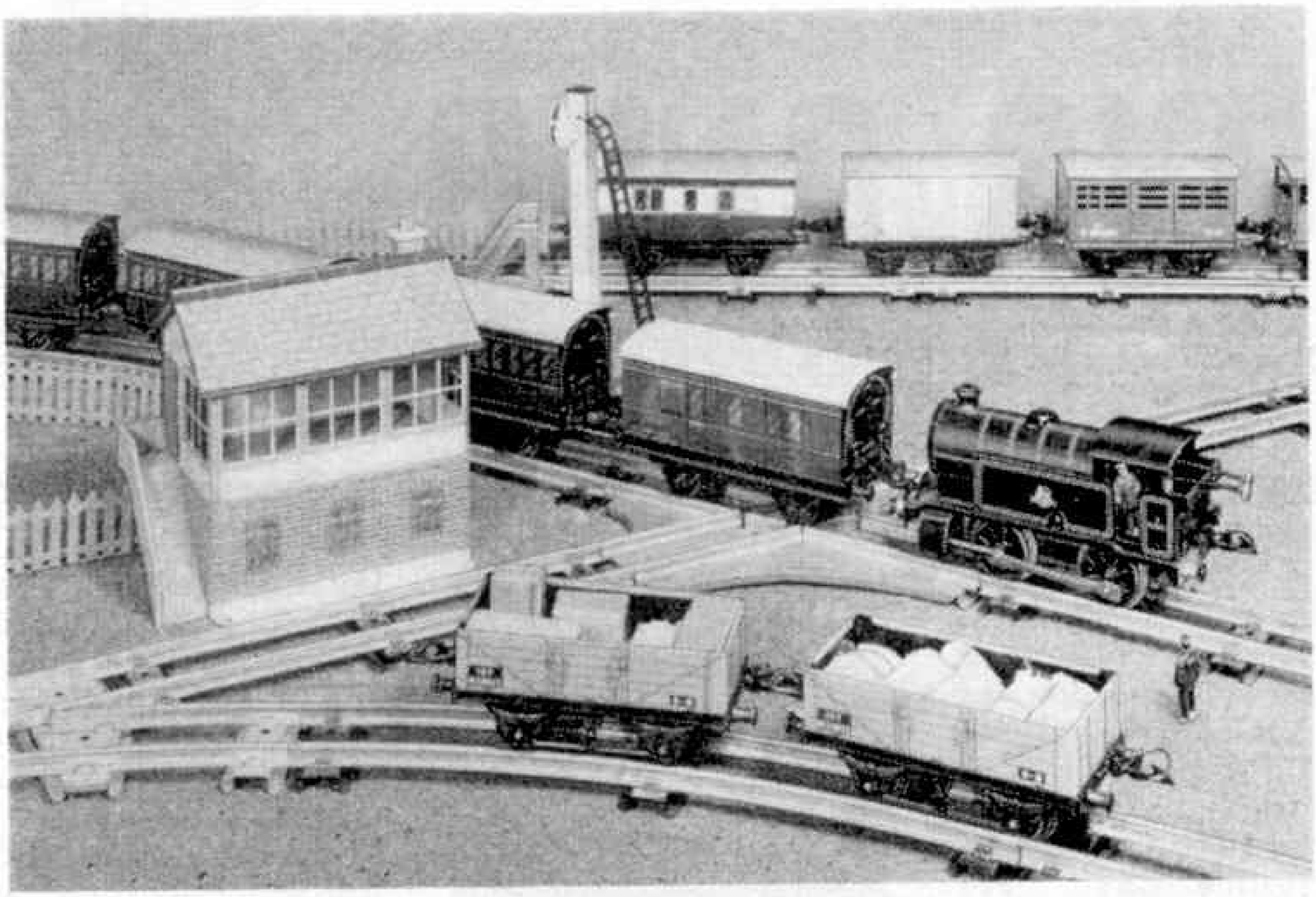
Other letters ask for information on how to make Dinky Toys layouts, and many tell me about their ideas for playing with Dinky Toys. Now this can become a useful way of helping each other. So tell me what you yourselves do, so that if your schemes are likely to appeal to other members I can include extracts from your letters. Best of all, if you have a good road layout or scene into which your Dinky Toys fit, or if you use these on your Hornby-Dublo railways, try to get a good photograph and send me a print, so that I can reproduce it here.

From time to time you will find pictures of layouts in the Dinky Toys pages of the *M.M.*, together with accounts of easy ways of constructing buildings such as churches, shops, houses and garages. Join in by telling me how you represent roads and make buildings and other features of a layout.

Elaborate layouts are not absolutely necessary. This has been discovered by Keith Eager, Shoreham-by-Sea, who is pictured on the opposite page. Keith uses his imagination, representing a road by a strip of paper, with zebra crossings marked on it, and putting down other scenes planned on an equally simple scale. Malcolm Peel, Boothstown, Halifax, seen with his 100 or more Dinky Toys and Supertoys on this page, has not yet got round to building layouts, as he is only about 20 months old, but he is certainly enjoying himself with his collection.

And don't forget to talk about Dinky Toys with your friends—you can always spot a fellow enthusiast by his badge. There is more fun in the hobby if its pleasures are shared with others, who together build up really large layouts.

"Tommy Dodd" writes about



Boxes and Bales

ONE thing that we all enjoy is loading the wagons of our miniature goods trains, so that our railways look as if they are doing real business. After all, real goods trains exist to carry goods, as their name suggests, and not just to career up and down the tracks empty.

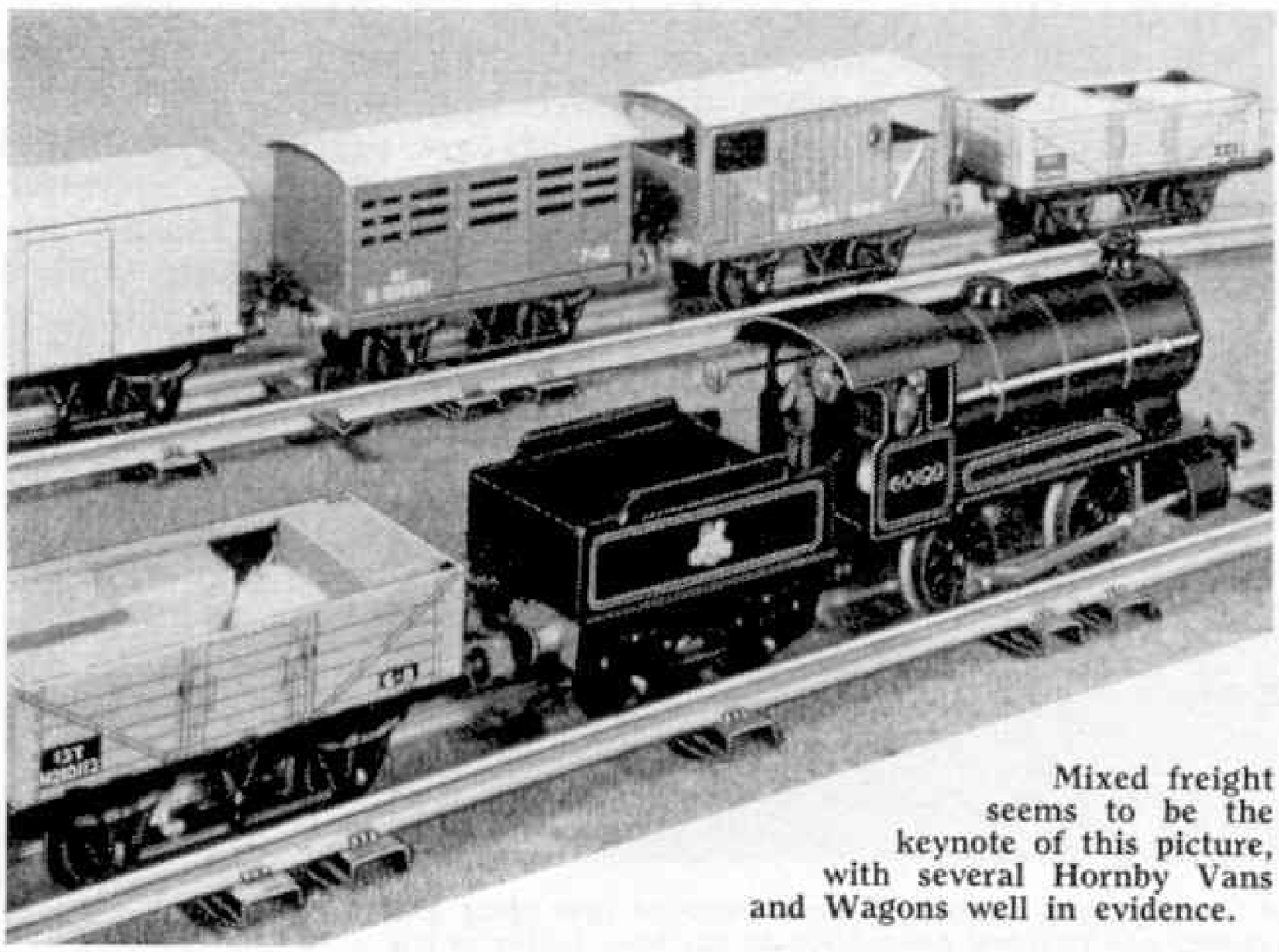
A busy road service is part of a railway system based on these ideas. Many Dinky Toys vehicles are particularly suitable for this sort of thing. You will remember that in some of our talks we have spoken about such things as container traffic. Now there are two Containers available in the Hornby System, with suitable lorries to carry them on the road part of their journeys in the Dinky Toys series. On the track the Containers run on the Low-Sided Wagons intended for this purpose, and on the road they can travel comfortably on the Guy Flat Truck, Dinky Toys No. 432. The transfer of Containers from road vehicle to rail wagon, or the other way about, can be managed splendidly with the Coles Mobile Crane, Dinky Toys No. 971. And don't forget, crane driving too is quite good fun.

Wagons do have to travel at times without loads to points where they are required and, with certain special traffics that move generally in one direction only, there is no suitable return load for the special wagons or vans used. So there is nothing wrong in having some empties in our trains. But whenever possible we should provide attractive loads for our Hornby Wagons and Vans. The latter have sliding doors that make loading and unloading quite good fun. This is missed with open Wagons, but with these the loads can be seen while they are on the run and that is a source of satisfaction.

Above is a busy corner on a Hornby layout. Wagons loaded with varied articles of miniature freight are waiting to be picked up, while a passenger train passes on the main line.

Loose material such as coal, stone or even sand, should not just be put into open Wagons. Instead, make up a cardboard shape, rather like the lid of a box, so that it just fits inside your open Wagon. The top surface of this "lid" is then thinly coated with some adhesive such as liquid glue, Seccotine or Durofix, and small pieces of coal or stone that have been washed and dried to clear away the dust are set in this before it dries. If you prefer it, you can use coarse sand, or perhaps the imitation coal or stone that can sometimes be seen in hobby shops. By the way, don't use balsa cement for this job; it dries too quickly.

When the adhesive is dry and any surplus is shaken off. You can make several of these "loads," each with different materials, and they can easily be dropped into your wagons when needed, or removed when they are not. Do not make the cardboard shapes to fit the wagons too closely, or you will have trouble in removing them.



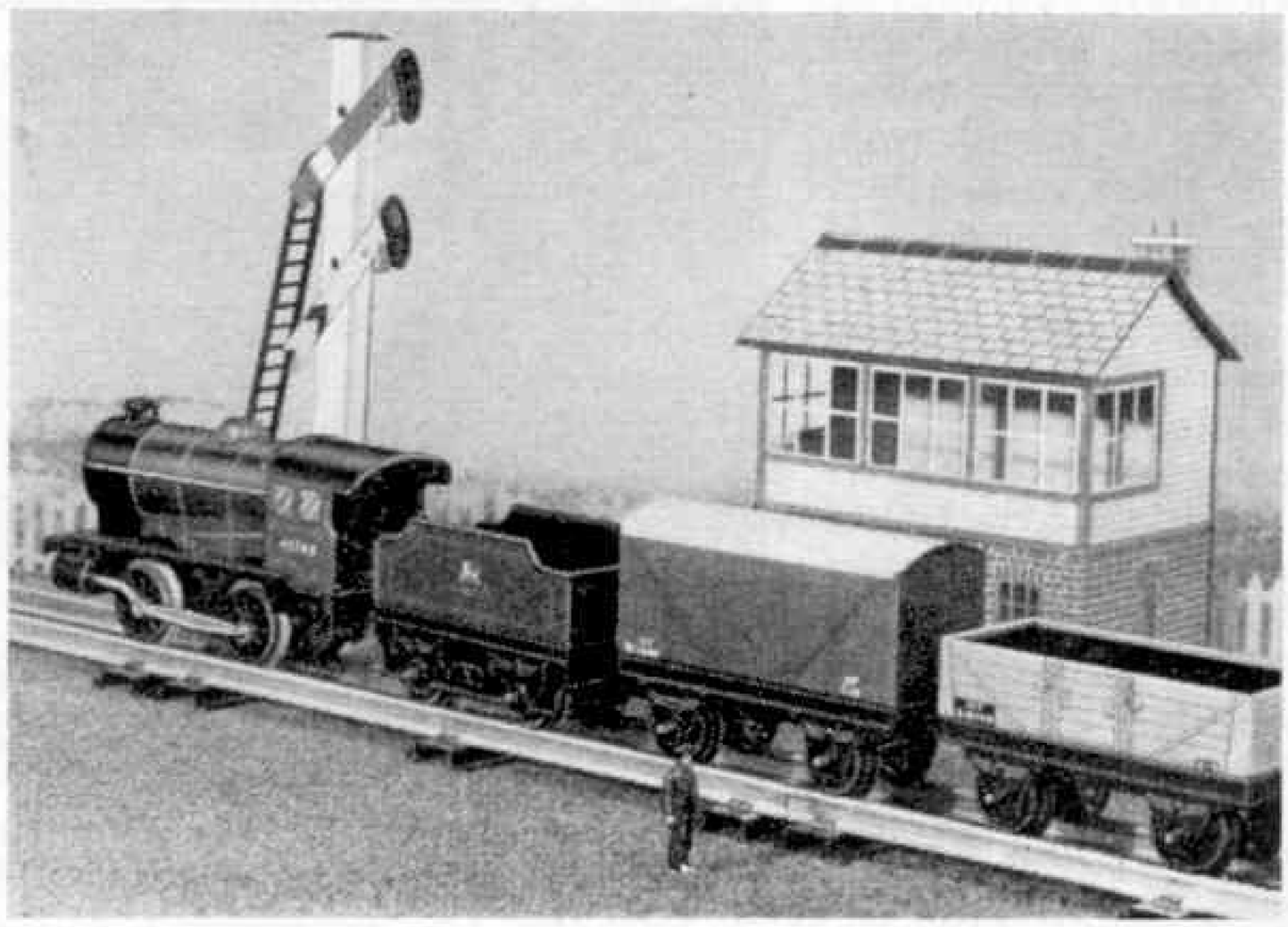
Mixed freight seems to be the keynote of this picture, with several Hornby Vans and Wagons well in evidence.

There is plenty of variety in loads for Hornby Railways. You have only to keep an eye on the loading bank of a real goods depot, or even on goods trains in movement. Some of the items may be difficult to represent in miniature, but boxes or crates will present no real trouble to those of you who like wood and card modelling. It is surprising, for instance, what can be done with a few odd scraps left over from that aircraft kit you finished recently. Another good idea is to look out for various items of merchandise delivered by rail at shops in your district.

It is quite easy to make up miniature packages by folding up small pieces of brown paper, and gumming or tieing them with cotton so that they keep the right shape. You may like to experiment, too, with the production of such things as bales of wool and the various mysterious things that travel wrapped up in sacking. Materials for such outer covering can probably be found at home, and you will no doubt be glad of assistance in the cutting and stitching involved.

Don't forget that many oddments found about the house can be adapted for miniature freight purposes. Sometimes little alteration is needed to make them realistic. Again, you can often use Meccano Loaded Sacks, Part No. 122. These are attractive and useful items and several of them stacked on the Goods Platform, or neatly loaded crosswise in a Wagon, have a really pleasing effect.

There is not a great deal that one can do about the loading of passenger trains and in any case miniature figures look best about the Station platform or in the general surroundings of the railway. One could not see much of the little people inside the Coaches anyhow! But one youthful enthusiast, so his father wrote to tell me, has got over this difficulty by carrying his passengers in the tender of his engine. No doubt they appreciate this unusual footplate trip.



Here is No. 31 Goods stock representing a train of empty wagons.

Of General Interest

IT is a long time since men lived in caves, but I wonder sometimes if the day is not approaching when we shall go underground again. The world population is increasing so fast that some day there may not be room on the surface for us to go on building the artificial caves that we use to-day, if we are to continue using land for growing food.

The pay booths at the Stad end of the Scheldt Vehicular Tunnel, between that place and Antwerp. Payment is made only at this end to avoid congestion in the busy sector of the city of Antwerp. Photograph by Michael A. Arnold, London.

It looks as if it will be necessary to go underground soon in our great cities, anyway, to make room for motor cars, and more and more we are building tunnels to carry people, trains and cars as quickly and as easily as possible from one place to another. In these cases, of course, the move underground is only temporary, but there is also the threat of atomic warfare. When we reflect that a single hydrogen bomb may be sufficient to obliterate an entire city and much of its surroundings, it doesn't look as if staying above ground too long will be healthy in the future—unless of course we can get some sense into our heads in dealing with such fearsome means of destruction.

These thoughts are perhaps pessimistic and exaggerated. They came into my mind while I was looking at the photograph reproduced here, which was sent to me by Michael A. Arnold, London. It shows one entrance to the tunnel under the River Scheldt, between Antwerp and Stad, in Belgium, and it reminded me of the Mersey Tunnel between Liverpool and Birkenhead, and of the many rail and road tunnels of New York. There always seems to be some tunnelling or boring in prospect somewhere in the world, and probably there will be more of it in the years to come.

Clive Leany and Derek Mowbray, of the Norbury M.C., with a model display at the Exhibition of the Norbury Transport and Model Railway Club in November last. Photograph by C. J. Stratmann.

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.

Hill Transport

Even in our own highly-mechanised country there are tasks which are carried out in what could be described as old-fashioned ways, which are still the safest or most suitable. For instance, the accompanying picture shows a method of gathering the hay harvest from a field approached by an extremely steep slope. On such a slope it would be dangerous, if not impossible, to use a wheeled vehicle such as a tractor or farm cart. So there the more primitive sledge comes into its own.

Haymaking on the slopes above Loweswater, in the Lake District. Photograph by C. Denwood, Penrith.

The "empty" sledge is drawn by a horse up the slope to the hayfield, where the hay is standing in large pikes. One of these pikes is transferred to the sledge, which conveys it safely, if slowly, down the hill to the farm.

My photograph was taken in Cumberland, above Loweswater, which can be seen in the valley far below the slowly-moving sledge. But this method is also used in other hilly areas of Britain.

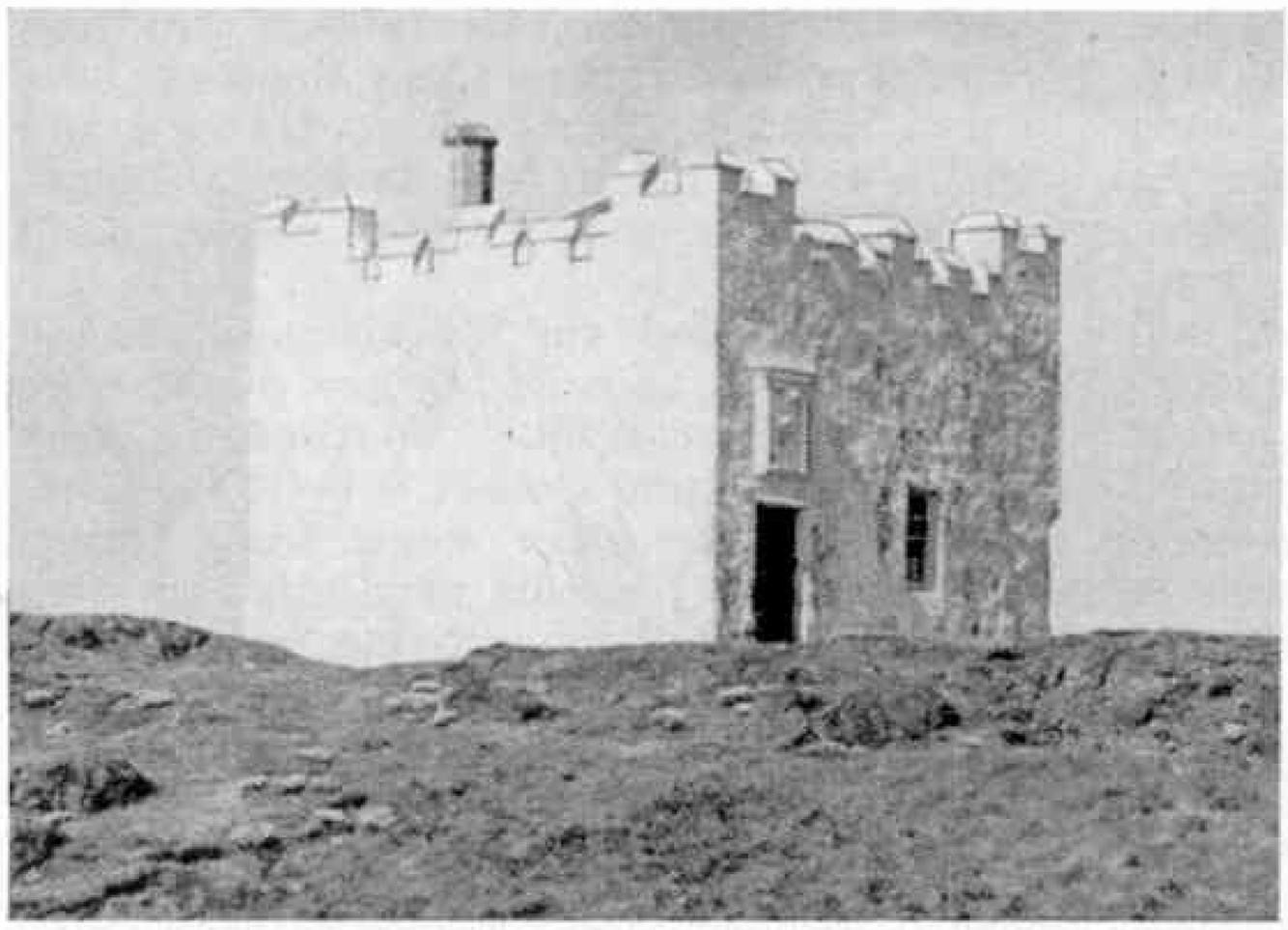
C. DENWOOD (Penrith).

An Ancient Lighthouse

The Isle of May, at the mouth of the Firth of Forth, is a well known bird sanctuary. Recently when visiting the island I was interested in its lighthouses. The present working lighthouse is on the summit of this rocky island. A bare stone's throw from it is the original one, which is shown in my photograph. The date above the doorway is 1636 and it is therefore over 300 years old. During its working life it burned a ton of coal a night. Its rounded corners are said to be due to the movement of a rope used when hauling coal up from the shore.

The lighthouse was built by a laird from Crail, on the shores of the Firth, who in consequence had the right to levy duties on passing ships.

J. D. MACDONALD (Glenrothes).



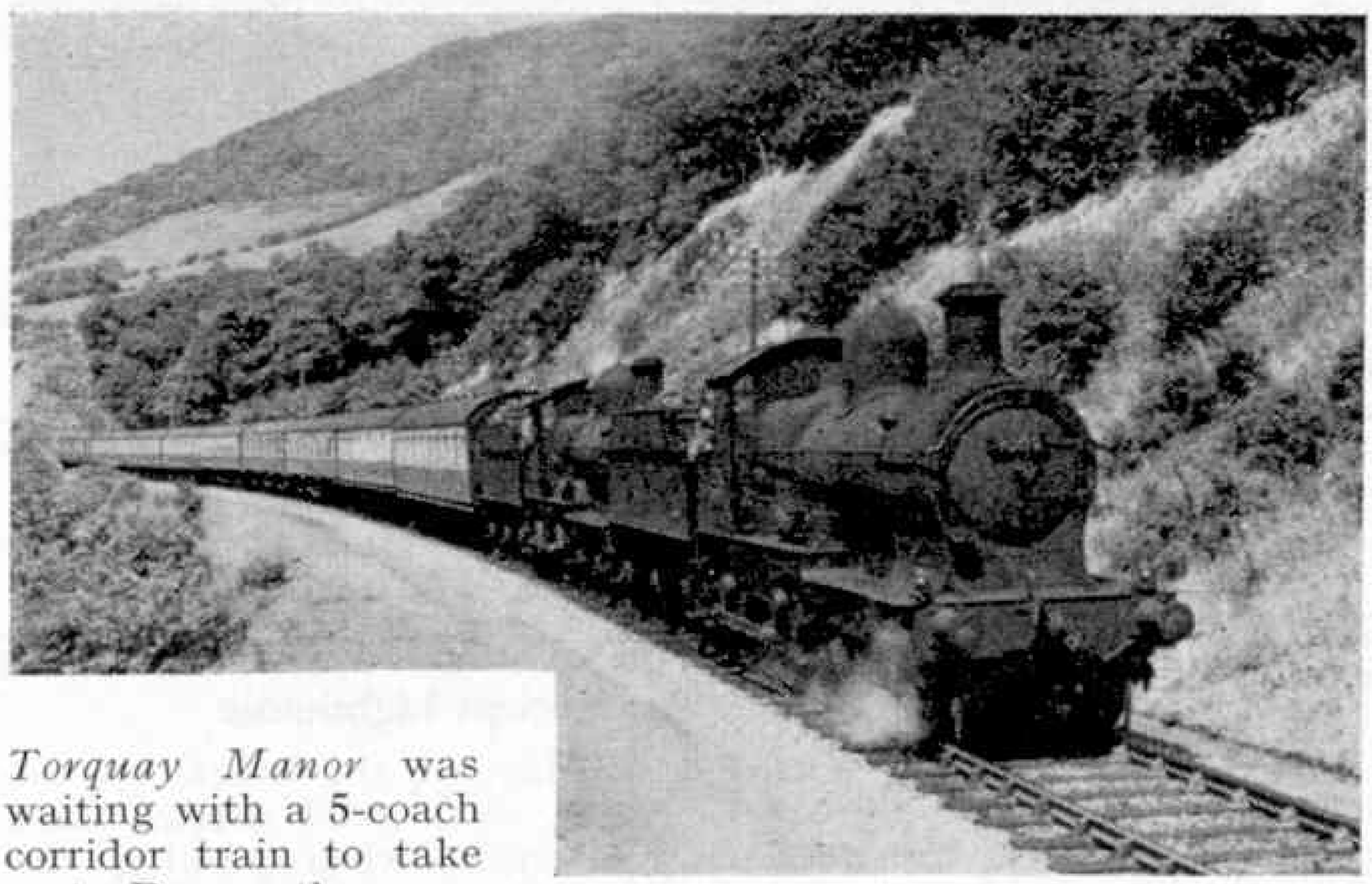
An ancient lighthouse, on the Isle of May. Photograph by J. D. MacDonald, Glenrothes, Fife.

Wide and Narrow Gauge in Wales

A Scenic Railway Tour—Shropshire to Cardigan Bay

By R. A. H. Weight

NORTHWARD-HO! on a day last midsummer, a very old friend and I were riding a fast W.R. train bound for Chester and Birkenhead hauled by grimy but efficient 4-6-0 No. 5047 *Earl of Dartmouth*. The industrial Midlands had been left behind and we had called at Shrewsbury and Gobowen. Then as we were enjoying our first fine vistas of Welsh scenery on this trip we prepared to alight at Ruabon, in Denbighshire, where the pioneer W.R. light mixed traffic 4-6-0 7800 *Torquay Manor* was waiting with a 5-coach corridor train to take us to Barmouth.



Two outside-framed W.R. 4-4-0s double-head a Paddington train through choice Central Wales scenery. This and the upper illustration on the next page are from photographs by H. F. Wheeller.

In this train we were soon on a typical Welsh single track, but a through line, with passing places at stations, enjoying grand valley, lake, riverside and wooded hill scenery. We called at Llangollen, Llandderfel, where a Birkenhead train headed by *Foxcote Manor* was crossed, and Bala Junction, which is just an interchange point in the country without any apparent road approach. There light 0-6-0 pannier tank No. 7431 with the Bala town local waited, close to the beautiful and extensive lake of the same name, which was surveyed from the train for miles.

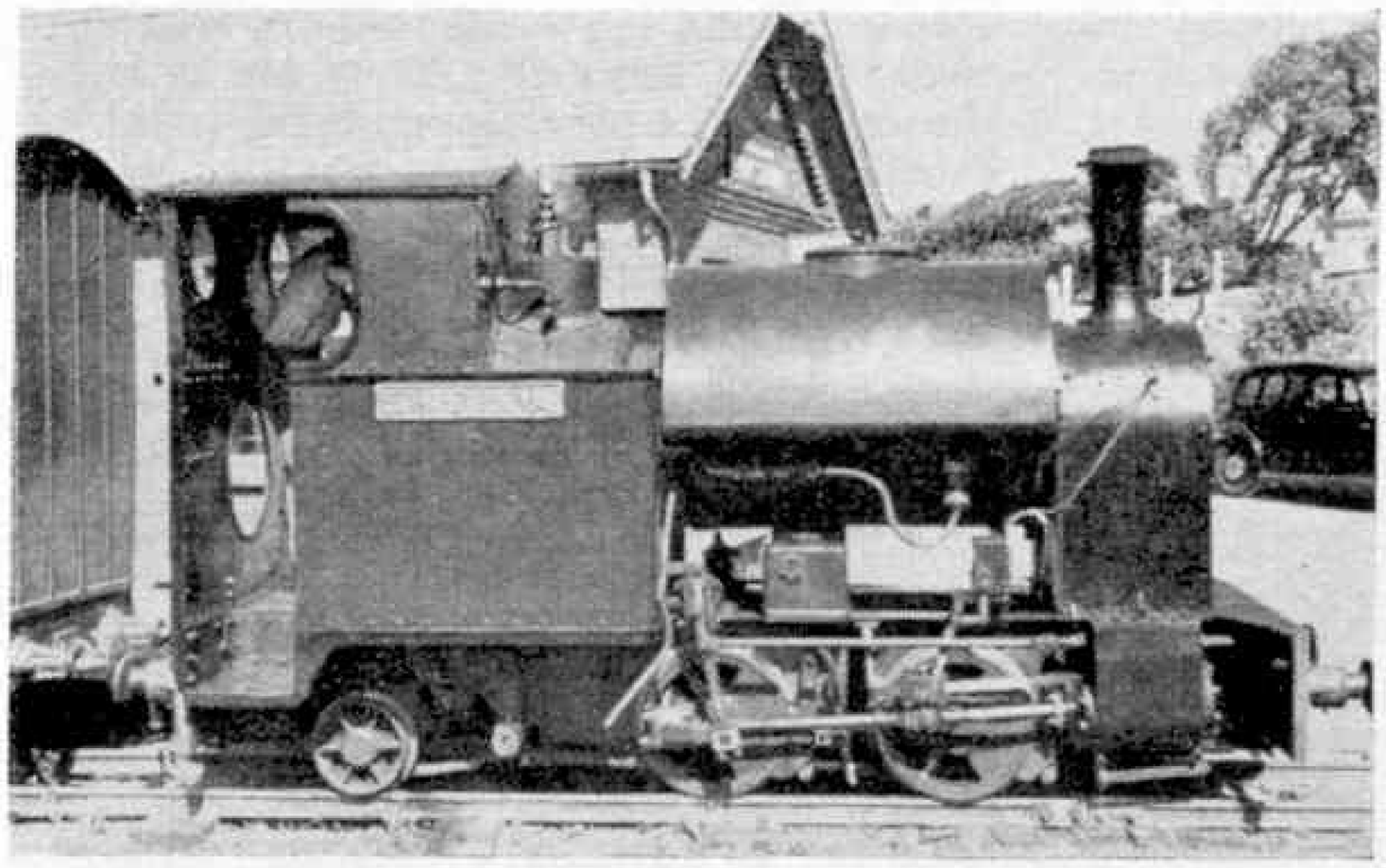
Rural motor trains were passed in charge of 0-4-2Ts Nos. 1416 and 5803. After Dolgelley we were on the route of the one-time Cambrian Railway and all our full-gauge travel, until we headed back from Welshpool into England, was along the tracks of what was, until the grouping in 1923, the largest Welsh railway, possessing many locomotives, the last of which has only lately been withdrawn.

Now approaching the shores of Cardigan Bay, we wound round the lovely estuary of the Mawddach. This gives the impression of a large tidal lake enclosed by woods and mountains. So we came into that rather spectacular coastal hillside resort of Barmouth by way of a long causeway across the wide waters, with a footpath alongside the single railway line and also a section that can be opened to allow shipping to pass. But meanwhile we had called at Barmouth Junction, where there is a triangle of lines which is used for turning locomotives and enables trains to run from the Dolgelley direction along the coast lines north through Barmouth to Harlech and Pwllheli, or south to Aberdovey and thence on to the main inland route from Aberystwyth.

Visibility and the weather in general were not now as good as they might have been, but travelling southward from Barmouth behind Collett 0-6-0 No. 2233, and taking the other single track served by Barmouth Junction platforms, we were not prevented from enjoying part of that remarkable seaside train journey which is such an attractive feature in this part of Wales. The line is laid on ledges, at some points not very far from the water's edge, at others on a higher altitude and penetrating the rocky cliffs by short tunnels, and then, in the vicinity of Aberdovey for

instance, it winds round above the sands.

Round about Towyn, where there are military and civilian holiday camps, the railway is a little further inland with fine views of the hills. From my hotel room there, in addition to a choice more distant prospect, there was quite a good near-view of the W.R. line, just there boasting double track, with passenger trains hauled by 0-6-0s, 4500 class 2-6-2Ts, or more uniquely by those rather quaint little 9000 class 4-4-0s, perhaps little known outside those parts. These are the only Western locomotives in traffic today possessing that wheel arrangement. They are hybrid rebuilds incorporating parts of older Duke and Bulldog type engines.



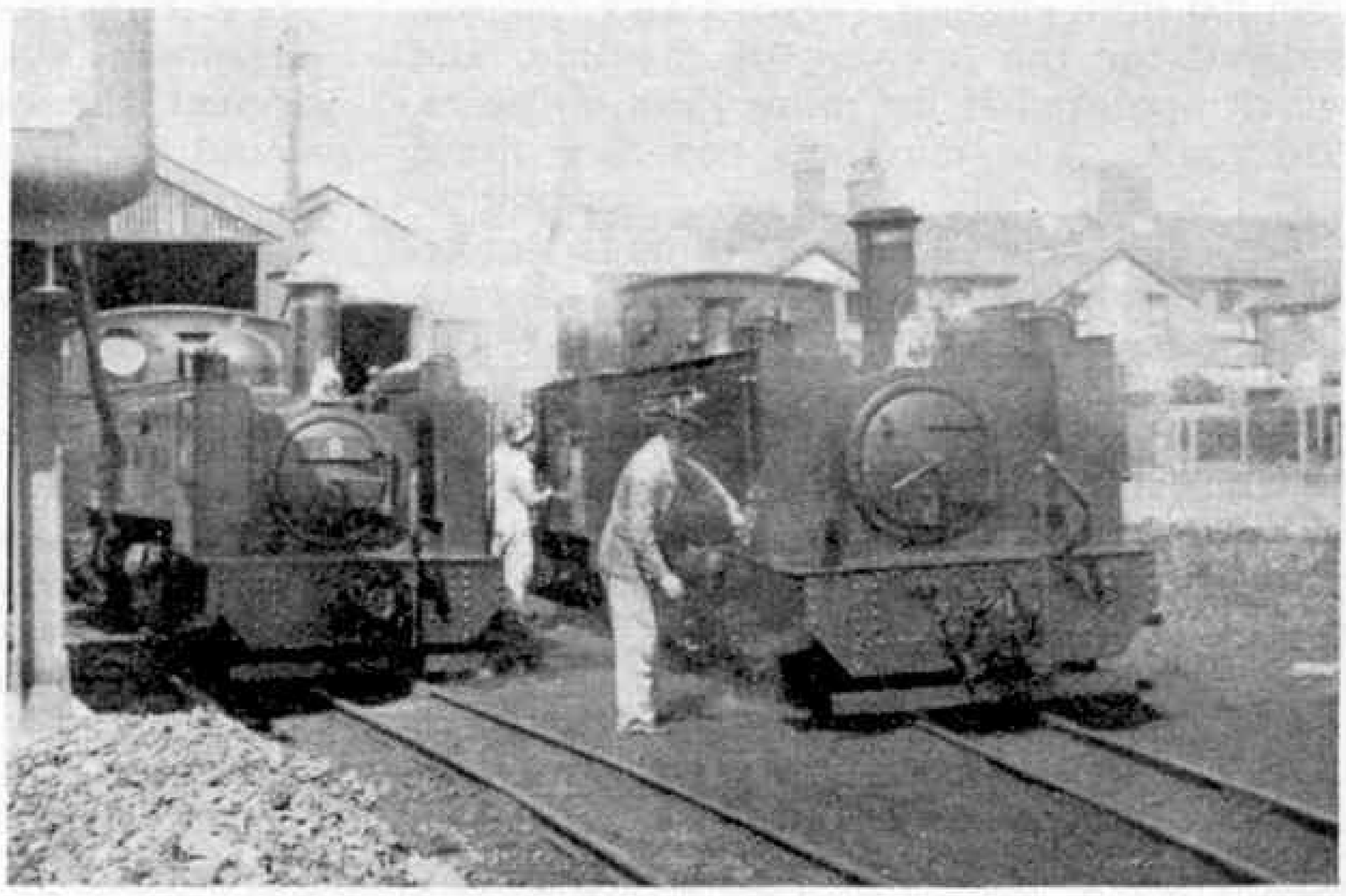
A 0-4-2 saddle tank locomotive of the former Corris Railway at work as No. 4 "Edward Thomas" of the Talyllyn Railway.

It was jolly to travel behind No. 9014 round to Dovey Junction, an isolated two-sided station rather like Barmouth Junction though not having a complete triangular layout. One curved platform serves the Barmouth single line; the long straight one the main track from Aberystwyth to Welshpool, etc. There are outside passing loops, and again one deviates round a broad and picturesque estuary, then parallel to a wide riverside.

Intermediately, however, the brief sojourn at Towyn enabled us to travel upon and inspect the fascinating 2 ft. 3 in. gauge Talyllyn Railway, which climbs for $6\frac{3}{4}$ miles up into a wild mountain valley among tangled hills and woodlands to its present terminus at Abergynolwyn, a remote spot well situated for beautiful walks to Talyllyn Lake or more strenuous climbing expeditions. This little line is some 90 years old, and like other small railways in Central or North Wales which in several cases have disappeared or become disused, was built largely to carry slate traffic.

In this case the traffic was from quarries high on the hillside beyond Abergynolwyn, to the coast, or to the standard gauge Cambrian system, as it then was. Slates for roofing and so on are not much in demand today. Though always carrying passengers, when available, the Talyllyn fell on evil days, especially after closure of the quarries in 1946. Its historic and attractive character, however, impelled a number of railway enthusiasts and business men resident mainly in the Midlands to get together and see if it could be operated privately as a passenger and tourist railway.

The outcome was the formation of the Talyllyn Railway Preservation Society, which attracted widespread interest. Many of us became subscribing members and the Society now supports the railway by financial subsidy, also to a large extent by the practical assistance of its members in



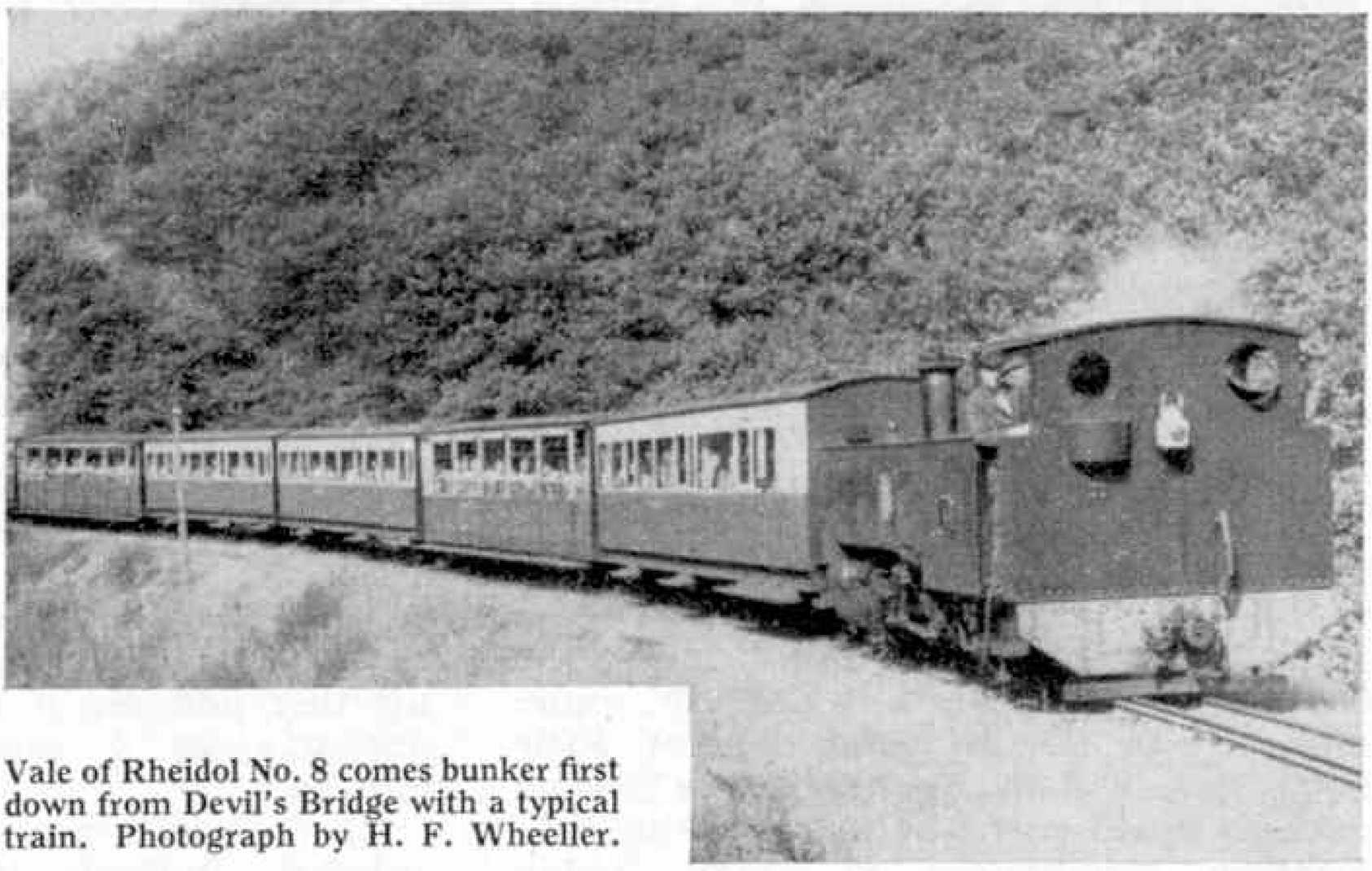
Vale of Rheidol engines Nos. 8 and 9 being prepared for afternoon duties at Aberystwyth. Photograph by H. N. James.

the work of maintenance, restoration and operation on a voluntary basis. Thousands of passengers are now carried each summer and this unusual little line is well worth support and a visit. Second-hand locomotives have been presented or purchased as a result of generous donations; the same applies to various items of equipment, additional rolling stock and so on, progressing annually since a restart under the present management in 1951.

Our train was hauled by smart green 0–4–2T No. 4 *Edward Thomas*, built in 1921, which came from the now closed Corris Railway. It consisted of a unique 4-wheeled guard's van with booking office and a 4-wheeled one-time first class, both original Talyllyn vehicles, and two 8-wheeled open or semi-open bogie coaches given by the Penrhyn Quarry Company, North Wales, and adapted from 2 ft. gauge 4-wheeled workmen's cars. The other, older, ex-Corris saddle tank *Sir Haydn* was in the small shed at Pendre, Towyn, as was the 0–4–0 well tank, *Douglas*, a gift from Birmingham, rebuilt and adapted in 1954, with other items. The diminutive four-coupled tank engines *Talyllyn* and *Dolgoch*, ordered for the opening of the line, and which operated it for more than 80 years, still exist. The carriages are now fitted with side buffers and screw couplings, though they have no continuous brake. At the slow speeds usual, the train is always well under control.

From Aberystwyth, not very much farther down the coast, another delight for tourists is the 11¾-mile journey in the Vale of Rheidol train on a 1 ft. 11½ in. track gauge. This is the only narrow gauge line of its kind owned by British Railways, running a number of daily passenger trains in summer. The three small 2–6–2T locomotives have been painted green and named as follows: No. 7 *Owain Glyndwr;* No. 8 *Llywelyn;* and No. 9 *Prince of Wales*. The last mentioned is much older and carried this name when in private ownership. The first two, behind which I travelled one way or the other, were built by the G.W.R. at Swindon about 1923, having side tanks higher than the boiler, outside cylinders and valve gear.

The carriages, of bogie type, are being painted in the W.R. style of chocolate and cream. There is considerable overhang on each side of the rails. They are either of the enclosed or partly open type, providing excellent visibility when weather is kind of the superb scenery, which is of an open and extensive character. The Rheidol train climbs and winds higher and higher above the lovely Vale, terminating on wooded slopes at Devil's Bridge, a rather romantic spot which is another starting point for mountain explorations and the like. There are W.R. type signals, mile-posts and general equipment. Once or twice the driver opened the cylinder cocks as a warning sound to hill sheep that had wandered on the track.



Vale of Rheidol No. 8 comes bunker first down from Devil's Bridge with a typical train. Photograph by H. F. Wheeller.

Along the main "Cambrian" route we travelled behind the following 4–6–0s: No. 75005, B.R. class 4; W.R. No. 7802 *Bradley Manor;* and then No. 7824 *Iford Manor* on into Shrewsbury.

Shrewsbury is a historic county town on the Severn and one of the most important railway centres of the north-west Midlands. It is situated on the main line from Chester to Birmingham, Oxford and Paddington, with junction routes radiating to Crewe and the North, Central and South Wales, etc. By the big Abbey Foregate Junction Signal Box, a triangle at the south end, with adjoining sidings, enables engines to turn, and makes (Continued on page 169)

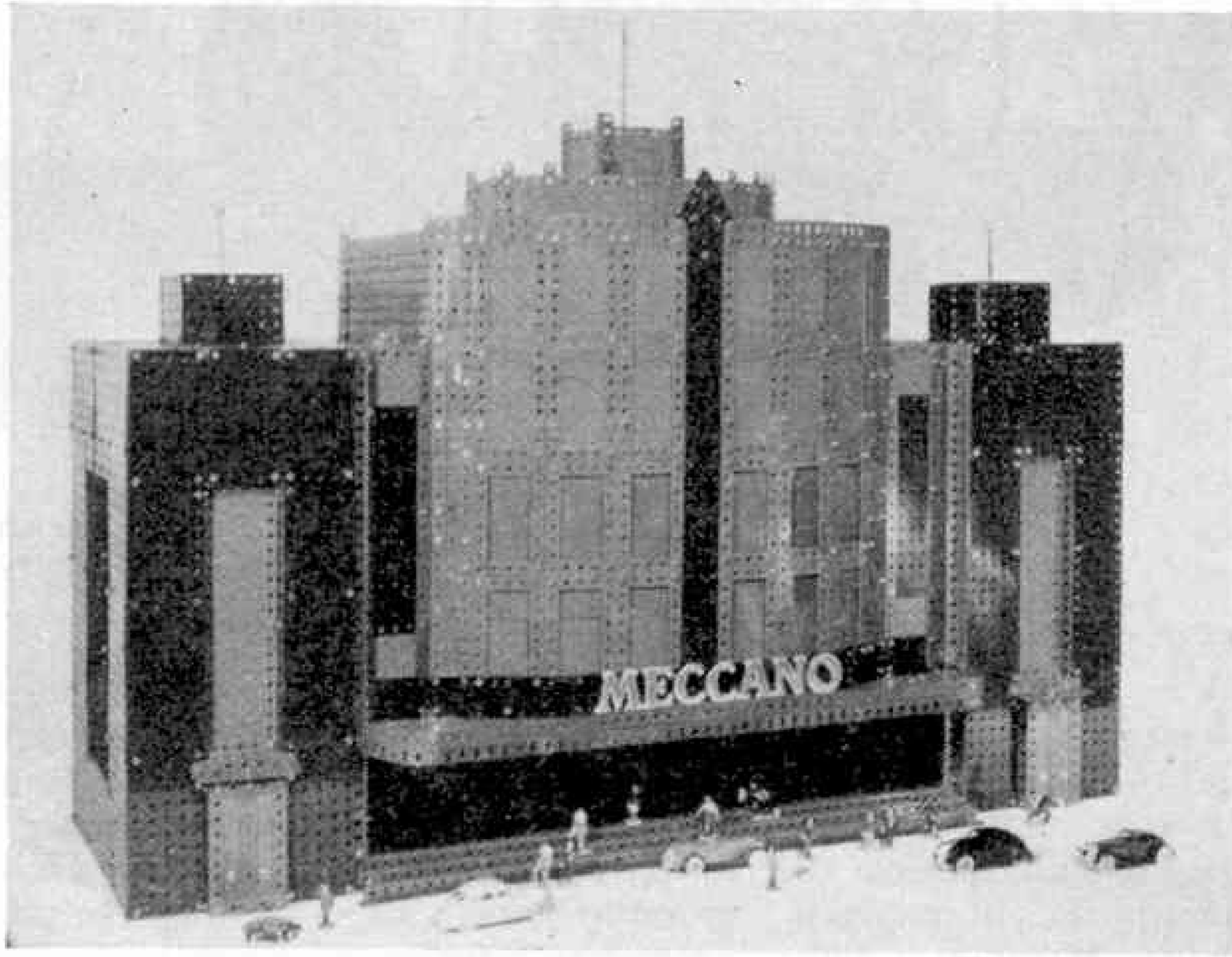
Meccano Model-Building Competition

HAVE you sent in your entry to the current Meccano Model-Building Contest? We have received hundreds of entries already, but even if you have not yet started to build your model there is still time to do so and to send in details of it.

The competition announced in the February issue of the "*M.M.*" is open for entries until the 31st May next, but if you want to make sure that your model is the best you can build you should start construction right away. Very often during the final stages of construction of a model it is realised that some slight changes in design would result in a big improvement, and if you start your model now you will have time to experiment, and to make any necessary changes, before the closing date.

Many readers will know the details of the Competition, but for the benefit of new readers and for those who missed the previous announcements we are repeating the main points. It is a general model-building competition. That is, there are absolutely no restrictions on the subjects you can choose for your models or on the number of parts you use to build them. Models can be of any kind and size, and you need not be discouraged if you have only a small Outfit. Remember, the judges will look for neat and sturdy design, excellence of construction and novelty in the choice of subject and in the use of parts. The size of the model does not matter and it will not influence the judges in any way.

A point to remember, especially if you have only a small Outfit, is that it is well worth while spending a little time choosing a suitable subject. You should look for a model that is well within the scope of the parts you have available, rather than choose a subject that stretches the model-building scope of your Outfit to the utmost and results in a flimsy looking model.



An Argentine reader's attempt to reproduce a modern theatre in Meccano. It is the work of Julio Giese, Buenos Aires, and was awarded a prize in an "M.M." Competition.

When you have built your model the next step is to obtain photographs or prepare sketches of it, and send these to *February Model-Building Competition, Meccano Limited, Binns Road, Liverpool 13.*

You must write your name and address clearly on *each* print or piece of paper submitted, and don't forget to add your age. This is important, because there are two sections of the Contest. Section A is for model-builders under 12 years of age on 31st May next, and Section B is for competitors aged 12 or over on that date.

Entries must reach us by 31st May, and please note, photographs or sketches only will be accepted. The actual models must not be sent. The prizes to be awarded 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

MODEL OF THE MONTH:

Lightship

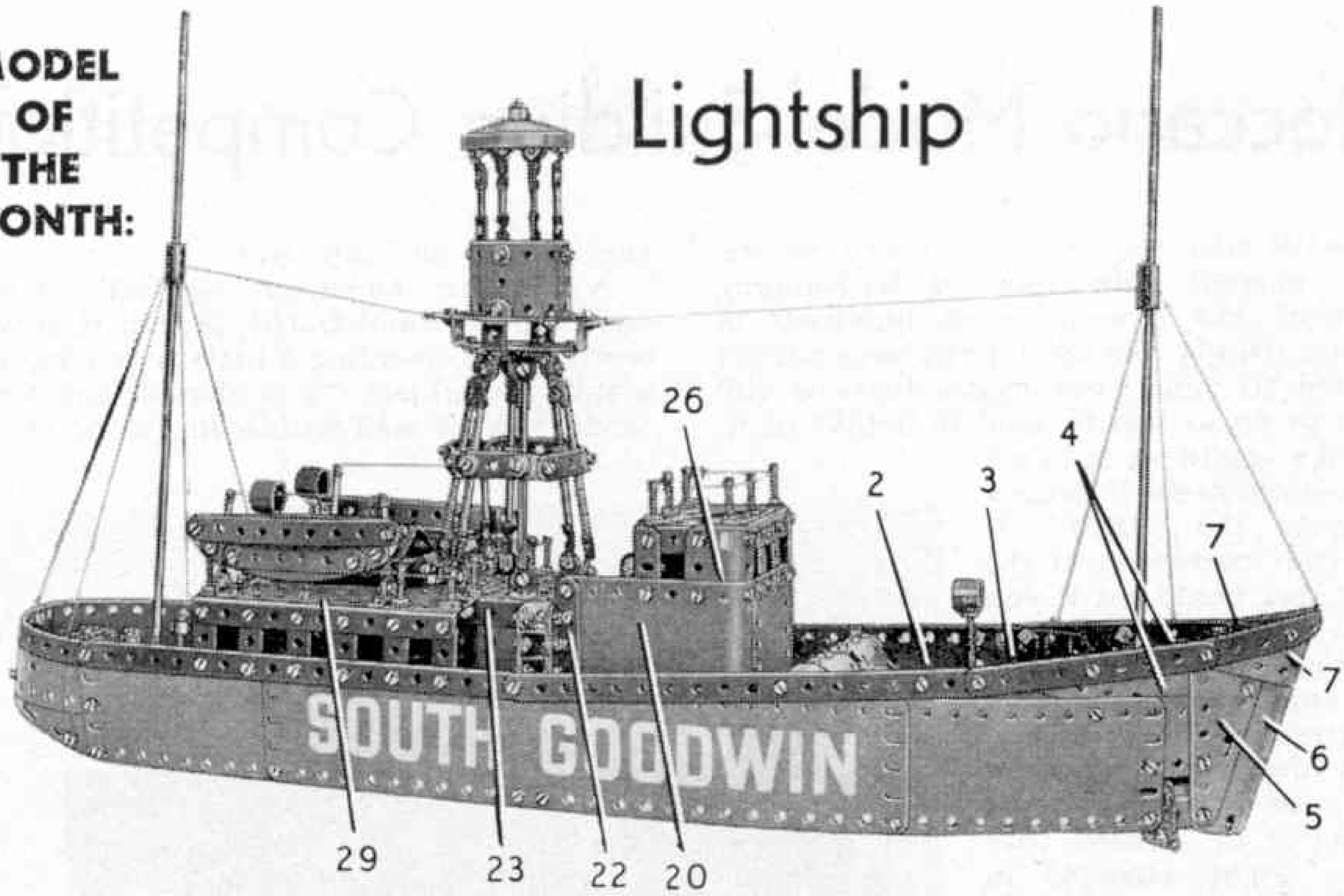


Fig. 1. An attractive model of a modern Lightship that should prove a popular subject with all lovers of ships.

MOST model-builders are frequent visitors to their local Meccano Dealers, and the fascinating display models shown by them have aroused widespread interest. One of the most popular of the display models distributed recently is based on a modern lightship, and we have received many requests for constructional details of it. This month a modified form of the model is included as our "Model of the Month" subject, and a general view of the Lightship is shown in Fig. 1 on this page.

Our model is based on a modern lightship and includes many details of the actual vessel. For convenience of construction, the assembly of the model can be divided into two main stages. These are the construction of the hull and the assembly of the superstructure. The two units can be pre-assembled and bolted together, and then the model can be completed by adding the mast, winch and deck fittings.

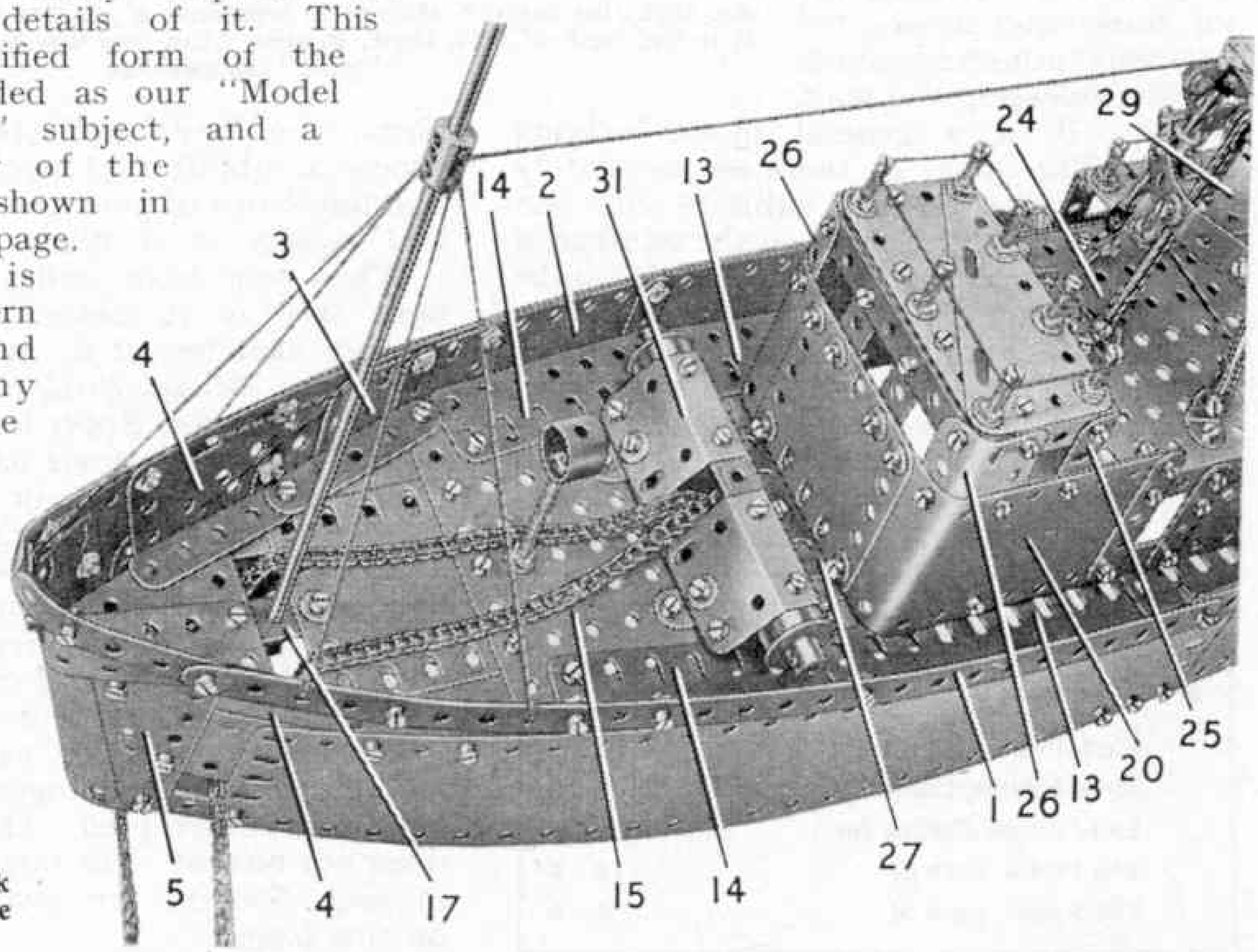


Fig. 2. The fore-deck and bridge structure of the Lightship.

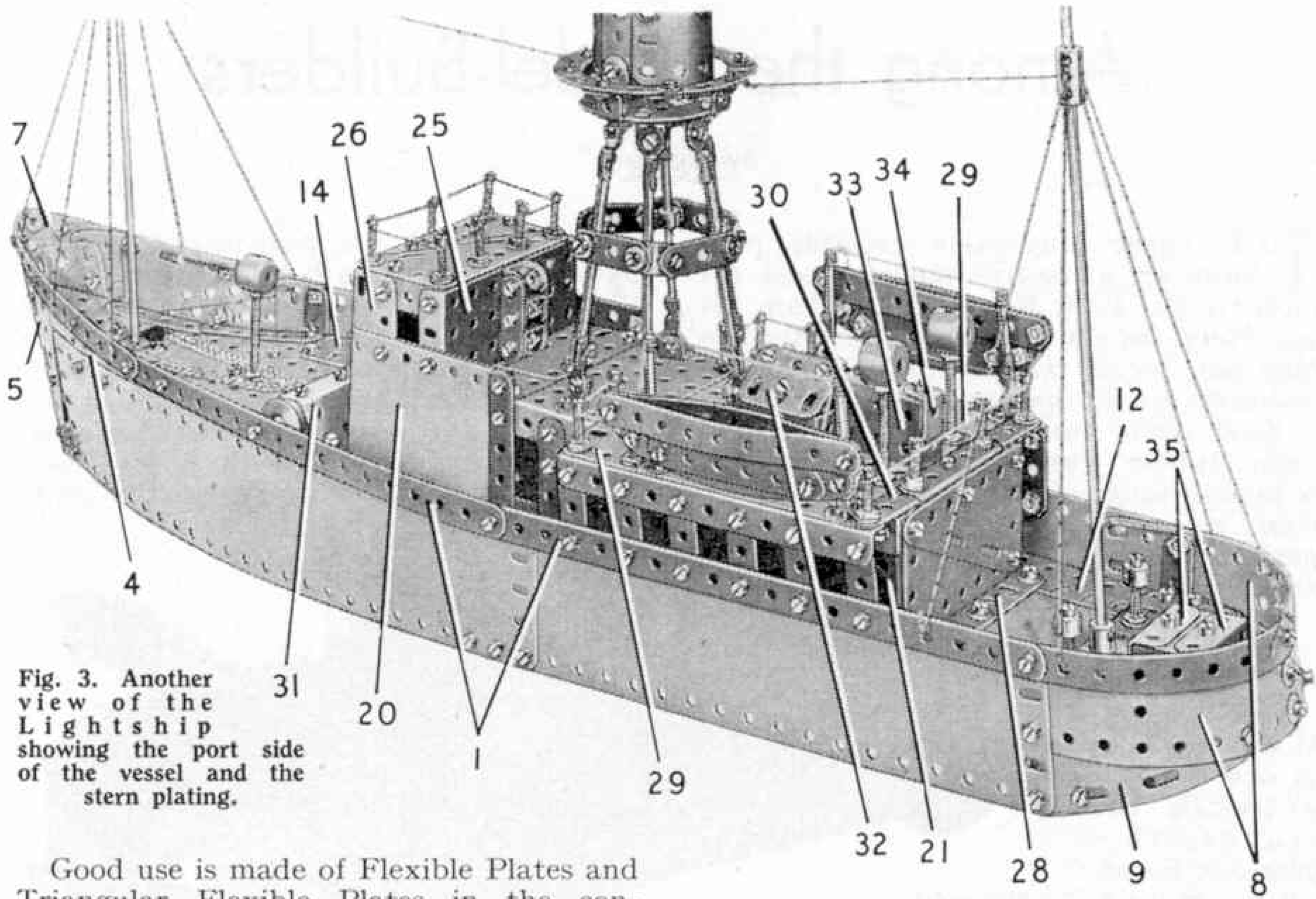


Fig. 3. Another view of the Lightship showing the port side of the vessel and the stern plating.

Good use is made of Flexible Plates and Triangular Flexible Plates in the construction of the hull, and the design of the light tower is noteworthy for the use it makes of Rods and Rod and Strip Connectors. The model illustrated is not fitted with a working light, but those who wish to have one can easily fix a small bulb holder, with a low voltage bulb, inside the lantern chamber. The bulb can be operated from a dry battery of suitable voltage housed inside the hull. Suitable bulb holders and bulbs can be obtained from most electrical and radio dealers.

Full instructions for building the Lightship and a list of the parts required can be obtained by writing to the Editor, enclosing a 2d. stamp for postage. The main Meccano Agents in Canada, Australia, New Zealand, South Africa, Ceylon and the United States have copies of the *current* "Model of the Month" instructions, and readers living in these countries can obtain copies of the Lightship instructions by writing to the appropriate Agents, enclosing suitable stamps for return postage.

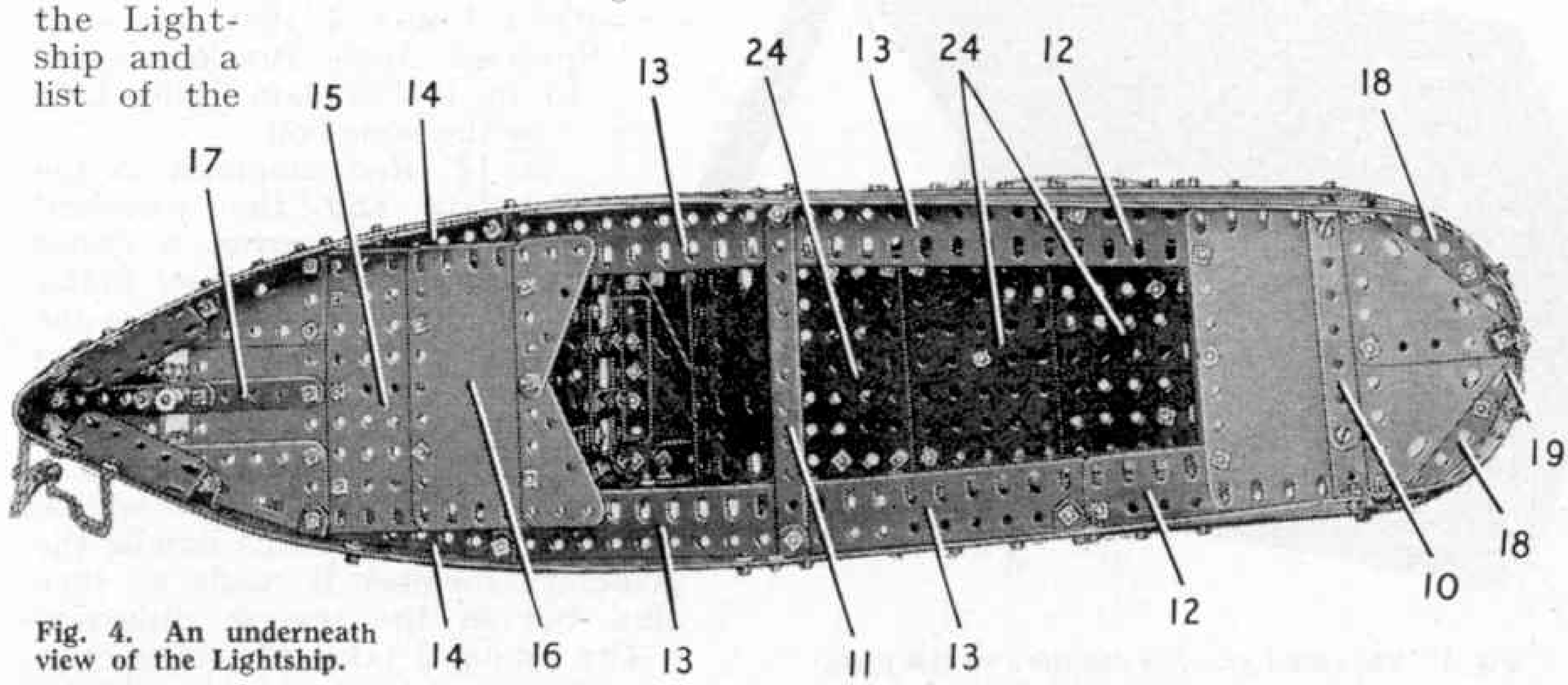
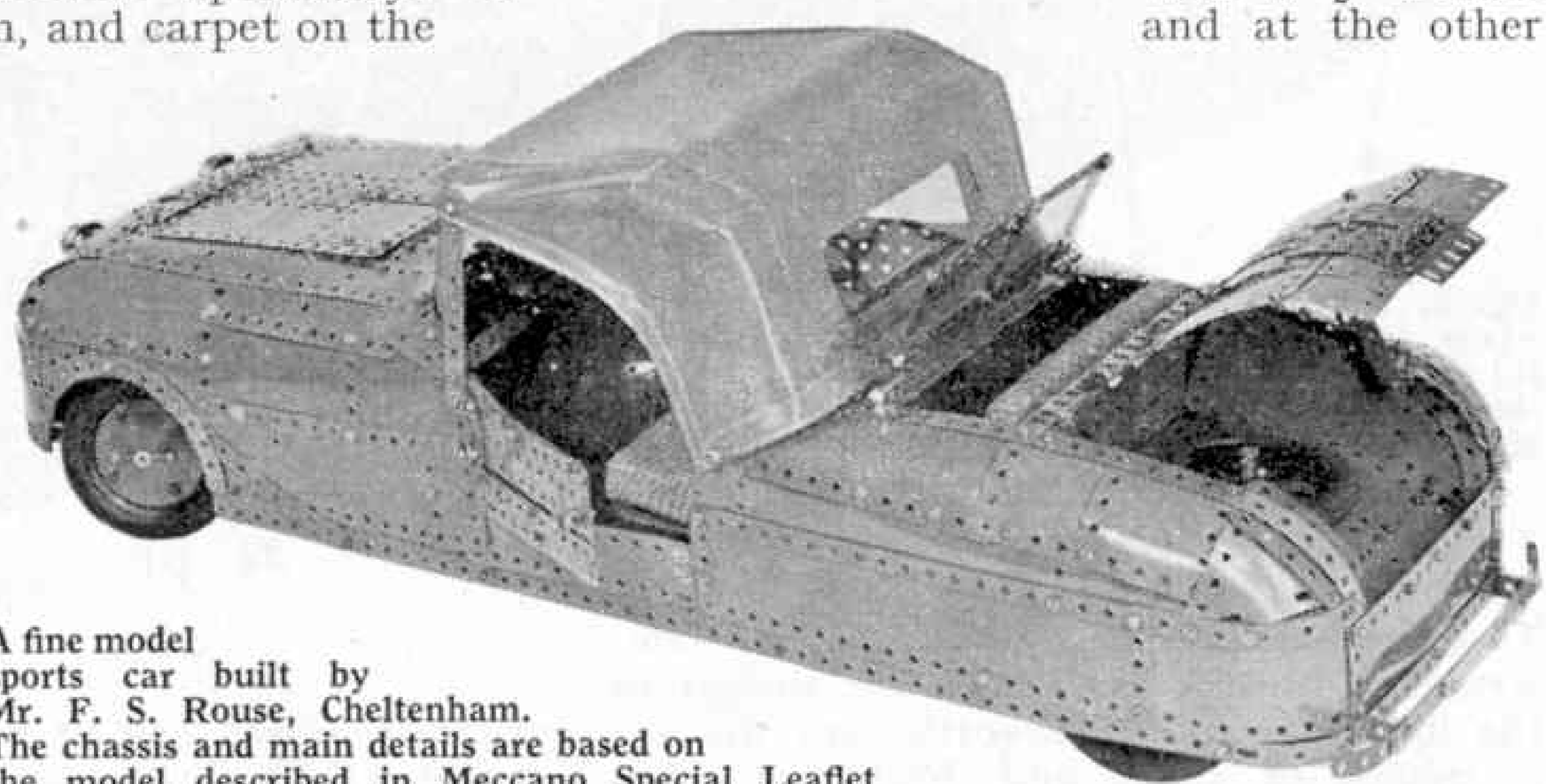


Fig. 4. An underneath view of the Lightship.

Among the Model-Builders

By "Spanner"

THE upper illustration on this page shows an attractive model sports car built by Mr. F. S. Rouse, Cheltenham. It was based on the Sports Car described in Meccano Special Leaflet No. 2. Notable additions are an opening bonnet and boot, a hood made from American cloth and foam rubber cushioned upholstery. A celluloid windscreen, and carpet on the floor, give the model a fine finish.



A fine model sports car built by Mr. F. S. Rouse, Cheltenham. The chassis and main details are based on the model described in Meccano Special Leaflet No. 2, but many additional features have been included.

Radial Gear-Box

In many Meccano models, especially cranes, the gear-box forms the most difficult part of the construction, particularly if a centralised control system is required. Fig. 1 shows an example that is extremely compact and efficient.

The sides of the gear-box consist of $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plates bolted to a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate and braced by $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. The driving shaft, a Rod 1, carries a planetary member built up in the following way. A Socket Coupling is fitted at one end with a $\frac{1}{2}''$ Pinion and at the other end with a Bush Wheel, which supports a $\frac{3}{4}''$ Bolt held in place by two nuts. A $\frac{1}{2}''$ Pinion 2 is mounted freely on the Bolt.

The complete assembly is free to rotate on the Rod 1, and it can be turned by means of a $\frac{1}{2}''$ Pinion 3 that meshes with the Pinion fixed in the Socket Coupling. Pinion 3 is fixed on a short Rod mounted as shown and fitted with a Crank 4 that has a $\frac{1}{2}''$ Reversed Angle Bracket bolted to it, a Fishplate being held by the same bolt.

A $1\frac{1}{2}''$ Rod mounted in the Fishplate and the Reversed Angle Bracket carries a Collar at its inner end, a second Collar being placed as shown to take the pressure of a Compression Spring fitted between the Reversed Angle Bracket and the Fishplate. The outer end of the Rod carries a Coupling to form a handle. It will be seen that by turning this handle the planetary member is made to turn also, but in the reverse direction.

The Pinion 2 takes the drive from

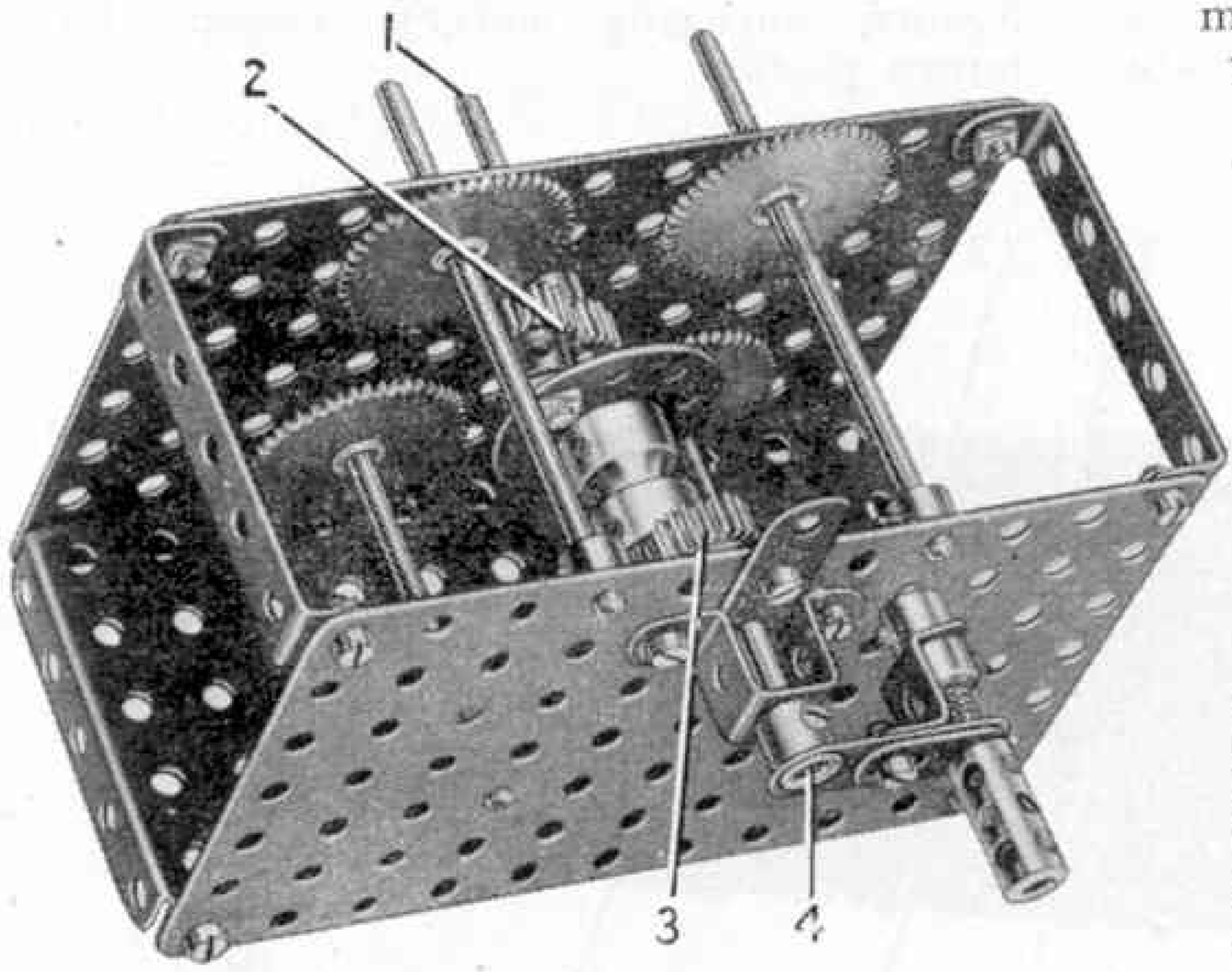


Fig. 1. The radial gear-box described on this page.

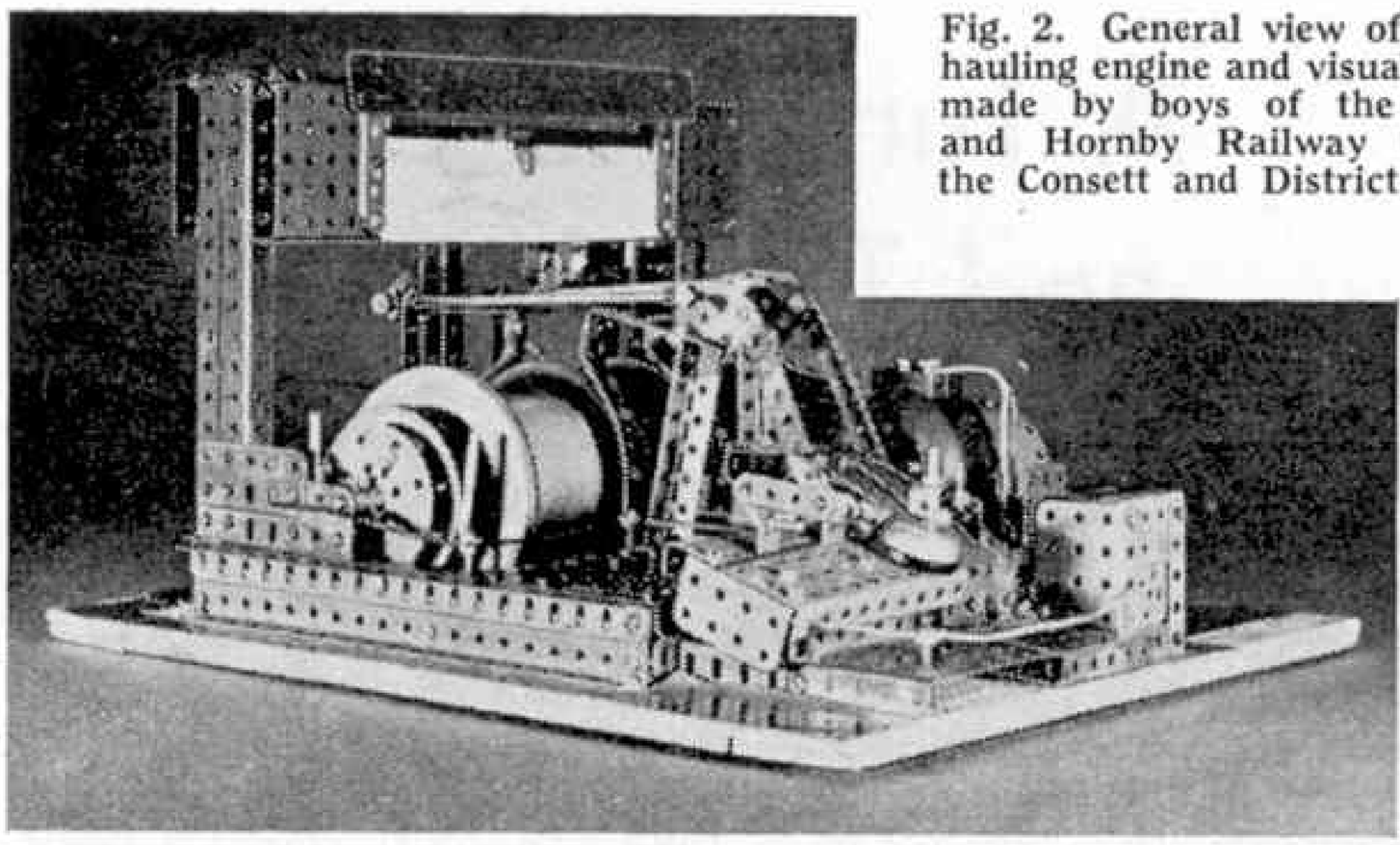


Fig. 2. General view of the mine hauling engine and visual indicator made by boys of the Meccano and Hornby Railway Group of the Consett and District Y.M.C.A.

Rod 1 through a ½″ Pinion that is fixed on the Rod. Pinion 2 can be meshed with any one of four 50-tooth Gears on Rods arranged radially round the planetary member. If required 57-tooth Gears may be used in place of the 50-tooth Gears shown, the spacing of the shafts being altered accordingly. Also, if more than four movements are required, additional shafts can be fitted, the Gears on them being offset in relation to those on the shafts shown in Fig. 1. A modified selector mechanism is necessary if more than four movements are provided by the gear-box.

A Colliery Tub Hauling Engine

I am able to illustrate this month an attractive model built by Norman Duxfield and Ivan Bell, of the Consett and District Y.M.C.A. Meccano Club, with guidance from a senior member, D. Whitfield. It represents a mine hauling engine in use at Eden Colliery, Leadgate, for hauling the coal tubs along the underground workings, and includes a visual distance indicator that shows at a glance the actual position of the "set" over the full distance of the run.

The indicator is driven by means of Sprocket Chain from the main rope drum, and the drive to it is seen in the rear view of the model on this page. The winding drums are fitted with clutches and brakes based on the Westinghouse rim brakes used on the prototype.

Another Meccano Tool for the Home Workshop

From time to time I have been able to give details of simple tools made with Meccano parts, and the folding brace and bit illustrated in Fig. 4 is yet another example of the way in which Meccano can help to stock a home workshop. The model is not suitable for really heavy work, but it could be used for light tasks of many kinds.

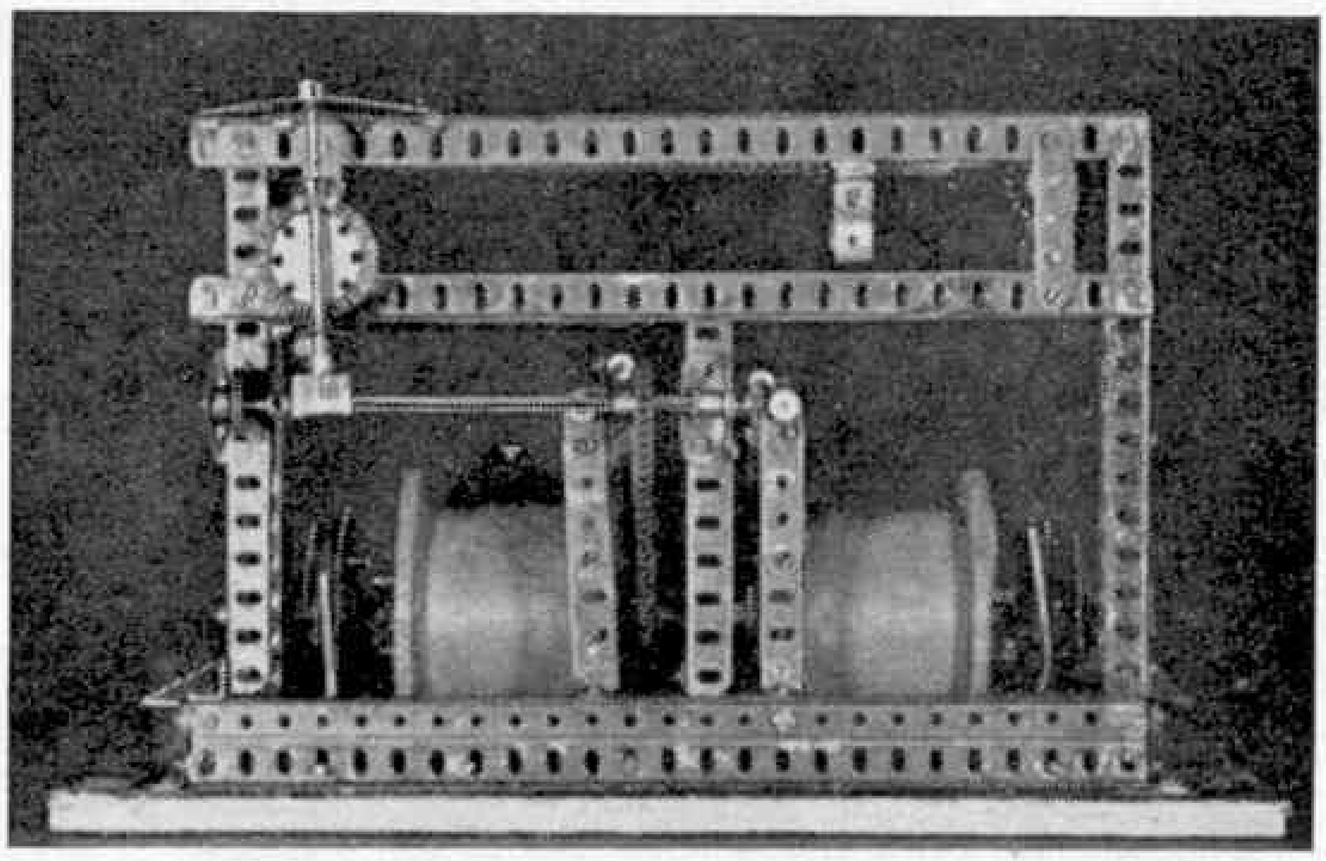


Fig. 3. A rear view of the hauling engine indicator showing the drive to the pointer.

The model was built by Alan Southard, who is an enthusiastic member of the Exeter Meccano Club and was awarded a Merit Medallion recently. The details of the model were sent to me by Mr. M. C. Hodder, who is Leader of the Club.

The main features of the brace and bit will be clear from the picture, but an interesting point is that by slackening two grub screws the tool can be folded for easy storage.

In the illustration a Meccano Centre Fork is used as a bit, but a small twist drill can be used instead if desired.

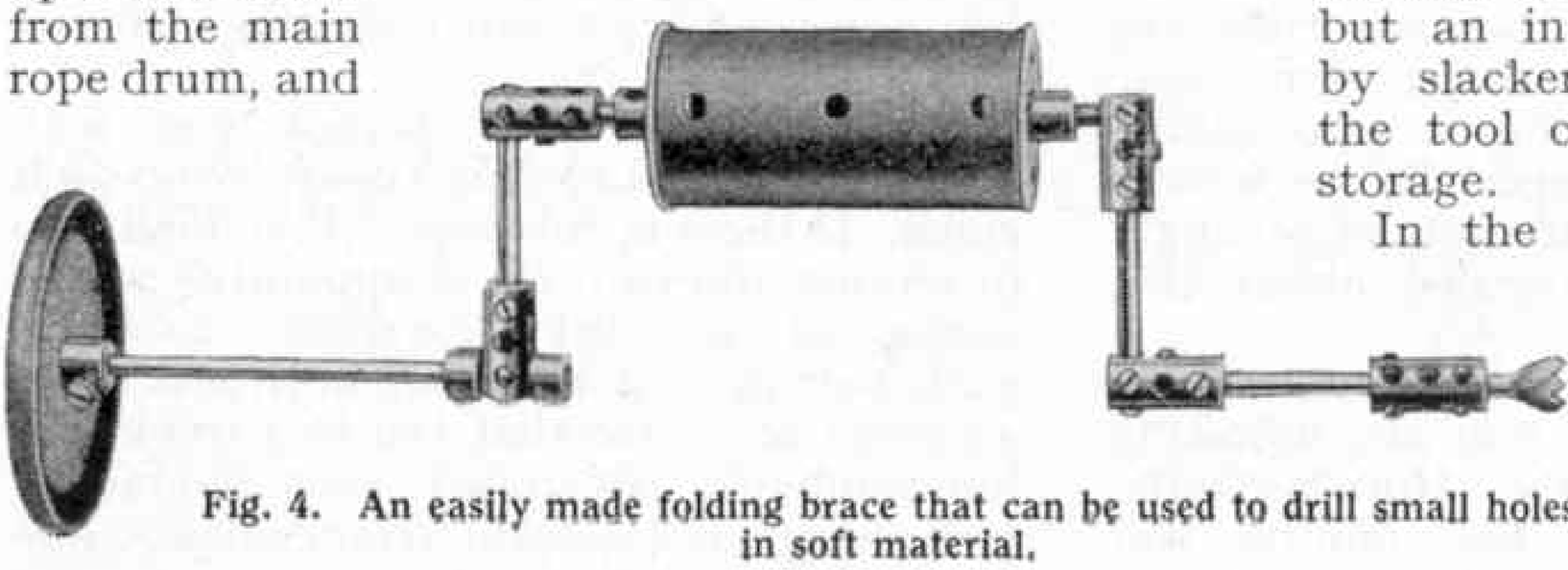


Fig. 4. An easily made folding brace that can be used to drill small holes in soft material.

HORNBY RAILWAY COMPANY

By the Secretary

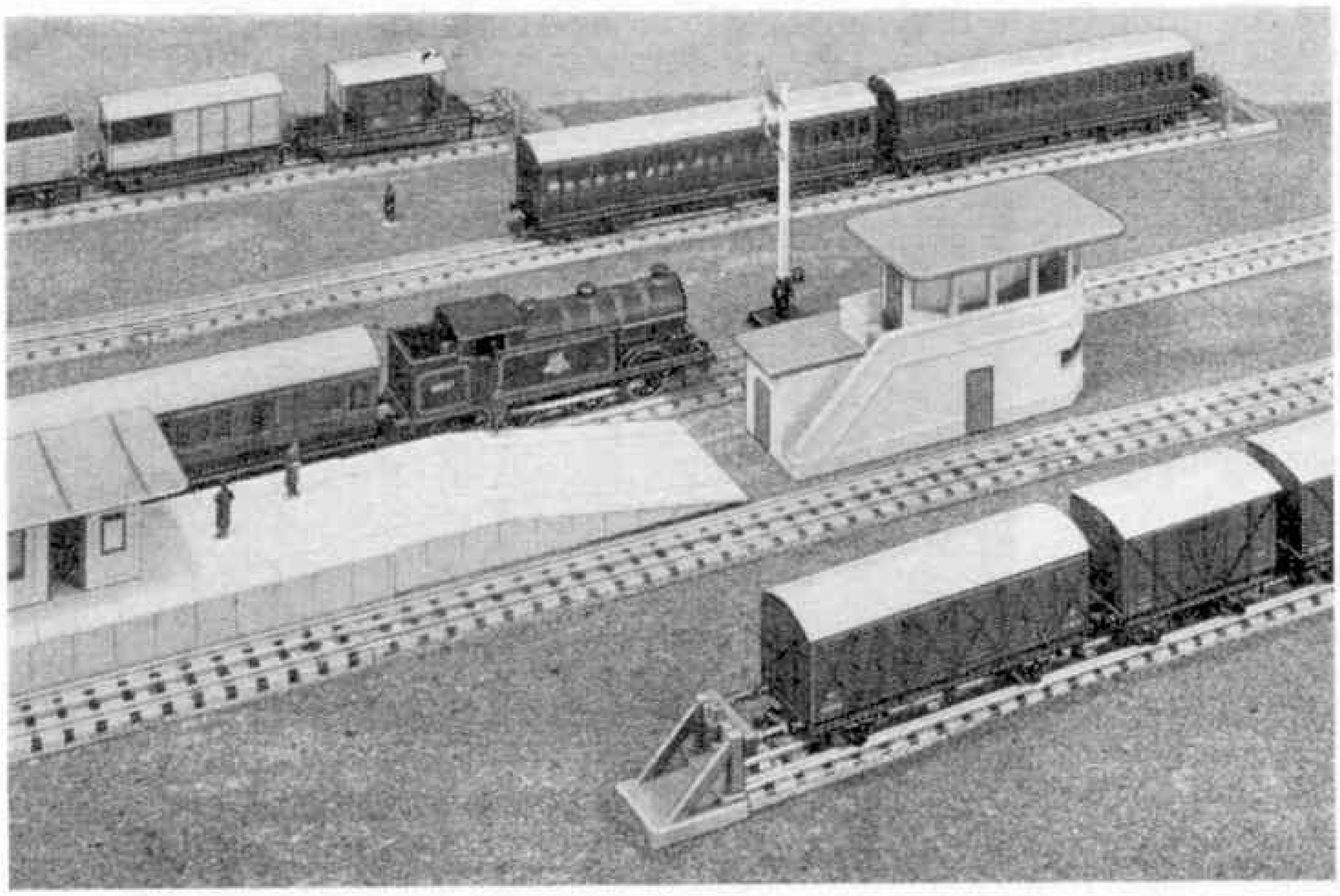
A Turntable Note and T.P.O. News

FROM my correspondence with *M.M.* readers I have noted with great pleasure what a difference the Turntable has made to many layouts and I continue to receive enthusiastic letters about this splendid piece of Hornby-Dublo equipment. The upper picture on the next page shows a particularly attractive Turntable arrangement, with several outlet tracks. This is fine where there is sufficient space, but on some systems the Turntable has to be so placed that it is used simply for turning engines, not for diverting them to further tracks.

This is quite in order, as it often happens in full size practice. After all, a Turntable is primarily a means of turning engines round. You do not *have* to use all the possible outlets simply because they are there. They are provided for your convenience in developing a Locomotive Yard. I mention this specially because a few beginners who are thinking of getting a Turntable have been puzzled about this point.

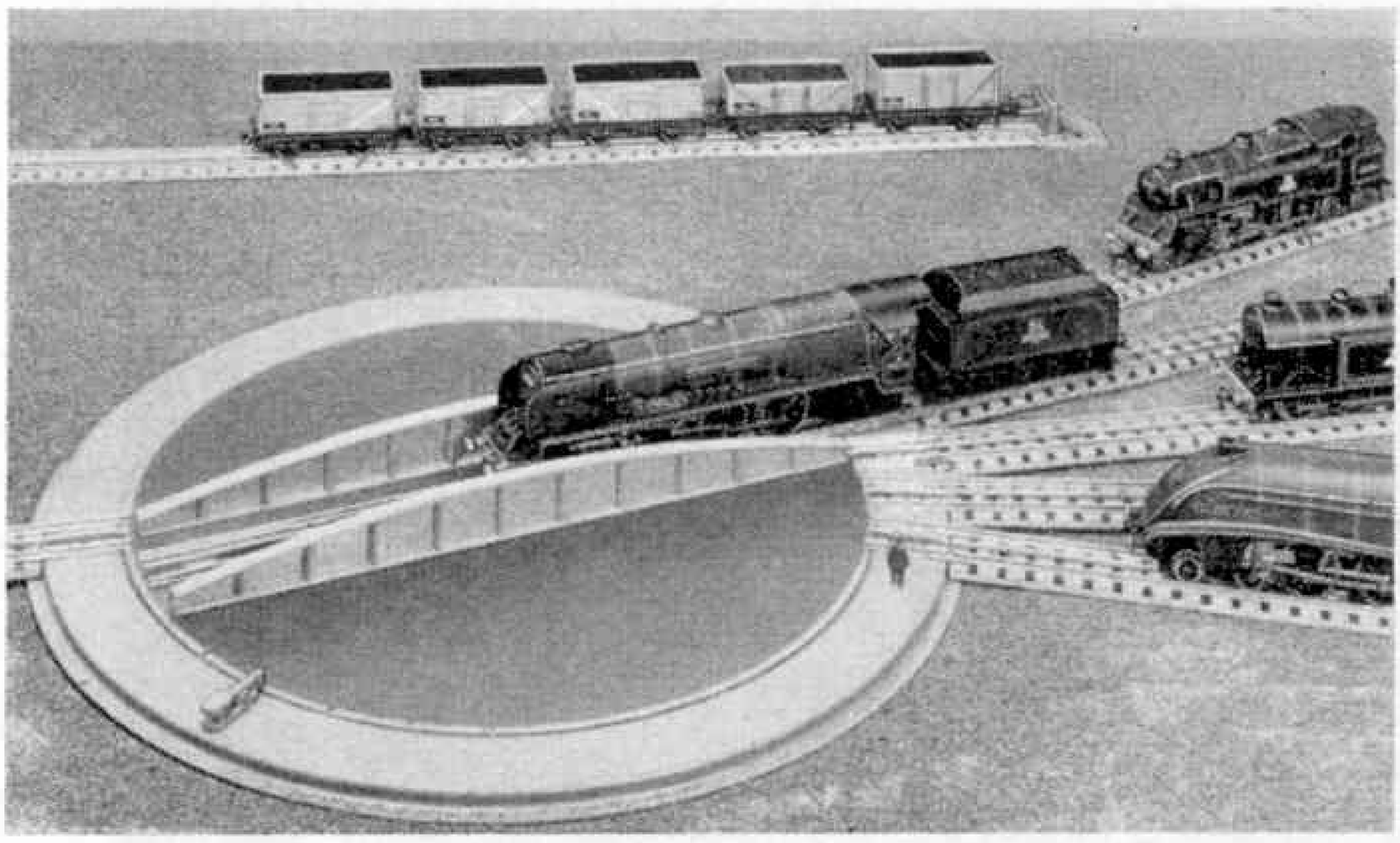
Those of you who are T.P.O. enthusiasts —and I expect most of you are, following the introduction of the Hornby-Dublo T.P.O. Mail Van Set last month—will welcome further good news concerning this fine addition. Besides the complete Sets already distributed, the individual components are being made available separately. This means that if you want an additional T.P.O. Mail Van alone you will be able to get one. Similarly, you may wish to set up more than one mail exchange point on your layout, so the Lineside Apparatus for the T.P.O. is being made available.

You may have two of these installations at different places on the same track, and a single push-button Switch, wired to the earthing or non-insulated terminal as detailed in the T.P.O. instruction leaflet, can be made to serve both sets of apparatus. The corresponding terminals of the two installations are just connected together, that is the insulated terminals are joined by one wire and the earthing terminals by another. The fact that the contact rails on both sets of apparatus are live at the same time does not matter, because your train can only pass one set of apparatus at once.



The Island Platform makes a neat and useful wayside station. Here the 0-6-2 Tank is ready to leave with a stopping train.

On a double track layout you may require a T.P.O. Lineside Apparatus on each track. If there is only one T.P.O. Mail Van in service, the two sets of apparatus can be connected as just described, a single push-button Switch serving both sets. It is assumed of course that the two tracks are independently controlled, each having its own supply and control arrangements, and



The Duchess has been turned and makes her way gently in reverse from the Turntable to one of the yard tracks.

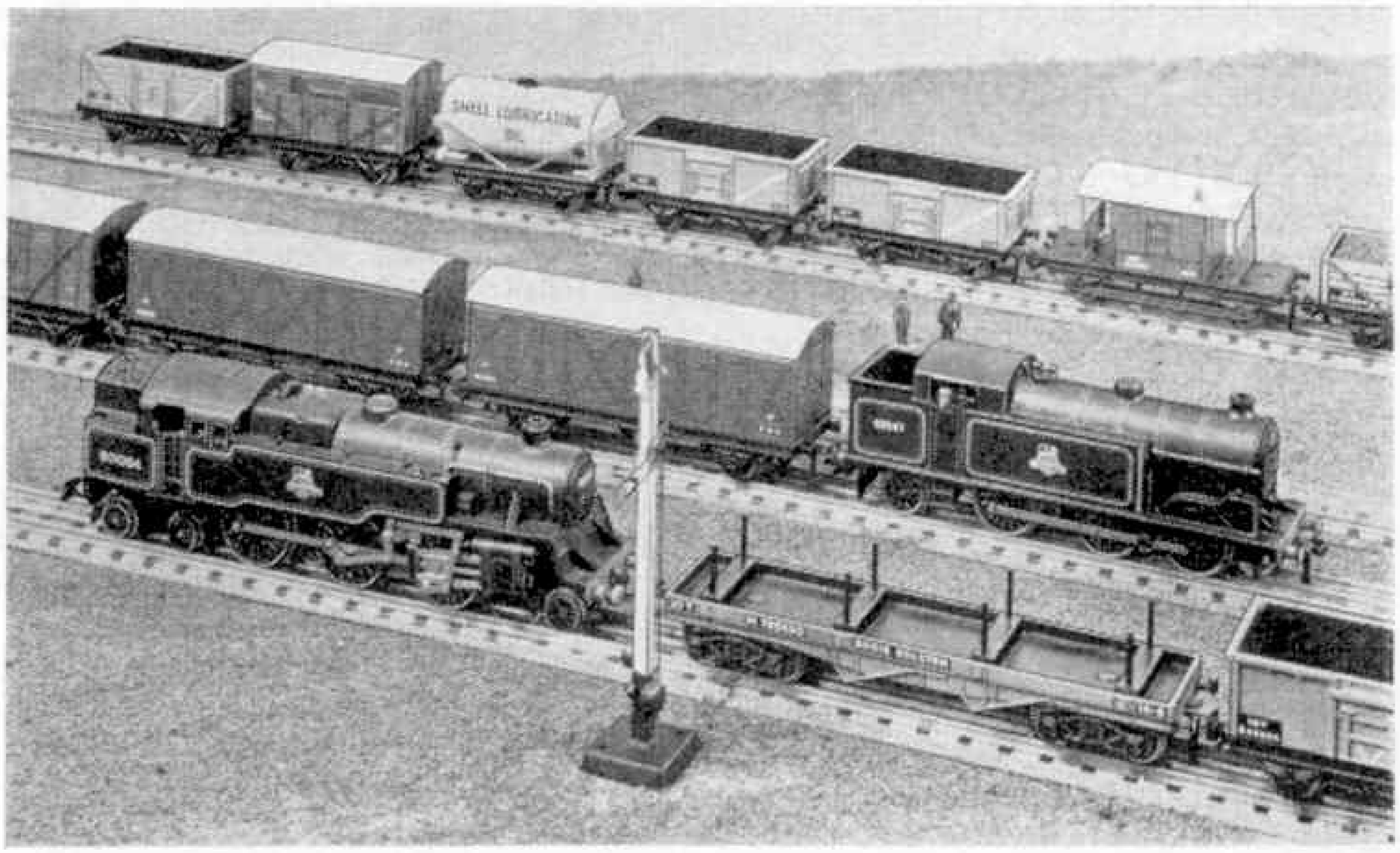
an Insulating Tab between the centre rail clips of any Points connecting the two tracks. You already know that the supply to the T.P.O. lineside apparatus *must* be quite separate from the train driving circuits.

Where there is more than one T.P.O. Mail Van in use and there is the possibility that up and down mail trains will be running at the same time, each on a separate track, independent control of the two sets of apparatus will be required. The same power source can be used for both, but each will require its own push-button Switch. In this case each Switch should be included in the connections to the insulated terminals, *not* the earthing ones.

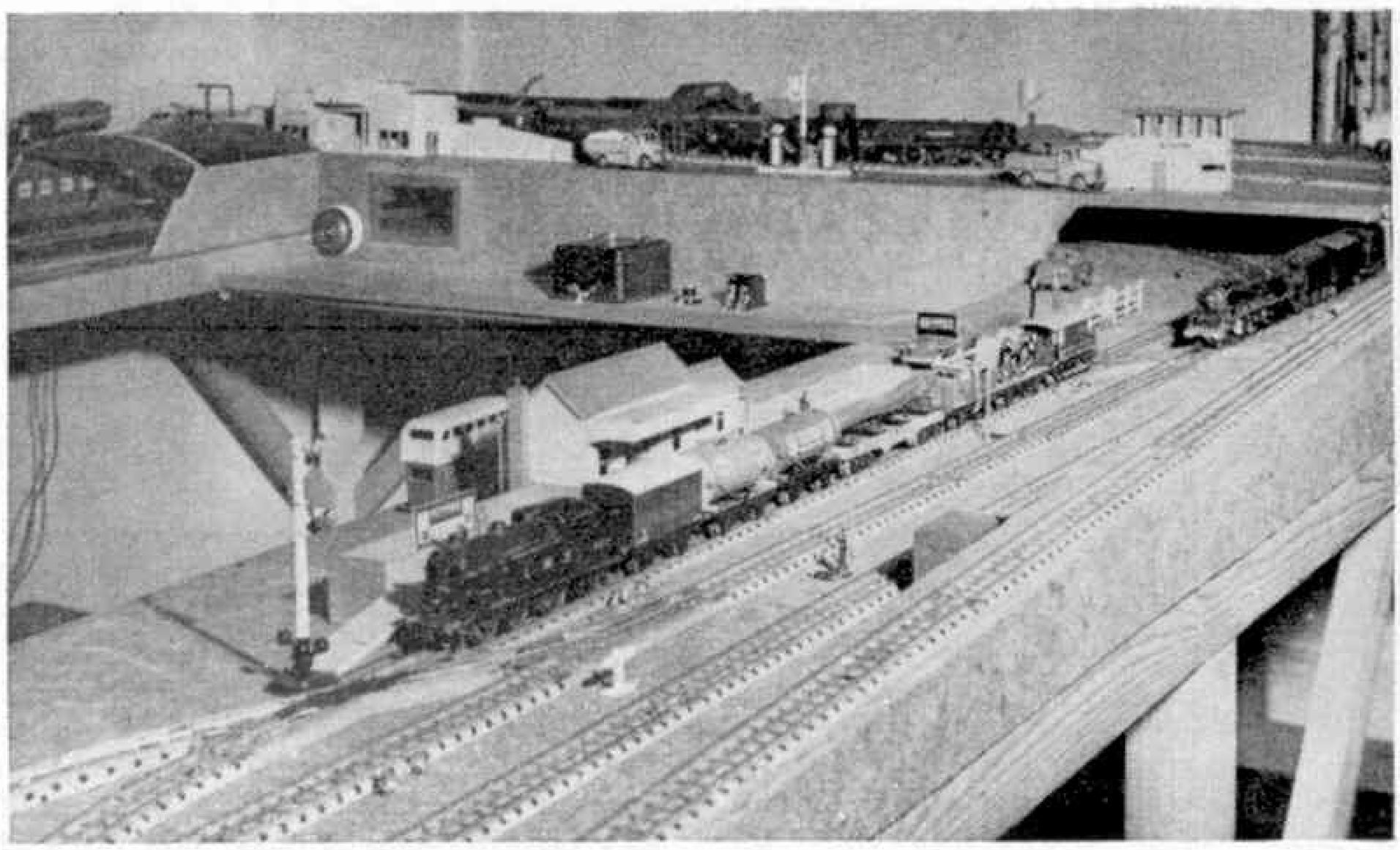
You will be able to get the Mail Bags separately as well, although each T.P.O. Mail Van is provided with a couple of them. They are slippery little customers and now and again they can get lost.

Some of you will probably want to include the T.P.O. Van in your passenger trains, which will be quite in order. But take care to place it next to the engine. Then if any Hornby-Dublo passenger pops his head out of the window it will not encounter a mail pouch hanging on the wayside standard! It is possible to see real trains where a T.P.O. is part way along the train, but the vehicles ahead of it will not be passenger stock or, if they are, they will part company with the rest of the train at a stop before the T.P.O. apparatus is to be used.

In a real train carrying mails alone the position of the operating T.P.O. Mail Van will be arranged as required for postal business. In Hornby-Dublo you can assemble a *Postal Special* with, say, two T.P.O. Mail Vans, and one or two of the long wheelbase Ventilated Vans, the latter carrying mail not requiring to be handled on the journey, except perhaps at stations.



A train of Vans, including two long wheelbase ones, hauled by a 0-6-2T, passes some empties in charge of a Hornby-Dublo 2-6-4T. Other vehicles are in the siding in the background.



A Neat Two-Level Layout

PETER BARR, a keen *M.M.* reader and Hornby-Dublo owner, a little while ago sent us details of his layout, which is illustrated on these pages. It is still in course of development. So far not a great deal has been done towards the building up of lineside effects, but for our purposes this has the advantage that the track and its immediate surroundings are shown very clearly in our pictures.

Those who are interested in layout diagrams, and most Hornby-Dublo owners are, will be glad to see the plan on the opposite page of this railway, with a list of the rails, etc., required for it. The layout requires a space of approximately 10 ft. 6 in. by 6 ft.

The illustration above gives a good general idea of the two-level Hornby-Dublo layout of Peter Barr. In the background is the high level end of the system, from which the inclined track to the right of the picture leads down to normal level. A goods train is passing through the wayside station, while another train, Duchess-hauled, is just beginning to overtake it.

It is obvious from the illustration above that the railway is built up on a well-framed and stoutly supported base. This is a good start because a firm level foundation is necessary for satisfactory track layout and good running. A railway is, as you know, only as good as its track. More careful attention is being given to this aspect of miniature railway construction nowadays, and this is all to the good.

The double track main line and the inner circuit shown in the diagram are laid at normal baseboard level. Special interest is given to the layout by a high level section at one end of the main oval. This is reached by means of an incline from the outer main track. The tracks at normal level are carried underneath the high level section by a sort of covered way rather than an actual tunnel, a total of four tracks being involved. The extent of this raised section is quite plain from an examination of the three illustrations, and it is a very attractive feature, in both appearance and running.

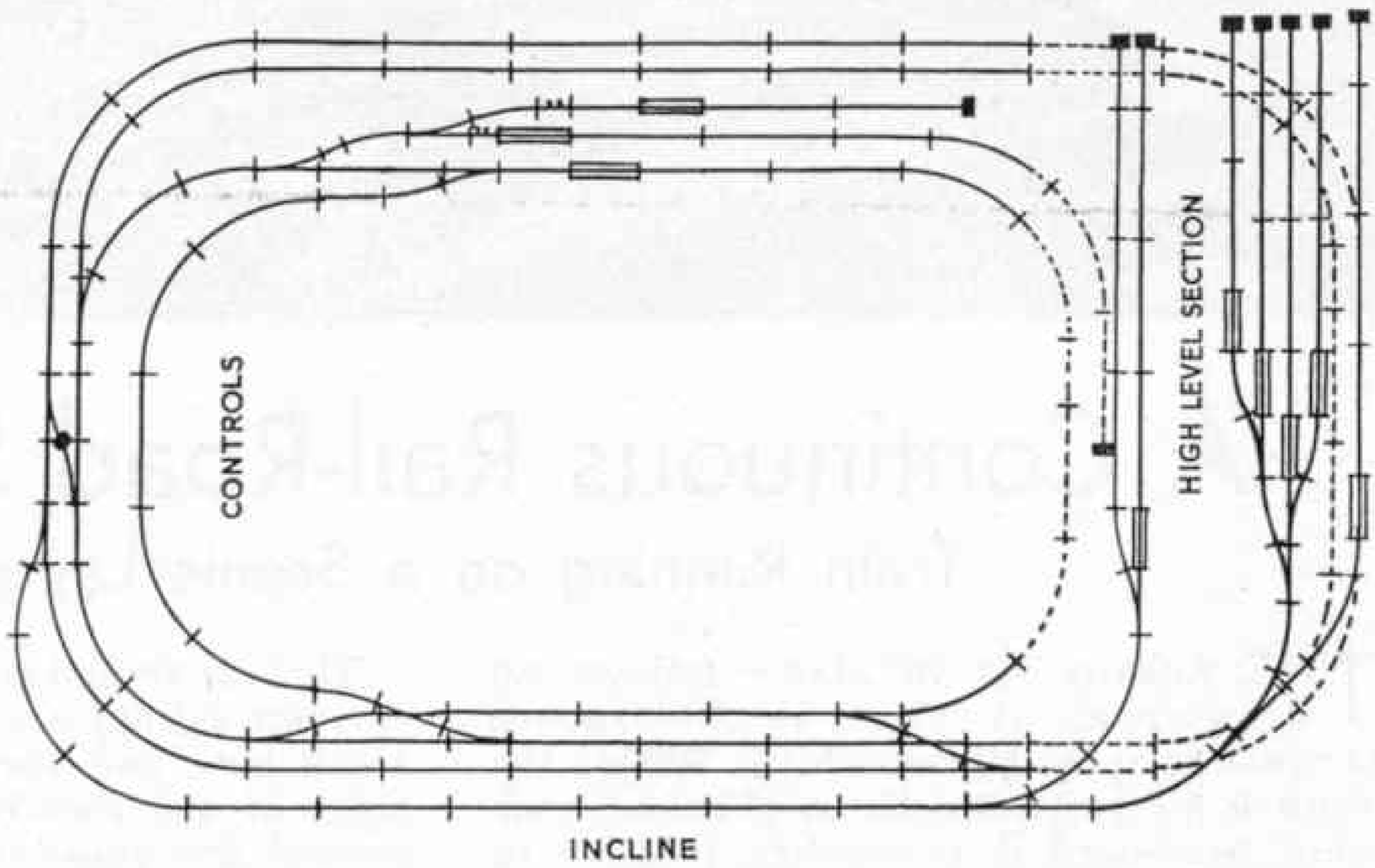
The opening that you can see in the wall of the covered way, to the left of the Controller, is actually an inspection "window." This is specially useful because one of the tracks inside the covered way is a siding ending in a Buffer Stop and movements along it have to be carefully managed by the operator. The opening has other uses too, particularly if any slight mishaps occur. Such things *will* happen in a tunnel, if they happen at all!

The high level section forms the neat terminal layout shown in the lower

illustration on this page, providing for both passenger and goods traffic. In addition to the standard Hornby-Dublo Main Line Station, there is a length of plain platform that can be used for passenger trains if necessary, and for certain types of goods traffic as well. A freight train is actually shown leaving this platform in the picture below.

The Uncoupling Rails on this layout have been strategically sited so that the fullest advantage of the tracks concerned is afforded in the matter of train length. You will notice in one of the sidings a train of coal wagons reaching from the Uncoupling Rail to the Buffer Stop, just as they have been left by the engine concerned.

Although only one Controller, of the older D1 pattern, is shown in the illustration, there are in fact two others at the opposite end of the operating space, as the railway really consists of three main sections. The Controller shown looks after the branch track, incline and high level section. A second governs the outer main line track, and a third is responsible

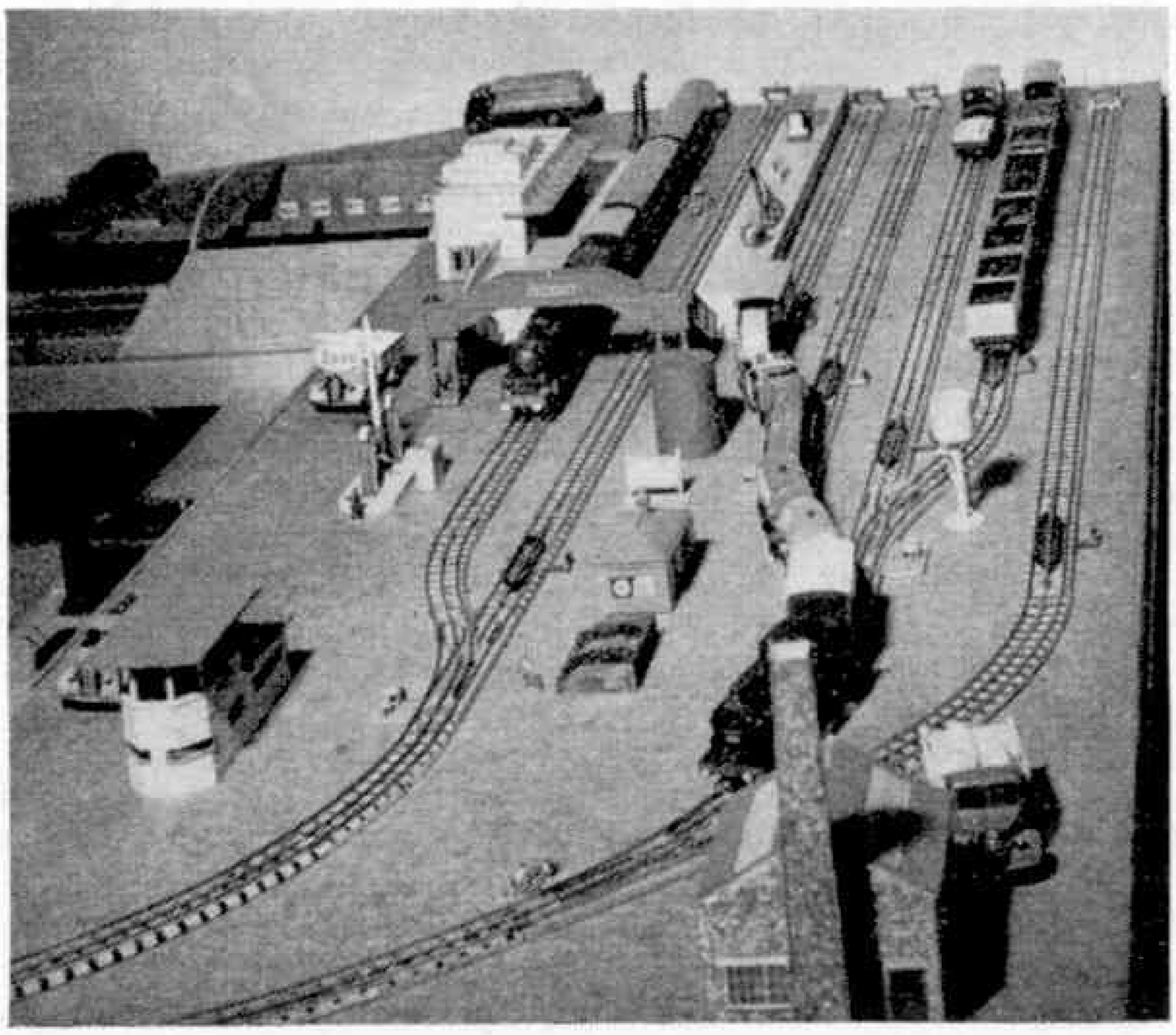


Peter Barr's layout requires the following rails, etc.: 22 EDA1; 2 EDAT1, 7 EDA2; 1 EDAT2; 13 EDA1½; 65 EDB1; 22 EDB1½; 6 EDB1¼; 2 IBR¼; 2 Switches D2; 9 UBR; 2 Diamond Crossings Right-hand, EDCR; 4 EODPR; 7 EODPL; 10 Switches D1; 2 ISPR; 4 ISPL; 9 Buffer Stops D1.

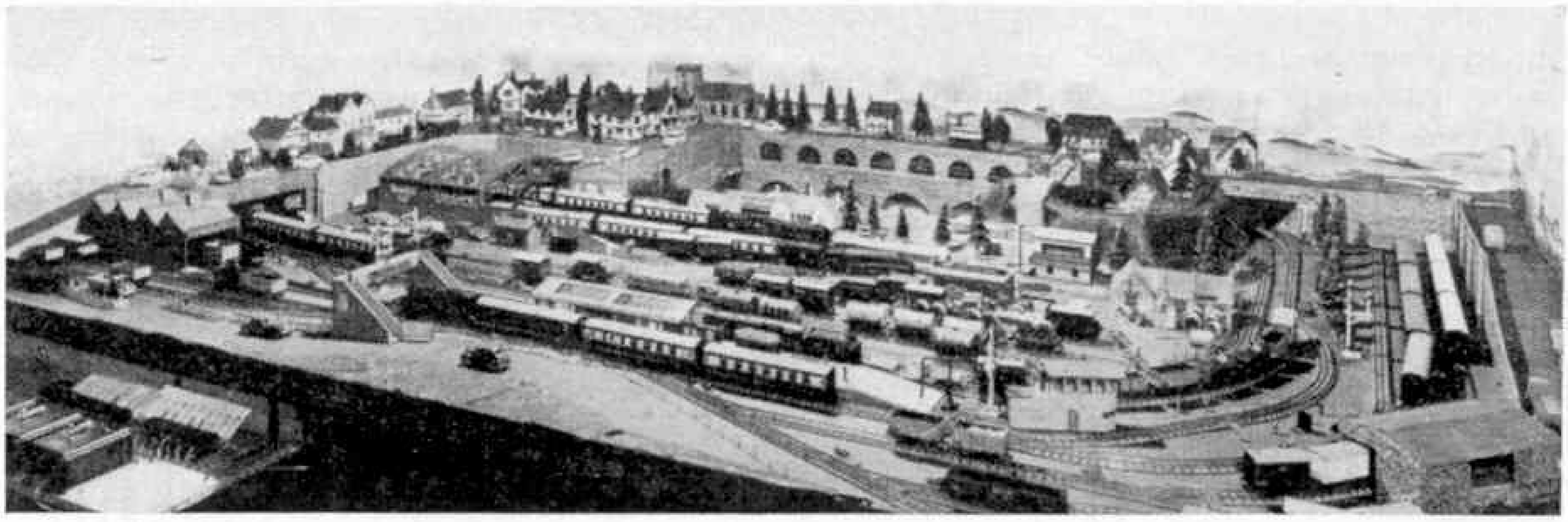
for control of the inner main track. There are various individual sections arranged by means of Isolating Rails and Switches. Two of these, as well as a push button switch for an Electrically Operated Uncoupling Rail, can be seen in the picture at the top of the opposite page.

In addition to the railway incline from the ordinary to the high level, there is one for road traffic on the opposite side of the board. This provides easy access for cars, taxis and lorries to the passenger station and goods depot. This matter of road access is a point that, in miniature, is not always given the attention it deserves, even on well developed systems.

As might be expected, the railway gives a great deal of pleasure to its owner, and to those of his friends who at times take part in joint operations. That is one reason why the various Controllers are not grouped together—the railwaymen cannot easily get in each others' way!



A fine view of the passenger station and goods sidings on the high level section. A loaded freight train is just leaving the yard.



A Continuous Rail-Road System

Train Running on a Scenic Layout

THE railway shown above follows an arrangement that is becoming increasingly popular nowadays. Within the more or less restricted limits of the average train baseboard it is scarcely possible to develop the lineside very extensively, for a continuous main line is a necessity for long through runs and the space inside the main oval is usually required for sidings and other track developments. This means that scenic features cannot be accommodated there. So those who require something more than a plain scenic background often solve the problem reasonably well by the inclusion of a tunnel section providing a raised base, on which part of a picturesque township can be arranged.

The layout we show here has been developed on these lines by Mr. R. Halton Balderstone, who has managed to include not only a great deal of railway, but also a fair amount of town or village in the layout. In the centre of the system is a terminal station known as *Chester*, the branch on which it is situated being connected to the inner main track. Soon after the junction points the line is carried below the raised section, which stretches approximately half way round the system.

In the foreground of the view above, to the right of the operating panel, is another station known as *Altrincham*, which has virtually two goods yards, one inside the main oval and the other outside it, with a separate small yard for coal traffic. This is a good feature, typical of so many real stations, and it gives splendid scope for the use of road lorries—Dinky Toys, of course—and for the development of simple, but effective things like a coal office, coal pockets and so on.

There is also an engine shed. In addition, carriage sidings are connected to the main track here and these can be seen at the right of the illustration, stretching away toward the supporting wall of the raised scenic section. So *Altrincham* is quite a busy place.

There is plenty of traffic on the line, as is evident from the picture above, and the lineside effects introduced fit in with the general scheme of things. There is for instance a small factory building devoted to making of cable drums, several of which appear in the works yard. Naturally, there are plenty of the correct Hornby-Dublo Low-Sided Wagons to convey the products of the factory to various destinations.

The section where the track passes below the town is not entirely covered in, and the arched openings in the wall seen in the background of our picture allow trains to be watched during most of their underground passage. In addition to this there is a suitable hole in the baseboard that is reached from underneath, so that the owner can deal with any problems that arise in the tunnel section. Road access to the different stations is provided and Dinky Toys motor vehicles make up the traffic on the roads. Appropriately, there are several Double Deck Buses, Dinky Toys No. 290, which are just right for Hornby-Dublo layouts.

There are three separate main sections, each with its own power supply and control arrangements, so that independent operation is possible. There are the requisite insulating arrangements between the various sections at Points connecting them, but these do not prevent through running from one section to another when the operating programme calls for this.

Club and Branch News

WITH THE SECRETARY

ON KEEPING IN TOUCH

With the months of major indoor activity now behind them the members of Meccano Clubs and H.R.C. Branches are looking forward to the outdoor season immediately ahead, with its familiar lighter schedule of rambles and cycling runs, games in the open, visits to places of interest, and so on. I hope that history will repeat itself and that, as last year, the majority of Clubs and Branches will maintain contact with their members throughout the summer. It is a mistake to "pack up" completely, and Clubs and Branches which do so always find, when the time comes to resume regular indoor meetings, that in the meantime some of their members have found other interests.

CLUB NOTES

Stourport-on-Severn County Secondary School M.C.—Regular weekly meetings are being held, to which members bring their own Meccano outfits, and build both individual and combined models. The Club's first model-building competition produced some good results, and a prize of 5/- worth of Meccano accessories was awarded for the most interesting and original model. A fine model of the Tower Bridge is being attempted by David Harrison, the youngest member. A visit to the London Schoolboys' Exhibition was greatly enjoyed. Club roll: 7. *Secretary:* D. Coghlan, 2 Flat Parkes Passage, Stourport-on-Severn, Worcs.

St. Thomas (Exeter) M.C.—Attendance has been well maintained. At a recent meeting, Mr. Hodder, the Leader, presented a book to David Drinnan, the only member who has remained with the Club since its formation. A table football game has been bought with Club funds, and is very popular. Light refreshments are sold at Club meetings. Club roll: 25. *Secretary:* E. Milton, 17 Beaufort Road, St. Thomas, Exeter.

Mile End (Portsmouth) M.C.—The Club continues to be very busy. A "Gadget" Night, when members submitted anything they had constructed at the Club or at home, was most successful. The outstanding "gadget" was an Episcope, constructed of Meccano parts. It projected photographs, postage stamps, etc., on to a screen. Members have been constructing improvised "footlights" from Meccano parts, for use at a forthcoming concert in aid of Club and Branch funds. It is planned to start a Club and Branch magazine, and several enthusiastic members have already submitted articles for it! A Dinky Toys Night was very popular. Club roll: 28. *Secretary:* Mr. A. J. Nicholson, 213 Sultan Road, Buckland, Portsmouth.

BRANCH NEWS

Hale End (London)—In addition to the normal meetings a Social has been held at which members enjoyed themselves in lighthearted manner. Typical party games and favourite records were played, and light refreshments served. On the modelling side, the miniature car enthusiasts are busy on a new design of a larger and more powerful car, several of which are to be produced. *Secretary:* A. Coe, 463 Hale End Road, Higham Park, London E.4.

Stourport-on-Severn County Secondary School—Since its formation the Branch has held regular weekly meetings, at which members have combined their layouts; this has made possible very interesting and varied working. Some members are engaged on the construction of a permanent Branch layout. The Branch joined forces with the associated Meccano Club for a visit to the Schoolboys' Exhibition, London. Another outing was to Kidderminster Town Hall to see a British Transport Commission film show. *Secretary:* R. F. Drew, 87 Brindley Street, Stourport-on-Severn.

Mile End (Portsmouth)—Branch activities have included planning layouts for a forthcoming Exhibition and Open Night, and drawings have been prepared siting the various lineside effects. An interesting talk on *Correct Signalling* was given at one meeting by Mr. P. Leggatt, a former member of the Branch, and demonstrated on his extensive clockwork layout. The Branch Hornby-Dublo and Clockwork layouts were well patronised at the recent Exhibition and Open Night. *Secretary:* Mr. A. J. Nicholson, 213 Sultan Road, Buckland, Portsmouth.

AUSTRALIA

St. Kevin's College (Melbourne)—Meetings are held fortnightly. An extensive electrified gauge 0 layout, of the continuous type, has been adopted. A successful Exhibition was put on at a College Fête, when the Branch had two layouts, in gauges 0 and 00 respectively, in operation. Interesting talks have been given by Mr. Hewett, of the "Puffing Billy" Preservation Society. *Secretary:* I. Weickhardt, 3 Mars Street, South Caulfield, Melbourne, Victoria, Australia.

Part of the Cape Peninsula M.C.'s display at the Hobbies Fair, Cape Town, last autumn. The two Club members "behind the counter" are Robert Bernstein (left) and William Neilon, who built the fine Meccano transporter bridge immediately in front of him. The Club are regular exhibitors at this important annual Fair, which last year attracted some 33,000 visitors.

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For other Stamp Advertisements see also pages 208 and xviii

Stamp Collectors' Corner

By F. E. Metcalfe

MORE STAMP MAKING

LAST month I promised more about the making of postage stamps, and now come to the question of the various processes used in the printing of the bits of paper that fascinate us so much.

The first kind of stamp to deal with is that known as line-engraved. This designation almost explains itself, though we also describe it as recess. The name recess perhaps explains the method most clearly, for the printing plates have the design cut into them and the resulting recesses are filled with ink by passing an inked roller over them. The paper is then pressed on the plate, whereby the ink is transferred to it to effect the printing.

It is often necessary to know if a stamp has been printed by the recess process or not. One way of telling is to press a piece of tin foil, perfectly smoothed out, on the stamp. Then rub the foil lightly. If the stamp is recess, the design will show up on the foil, because the ink on the stamp is slightly raised above the area of paper that is bare of design. Many British Colonial stamps are recess printed, as are all of modern Canada, and a number of those of New Zealand and Australia.

Next we have the typographical method of printing. Ordinary type is used for this method. As this process is well understood, I need not go into details. The ordinary stamps of Ireland are typographed.

A very popular method used today for printing stamps is photogravure. This is a much more complicated process to describe, but I will try to simplify my explanation as much as possible. To begin with, the design is photographed on to a glass negative. It is from this that a glass positive is made up, and this latter contains as many reproductions of the design as are needed to make up a sheet of stamps.

Having made up the positive a carbon tissue is made. This is paper coated with gelatine, colouring matter and potassium bichromate, and a print is made on this from the glass positive. The tissue is then pressed on to a copper plate that has been prepared with a coating of finely powdered resin. The carbon print is then developed and the paper backing is removed, leaving the print on the metal, which can then be etched to form a printing surface reproducing the design.

This is the bare bones of the process, which I have set down as simply as I could. Those who want to go more deeply into the matter can go to the reference department of the local public library, and get books which should be found there that explain the whole process. Our own British stamps up to the 1/6 value are examples of photogravure printing.

Lithography is the only other printing process about which we need concern ourselves. In this the impression is obtained from a metal plate by the use of a special ink. Examples of lithograph printing are common, though it is the least satisfactory method to obtain clear impressions.

Now having obtained our stamps, we come to what is very important to collectors—the process of perforating. Stamps are generally perforated by either the line or comb methods, and these designations give a clue as to how stamps receive those small punch holes that so facilitate separation of stamps from sheets without tearing.

We all know that the first stamps to appear were the Penny Black and the Twopenny Blue, and these were imperforate. Mark this term; it is incorrect to talk about "unperforated" stamps. The machine invented by William Archer to perforate stamps did not come until later.

We say that stamps are line perf. when we mean that only a single straight line of perforation has been applied to a sheet at a time. When we refer to comb perforation we are describing the system where not only a straight line of holes, but also short vertical lines, branching out from the lower horizontal row in the form as it were, of a very wide-tooth comb, are being punched in one operation.

Harrow perforation is used in some instances. In this more than one row is punched in one operation, both horizontally and vertically. A half or even a full sheet of stamps may be perforated at one go. Collectors are greatly interested in the various methods of perforating employed, and when I compiled the Commonwealth Catalogue, I included the information.

Many young collectors will wonder what it is all about when they see in the catalogue, say, Perf. 12(L). The explanation is that the method used was line, and that there are twelve holes in a length of 2 centimetres, C instead of L means that comb perforation had been used.

Don't forget that it is very important to learn how to use a perforation gauge correctly, for a perf. variation may mean a question of pounds.

There are all kinds of fancy perforation gadgets, but I find that one made of cardboard and costing about 9d. does the job quite well. With one of these, it is just a question of fitting the dots exactly into the perforations of the stamp.

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Stamp Gossip

TREASURE TROVE

WHEN we talk about stamps being found that are worth thousands of pounds, we usually associate such lucky strikes with attics. But stamp collectors know differently, for they have all heard of what can be discovered over the post office counter! The latest find of this kind resulted in a nice Christmas box for the man in Kent who bought a sheet of imperforate 2d. stamps issued from the Dartford Post Office for £40, which when sold piecemeal should result in the sum of not much less than £10,000 being collected.

Postage stamps have a great fascination for many. Probably the monetary angle has a good deal to do with that fascination, and finds such as this whet the appetite, without a doubt.

WATERMARKS

Recently several readers have written about a new watermark for Colonial stamps, and have asked on which stamps it can be found. The answer is that at the time of writing, except the stamps of Great Britain and the overprinted for Morocco Agencies, etc., none has appeared with the new watermark, in spite of the fact that it is a year since the Crown Agents first announced the impending change.

What that change was to be has been explained previously. But for those who do not know, it can be mentioned that the watermark on most Colonial stamps at present current has the Crown that with some imagination is called Tudor, and it is proposed to alter the shape of the crown to that of the St. Edward's type. The difference between the two can be judged roughly if the watermark of our own British stamps of a year or so ago is compared with that on current stamps.

I don't think it will be long now before there is a Colonial change, but it has been stated that the new St. Edward's Crown watermark will only come on entirely new stamps. In the case of the watermarks, two kinds will be in use, with the Tudor crown for some stamps, and the St. Edward for the others. It is going to need very skilful management if crosses are to be avoided.

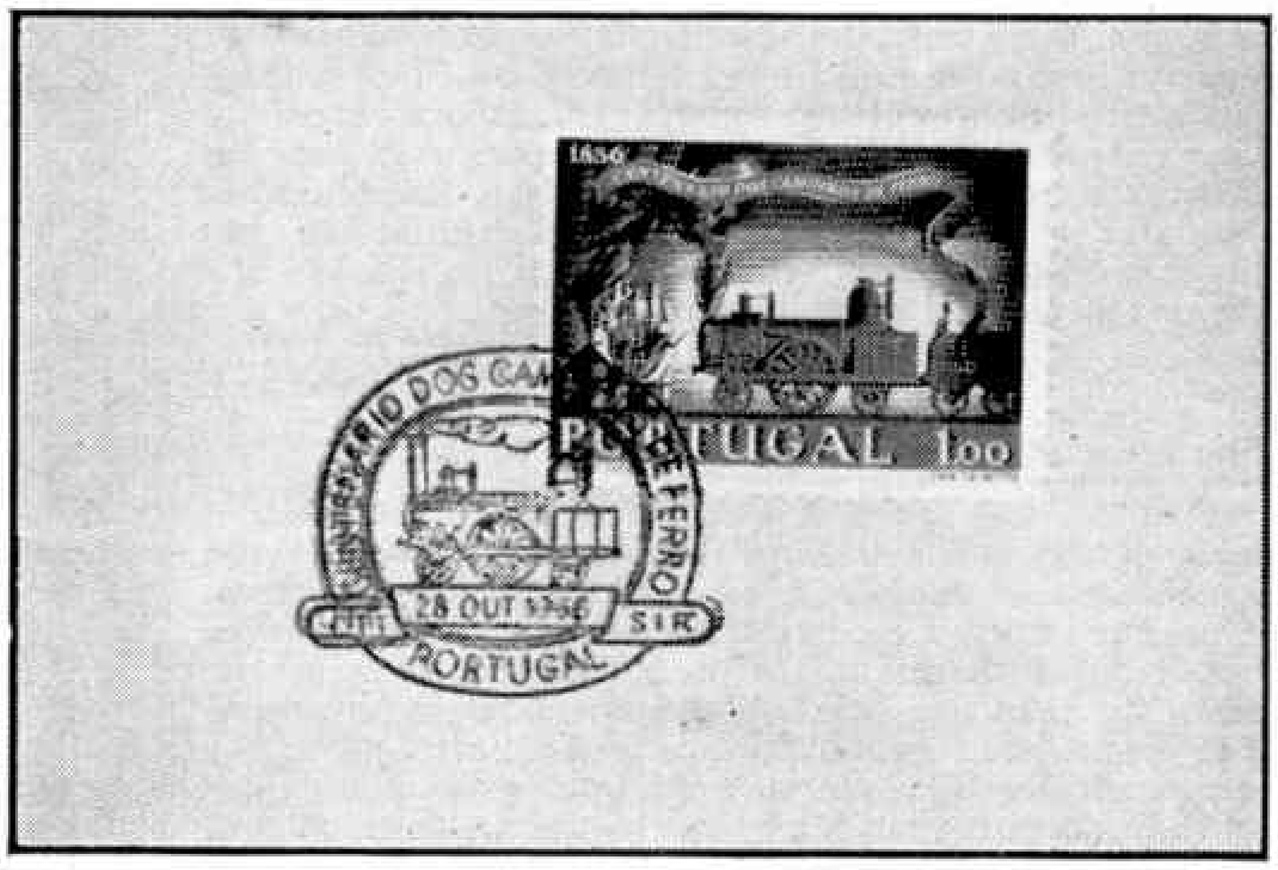
COMMEMORATIVES

I suppose that gradually the opposition of our Post Office to the issue of special stamps to commemorate important events is being overcome. In the meanwhile other countries, all of them, do mark centenaries, etc. with sets of stamps, and one of our illustrations, with a really wonderful postmark, as well as an attractive stamp, has to do with one of these. It shows one of a fine set of four. The illustration is from a cover very kindly sent by Sr. Carlos Barradas. It has been issued by Portugal to mark the centenary of the first railway of that country.

Many countries have commemorated similarly their first railways. The one notable omission is Great Britain, the country that had the very first!

KING COTTON

Recently a reader sent me a stamp similar to that of Argentina that is illustrated on this page, with a request to be told what kind of a flower was depicted. Well, actually it is cotton that is shown, but the object behind the production of the stamp is also interesting and that is why I am asking the Editor to illustrate it. Agentina was ruled for a time by Col. Peron. During his regime, several of the provinces were renamed according to the dictator's fancy. Peron fell, as do all such sooner or later, so back came the old titles. The Chaco is a hot place in summer at least, as I well know



first hand, but seeing that more cotton is grown there than in all the rest of the republic, the design of the stamp selected to signify the change has been aptly chosen.

THE MONTH'S TIP

It is a real special tip this month, to make up for my omission last month, and as the stamp belongs to one of the countries in the Commonwealth most popular with collectors it should be particularly welcome.

Most collectors who go in for our own stamps know the "Arms" issues of New Zealand. These run up to a face value of £50, but you will only find those up to £5 listed in the catalogues, because the theory is that all stamps above the latter value are only used fiscally. This is certainly not true about the £10 stamps, for they are quite often seen on air-mail packets, but that is another matter.

In June 1953 an "Arms" type stamp was issued with a face value of 3/6d., and overprinted in black, because the lettering on the stamp did not show up well, on which the type on the top and bottom panels had been altered from letters with serifs to letters without. Quite unobtrusively, in November 1955 the stamp was withdrawn, and it is now becoming evident that nobody bothered much about the stamp during its currency. It is therefore scarce. I have proved how really scarce the stamp is, either mint or used, for I have been informed officially, that only 40,000 copies were printed, and some of these were not even sold.

Now see if you can find a copy, at anything up to 10/–, and if successful, I think you will have found a bargain. But study the illustration carefully, and take care that you get one with the inscriptions of the type shown on it.

The C.P.R. Canadian—(*Continued from page 163*)

respectively as *Chateaux* and *Manors*. The former have such names as *Chateau Montcalm* and *Chateau La Salle*, all those of historic French Canadians, while the Manors, among them *Cabot Manor* and *Wolfe Manor*, similarly associate English speaking celebrities from Canada's history. Even the dining cars have names, taken from those of famous rooms in Canadian Pacific Railway hotels.

The cars are built of stainless steel, so that it is a shining train that crosses Canada on daily service in each direction. The colour is relieved by a maroon band above the windows, in which on each side is the name "Canadian Pacific" in gold, with other maroon lines running horizontally, while the names of the coaches are reproduced on the sides, also in maroon.

At the front end of the train there is a striking colour contrast, for there the diesel engines are finished in Tuscan Red with gold lining, relieved by Planish Grey strips running from front to back, this colour extending over the cab fronts. Over the greater part of its journey *The Canadian* is hauled by a two unit combination. One unit is of the A type, which has a driving cab, and the second is of the B type, which has no cab. In the mountain section a third unit is added.

The Polar Postman has Wings—

(*Continued from page 173*)

air mail network. Certainly they are as efficient as those spanning the world's most highly populated areas. Thus the letters I receive from a friend in Kiruna, the important iron mining town 100 miles north of the Polar Circle in Swedish Lapland, reach me in four days, sometimes less. An offshoot of airmail services to the towns of Northern Norway fly mail every Christmas to the coal miners in Spitzbergen, the archipelago that stretches to within 450 miles of the North Pole itself.

Likewise the men of Canada's Arctic weather stations receive their Christmas mail by air. Royal Canadian Air Force transports make regular deliveries to the chains of weather stations and radar outposts that span the Canadian North to within 500 miles of the North Pole. And U.S. Air Force long range transports act as postmen for the great new air base at Thule in the extreme north-west of Greenland. Only a few years ago this was a small Eskimo settlement that normally enjoyed one mail delivery a year—by boat through the pack ice.

The scientific outposts that the United States has maintained on the floating ice islands that revolve around the North Pole receive their mail by air—sometimes by parachute. And we can be sure that the men of Russia's Ice Island Outposts get their letters by Air Mail too. Indeed, by all accounts the Soviet Union has fully developed aviation in its polar regions.

Meanwhile several major companies are planning to supplement the new Scandinavian Airlines Norway-Japan (via the Pole) schedule, and the even newer Canadian Pacific "short cut" polar route between Europe and Canada's Pacific coast. And no doubt, in time, when the nations of the world once again settle down to normal relations civil air services will operate between Europe and Asia across the "Russian Arctic," thereby knocking many more hours off present passenger schedules—and trans-world air mail services.

Fish Ladders and Lifts—(*Continued from page 180*)

consisted of two parallel rows of aluminium tubes strung diagonally across one end of a reservoir. The total length of the screen was some 300 ft. and electrical impulses, produced by special equipment, were sent across the rows of tubes. There, too, fish suffered no ill-effects from the mild shocks used to divert them, and an adaptation of this screen is now in regular use at Loch Poulary, in Invernessshire. It has been erected about half-a-mile downstream from the trap, and its purpose is to prevent salmon crowding round the entrance to the trap.

In all this work of fish preservation the North of Scotland Hydro-Electric Board has earned a distinctive place among international hydro-electric power undertakings. The Board's activities in this field are accepted as models everywhere and each year their schemes are visited by experts from abroad, anxious to learn how salmon stocks can actually be improved, rather than despoiled, despite massive hydro-electric development.

Easy Model-Building—(*Continued from page 183*)

with two Formed Slotted Strips. For the roadway you should use a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate attached to an Angle Bracket bolted to the upper end of the cylinder.

Parts required to build the Swing Bridge: 2 of No. 1; 4 of No. 2; 9 of No. 5; 8 of No. 12; 1 of No. 17; 1 of No. 19g; 4 of No. 22; 1 of No. 23; 1 of No. 24; 1 of No. 24a; 2 of No. 35; 55 of No. 37a; 50 of No. 37b; 6 of No. 38; 1 of No. 40; 2 of No. 48a; 1 of No. 52; 4 of No. 90a; 6 of No. 111c; 2 of No. 126a; 1 of No. 187; 2 of No. 188; 2 of No. 190; 2 of No. 191; 2 of No. 192; 2 of No. 199; 2 of No. 200; 2 of No. 214; 4 of No. 215.

Parts required to build the Electric Truck: 4 of No. 2; 4 of No. 5; 4 of No. 10; 5 of No. 12; 1 of No. 16; 1 of No. 19s; 4 of No. 22; 1 of No. 35; 29 of No. 37a; 24 of No. 37b; 3 of No. 38; 1 of No. 40; 2 of No. 48a; 1 of No. 52; 2 of No. 90a; 4 of No. 111c; 1 of No. 125; 2 of No. 126; 2 of No. 126a; 2 of No. 142c; 2 of No. 189.

"THE OBSERVERS' BOOK OF AIRCRAFT"

By William Green and Gerald Pollinger

(Warne, price 5/–)

In the four years since this handy little pocket-size book became an annual reference manual over half a million copies have been printed. This new, 1957, edition contains all available details of the world's latest military and civil aircraft, from lightweight fighters and supersonic bombers to light touring planes and large civil transports. The aircraft are, as usual, arranged in alphabetical order by manufacturers' names, so that specific aircraft can be easily located.

The many excellent half-tone illustrations of the aircraft described include more than 180 new photographs, and there is a wealth of new three-view silhouettes. The text in respect of all the main types of aircraft dealt with includes details of nationality, type, dimensions, weight, engines, performance, and a brief historical summary of the machine.

There is a list of international civil aircraft markings and an excellent index.

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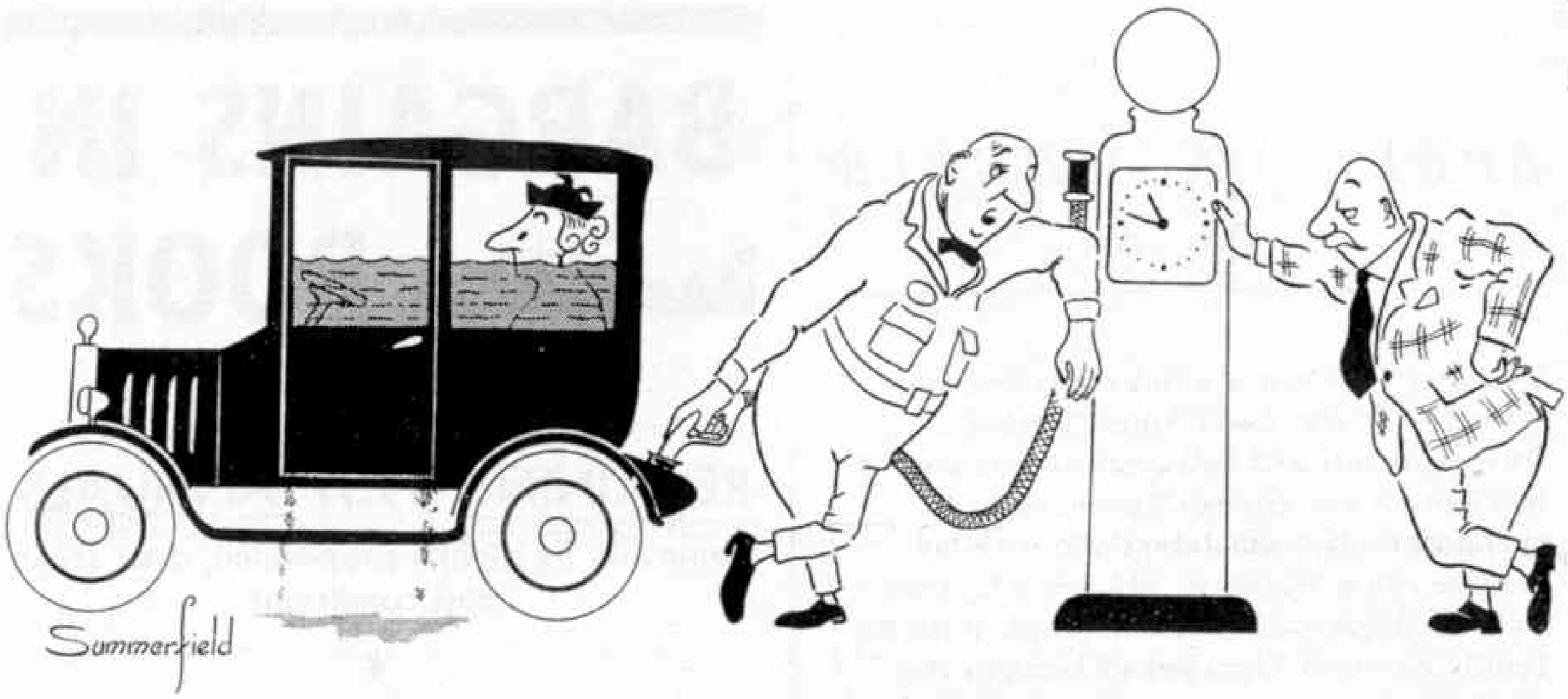


"Yes, my lord, this petrol rationing is a real worry to us garage men."

Fireside Fun

Neighbour: "Where is your brother, Freddie?"
Freddie: "He's in the house playing a duet. I finished first."

* * * *

Two farmers were grumbling to each other.
"Never did see hay grow so short as mine this summer," sighed one.
"You think yours is short," answered the other. "I had to lather mine to mow it!"

* * * *

A London actor touring in the provinces had difficulty in obtaining suitable lodgings in a small town.
One lady, showing him a dingy bedroom, remarked persuasively, "As a whole, this is quite a nice room, isn't it?"
"Yes, madam," he agreed, "but as a bedroom it's no good."

* * * *

Teacher: "Ronald, give me a definition of 'steam'."
Ronald: "Please, sir, water gone crazy with the heat!"

* * * *

Negro Soldier: "I'd like to have a new pair of shoes, Sergeant."
Sergeant: "Are you sure your old shoes are worn out?"
Negro Soldier: "Worn out! Sir, the bottoms of mah shoes are so thin ah can step on a penny and tell whether its heads or tails!"

* * * *

Johnnie: "Please let me have an ice cream, mummie."
Mother: "No, Johnnie, its too cold now."
Johnnie: "Well, I can put my overcoat on."

* * * *

Bill: "How do ghosts get in houses?"
Dick: "With skeleton keys, of course."

* * * *

Father: "Don't bring me any more bills. I can't face them."
Son: "You needn't Dad, I only want you to foot them."

Sambo: "Do you refuse to pay me dat five pounds ah lent yuh?"
Rastus: "Oh no, Sambo, Ah don't refuse. Ah jis refrains, dat's all!"

* * * *

Mike: "Did you ever speak before a large audience, Pat?"
Pat: "Well, fairly large, I did, Mike."
Mike: "What did you say?"
Pat: "Not guilty, yer honour."

* * * *

BRAIN TEASERS

THE FOUR "FIVES"

Take out the fives from a pack of playing cards and arrange the four cards in such a way that only four "pips" are visible on each. It is easy enough to arrange the first three cards so that the fifth "pip" is hidden, but how can you do it so that they all have one "pip" obscured?

* * * *

WHAT AM I?

Strike me if you will,
Treat me with disdain,
Burn me, break me, still
Your equal I remain,
What am I?

* * * *

ANSWERS TO LAST MONTH'S PUZZLES

Five Minute Crossword

The solution to the Five Minute Crossword in last month's *M.M.* is shown in the diagram alongside.

1 B	U	2 G	L	3 E
I	■	R	■	S
4 B	O	O	R	S
L	■	P	■	A
5 E	N	E	M	Y

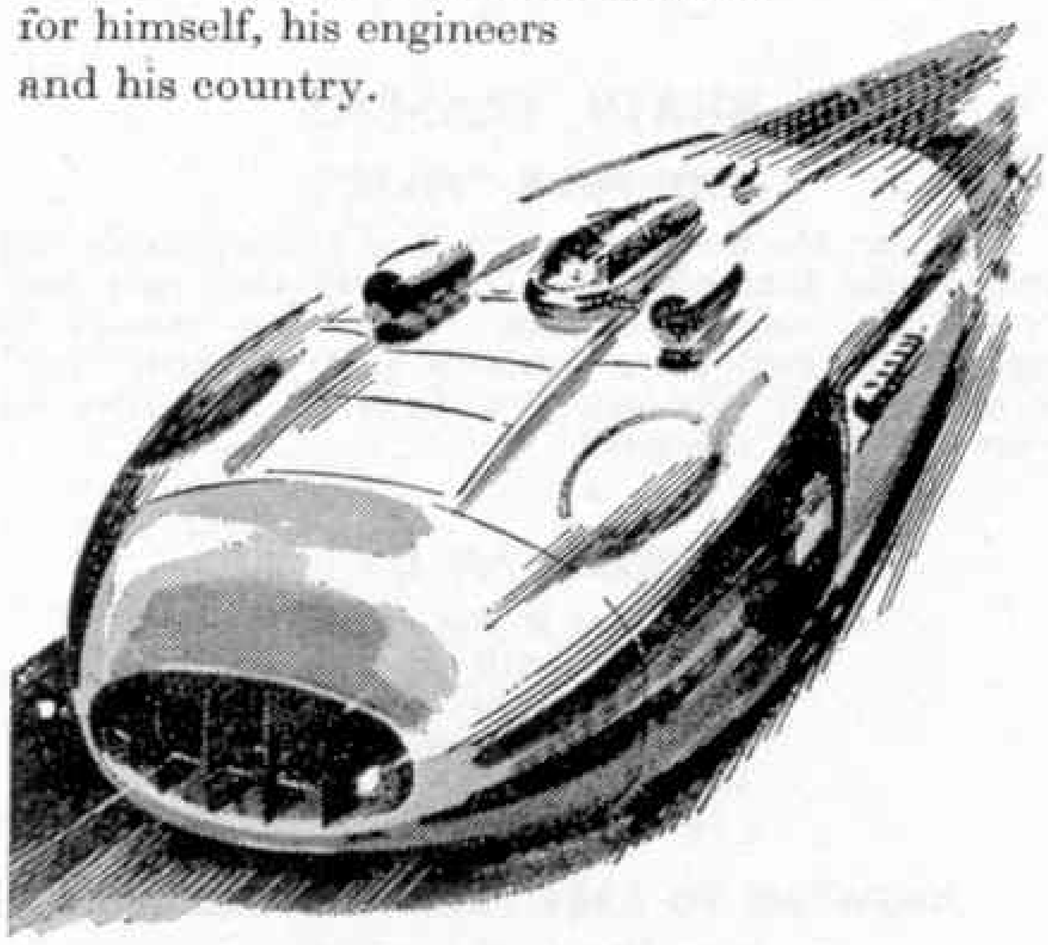
* * *

Can You Name Them?

The Meccano part names indicated by the clues given are as follows:
1. Dog Clutch; 2. Face Plate; 3. Spring Clip; 4. Rack Strip; 5. Screwdriver; 6. Bevel Gear.

SPEED ON WHEELS
No. 5

The year 1938 saw a wonderfully exciting struggle for the Land Speed Record. Two great cars and two great drivers arrived at Utah—Capt. George Eyston with "Thunderbolt" and John Cobb with his Railton. First Eyston at 345.5 m.p.h., then Cobb at 350.2, captured the record. With its tail-fin removed Thunderbolt brought the record back to Eyston at 357.5 m.p.h. In 1939 Cobb returned to Utah. His first attempt was unsuccessful, but in the early morning of August 22nd he tried again. The Railton, with its two Napier "Lion" engines, and tyres specially made by Dunlop with treads only $\frac{1}{50}$ inch thick, travelled at over 10 m.p.h. faster than any previous car. Cobb had recaptured the record at 369.7 m.p.h. and he returned to England with war threatening, having gained prestige for himself, his engineers and his country.



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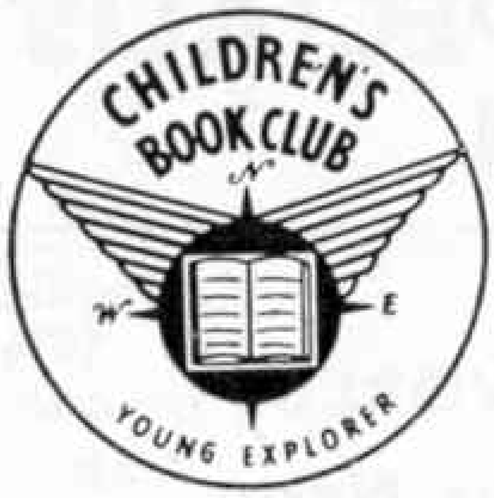

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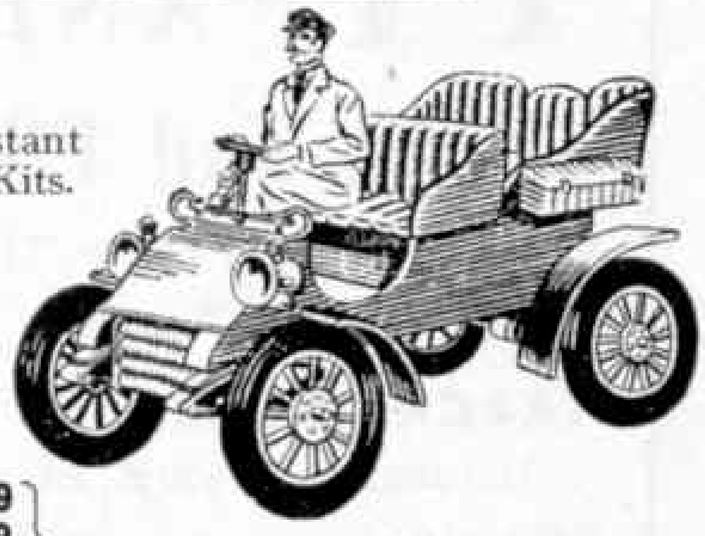

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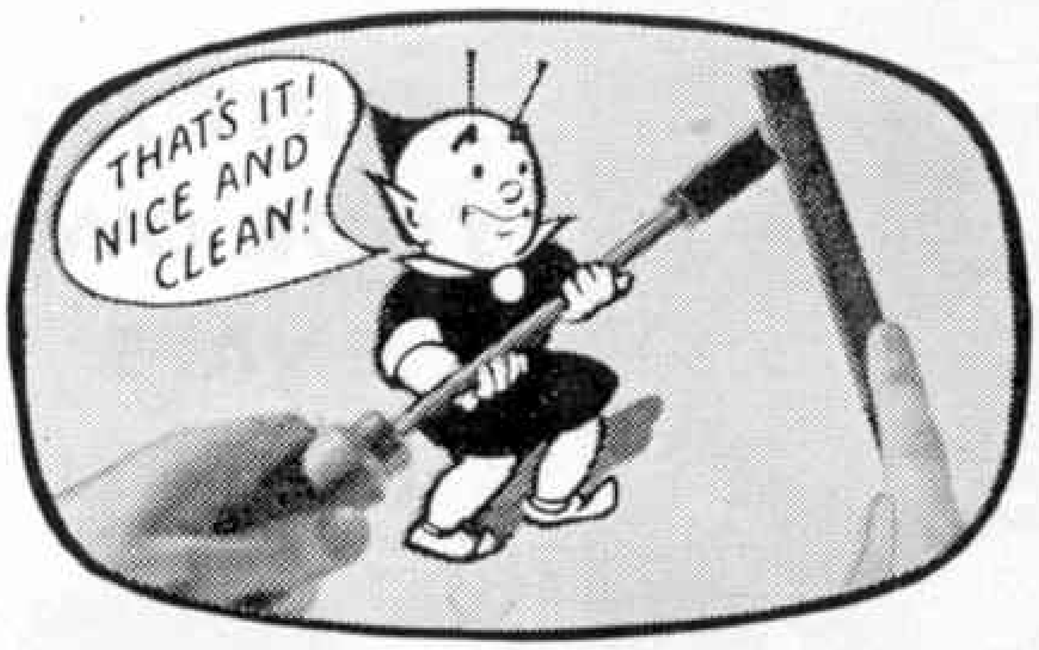

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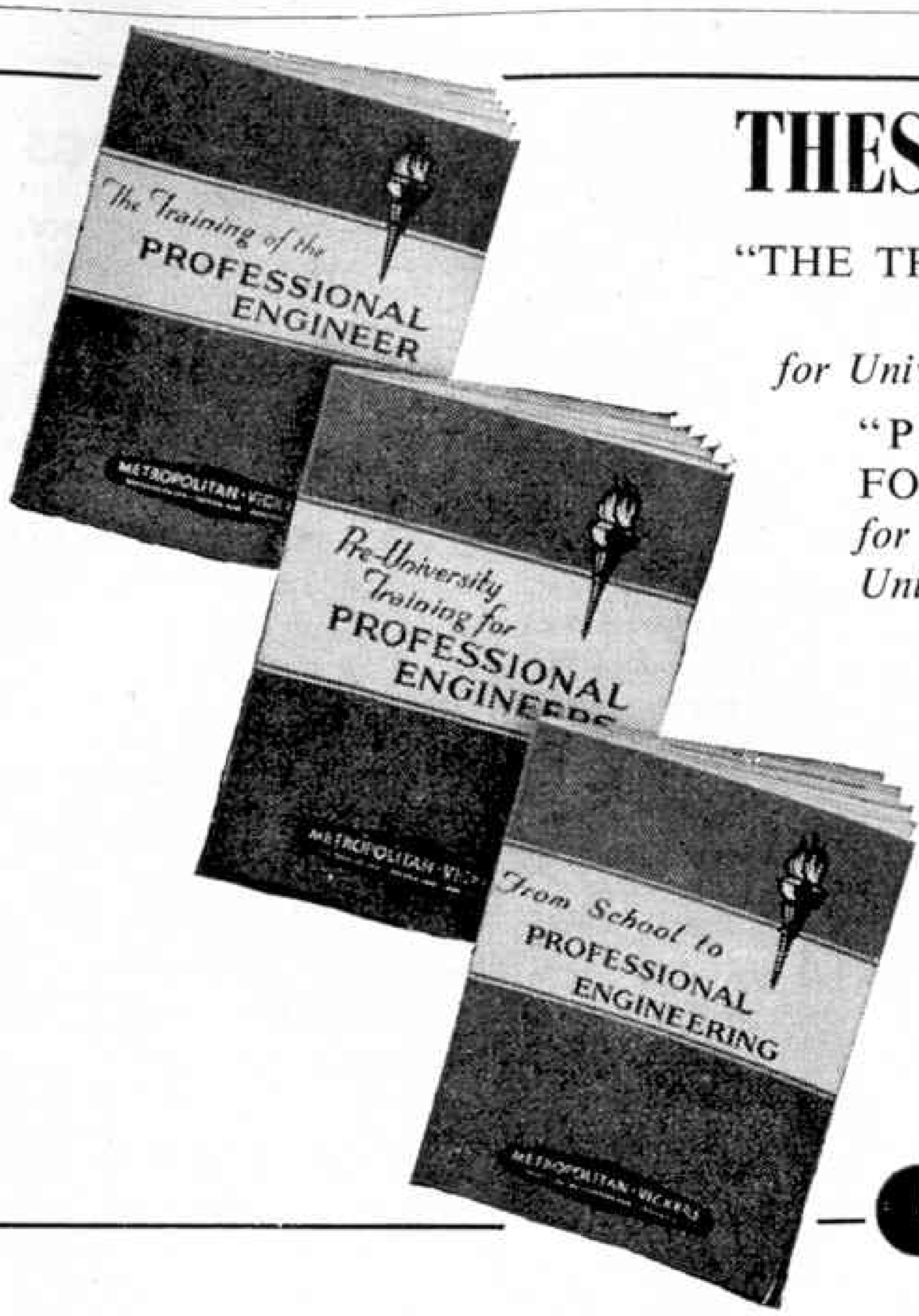

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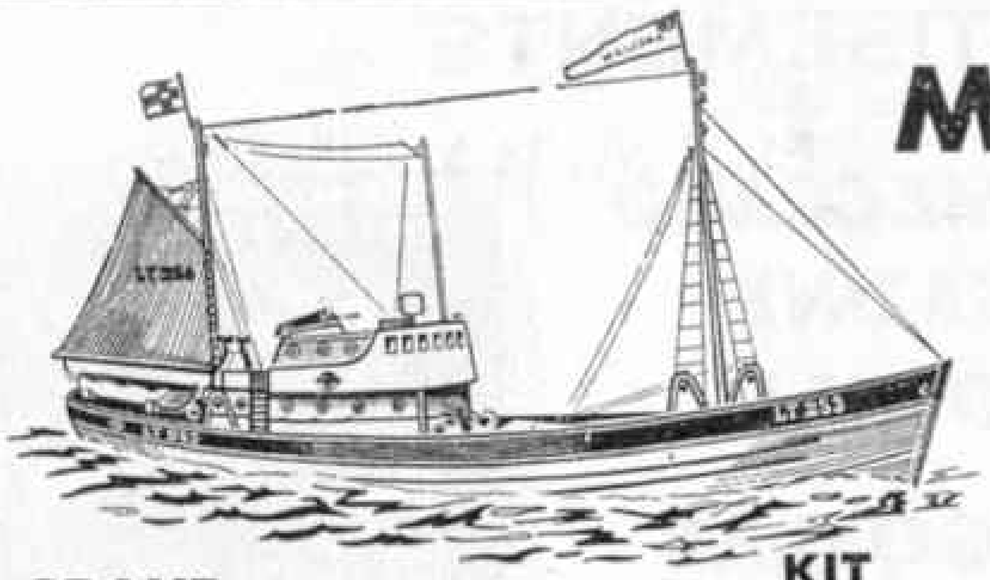

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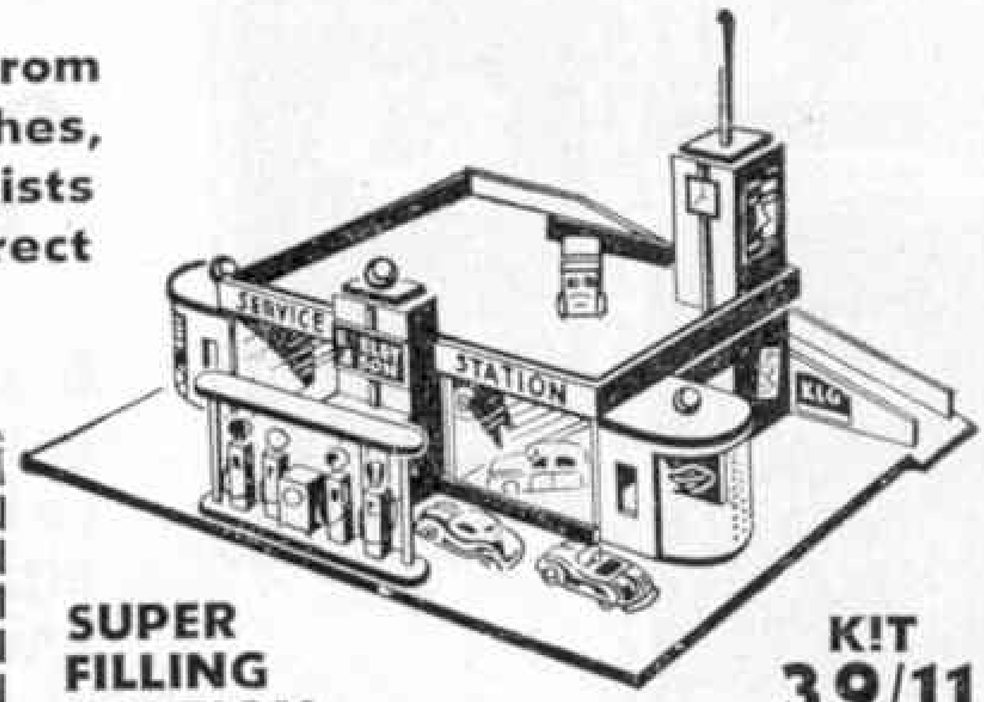

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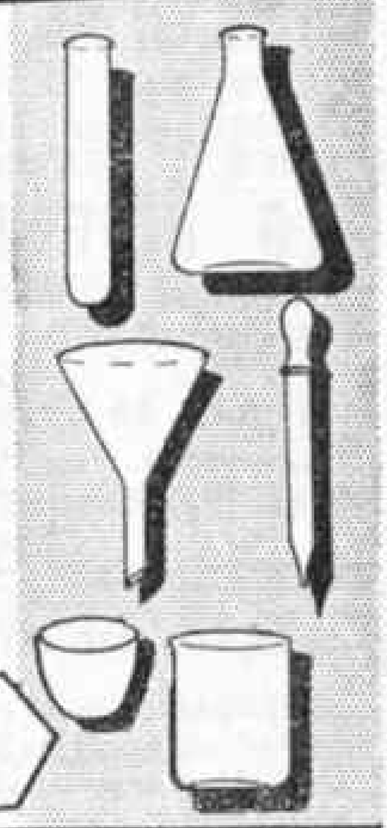

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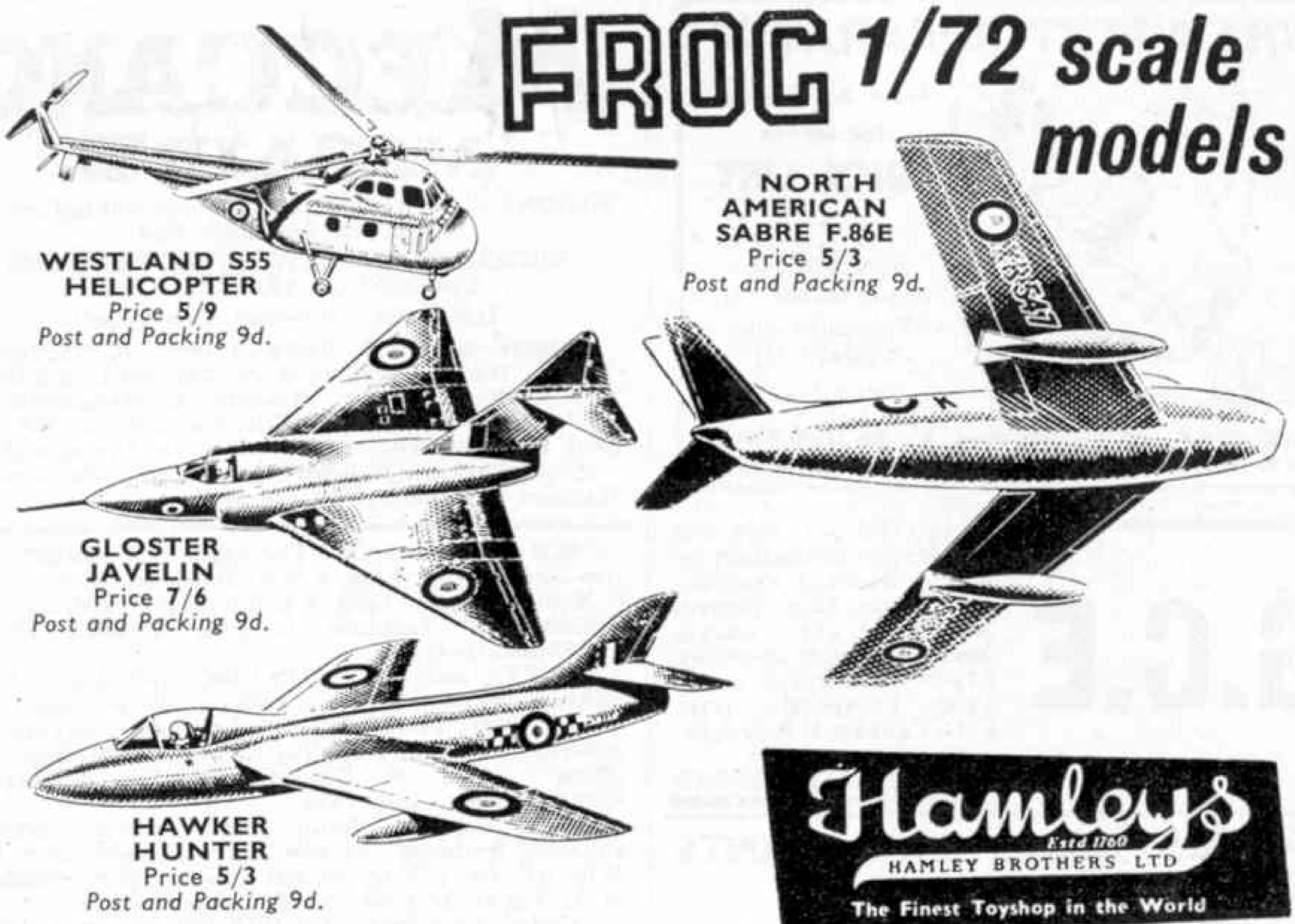

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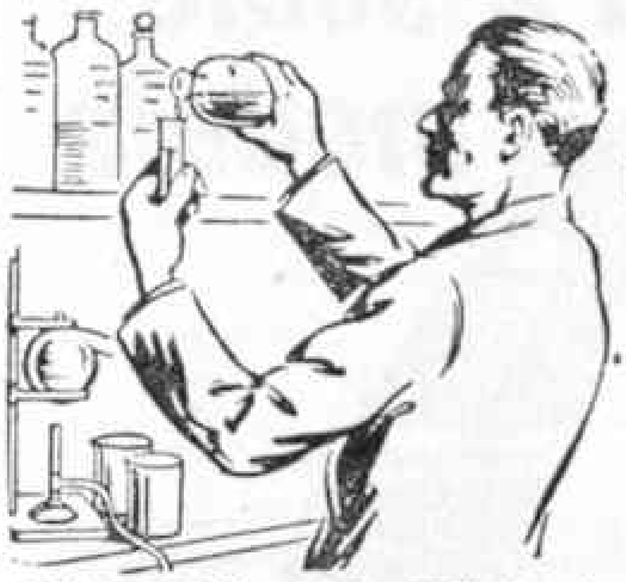

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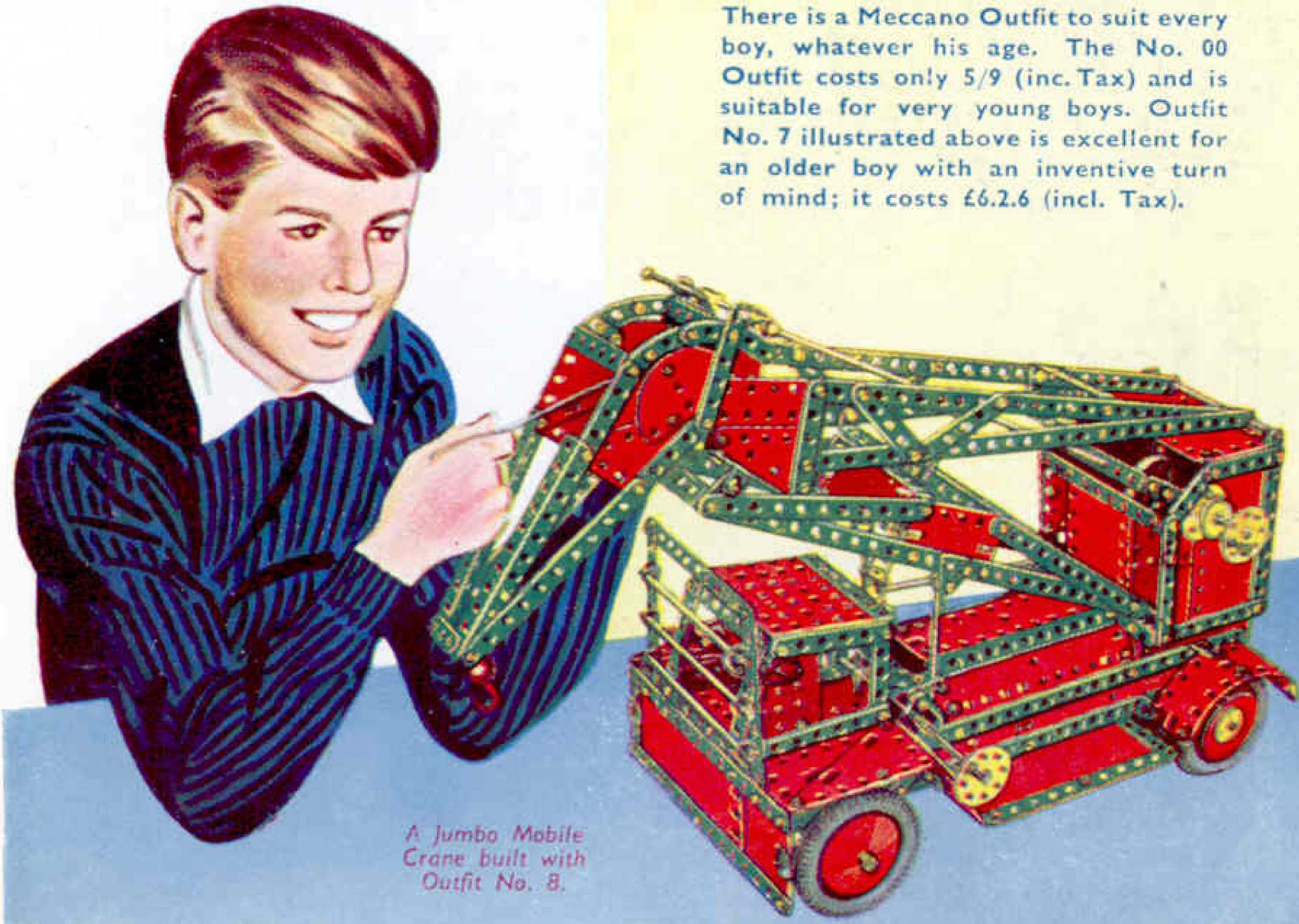

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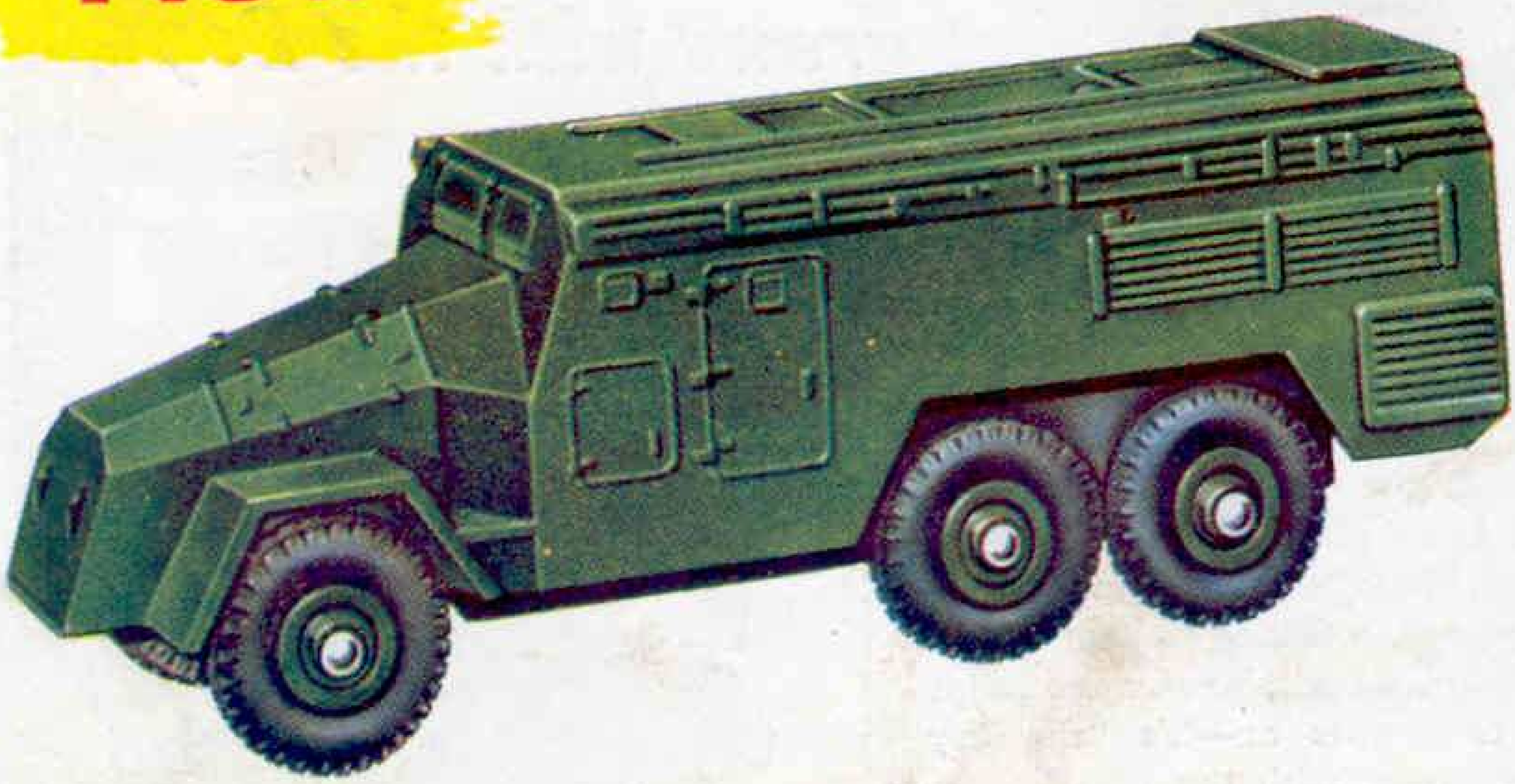

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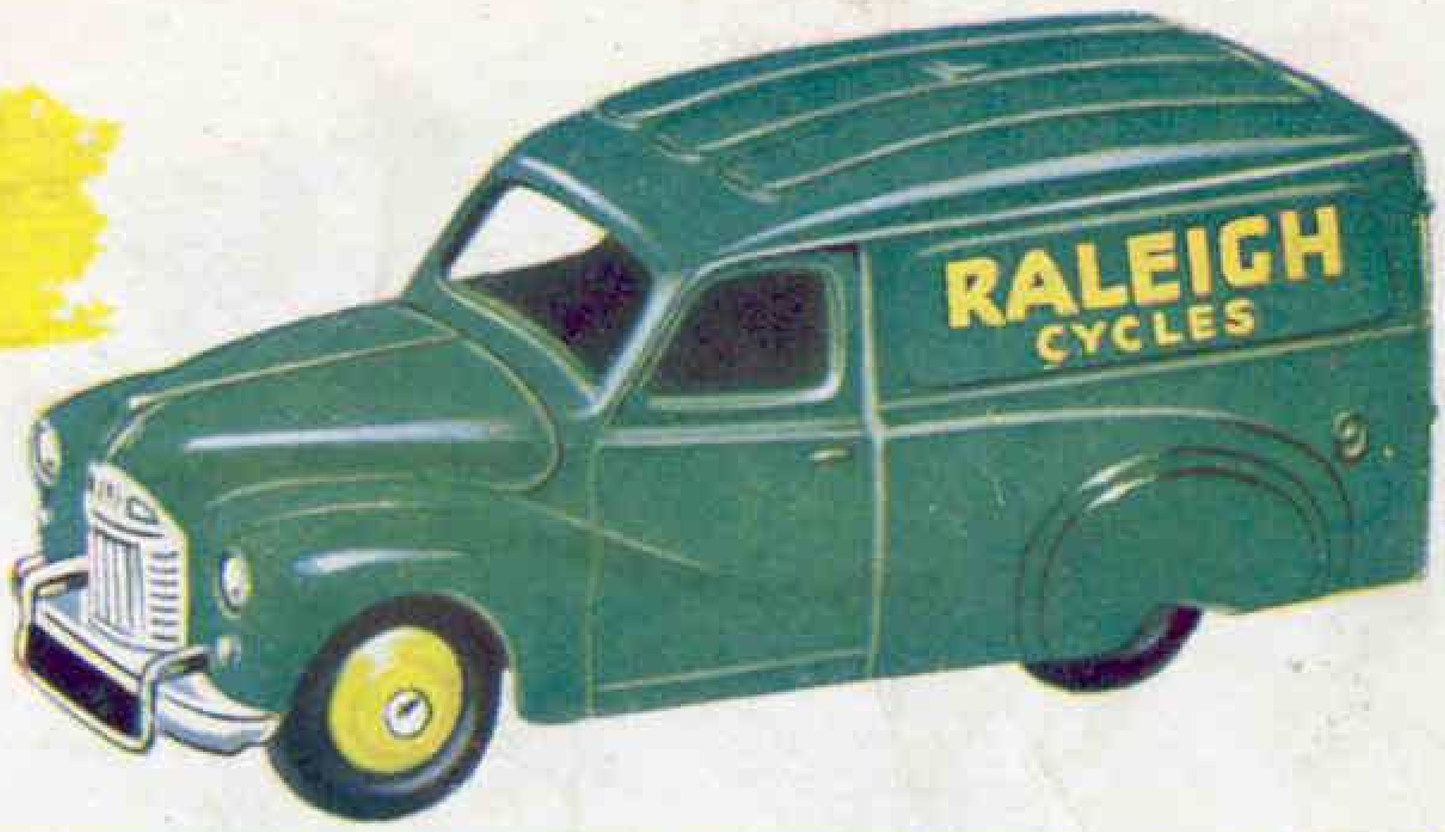

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MODEL OF THE MONTH

LIGHTSHIP

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

Construction of the Hull

The side of the hull seen in Fig. 3 consists of a 12½" x 2½" and a 9½" x 2½" Strip Plate overlapped two holes. The lower edges of these Plates are strengthened on the inside by a 12½" and a 9½" Strip, and the upper edges are strengthened by two 9½" Strips 1. Towards the bow the side is extended upward by a 5½" x 1½" Flexible Plate 2, a 2½" x 1½" Flexible Plate 3 and a 3½" x 1½" Triangular Flexible Plate 4. A 3½" x 1½" Triangular Flexible Plate 5 is bolted vertically to the Plate 4, and is connected to the 9½" x 2½" Strip Plate by two 2½" x 1½" Flexible Plates. The lower one of these is bent inward slightly to form the hawse hole for the anchor chain. The upper edge of the Triangular Plate 4 is strengthened by a 4½" Strip.

The main section of the side seen in Fig. 1 consists of a 12½" x 2½" Strip Plate with a 5½" x 2½" Flexible Plate at the stern arranged to overlap the Strip Plate by three holes and a similar Flexible Plate at the bow overlapped two holes. The side is strengthened by Strips and is extended at the bow by Flexible and Triangular Flexible Plates arranged in exactly the same way as the side already described.

The sides are connected at the bow by a curved 3½" x 2½" Flexible Plate 6 and two curved 2½" x 1½" Triangular Flexible Plates 7. The upper edges of the Plates 7 are strengthened by two curved 2½" Strips. At the stern the sides are connected by two curved 5½" x 1½" Flexible Plates 8 edged at the top by 4½" Strips. A 3½" x 1½" Triangular Flexible Plate 9 is bolted in position on each side. The lower edge of the stern is strengthened by two 3" Strips and a 2½" Strip arranged inside the Plates. A 3½" Strip 10 is attached to 1" x ½" Angle Brackets fixed between the sides at the stern.

Details of the Main Deck

The deck is supported by four 1" x ½" Angle Brackets and a ½" x ½" Angle Bracket on each side. The 1" x ½" Angle Brackets are attached by bolts through their slotted holes level with the upper edge of the side, and a 5½" Strip 11 is fixed to two of the Angle Brackets between the sides. On each side of the hull a 4½" Flat Girder 12, two 5½" Flat Girders 13 and a 3½" Flat Girder 14 are fixed to the lugs of the Angle Brackets. A 4½" x 2½" Flat Plate 15, a 4½" x 2½" Flexible Plate 16 and two 2½" x 1½" Triangular Flexible Plates are bolted to the Flat Girders. The Flat Plate 15 is extended forward by a 2½" x 2½" Flexible Plate and two 3½" x 1½" Triangular Flexible Plates. The deck at the bow is completed by two 2½" x 1½" Triangular Flexible Plates supported by a 5½" Strip 17, leaving two holes in the deck to accommodate the anchor chains.

The deck at the rounded stern is formed by a 4½" x 2½" Flexible Plate and two 2½" x 2½" Triangular Flexible Plates bolted to the Flat Girders 12 and to a 4½" Flat Girder fixed across the hull between the ends of the Flat Girders 12. Two 2½" Curved Strips 18 connected by a 2½" Stepped Curved Strip 19 are bolted to the Triangular Flexible Plates and are connected to the stern by an Angle Bracket.

The Bridge and Deck House

The side of the deck house and bridge superstructure seen in Fig. 1. consists of a $2\frac{1}{2}$" x $1\frac{1}{2}$" and a $5\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plate bolted together and extended forward by a $4\frac{1}{2}$" x $2\frac{1}{2}$" Flexible Plate 20. The lower edges of the Plates are strengthened by a $9\frac{1}{2}$" Strip, and a 2" Angle Girder 21 and a $2\frac{1}{2}$" Strip 22 are fixed in position. A $7\frac{1}{2}$" Strip 23 is bolted between Girder 21 and Strip 22. A ladder attached to this side is formed by four Double Brackets bolted between two 2" Strips. The side seen in Fig. 3 is similar to the one described above but the $2\frac{1}{2}$" x $1\frac{1}{2}$" and $5\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plates are overlapped two holes to leave a gap to represent a doorway.

The sides are connected by three $3\frac{1}{2}$" x $2\frac{1}{2}$" Flanged Plates 24 that form the light deck, and these are extended forward by two $2\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plates that complete the deck up to the rear of the bridge. The rear of the bridge is a $3\frac{1}{2}$" x $2\frac{1}{2}$" Flanged Plate 25, and it is connected by two $1\frac{1}{2}$" Angle Girders to a $2\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plate 26 on each side. The Plates 26 and 20 are curved as shown and a $2\frac{1}{2}$" x $2\frac{1}{2}$" Flexible Plate is bolted between the ends of the Plates 20 to form the front of the bridge. A $3\frac{1}{2}$" Strip is fixed between the upper corners of the Plates 26 and a $2\frac{1}{2}$" Angle Girder is attached to this Strip. The roof of the bridge is formed by two $3\frac{1}{2}$" x 2" Triangular Flexible Plates bolted to the $1\frac{1}{2}$" and the $2\frac{1}{2}$" Angle Girders. The window frames are formed by $1\frac{1}{2}$" Strips.

Two $3\frac{1}{2}$" x 2" Triangular Flexible Plates are bolted to the Girders 21 to form the rear of the deckhouse, and one of them is fixed to a $2\frac{1}{2}$" Angle Girder attached to one of the Flanged Plates 24.

The bridge and deckhouse superstructure is attached to the main deck by a $2\frac{1}{2}$" Angle Girder 27 at the front and a $3\frac{1}{2}$" Angle Girder 28 at the rear. A $5\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plate 29 is fixed at a slight angle to each side of the Flanged Plates 24, so that it corresponds to the shape of the hull. The front end of the Flexible Plate is bolted in place and the rear end is supported by a 2" Slotted Strip 30 attached to the deckhouse. The Flexible Plate is edged by a $5\frac{1}{2}$" Angle Girder and this is connected to the hull by six $1\frac{1}{2}$" Strips.

The Lamp House and its Tower.

The lamp tower isformed by six $3\frac{1}{2}$" Rods fitted at each end with Rod and Strip Connectors. These are bolted to Angle Brackets fixed to two of the Flanged Plates 24 and they are connected by Angle Brackets to a six hole Wheel Disc. A Face Plate is attached to the Wheel Disc by $\frac{3}{8}$" Bolts, and four $\frac{1}{2}$" Reversed Angle Brackets bolted to the Face Plate support a ring of four $2\frac{1}{2}$" Stepped Curved Strips. The Curved Strips are connected by Angle Brackets to a cylinder formed by two $5\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plates rolled into a circle and overlapped ten holes. Four Rod nd Strip Connectors bolted to the cylinder are fitted with $1\frac{1}{2}$" Rods, and further Rod and Strip Connectors on the upper ends of these Rods are connected to Angle Brackets bolted to a Wheel Flange. The lamp is capped by a Conical Disc and a Collar attached by a $\frac{3}{4}$" Bolt to a Wheel Disc fixed to the Wheel Flange by the same bolts as the Angle Brackets.

Arrangement of the Deck Fittings

Each of the masts consists of an 8" and a 5" Rod joined by a Coupling. The foremast is supported in a Double Arm Crank and the aft mast is mounted in a Rod Socket. The ventilators are Chimney Adaptors held by nuts on Screwed Rods, and the handrail supports are $\frac{3}{4}$" Bolts, each of which is fixed in place by two nuts. Cord tied to the Bolts forms the rails.

The winch assembly 31 consists of two $2\frac{1}{2}$" x $1\frac{1}{2}$" Flexible Plates connected by two $3\frac{1}{2}$" Strips and a $3\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strip. A $4\frac{1}{2}$" Rod is passed through the lugs of the Double Angle Strip and is fitted at each end with a $\frac{3}{4}$" Flanged Wheel. The winch is attached to the main deck by three Obtuse Angle Brackets.

Each of the lifeboats is formed by two $4\frac{1}{2}$" Strips curved slightly and connected by a Fishplate at each end to a 4" Curved Strip. A 3" Strip is bolted to the Curved Strip as shown. Each lifeboat is suspended by Cord passed through Cord Anchoring Springs on $1\frac{1}{2}$" Rods, which are supported in Rod and Strip Connectors attached to the deck by Angle Brackets.

The hatchway 32 consis s of four 1" x 1" Angle Brackets bolted together to form a square. Two $1\frac{1}{2}$" Flat Girders are connected by Obtuse Angle Brackets and are attached to the square by further Obtuse Angle Brackets. To one end of the structure a 1" x $\frac{1}{2}$" Angle Bracket is bolted and this supports a Channel Bearing 33. The complete assembly is attached to the deck by an Angle Bracket and by the lower lug of a 1" Reversed Angle Bracket 34 fixed to the rear end of the Channel Bearing.

Two $1\frac{1}{2}$" Angle Girders 35 and two $1\frac{1}{2}$" x $\frac{1}{2}$" Double Angle Strips are bolted to a $1\frac{1}{2}$" Flat Girder, one of the bolts being used also to fix a $\frac{1}{2}$" Reversed Angle Bracket in place. The lower lug of the Reversed Angle Bracket is used to attach the structure to the deck.

PARTS REQUIRED

2	of No.	1	
6	" "	1a	
2	" "	1b	
2	" "	2	
8	" "	2a	
5	" "	3	
4	" "	4	
12	" "	5	
6	" "	6	
20	" "	6a	
12	" "	9	
1	" "	9b	
2	" "	9d	
2	" "	9e	
4	" "	9f	
4	" "	10	
11	" "	11	
27	" "	12	
4	" "	12a	
13	" "	12b	
11	" "	12c	
2	" "	13a	
2	" "	15	
1	" "	15a	
6	" "	16	

8	of No.	18a	
2	" "	20b	
1	" "	24a	
1	" "	24c	
356	" "	37a	
290	" "	37b	
84	" "	38	
1	" "	40	
2	" "	48	
1	" "	48b	
4	" "	53	
1	" "	53a	
2	" "	55a	
13	" "	59	
1	" "	62b	
2	" "	63	
3	" "	81	
2	" "	89b	
2	" "	90	
5	" "	90a	
1	" "	94	
4	" "	103	
3	" "	103c	
2	" "	103d	
3	" "	103h	

1	of No.	109	
18	" "	111	
16	" "	111a	
4	" "	111c	
2	" "	111d	
1	" "	124	
5	" "	125	
1	" "	137	
1	" "	160	
3	" "	164	
4	" "	176	
1	" "	179	
1	" "	187a	
14	" "	188	
6	" "	189	
2	" "	190	
1	" "	190a	
4	" "	191	
2	" "	192	
1	" "	196	
2	" "	197	
24	" "	212	
6	" "	221	
2	" "	223	
6	" "	224	
4	" "	225	