VOL. XXV. No. 3 MARCH 1940

MECCANO MAGAZINE

THE DIVE-BOMBER!

6D.

A NEW MECCANO OUTFIT, BOYS!

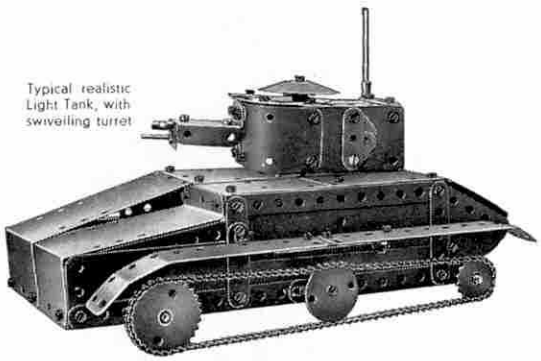
MECCANO

MECHANISED ARMY OUTFIT

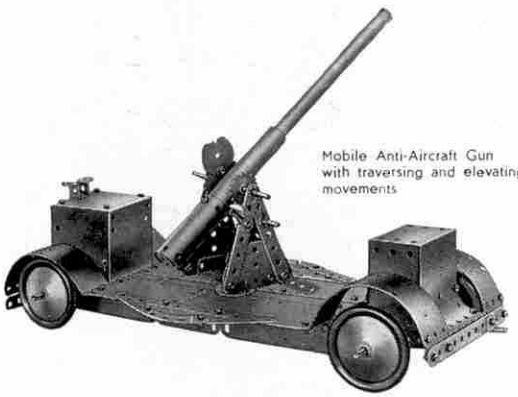
Every boy is interested in the mechanised units of the British Army, and will welcome this fine Mechanised Army Outfit, which makes possible the building of models of a variety of Army prototypes.

The Outfit consists of a big assortment of specially designed Meccano Parts, including gun barrels, with which realistic models of Tanks, Anti-Aircraft Guns, Field Guns, Transport Lorries, etc., can be built. The parts are finished in the correct shade of Service green.

The models shown here are taken from the illustrated Manual of Instructions included in the Outfit.



Typical realistic Light Tank, with swivelling turret



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OVER 300 VARIETIES

The Dinky Toys aeroplanes owe their popularity to their scale proportions, wealth of detail and attractive finish. Turn to page 133 for another splendid article on these aeroplanes.

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Scale model of the Empire Flying Boats of Imperial Airways which operate fast air services between London and various parts of the Empire.
Price **1/3** each

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" 23a	Racing Cars	" **5d.**
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" 52a	"Queen Mary" with rollers, presentation packing ...	" **1/6**

R.A.F. AEROPLANES

Dinky Toys No. 61
This interesting Set contains miniatures of three contrasting types of R.A.F. aircraft.
No. 60h "Singapore" Flying Boat ... ... each **1/-**
No. 60n Fairey "Battle" Bomber (2) ... ... " **6d.**
No. 60p Gloster "Gladiator" Biplane (2) ... ... " **7d.**
Price of complete set **3/-**

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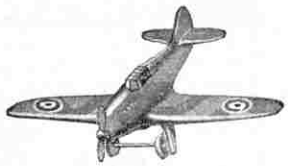

Dinky Toys No. 62h
Scale model of the Hawker "Hurricane" single-seater Fighter extensively used by the R.A.F. Price **7d.** each

IMPERIAL AIRWAYS "FROBISHER" CLASS LINER

Dinky Toys No. 62w
Scale model of the Imperial Airways "Frobisher" class liner. Three models available named: "*Frobisher*," "*Falcon*" and "*Fortuna*."
Price **1/1** each

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Dinky Toys No. 60t
Scale model of the Douglas DC-3 air liner, which is in regular service on American and European routes. Price **1/-** each

ARMSTRONG WHITWORTH "WHITLEY" BOMBER

Dinky Toys No. 60v
Scale model of the "Whitley" long-range heavy bomber adopted by the R.A.F.
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FLYING BOAT "CLIPPER III"

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Scale model of the Pan American Airways flying boat "Clipper III," which took part in the 1937 transatlantic experimental flights. It is a Sikorsky S-42-B all-metal flying boat.
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Also obtainable in camouflage colours.

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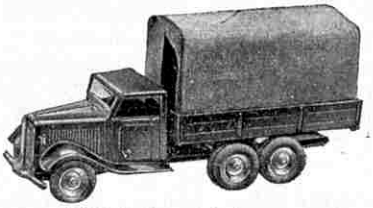

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BALLOON BARRAGE
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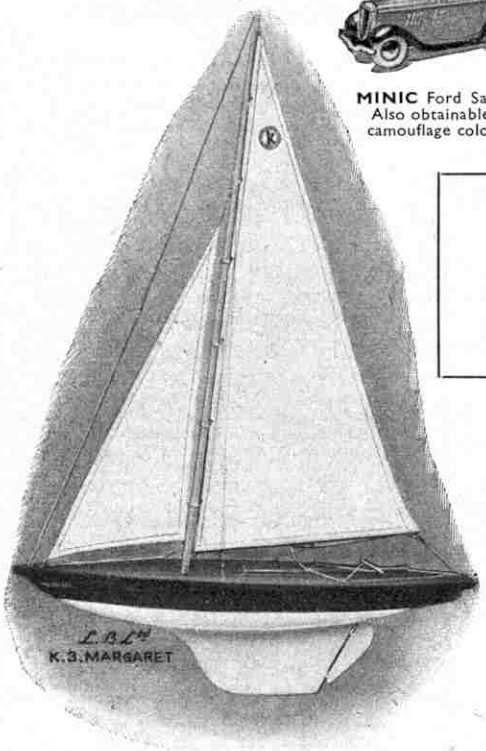
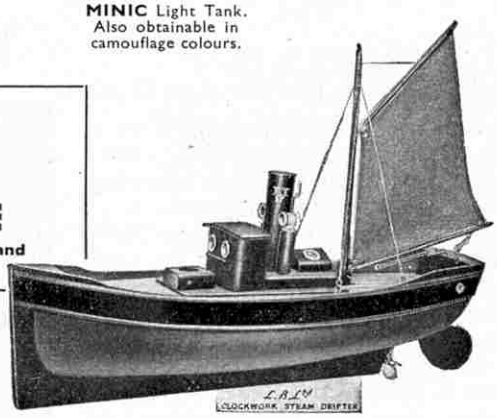


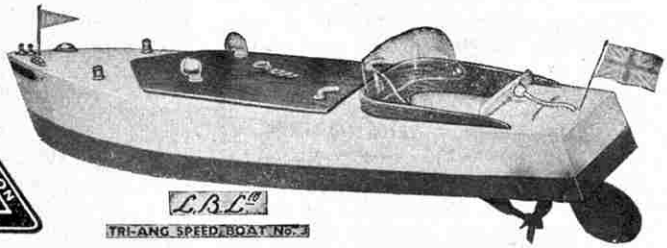
'K' YACHTS

TRI-ANG

SPEED BOATS, CABIN CRUISERS, COASTAL STEAMERS, ETC.



CLOCKWORK STEAM DRIFTER
Realistic model with strong, long running clockwork mechanism, adjustable mizzen sail and rudder, dummy ventilators, etc. Length of hull, 16½ in.



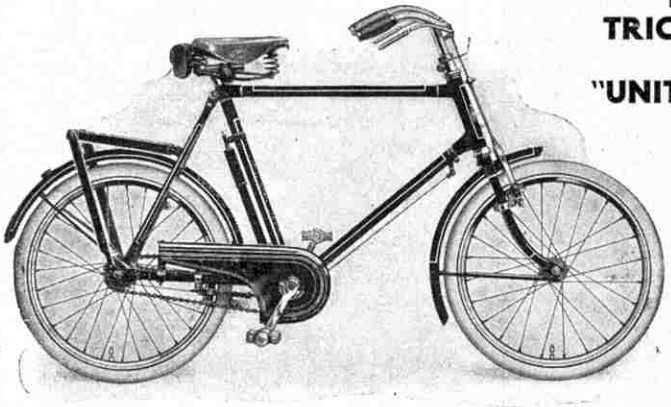
TRI-ANG SPEED BOAT No. 3
Specially designed hull with mahogany deck, brass fittings, ventilators and detachable motor cover. Electric motor mechanism. Complete with bow pennant and stem flag. Hull 20½ in. overall.

"K" YACHT "MARGARET"
Magnificent craft with AUTOMATIC STEERING. Patent light-weight weather resisting hull. Solid mahogany polished deck. Mast and boom made from finest selected material, best quality sails, fully adjustable. Beautifully finished in blue and white. Length of hull, 26 in.

L. BROS. LTD. LONDON BROS ENGLAND

TRI-ANG TOYS
Obtainable from all good toy shops and stores.

TRI-ANG TRICYCLES (Redg.) AND "UNITY" JUVENILE CYCLES



"UNITY" BOY'S CYCLE No. 16PB
16 in. frame. Finest quality British tube. Wheels 16 in. x 1⅜ in. CHROMIUM-PLATED rims. Dunlop pneumatic tyres. Roller lever pattern brakes. Three-coil saddle. ½ in. x ⅛ in. roller chain. Ball-bearings throughout. Complete with equipment and finished in black, blue or maroon. All usual bright parts CHROMIUM-PLATED. Ages 7 to 11.

TRI-ANG TRICYCLE No. E2 (Regd. Trade Mark)
Cycle chain drive with free-wheel. Frame and forks best quality weldless cycle tubing. 16 in. front and rear wheels. 1⅜ in. jointless sponge-rubber tyres. Roller lever brake. Ball-bearings throughout. Coil spring saddle. CHROMIUM FITTINGS. Black, blue or maroon.

Made by LINES BROS. LTD., Tri-ang Works, LONDON S.W.19

MECCANO MAGAZINE

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Binns Road, Liverpool 13
England

Vol. XXV. No. 3
March 1940

With the Editor

What Keeps the Bridge Up?

It is fifty years this month since the Forth Bridge was opened. This mighty structure has been exceeded in span length, but in my opinion no bridge in the world surpasses it in majestic impressiveness. To sail beneath it is a memorable experience, and the crossing in the train never fails to provide a thrill.

Mention of the Forth Bridge always recalls to me an incident of many years ago. I had written for the "*M.M.*" a full account of the building of the bridge, and had included what I thought to be a perfectly clear description of the cantilever principle. I felt quite proud of my effort, but the fall was not long in coming. A small boy wrote as follows: "Dear Editor, I like the story about the Forth Bridge and how it was built, but what I don't understand is what keeps the bridge up." It was some time before I recovered my normal cheerfulness!

Next Month's Features

The article "*Aloft with the Interceptors*" by Flight-Lieutenant "Tommy" Rose, in last month's issue, has aroused quite remarkable interest. This month I publish another article by the same pilot entitled "*With the R.A.F. on Photographic Reconnaissance,*" which I think will be read with equal approval. For next month I have in preparation another article by Captain H. S. Broad entitled "*A Day Out with the Bombers.*" Other striking features of next month's issue will be a description by Prince Chula of a thrilling race won by "B. Bira"; an account of the world's largest slate mine, and articles dealing with Scouting in war time, the production of tin, and the protection of London's Underground against flood.

Vice-Admiral Sir Andrew Browne Cunningham, K.C.B., D.S.O., Commander-in-Chief, Mediterranean Fleet.

Sold Out Again!

The February issue of the "*M.M.*" was sold out almost as quickly as that for January, although several thousand more copies were printed. Now I am receiving agonising appeals from readers who failed to obtain copies because they did not place definite orders. Once more let me emphasise that newsagents obtain only the number of copies that are ordered. No more can be printed, so that no surplus copies are available. In order to make sure of obtaining his copy of the Magazine therefore every reader should *place a regular order for it now* if he has not already done so. If he fails to obtain the "*M.M.*" then he should let me know at once.

Leaders in the War
VI. Sir Andrew Cunningham

Vice-Admiral Sir Andrew Browne Cunningham was born in 1883 and educated at Edinburgh Academy and Fareham. He entered the Royal Navy in 1898. He served during the war of 1914-18, and was mentioned in dispatches. In March 1916 he was awarded the D.S.O. for service with the Destroyer Flotilla, and in February 1919 he was awarded a bar to this medal for his service in destroyers of the famous Dover Patrol.

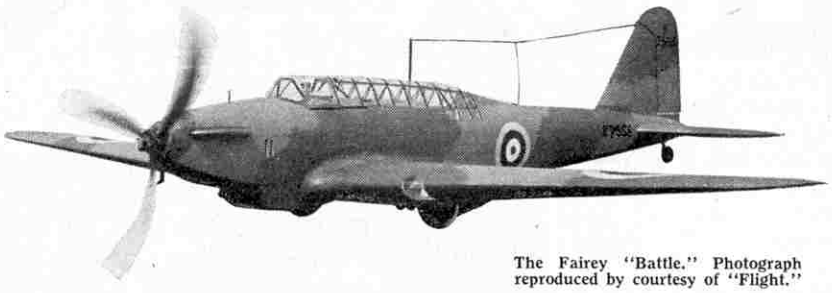
Sir Andrew was appointed Naval A.D.C. to King George V in 1932, and from 1933 to 1936 he was Rear-Admiral (D) commanding Destroyer Flotilla, British Mediterranean Fleet. In the following year he was promoted to Vice-Admiral commanding Battle-Cruiser Squadron and second-in-Command, Mediterranean, and in 1938 he became a Lord Commissioner of the Admiralty and Deputy Chief of Naval Staff. In 1939 he was appointed Commander-in-Chief of the Mediterranean Fleet.

The R.A.F. on Photographic Reconnaissance

By Flight-Lieut. "Tommy" Rose

"SUCCESSFUL reconnaissance of North-West Germany was carried out by R.A.F. aircraft last night. One of our aircraft failed to return."

This masterpiece of under-statement, with little or no variation, has been issued again and again during the past four months. Not one reader in a hundred dreams of the real-life adventure stories it conceals. Let me take you in imagination on a perfectly ordinary photographic reconnaissance—one which contains no incident that is not, literally, to be found in a normal day's work.



The Fairey "Battle." Photograph reproduced by courtesy of "Flight."

Visibility plays a vital part in this photographic work, and so one morning, when there is every promise of a cloudless day, our pilot is called into the C.O.'s office at an R.A.F. aerodrome "somewhere in France."

Normally he would be shown seven or eight "pin-points" on the enormous map hanging across one wall. These would mark rail or road junctions, possibly bridges, suspected gun emplacements or other points in which our Higher Command was showing an inquisitive interest. It would be his job to seek them out and come back with a set of photographs. To-day, however, his objective is a single one—nothing more nor less than the vast Krupp works at Essen.

We already know that it has been elaborately camouflaged. For obvious reasons we want as many as possible of our bomber pilots to know just what it looks like nowadays. Hence the need for a set of aerial photographs taken from every angle from which a bombing squadron might approach.

Our pilot will time his flight to arrive as nearly as he can at mid-day, when shadows are shortest. Look at any aerial photograph you can find, and you will see how hard it may be to distinguish shadow from substance. So the less shadow the better.

He has, however, an hour or two to go before it is time to take off, so he hunts up his gunner-photographer and passes on the instructions. The ground-staff are told to have his "Battle" ready and warmed up, and he himself spends some of the intervening time conning the route and mentally noting down a number of landmarks that will tell him that he is on his course.

A few minutes before zero-hour he strolls across the flying ground and cocks an attentive ear at the engine tick-over. The "Battle" is a famous bomber with a single engine, and on the reliability of that engine his own safety is going to depend for the next few hours.

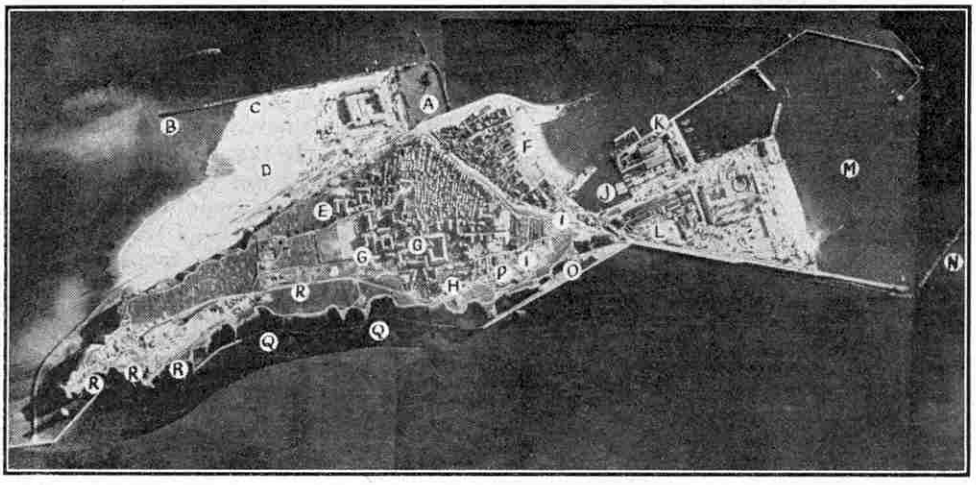
The two men climb into their seats beneath the big transparent roof that marks this particular type of aircraft. The pilot, receiving the signal at once from his Control Officer, pauses to settle himself comfortably in his seat, and then pushes forward the hand throttle control.

The engine note deepens to a roar and the machine starts to bump over the frozen ground. The "stick" is eased, rather than pushed, forward, and the tail comes up. The "Battle" surges forward with the acceleration of a racing car, and in a very few seconds the pilot notes, almost unconsciously, that the needle of the airspeed indicator is hovering around the seventy mark. Back comes the stick, almost imperceptibly, and two seconds later the five-ton machine is borne by nothing more solid than thin air.

In a single glance the pilot takes in the score or so of dials on the dashboard in front of him. His eye never seems to rest on them, but from long practice he would notice at once if one of the readings varied from normal. Satisfied on this point, he moves the lever that retracts his undercarriage, and notes that this, too, is indicated on the appropriate dial.

His course has naturally been worked out with care, but he now looks for two marks—a tall tree and a ruined barn—which, like the sights of a gun, will give him approximately the right direction if he gets them exactly in line. Having done so, he notes—carefully this time—the precise compass reading, and knows that if he keeps faithfully to that reading he will reach his objective. A simple trick, this, which avoids much complicated reckoning of the effect of a cross-wind.

All this time the "Battle" is climbing steadily. The country is now spread out below like a large-scale map, and it strikes the young warrior that he has never seen anything more peaceful. But before



Photograph of Heligoland taken by the R.A.F. Key to lettering: A. New harbour, with dredge. B. New Mole. C. Pipe line pumping silt. D. Area being reclaimed—possible future aerodrome. E. Oberland. F. Unterland. G. Barracks. H. Lighthouse. I. Tunnel entrances from Oberland to Unterland and vice versa. J. War vessels. K. Hangar. L. Naval stores. M. Outer harbour. N. Old mole, destroyed after last war. O. Anti-aircraft battery. P. Tunnel entrances down to harbour. Q. Protected wall to prevent erosion. R. Gun positions. British official photograph.

he can wax poetical about it he shivers, and a glance at his altimeter shows that they are now between 15,000 and 16,000 feet above sea-level.

"Better turn on the heat," he remarks through the telephone to the gunner, who sits stolidly eight feet behind, probably wondering if they'll get there and back without a scrap.

They both switch on the current that heats their special clothing. At these high altitudes the hands and feet easily get cold, and no one can do his best work in an aeroplane if he can't feel his own extremities.

Soon the front line positions are visible. They cross the German lines at some 22,000 ft., to be greeted with a few perfunctory rounds of "Archie." The pilot grins to himself as he remembers how worried he was when first under fire scarcely three months ago.

They leave the fighting lines behind and to their left, and see ahead the waving silvery line of the Moselle spread away to the horizon. Away to the left, perhaps five miles off his course, is a large city that can only be Treves. He fiddles with the "strip" map showing the country over which he is to fly, and so arranged that the sections fall open in the right order as he comes to them. Yes, as he thought, he is dead on course.

By this time both men are wearing their oxygen masks, for they have reached a height of 26,000 ft. and, as instructed, flattened out. Not only is the temperature something like 25 degrees below zero, but the rarified air is unfit for human consumption. With modern comforts, however, they feel nothing of this.

The Moselle is crossed obliquely and left on their right. Far ahead is a glint of sunlight on water athwart their track. It is the Rhine, perhaps twenty miles distant. But at three miles a minute that distance is covered by the "Battle," and before five minutes have passed the huge mass of Cologne is visible, ahead and to the left. The pilot makes a slight correction to his course and passes right over Cologne. Things will get more exciting now.

About seven minutes later they are over the great German industrial area of the Ruhr—an area of brick and mortar which, unlike ours, is dotted here and there with fairly extensive patches of woodland.

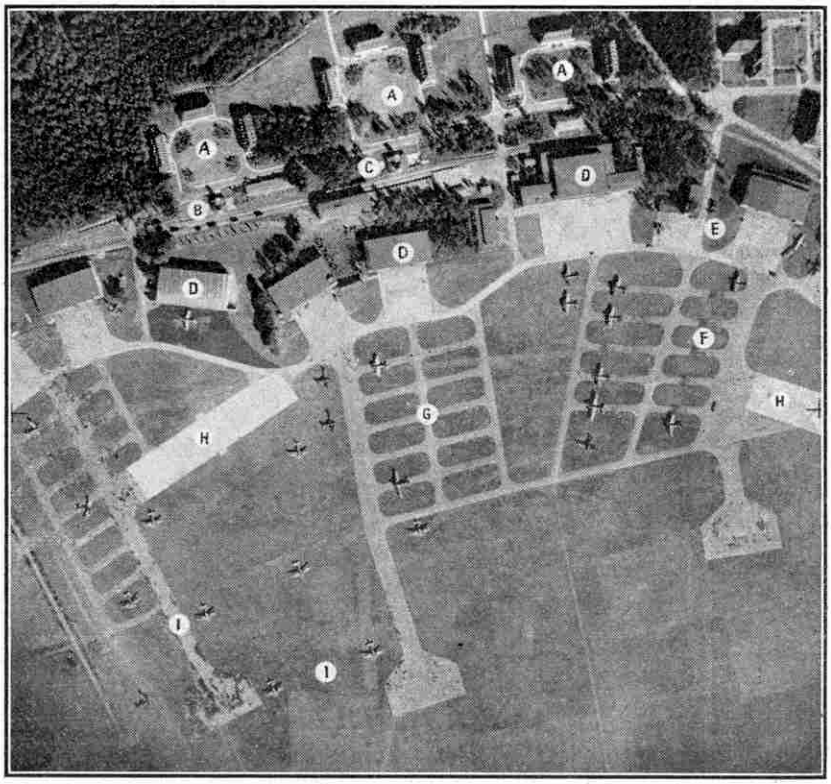
Puffs of smoke bursting below him remind him that there is a war on. He wonders, almost idly, if Jerry has any "Archie" that will reach him, and supposes not. He wonders how Jones, Smith and Robinson, from the same aerodrome, have got on with their reconnaissance farther down the Rhine. And then his eye is caught by the landmark for which he has waited—the big loop of the Ruhr, with a broad railway track running parallel with the river. That track leaves the river and takes him direct to Essen, easy to identify now that he knows exactly where to look.

And there, sure enough, is the enormous modernistic pile of the "Krupp" buildings. "Kolossal!" he grins to himself, and "See it? Straight ahead," he calls to the gunner-photographer. "Got it? Then start shooting!"

He knows he can rely on his colleague to get the shots of the southern approach as they cross directly over the building. "Camouflage it as they will," he thinks, "they can't disguise a place that size."

He flies straight over, continues for two or three miles, turns and approaches from the north. "O.K." comes into his ear-phones, and he shoots off to the right, to make a quick turn and describe a half-circle round the building, so that any likely direction of approach has now been photographed.

A quick consultation over the 'phones, and having decided that the job is well and truly done, he drops his nose slightly, opens the throttle wide, and streaks for home at a round 250 m.p.h. No fighters came up. Before they had attained anything like his height he would have been miles away. But he knows full well, from the inocuous A.A. fire, that the Germans who observed his flight will have warned other fighter squadrons on his homeward route. He prays devoutly that they'll be slow in getting up.



R.A.F. photograph of Langen Haagen Aerodrome, 10 miles north of Hanover. Key to lettering: A. Quarters. B. Special railway line for aerodrome. C. Station and platform. D. Hangars. E. Motor Transport. F. Oil patches made by aircraft parked at the same spot always. G. Servicing tarmac. H. Runway. I. Aircraft just moving off across aerodrome. British official photograph.

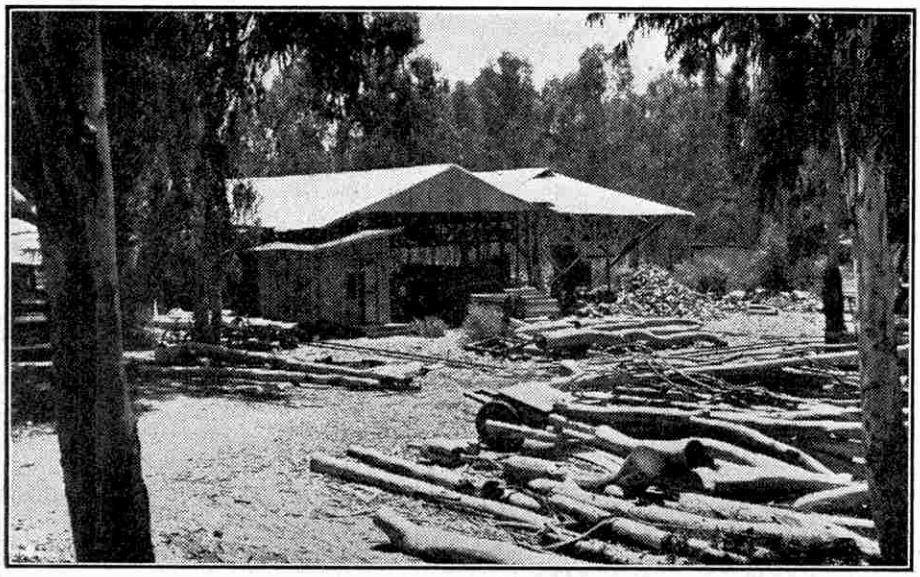
In less than fifty minutes, all being well, he will be safe home. Anxiously he scans the horizon. For half an hour there is not a speck in the sky. However, they have scarcely recrossed the Moselle when the gunner's voice is heard again—"Looks like Jerry away on the left."

Screwing his head round, the pilot makes out two—no, three—black dots well above the horizon. As he looks they seem to grow bigger. Instinctively his right foot moves forward, he leans the stick ever so slightly to the right, as he changes direction so as to cross the firing line sooner and get over friendly country. To gain a few more miles an hour he pushes the nose well down, and, with the A.S.I. showing a full 270 m.p.h. roars over the German lines at a mere twelve thousand—well within range of their A.A. guns, but mercifully without being hit.

He is not to get home scot free, though. The enemy, now plainly seen as Messerschmitts, are overhauling him at more than a mile a minute. A minute later they are right on his tail, and the staccato of their machine guns is audible above the engine, to be answered at once by his own gunner.

He dives almost on to the tree-tops, so that the Germans cannot attack from below. He recognises familiar landmarks as he flattens out,

(Continued on page 148)



A saw-mill near Hedera, south of Haifa. Here large eucalyptus trunks are sawn up into boards and sent to Jewish furniture factories in different parts of the country.

Lumbering in the Holy Land

By Harold J. Shepstone, F.R.G.S.

ONE does not associate Palestine with forests and the business of lumbering. As travellers who have visited the land know, its hillsides are for the most part barren and stony, and devoid of vegetation except after the winter and spring rains. The climate is dry and arid; the nomadic peasants roam over the countryside with their flocks of sheep and goats, and we know how destructive goats are to plant life.

Thus it was a revelation to the writer, while travelling through the country recently from Haifa, to stumble suddenly upon a scene that was distinctly reminiscent of Canada —a fully equipped saw-mill in the heart of the woods. I was aware that both the Palestine Government and the Jews had planted trees in the country. On one of the hills close to Nazareth is the Balfour forest, and scattered about the country there are several large patches of oaks. The Jews have a very beautiful custom known as arbour day, when once a year the school children plant a tree.

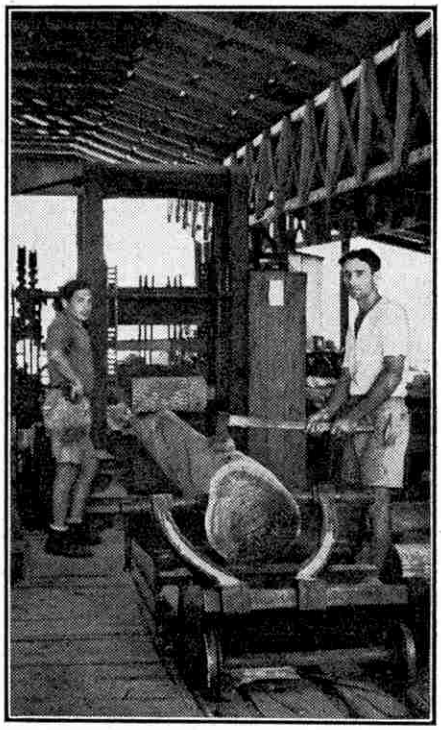
The spectacle before me, however, was hardly typical of the Holy Land. From the mill came the buzzing sound of giant saws, cutting the logs into planks; while scattered on the ground around the building were hundreds of tree trunks. Lumbering, then, is one of Palestine's latest industries, a striking instance of how the country is being developed on western lines.

For some years past forests of eucalyptus trees have been planted in the swampy areas along the coast between Haifa and Tel-Aviv. The eucalyptus was selected because of its rapid growth, while its wood is in demand both for building and for furniture. The trees grew rapidly, and at the time of my visit were being cut down for the second time. The venture, in fact, had passed beyond the experimental stage.

The wood of this tree is easily worked, mahogany-like in colour, and excellent for furniture. A few years ago trunks of eucalyptus were sent from these forests in Palestine to Vienna for veneering, and the wood was found to be very appropriate for this purpose. Samples of the wood were sent also to match factories in Lithuania. Here again the eucalyptus was found suitable, and this has led to the establishment of match factories in Acre that are now doing a good business under the name of "Nur," the Arabic and Hebrew word for light. The eucalyptus has proved suitable also for bent furniture.

This afforestation of the Holy Land is a very commendable and even essential piece of work. Ever since Great Britain took over the country from the Turks after the war of 1914-18 she has been devoting attention to afforestation. In Bible times the hills of Palestine were covered with forests; we have proof of this in the many references to forests and trees in the Scriptures. The hills and terraces were adorned with a variety of trees—the olive, fig, cedar, oak, acacia, caroub, juniper, myrtle, sycamore and palm.

As a result of wanton neglect of the land on the part of the peasantry, and due also to war, pestilence, and other causes, the trees have been thoughtlessly cut down. No encouragement was given to the peasantry to preserve the forests, while the Turks who ruled the country for many centuries despoiled it of many valuable trees. As timber was needed for carrying on a war, it was simply commandeered. The owner of an olive orchard would receive an order to cut down and deliver to the authorities 25 per cent. or more of his trees. Thus the hills to-day are largely barren and rocky, and the soil is being washed away by the heavy winter rains. Even the plains along the coast have suffered seriously from the absence of trees and vegetation, which has allowed the sand-dunes to advance and cover



The gang-saw in the saw-mill at Hedera.

large areas that hitherto had been cultivable.

Thus the main work of the

Forests Department of the Palestine Government has been to build up the soil on the hills and terraces by afforestation. It has not been an easy task. First it was essential to get the peasants interested in the scheme. The Arab farmer, particularly, resents change of any kind. Hence it was necessary to show him by practical demonstration how the soil could be retained by planting and how this would be to his direct benefit.

"Wherever there is a little handful of soil," said Mr. G. N. Sale, of the Palestine Department of Forests, "we encourage the peasant to sow or plant lowly hardy shrubs that will thrive on next to nothing and will drop a few leaves to increase and improve the soil, and by their very existence will hinder the rate at which the soil particles are washed or blown down the slopes. In deeper patches he is taught to introduce hardy trees like the arbutus, or even the adaptable Aleppo pine, which endures gallantly on dry and barren ridges, but grows tall and beautiful where conditions are more favourable.

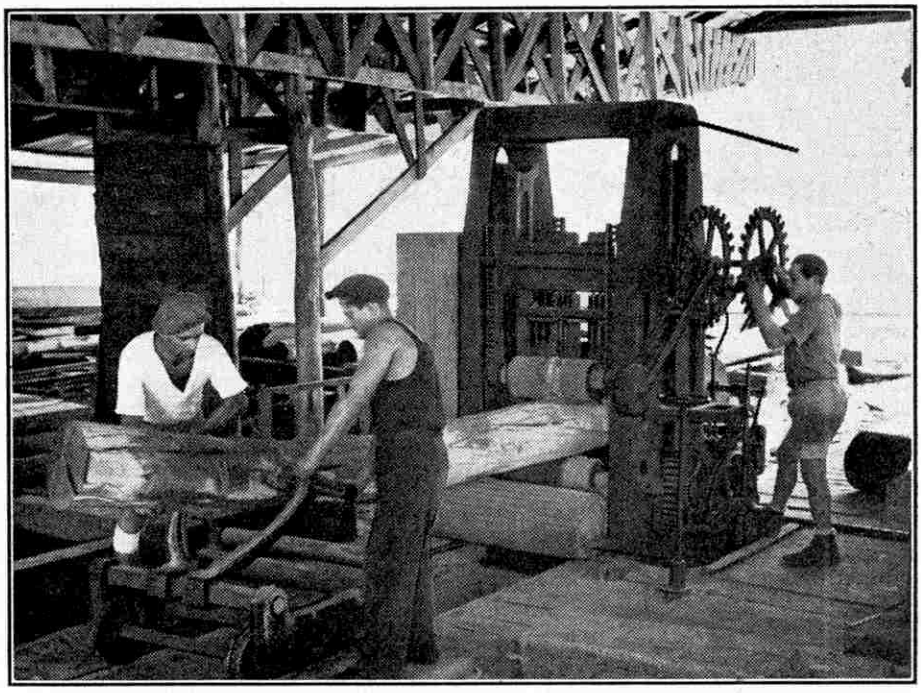
"In the small areas where enough soil remains to encourage tree growth, the production of timber has been encouraged. Over the greater part of the areas available, however, the soil has been ruined, and while it is being rebuilt nothing of value can be expected except firewood, which is no mean asset in a land where wood and charcoal are still the main fuels. Gradually, however, as the soil improves, trees are planted and a whole forest appears. The recuperative powers of the land, considering how it has been neglected for centuries, is amazing. As soon as the land is protected vigorous young shoots appear, and two years later such an area is studded with green bushes, pioneers in redeeming the waste places.

"On steep slopes, where the greedy removal of all ground cover has allowed the storms to gnaw out great gullies in more recent times, leaving areas of soil still to be diminished by every rain, the utmost ingenuity is exercised to delay the process until reafforestation can develop a network of roots to tie down each separate clod and particle. The main gullies have to be dammed with masonry, the side gullies with wire and brushwood; while the smooth slopes are rippled with tiny terraces all calculated to hinder the flow of surface drainage water, and so to retain the precious soil which, once lost, cannot be fully replaced for centuries.

"The forester always bears in mind that the value of an agricultural country cannot be adequately measured in square miles or acres, but depends on the amount of soil and water available. The vegetation on the hills will retain the soil; the soil will hold the winter rainfall like a sponge and delay its flow, so preventing floods, which at present sweep down the valleys almost every year, carrying away to the sea the soil without which the farmer starves."

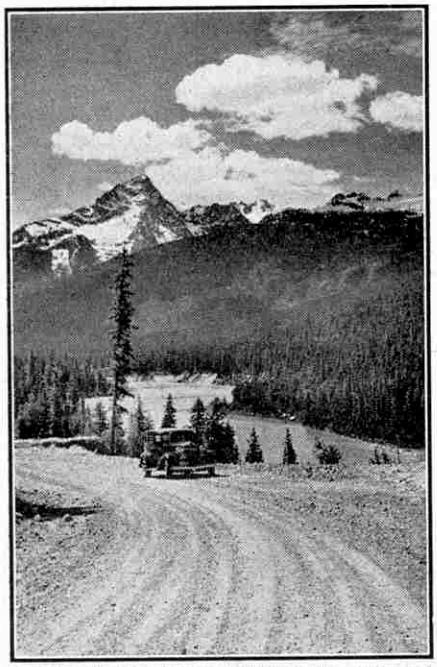
During the past two decades the Palestine Department of Forests have planted between four and five million forest and fruit trees. On the slopes of the western side of the Sea of Galilee there are now several forests, many of them several acres in extent. Few more interesting strips of land exist than this, which contains the sites of Genneserat, Tiberias, Magdala and Capernaum. Part of the slopes on both sides of the plain of Esdraelon is now protected by forests. On the Carmel Hills above Megiddo and west towards Haifa there are now natural forests of Aleppo pine and scrub, while interesting plantations exist along the steep slopes south of Nazareth.

To the work of afforestation carried out by the Palestine Government one has to add the splendid contribution made by the Jews. During the past five years they have planted 358,000 new trees; and at the end of 1938 the forests planted on land owned by them covered an area of 2,565 acres and contained 2,554,000 trees. The Jews have favoured the eucalyptus because of its rapid growth, and the Arabs refer to this tree as the "Jews' Tree." They have also planted whole forests of caroub, or locust bean. This tree will flourish in the poor soil of the hillsides. Its hard wood is used in building and for fuel, and the long, sweet bean-pods are a popular cattle food. The "husks" that the prodigal son was forced to eat through hunger were quite possibly locust beans, as they are commonly fed to the herds of swine.



Another scene in the saw-mill, showing the ripping of large tree trunks.

The commonest tree in Palestine to-day is the olive and it is still being planted. No tree was better known in the New Testament days. It produces abundant fruit and oil; a single tree often supplies from 10 to 15 gallons of oil. "Sweet oil" is only another name for olive oil. The oil of this tree supplied the illuminant for the lamps in the Hebrew temples. The natives recognise its medicinal qualities and it is used in the soothing treatment of wounds. Another common tree also largely cultivated is the fig, which is the first tree mentioned in the Bible. To dwell under one's own vine or fig tree represents in Scripture a time of "happiness and prosperity, safety and security."



A scene on the western section of the Big Bend Highway, British Columbia.

The Big Bend Highway

Canada's Great New Mountain Road

By E. A. Grubb

ONE of Canada's most important road projects is the construction of the Big Bend Highway, which is being built around the great northern bend of the Columbia River between the towns of Golden and Revelstoke, in British Columbia. The new highway is 193 miles in length, and on completion will form the final link in the western half of the Trans-Canada Highway, which ultimately will extend from Halifax, Nova Scotia, to Vancouver, British Columbia, a distance of 3,500 miles.

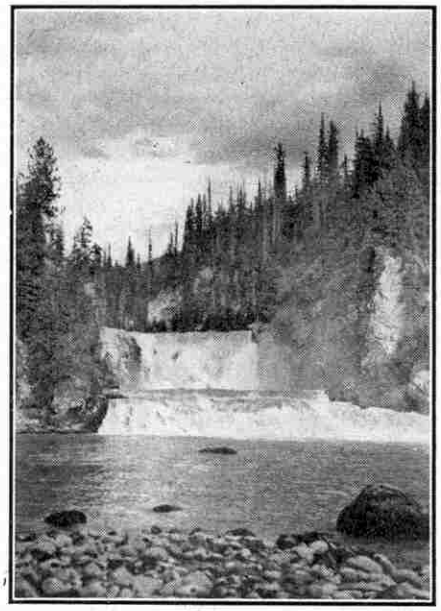
The country traversed by the new road is practically uninhabited. It is a magnificent mountain region covered by virgin forests, and the road passes within sight of snow-fields and glaciers. The highway is a route of history, for the romantic Columbia River, one of the world's great waterways, played an important role in the opening-up and development of British Columbia in the 19th century. From eastern Canada explorers and fur traders came over the Rockies through Athabasca Pass, down Wood River to the Columbia, and then south to what are now the States of Washington and Oregon and the Pacific Ocean. The road follows the river that carried these hardy pioneers of the "West." This river is 1,400 miles long. It rises in southern British Columbia and flows northward between the Selkirk and Rocky Mountain Ranges. At the northern extremity of the Selkirk Range it makes a sharp turn to the south to form the "Big Bend" that gives its name to the new highway, and then flows through the interior of British Columbia and into the State of Washington to its outlet in the Pacific Ocean.

The Selkirk Mountains are a rugged complex of jagged peaks, many of which are over 8,000 feet in height. They were too inhospitable, too rugged and too densely forested to prompt even the adventurous pioneers to push their way into the interior, and from the earliest times such commerce and travel as existed in the vicinity passed along or around the range by way of the well-defined routes afforded by the Columbia River. The first white man to journey around the Big Bend was David Thompson, an English surveyor and astronomer who was engaged by the Northwest Fur Company to establish fur trading posts in the region west of the Rockies, and to explore its rivers. At the top of the Bend, where the mountain torrents of Wood and Canoe Rivers come down to join the Columbia, is the spot named Boat Encampment, where Thompson reached the banks of the Columbia and spent the winter of 1811, after a journey over the Rockies.

By 1860 gold had been discovered in the interior of British Columbia and great tides of gold-seekers were surging inland. The general course of the movement led northerly and easterly, and before long the valley of the Columbia became available as a route from the United States to the different centres of excitement. At this juncture it was that the Selkirk Range began to exert a positive influence upon the affairs of men, for in 1866 gold was reported on its westerly slopes and from 8,000 to 10,000 people hastened into this locality. Log towns were erected, sluices and dams were constructed, and gold worth more than £600,000 is estimated to have been taken out in the first two years. The diggings were gradually abandoned owing to the difficulty of bringing in sufficient supplies, and to the frequency with which the pits were flooded by sudden rises in the mountain torrents. The old trails used by those who came on foot are still visible from the new highway, and at Laporte are the remains of an old town of over 2,000 inhabitants.

In 1871 the Big Bend was suggested as a suitable route for the Canadian Pacific Railway between the points that were to become Golden and Revelstoke. Walter Moberly, a surveyor who was engaged in locating a way across the mountains of eastern British Columbia, suggested this route as a means of circuiting the frowning barrier of the Selkirk Mountains. The idea was abandoned in 1882, however, when Major A. B. Rogers, a later surveyor for the line, discovered the mountain pass that now bears his name.

The development of a scenic motor highway through this region is of more recent interest. With the exception of the Big Bend link, the sections of the Trans-Canada Highway from Calgary to Vancouver have been open to traffic for several



Goldstream Falls, seen from the Big Bend Highway. The illustrations on this page are reproduced by courtesy of the Board of Trade, Revelstoke.

seasons. About 12 years ago the Dominion Government constructed a section way across the Rocky Mountains through Banff and Yoho National Parks, which linked up with a provincial road running east from Golden, B.C. About the same time the Province of British Columbia completed the scenic highway up the Fraser River Valley from Vancouver as far as Revelstoke, a distance of 436 miles, leaving only the barrier of the Selkirk Mountains between these two highways. A proposal to build the connecting link across the Selkirks through Glacier National Park along the same route as the railway was abandoned because of the heavy winter snowfalls in the Selkirks, and the more favourable route following the Columbia River around the mountains was chosen. This route as planned entailed the construction of approximately 177 miles of new road between Donald and Revelstoke, utilizing at the same time an existing provincial road 16 miles in length between Golden and Donald.

The undertaking was started in 1929 and was to have been completed by 1932. While the Dominion Parks branch pushed forward on the eastern leg from Donald to Canoe River, a distance of 77 miles, the British Columbia Government, through lack of funds, was unable to keep pace on the western section from Revelstoke. This resulted in the construction of the whole road becoming a Federal responsibility.

The building of the Big Bend Highway has called for great engineering ingenuity. Surveyors had to take canoes and boats through the foaming rapids that occur frequently along the route in order to get construction camp supplies to various points on the right of way. Clearing crews followed when the trail was blazed. In certain sections the road had to be blasted out of forest-covered mountain, which dropped sheer into the river and rose hundreds of feet above the route. In places it was necessary to carve out the solid rock and elsewhere a cut had to be made high on a mountain side. Bridges were required to cross tributary streams along the way, and these were constructed from timber cut by portable sawmills in the immediate vicinity. Near the apex of the Big Bend the Columbia River is crossed by a steel truss bridge with a single span of 270 ft.

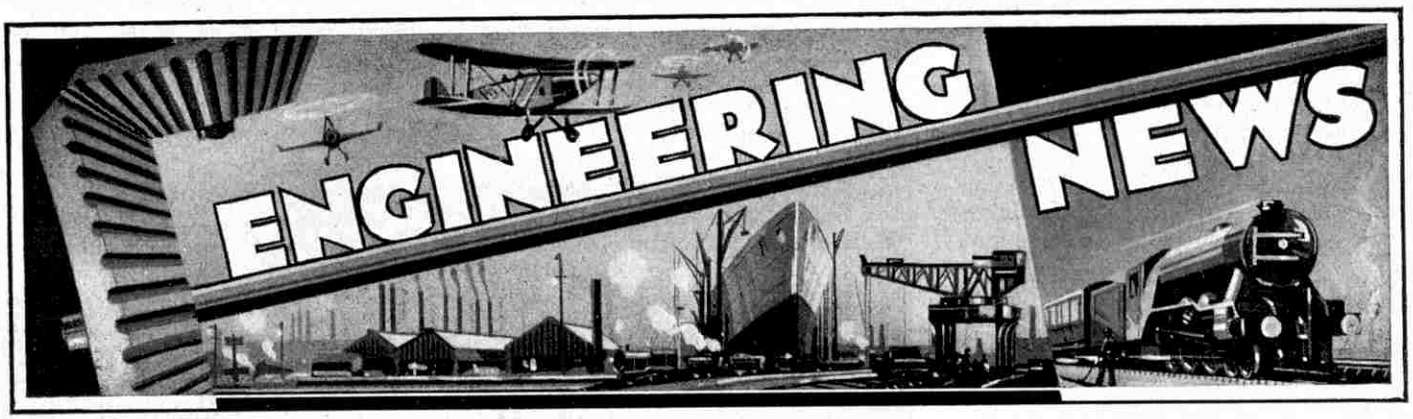
Mechanical shovels, tractors, scrapers and compressed air drills have been used by the engineers in charge. The work was started from both ends of the route. Tractors and trucks hauling together nine tons each trip have daily been hauling in the equipment, while boats with outboard motors have taken in loads of two tons each. Beside camps for the builders on the right of way, telephone lines had to be strung through the wilderness to keep communication open between the camps and the bases at both ends of the road. Portable compressors for operating jackhamers and drills were taken in to clear solid rock sections of the route, and dynamite sent entire rock walls sliding into the river.

The highest point on the road is attained 33 miles north of Golden at a height of 3,256 ft. above sea level, and from east to west there is a descent of 1,100 ft. in 200 miles. For the greater part of its length the highway skirts the Columbia River, affording splendid views of the snow-capped Selkirk Mountains and of the giant peaks that form part of the main divide of the Rockies. About 75 miles north of Golden the road passes through the last great forest of virgin timber to be seen anywhere along the whole length of the Trans-Canada Highway from Halifax to Vancouver. Here giant cedar trees, with butts from 6 ft. to 10 ft. in diameter, rise above the sides of the roadway, along with fine specimens of white pine that reach a height of 150 ft. and groves of stately firs.

Actually three mountain ranges form the setting for the road, which winds northward along the Columbia River between the Rockies and the Selkirks, and turns, with the river, to travel southward between the Selkirks and the Gold Range, which towers along the west bank of the Columbia. There the Selkirks lose the rugged aspect that they present when seen from the east, and glaciers and snow-covered peaks give place to a long succession of wooded hills which slope gently down to the river. The Columbia is much wider, too, on the western section. There large canyons and rapids are the rule, and there are miles of icefields visible on the peaks of the Gold Range across the stream.

The Big Bend Highway forms the final link of the Trans-Canada Highway, which stretches from Halifax, Nova Scotia, to Vancouver, British Columbia. Photograph by courtesy of the Department of Mines, Ottawa.

Completion of the road is regarded as the greatest event in the history of the provinces of Alberta and British Columbia since the last spike of the Canadian Pacific Railway was driven at Craigellachie, just west of Revelstoke. The new highway will do much to develop tourist travel through the mountains of western Canada. Not only will it provide a direct route from Western Ontario and the prairie provinces to the Pacific Coast, but it will also bring such world famous tourist centres as Lake Louise, Banff and Jasper within easy reach of motor tourists from Vancouver and the coast cities of the United States.

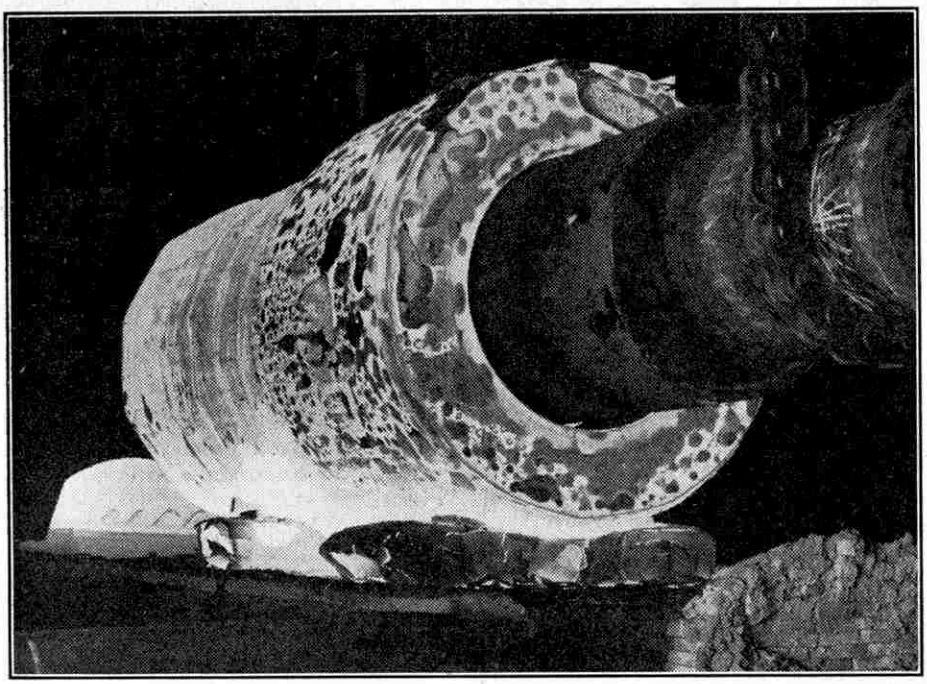


The British Empire's Largest Forging

The illustration on this page shows the largest forging ever produced in the British Empire. This giant piece of metal was produced at the Atlas Works of Thos. Firth and John Brown Ltd., Sheffield. It weighs much more than 200 tons, and owing to its enormous size special precautions were necessary at every stage of its production, both as regards the casting of the ingot and the subsequent forging.

The majestic sight of the forging of this huge mass of steel was witnessed by a privileged few. Under the tremendous pressure of the Firth-Brown large press, the forging gradually assumed the desired shape, and later it will play its part as a finished machined forging in an important phase of British industry.

Ingots ranging in size from a few hundredweights up to much more than 200 tons are cast regularly at the Atlas Works, but the forging shown on this page is the largest of its type that has yet been produced. The giant press used in its production has produced many of the most outstanding forgings in the steel industry.



The British Empire's largest forging during production at the Atlas Works of Thos. Firth and John Brown Ltd., Sheffield, to whom we are indebted for our photograph. The ingot weighs well over 200 tons.

A Large Canadian Mine Shaft

An unusually large mine shaft was sunk recently at a large asbestos mine in the province of Quebec, Canada, to replace a temporary shaft sunk a few years ago. It descends to a depth of 1,150 ft., and is designed to permit the hoisting of 4,000 tons of ore in 16 hours. The shaft is divided into five compartments, and steel sheets were used instead of wood for lining it, to eliminate the possibility of bits of wood getting into the finished fibre.

Special measuring pockets are provided for loading the hoists, and each of these has a capacity of seven tons of ore. The flow of ore into a pocket is controlled by patented chain-gates installed in each of two chutes. The headframe that carries the hoist winding wheels is an all-steel structure 140 ft. high, and is covered with asbestos sheets.

New French Motor Ship

A large new motor liner to be used on the Marseilles–China–Japan service is now being built in France. The ship will be 500 ft. long and 75 ft. in beam, and is designed for a service speed of 20 knots. Her propelling machinery will consist of three 11-cylinder, two-stroke oil engines, each of 10,300 h.p.

Motor Life-boats for Cornish Stations

Two new motor life-boats have been built for the Royal National Life-Boat Institution's stations at Falmouth and St. Ives. The Falmouth boat is of the powerful Watson cabin type 46 ft. in length, with two 40 h.p. engines and a speed of 8½ knots. She can travel over 240 miles at full speed without refuelling and has cost about £9,000. She has been built out of a gift from Mrs. Constance Conybeare, in memory of her husband, the late Rear-Admiral Crawford Conybeare, who took part in the Arctic expedition of the *"Discovery"* and the *"Alerte,"* under Admiral Sir Henry Stephenson in 1874, and distinguished himself in the fighting in Egypt and the Sudan in the early eighties. Admiral Conybeare died in 1937. The new boat is named *"Crawford and Constance Conybeare."*

The St. Ives boat is of the light Liverpool type, 35 ft. long with a 35 h.p. engine and a speed of 7 knots. She is being stationed at St. Ives as a temporary war measure. She has cost about £4,000.

During the first five months of the war the life-boat service rescued 1,273 lives and during that period the Royal National Life-Boat Institution paid in rewards to its crews and launchers over £9,000, about twice as much as the rewards paid in the corresponding months of the years 1938 and 1939.

A Novel Camera Aids Engineers

A camera capable of taking 120,000 pictures a second, and which is said to be the fastest in the world, is in use in the United States. It has been designed to facilitate the study of electric arcs, so that engineers may analyse the behaviour of such arcs in circuit breakers and other electrical equipment.

A striking feature of the new camera is that it does not employ glass lenses. Instead it has a cylinder perforated with 1,000 holes, each one hundredth of an inch in diameter. The cylinder is 14 in. in diameter and is driven by a ½ h.p. motor at speeds up to 7,200 revolutions per minute. At top speed, each of the 1,000 pin-hole openings is open for only 1/120,000 of a second! Each of the 1,000 pictures taken by the camera on a single film is about a third of an inch square.

Waterloo Bridge Progress

Construction of the new Waterloo Bridge, London, which was begun in 1937, has been delayed by the outbreak of war, but work is going forward as quickly as circumstances permit. It is hoped that the bridge may be opened some time next year. The temporary bridge now in service will remain in use for the period of the war.

A Large Sack Stacking Machine

The upper illustration on this page shows one of many large sack stacking machines that have been built for use in sugar factories by Spencer (Melksham) Ltd., Melksham. These machines are capable of lifting and stacking sacks up to a height of 40 ft., and are believed to be the largest ever made. The sacks are transported by a conveyor belt that travels on a hinged steel boom or jib. The conveyor is driven from the lower end by an electric motor operating through reduction gearing. The outer and longer portion of the jib can be raised and lowered so as to deliver the sacks at the required height. The machine is capable of handling 400 sacks per hour and is so lightly constructed that it can easily be moved from pile to pile as stacking proceeds.

A fine Meccano model of the stacker shown in the illustration is described and illustrated on page 144 of this issue.

Scholarships for the Merchant Navy

A scholarship having an annual value of £50 has been provided by the Worshipful Company of Ironmongers and is placed at the disposal of the Merchant Navy. It is intended for boys who wish to enter the Merchant Navy with a view to taking up careers as officers, and it will be tenable for a period not exceeding three years at H.M.S. *"Conway,"* H.M.S. *"Worcester"* or the Nautical College, Pangbourne.

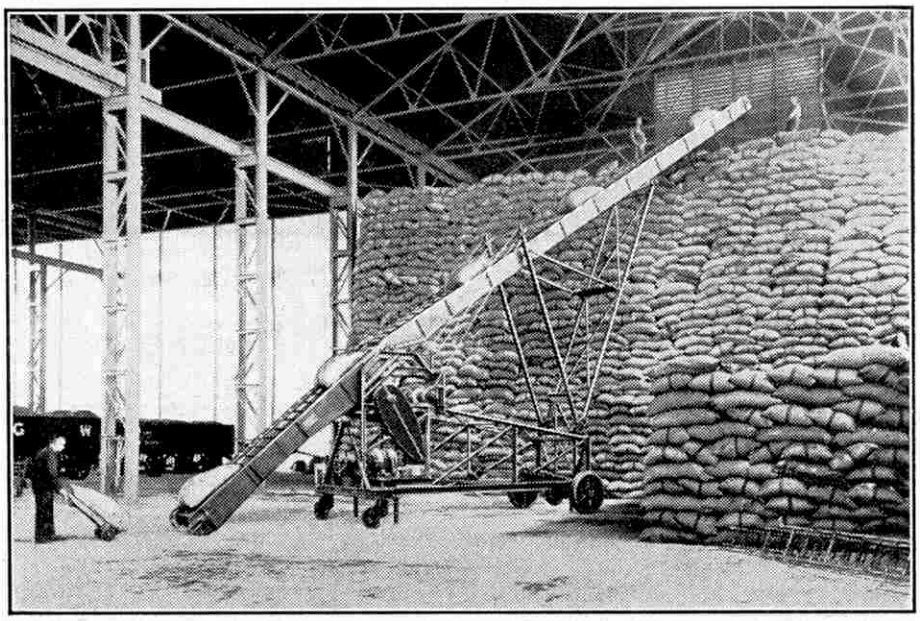
American Field Gun with a Range of 14 Miles

The United States now have a field gun for which a greater range is claimed than that of any other standard field gun in the world. It can send a projectile a distance of 25,000 yds., or roughly 14 miles, and in ordinary ground the shell can blast a hole 16 ft. deep.

The weight of the gun is slightly more than 15 tons. The weapon is mounted on a six-wheeled bogie fitted with rubber tyres, and outriggers give a firm foundation when the gun is in action. It is intended for long range shelling of communications from positions well behind the lines.

Power from an Armenian Mountain Lake

The waters of the great Lake Seven, in the mountains of Armenia, are to be used to generate electric power. The lake has a surface of about 580 square miles and the annual inflow of water is estimated to be 24,720 million cu. ft. A small portion of this is drained away by the River Zanga, the remainder being lost by evaporation. In order to reduce this loss by evaporation it is planned to lower the lake level by 164 ft. A tunnel about four miles long is to be constructed to carry the water to an underground hydro-electric station, and after driving the turbines at this station it will pass on to several other power stations in the vicinity. A large irrigation reservoir also is to be constructed to provide certain districts with water.



The sack stacker referred to on this page. It can stack up to 400 sacks an hour and place them at heights up to 40 ft. Photograph by courtesy of Spencer (Melksham) Ltd., Melksham.

Fluorescent Lighting for the World's Fastest Motor Ship

One of the most outstanding ships completed during 1939 was the new Dutch 21,000 ton motor liner *"Oranje."* This fine vessel has a designed service speed of 21 knots and on trials actually attained a maximum speed of 26.3 knots, which gives the ship the distinction of being the fastest motor liner in existence.

Many special features are incorporated in the design and equipment of the ship, and among these is the lighting installation in the first class social hall. This consists of 1,400 ft. of red, blue and green G.E.C. Osira fluorescent tubing, and it is the largest and most ambitious installation of its kind yet fitted in any ship. A photograph of the social hall illuminated is reproduced at the foot of this page. There are three main ceiling cornices over the central part of the room, which may be used as a dance floor, and a number of smaller ceiling recesses of lower height in the wings of the room.

Each of the three main cornices and the outer groups can be separately controlled, and for each colour there is a remote controlled dimmer, so that an infinite variety of colour effects can readily be obtained. It is also possible to retain the light in the wings of the room while the central space is in darkness, so that effective use may be made of spotlights during dancing.

The dimmers, transformers, chokes, and other equipment for the lighting are housed in a fan room above the social hall, and are controlled from a small switch panel on the bandstand adjacent to the dance floor.

With all the lights full on, the resultant illumination is of high intensity and the Hall has an appearance very similar to that derived from daylight. A warmer or cooler light can be obtained, however, by varying the proportions of each colour. This allows effective changes to be brought about to suit various climatic conditions, an important feature for a vessel that spends some time in the tropics.

The General Electric Co. Ltd. supplied also a great amount of other electrical equipment for this ship, including automatic telephones.

The First Class Social Hall in the Dutch motor liner "Oranje" illuminated by means of fluorescent tubing. Photograph by courtesy of the General Electric Co. Ltd.

The Fokker T.9 twin-engined long-range bomber.

Fokker Military Aircraft

Three Varied Twin-Engined Types

By J. I. Dorgelo

THE death last December of Anthony H. G. Fokker, the famous inventor and aircraft pioneer, has drawn attention anew to the fine aircraft produced by the Netherlands company that he established. For almost 30 years the Fokker Company of Amsterdam have been noted for their military aircraft, and—until production ceased a few years ago—also for commercial aircraft. The types at present in production are remarkably varied, but are alike in being of a very high standard of design, construction, and efficiency. The three types illustrated and described in this article are in marked contrast to each other. They are the T.9 bomber, the T.8W torpedo-bomber seaplane, and the G.1 fighter.

The T.9, shown at the head of this page, is the first Fokker all-metal aeroplane. It is a twin-engined long-range bomber designed for service in the Netherlands East Indies, and is fitted with two 1,375 h.p. "Bristol" Hercules sleeve-valve engines. Details of performance have not been released, but the T.9 is known to be very fast, and to carry a heavy bomb load. Although this fine monoplane is larger than the earlier Fokker bomber, the T.5, it is more graceful than its predecessor. It carries a crew of four, consisting of a commander, whose station is in the transparent nose of the fuselage, a pilot in the front cockpit, a wireless operator directly behind the pilot, and a rear gunner farther aft. There is also provision for a gun to be mounted in the bottom of the fuselage to defend the bomber against attack from below.

One of the most interesting of the current Fokker aircraft is the T.8W, a twin-engined twin-float seaplane designed to carry either a torpedo or a bomb load. An unusual feature of this machine is that the torpedo is carried inside the fuselage instead of in the customary position underneath it. It was not easy to design this arrangement, as nobody knew what the exact behaviour of the torpedo would be when released from its compartment in the fuselage into the airstream caused by the high speed of the seaplane. The tests of the first T.8W were carried out in the spring of 1939, and were very successful.

For duty as a defender, an aircraft of the type of the Fokker T.8W must be capable of fast flight, must have a long range, and must be well armed, so that it can both carry out prolonged patrol flights and be able to meet and combat the enemy far out at sea. The T.8W fulfils these requirements so well that a series of this aircraft was ordered for the Netherlands Naval Air Service, and another series for the Naval Air Service in the Netherlands East Indies.

This torpedo-bomber carries a crew of three, consisting of an observer in the fuselage nose, a pilot whose cockpit is in line with the leading edge of the wing, and a wireless operator who also acts as rear gunner and occupies a cockpit in the wing centre section, between the spars. The accompanying illustration of the T.8W shows the nose compartment, which has large windows, and a sliding roof with windows so that the observer can signal to other aircraft when the seaplane is on the water. The automatic bomb-sight is mounted in an opening in the floor in front of the observer's seat, and this opening may be used also for a camera, thus allowing the machine to be used for

View of the Fokker G.1 fighter-bomber showing the short fuselage, and the two long, tapered booms that carry the wide tail unit. When fitted with "Bristol" Mercury VIII engines the G.1 can attain a top speed of 300 m.p.h. The photograph at the top of this page is reproduced by courtesy of N.V. Nederlandsche Vliegtuigenfabriek, Amsterdam.

air photography on reconnaissance. In the fuselage nose, and just above the floor, there is a large window that gives the observer a good downward view as the aeroplane approaches the target.

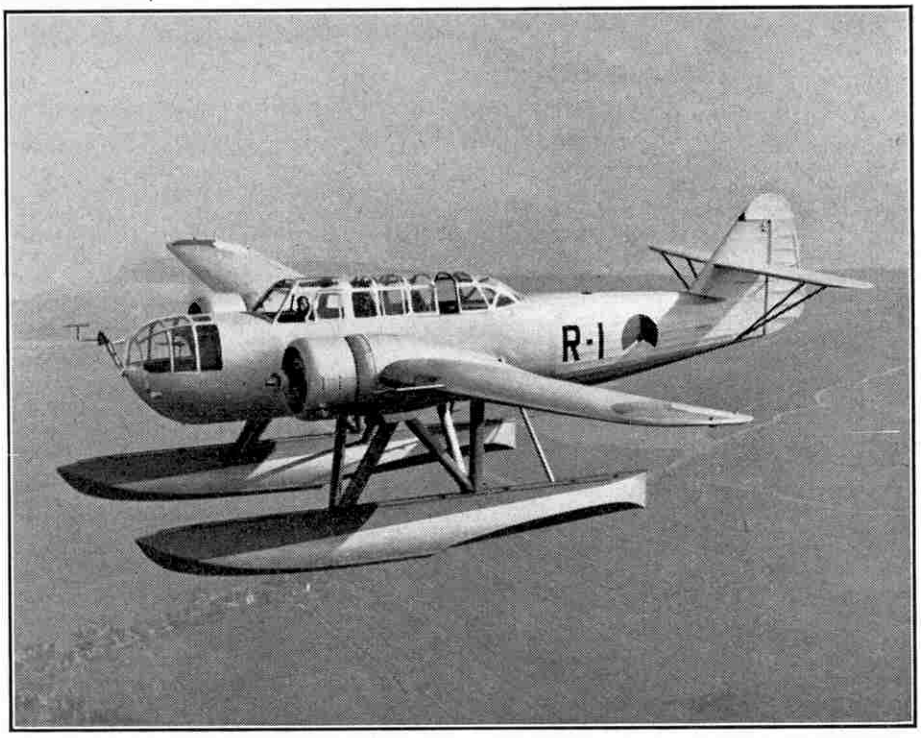
The cockpits for the pilot and the wireless operator are covered by a transparent roof with sliding forward and rear portions for the two men below, and in an emergency the roof can be thrown off. The pilot sits on the port side, and on the starboard side there is a passage that leads to the rear cockpit. A fixed machine gun in the fuselage nose is operated by the pilot, and the trigger lever for the gun is attached to the left steering handle. When the radio operator acts as rear gunner he uses a fixed machine gun that is mounted in the rear of his compartment and can be retracted into the fuselage when not in use.

The Fokker T.8W is a low wing monoplane type seaplane. Its two engines are mounted in large nacelles, which extend rearward almost the full width of the wings and taper gracefully into them just short of the trailing edges. Any type of 400-750 h.p. radial air-cooled engine, and either constant speed or controllable pitch airscrews, can be fitted in this machine. No details of either engine or airscrew fitted in the standard T.8W are available, and of course there are no performance figures.

The fuselage of the standard machine is built in three sections, a forward one of duralumin monocoque construction, a centre one of wooden monocoque build, and a rear part of tubular steel, covered with fabric. The wings are of wood, with Bakelite plywood covering, but the T.8W seaplanes ordered for the Netherlands East Indies will be all-metal machines. The long twin floats are of duralumin, and each is divided internally into six watertight compartments.

Another new type of Fokker seaplane is the C.14W designed for reconnaissance duties. It is suitable also for use as a trainer, and when thus employed is fitted with dual control. Each cockpit has a sliding roof, and as a reconnaissance aircraft the C.14W has a machine gun mounted in the rear cockpit for defence and lowered into the fuselage when not in action. The fuselage is of normal Fokker construction, that is, it is of tubular steel with a covering of duralumin sheeting in panels that are easily removable for inspection of the framework. The floats are made on the same lines as those of the T.8W seaplane.

Reverting to Fokker landplanes, the G.1 fighter-bomber shown in the lower illustration on the previous page is a very interesting machine. It is a twin-engined high wing monoplane of unusual design for a military aeroplane. The very short fuselage ends just aft of the trailing edges of the wings, and the wide tail unit is carried on the sterns of two long, tapering booms, in the front or wide ends of which the engines are installed.



The Fokker T.8W twin-float seaplane, designed to carry either a torpedo or bombs.

The G.1 can be arranged with either two or three seats. In the two-seater version there is a pilot and an observer who acts also as the gunner and radio operator. The three-seater machine carries a radio operator, who is accommodated between the pilot and the observer, in the place occupied by the petrol tank in the two-seater G.1. The pilot's cockpit is covered by a streamlined transparent roof, and access is gained by way of one of the large side windows, which is hinged at the bottom for this purpose.

The armament of this fighter-bomber consists of eight fixed machine guns in the fuselage and a machine gun in the observer's compartment. The levers for working the machine guns in the fuselage, the trap doors of the bomb compartment, and the wing landing flaps, are fitted where they can be easily reached by the pilot.

The rear compartment in the fuselage is for the observer, who has at his disposal the single gun just mentioned. The rotatable turret in which this gun is suspended on gimbals can turn a complete circle, so that the weapon can be operated irrespective of the position of the turret. When the observer wishes to fire, the gun is passed outward through an opened narrow slot in the turret, and this slot is closed again when the gun is withdrawn. Large windows in the walls and roof of the rear compartment ensure an excellent view on all sides, and a large trap window in the roof provides the means of access. There is a folding seat for the observer, and the walls are padded to protect him. He is shielded from draughts when the slot for the gun is open by a transparent partition fixed behind the fuel tank.

Part of the fuselage under the wing forms the bomb room, and this is closed by hydraulically operated trap doors. The undercarriage is retractable. When it is drawn up trap doors close over the recesses containing it, and these open automatically when the undercarriage is lowered.

The Fokker G.1 can be equipped with any type of 600-900 h.p. radial air cooled engine, and when fitted with "Bristol" Mercury VIII engines it has a top speed of 300 m.p.h.

RAILWAY NEWS

A Driver's Eye View

For some time the L.M.S. have run a Diesel railcar service between Darwen, Blackburn and Clitheroe. This mode of railway transport is very interesting to the railway enthusiast because of the seats beside the driver, from which there is an uninterrupted view along the track ahead. The fortunate occupier of one of these seats has all the fun of sighting the signals and seeing the route from the driver's point of view.

The line between Blackburn and Clitheroe must be one of the finest scenic routes on the Central Division, and this splendid country can be seen at its best from the front of a railcar. On the northward run a magnificent panorama stretches to the left and ahead, including the length of Jeffrey Fell and the large mass of Pendle Hill, with the broad fertile valley of the Ribble between. Further groups of fells can be seen over by Whitewell and Slaidburn, still farther away.

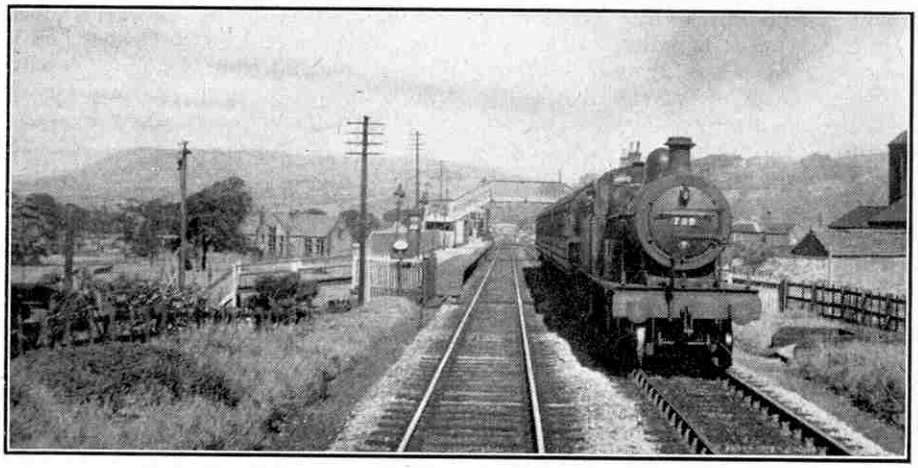
The photograph reproduced on this page was taken from the front seat of the railcar entering Langho station from the Blackburn side. A stopping train, headed by a Class 2 engine, is seen leaving the station on the adjacent track. In the distance is the broad expanse of Pendle Hill, sloping on the left towards the Ribble Valley. W. S. GARTH.

L.N.E.R. Wartime Running

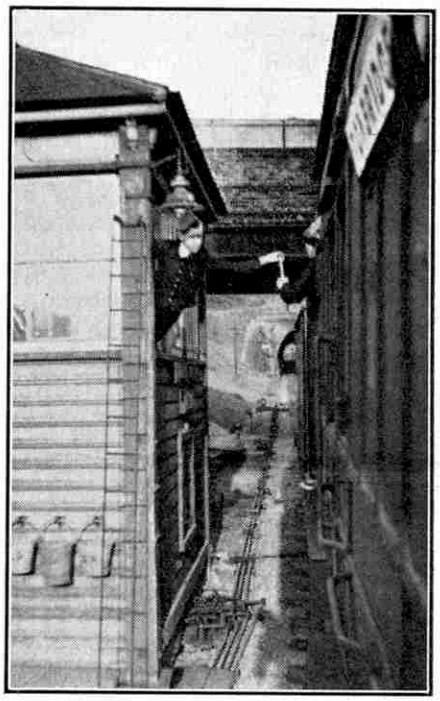
The first logs recorded during the present conflict are of considerable interest, as locomotive power has increased enormously since the Great War of 1914-8. Many of the largest engines of that period were heavily taxed by enhanced loads, which however did not by any means come up to the vast trains hauled during the most severely restricted train-service period of September-October 1939.

The 7.50 a.m. breakfast-car express from Leeds to King's Cross, running to the improved schedule introduced on 4th Dec., was boarded at Doncaster, where it was 13 min. late getting away behind "Green Arrow" 2–6–2 No. 4812 with a moderate load of 380 tons. The 17.4 miles to Retford, for which 26 min. are allowed, would have taken no more than 23½ min. but for a signal slowing that caused the actual time to be 25½ min. Speeds up the 1 in 198 to Pipers Wood were 46–44 m.p.h., followed by a maximum near Ranskill of 63 m.p.h. On restarting gently 38½ m.p.h. was attained up the 1 in 178 to Askham Tunnel, speed subsequently rising to a sustained 70 m.p.h. down to the Trent valley. In order apparently to ensure a good supply of trough water, the driver eased down to 40-33 m.p.h. at Muskham and after a maximum of 58½ m.p.h. beyond Newark fell to a minimum of 46½ m.p.h. at Peascliffe. Even then an arrival in Grantham would have been easily possible in 41½ min., compared with the 45 min. booked, but a signal stop outside lost the regained time.

At Grantham the Doncaster engine went off, as is now usual, and from the shed came A1 Pacific 2557 *"Blair Athol"* for the non-stop run to London. For the 105½ miles the time allowed is 128 min., 28 min. more than the very fast timing in force from 1932 to 1939. Down Stoke bank 68 m.p.h. was the maximum and Peterborough was passed, dead slow on the station avoiding line, in 34½ mins. A maximum of 62½ m.p.h. on the Holme level was followed by a minimum of 48½ m.p.h. up the 1 in 200 of Ripton Bank, and 65½ m.p.h. easing to 60 m.p.h. after Huntingdon. Following a permanent way slack costing 2 min. near St. Neots, the train travelled at 55-61 m.p.h. until the long rise past Hitchin to Stevenage, taken under easy steam, reduced the speed to 47½ m.p.h. Touching 66 m.p.h. before Hatfield and 67-68 m.p.h. past New Barnet, with a steady 52-53 m.p.h. up the broken rise to Potters Bar between these places, the train reached King's Cross in 120¾ min., showing an improvement upon the emergency schedule of over 7 min. without allowing for the relaying check. R. A. H. WEIGHT.



A driver's eye view, seen from the front seat of a Diesel-engined railcar entering Langho station between Blackburn and Clitheroe. Photograph by W. S. Garth, Luton.



Handing over the staff on entering the single line section from Tunbridge Wells West to Central. This prize-winning photograph was taken from a carriage window by J. Turley, Tunbridge Wells.

Cross-Country Services Restored

Many useful cross-country through carriage services, in certain instances running over the lines of more than one group, have been restored or amplified with the introduction of the December–January timetables. They include the Brighton, Portsmouth and Plymouth service worked by the S.R., trains between Bournemouth and Leeds and Bradford, over the Somerset and Dorset and L.M.S. Midland lines, and the Liverpool–Crewe–Bristol–Plymouth service through the Severn Tunnel by L.M.S. and G.W.R. Among them also are the York and Swindon service by way of Banbury, L.N.E.R. and G.W.R., the Hull, Manchester and Liverpool trains, L.N.E.R. and Cheshire Lines, and those between Newcastle, Leeds and Manchester, L.N.E.R. and L.M.S. In addition there has been an increase in the number of normal through portions attached to trunk route express services. R. A. H. WEIGHT.

L.M.S. Locomotive News

Three further heavy oil engines have now been put into traffic. These are Nos. 7088–90, all built at Derby.

Among engines condemned are the former H.R. 4–6–0 No. 14684 *"Duncraig Castle"* and 4–4–0 No. 14402 *"Ben Armin."* The former Caledonian 4–6–0 engine No. 14620 and L.N.W.R. 4–4–0s No. 25272 *"Brindley"* and 25282 *"Champion"* also are in the list of engines condemned.

Speedy Runs from Birmingham to London

Little has been published regarding performance since the introduction of the three-cylinder 4–6–0 engines on the L.M.S. London–Birmingham expresses, which during the last year or two of normal services were accelerated. With numerous start to stop timings above the mile a minute mark they formed a notably fast service. Some summarised details are appended of a number of runs on the 2.35 p.m. Birmingham (New St.) to London (Euston), which were made last year and of which some of the logs are only just to hand. The schedule was 115 minutes for 112.9 miles, including a Coventry stop.

The engine on the first four trips was 5XP No. 5532 *"Illustrious,"* of the "Patriot" or "Baby Scot" class. The loads of 10, 9, 11 and 10 coaches respectively represented gross weights behind the tender of about 325, 290, 360 and 335 tons, all but one above the normal applying when the 4–4–0 Midland compounds ran this train on a slower two-hour timing. The initial 18.9 mile sprint to Coventry stop was covered in an average time of no more than 20 min., the very fast time of 19¼ min. being achieved with the heaviest 11-car train. Only 92 minutes were allowed for the 94 miles on to London, and each train suffered a permanent way slack south of Berkhamsted.

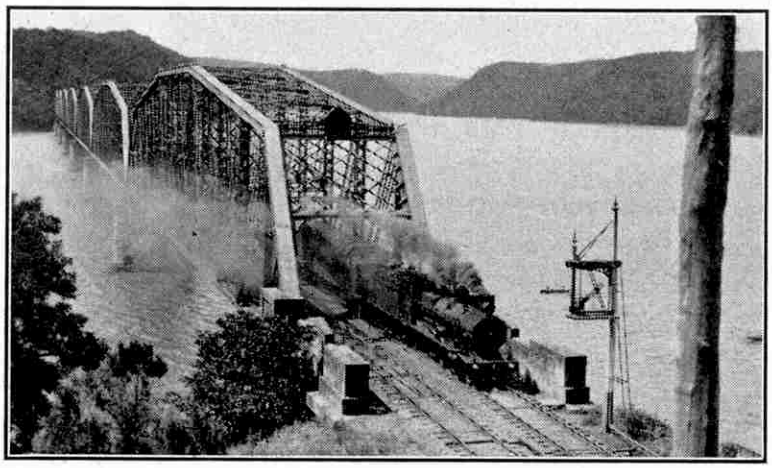
The running was remarkably steady and similar, the four overall times from Coventry start to Euston stop showing a variation of no more than 21 seconds, and all arrivals were practically to time, despite 2 to 2½ min. delay. The 82.6 miles from passing Rugby slowly was covered in about 77½ min. actual, or 75 to 75½ min. nett. The mean speed over 70 miles between Welton and Willesden for the four runs averaged 68.6 m.p.h., relaying slack included. On the fourth trip *"Illustrious"* made a notably rapid finish following gentler running, by comparison, out in the country. The 8.1 miles in from Wembley and the 5.4 miles from Willesden Junc. took only 8 min. 3 sec. and 5 min. 57 sec. respectively, so that not quite as much respect was paid as usual to the sharp descent from Camden into the terminus.

The engines on the remaining journeys were the newer Stanier three-cylinder 4–6–0's of the "Jubilee" class. No. 5719 *"Glorious"* with nine coaches suffered a bad signal slowing outside Rugby, as well as a protracted permanent way slack on the descent from Tring, but with another rapid finish the arrival at Euston was barely 2 min. late. The better of two runs by No. 5738 *"Samson"* was a fast effort with 10 coaches, 330 tons full. Coventry was reached in 20½ min., and on restarting particularly fine time was made. The 39.2 miles to Castlethorpe, including the Rugby service slack and subsequent ups and downs, took only 36 min., but a permanent way slowing to 25 m.p.h. followed. The 15 rising miles between Bletchley and Tring were covered in 13 min. 8 sec., and the average speed over the 23½ miles on to Wembley was 75.7 m.p.h. In spite of a 40 m.p.h. slowing before Willesden *"Samson"* was in Euston a good quarter of a minute early. An unchecked run of this calibre would have provided non-stop times of no more than 87 min. for the 94 miles in from Coventry, or say 106 mins. overall from Birmingham. R. A. H. WEIGHT.

100 m.p.h. on the G.W.R.

Several three-figure speeds have been attained in ordinary express passenger service in Britain during the last few years, apart from the more spectacular test runs and record achievements. Details of these have been reserved to the annals of the streamlined L.N.E.R. Pacifics working one of three high-speed services over the East Coast main-line. It is therefore of notable interest to record that, as announced by the *"Railway Magazine,"* on 31st July last the G.W.R. "Castle" engine No. 4089 *"Builth Castle"* reached a sustained 100 m.p.h.

"Builth Castle" was working the 12.45 p.m. Paddington–Worcester express in charge of Driver Tidball of Worcester shed, and attained 100 m.p.h. between mile-posts 101¾ and 102 at the foot of the sharp descent at 1 in 100 which exists on a well aligned 4½ mile stretch between Campden and Honeybourne. Six miles were then covered at an average speed of 93.7 between posts 99 and 105. R. A. H. WEIGHT.



Passenger train hauled by "P" Class 4-6-0 locomotive 3291 on Hawkesbury Bridge, 36 miles north of Sydney. Prize-winning photograph by R. B. McMillan, Neutral Bay, New South Wales.

Railways in the January Blizzard

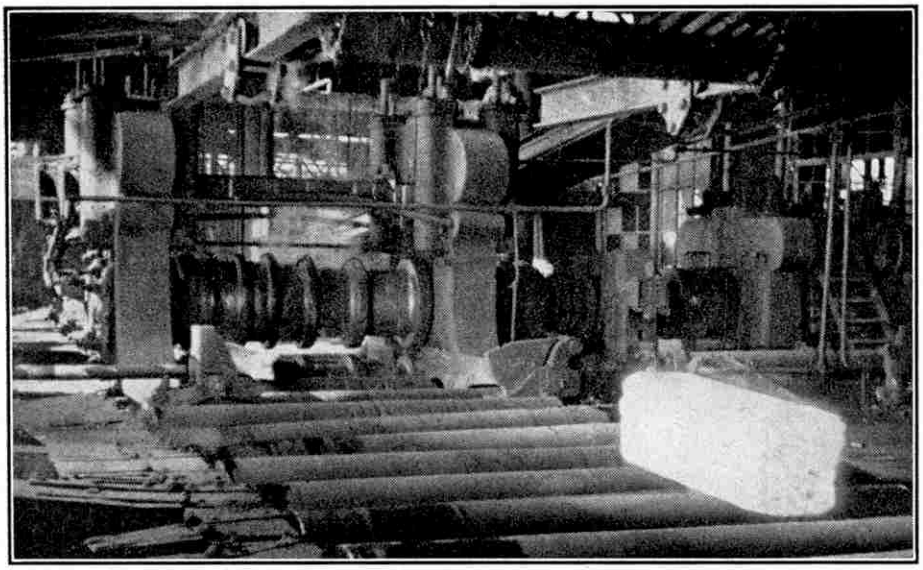
The story can now be told of the effect on railways of the great blizzard at the end of January, the worst for a century. It caused 1,500 miles of line to be blocked by snow. Many hundreds of miles of telegraph and telephone wires were brought down, and scores of trains were entirely snowed up. Snowdrifts 15 ft. in depth were common in the country, and 314 snow ploughs were used to clear the lines. Sometimes four engines had to be used on each plough in order to make any impression on the frozen snow, and in some instances even snow ploughs were derailed.

The greatest trouble was experienced near Beattock, on the L.M.S. West Coast route between London and Scotland, where at one time six passenger trains, two freight trains and a newspaper train were completely blocked. For hours on end 200 soldiers helped 120 railwaymen to dig through the snow from the north, while 50 soldiers and 120 railwaymen dug feverishly to meet them from the south.

Six freight trains and seven engines, a ballast train and six passenger trains were blocked at different times on the former Midland line of the L.M.S. in the Peak district of Derbyshire. One train attempting a rescue expedition itself got snowed up, and was only freed after heroic efforts on the part of the crew.

A remarkable freak effect was the fall of rain that turned to ice immediately it touched a metallic surface. As a result many of the live rails of electrified lines were coated with ice, preventing electric trains from getting power, and services had to be steam hauled until the live rails could be freed. Telegraph lines were coated with more than 1 in. of solid ice,and where they broke under the strain it was often impossible to effect repairs because the poles themselves were so coated with ice that they gave the linesmen no foothold.

Rounding the curve leading to Hailes Platform. A picturesque scene on the Balerno branch of the Caledonian section of the L.M.S. Prize-winning photograph by D. F. Forbes, Edinburgh.



A cogging mill, which is a rolling mill having grooved rollers through which hot metal is passed.

HOW THINGS ARE MADE:

Screws

By F. W. Farley

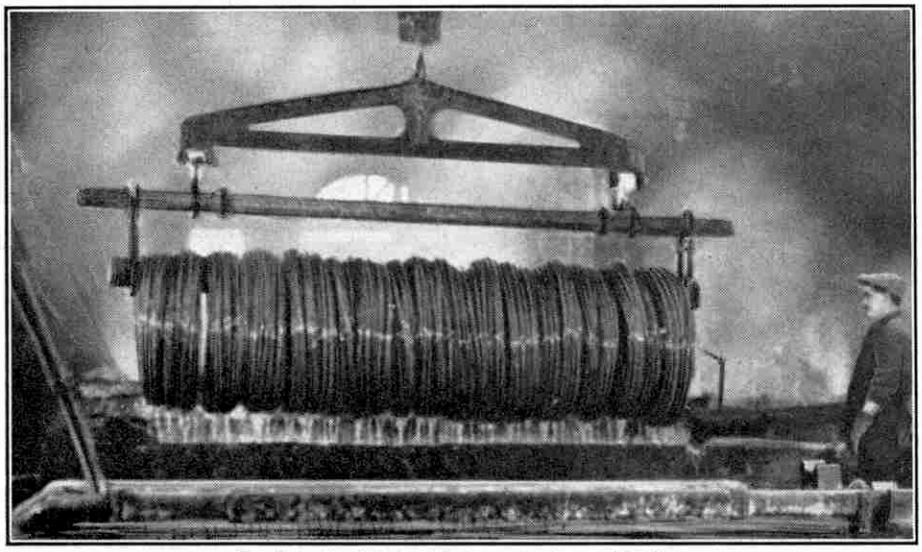
THERE is an interesting story behind the production of almost all the everyday objects we use, and this is certainly the case with the screws that make possible the erection of so many and varied structures.

In the first place, as a screw is a steel product, supplies of iron ore, coke and limestone are involved, and from these materials pig iron is made. The ore is smelted in large blast furnaces, some of which use as much as 10,000 tons of raw material each week, and turn out about 3,500 tons of pig iron in that time. The furnaces are fed automatically by means of electrically driven scale cars, which collect the various materials from bunkers, weigh the amounts required and place them in a hoist. This takes the load to the top of the blast furnace and deposits it into the furnace when needed. As the steel for screws is made by the Bessemer process, the molten iron from the furnaces is run off from the bottom into ladles and taken to a mixer, which is a device for ensuring even quality in the iron. It consists of a huge steel tank, lined with brick, and holding about 750 tons of metal at a time; and in this tank the iron is kept at a constant temperature by means of gas passing through, so that all the contents can flow together and become thoroughly mixed. The iron is then run off once more into ladles and taken to a Bessemer converter where the steel is made.

Bessemer converters are steel receptacles lined with refractory material, and are some 20 ft. high and about 10 ft. across, holding 25 tons of molten metal at a time. They are mounted on trunnions so that they can be tipped forward for charging and for pouring the steel into a ladle. To make the steel the Bessemer converter is charged with a supply of pig iron from the mixer while it is tipped forward, and as it resumes the upright position strong jets of air are turned on at the base so that the air blows through the iron. These jets must have enough pressure to prevent the iron from filling up the apertures through which they are blown.

Interesting changes take place when the air comes in contact with the molten iron. First of all iron oxide is formed, and this extracts silicon and manganese by oxidising them. Then after a short time the carbon contained in the iron begins to burn brightly and a shower of brilliant sparks is given off from the top of the converter, all of which makes a most picturesque sight. When this action is complete, however, there still remain sulphur and phosphorus, and the metal is also very much oxidised, so that at this point additions are made that govern the quality of the finished steel.

Heat is produced during oxidation, and in the case of the Bessemer process this heat is sufficient to maintain the heat in the converter. This dispenses with the need for any heating, saves the use of fuel, and makes the process very economical indeed. Here a second function of the mixer should be noted. The Bessemer converters are usually large enough to deal with the pig iron output of two blast furnaces, and the mixers therefore form convenient reservoirs for the molten metal. The whole "blowing" operation takes only about 12 minutes, so that the output of steel is considerable.



Cleaning coils of steel rod by immersion in an acid bath.

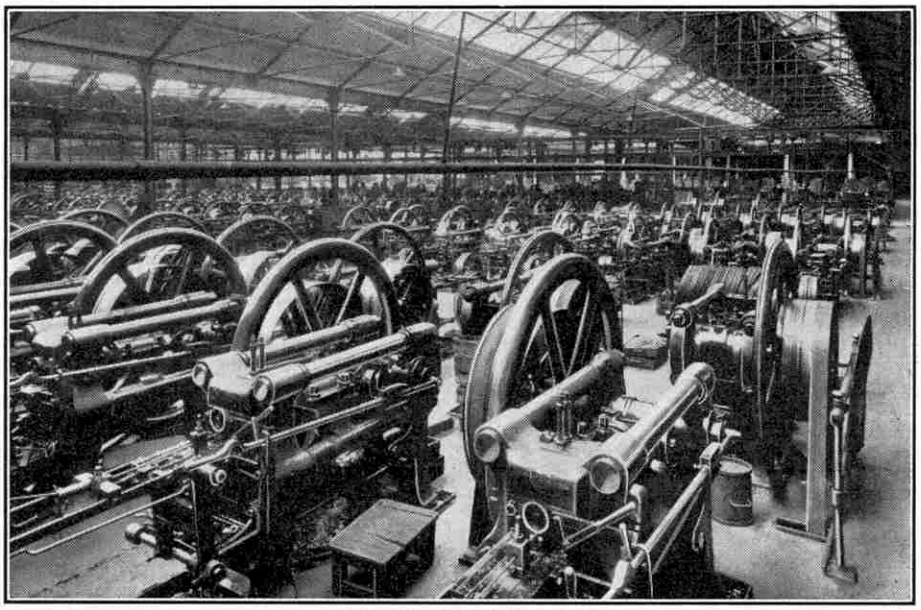
The actual raw material—steel—is now finished, and it is run from a great ladle into moulds holding about 2½ tons of metal, thus forming large ingots, which are removed from the moulds when they are cool enough and placed in the soaking pits. These pits are furnaces heated by gas passing through, and the ingots are reheated to the correct temperature for working down to smaller dimensions. Here the first illustration should be noted. It shows a cogging mill, which is a rolling mill having grooved rollers through which the hot metal is passed, becoming reduced in section in the process, but still remaining in a roughly square shape. The metal passes and repasses through the rolls, which helps to ensure a good even texture in the steel.

From the cogging mills the ingot travels on roller conveyors like those in the picture, to the billet rolling mill, from which emerges steel bar of 4 in. square section. This is cut off into lengths of 12 ft. as it comes from the rolls, and these lengths, after they have become cold, are further cut into convenient 3 ft. billets, which are taken by rail truck to the mills where the rod is rolled.

The steel billets are collected from stock by travelling overhead electric magnets, and fed into and discharged from the billet furnaces by hydraulic rams. After leaving the furnace they pass through no less than 18 sets of rolls to reach the final diameter, by which time they are about 1,400 ft. long; while the rod emerges from the last rolling mill at a rate of about 2,000 ft. per minute, at which point it is automatically formed into coils for easy handling and carried off by overhead cranes to cool.

The next process is the drawing of the wire in the various diameters needed for screws. Before this can begin the coils of rod have to be cleaned in an acid bath.

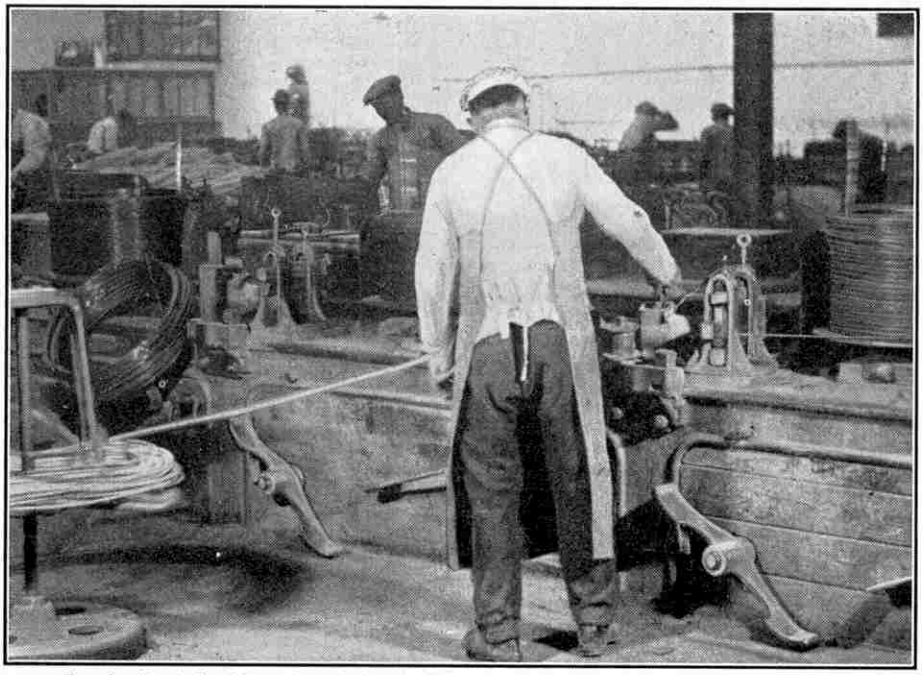
Next the acid must be got rid of, so that it does not destroy the metal; and the coils are therefore washed in water and then dipped in a tank containing lime, which effectively neutralises any acid still remaining. Drying follows, a process that takes place in "ovens," from which the coils come out ready to be drawn into wire. This process is shown in the lower illustration on this page. The rod is being drawn through a hole in a steel plate, and the finished wire rolled up on a drum, ready to be made into screws.



Long rows of heading machines.

Heading machines, long rows of which are shown in the photograph above, are fed with wire, and automatically cut off pieces of the correct length, on which at the same time they form the head. The pieces of metal are then known as "blanks." These are first cleaned in rotating iron containers, and then weighed and passed to the hoppers that automatically feed the machines that turn the blanks to a bright surface and the correct size, and then saw the cut in the heads, known as the "nick." At this stage scrupulous cleaning once again takes place, and also sorting, to discover any faulty work.

After this the blanks are ready for threading or "worming." From the supply hoppers the blanks fall into the clutch of sensitive steel fingers that automatically place them in the correct position so that the cutters can form the thread, the finished screw being ejected to make room for the next as soon as completed. There only remains a final cleaning and polishing, carried out in rotating drums; and the screws can then be sorted once more to detect any faults, counted and then wrapped.



Drawing the steel rod through a hole in a steel plate. The finished wire is being rolled up on a drum.

Of General Interest

Coal Gas Instead of Petrol

The illustration on this page shows a lorry fitted with a gas bag so that it can be driven on coal gas instead of petrol. Vehicles fitted in this manner were often seen during the Great War of 1914-18, and there is every sign that similar use will be made of gas during the present war. The lorry shown is the first equipped in Bradford, where filling stations are being provided to enable supplies to be renewed.

It is claimed that the performance of a gas-driven lorry is equal to that of one using petrol. The gas is bulkier than liquid fuel, and not as easy to store. The envelope on the roof of the lorry shown in our illustration is 12 ft. long, 6 ft. wide and 6 ft. deep. It holds 432 cu. ft. of gas, a quantity that is equivalent to nearly two gallons of petrol.

Another system that promises good results has been introduced in Wallasey. There the gas is stored under pressure in cylinders, so that it occupies much less room than in bags.

Japan's Silkworm Army

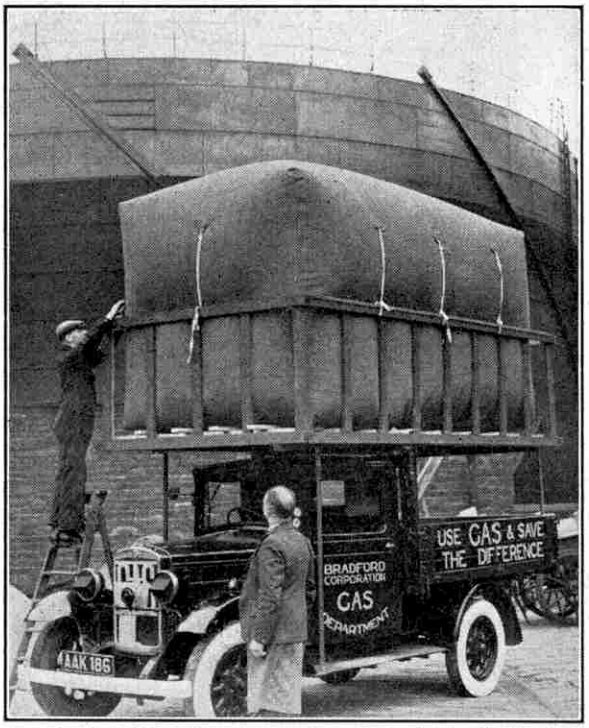
It has been calculated that the silk exported from Japan in a single year is the product of more than 200,000 million silk worms. Feeding this immense army of silk worms on mulberry leaves and gathering in the silk they produce is the work of two million families. The feeding itself is no light task, for every worm that spins a cocoon eats 50 times its own weight of mulberry leaves. The silkworm of course is small, and the reason for the use of such enormous numbers is that 3,000 cocoons go to one pound of raw silk.

Secrets of the Vacuum Flask

The best way of preventing heat from reaching a body, or escaping from it, seems to be to surround it with nothing! The well-known vacuum flask used for keeping liquids hot has double walls, and the air in the space between them is pumped out as far as possible. Vacuum flasks serve also for keeping liquids cold, and are used for such purposes as storing liquid air to preserve it from evaporation for as long a period as possible. The glass of these vessels is silvered, as it has been discovered that a silvered vessel absorbs heat from outside more slowly than one with walls of plain glass.

The vacuum flask was invented by Sir James Dewar, a famous scientist who was professor at the Royal Institute, the home of Faraday and the scene of his greatest work in chemistry and electricity.

Vacuum flasks made of glass are suitable for storing the comparatively small quantities of liquid air used in laboratory experiments, but when liquid air became an industrial product larger vessels were necessary. These could not be made of glass, which in any case was too fragile for transport. Metal flasks therefore were constructed, but they did not prove satisfactory, for their metal walls continually gave out small quantities of gas, the effect of which was to ruin the vacuum. Charcoal solved the difficulty. This material when specially prepared is capable of absorbing immense quantities of gas, and it is most effective when it is at a very low temperature. In a metal vacuum flask intended for storing liquid air charcoal is placed in a small capsule attached to the inner wall. There it is at the temperature of the liquid air itself, and it absorbs practically all gas given out by the metal.



A motor lorry driven by coal gas. It was converted by the Bradford Corporation Gas Department, and the 432 cu. ft. of gas it can store in the envelope on the roof is equivalent to nearly two gallons of petrol.

Making Air Disappear

How effective charcoal is in absorbing gas can be shown by a very simple experiment. Every reader of the "*M.M.*" will know that a simple barometer can be made by filling a tube more than 30 in. in length with mercury and inverting it, placing its open end under mercury in a basin. In this experiment a longer tube is bent round at the top and charcoal is placed in the bend. The tube is then inverted in a basin of mercury, but is not itself filled with mercury, so that it contains air. Then the charcoal is cooled by placing a vessel containing liquid oxygen round the portion of the tube containing it. The mercury rises to practically the same level as in the simple barometer just described, showing that the cooled charcoal has actually absorbed practically the whole of the air in the tube.

Why is the Earth a Magnet?

It has been known for many years that the Earth behaves like a huge magnet, and for centuries seamen have taken advantage of its magnetism to find their way about the oceans. Yet we do not know why the Earth is a magnet. It may be suggested that it is naturally magnetic, since its interior consists chiefly of iron. Unfortunately for this theory iron loses its magnetic properties when it is made red hot, and there is little doubt that the vast mass of metal in the interior of the Earth is far too hot to be magnetic.

It has now been suggested that the Earth is not a permanent magnet, but an electro-magnet. If so the currents that give it its magnetic properties must have an intensity of millions of amperes. The currents that are supposed to give the Earth its magnetism may be due to the heating of metals of different kinds in contact with each other. If a semicircle of iron has its ends brought into contact with those of a similar half circle of copper, and one point of contract is heated while the other remains cool, an electric current will flow round the circuit. Something of the same kind may happen within the interior of the Earth, where the white hot metal seems to be plastic and to move about in swirls and eddies, causing temperature variations. If the Earth were still the effects would cancel each other, but the rotation of the globe gives the flow of the heated eddies a more or less definite direction, with the result that definite electrical currents are set up that give rise to the familiar magnetic effect.

The discovery that the Earth is a great magnet is credited to Dr. Gilbert, of Colchester, who made this announcement in the year 1600.

Photography Nearly Two Miles Under Water

A Münich engineer has constructed a camera with which flashlight photographs can be taken under water at a depth of 9,000 ft. It works automatically so that no diver is necessary to accompany it. It consists of a metal chamber more than a foot in diameter from which three bull's eyes project. Behind the lowest of these a miniature camera is mounted and apparatus controlled by clockwork flashes light through the two upper windows.

The inventor has already tested his camera with success in the water of Lake Constance, and is to make further trials in the Mediterranean, where greater depths are available.

Hall Built of Coal

The Chamber of Commerce building at Williamson, West Virginia, in the United States, is constructed entirely of coal. Williamson is the centre of a coal-mining district, and the idea of constructing a building of coal occurred to the General Superintendent of the mines of the Norfolk and Western Railway, who at the time was President of the Chamber.

The building occupies a central and prominent position in the city, where it is seen at once by interested visitors. Altogether 65 tons of fuel mined in the immediate neighbourhood went into its construction. This coal was presented by local companies, and building materials, money and even labour were provided by local citizens to make this unique monument of the coal industry possible.

The lower illustration on this page shows the building. The pillars in front are made of coal sawn into blocks by hand and laid with black mortar, giving a perfectly smooth appearance. White mortar was used on the rest of the building, and the contrast between it and the black coal "bricks" is very effective. The entire structure was given a heavy coating of varnish, which gives it a fine glossy appearance and protects the coal from the results of exposure to the elements.

Testing Eggs by Ultra-Violet Rays

Ultra-violet rays are now largely used in the preparation of foodstuffs in order to assist in promoting general health. For this purpose they are used in various ways. For instance, they are used for sterilising food containers, air or water, and simple means of applying them for this purpose have been developed in recent years. Ultra-violet radiation also improves certain foodstuffs by increasing the proportion in them of vitamin D, one of the active constituents of the oils prepared from the livers of cod and halibut. Care has to be taken to expose the foodstuffs to exactly the right amount of radiation, for to continue the application too long would produce harmful results.

One of the foodstuffs that can be improved by radiation is dough, which then gives bread that is spongier and of better colour, and has a crust that is crisper than if untreated dough were used. Exposure to ultra-violet rays for 7 to 10 minutes is sufficient.

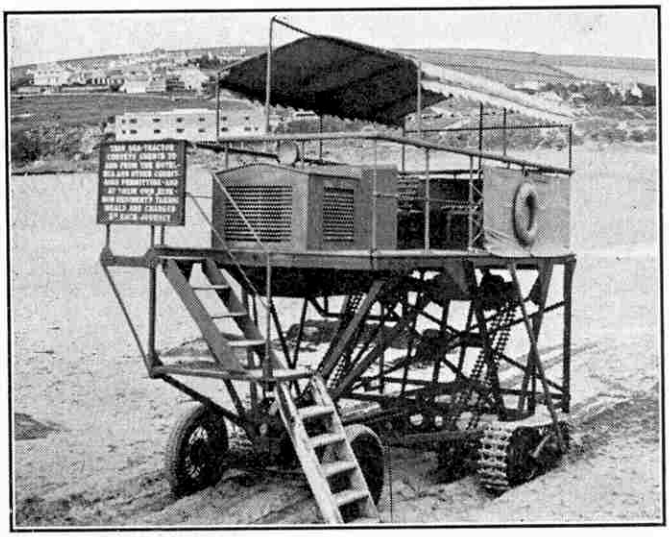
Milk is another food that can be irradiated. In one system this is done while the milk is flowing down the cooler. The milk is sterilised during the process, which has no effect on its flavour.

Ultra-violet rays are also used in testing the quality or freshness of foodstuffs, many of which absorb the rays and in return give out light of definite colour. The light emitted by a really fresh egg undergoing this test is mauve-red, but as the egg grows older the colour changes to pale blue. The rays are invaluable also in detecting the addition of foreign matter to many kinds of foodstuff. For instance, there are surprising differences in colour when pure butter, margarine and mixtures of the two are tested.

A Shadow Mystery

One of the marvels of the New York World Fair was a shadow that remained behind when the man who cast it walked away. This was part of a display arranged by the General Electric Company of New York. The demonstrator sat down in front of a screen for a time, and then got up and walked away. His shadow remained on the curtain, and he actually returned and apparently shook hands with it.

The explanation of this seeming miracle is simple. The curtain used was coated with a phosphorescent material that glows after light has been allowed to fall upon it, giving off its return light for as long as 10 minutes. When the demonstrator sat in front of the curtain the whole of this was "charged" with light except the part shielded by his body. When he walked away the lights were switched off. That part of the curtain previously illuminated then glowed, while the rest remained dark.



A bus that goes to sea. It carries passengers between Burgh Island and the Mainland in South Devon. Photograph by P. H. Lovell, London S.E.22.

A Bus that Goes to Sea

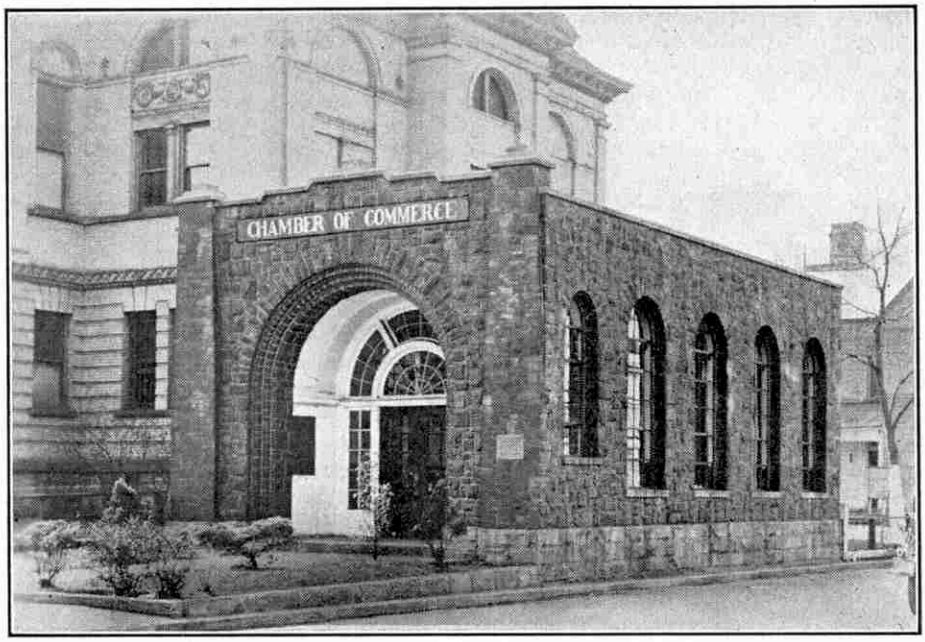
The unusual vehicle shown in the upper illustration on this page is the motor bus ferry that carries passengers between Burgh Island and the mainland at Bigbury-on-Sea, in South Devon. It is equipped with creeper tracks to enable it to travel easily over the sand, and passengers must get a thrill when they travel on it, especially in rough weather, for at high tide it passes through several feet of water. P. H. Lovell.

An Electric Miracle

Electricity has achieved many miracles of simplicity, and one of the most remarkable of these is a means of controlling switches for various purposes without disturbance to the power and lighting circuits, or additions to them. This is done in a remarkably simple manner by a new system, introduced by Metropolitan Vickers Ltd., to which the name Ripplay has been given. The name is a combination of "ripple" and "relay."

There are many purposes to which this ingenious system can be applied. Thus shop window, advertising or decorative lighting can be switched on and off when desired from the mains station with practically no trouble or effort. One very interesting application is in connection with air raid precautions. Warnings to wardens can be transmitted easily and readily, and receiving apparatus can be made portable so that a warden may take it with him and plug it into the electric lighting system wherever he may be.

In operating this system, what are called ripple currents of very high frequency are introduced into the circuits concerned, in which the main current has the standard frequency of 50 cycles. The ripples have frequencies ranging from 400 to 1,000 oscillations per second, and they pass completely unnoticed by the appliances making use of the normal supply.



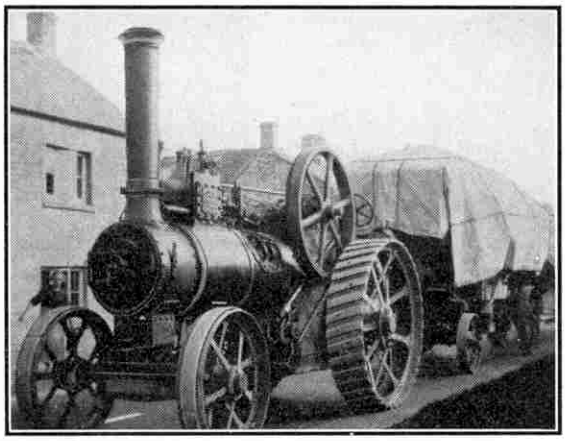
A building constructed of coal. The Chamber of Commerce building at Williamson, West Virginia, in the United States. Photograph by courtesy of the "Norfolk and Western Magazine."

Steam Traction Engines

Machines Once Popular on Farm and Fairground

By E. G. Hobson

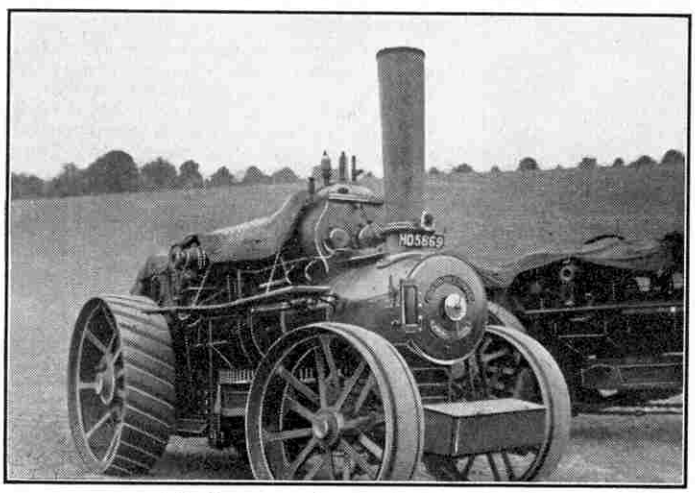
ENGINEERING practice develops so rapidly that many machines that were the wonders of yesterday are already obsolete. Those who are attracted by the history of engineering will find it an interesting hobby to examine and photograph disappearing types of machinery before they are forgotten. For example, the steam traction-engine, one of the most interesting and impressive machines of the countryside, is vanishing, and in a few years' time there may be none left. This is shown in the decreasing numbers that are registered each year.



Robey single-cylinder agricultural threshing engine.

In the early days of mechanised farming, the threshing machines that were sent from farm to farm were driven by portable steam engines, hauled by teams of horses, and some of these are still in use. In the fifties of last century came the first agricultural traction engines. They resembled the portable engine very closely, having wooden cart-wheels and a very tall funnel. On the end of the crankshaft was a sprocket wheel, which drove the rear pair of road wheels by means of a long endless chain. The boiler was of the locomotive type, with a simple slide-valve engine mounted above it. The driver stood on a small platform at the side, or behind the boiler, and steered the front wheels through a screw and nut device that moved the ponderous fore-carriage. The engine had a tender, like that of a railway locomotive, to carry its fuel and water; and there was also a dome on top of the boiler to collect dry steam.

It was not long before the traction engine as we know it began to emerge from this crude design. Some of the early ones were built by Ransomes of Ipswich and were called "self-moving engines." The next step came with the invention of the cable-ploughing system, in which engines placed on opposite sides of the field to be cultivated drew a reversible plough to and fro by means of a wire rope. Early engines of this type were developed by Yarrow, the well-known designer of marine boilers, and similar machines were built by Howard of Bedford and Fowler of Leeds. They were provided with large winding drums to accommodate a plentiful supply of wire rope.

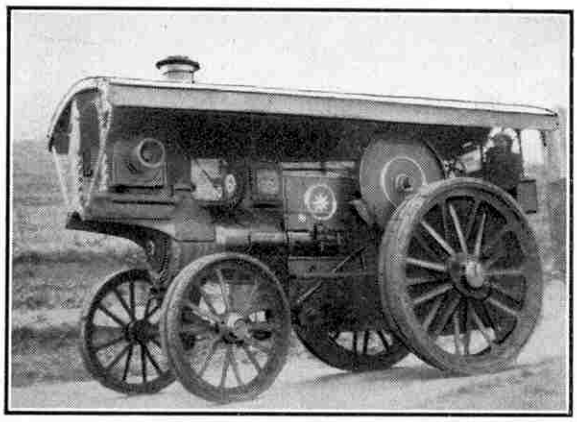


A Fowler compound steam ploughing engine.

These engines often had a fifth wheel, or pair of wheels, attached by framing to their swivelling front axles. On this framing rode the driver, who steered the small guiding wheels with a long tiller, after the manner of a bath-chair! This guided the second pair of wheels on their chosen path, and they in turn guided the engine. The cylinders were mounted on the smoke-box, just behind the driver's head; and when the engine was working on a steep gradient they would often prime furiously, raining hot water on the unfortunate steersman. For this reason the driver often dismounted on hills and swung the tiller and front wheel combination right round, so that he could walk well in front of his charge, steering it with the tiller, which then projected in front! The fireman stood in the coal bunker behind the boiler, and his lot was an unhappy one, for these two-cylinder simple engines consumed vast quantities of fuel and were very hot and awkward to manage.

Soon afterwards the driver returned to his present place at the rear of the engine, and the front pair of wheels was dispensed with. A few makers retained the front seat, however, the single pair of front wheels being geared to a large wheel shaped like a ship's helm. The throttle, and in some cases other controls, were brought within reach of the steersman, who was now unable to escape from the priming cylinders.

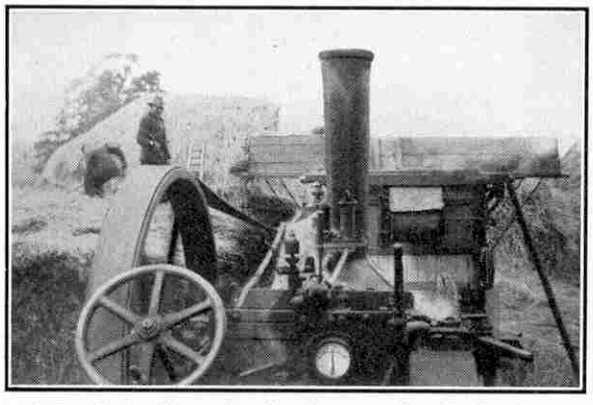
A more conventional type of engine, popular in the seventies, was the Aveling and Porter, built by the well-known pioneers of the steam-roller. It had only a single speed, reversing being effected by Stephenson's link motion. There was no differential. The drive was conveyed through slotted plates that engaged with a pin passed through the hub of each rear wheel, and one pin was withdrawn when sharp bends or gateways had to be negotiated. Modern engines retain this feature for use with a winding drum, which is fitted to the rear axle on one side. When the driving



A Burrell compound tractor of the type built for showmen.

pin is withdrawn, the transmission gearing rotates the drum without permitting the driving wheels of the engine to revolve.

It was not long before the compound engine became popular for the larger machines, although the older generation of drivers still somewhat despise the compound. It was the ordinary two-crank compound principle that enabled John Fowler and Co. Ltd. to develop their enormous steam ploughing engines, which were among the largest traction engines ever built. Some of these engines survive in parts of Hertfordshire and in other agricultural counties with large fields. They sometimes weighed as much as 25 tons. Their winding drums beneath an elongated boiler carried a tremendous length of rope, and were rotated by a vertical shaft and bevel wheels on the engine crankshaft. The spokes



A Burrell threshing engine at work as seen from the footplate.

of the flywheel were dished to permit the shaft and gearing to be accommodated behind it.

These big engines generally work in pairs, although devices have been patented to permit one engine to draw the plough by means of a return rope and ground tackle anchored at the opposite side of the field. It was often necessary to construct a temporary roadway into the field to prevent them from sinking into the soft soil. The great weight was necessary to resist the strain of the plough, which sometimes had eight or 10 shares, and often struck stones or buried tree-stumps.

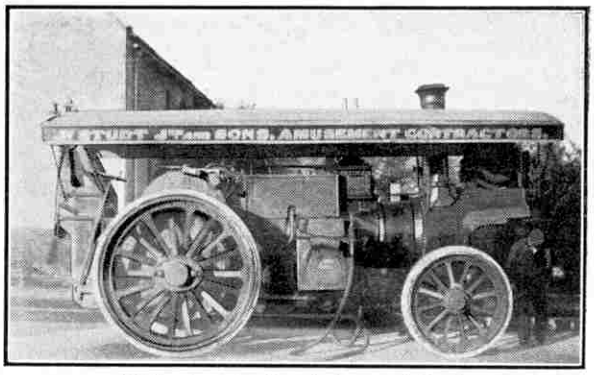
A governor of some kind is nearly always used on agricultural engines, because the work of threshing, sawing and chaff-cutting for which they are mostly employed gives them a very variable load. A centrifugal governor of the Stephenson or Pickering type is generally belt-driven from the crankshaft, and a good governor, carefully adjusted, is much prized. It can make a great difference to the fuel consumption on a threshing job.

Although three-speed traction engines have been used for road hauling and fairground work, the threshing engine has usually only two speeds. Changes are made by means of a long lever, which keeps its position in its rack by a split-pin and chain. There is no clutch, and the engine has to stop if it is required to change gear on the road. Reversing is always effected through the link-motion, so the two speeds are effective in either direction, though in practice low gear is generally used when reversing.

A motorist would be appalled by the brakes of a traction engine. The main brake is worked by a screw-wheel on the side of the bunker, and the other brake, where one is provided at all, works on the rim of the flywheel. Steering is nearly always by the chain and barrel that are so prominently displayed under the boiler. There seems to have been no definite rule for the side on which to fit the steering wheel; about half the makers placed it on the right and the other half on the left. Owing to the completely irreversible character of the worm-and-wheel gear, steering is hard work, and the wheel has to be turned many times to bring the front axle from one lock to the other. When a threshing outfit reaches the rick-yard, it requires a great deal of skill to "set" the engine in line with the threshing machine, and a driver is judged by the number of movements he has to make before he can place his cheek against the flywheel, sight along it to the pulley of the machine, and announce to the waiting gang: "She'll do."

It is not long since there were over 30 makers of this peculiarly British type of engine in this country. To-day the builders can be counted on one hand, and these only make steam engines to order.

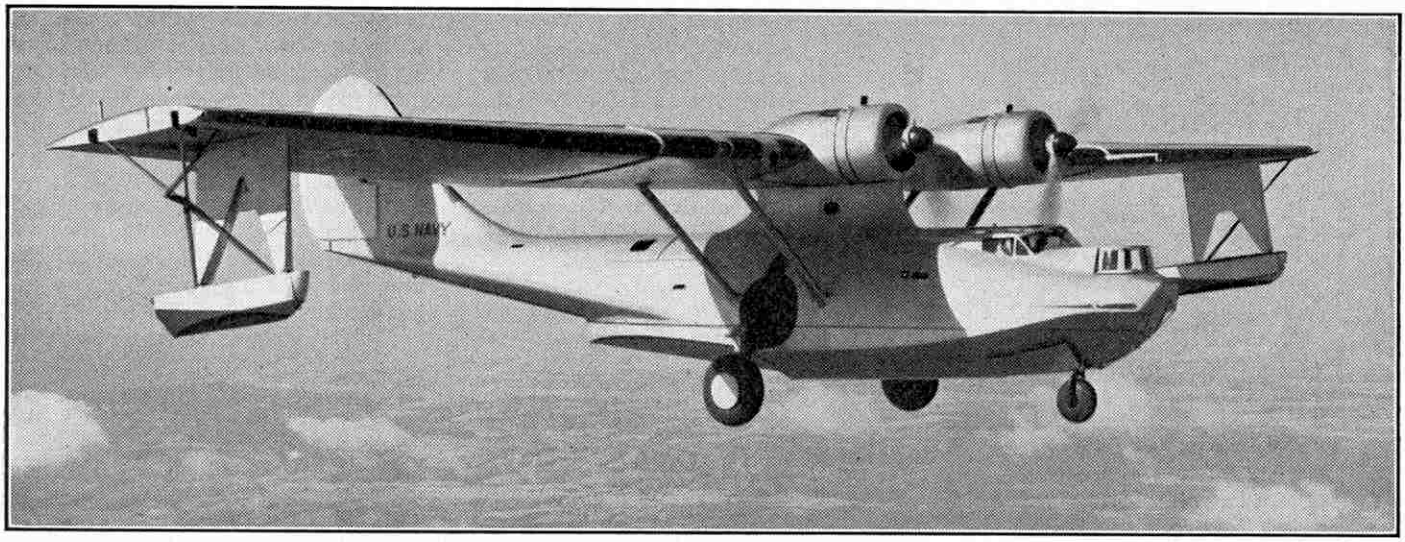
It was hoped by many traction-



Offside view of a Burrell showman's tractor.

enthusiasts that the fairground, the last stronghold of the big road locomotives, would employ them for some years yet. Last season, however, visitors to the fairs must have noticed the growing number of Diesel tractors and power plants.

The best-known makers of showmen's engines were Charles Burrell, of Thetford, Norfolk. Their machines were large and powerful for the most part, built in three principal sizes, 7-8 n.h.p., 8-10 n.h.p., and 10-12 n.h.p. All three sizes were two-cylinder cross compounds, generally with three speeds and rubber tyres. An extended shelf in front of the smoke-box carried a large dynamo to provide electric current for the fairground, and some of the biggest engines, used for driving scenic railways, had a second dynamo on a bridge between the funnel and the cylinders. This was driven by a return belt from a pulley on the leading dynamo, which in its turn was driven from the large flywheel on the left-hand side of the engine. A canopy ran the full length of the engine, the funnel protruding through a hole. An extension to the funnel was provided, so that smoke and sparks would be carried away from the tents.



Consolidated Model 28-5A, the largest amphibian aircraft in the world. Photograph reproduced by courtesy of Consolidated Aircraft Corporation, U.S.A.

Air News

World's Largest Amphibian Aircraft

The photograph at the top of this page shows the largest aircraft in the world that is equipped to take-off from, and alight upon, either land or water. It is the Consolidated Model 28-5A, built by the Consolidated Aircraft Corporation, of San Diego, U.S.A., for the United States Navy and named by them the XPBY - 5A. It was test flown last autumn.

This big aircraft is a new version of the company's Model 28 twin-engined flying boat, a type that has a remarkable total of massed-flight records to its credit and a reputation for sustained performance. The addition of the tricycle landing gear gives the 28-5A the great advantage of being able to operate from land as well as water.

When the nose wheel in the bow is retracted it is completely covered by automatically operating hatches. The side wheels and their supporting mechanisms retract into wells in the side of the hull. All three wheels are operated by a central hydraulic power drive, and a single lever controls both the retraction and the extension of the landing gear.

A beaching crew is not required as the aircraft can climb a ramp or a beach under its own power, and the lowered landing wheels prevent the keel from scraping on ground during this process. It can descend in the same way, completely controlled by the brakes.

Britain's "Turret" Fighters

Modern defence aircraft have developed chiefly on the lines of the fast, powerfully armed single-seater fighter of rapid climb. In action this type generally pursues its adversary, the bomber or hostile fighter, and attacks it from behind with guns or cannon. The British "Spitfire" and "Hurricane" fighters are probably the best examples of this type. Each is armed with eight forward firing fixed machine guns, and is fast enough to out-fly any enemy bomber.

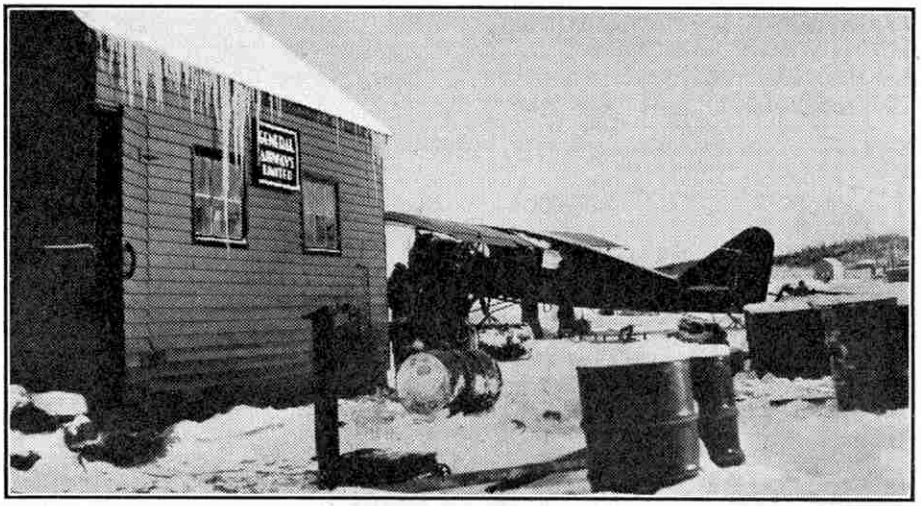
The fixed gun fighter, however, has certain limitations, one of which is its inability to make a broadside attack on its quarry. A new type of British fighter developed for the Royal Air Force, the two-seater Boulton Paul "Defiant," overcomes this difficulty by the use of a power-driven gun turret. This turret contains a battery of guns, and is operated by a trained air gunner. In an attack on an enemy aircraft the pilot of a turret fighter could place his aircraft in such a position that his bullets would strike the enemy at an angle favourable to penetration of the vulnerable parts. Flying alongside a formation of hostile bombers the "Defiant" gunner would be able to rake them with gunfire from nose to tail. With this fighter the R.A.F. have added a new technique to air defence.

The "Defiant" is a low wing monoplane of all-metal, stressed-skin construction, and has a wing area of 250 sq. ft., which is a little more than that of the "Spitfire" and "Hurricane" fighters. Like these two machines, it is fitted with a retractable undercarriage as an aid to speed in flight. It has a Rolls-Royce "Merlin" engine of over 1,000 h.p. that drives a three-bladed controllable pitch airscrew.

More American Giants

News comes from the United States of yet another new giant air liner. This is a twin-engined, middle wing, all-metal monoplane being produced by the Curtiss-Wright Corporation. It has a wing span of 108 ft. and is 75 ft. long, and when completed it will be the largest twin-engined civil aircraft in that country. The two Wright "Cyclone" 14 engines for this air liner are rated at 1,600 h.p. for take-off, and they are expected to give it a top speed of 243 m.p.h. at 13,000 ft. The 15 ft. Curtiss electric full-feathering airscrews to be driven by these powerful engines will be the largest ever made in the United States for commercial air operation.

The new Curtiss air liner will be equipped to carry 36 passengers by day and will have berths for 20 at night. The air pressure in



An airport in north western Canada, where aircraft take off throughout the winter to pick up freshly caught fish on frozen lakes far beyond the railways. Photograph by J. Montagnes, Ontario.

the cabin will be regulated during flight to enable the air liner to cruise at 20,000 ft.

The Wright Aeronautical Corporation, who make the famous Wright aero engines, are busy on a new 18-cylinder engine that develops 2,000 h.p. at take-off and is claimed to be the most powerful ever produced for use in civil aircraft in the United States.

Under One Roof

Two famous fighting men are sharing the same "billet" in France. They are Air Marshal A. S. Barratt, C.B., C.M.G., M.C., Commander-in-Chief of the British Air Forces in France, and General Vuillemin, who commands the French Air Force. Their quarters are in the simple but beautifully situated country house of a French merchant. It stands on the top of a wooded hill and has a splendid outlook over the landscape.

The Archdeacon's Parachute Jump

An Archdeacon who once saved his life by jumping 2,000 ft. out of a disabled aeroplane is the padre at an R.A.F. fighter station near the East Coast. He is the only padre who can claim membership of the Caterpillar Club, every member of which has saved his life by parachute; and below his collar he wears the tiny caterpillar tie-pin that reveals his membership.

The scene of his escape was the Egyptian desert. Flying there 10 years ago—he was already an R.A.F. padre—he had to "abandon ship," dive head first over the side of the spinning aircraft, count 10 slowly and pull the rip-cord.

"Yes, I prayed hard," he admits to polite young pilots who attempt to pull his leg.

"Enemy Raiders" that were Geese

Ornithologists in the R.A.F. are finding that their work on lonely, scattered stations gives them wider opportunities than they had in civilian life. Bird watching pilots at one Scottish station have discovered that redshank, snipe, and oyster-catchers are near neighbours. A kestrel flies tamely round waiting aircraft, quite undeterred by the noise and bustle of take-offs.

At another R.A.F. station plovers have become so tame that they will only rise if a passer-by stops and looks directly at them. Anti-aircraft gunners have also found that most birds soon become used to wartime disturbances. A curious incident occurred at a third station. Observers there noted the approach of "enemy aircraft" that turned out to be a gaggle of geese! In poor light, or with the Sun behind them, high-flying geese in V formation may easily be mistaken for a flight of marauding Heinkels.

The Coldest Job of All

Four young airmen living in a Maginot Line fort and working perched high on the top of the fortifications have probably the coldest job in the war. Their task is to keep a close look-out for enemy aircraft, and to flash back the news of their approach both to R.A.F. and French Air Force squadrons a few miles behind the line. For this job they must have an uninterrupted view of the countryside, and therefore they have to operate in an exposed position. For regular periods, day in and day out, these hardy airmen stand on the top of one of the forts, in the teeth of biting wind, in rain and snow, keeping a constant vigil for the approach of raiders; and their only shelter is a narrow trench.

Recently this part of France has had some of the coldest weather in living memory, but through it all these four men have carried on with their job as usual. They volunteered for this task and they say they are happy in it.

Boeing B-17B "Flying Fortress" Bombers under construction. The fuselages are shown at the start of the final assembly line, and the one in the centre of the picture is just being lowered by overhead cranes to its place on the assembly floor. Photograph by courtesy of Boeing Aircraft Company, U.S.A.

Eire-England Air Service

Since the 19th January last air liners of Aer Lingus Teoranta operating the Dublin-Liverpool air service have been using the new Collinstown, Dublin, airport. This service continues to be very popular, and in the 10 weeks ended 31st December 1939 a total of 1,350 persons made the cross-Channel trip in the company's aircraft, an increase of 309 on the total for the same period in 1938.

Italian Long-Distance Record Attempt Fails

An Italian Savoia Marchetti 73 aeroplane, commanded by Col. Tondi, of the Royal Italian Air Force, made an unsuccessful attempt in January last to beat the world long-distance air record of 7,162 miles held by Britain. This record was made on 5th-7th November 1938 by two Vickers "Wellesley" bombers that flew non-stop from Ismailia, in Egypt, to Darwin, in Australia.

The Italian machine took off from Rome, but soon ran into bad weather, and it encountered such severe headwinds over the South Atlantic that eventually it was forced down on an island off the coast of Brazil. It had flown just over 4,370 miles and had been in the air 32 hr. 25 min.

A Percival "Q" type monoplane in flight, with the undercarriage retracted into the rear of the deep engine nacelles. Photograph by courtesy of "The Aeroplane."

Safety of British Air Liners

The report on the progress of civil aviation in this country issued by H.M. Stationery Office last summer has been supplemented recently by one giving striking proof of the safety of air travel in British civil aircraft. It reveals that during 1938 these machines carried a total of 222,200 passengers, and the passenger mileage reached the huge total of 56,368,000. About 4,697,000 passenger miles were flown for each passenger killed, a very good record. There were only four accidents.

These pages are 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.

An Inigo Jones Windmill

At Chesterton, Warwickshire, there was at one time a fine manor house designed by the famous architect Inigo Jones. On the slope of a hill near there is an interesting windmill that also was designed by Jones. This is supported on six arches, and is shown in the illustration on this page.

A pool and watermill at Chesterton also are thought to have been the work of Jones, who was Court architect during the reigns of James I and Charles I and was engaged to prepare designs for a new palace at Whitehall. Jones also designed masques performed at court. During the Civil War he was captured by the Roundheads and was heavily fined. He died in poverty in 1651.

Chesterton is near the Fosse Way, the straightest of Roman roads, which stretched from Bath to Lincoln. It was no doubt an important place in Roman times, and excavations in the district have unearthed much Roman pottery and the remains of a Roman building.

C. H. EATON (Birmingham).

Gems in Scotland

It is not generally known that Scotland is a veritable storehouse of gem stones, which are scattered far and wide, but are easily found by the searcher who knows the likely districts. One of the most widely distributed and most easily found of these is the garnet, a beautiful evenly formed gem of a deep red colour, which is found in the old volcanic areas of Perthshire. On the hills at Crianlarich there are great boulders literally studded on the surface with garnets as large as peas, and all that is necessary to detach them is a screwdriver or a strong pocket knife. Similar stones are found at Kirkmichael, and the blocks of a wall in the village street are thickly dotted with them. Rubies, although not so common, can be found at certain states of the tide on the beach at Elie, a popular little resort in Fife.

Amethyst, topaz, rose quartz, and cornelian can be picked up on the beach at Tighnabruaich, on the Kyles of Bute. Similar semi-precious stones are found at Findhorn, near Elgin, in Morayshire, while agates can be discovered at the Heads of Ayr, in the Sidlaw Hills and at Montrose. Particularly fine specimens of agate, brown in colour and wonderfully veined, can be picked up on the beach near the lighthouse at Scurdy Ness, Montrose.

Many lovely examples of Cairngorm stones can be seen in any jeweller's shop in the Highlands, and these beautifully veined and coloured stones may be got on the Cairngorm hills. Any district will yield Scottish pebbles, which are found in the beds of hill streams. They are clear when held to the light, and are very beautiful when cut and polished.

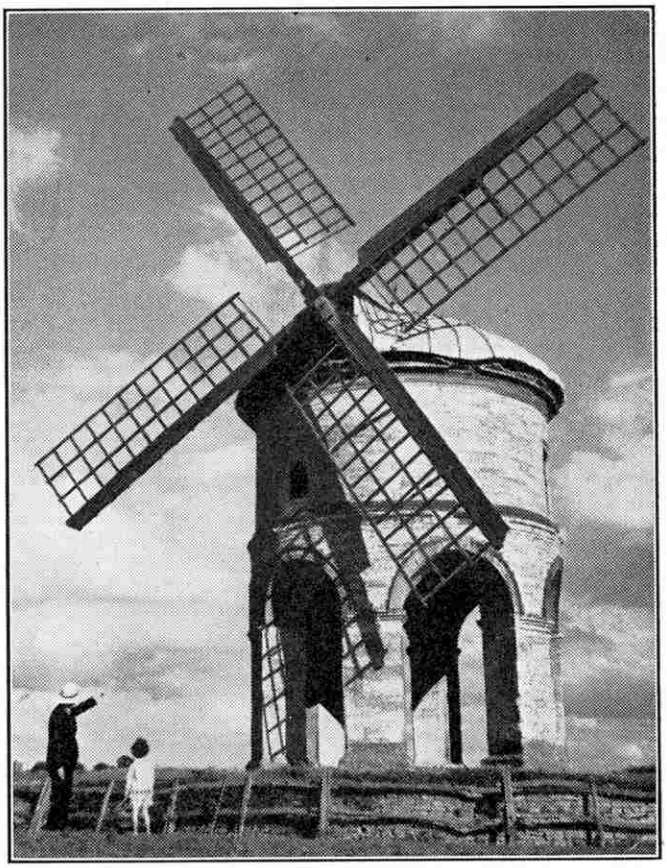
All the gems mentioned can be cut out and polished to compare very favourably with expensive gems. The work is undertaken by firms that specialise in making brooches and pendants.

J. M. WIGHTON (Edinburgh).

Death Valley

Lying along the California-Nevada border is Death Valley, the hottest place on earth. Temperatures of 140 deg. F. and even more are recorded there in summer, and even in winter day temperatures are around 100 deg. F., although at nights the thermometer level sinks below freezing point.

The valley has earned its grim name by the deaths that have occurred in it. The worst disaster happened many years ago, before a railway had been constructed across the States to San Francisco. All goods for California had either to go round Cape Horn or be carried across the continent in covered wagons. One such train of wagons had trouble at several points en route and in an attempt to make up time took what was thought would be a short cut through the valley in the middle of summer. For many of the travellers it was a short cut, but not of the type they anticipated, for very few survivors were left to tell the story.



Chesterton Mill, Warwickshire. Photograph by C. H. Eaton, Hall Green, Birmingham.

The valley is a great reservoir of borax, and at one time this was brought out in wagons hauled by teams of 20 mules.

A. HARVEY (Appley Bridge).

A coot's nest on Blagdon Reservoir, in Somerset.

Bird Life on a Somerset Reservoir

Blagdon Reservoir is an artificial lake in a fold of the Mendip Hills. It is five miles round and is the largest sheet of water of its kind in the neighbourhood. Aquatic birds in general, and wild fowl in particular, frequent it both in summer and winter. At one end of the reservoir is a masonry dam with its attendant spillway and channel; at the other end, close to the village of Ubley, there are reed beds which are of special interest at nesting time.

Coot, moorhen, tufted and wild duck are the most common of the wild fowl seen on the reservoir. Coot favour floating nests anchored to the bottom or the bank, and usually amongst other reeds but sometimes quite alone. A coot's nest is shown in the upper illustration on this page. There are few moorhen at the embankment end of the lake, but half submerged pollards at the other end are very popular, as the lower illustration on this page suggests, and many moorhen families are brought up in these nesting quarters. Tufted duck do not stay to breed on Blagdon, though in winter they are probably more numerous than any other bird. Wild duck usually nest among the hills surrounding the lake, bringing their families down to the water soon after hatching. In May and June families up to eight or nine strong are quite common.

Owing to the absence of mud flats Blagdon does not attract waders in any numbers. Ringed plover, lapwing, sandpiper, snipe and redshank do visit the water's edge, and of these lapwing are by far the most numerous, only one or two odd pairs of the others showing themselves. The shore is only the feeding ground of the waders, and nesting is not to be expected in its damp environs.

The waterline of most lakes is a favourite feeding ground for many of our insectivorous birds, and Blagdon is no exception. All three wagtails, the pied, grey and yellow have been seen. Avian insects attract swallows and house martins as well as occasional spotted flycatchers.

The largest birds to be seen are the heron and mute swan. The heron seems to be coming in increasing numbers, as I have seen five on a single visit in April where a year or so previously there were only two. The mute swan breed at several points round the lake and are probably resident birds.

Both members of the grebe family are visitors. The little grebe stays to breed, although as yet I have only seen one nest; but the retiring nature of the bird, and the ease with which its nest may be mistaken for a pile of decayed vegetation, make it difficult to observe. Its larger brother the great crested grebe is more common, and this handsome bird has nested with success.

Pochard duck keep company with the tufted duck in the winter months, though they also do not stay to breed. Very rare visitors seen by the reservoir keepers include the white-eyed pochard and the red-necked phalarope.

P. MILLS (Compton Greenfield).

A moorhen's nest in half submerged pollards. The photographs on this page are by P. Mills, Compton Greenfield.

A Day on a Pilot Boat

Last August my father and I were invited to spend a day on a pilot boat. After casting-off we went out to inspect a Spanish ship that had damaged the end of a breakwater. Soon we heard the special blasts of a ship's siren indicating that a pilot was required. We ran alongside the vessel and a pilot was put aboard her while she was still moving.

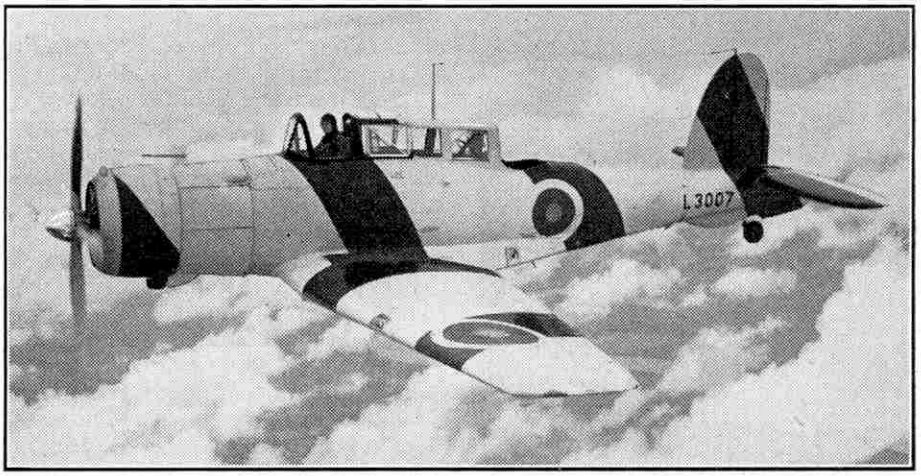
We cruised about for some time and then dropped anchor and had lunch with the pilots. We were expecting a tanker, as the probable times of arrival are carefully calculated by the pilots from the shipping news. There was a considerable time to wait, however, and the engineer took advantage of this to ease a bearing that was running hot. The day was hot, so the mate and two of the apprentices lowered a boat, stripped and were soon having a fine time in the water. There were many interesting vessels in sight, among them a topsail schooner just moving with the tide, a smart "Cory" boat, and a London River "flat iron" collier with hinging funnel. Another apprentice took a boat to bring off two pilots and the mail, some of it for a lightship. Anchor was raised, and I was allowed to steer the ship on a compass course. It was evidently a welcome break for the men on the lightship when we drew alongside and passed on their mail by means of a net at the end of a long handle.

The tanker we were expecting was now coming into view and all glasses were turned in that direction. We drew up on to her starboard side; a pilot, clutching his bag, climbed aboard, while both ships maintained the same speed. The tanker was Norwegian, and she was beautifully spick-and-span, with towering white bridges.

No further ships were expected until late at night so we made for our station and there dropped anchor. I went to see the apprentices' quarters, which are very snug, and about eight o'clock rowed ashore with the captain after a most interesting and enjoyable day. We had learned a great deal about the Channel pilot services and had been treated with the greatest kindness by all on board the pilot vessel, which is a fine sea boat.

A. GARDNER (Carlisle).

A British Dive-Bomber

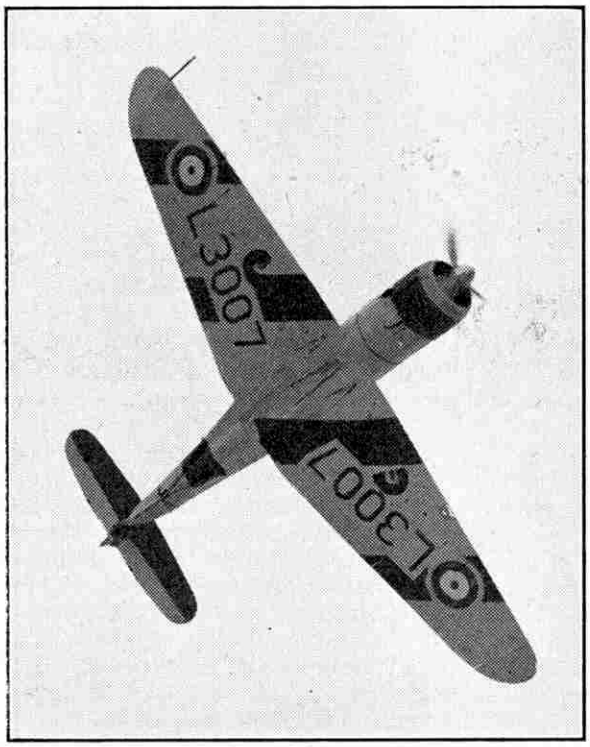


Blackburn "Skua" Fighter-Dive-Bomber. Photographs reproduced by courtesy of "The Aeroplane."

THE effectiveness of the aeroplane as a means of attacking enemy military objectives was demonstrated in the war of 1914-18, and resulted in the development of aircraft designed for this purpose. Until these special machines became available, other military types were utilised for raids on the enemy, and the earliest British "bombers" had not even a crude form of bomb release gear. The bombs themselves were rifle grenades with the stick removed; they were carried in the pocket and were launched by hand. Then small bombs were adopted, and attention was given to devising means of releasing them mechanically, thus relieving the bomb-aimer of an unenviable and risky task.

One of the early bombing aeroplanes that played its part in seriously hampering the enemy is to be seen to-day in a British aircraft factory. It stands there, tucked away under the wing of a modern bomber of the type that have been flying over Germany almost nightly. This famous "old timer," with its flax-covered wings now almost devoid of covering and revealing the skeleton framework, its one seat, and its small 200 h.p. engine, looks more like the young son than the aged father of the huge twin-engined all-metal bomber of 2,000 h.p. that appear to be giving it protection.

The veteran, frail-looking by modern standards, was in its heyday the pride of the Royal Flying Corps. It had been built as a fighter, and was known as S.E.5A. Occasionally it carried small bombs, but it had no special bomb apparatus. The bomb was thrown overboard by the pilot, who hoped that his aim was as good as when he played cricket for the school eleven.



The "Skua" demonstrates its manœuvrability.

The small fighter-bomber of the last war and the modern large bomber differ in size as much as Stephenson's "*Rocket*" and the latest type of railway engine. Whereas the railway engine has taken about 80 years to grow up, however, the bomber has achieved maturity—if its present stage of development can be so termed—in almost a quarter of that time.

At one time aircraft of this type were classified as day, night, or day and night bombers. Later it became the fashion to group them according to size and the bomb load they could carry, rather than by their suitability for day or night operation; and the terms "light," "medium," and "heavy" bomber became familiar. The present tendency is to base classification upon the range of the aircraft, and accordingly bombers are now spoken of as short, medium, or long range machines, as the case may be.

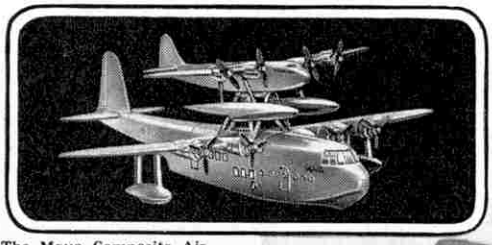
A form of bombing developed late in the last war was dive-bombing, in which the aeroplane itself rather than the bomb is aimed at the objective. The bombers of that time, however, were not strong enough to withstand much of this diving at the target, owing to the terrific strain imposed upon the aeroplane structure when pulling abruptly out of the dive. This form of bombing therefore did not become adopted immediately in post-war training, and several years passed before the introduction of Curtiss two-seater dive-bombers into the United States Navy revived world interest in this subject. During recent years several other great Powers have developed highly-efficient dive-bombers.

A British example is the Blackburn "Skua" illustrated on this page, and shown on our cover, which is based upon a coloured drawing kindly lent by Blackburn Aircraft Ltd. The "Skua" was designed both as a dive-bomber and a long-range fleet fighter. The wings can be folded, thus greatly reducing the hangar space required to accommodate the machine, and there are watertight compartments in the hull, a helpful provision against forced landings in the sea. Special flaps enable the pilot to restrict the speed to a certain limit during dive-bombing, and to descend almost vertically until close enough to the target to bomb it with great accuracy. As a fighter the "Skua" is armed with four fixed machine guns and a fifth gun mounted in the rear cockpit. It carries a pilot and a gunner in enclosed cockpits.

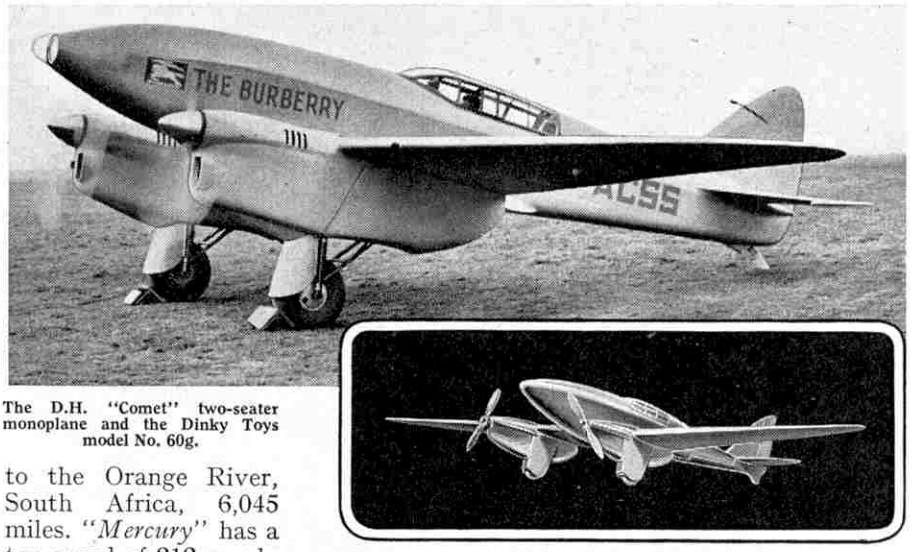
Aircraft in the Dinky Toys Series

Further Realistic Models

LAST month we concluded our account of some of the splendid scale model aircraft in the Dinky Toys Series with a reference to the famous Mayo Composite Aircraft and the fine miniature of it (Dinky Toys No. 63). For the benefit of new readers we repeat that the composite aircraft was invented by Major R. H. Mayo, and built by Short Bros. (Rochester and Bedford) Ltd. to the order of the Air Ministry, for experimental long-distance flights. It consists of a four-engined high wing seaplane, "*Mercury*," mounted on and locked to a four-engined high wing flying boat "*Maia*." The object of this machine is to solve the problem of getting a heavily loaded long-range machine into the air, by lifting it on the back of a larger machine from which it takes off, the lifting machine then returning to its base. Among the fine flights achieved by the upper component, the seaplane "*Mercury*," after being launched in this way, are the following: July 1938, Foynes, Eire, to Montreal and New York, 3,240 miles; October 1938, Dundee to the Orange River, South Africa, 6,045 miles. "*Mercury*" has a top speed of 212 m.p.h.

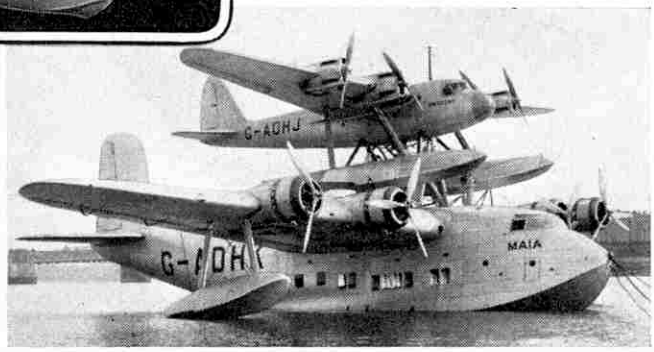


The Mayo Composite Aircraft and the Dinky Toys model No. 63.



The D.H. "Comet" two-seater monoplane and the Dinky Toys model No. 60g.

A British twin-engined commercial monoplane that has proved very successful is the Airspeed "Envoy," designed for passenger or freight carrying. It is a twin-engined low wing machine, and the Dinky Toys miniature (No. 62m) gives an excellent impression of its attractive appearance. The main cabin of the "Envoy" can be equipped to seat up to eight passengers. When fitted with two 310 h.p. Armstrong Siddeley "Cheetah" IX engines, this machine has a top speed of 203 m.p.h.



An Airspeed "Envoy" was acquired in 1937 by the Air Council for the King's Flight, and in the Dinky Toys Series there is a beautiful model of this machine (No. 62k). It is finished in the colours of the actual monoplane, and bears the correct registration letters on the wings. The King's aeroplane differs from the standard "Envoy" only in its luxurious equipment. It has accommodation for four passengers, pilot, radio operator, and steward.

Another twin-engined low wing monoplane of special interest is the D.H. "Comet," reproduced in Dinky Toys No. 60g. It was in a "Comet" that Flying Officer A. E. Clouston and Mr. V. Ricketts made their record flight to New Zealand and back, in 10 days 21 hr. 22 min. in March 1938. By this fine double flight they completed the first direct round trip by air to New Zealand and back. The "Comet" used by them first became famous in October 1934 when C. W. A. Scott and T. Campbell Black won with it the MacRobertson Air Race by flying from Mildenhall to Melbourne, Australia, in 2 days 23 hrs. 18 sec.

The Airspeed "Envoy" twin-engined air liner and the Dinky Toys model No. 62m.

MODEL RAILWAY ON YOUR OWN TABLE

The ideal 'Blackout' hobby for boys and their fathers!

Hornby-Dublo has already become famous because of these outstanding qualities—**accurate scale proportions, realistic detail, power and speed, and Positive Remote Control.**

In spite of the war we have been able to complete sufficient new features to establish Hornby-Dublo as the most perfect and progressive miniature railway system ever devised. **By means of a special Switch, Hornby-Dublo Points and Signals can now be controlled just as on real railways.** The two arms of the Double-arm and Junction Signals can be operated independently in the most realistic manner.

Another great development is the introduction of Isolating Rails and Switches, by means of which different sections of track can be made "alive" or "dead" as required. With these Rails and Switches endless fun can be had by controlling two or more trains independently at the same time. **All kinds of fascinating shunting operations can be carried out, every movement being made as on an actual railway.**

The Hornby-Dublo track is now completed by the introduction of Large Radius Curved Rails which, used in conjunction with the standard Dublo rails, form **a perfect double track. The new developments make the perfect railway super-perfect!**

PRICES OF HORNBY-DUBLO TRAIN SETS

Hornby-Dublo Electric Passenger Train Set (L.N.E.R.), mains operated	**77/6**
Hornby-Dublo Electric Passenger Train Set (L.N.E.R.), for use with 12 volt accumulator	**67/6**
Hornby-Dublo Clockwork Passenger Train Set (L.N.E.R.)	**43/6**
Hornby-Dublo Electric Tank Goods Train Set (L.M.S., L.N.E.R., G.W.R. or S.R.), mains operated	**62/6**
Hornby-Dublo Electric Tank Goods Train Set (L.M.S., L.N.E.R., G.W.R. or S.R.), for use with 12 volt accumulator	**52/6**
Hornby-Dublo Clockwork Tank Goods Train Set (L.M.S., L.N.E.R., G.W.R. or S.R.)	**30/–**

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An attractive new folder is available giving complete particulars of the Hornby-Dublo Railway System. Get a copy from your dealer or write direct to

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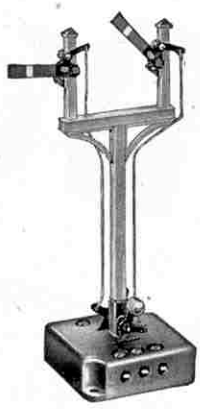
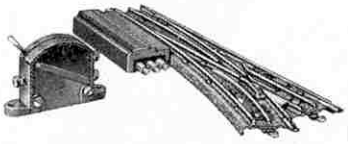


JUNCTION SIGNAL

Electrically Operated "Home" (as illustrated) or "Distant." Price, each **7/3**



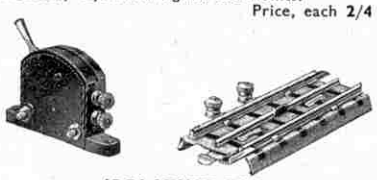
POINTS ELECTRICALLY OPERATED

Designed to work off a Dublo Transformer or D.C. Converter. The same Transformer or Converter that supplies current to the trains can be used.

Electrically Operated Points, Right-hand } pair
Electrically Operated Points, Left-hand } **17/–**

SWITCH D1

Specially designed to control the Hornby-Dublo Electrically Operated Signals and Points.
Price, each **2/4**



ISOLATING RAIL

The centre rail is divided into two separate sections, each connected to the terminal provided for wiring up to Switch D2.
Isolating Rails. Price, each **1/9**

SWITCH D2 (For Isolating Rail)

For connecting to the terminals of the Isolating Rail to make an isolated section of track "alive" or "dead" as required. Price, each **2/–**

LARGE RADIUS TRACK

These Large Curved Rails have a radius of 17½ in. and used in conjunction with standard Hornby-Dublo 15 in. Radius Curves provide a perfectly symmetrical double track.

No miniature railway is complete without double track. With it, all kinds of fascinating operations become possible, just like those on real railways.

EDA2 Curved Large Radius Rails (8 to circle). Price, each **1/9**

EDAT2 Curved Large Radius Terminal Rails. Price, each **2/6**

New Meccano Models

Ferry Boat—Cantilever Bridge—Mobile Crane

THE three models described and illustrated this month differ greatly from each other. Any model-builder is sure to find among them one that he will decide to build immediately, and indeed many will build all three of them. One is a ship model, representing a ferry boat for passengers and motor cars, and a second is a very fine, but easily-built working model crane. The third is a simple bridge, and it has the added advantage that it can be put to excellent use by the owner of a Hornby-Dublo layout.

The ferry boat model is illustrated below, and it can be built from the contents of a No. 6 Outfit and a few additional parts. This type of vessel is used for conveying light vehicles and passengers. It is of very small draught, so that it is suitable for the navigation of comparatively shallow rivers.

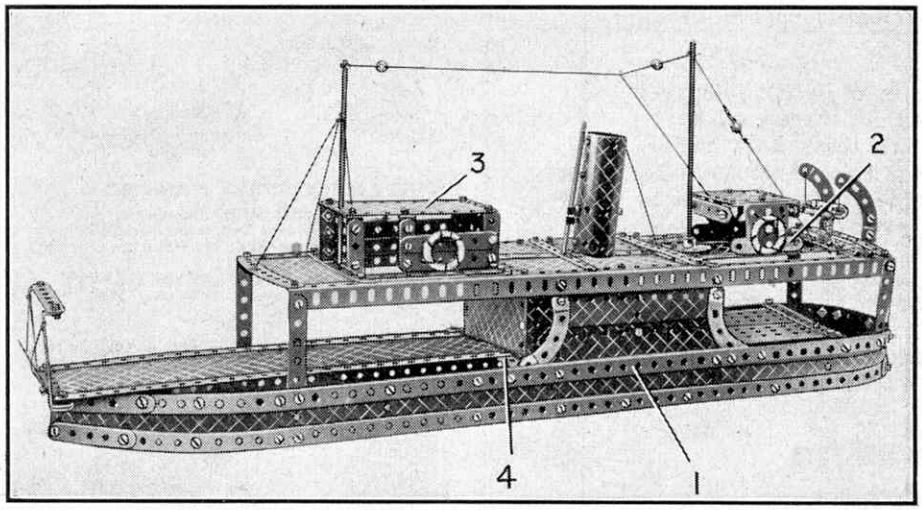


Fig. 1. A fine model of a ferry boat for passengers and motor cars. It can be built from Outfit No. 6 and a few extra parts.
Fig. 2, below, shows an underneath view of the model ferry boat.

The construction of each side of the hull is commenced by bolting a 12½″ Strip to the edge of a 5½″×2½″ Flexible Plate and a second 12½″ Strip along its middle. The sides are spaced apart by a 5½″×2½″ Flexible Plate, and the free ends of the 12½″ Strips are joined to Formed Slotted Strips that are shaped to represent the stern. The other ends of the 12½″ Strips are extended toward the bows by means of further 12½″ Strips, which are shaped to the required curve. The latter Strips are extended to the stem by shorter Strips as shown in the illustration and the two sides are connected by Angle Brackets. The hull is then filled in with 5½″×1½″ and 2½×1½″ Flexible Plates.

The upper halves of the two 5½″×2½″ Flexible Plates are built up with 5½″×1½″ Flexible Plates, each side being braced by two 2½″ Curved Strips. The 12½″ Angle Girders form each of the side-members and the upper deck is formed of two 12½″ Angle Girders overlapped five holes, and the ends of their Angle Girders are supported by 3″ Strips and spaced apart by 5½″ Curved Strips.

The forward cabin is built up on five 1½″×½″ Double Angle Brackets, three of which are built up from 1½″ Strips and Angle Brackets. The roof consists of a 4½″×2½″ Hinged Plate 3 and the rear wall of a 2½″×1½″ Flanged Plate. Three 4½″ Strips represent one wall and that opposite is built of two 3½″ Strips. The upper deck forward of the cabin is filled in with a 5½″×2½″ Flexible Plate, and the deck alongside the cabin with 4½″ Strips connected crossways to the 5½″ Strips on which the cabin is bolted.

Amidship the upper deck consists of two 5½″×2½″ Flexible Plates, on which the Funnel is superimposed. The latter is formed from two 4½″×2½″ Flexible Plates overlapping three holes to give the necessary height, and the steam pipe is a Rod supported in Angle Brackets connected to the funnel and held in place by Spring Clips. The after part of the deck is filled in with Strips and a 5½″×2½″ Flexible Plate.

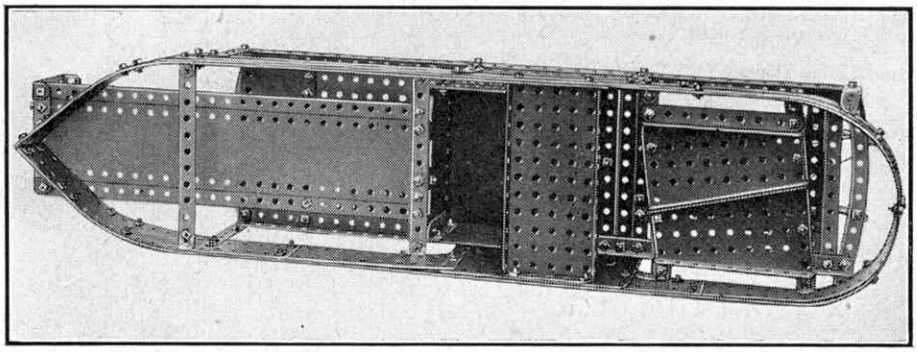
Flat Trunnions mounted on the deck by means of ordinary Trunnions support the after cabin, and the roof of this, a 2½″×2½″ Flexible Plate, is supported on 2½″ Strips and Double Angle Strips, which are connected by means of Angle Brackets to the Flat Trunnions. The deck ends of the Trunnions are fitted to 2½″ Strips to represent the sides of the cabin. Two 2½″ Strips joined by Angle Brackets represent the life-boat, which is supported by means of two lengths of cord.

Two 12½″ Strips are bolted to the 3½″ Strip at the stem and the opposite ends of the Strips are connected to the 5½″ Strip 4 which is connected to the hull with Angle Brackets. The carriageway is reproduced by a 12½″×2½″ Plate bolted parallel to the 12½″ Strips. The aft mast is mounted in a Bush Wheel held to the deck in front of the cabin, and the forward mast in one of the holes in the 4½″×2½″ Plate representing the roof by means of Spring Clips.

Parts required to build the model ferry boat: 8 of No. 1; 18 of No. 2; 7 of No. 2a; 2 of No. 3; 7 of No. 4; 7 of No. 5; 3 of No. 6a; 4 of No. 8; 4 of No. 10; 24 of No. 12; 1 of No. 15; 2 of No. 15b; 1 of No. 17; 1 of No. 24; 150 of No. 37a; 150 of No. 37b; 4 of No. 35; 5 of No. 38; 1 of No. 40; 4 of No. 48; 4 of No. 48a; 1 of No. 51; 1 of No. 52; 2 of No. 54a; 1 of No. 57c; 2 of No. 89; 6 of No. 90a; 2 of No. 126; 2 of No. 126a; 3 of No. 155a; 6 of No. 188; 10 of No. 189; 3 of No. 190; 2 of No. 191; 6 of No. 192; 1 of No. 197; 1 of No. 198; 1 of No. 212; 1 of No. 214; 4 of No. 215.

Next we come to the simple but remarkably effective model of a cantilever bridge shown in Fig. 3. This was constructed for use on a Hornby-Dublo Railway, on which it forms an interesting and useful accessory. It is best to commence by assembling the roadway. The sides of this consist of 24½″ Angle Girders, spaced apart by means of six 2″ Strips that are bolted in the 1st, 5th, 16th, 23rd, 44th and 49th holes from the left-hand end of the bridge. The Strips are bolted in these positions in order to provide supports for the two Hornby-Dublo Straight Rails that form the track on the bridge.

The Curved Strips of the cantilever are next placed in position, a process that involves no constructional difficulty, and the cantilevers are mounted by means of Angle Brackets on 2½″×3½″ Flanged Plates, which represent the supporting piers. Curved Strips form the side rails of the suspended span between the cantilevers.



Parts required to build the model cantilever bridge: 7 of No. 6; 2 of No. 7; 4 of No. 10; 8 of No. 12; 44 of No. 37a; 44 of No. 37b; 2 of No. 52; 20 of No. 89.

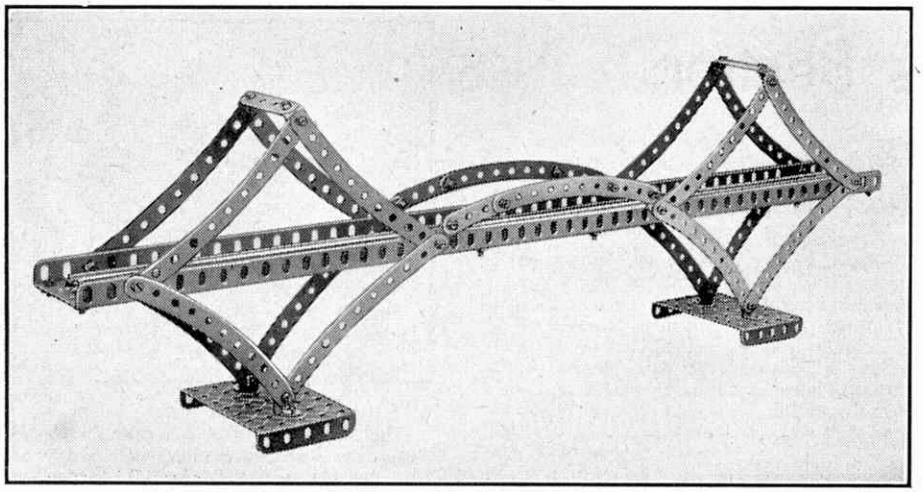


Fig. 3. A simple model cantilever bridge fitted with Hornby-Dublo Rails. This bridge was designed for use on a Hornby-Dublo layout.

Mobile cranes are very useful items of equipment in modern factories, warehouses and railway goods yards, and in Fig. 4 we illustrate a fine example of a working model crane of this kind. The power unit is either an E06 or an E020 Electric Motor, which operates the travelling and hoisting movements. Luffing of the jib is controlled by hand.

A $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 1 forms the chassis of the crane, and to the rear holes of the long flanges are bolted two $5\frac{1}{2}''$ Strips 2, which are joined at the top by a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. The compound strips, one of which is shown at 3, are built up from a $2\frac{1}{2}''$ Strip and a $3\frac{1}{2}''$ Strip overlapping each other by three holes, and one of these is bolted on each side of Flanged Plate 1. They are fixed in the second holes from the front end of the Plate, and the upper ends of Strips 2 and 3 are then connected by further $5\frac{1}{2}''$ Strips. This is done on each side of the model and the side frames thus formed are braced by further $5\frac{1}{2}''$ Strips bolted to the Strips 2 and connected to Strips 3 by $2\frac{1}{2}''$ Strips.

The E06 or E020 Electric Motor 4 is bolted to a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate 5 that in turn is fastened to the $2\frac{1}{2}''$ Strips previously mentioned. The armature shaft of the Motor is fitted and a 1″ Pulley shod with a Rubber Ring. Two Semi-Circular Plates 6 are now bolted in position; they provide bearings for a $3\frac{1}{2}''$ Rod that carries two Road Wheels. The latter are so arranged that by sliding Rod 7 from side to side either wheel can be brought into contact with the 1″ Pulley to give a friction drive.

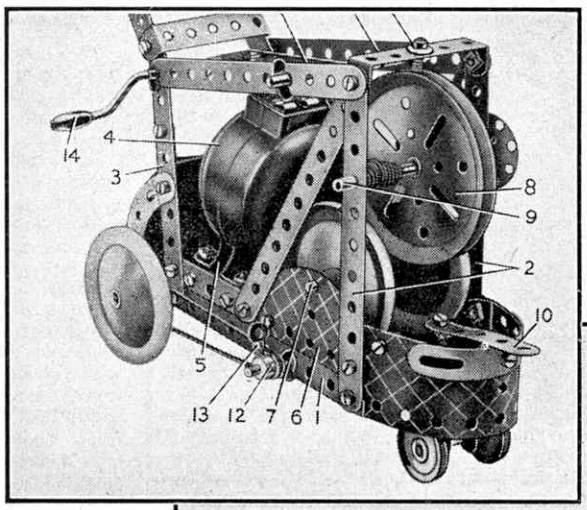
The drive is taken from Rod 7 to a 3″ Pulley 8 that is free to rotate on Rod 9, which is slideable in its bearings. Side movement of Pulley 8 is prevented by a $\frac{3}{8}''$ Bolt passed through the centre hole of the $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. The shank of the Bolt projects between the rim of Pulley 8. In order to enable Pulley 8 to rotate Rod 9 a dog clutch is arranged in the following manner. A Bush Wheel is fitted with two Angle Brackets and is fixed on Rod 9, the Angle Bracket being arranged to engage with two bolts lock-nutted in the boss of Pulley 8.

A $1\frac{1}{4}''$ Disc is retained on each of Rods 7 and 9 with Spring Clips to facilitate their movement from side to side.

The front of the chassis can now be completed and this is carried out by overlapping two $1\frac{11}{16}''$ radius Curved Plates by two holes and bolting them to the Flanged Plate 1. The other end of the Plate is bolted to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip fixed to Strips 3. The rear wheels of the crane are 1″ Pulleys mounted on a $1\frac{1}{2}''$ Rod that is journalled in a Cranked Bent Strip. The latter is supported from the chassis by a Trunnion, and can be steered by Strips 10 in the following manner. Strip 10 is bolted to a Reversed Angle Bracket, through the other end of which is passed a $\frac{3}{8}''$ Bolt. A nut is screwed up against the Bracket and the Bolt is passed through a hole in the Trunnion. A second nut is screwed up loosely and the Cranked Bent Strip fitted over the Bolt shank. Finally a third nut is threaded on the Bolt and lock-nutted in place.

The front Road Wheels are mounted on a 4″ Rod journalled in the Flanged Plate. They are driven in the following manner. The drive is taken from Rod 7 to a 1″ Pulley 11 mounted on a 4″ Rod journalled in Flanged Plate 1. The drive is then taken from the small pulley 12 to a 1″ Pulley on the Road Wheel axle. In order to disconnect the drive to the front wheels Pulley 12 is fitted with a Bolt 13, in the slot of which a Washer is pressed. By turning bolt 13 Pulley 12 can be fixed to its Rod at will. The jib can then be assembled and the cords fitted.

Parts required to build the model mobile crane; 4 of No. 1; 8 of No. 2; 2 of No. 3; 2 of No. 10; 1 of No. 11; 2 of No. 12; 2 of No. 15b; 3 of No. 16; 1 of No. 17; 1 of No. 18a; 1 of No. 18b; 1 of No. 19b; 1 of No. 19g; 5 of No. 22; 1 of No. 23; 1 of No. 24; 8 of No. 35; 60 of No. 37a; 56 of No. 37b; 8 of No. 38; 1 of No. 40; 1 of No. 44; 1 of No. 48; 3 of No. 48a; 1 of No. 51; 1 of No. 52; 1 of No. 57c; 4 of No. 90a; 2 of No. 111c; 1 of No. 125; 1 of No. 126; 2 of No. 126a; 1 of No. 155a; 1 of No. 176; 1 of No. 186; 2 of No. 186a; 4 of No. 187; 1 of No. 189; 2 of No. 200; 2 of No. 214; 1 of No. 215; 2 of No. 217a; 2 of No. 217b; 1 E06 or E020 Electric Motor (not included in Outfit).



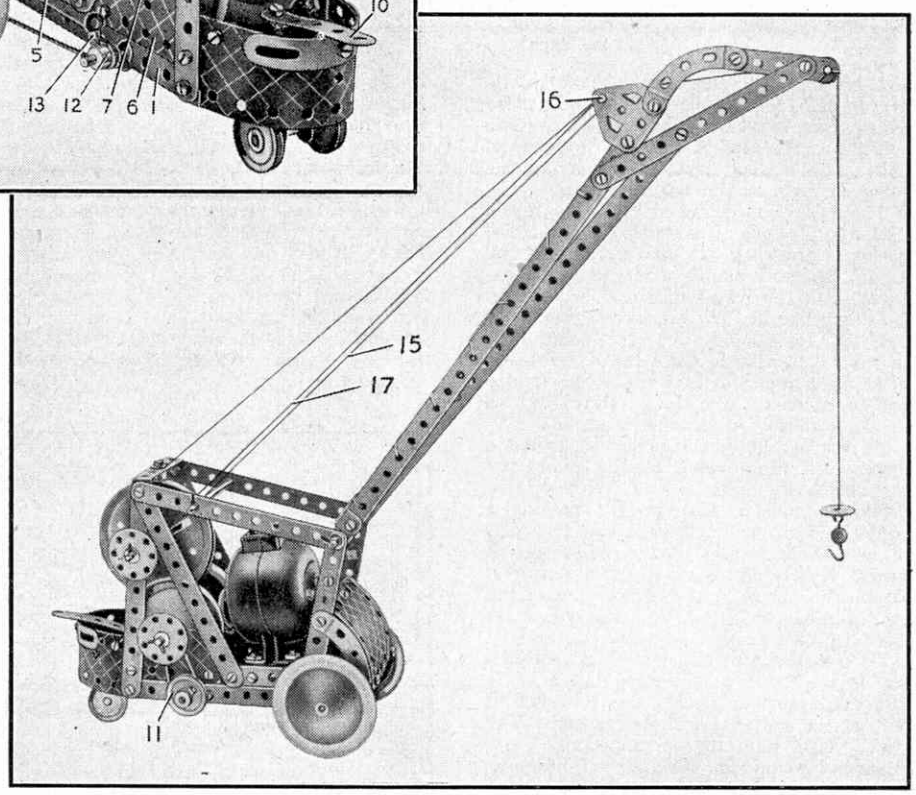


Fig. 4. A model mobile crane. The illustration inset above shows the operating mechanism of this model, and the method of mounting the E06 or E020 Motor by which it is driven.

Suggestions Section

By "Spanner"

(464) A Meccano Harmonograph

(A. N. Waters, Liverpool)

'Fig. 464 on this page and Fig. 464a on the opposite page show a Meccano harmonograph, an interesting model designed to record harmonic motions, that is reciprocating movements like those of a piston or pendulum, in a permanent visible form. The records obtained by means of the model can be made to form a variety of designs, similar to those produced by the well-known Meccanograph. The harmonograph also has a scientific application, for its records can be used in studying vibrations of all kinds. The chief purpose of this model indeed is to demonstrate the scientific uses of the harmonograph.

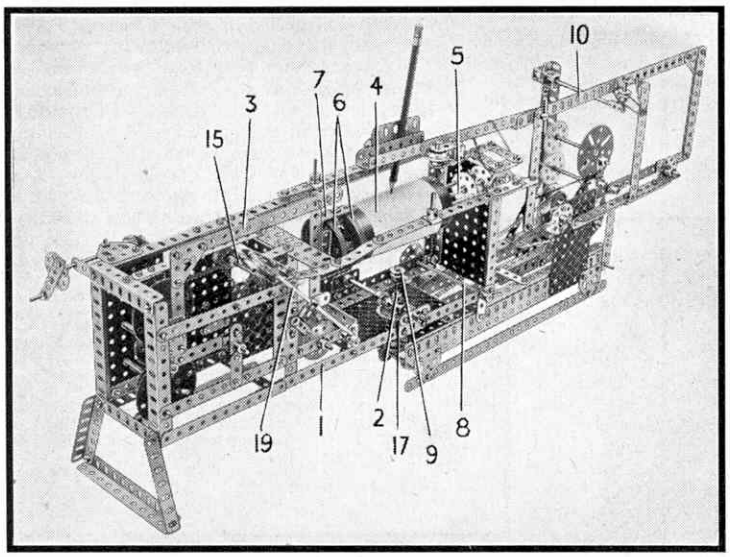


Fig. 464

The model was designed as the result of a desire to produce an instrument capable of giving accurate results, and in Mr. Waters' model the motions are produced and combined, and the result recorded, simply by turning a handle. The machine is primarily devised for combining two harmonic motions occurring in the same straight line or at right angles to each other, but it also can be made to give the resultant of two motions at any intermediate angle.

As the handle of the model is turned a drum 4 is made to rotate slowly, and at the same time to move to and fro in simple harmonic motion. An arm 10 carrying a pencil also moves backwards and forwards in simple harmonic motion. The pencil presses lightly on a strip of paper wrapped around the drum, and the resultant of the two motions is drawn on the paper in the form of a graph.

To combine motions occurring at right-angles the drum is not used but a table carrying a piece of paper is made to slide to and fro in simple harmonic motion. The pencil arm and its accompanying mechanism is swung out through a right angle, as shown in Fig 464a, and the pencil then records the resultant of the two motions.

(465) Compact Spur Differential

(J. A. Blacklin, Liverpool)

The differential gear shown in Fig. 465 is noteworthy on account of its compact design and the ingenious method of construction. The side frames consist of 1" Triangular Plates, lock-nutted on Screwed Rods 1 passed through diametrically opposite holes in a 1½" Bevel Gear or, if this is not available, in a 1½" Contrate Wheel. A Rod 2 of suitable length is passed through the boss of the Gear and a 1" Triangular Plate fitted over the Rod and the far Screwed Rod. This is followed by a 1½" Strip 3, which fits over both Screwed Rods 1 and Rod 2, and a second Triangular Plate is fitted to the nearer Screwed Rod to the first one. The Strip and Triangular Plates are fixed in position by lock-nuts. A ½" Pinion is fitted on Rod 2, which passes halfway through the bore of the Pinion.

Two nuts are then put on each of the Screwed Rods, followed by a Washer and a ½" Pinion, a second Washer and a nut. Rod 4 is then fitted with a ½" Pinion and sufficient length is left to allow the Rod to fit into the remaining part of the boss of the Pinion on Rod 2. The remaining side of the frame is now added. It is identical with the first side and is held in place by means of lock-nuts. The 1½" Rods 5 and 6 are next fitted. Rod 5 carries a ½" Pinion and two Aeroplane Collars, and Rod 6 carries four Washers, a ½" Pinion and an Aeroplane Collar. Both Pinions are fixed on their respective Rods, but the Pinions on the Screwed Rods are free to rotate.

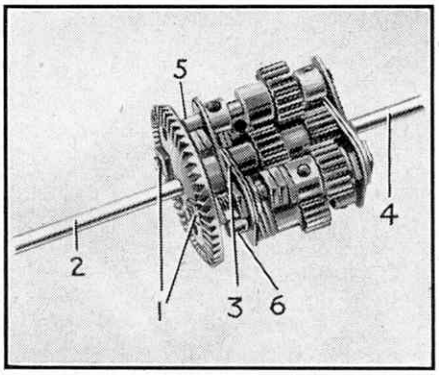


Fig. 465

The Pinion on Rod 6 meshes with the Pinion on Rod 2 and also with the one on the nearest Screwed Rod 1. This last mentioned Pinion meshes with the Pinion on Rod 4. Similarly the Pinion on Rod 5 meshes with the Pinion on Rod 2 and with that on the rear Screwed Rod 1, which also meshes with the Pinion on Rod 4.

(466) Four Wheel Steering Mechanism

(R. S. Drinkwater, Hornsey, London)

For correct steering the front wheels of a motor vehicle must turn about the same centre or pivot, whether there are two or four wheels. This condition is met by the ingenious four wheel steering device illustrated in Fig. 466, which is an application of the Ackermann principle.

Each side member of the chassis of this model is built up from two 12½" Angle Girders, which are lengthened by 4½" Angle Girders and bolted to form a U-section girder. The axles for each of the four wheels consist of 2" Rods locked into Rod Couplings that are pivoted to the Springs by 1" Screwed Rods. Swivel Bearings locked to the ends of 2½" Rods link the movements of opposite axles, and are connected to the Couplings holding the axles by means of 1" Rods.

The turning movements of the front and rear axles are kept in step by a 4" Axle Rod, which is joined by Swivel Bearings to 2" Rods attached by Couplings to the 1" Rods held in the Axle Couplings. The 4" Rods must be joined at corresponding positions to the front and rear axle. The steering wheel drive is transmitted to the 4" Rod, which governs the movement of the wheels by connecting the Swivel Bearing to the screwed coupling 3 on the wheel drive.

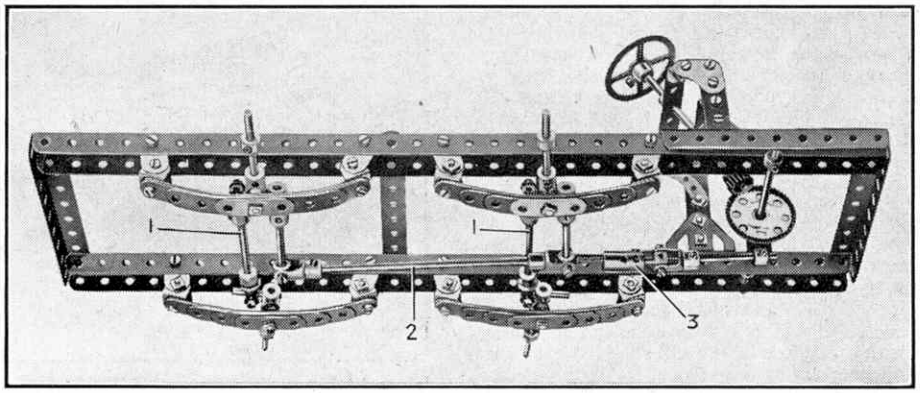


Fig. 466

(467) Screw-Operated Shoe Brake

The most powerful type of brake used in engineering is the screw-operated shoe brake, the shoes being of the external contracting type. Brakes of this kind are fitted on many winding engines used in coal and other mines, and in very large cranes. They are efficient and effective. They have the disadvantage of being somewhat slow in operation, but are comparatively simple in form, as the model shown in Fig. 467 suggests.

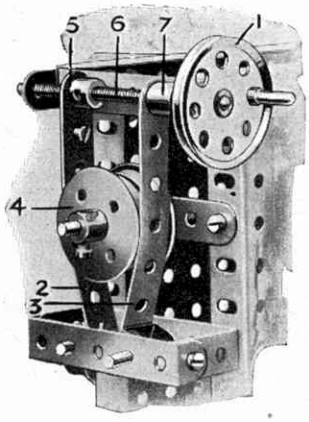


Fig. 467

The brake drum 4 of the model is built up of two 1¼" Flanged Wheels, which can be replaced by Wheel Flanges if great pressure is required. The brake shoes are 3½" Strips 2 and 3, which are pivotally attached to the framework at the base of the model by means of a Double Bracket and 1½" Rod. The inner end of the Rod is carried in one hole of a 2½" × 1" Double Angle Strip while the outer end rests in a similar positioned hole of a 2½" × ½" Double Angle Strip. The Strip 2 is fitted with a Threaded Crank 5 that moves laterally on a 3½" Threaded Rod 6. The end hole of Strip 3 passes over the Threaded Rod 6 and that end of the Strip bears against a Threaded Boss 7.

One end of the Threaded Rod 6 is journalled in the end hole of a short Strip; the other end is fitted with a 1½" Pulley 1 and a Threaded Pin to form a handle. Turning the latter clockwise causes the shoes to press on the drum, and the brake is released by turning in the opposite direction.

Apart from its power this form of brake has the great advantage that it can be applied to hold a load in a raised position, and this makes it of special value in certain types of crane.

(468) A Planetary Gear-Box

Here is an excellent model of a planetary gear-box that will appeal particularly to the more advanced model-builder. Planetary gearing is interesting in itself and gear-boxes of this type lend themselves to experimental work on pre-selector mechanisms.

The model is illustrated in Fig. 468. The 6½" Axle Rod 1 takes up the drive from the power unit, and is journalled in the centre of a 5½" Angle Girder and a 5½" × ½" Double Angle Strip forming part of the framework for the gear-box. The driven 5" Rod 2 is journalled in a similar manner at the other end of the frame. The cage for the planet gears is built up from two Face Plates, which should be lined up carefully so that the holes through the bosses are in perfect alignment, and it is free to slide on the Rods 1 and 2.

The Rod 2 carries at its inner extremity a 1" Gear Wheel 4, in the centre hole of which the end of the Rod 1 is inserted to prevent wobble. The Rod 1 carries a fixed ¾" Pinion 3. The sun wheels 6 and 7, consisting of a 57-teeth and a 50-teeth Gear Wheel, are held together by a Socket Coupling placed over their bosses, and the Rod 1 is free to rotate in their centres. The Gears are prevented from rotating by a 2½" × ½" Double Angle Strip attached to the 57-teeth Gear by ½" Bolts, on the shank of each of which is a Collar for spacing purposes.

The general construction of the gear-box should now be clear from Fig. 468, but fuller details will be sent to any reader who is interested. Its operation is simple. The 1" Rod at the end of the gear lever should be adjusted so that normally it fits into one of the holes in the Curved Strip but by a slight upward movement of the lever can be disengaged to allow the lever to be moved in another position.

In the illustration reverse gear is in engagement. In this position the Pinion 3 on the driving shaft engages with the Gear 10, thus causing the ½" planet Pinion on the Rod 8 to travel round the sun wheel 6. This movement causes the cage to revolve, and for reverse gear the cage is locked "solid" with the driven shaft by means of a fixed ½" Pinion that engages the 1" Gear 4.

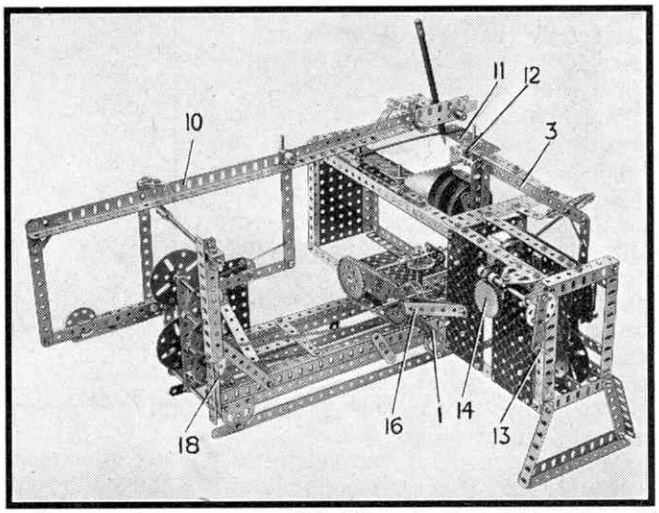


Fig. 464a

First Gear is engaged on moving the lever to the next position on the left after which comes a neutral position, followed by second, third and top gear positions.

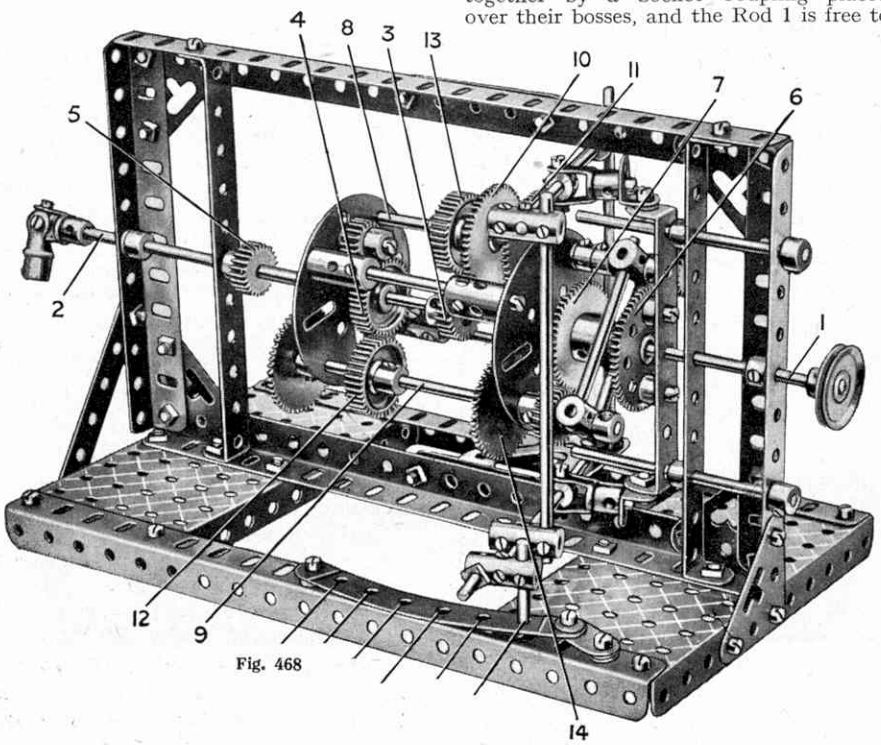


Fig. 468

(469) Automatic Brake for Trailers

(S. Spires, Peterborough)

S. Spires has devised a very simple automatic brake mechanism for trailers. A Single Bent Strip is attached rigidly to the leading vehicle, and a Coupling is pivoted on it by means of a short Rod. A 2½" Rod is fitted in the Coupling.

A 3" Strip is attached to the trailer by a Simple Bell Crank and a 2½" Angle Girder, and one end of it is fitted with a 1½" × ½" Double Angle Strip. The 2½" Rod passes through the holes in the flanges of the 1½" × ½" Double Angle Strip, and carries at its end a Collar.

Behind the 1½" × ½" Double Angle Strip are two 1½" Strips pivoted vertically at their centres on a Double Bracket under the 3" Strip. Cables connect the lower ends of the 1½" Strips to the brake mechanism. When the brakes are applied the Double Angle Strip slides forward and the upper ends of the 1½" Strips are pushed back. The lower ends go forward and apply the trailer brakes.

Meccano Model-Building Competitions

Cheques and other Fine Prizes

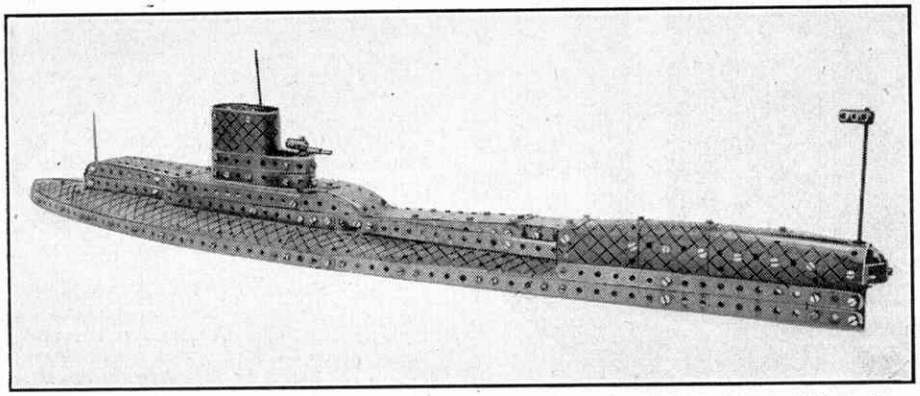
"Home Gadgets" Model-Building Contest

In this Competition we are offering prizes for Meccano "gadgets" of any kind that can be put to practical use in the home. A wool-winder that would be welcomed by Mother, a tool rack for Dad or a bicycle carrier for Tom are typical examples of the kind of models that will be suitable as entries. There is considerable scope for useful articles of this kind in every home, and many others will readily suggest themselves to readers.

Only models of home gadgets such as those mentioned are eligible for this competition, and in building them readers may use any size of Outfit or quantity of parts. The Contest is open to readers of all ages, and the prizes will be awarded to the senders of the gadgets considered by the judges to be the most practical and most neatly designed.

When the model is completed it is only necessary to send either a photograph or a drawing of it to this office. The envelope should be addressed "*Home Gadgets Model-Building Competition*," Meccano Ltd., Binns Road, Liverpool 13, and should be posted to reach Liverpool before 31st May.

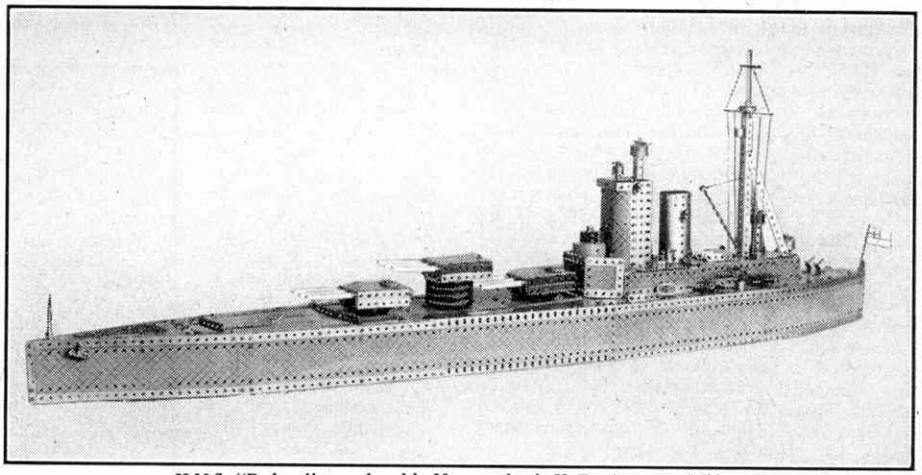
The following prizes will be awarded for the best models submitted. First, Cheque for £3/3/–. Second, Meccano or Hornby products value £2/2/–. Third, products value £1/1/–. There will be also five prizes of products value 10/6, and five of products value 5/-.



A waterline model of a submarine built by E. A. Bridle, Tunbridge Wells. It won a prize in the "Autumn" Competition.

New Year Model-Building Contest

In last month's "*M.M.*" we published details of the "New Year" Model-Building Competition, in which cash and other valuable prizes are offered for the best models submitted. The closing date of the Contest is 31st March, and as there is still plenty of time for readers to send in their entries we are again giving full details of how these should be prepared and submitted. All that competitors have to do is to build a Meccano model to their own ideas. This may be of any size and of any type, and the only condition is that it must be the entrant's unaided work in design and construction.



H.M.S. "Rodney" reproduced in Meccano by A. V. Featherstone, Widnes.

All readers and Meccano Outfit owners are eligible to compete in this Contest, no matter where they live or what age they may be. It is not necessary to go to the trouble of packing the actual model and sending it to us. All that is required is a good drawing or, better still, a photograph. Neither of these need be the competitor's own work. He can get someone who is more skilful than himself to help him to get this part of his entry ready. It is advisable to send also a written description of the principal features of the model, especially of parts that are not clearly shown in the illustration. Then the competitor should write his age, name and address in block letters on the back of each photograph or drawing submitted.

Finally the drawing or photograph, with the accompanying written description, should be placed in an envelope addressed "*New Year General Model-Building Competition*," Meccano Ltd., Binns Road, Liverpool 13, and posted in time to reach Liverpool before 31st March.

Entries will be divided into two sections, A, for readers of 15 years of age or more, and B, for those under 15 years. The first prize in each section will be a cheque for £3/3/–. The second and third prizes will consist of Meccano or Hornby products to the value of £2/2/– and £1/1/–, and there will be 20 fine consolation prizes of Meccano or Hornby products.

R. P. Walford, Lustleigh, Devon, who has won several prizes in Meccano competitions.

Meccano Contest Results

By "Spanner"

"M.M." Readers' Fine Models

J. Darby, Holmfirth, a prize-winner in a recent "M.M." model-building contest.

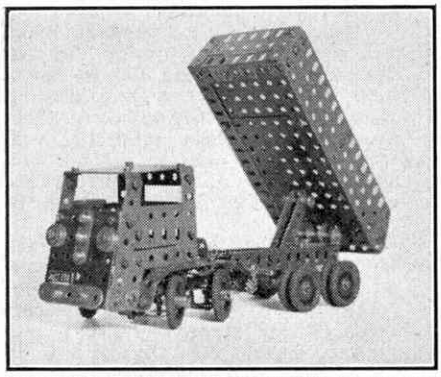
In my review of the "Autumn" Model-Building Competition in last month's *"M.M."* a fine automatic radio receiver built by A. V. Butcher, Christchurch, New Zealand, was illustrated. In appearance this is very like a modern grandmother clock, and the central feature of its mechanism is a synchronous clock built up from Meccano parts. The clock indicates the time in any part of the world and it drives an automatic switch mechanism, the purpose of which is to switch the radio receiver on or off at any predetermined time. In addition the switch mechanism controls illuminated dials that indicate which of six chosen stations are transmitting at any given time.

By means of other dials the instrument may be set to give a whole evening's entertainment from several stations. Once these dials are set the automatic apparatus does the rest and switches in each station at the appropriate time, the tuning for each station being carried out entirely automatically.

The automatic apparatus and casing of this ingenious model are built mainly from Meccano parts. There are more than 30 controls on the front panel and more than 2,000 nuts and bolts were used in the complete instrument. There are four electric motors and about 20 electro-magnetic relays.

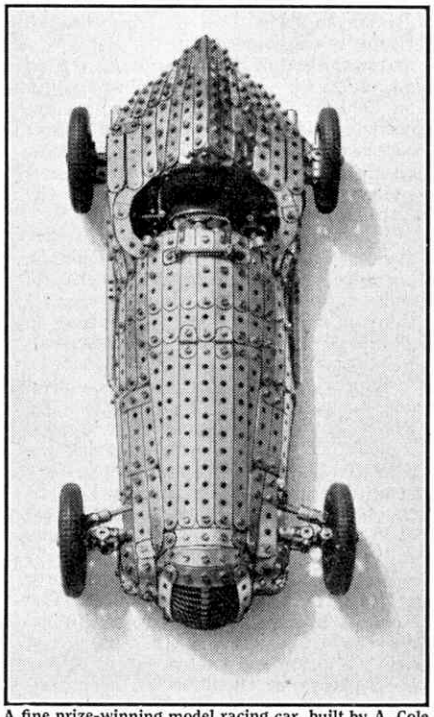
The making of a model such as that submitted by Mr. Butcher, is of course an excellent achievement, and one that is possible only to those who possess the necessary technical knowledge and the large quantity of Meccano parts required. Inability to build large and intricate models, however, need not prevent anyone from winning a prize in a Meccano competition. For example, note the simple model tipping lorry shown on the left. This won a prize of 10/6 for A. G. Turton, Ottawa, and its success is due entirely to the very clever manner in which the mere handful of parts used in its construction have been put together. Not only has the utmost use been made of each part, but careful attention has been given to neatness and realism.

I find it difficult to describe the model industrial locomotive crane shown below. To me the usual adjectives such as fine, neat, realistic, seem quite inadequate to do justice to the workmanship put into the model and I think I cannot do better than to say I should be very proud of my achievement if it were my work! The actual builder was F. G. Rich, Orpington, a very keen enthusiast who has several previous successes in Meccano Competitions to his credit. I hope to see many more examples of his work adorning the pages of the *"M.M."*

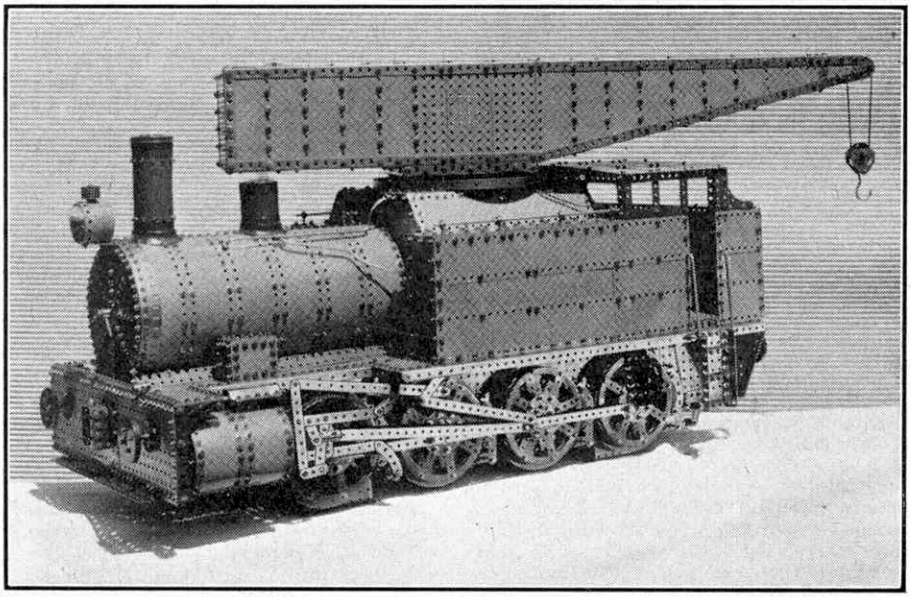


An abundance of detail is included in this simple tipping lorry. It was built by A. G. Turton, Ottawa, Canada.

The model racing car shown below incorporates many interesting mechanisms, including independent suspension, overdrive gear-box and steering gear designed to prevent tyre creep. The model is the work of A. Cole, Broadchalk, nr. Salisbury, and was awarded a prize value 10/6.



A fine prize-winning model racing car, built by A. Cole Broadchalk.



A model of a locomotive crane that won Second Prize in the "Autumn" Competition for F. G. Rich, Orpington.

"Suggestions" Contest

The prizes offered for details of interesting mechanisms suitable for inclusion in *"Suggestions Section"* of the *"M.M."* have been awarded to the competitors named in the following list.

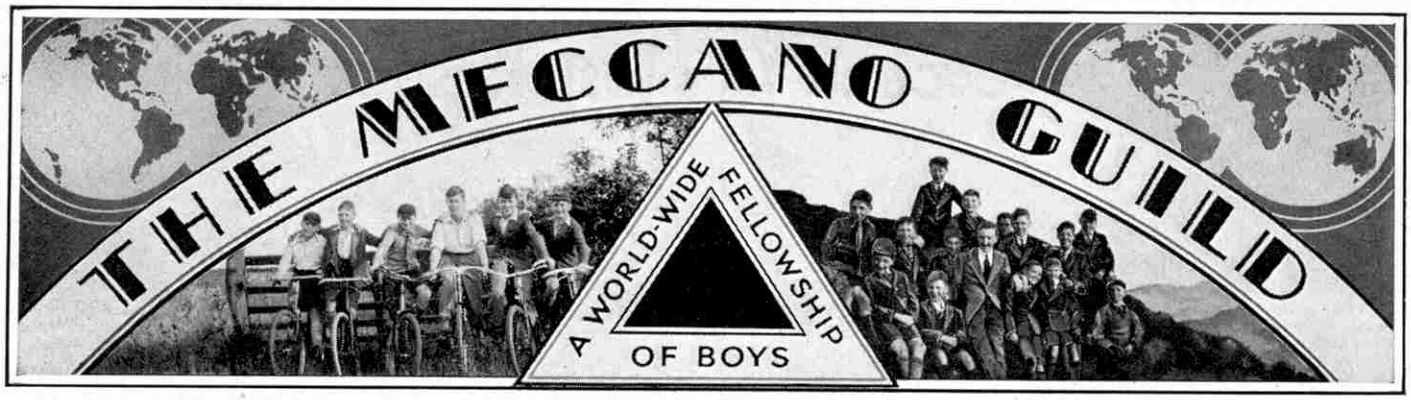
1st Prize, Meccano or Hornby products value £3/3/–: N. Ta'Bois, Woodford Green. 2nd, products value £2/2/–: D. Southin, Wootton Bridge. 3rd, products value £1/1/–: K. Pritchard, Brook's Green.

Products value 5/–: T. A. Wade, Johannesburg; L. Masters, Bletchley.

"Short Story" Contest

In the November 1939 issue of the *"M.M."* we offered prizes for humorous short stories incorporating the names of Meccano parts and model-building terms. The readers named in the following list have been awarded prizes as indicated.

1st Prize, Meccano or Hornby goods value £2/2/–: T. Tasker, Barnsley. 2nd, goods value £1/1/–: L. Chitty, London S.W.20. 3rd, goods value 10/6: D. Calow, Leicester.



Exhibitions in Wartime

I am glad to see that Exhibitions are being planned for the end of the present Session, in spite of all wartime difficulties. Easter is a favourite time for displays, as it marks the end of the indoor season. There is no reason why such Exhibitions should not be held, if due regard is paid to the needs of safety, and they should be as successful as those of previous years, giving useful publicity and adding in a welcome manner to the funds of the clubs concerned.

I suggest that this year the *"M.M."* Radio Fund for the R.A.F. should be borne in mind. This fund is worthy of every support that we can give it, and I think it would be a very fine thing to allot a proportion of the proceeds of an Exhibition to this as a club contribution.

Efforts on behalf of the Fund need not be confined to Exhibitions. The Plymouth club organised a special concert, at which members themselves provided the turns. Any kind of display or entertainment that brings people to the club room would be suitable, for visitors would be interested both in the club work and in the Fund, and would willingly drop small contributions into a box provided for the purpose. The Fund is making good progress, but so far the Guild and H.R.C. have not made a prominent show, as is shown by a glance at the first list of contributions on page 157 of this issue.

Blackout Models for Competitions

In spite of the trouble and inconvenience that the blackout has caused since September, the past winter will be recalled by lone members and those belonging to clubs alike with a certain amount of satisfaction because of the increase in model-building that it brought with it. Meccano has shown itself to be an ideal means of defeating blackout boredom by providing something really worth while to do and follow up.

I want all Guild members who have been busy with their Outfits throughout the winter to let me know what they have been doing, and I think the best way is for them to enter the best of the models they have constructed in one or other of the Model-building Contests announced in the Magazine. The "Home Gadgets" Contest announced this month should make a special appeal to them, for every boy loves to make little things that can be used in the home or to reproduce household things in Meccano, and the splendid prizes waiting for the winners are well worth trying for.

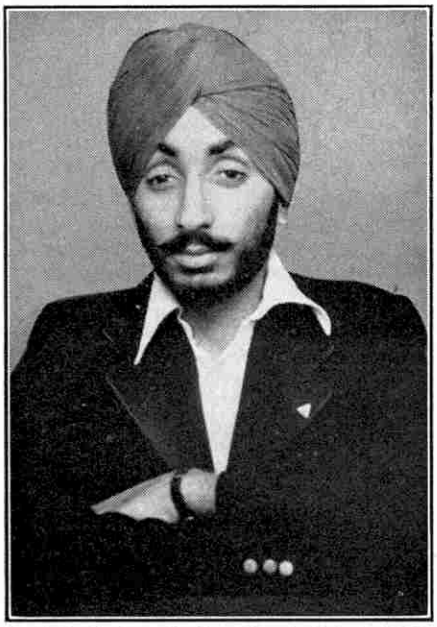
For Clubs in Safe Areas

At first glance the evacuation of members to the countryside appeared to put an end to the activities of many clubs, but it is now being realised that the upheaval actually provided splendid opportunities for extending the work of the Guild and of Meccano clubs. For instance, a Meccano club for evacuees has been formed at one centre where there is already a very active and efficient club. In another case the membership of a Branch of the H.R.C. suddenly jumped from a dozen or so to nearly 200!

I hope that every opportunity of extending club or Branch work will be seized. There may be difficulties following on sudden expansion, or on the formation of new clubs, but with patience and perseverance these can be overcome, and more boys initiated into club life.

Meccano Club Leaders

No. 100. Mr. S. Harbhajan



Mr. S. Harbhajan is Leader of Egon's (Calcutta) M.C., a strong Indian club that was affiliated to the Guild in June 1938. Model-building is carried on enthusiastically, and other special features of the programme are fretwork and stamp collecting. Excursions and picnics also are arranged regularly.

Merit Medallions

This month Leaders should make up their minds about nominations for the Merit Medallions for the second Winter Session. Two Medallions are available for each club for the Session, and I should like the names of the winners as soon as possible in order that their Medallions can be prepared and sent for presentation.

Leaders who did not nominate members for this award during the first Winter Session, ending 31st December 1939, may still send in nominations if they wish. I hope they will do so, for in every Session there must be some member whose work merits the presentation of the Medallion, and I do not wish any work of this kind to be overlooked.

There is no restriction in regard to the kind of good work that qualifies for the award of the Merit Medallion. The difficulties that have arisen since the outbreak of war may have thrown into greater prominence the efforts of members who have given unstinted help in keeping things going. This kind of good work might well be recognised by the award.

Proposed Clubs

Attempts are being made to establish Meccano clubs in the following places, and boys interested should communicate with the promoters, whose names and addresses are given below:

AYR—B. Ritchie, Croftpark, Craigwell Road, Ayr.

BEDFORD—H. Miles, 33, The Grove, Houghton Conquest, Bedford.

BLUNDELLSANDS—Rev. F. O. Bennett, "Bardowie," Merrilocks Road, Liverpool 23.

BOURNEMOUTH—R. G. Still, 3, Wallescott Road, Wallisdown, Bournemouth.

BURY ST. EDMUNDS—T. S. West, 10, Crown Street, Bury St. Edmunds.

DEWSBURY—A. Casson, 12, Upper Bank Street, Highgate, Dewsbury.

EDINBURGH—R. Thomson, 4, Balgreen Park, Edinburgh.

LONDON—A. Simmons, 11, Crutchley Road, Verdant Lane, Catford, S.E.6.

NEWPORT—R. V. Marsh, "Montazal," Sunningdale Road, Newport, I.O.W.

SNODLAND—J. R. Parris, 15, Woodlands Avenue, Snodland, Kent.

STARCROSS—M. Hector, Rothesay, Starcross, Devon.

TOTNES—G. Wheatley, The Gables, Totnes.

WAKEFIELD—K. Ward, 94, Alverthorpe Road, Wakefield.

WORCESTER—P. Harris, Tripleton, Holywell Hill, Worcester.

Great Baddow M.C.—Regular meetings are being held. Members are allowed to choose the section in which they will work at each meeting. Some bring their own Outfits and build models from these. Others take part in the construction of a large club model, and Discussion Groups also are arranged. Competitions are organised, and points are awarded to members for Model-building and other activities. Prizes are awarded on the monthly totals of points, and a cup is presented at the end of each quarter to the member with the greatest number. Rehearsals are being held for the club Concert. Club roll: 20. *Secretary:* R. Willis, "Ivydene," Maldon Road, Gt. Baddow.

York M.C.—Great activity prevails. Members build models at home, and have constructed lorries, stationary engines and other structures at club meetings. The secretary is busy with a model of a 50-ton dock crane, which includes a four-movement gear box operated by cams, with miniature figures that appear to move the necessary levers. The *"M.M."* is read and discussed at meetings, and a collection is being made of aeroplane photographs appearing in it. Improvements are being made to the club's Hornby Railway, on which operations are carried out regularly. Club roll: 16. *Secretary:* G. Hodgson, 1, Sunnyside, Heslington Lane, Fulford, York.

Plymouth M.C.—An Afternoon of Variety has been held in aid of the *"M.M."* Radio Fund for the R.A.F. Members worked hard in preparation for this entertainment, and in selling tickets. Concerts also have been given to evacuees and the local Branch of Dr. Barnardo's Home. A Theatrical Section has been formed to carry on this work, all the turns being given by members themselves. The club evidently possesses considerable talent, and the efforts of the Theatrical Section has brought the club much valuable publicity. Other Sections continue to flourish, although they are not as active as in peace time owing to the demands made on members' time by the charitable efforts organised by the club. Club roll: 95. *Secretary:* A. E. Miller, 21, Hamilton Gardens, Mutley, Plymouth.

Hornsea M.C.—The lively programme of this very active club has included Games of all kinds, Cinema Shows and interesting Lectures. The subjects of the Lectures have included *"The Bible," "Great Britain"* and *"Bridges."* Science Talks have been unusually interesting. *"The Chemistry of the Colour Box," "The Telescope"* and *"The Microscope"* have been popular subjects dealt with, and a garden telephone has been constructed. A Junior Committee has been set up in order to give younger members a share in organising club proceedings. Club roll: 17. *Secretary:* P. Richardson, 14, Grosvenor Terrace, Hornsea.

Exeter M.C.—The four football teams raised by the club have continued their programmes with gratifying success, many fine matches having been played. Interesting models constructed have included a destroyer and a representation of the entrance to Exeter Central Station. Attendances continue to be excellent, and great interest is taken in various Games Tournaments. A review of 1939 shows how active the club has been. The number of models built has been a record, and all other sections have been carried on with equal zeal and ability. In spite of the blackout and war conditions attendances during December were the highest for several years. Club roll: 60. *Secretary:* E. Edworthy, 23, May Street, Exeter.

Officials and members of the Lasallian M.C.; Leader, Rev. Bro. Anthony, F.S.C., who in our photograph is on the right of the table; secretary, A. Caruana. This active Maltese club was affiliated in June, 1939. Model-building is the centre of interest, and finished models of aeroplanes and other subjects are exhibited on the club room tables at meetings. Fretwork is another popular activity. The club has already held a very successful Exhibition.

Stretford Public Libraries (Lostock Branch) M.C.—Members have been very active in Model-building. Models constructed include a basement air-raid shelter, a miniature of the German pocket battleship *"Deutschland,"* several models of Blackpool tower, lighthouses, bridges and two aircraft carriers in addition to aeroplanes of various types. A special meeting has been devoted to the construction of models representing Britain's defence measures. The Stamp and Cigarette Card Sections have held interesting meetings. At one of these a map-reading contest was held, members being asked to locate stamp issuing places. Stamps or cigarette cards were awarded as prizes. The members of the Junior Section are giving short talks on portrait stamps. Games and Competitions also have been organised, and many prizes of stamps and cigarette cards have been awarded. Club roll: 30. *Secretary:* Miss F. Scattergood, Public Library, Technical Institute, Stretford Road, Old Trafford, Manchester 16.

Acton M.C.—Meetings for Model-building are being held. Two large models under construction are a crane and a railway coach, and others recently completed have been a gantry crane and a swivelling jib crane. A Debate has been held on the subject *"Diesel v. Electric Traction."* The catalogue of books in the club Library has been completed. Club roll: 15. *Secretary:* S. W. Simmons, 7, Alfred Road, Acton, London W.3.

Saffron Walden M.C.—The club has been temporarily closed, but on the completion of Air Raid Precautions a new start was made and there are already enquiries from prospective new members. The club did useful work in school preparations for protection in wartime. Club roll: 20. *Secretary:* D. A. Rees, Friends' School, Saffron Walden.

AUSTRALIA

Maylands M.C.—More Faction Exhibitions have been held. At one of these the Green and Gold Faction displayed a model of a modern steelworks with a miniature blast furnace made to give a realistic glow by means of a red light inside it. Games tournaments have also been held, the games played including Monopoly and darts. Preparations were made for the club's Exhibition, some of the excellent models shown including a grandfather clock, a railway breakdown crane, and a steam shovel. The receipts were excellent. Club roll: 25. *Secretary:* W. Petersen, 1, Warne Street, Maylands, Perth, Western Australia.

HOLLAND

Maastricht M.C.—This club celebrates its 10th birthday during 1940, and preparations are being made to mark the occasion. An Exhibition is to be arranged, and special model-building contests are to be organised. Attendances are satisfactory in the difficult circumstances occasioned by the war. Lantern Lectures and papers by members are being included in the programme. Club roll: 12. *Leader:* F. L. Bingen, Mathias Wijnandstraat 6, Wijk Maastricht.

Meccano Conveyor that Stacks Bags in a Pile

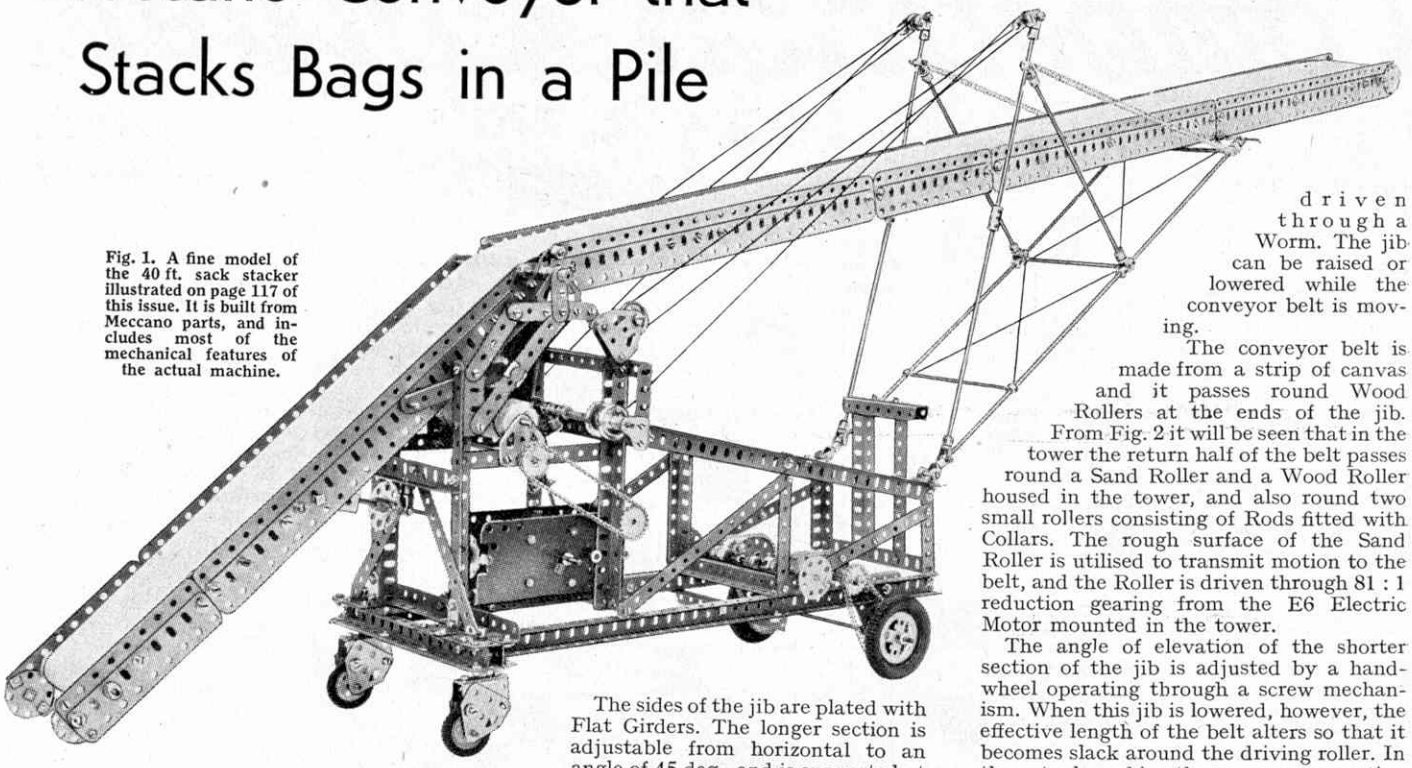


Fig. 1. A fine model of the 40 ft. sack stacker illustrated on page 117 of this issue. It is built from Meccano parts, and includes most of the mechanical features of the actual machine.

IN modern warehouses many interesting machines are used for handling various kinds of goods quickly and easily. Among these machines are many different types of conveyors, some of which are specially designed for transporting and stacking bags of such materials as cement, sugar and flour. A fine Meccano model of one of these sack stackers is shown on this page. It is based on a machine manufactured by Spencer (Melksham) Ltd., an illustration of which appears on page 117 of this issue. This machine is capable of dealing with 400 sacks an hour, and it can stack them at heights up to 40 ft.

The Meccano model is built to a scale of approximately one inch to a foot, and it reproduces most of the principal mechanical features of the actual machine. This consists essentially of a travelling carriage mounted on four rubber-tyred wheels. Two of the wheels are pivoted to form castors. The other pair can be rotated independently or together by turning crank handles fixed one on each side of the carriage, and one man can manœuvre the machine easily to any part of a warehouse floor.

The travelling carriage is provided with a light steel framework that in turn carries a hinged jib along which travels a conveyor belt that carries the sacks. The conveyor is driven by an electric motor, and its angle of elevation can be altered as necessary to place the sacks in the required positions.

Referring now to the Meccano model, one end of the travelling carriage is built in the form of a small tower from 7½" Angle Girders and Strips, and it forms a support for the hinged conveyor jib. The jib is built up in two lengths from Angle Girders connected by 3" × 1½" Double Angle Strips, and the two portions are pivoted on a Rod supported in the framework of the tower.

The sides of the jib are plated with Flat Girders. The longer section is adjustable from horizontal to an angle of 45 deg., and is supported at its outer end by two pivoted frames, one at each side, built up from Rods of various lengths joined by Couplings and small Fork Pieces. The frames are connected by Screwed Rods and braced with wire. A ½" loose Pulley is carried in a small Fork Piece at the upper end of each frame, and these provide rollers on which the jib slides when it is being raised or lowered.

A Rod journalled in the tower forms the winding barrel for derricking the longer section of the jib, and the operating Cord, which is wound around the Rod, passes through pulley blocks fixed in the frames and tower as shown. In order to render the hoisting mechanism self-sustaining when the Motor is not working the winding Rod is driven through a Worm. The jib can be raised or lowered while the conveyor belt is moving.

The conveyor belt is made from a strip of canvas and it passes round Wood Rollers at the ends of the jib. From Fig. 2 it will be seen that in the tower the return half of the belt passes round a Sand Roller and a Wood Roller housed in the tower, and also round two small rollers consisting of Rods fitted with Collars. The rough surface of the Sand Roller is utilised to transmit motion to the belt, and the Roller is driven through 81 : 1 reduction gearing from the E6 Electric Motor mounted in the tower.

The angle of elevation of the shorter section of the jib is adjusted by a handwheel operating through a screw mechanism. When this jib is lowered, however, the effective length of the belt alters so that it becomes slack around the driving roller. In the actual machine there are compensating cams to take up this slack, but in the model the effect is obtained by means of a link that connects the tensioning roller to the small jib. This arrangement can be seen in Fig. 2.

When the stacker is not in use the larger section of the jib is lowered so that it rests on the support provided at the outer end of the travelling carriage.

The steering arrangement used in the model is similar to that of the actual machine. The wheels are driven by Sprocket Chains and Sprockets acting through Dog Clutches on the shafts.

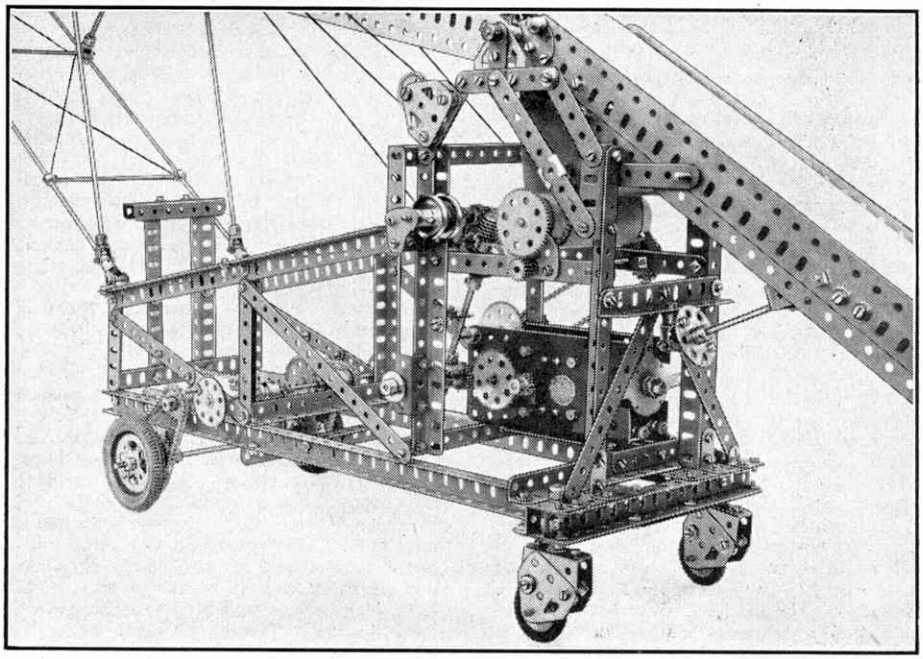
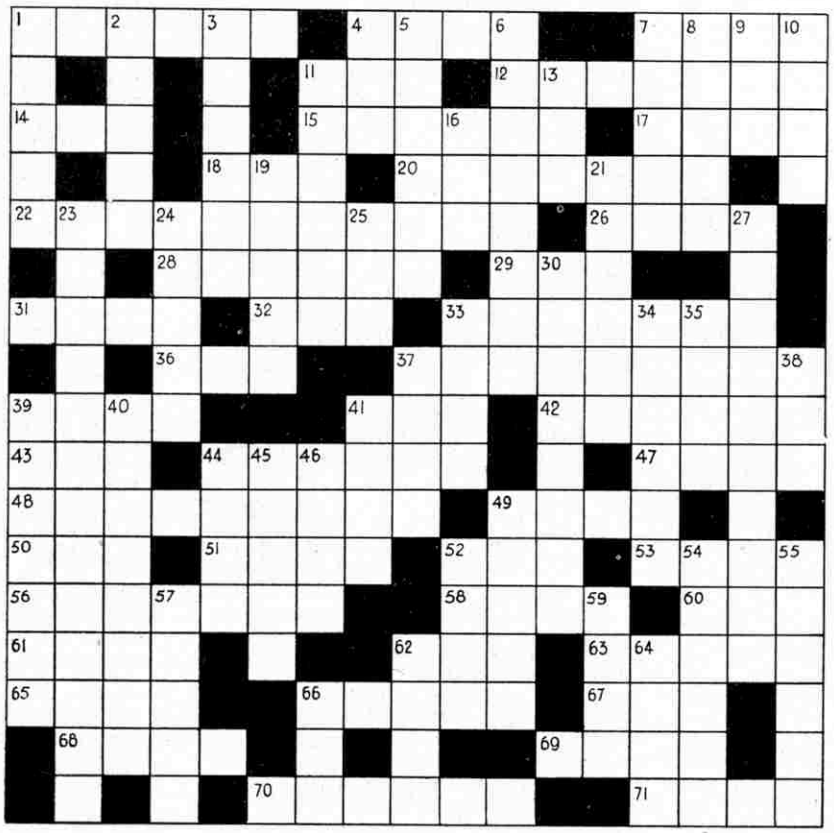


Fig. 2. A view of the mechanism of the Meccano model sack stacker.

Competition Corner

MARCH CROSSWORD PUZZLE



CLUES ACROSS

1. Flow in.
4. To make designs on metal or glass.
7. Brink.
11. To go astray.
12. When cooked this makes a national food.
14. Personal pronoun.
15. Going on.
17. Beseeches.
18. To the point.
20. Awry.
22. One of the earliest annalists.
26. A Gælic language.
28. A measure of length.
29. Consumed.
31. A ladder.
32. Clear of all charges or deductions.
33. A cheap excursionist.
36. A standard for black.
37. A would-be poet.
39. The first part of the day.
41. An affirmative.
42. Fruit.
43. Period.
44. Gain by effort.
47. Pressed down.
48. Trumpery gimcracks.
49. You can steer by it.
50. A headland.
51. A snake-like fish.
52. A mark for quoits.
53. Hardens.
56. This usually pertains to a church.
58. Scarce.
60. Confine.
61. Cast off.
62. To strike.
63. Prop up.
65. Term of respect.
66. A representation by means of lines.
67. In fruit.
68. Deer.
69. A strait.
70. Ancient symbol.
71. Pastures.

CLUES DOWN

1. A pictorial poem.
2. Threw.
3. To set free.
4. A unit of work.
5. A lozenge.
6. Unpaid.
7. Live coal.
8. Acts.
9. Silence.
10. Alternative.
11. Fodder for horses.
13. Past.
16. Anger.
19. Trick.
21. An attendant.
23. One who spells words correctly.
24. A natural fat.
25. Place.
27. Enrol.
30. Helmsman.
33. Conjunction.
34. Sacred songs.
35. Volcano.
37. Foreign coin.
38. A colour.
39. A chemical vessel with a tapering neck.
40. To re-declare strongly.
41. Sweet potatoes.
44. Old.
45. Pleasant surprise.
46. Lofty.
49. Barren open country.
52. To move with short light steps.
54. Epic poetry.
55. Show contempt.
57. An imaginary standard of perfection.
59. To see at a distance.
62. Fraction.
64. Eminence.
66. An odd figure.

Many readers of the Magazine have asked us to include another Crossword Puzzle in our *"Competition Corner,"* and this month we meet their wishes. As usual the puzzle is straightforward, and every word included can be found in any standard dictionary such as Chamber's. The competition will be divided into two sections, for Home and Overseas readers respectively. In each section there will be four prizes, consisting of Meccano products to the value of 21/–, 15/–, 10/6 and 5/– for the senders of the best solutions.

Entries should be addressed *"March Crossword Puzzle,* Meccano Magazine, Binns Road, Liverpool 13." The latest date for receiving solutions in the Home section is 30th March, and the closing date for the Overseas section is 29th June.

March Drawing Contest

This month we are continuing our series of Winter Drawing Contests. As in previous competitions of this kind, there is no restriction as to subject, size or treatment. Paintings as well as drawings in pencil or ink are eligible, but the prizes will be awarded solely on drawing merits, so that there will be full opportunity for those who for any reason cannot make use of colour. There are two sections, "A" for readers aged 16 and over, and "B" for readers under 16. In each section products to the value of 21/– and 10/6 respectively will be awarded to the senders of the two best entries. Similar prizes will be awarded in the Overseas section.

Competitors must write their names, addresses and ages on the back of each sheet of their entries, which should be forwarded to *"March Drawing Contest, 'Meccano Magazine,' Binns Road, Liverpool 13."* The closing date for Home entries is 30th March and for those in the Overseas section 29th June.

Unsuccessful entries will be returned if stamped addressed envelopes are forwarded with them. Successful entries become the property of Meccano Limited.

Competition Closing Dates

HOME

March Crossword Puzzle Contest ...	30th March
March Drawing Contest	30th March

OVERSEAS

Advertisement Jig-Saw Puzzle ...	30th March
December Drawing Contest ...	30th March
Christmas Photographic Contest ...	30th March
Cover Voting Contest	29th April
Advertisement Contest	29th April
Missing Words Contest	31st May
February Drawing Contest... ...	31st May
March Crossword Puzzle Contest ...	29th June
March Drawing Contest	29th June

Watch the Closing Dates

Competitors, both Home and Overseas, are particularly requested to make a careful note of the closing dates of the competitions.

In sending entries to competitions that are divided into age groups, competitors should take particular care to mark their ages clearly on the back of the entry. It is not sufficient merely to indicate the age group.

COMPETITION RESULTS

HOME

January Cover Voting Contest.—1. B. G. Wilson, Truro. 2. I. G. Richards, Nantwich. 3. R. King, Chorlton-cum-Hardy. 4. H. B. Juby, Stowmarket. Consolation Prizes: J. Arthur, Barnstaple; K. Sage, Sheffield 8.

January Advertisement Contest.—1. G. Worraker, Halberton. 2. C. E. Wrayford, Bovey Tracey. 3. A. J. Evans, Bicester. Consolation Prize: R. L. Eastleigh, London.

OVERSEAS

October Sports Voting Contest.—1. E. Miller, Johannesburg. 2. J. Johnstone, Melbourne. 3. D. Parker, Bombay. Consolation Prizes: L. Barton, Hong Kong; R. van Berkum, Ontario; A. Pearson, Ottawa.

October Drawing Contest.—First Prizes: Section A, J. Johnstone, Melbourne; Section B, T. J. Parry, Wellington, N.Z. Second Prizes: Section A, N. T. Adams, Vancouver; Section B, A. C. Skinner, Capetown. Consolation Prizes: L. Barton, Hong Kong; R. Stroud, Lucknow, India; T. A. Wade, Johannesburg; F. H. Jordan, Napier.

"Editor's Yarn Contest."—1. J. L. Calverley, Burnley. 2. B. Collin, Leicester. 3. E. Ballantyne, Culduthel. Consolation Prizes: A. B. Aston, London S.E.6; W. Williamson, Liverpool 9; A. Edwards, Cardiff; A. Hutchinson, Aberdeen.

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STAMP COLLECTING

Displaying the Collection

IN our article last month we dealt with the collecting of stamps to build up an interesting and attractive album. This month we turn to the best way of displaying the stamps.

The most important point is that the pages of the album must not be overcrowded. Every stamp must be given all the space it needs to show its points of interest. The number of stamps to be placed on a page depends on the size of the page and of the stamps themselves. The average page measures about 10½ in. by 8½ in., but there are albums with smaller pages. For example, the pages of the popular S.G. Minor are 6¾ in. by 5½ in. We prefer the average size, and our experience is that from 16 to 18 average stamps can be accommodated nicely on such a page. A space equal to the stamp's own length and breadth should be left between each pair. Two pages can be allotted to a set that is too long to be accommodated conveniently on one page.

As a rule stamps of different sets should not be placed on the same page, except where it is desired to show a comparison between stamps of similar design or type. We do not hesitate to save space by placing two short sets on one page, however, where this can be done without breaking the sequence of the sets in the display. We have two pages in our collection of the stamps of Great Britain that break this rule. One, shown in the upper illustration on this page, actually has three sets. These are the Wembley Exhibition sets of 1924 and 1925, and the Postal Union Congress Commemorative set issued in 1929. The other page also has three sets, these being the Silver Jubilee set of 1935, the King Edward VIII issue of 1936 and the King George VI Coronation commemorative of 1937. A page of this kind requires some special treatment to ensure proper display for each set. This has been done by panelling the page, as shown in the illustration.

Every page should have some distinctive patterning, and successive pages should differ so that the eye is not wearied by seeing the same layout time after time as the leaves of the album are turned over. Pages may be arranged symmetrically by placing the stamps on the right side of the page in positions corresponding with those of stamps on the left side; or in rows, those at the bottom corresponding with those at the top. Rows next each other should not contain the same number of stamps. If there are five in the top row, the next should contain four, three or two, and the following row should differ from the second.

Most loose-leaf albums are printed with a faint patterning of squares, known as the quadrille, with the centre point clearly marked. A good rule to follow is that stamps must radiate from the centre point if it is occupied by a stamp, or rotate around it if it is left uncovered. The stamps on our page of Falkland Islands current issues, which is illustrated on this page, are set out on lines radiating from the central point.

Another plan is to arrange what is termed a "balanced" layout of a less formal kind. Such a layout is particularly suitable for pages of pictorial stamps, or for displays of one subject, in which it is desired to incorporate a news cutting explaining the purpose of the stamps.

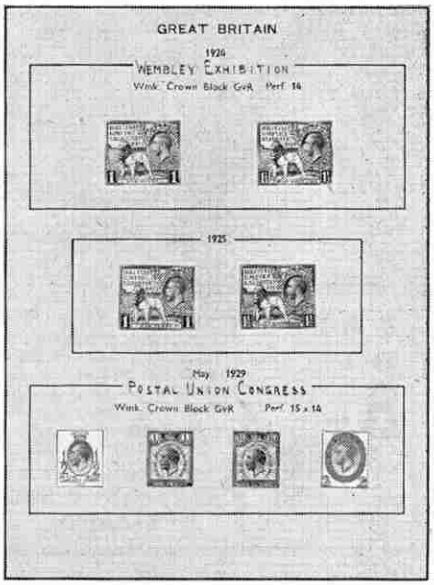
Maps can frequently be used with pictorial sets in which the designs show the beauty spots or industrial centres of a country. We have seen some very attractive pages in which a map has been placed in the centre with pictorial stamps arranged close to the places illustrated by the designs. The idea is most suited to sets containing only six or seven stamps. A longer set such as that of the Falkland Islands stamps would require two pages with the map duplicated, and we think

An effective type of layout for a page of the album.

this is one of the rare instances where similar treatment of two succeeding pages would be allowable.

Photographs can often be employed effectively. For example, they could be used on a page in a collection of bridge designs. Some time ago we were shown a collection of pictorial stamps the designs of which were based on actual photographs. Every stamp was accompanied by a photograph of the scene shown on the stamp, taken from the same viewpoint. There were several pages devoted to views of cathedrals. Others showed ships, and there were many portraits of Kings, Presidents and famous men portrayed on the stamps.

As far as possible, used stamps should not be placed with unused stamps. This rule probably will be a little troublesome to young collectors, but it is worth while making sacrifices to follow it.



A fine page of British commemorative stamps.

In writing up an album the golden rule is to keep the style simple and the wording short. It is then an easy matter to keep the pages uniform throughout the collection. Decorative writing is not necessary and collectors who cannot draw them easily and well should be satisfied with simple block lettering or ordinary handwriting. They may find it even better to use a typewriter or employ ready printed headings.

Printed country titles have long been available, and Stanley Gibbons Ltd. have recently provided even more aid for those unable to do their own lettering, by issuing a special set of gummed labels. These provide almost all the material necessary for the writing up of a British Colonial collection, except the brief descriptions of the stamps themselves. They include headings for countries, districts, groups, dates, watermarks and perforations in all usual gauges, with symbols that will build up any unusual ones.

The labels are available in black lettering on white paper, or in white on black, for use with the increasingly popular black album pages that are so effective in displaying brightly coloured pictorial stamps. The books of country titles are priced 1/3 for black on white and 1/9 for white on black. The miscellaneous labels are 2/6 in either style. All may be obtained from any stamp shop.

The minimum amount of writing up required for a set consists of the date of issue, the watermark and perforation. In the case of commemorative sets the purpose of the issue also should be given. This writing up should be placed at the head of a page bearing (*Continued on page 149*)

Help from the Stamp Editor

The stamp articles included each month in the "*M.M.*" are intended to help beginners to start collecting in the right way and to get more and more pleasure from their hobby as time goes on. The Stamp Editor is always delighted to answer any queries, to give information, and to make suggestions to stamp enthusiasts. This applies whether readers are beginners, or have been engaged in the hobby for a considerable time. By keeping in touch with the Stamp Editor readers will add enormously to the interest of collecting, and the knowledge gained will enable them to study with greater profit the offers made by advertisers in these pages. There is only one restriction in regard to enquiries—the Stamp Editor cannot undertake to value stamps.

The R.A.F. on Photographic Reconnaissance—

(*Continued from page 111*)

and suddenly a gaping hole appears on the dash where the oil pressure gauge should be. Another and another hole appears, and the cockpit seems to be full of flying splinters.

A quick turn takes him out of that terrible hail of bullets, and he blesses the foresight which made him so familiar with the locality that he can now find the aerodrome without having to rise and look for it. And as the thought strikes him the "Hurricanes" rise, like startled pheasants, out of the ground almost ahead.

His adventures are over, but it was a near thing. They count seventy-eight bullet holes in the wings and fuselage of the "Battle." It is a miracle that the precious photographic plates escaped damage.

But as he climbs stiffly to the ground he is greeted with shouts of laughter from the bystanders. In the excitement of the chase he has forgotten to remove his oxygen mask!

Stamp Collecting—(*Continued from page 147*)

only one set. If there is more than one set the information for each must be placed at its head.

Descriptions of the designs of individual stamps must be placed under the stamps or at their sides, unless the same design is used throughout the set. In this case the description should be placed at the head of the page. The alternative is to place the descriptions in a neat panel, surrounded by a plain ruled border, in the middle of the display. This is a good plan in cases where the set has two or three designs shared by several stamps, as the need for repeating the wording is avoided.

The descriptions must be kept short, and the Gibbons and Whitfield King catalogue descriptions are good models to follow. Where some specially interesting point has to be brought out the wording should be written on a separate sheet inserted in the album to face the page of stamps. It must not be written on the back of the preceding page, as this would prevent the insertion of an intervening page at some later date.

It will be clear that it is important to consider the amount of writing up and the placing of the stamps before mounting the stamps in the album. A planned page always looks better than one that has been allowed to shape itself.

Many readers no doubt will be tempted to experiment in the use of different coloured inks in preparing the display, but as a general rule we advise against it. Such experiments must be well carried out if clashes of colour are to be avoided, especially when dealing with pages of gay pictorials.

Obviously it is impossible to deal here with all the problems that may be encountered in dealing with special displays. Every collector will have his own special problems, and in cases where these prove obstinate we shall be very glad to help. Just write to the Editor about them.

N.Z. Centennial Postmarks

Readers who collect covers bearing postmarks should keep watch for the special commemorative postmarks that are being used in New Zealand in connection with the Centennial celebrations this year.

The most important are those from Petone, Russell and Akaroa, the three towns that figure most prominently in the story of the original settlement. The Petone postmark appeared on 22nd January, the anniversary of the landing of the first immigrants on Petone Beach. This incident is depicted on the 3d. stamp of the series illustrated in the October *"M.M."* The Russell postmark was used on 6th February, and that for Akaroa will appear on 10th August. Distinctive postmarks are being used on mail posted at the special office in the Centennial Exhibition grounds.

Stamp Gossip

and Notes on New Issues

Argentine "Phonopost" Stamps

We illustrate this month one of the three stamps issued in Argentina for use in connection with the recently introduced "phonopostal" service, the most up-to-date novelty in postal services.

This service enables the public to record messages on unbreakable gramophone records that can be posted just like ordinary letters. It is proving so popular that microphone recording booths are being installed at all principal post offices. The records now in use can take a message up to 200 words in length, and they can be "played" over on the recipient's gramophone just as an ordinary record.

Each of the three stamps bears a design symbolising the new service. The 1.18p. value, illustrated on this page, shows a dove carrying a phonopostal disc; the other values, 1.32p. and 1.50p. respectively, show a head of Liberty superimposed on a disc, and a winged letter mounted on an arrowhead with a gramophone disc superimposed.

Italian Railway Centenary

The centenary of railway operations in Italy, which commenced in 1839, have been commemorated by the issue of three stamps each bearing the design illustrated here on the 50c. value. The design shows Italy's first locomotive side-by-side with a modern streamlined Diesel-electric locomotive. The first Italian line connected Naples with Portici, 5 miles away, and the inaugural run was made on 3rd October 1839.

* * * *

Readers seeking a side-line collection with a war time interest might turn their attention to covers bearing censor marks. In addition to the British Expeditionary Force and H.M. Ships, almost every one of the British Colonies is now censoring mail before despatch, and a special marking is applied to show that the letter has passed the censor.

Most mail from neutral countries is opened by censors, and the re-sealing label bears words such as "Opened by Censor" and the number of the censor responsible.

Many of the military and colonial marks are most attractively designed, and a complete collection showing one from each source would prove a most interesting War souvenir. We do not recommend an attempt to achieve completeness to the extent of collecting a full range of censor numbers. Life is too short! A few specimens of labelled covers, one from each country, would suffice for this feature.

Jugoslavian Postal Workers' Charity Series

One of the most attractive of recent new issues is a set illustrating different phases of postal service, issued by Jugoslavia with a premium in aid of Postal

Workers' Charities. We illustrate three of the stamps. On the 50p. value a postman is seen delivering mail. The 2 din. shows the loading of a parcel train, and 4 din. depicts a linesman repairing telegraph wires in a snowstorm.

The remaining designs are as follows: 1d., clearing a pillar box; 1.50d., delivering parcel mail. The stamps are being sold at double face value.

Pitcairn Islands Issue

A full series of eight stamps is to be issued shortly by the Pitcairn Islands group in the Pacific Ocean.

Probably this news will recall for most of our readers memories of that great film epic *"Mutiny on the Bounty,"* for it was on Pitcairn Island that the mutineers landed and settled.

The designs of the stamps will help those memories, for most of them depict the central figures of the *"Mutiny's"* story. The series opens in prosaic style by depicting a cluster of oranges in the design of the ½d. value, but the remaining stamps carry the full tang of romance with the following designs: 1d., view of Pitcairn Island, with a representation of Fletcher Christian on the poop of the *"Bounty"*; 1½d., a view of John Adams' house and a portrait of Adams; 2d., H.M.S. *"Bounty"* and a portrait of Lieut. Bligh; 3d., map of the Pacific Ocean showing Pitcairn Islands, the adjacent members of the group; 6d., broadside view of the *"Bounty."* 1/–, portrait of Fletcher Christian and a view of the island from the sea; 2/6, a view on the island and another portrait of Christian.

* * *

The world total of letters posted annually is estimated to exceed 65,000 million.

We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations on this page have been made.

LOUGHTON.—As many members as possible are given official positions in order that they may take part in the regular operations on the Branch layout. They are now becoming expert in their tasks, and operations proceed smoothly. Additional locomotives have been brought into use, and it is suggested that another main line be added. Special work meetings have been arranged by the Chief Engineer, at which he and his staff ensure that points and other components are in good working order. Secretary: P. T. Bridgman, 7, Harwater Drive, Loughton.

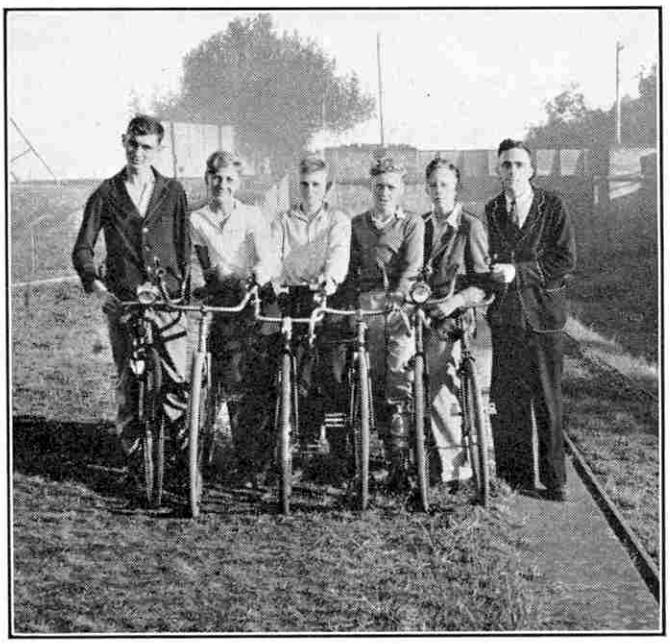
GREENLANDS (BUXTON).—This recently incorporated Branch has held successful meetings, at which arrangements for its programme were made. Meetings are held on Saturdays, and all concerned are looking forward to enjoyable times with the Branch layout. Secretary: J. R. Swain, "Greenwood," College Road, Buxton, Derbyshire.

NORTHAMPTON.—Meetings have now been resumed. The first was a Rally, members visiting a local picture house to see *"The Lion Has Wings"* and a film telling the life story of Graham Bell, the inventor of the telephone. Meetings for track operations have been arranged. A monthly *"Newsletter"* is now being issued. Its purpose is to circulate news of members and items of interest about the Branch. Secretary: D. J. Rushton, 40, The Vale, Northampton.

WATERLOO (DUBLIN).—Part of the Branch track, which represents the Kent and East Sussex Railway, has been relaid with excellent results, and a new speed controller has been installed. An emergency timetable has been in operation since October. Trains are stopped by signal at certain stations to back up or set down passengers, an operation that gives opportunities for interesting working. Secretary: S. B. Carse, 38, Oakley Road, Ranelagh, Dublin.

ACTON.—In the difficult conditions that have prevailed it has been found impossible to carry on with operations on the Branch track. The last work done on this was to provide scenery, after which it was covered up and tidied. Subsequent meetings were devoted to Model-building, as described in the report in this issue of the working of the associated Meccano club. Secretary: S. W. Simmons, 7, Alfred Road, Acton, London W.3.

LOSTOCK GRALAM.—Most of the Senior members have joined the Air Defence Cadet Corps, and this, together with the blackout, has reduced attendance. An effort is being made to form a boys' club from evacuees in the neighbourhood. The activities of this includes woodwork modelwork, football, physical training and amusements, and when it is in full swing the Branch will take part in the work. Secretary: A. P. S. Milligan, Wincham Hall, Northwich, Cheshire.



A party of members of the Melbourne (Australia) Branch, No. 224. Our photograph was taken during a Branch excursion along the track of a disused line. Cycling trips to places of railway interest are often arranged by this Branch. Timetable operations are carried out regularly on an extensive electric layout, and demonstrations are given of train control and other special features of train operation.

MONKSTOWN (CO. DUBLIN).—Timetable work is the general occupation of members. An intensive local and suburban service has been operated. Meetings are now being held in a new hut that serves as Branch room. More games are being introduced. The Branch library has been enlarged. A special effort is being made to raise money for the *"M.M."* Radio Fund for the R.A.F. Secretary: R. D. Pierce, 20, Monkstown Road, Monkstown, Co. Dublin.

ST. PETER'S SCHOOL (SOUTHBOURNE).—At all meetings electric and clockwork trains are run on the Branch layout to give regular and well-planned services. Interesting competitions also are arranged. In one of these a small prize was awarded to the member whose clockwork locomotive ran the greatest distance on a continuous track. Railway questions tests also are held, prizes being awarded to successful competitors in Senior and Junior Sections. The Branch Hornby-Dublo Railway is to be enlarged, and more competitions are promised. Secretary: V. G. Wykes, 307, Belle Vue Road, Southbourne, Bournemouth.

UPPER WHARFEDALE (GRASSINGTON).—Much time has been spent in planning and laying new tracks. The Branch locomotive stud has been increased and good running has been carried out on extensive layouts. A model of the Conway Tubular Bridge has been built by Mr. Scales for use in the layout. Members are already planning for an Exhibition in summer. Secretary: D. H. Scales, 1, The Avenue, Grassington, Yorks.

HOLLAND

MAASTRICHT.—The Branch possess a very fine layout of the non-continuous type, with terminal and wayside stations. It is being progressively electrified, and an excellent service is run according to timetable. A second terminal station is now to be built. All working is made as realistic as possible. Carriages and wagons are carefully classified, and locomotives and rolling stock are overhauled from time to time. Leader: F. L. Bingen, Mathias Wijnandstraat 6, Wijk-Maastricht.

Proposed Branches

The following new Branches of the Hornby Railway Company are at present in process of formation, and any boys who are interested should communicate with the promoters, whose names and addresses are given below.

BRIGHTON—E. R. Campbell and H. Bellchamber, Glen Air, 20, Coldean Lane, Parkside.

LEICESTER—M. Oldham, 3, Gainsborough Road.

LONDON S.E.2—M. Proctor, 380, Wickham Lane, Abbey Wood.

LONDON S.W.18—S. L. Read, 187, Magdalen Road, Earlsfield.

NEW ZEALAND—H. Thompson, 316, Clifford Street, Gisborne.

NOTTINGHAM—Mr. J. E. Dear, 3, Aylestone Drive, Aspley Lane.

WEST HARTLEPOOL—F. Fells, 17, Johnson Street.

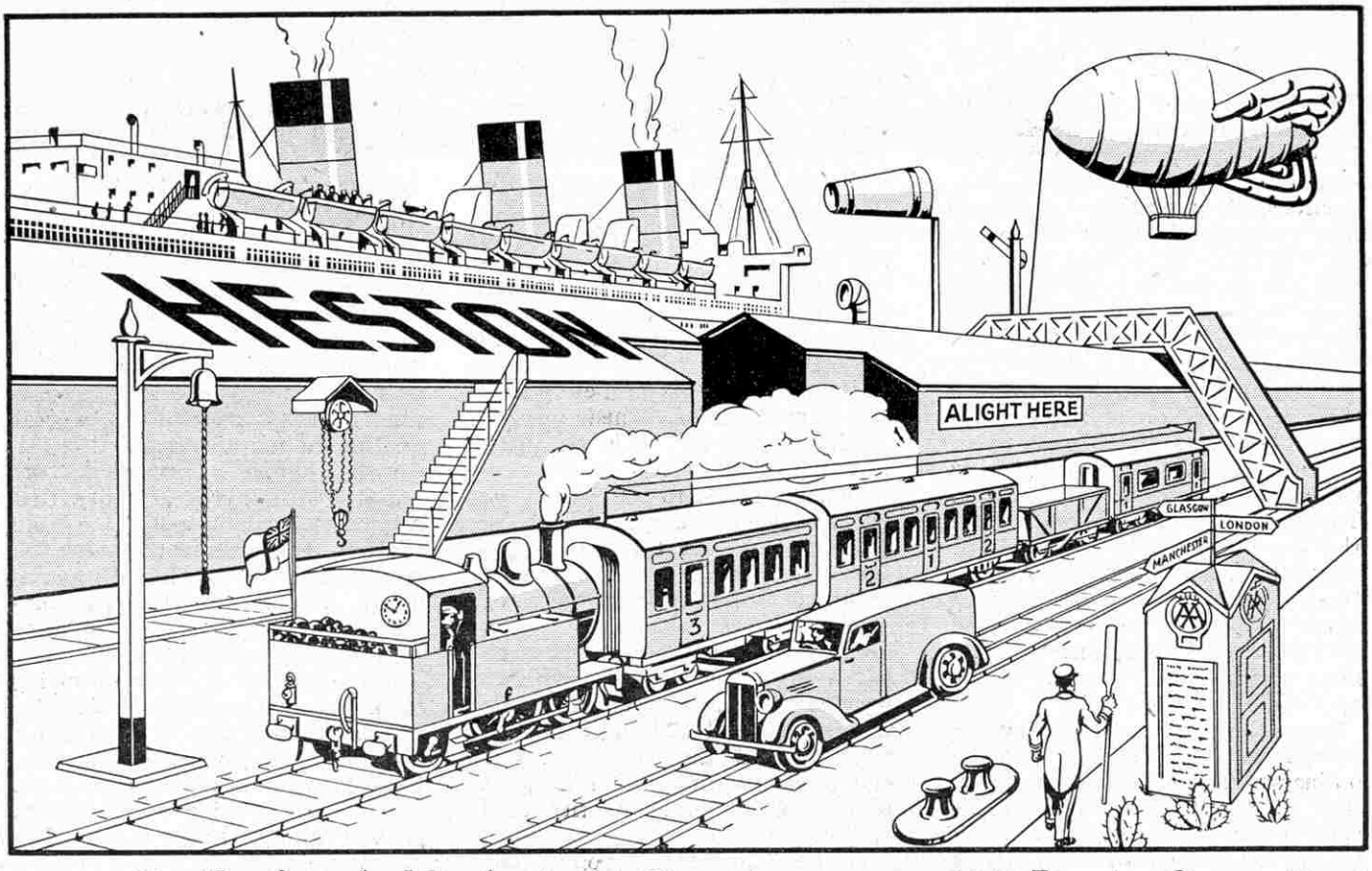
Branch Recently Incorporated

386. KINGLASSIE—Mr. F. Bainbridge, 32, Mina Crescent, Kinglassie, Cardenden, Fife.

HORNBY RAILWAY COMPANY COMPETITION PAGE

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

Join the Hornby Railway Company and become eligible for the competitions announced on this page.



Can You Spot the Mistakes in this Picture?

Here is a fine competition for all H.R.C. members. It is one that will give them real fun as well as an opportunity for using their powers of detection. We asked our artist to produce a really striking railway drawing for us, and his effort is reproduced on this page. He has chosen to show a railway scene at a great port, but somehow he has mixed up seaports and airports, and then has added wonderfully to the confusion in a multitude of ways. It would be difficult to find a picture in which there are so many things wrong, and indeed it seems to us that the artist has gone to the greatest trouble to make sure that nothing is right!

How many mistakes can you find? Make out a list of them, and remember when preparing your final entry that if there is a tie for any prize the neatest or most novel effort will be given preference. Write your name, full postal address, age and H.R.C. number on the back of each sheet of your entry, and forward it in an envelope marked *"H.R.C. Errors Contest"* in the left-hand corner to Headquarters at Meccano Ltd., Binns Road, Liverpool 13.

There will be the usual two sections for Home and Overseas members respectively, with two sets of prizes in each for Senior and Junior members respectively. In each case the prizes will consist of any products manufactured by Meccano Ltd. to the values of 15/–, 10/6 and 5/– respectively. In addition there will be consolation awards in both sections of the competition.

Entries in the Home section must be posted to reach Headquarters on or before 30th March, and the closing date for Overseas entries is 29th June.

COMPETITION RESULTS

HOME

December "Christmas Card Contest" (Junior Section).—First: R. Beniston (66736), Coalville, Leicester. Second: J. McCabe (51514), Ballysillan, Belfast. Third: E. Sinton (62448), Aberdeen. Consolation Prizes: R. H. D. Hoyle (63668), Oakwood, Leeds; J. Wilkins (60222), Grange Park, London N.21; M. Phillips (30222), West Bridgford, Nottingham.

December "Name Building Contest" (Senior Section).—First: D. B. Blackburn (49069), Kingsbury, London N.W.9. Second: M. J. Warde (60931), Oxhey, Herts. Third: A. Elvey (59159), New Eltham, London S.E.9. Consolation Prizes: W. K. Cocking (60908), Redruth, Cornwall; J. Simmons (65995), Headley, Oxford; J. H. Waters (62750), Kingston-on-Thames, Surrey; D. H. Earle (41617), Wembley Park, Middlesex; E. F. Jones (61494), Nantwich, Cheshire; E. Barratt (66662), Dewsbury, Yorks.

December "Railway Jokes Contest."—First: A. McIntyre (30925), Paisley. Second: A. Elvey (59159), New Eltham, London S.E.9. Third: E. F. Jones (61494), Nantwich, Cheshire. Consolation Prizes: G. Jack (61812), Townhill, Dunfermline; J. H. Waters (62750), Kingston-on-Thames, Surrey; H. E. Symons (65280), Camborne, Cornwall; A. F. Truscott (66012), South Croydon, Surrey.

1940 Drawing Contest No. 2

This month we have pleasure in announcing the second Drawing Contest in the 1940 series, the first of which was announced in last month's *"M.M."* In the present contest competitors are asked to draw a present-day locomotive. Making a good drawing of a favourite engine provides an enjoyable way of spending the blackout evenings. Drawings may be in colour, pencil or pen and ink, and entries will be judged solely on drawing merits, so that every member will have a fair chance.

Each competitor must write his name, full postal address and H.R.C. membership number on the back of his drawing. His age also must be given, as this will be taken into consideration by the judges in their task of finding the winner.

The contest will be divided into two sections, Home and Overseas, in each of which there will be three prizes of Hornby Trains, or Meccano goods if preferred, to the value of 21/–, 15/– and 10/6 respectively. Consolation prizes also will be awarded in each section.

Envelopes containing entries must be marked *"H.R.C. Drawing Contest No. 2"* in the top left-hand corner. Entries in the Home section must be sent to reach Headquarters at Binns Road, Liverpool 13, on or before 30th March. The Overseas closing date is 29th June.

Fun with Your Hornby-Dublo Railway

Electrically-Operated Points and Signals

PERFECT remote control of trains has been a feature of the Hornby-Dublo railway system from the first. Now, as a result of recent introductions, it is possible to operate points and signals electrically with a great advance in realism and convenience in working. This article deals with the new Electrically-Operated Points and Signals and their uses.

A feature of special importance about the addition of Electrically-Operated Points and Signals to an existing railway is that no new electrical apparatus is necessary. The Points and Signals work from the same Dublo Transformer that supplies current to the track for train operation. Any number of Points or Signals can be connected to the same Transformer, but no more than four items should be operated at the same time.

From the layout point of view the new Points are similar to the ordinary hand-operated ones, so that they can be substituted for existing hand-worked Points in any layout. When a substitution of this kind is being carried out there is no need to discard entirely the hand worked Points. They can usually be used in sidings, and even on the main line where they are within easy reach of the operator.

In place of the familiar lever of the hand Points, the Electrically-Operated Points have a neat casing in which the operating mechanism is accommodated, and thus completely protected.

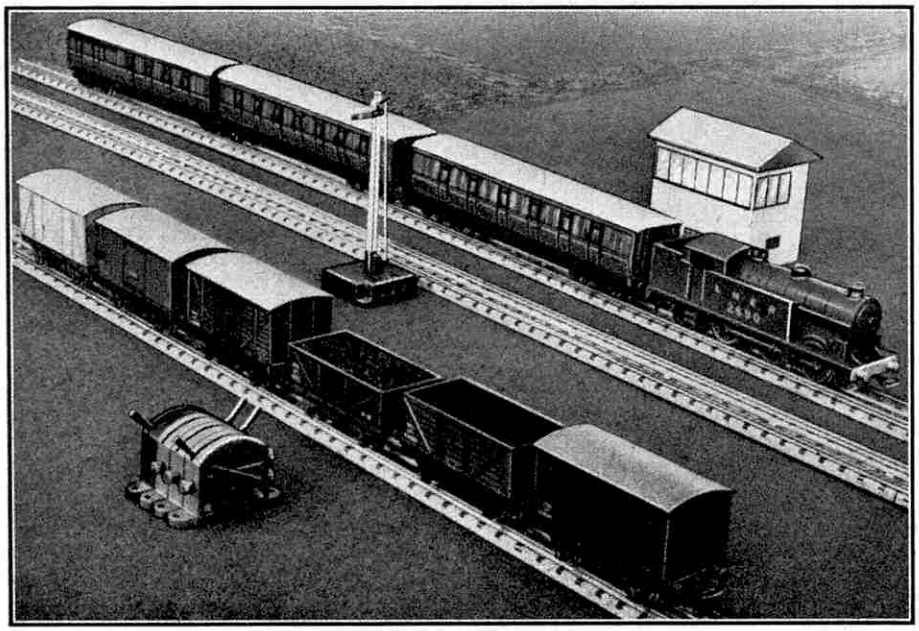
The operation of the new Points and Signals is governed by the special Switch D1. This is a particularly neat unit, similar externally in shape to the Switch D2 referred to last month. It can be distinguished from the latter, however, by the fact that there are three terminals projecting from the casing of the D1 Switch, and the casing itself is coloured red. The D2 Switch has a black casing and only two terminals. The method of connecting the Signals and Points with their Switches and the Transformer is given in the Instruction Leaflets packed with the accessories concerned.

A very important point that should be noted in connection with the use of the Switches is that the operating levers should never be "flicked" over from one position to another; they must be pulled or pushed steadily over.

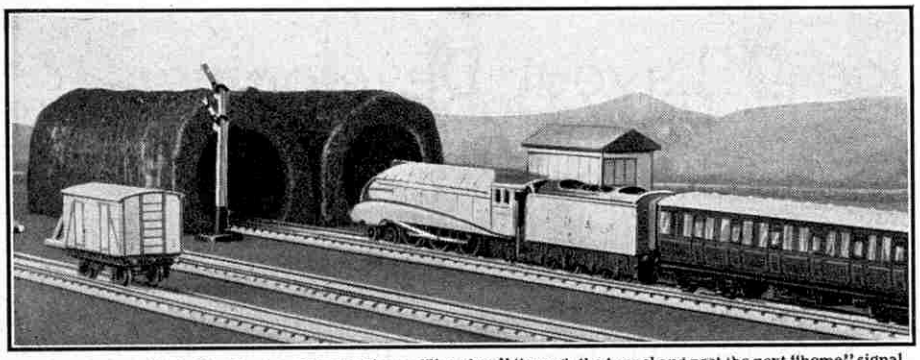
The simplest application of Electrically-Operated Points and the corresponding Switch would be in connection with a plain dead-end siding leading off the main line. On the smallest layout, with possibly only one siding, the electrical operation of the points would add a great deal to the fun of operation. It frequently happens that Points are required on a layout in a spot that cannot easily be reached by hand without the operator having to stretch right across the railway. In such circumstances Electrically-Operated Points make for convenience in working.

There is a real thrill in operating the new Points and Signals. Take for instance the working of a train into a branch or loop line as shown in the lower illustration on the next page. The normal position of the switch gives a straight run through down the main line. When a train is to be run into the siding the "road is made," as railwaymen say, by pulling over the Switch lever controlling the Points; then the appropriate semaphore of the Junction Signal giving access to the siding is worked by its Switch lever, and all is ready for the train to come along.

A special advantage of the Switches is that they can be grouped together to form a lever frame. Special parts known as Switch Grouping Rods are available for this purpose; the Rods are passed through holes in the Switch casings, and have nuts run on to each of their threaded ends. In order to identify each particular lever in a group arranged in this way, white labels packed with each Switch are slipped over the lever handles. On these labels can be marked identification letters or numbers so that the "signalman" can see at a glance to which Signals or Points the respective levers belong. As an example, the three levers necessary for the Points and



An interesting view showing how the switches can be arranged in group by means of the Switch Grouping Rods.



Entering the tunnel! The Double-Arm Signal indicates "line clear" through the tunnel and past the next "home" signal.

the Junction Signal shown in the siding illustration might be marked "SP" for "Siding Points," "S" for the semaphore controlling entrance to the siding, and "M" for the corresponding main line semaphore.

It is often convenient to arrange two or more Points or Signals to be operated from one lever. The most familiar example that occurs to mind is the use of two sets of Points together to form a crossover between two tracks; actually the two sets of switch rails should move together and it is very convenient, where the space available for a control frame or group of Switches is restricted, to be able to use one lever to operate more than one Signal or one set of Points.

An interesting instance of the maximum number of items that may be wired together to the one Switch was shown in the lower illustration on page 100 of the "*M.M.*" last month. Here three Points and a Signal were used to give a definite route through from a branch or return loop line, over the "down" to the "up" track of a double track main line.

The Electrically-operated Signals are perfectly efficient in operation, and retain all the features characteristic of the hand-operated Signals. They are of course of the modern upper-quadrant type. The movement is connected to the balance weights at the foot of the Signal post so that their working is most realistic. Signals of the single-arm, double-arm and junction types are available, and when used in conjunction they can be made to signal satisfactorily practically any Hornby-Dublo layout.

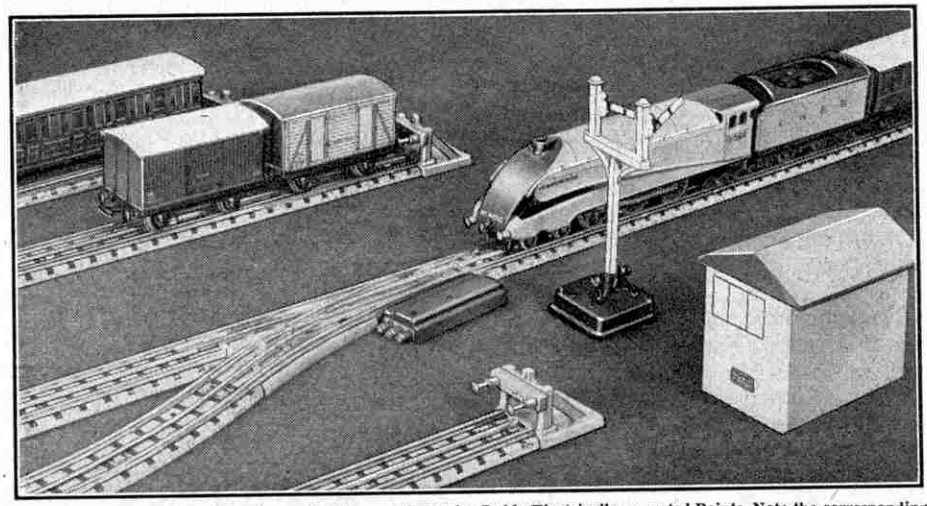
The Single-Arm Signal is made in two types, either with a "home" or a "distant" semaphore. The "home" semaphore has a square end, and when in the "danger" position it forms a definite "stop" indication. The "home" type of signal therefore should be used at the platform ends of a station to control the admission and exit of the trains; in sidings to govern the starting of trains held in them, and at points to prevent trains from running over the points should the road not be clear.

The "distant" signal has a semaphore with a fishtail end, and forms a warning signal when the semaphore is in the horizontal position. The "distant" signal is placed at some distance away from the "home" signal and shows the driver what indication he may expect when he comes to the "home" signal. The "distant" therefore can be passed when in the horizontal or "caution" position, but the driver must be prepared to stop at the "home" signal if this should be still in the danger position when the train reaches there.

A particularly interesting signal is the Double-Arm Signal with a "home" and a "distant" semaphore on the same post. This is applied when there is not sufficient distance between two successive "home" signals to use an ordinary distant signal. The "distant" semaphore is therefore placed below the "home" arm of the first signal. The "distant" semaphore is never pulled off to show "line clear" unless the next "home" signal is showing "line clear" also; and it can only be pulled off when the "home" semaphore on the same post is showing "line clear." When both arms on the same post are showing "line clear," the driver knows that the next "home" signal shows "line clear" also, and that he can proceed at normal speed. In one of the accompanying illustrations a signal of the Double-Arm type is shown at the entrance to a tunnel. Such a signal is very useful in this position, for the driver knows by its indication what the aspect of the next "home" signal will be, even though he may not be able to see it until close to it on emerging from the other end of the tunnel.

The Junction Signals are attractive, and a "home" type Signal of this kind should control all points that are approached in the facing direction. On high speed routes the corresponding "distant" signal should be of the junction type, but where any reduction of speed may be necessary, as when approaching a station, then a single-arm distant signal will be sufficient.

In the ordinary way the signalling of a Hornby-Dublo layout is quite straightforward when the purposes of the Signals are understood. Readers who need advice on any problems encountered in signalling their layouts should get in touch with Headquarters. We shall be glad to give assistance in the solution of difficulties, and to hear how the individual Hornby-Dublo owners have dealt with the situations arising on their own systems.

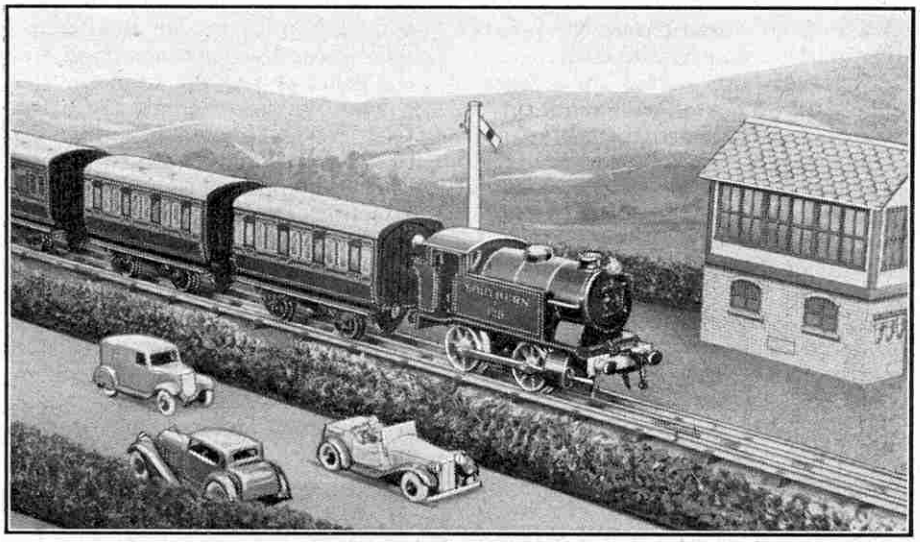


A train about to enter a siding formed by the use of Hornby-Dublo Electrically-operated Points. Note the corresponding Junction Signal controlling the Points.

Hornby Gauge 0 Layout Development

Some Practical Suggestions

THE keen Hornby railway owner is not long content to restrict his layout to a simple single-line track. Even though the main part of the layout may have to remain single line, sidings, loop lines and other track features are necessary if traffic working is to be developed in a realistic manner.



A local train on a single line railway. Fascinating train operations can be carried out on such a line if a passing loop is incorporated as suggested in this article.

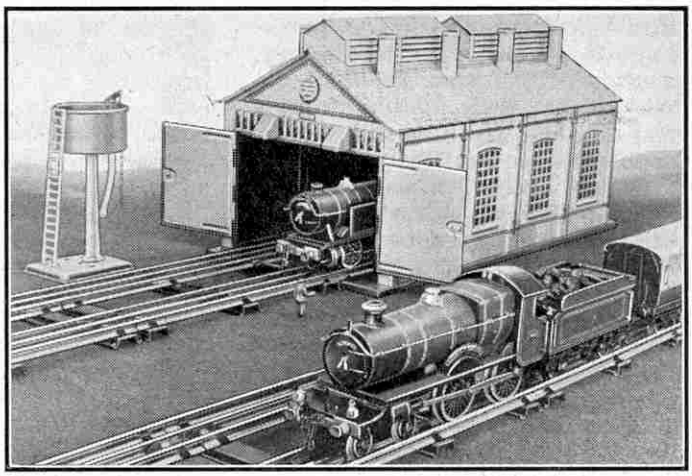
As a rule the first step in the development of a system, apart from the expansion of the main track by the addition of extra rails, is to lay in a siding. This is usually placed by the station, and can be used for goods loading purposes or for the storage of rolling stock. Points are of course necessary when a siding is to be put in, and the uses of the various types of Hornby Tinplate Points are given in the booklet *"Hornby Gauge 0 Layouts, 60 Suggestions,"* with which most readers will be familiar.

The same principles apply to the Points made for the Hornby Steel Track, for both these and the corresponding Tinplate Points bear a definite relation to the straight and the curved rails of their respective types. It is therefore not difficult to find out what the effect of the addition of Points at any given spot will be. The straight and the curved portions of Hornby Tinplate Points of the ordinary turnout kind correspond exactly with the standard straight and curved rails; with the Solid Steel Points the straight and curved half rails of the same type form the unit. Thus a "trial assembly" can be made on the spot where a siding is to be, before actually obtaining the Points themselves. This trial may suggest some improvement or alternative scheme, and it may save the model railway owner disappointment by showing him whether the plan he has in mind can be carried out or not.

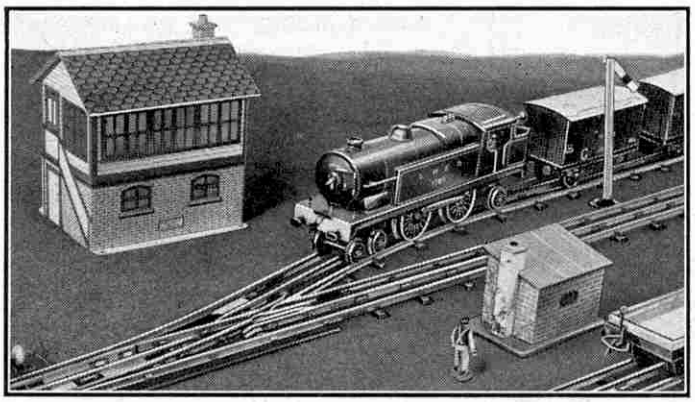
When a dead-end siding is to be installed, the Hornby railway engineer has to decide whether it is to be connected to the main line by facing or trailing points. Points are described as facing or trailing according to whether the train approaching them in its normal direction of track can have its route changed by the points or not. In actual practice trailing points are favoured wherever possible; but facing points are of course necessary at junctions and similar places.

With a dead-end siding, whether it is approached in a facing or a trailing direction, one of the movements of a train using the siding has to be performed by backing the train. If the train can run straight into the siding engine first, then to get out of the siding the engine must be reversed and shunt its train out on to the main line backward, and vice-versa. This method of operating is satisfactory up to a point, but it is naturally much more convenient to be able to run a train straight into and out of a side track. This can be done by converting the dead-end siding into a loop line, with points at each end connecting it to the main line.

A loop line is easily formed with either Tinplate or Steel Track and it is a most useful feature to include in a layout. On a single-track railway the addition of a loop line makes it possible to operate two trains, one in each direction, alternately. The loop then forms a passing or crossing place, one train being held in the loop while the other is making a journey round the track. If such a loop is laid down at a station, the waiting train can perform its station duties while standing on the loop.



A typical engine shed scene on a Hornby layout. Hornby Engine Sheds have rails inside them which are the same width apart as the roads of Hornby Double Track.



A freight train leaving a siding. This illustration shows very well the general design and construction of the Hornby Steel Track Points.

A loop line can be used also for "refuge" purposes, a slow or freight train being held there while it is passed by a fast express travelling in the same direction.

Ordinary points are quite satisfactory for the formation of running loops, but a very railwaylike arrangement is the result if Crossover Points are used instead, one left-hand set being placed at one end of the loop and a right-hand set at the other. The use of such points makes it possible to extend the loop by adding rails to the projecting "tail" lengths of the Points that are not normally used. Ordinarily these "tail ends" can be provided with buffer stops, thus guarding against the possibility of any over-running, as is done on real railways.

A loop line at a station can fulfil another useful purpose in addition to acting as a passing loop for trains travelling in opposite directions. Where trains terminate their journeys at the station, and are made ready to return, the loop can be used for running the engine round its train. This is particularly necessary when a busy suburban service is being run.

Unless an engine, having rounded its train, is to make its return journey either tender or bunker first, a visit to the turntable will be necessary in order to turn round. This is more necessary with tender engines than with tanks, although sometimes the latter are turned as a matter of preference, especially if fast running on the return journey is required. There are two sizes of turntable in the Hornby Series, the No. 1, which is suitable for 1 ft. radius layouts, and the No. 2, for use with 2 ft. radius rails. The E2 Turntable is similar in size to the No. 2, but is fitted with a centre rail for use on electric railways.

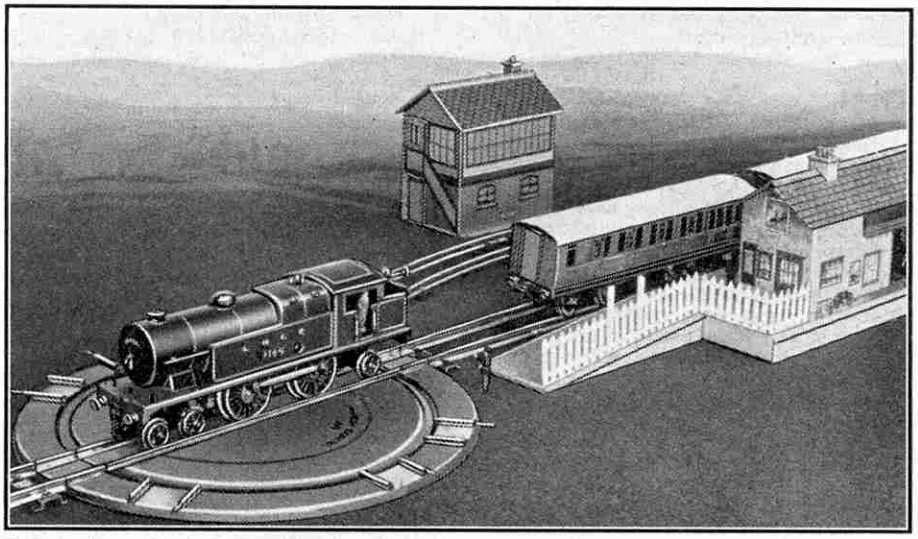
An interesting use of the No. 2 Turntable is shown in the lower illustration on this page. Here the Turntable is fitted in at one end of a loop line at a country branch terminus. It thus acts as a traverser for transferring "running round" engines from the main to the loop line or vice-versa as required. At the same time it can be used for turning them round if this is required.

It is possible that a Turntable used in such a position as that shown in the illustration referred to might lead also to the engine shed.

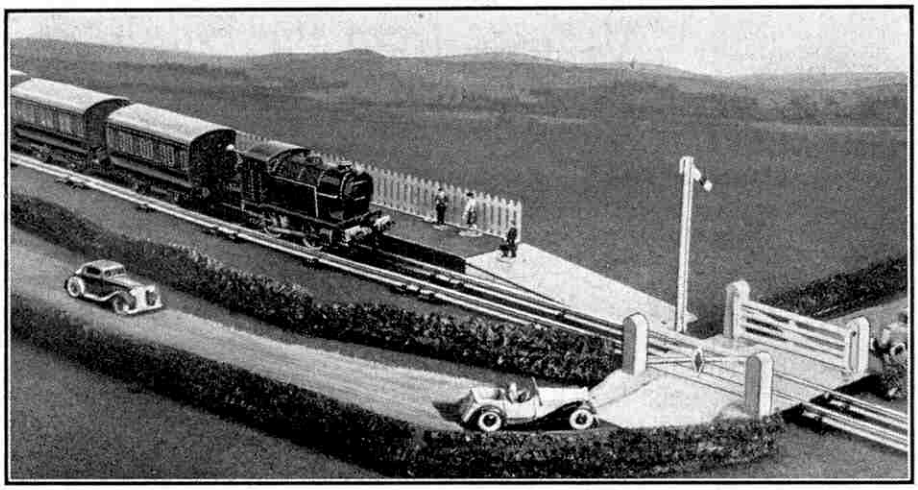
The Hornby Engine Sheds are useful accessories that look well on any layout. Various types are available, but all are double-road sheds and the width apart of their tracks corresponds to the standard adopted for Hornby Double Track. In order to lead to the double roads of an Engine Shed from the single track radiating from a Turntable, Parallel Points would be required. These are specially designed for leading a single track into two parallel roads the same width apart as those of Hornby Double Track. When using them in conjunction with a Turntable it is best to have a short length of straight rail—a Straight Half Rail will do—in between the Turntable and the Parallel Points. This will give a less sudden turn to an engine crossing off the Turntable and proceeding to the Shed.

Sometimes it happens that a well developed Tinplate railway is to be extended by means of Hornby Steel Track, and some means of joining the two types of rail then becomes necessary. For this purpose there are available special accessories known as Adapting Pieces. One end of each of these is made the same section as the rail of Hornby Steel Track, and is fitted with a fishplate for joining up to this type of Track; the other end is formed like the rail connecting pin of Hornby Tinplate Rails, and fits into the hollow rail head of this type of track. There is some difference in the total height of the two types of track, the Tinplate type being the higher, so that it is necessary to pack up the Steel Track slightly where it joins up to Tinplate Track. To secure the best results, and to ensure smooth running from one type of track to the other, it is best to allow the Steel Rail to lead up to the Tinplate gradually, packing commencing perhaps a rail length away from the joint, and increasing in height until the required amount is attained.

The AP Adapting Pieces are necessary also where accessories incorporating the tinplate type of rail, such as Engine Sheds and Level Crossings, are used on a Steel Track layout. Here again the Steel Track should be packed up in order to obtain the best results. On layouts of the permanent kind the packing and the track should be secured to the baseboard by screws. These prevent the track from becoming out of alignment, and allow good running to be obtained as a matter of course.



An interesting use for the No. 2 Turntable is shown in this illustration. The Turntable forms part of a loop for "running round" purposes at a country terminus.



An attractive "halt" or wayside station made up with the Hornby Passenger Platform. The Level Crossing provides a particularly realistic touch.

Stations on Hornby Layouts

STATION arrangements have a great influence on the realistic effect of a railway, and this month we consider various schemes that can be employed by the Hornby railway owner.

On the simplest layouts, the M type Station and Wayside Station are very suitable. These do not take up much space, and in appearance they are typical of the stations and halts found in country districts in actual practice. For bigger systems there are the Hornby No. 3 and No. 4 Stations, both consisting of a building mounted on a platform, the No. 4 type being rather more elaborate and including the slipping ramps required at the platform ends. Then there is the Island Platform which, as its name implies, is used between two tracks. It consists of a length of platform, with ramps provided for each end, the centre part of the main platform being protected by an awning. The Passenger Platform is a particularly useful component. It has a length of standard Fencing along one side; this is detachable so that the Passenger Platform can be used to extend in length either the No. 4 Station or the Island Platform.

With the standard Hornby Stations a straight length of track is necessary; stations on curves are not a success in miniature. On a railway of the simple oval formation, where perhaps only one station is to be provided, a site should be chosen that is near the usual position of the operator. He can thus work the trains in and out of the platform, and deal generally with such station business as the handling of luggage and the movement of Dinky Toys road vehicles on the station approach.

The arrangement of the road approach has an important bearing on the realistic effect of the station. Where space permits, miniature pavements should be laid down, using the components of the Pavement Set, Meccano Dinky Toys No. 46 and, where suitable, the Hornby Hedging. Whether this is done or not, however, one or two Dinky Toys road vehicles such as Taxis, Dinky Toys No. 36g and the Mechanical Horse and Trailer Van, Dinky Toys No. 33R, should certainly be used.

It should be remembered that the station should serve the "road" side equally as much as the railway. Good use can be made also of the Station Hoardings on or about the station approach.

On a system where there are several stations, and possibly a terminus, it is sometimes difficult to secure a really good position for all of them. As a general rule each station should have its own sidings and yard, and if at all possible a Goods Platform. Space however may require the terminus to have only just sufficient sidings for accommodating its empty trains; and for the same reason a passing station may have to do without any sidings or goods accommodation at all. It can then be arranged as a purely passenger station in an area where the goods work is covered from a larger station in the neighbourhood. This is quite a common situation in actual practice.

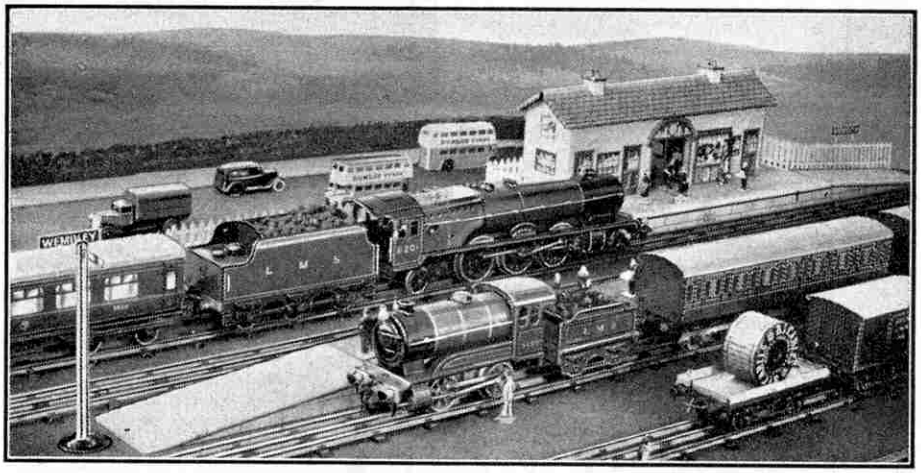
On a layout with several stations it is desirable to have some variation in the station arrangements. For instance, for a simple "halt," where "something different" is required, it is possible to use the standard Passenger Platform in quite an interesting manner. A single length of Passenger Platform will probably be sufficient to deal with the class of train stopping there, and it can be finished off at each end with a sloping ramp as supplied with the Island Platform. The fitting together of the ramps and the Passenger Platform is quite an easy matter for all Hornby Station components, with the exception of the No. 3 Station, and the M Series items are provided with efficient locking devices at the ends.

The upper illustration on this page shows a typical "halt" scene. The railway crosses the road by means of a Level Crossing, and access to the Passenger Platform that forms the halt is provided for by means of one of the ramps.

For a more important station on a double-track layout two Hornby No. 4 Stations can be used, one to each track. This provides a symmetrical arrangement that looks most realistic. To extend the length of the platforms to accommodate any long train that may arrive, Passenger Platforms can be placed between the centre unit of the Station on which the building is erected, and the end ramps. The locking devices fitted on these components make this easily possible. If desired the extension of the platform can be carried out in one direction only, so that the buildings are at one end of the completed Station. This plan is often followed in real practice.

The plan just described can be varied by forming one side of the station with lengths of Passenger Platform laid end to end and completed by ramps. The opposite track can be served by a standard No. 4 Station with Passenger Platform extension in the usual manner. This scheme is effective when the No. 4 Station and its building are arranged on the side of the railway away from the operator, against a suitable background. The absence of any structure on the near side platform higher than the Paled Fencing shows up the station to advantage, and allows such work as may be required on the platforms to be performed easily. On a railway carried on a baseboard, where there is not much room on the inner side of the track, this plan is particularly useful.

The Island Platform, used alone, or extended by means of Passenger Platform lengths, forms a station specially intended for placing between two tracks. It can be employed also in conjunction with the No. 4 Station to form part of a large passing or junction station. The lower illustration on this page shows it placed between one of the main lines at a junction station and a bay line used by branch trains.



The No. 4 Station and the Island Platform are used together to make an effective junction station. Note the branch line train in the bay reserved for its use.

THE MECCANO MAGAZINE

R·A·F RADIO FUND

Have you sent your donation ?

A Message from the Editor

RADIO SETS FOR THE R.A.F.

The object of this Fund is to provide portable radio sets for the isolated units of the R.A.F., who are in urgent need of this means of keeping in touch with current events and hearing the programmes of the B.B.C. These units, which include the Observer Corps and outlying detachments of all kinds, are on watch unceasingly, day and night, for enemy activities. The conditions in which they work cut them off almost entirely from any form of amusement, and their off-duty hours are apt to become very monotonous. For these units a radio set will come as the most welcome of all gifts.

The Fund is in direct association with the R.A.F. Comforts Committee, and all money received will be forwarded to this Committee *without any deduction whatever for working expenses.* The Committee will buy suitable radio sets, and distribute them where they are most needed.

I appeal to every one of you to look on this Fund as your own special way of making things more cheerful for the men of the R.A.F. Tell your parents, uncles and all other relations about the Fund, and gather in their subscriptions.

Readers, this is our very own Fund. Help me to make it a resounding success!

THE EDITOR.

A first cheque for £50 has already been sent to the R.A.F. Comforts Committee.

FIRST LIST OF DONATIONS

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Special contribution from the Directors of Meccano Ltd.	25	0	0
	£60	5	0

All envelopes containing contributions should be addressed as follows: The Editor, R.A.F. Fund, "Meccano Magazine," Binns Road, Liverpool 13.

NO SEATS LEFT

Valet: "There is a man to see you, sir."
Lord Hard-up: "Tell him to take a seat."
Valet: "He has taken four already, and he says if you don't pay last year's instalments he will take the piano and the piano stool as well."

* * * *

Drill Sergeant: "Hey, you there. Didn't you hear 'About Turn'?"
Private: "No. What about Ern?"

* * * *

"Ever bothered with tramps out your way?"
"No. I have a sign on the gate reading: 'We are vegetarians but our dog isn't'."

* * * *

"Ladies and gentlemen," said the vicar, "I have thanked, personally, all those who have given articles for our sale of work. Two towels have been presented by anonymous donors who prefer to be known by their initials only. They are L.M.S. and L.N.E. respectively."

* * * *

Father (looking at son's report): "Do you know that George Washington was at the head of his class when he was your age?"
Son: "Yes, but he was President of the United States when he was your age, Pop."

* * * *

Telephoner: "Long Distance? I want to send a call to Damariscotta, Maine."
Operator: "How do you spell that name, please?"
Telephoner: "Shucks, lady, if I could spell it, I'd write!"

* * * *

"Does your wife ever pay you any compliments?"
"Only in the winter."
"In the winter? How do you mean?"
"When the fire gets low, she says, 'Alexander, the grate'!"

* * * *

Truck Driver: "Use your noddle, lady, use your noddle."
Lady Motorist: "My goodness, where is it? I've pulled and pushed everything in the car!"

* * * *

Shopkeeper (to explorer): "I think you will find these boots will do, sir."
Explorer: "Yes, I took this kind last time, and they were the best boots I ever tasted."

* * * *

Two ex-Army men were discussing their respective occupations since their retirement from the forces.
"I've done fairly well," said one. "I've started a pig-farm."
"Ah," said the other, "then I can suggest a good motto for your business."
"And what might it be?" was the query.
"Well," went on the other, "as an ex-Army man keeping pigs, why not have 'The pen is mightier than the sword'!"

* * * *

Jim: "I can tell you how much water to the quart goes over Niagara Falls."
Joe: "Well, how much?"
Jim: "Two pints."

* * * *

ORDERS ARE ORDERS

Fireman: "You'll have to argue it out with the chief . . . . . this is the address he gave us!"

DOING HIS PART

Three explorers in the bush had no food and only one cartridge. They drew lots for the use of it.
The winner set off, but had not gone far before he was faced by two lions. He immediately fled back to the tent, hotly pursued by the lions.
Just as they made their final spring, he stepped smartly to one side, allowing the lions to burst through the tent opening.
Quickly he closed the flaps and shouted to his companions: "Start skinning those two while I look around for a few more."

* * * *

Tom: "I've been sleeping like a log."
Dick: "You wood!"

* * * *

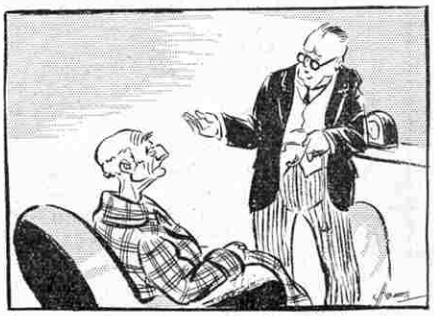
The master to impress on his pupils the need of thinking before speaking, told them to count 50 before saying anything important and 100 if it was very important. Next day he was speaking, standing with his back to the fire, when he noticed several lips moving rapidly. Suddenly the whole class shouted: "98, 99, 100. Your coat's on fire, sir."

* * * *

Mrs. Flanagan: "I hear your husband's in gaol."
Mrs. O'Reilly: "Yes; an' it's about time. Here we been pinchin' ourselves for years to pay taxes to keep it goin' an' this is the first chance we've ever had to use it."

* * * *

PROVED



"A very strong heart, indeed," said the doctor. "You should live to be eighty at least."
"But, doctor, I am eighty."
"There you are! What did I tell you?"

* * * *

The patient was recovering from pneumonia. He had asked repeatedly for food, and, finally the nurse served him a spoonful of rice.
A few moments later the patient called her and said: "Now I want to read a little. Please bring me a postage stamp."

* * * *

Lady of the House (interviewing a new maid): "And now, Nora, are you efficient?"
Nora: "Indade I am that, mum. In me last place ivery mornin' I got up at four, made me fires, put me kettle on to bile, prepared the breakfast, an' made up all the beds before inyone was up in the house."

* * * *

An Irish farmer was explaining how to tell the weight of a pig. "It's easy," he said. "All you do is to lay a plank across a gate and put the pig on one end of the plank. Then you put a big stone on the other end and shift the plank about until they balance. Then guess the weight of the stone—and that's how much the pig weighs."

* * * *

Mistress was having an unpleasant interview with her large cook, whom she was reprimanding on account of her numerous breakages.
"Look 'ere," said the cook, "you can't frighten me—I'm a 'dreadnought,' that's what I am!"
"Well," replied the other looking at the heap of broken china, "I think you would be more correctly described as a destroyer."

* * * *

THIS MONTH'S HOWLER

"Nota bene" means "Stony-broke."

TIT FOR TAT

Colonel Blank was very proud of his magnificent flowing moustache. One day a friend came up to him and enquired sarcastically: "When are you going to put your moustache on the retired list, Colonel?"
"The day you put your tongue on the civil list," retorted the soldier.

* * * *

Mother: "Why did you give Tommy Smith your nice new ball, Bobby?"
Bobby: "He promised to let me be Chancellor of the Exchequer when he becomes Prime Minister, that's why!"

* * * *

Teacher: "Give me the names of two fishes beginning with 'E,' Tommy."
Tommy: "Eel and Eastbourne, sir."
Teacher: "Eastbourne is not a fish."
Tommy: "Yes, it is sir. It's a place (Plaice)!"

* * * *

A machine had gone wrong in a large factory. The mechanics tried to start it again, but all their efforts were of no avail, and finally an expert was called in.
He went over the machine carefully, and eventually asked for a hammer. When the tool was brought to him he gave a smart tap, and the machine started.
Shortly after he sent in his bill—£20 5s. The factory manager thought this amount rather heavy and asked for a detailed statement. When this came it read:

	£	s.	d.
To tapping machine with hammer	0	5	0
To knowing where to tap ...	20	0	0

* * * *

In the middle of the night the absent-minded professor jumped out of bed, ran to the stairs, and shouted: "Who's down there in the kitchen?"
"Nobody," said the burglar.
"Well, that's funny," said the professor; "I could have sworn I heard a noise."

* * * *

At the christening the boy was given the name of Homer. In the vestry, afterwards, the clergyman turned to the father and said: "I suppose you are a great Greek scholar."
The father was embarrassed, but managed to reply: "Nay, ahm no Greek scholar, but ah do keep a few racing pigeons."

* * * *

Note from Teacher: "Johnny has been very mischievous in school. I think I will drop in and see his father."
Mother promptly sent a reply: "Dear Teacher—If you cannot handle Johnny, you'd better not tackle his father."

* * * *

Jack: "I started out on the theory that the world had an opening for me."
John: "And you found it?"
Jack: "Well, I'm in an awful hole at present."

* * * *

"If there were four flies on the desk, Mary, and I killed one, how many would be left?"
"One," replied Mary, "the dead one."

* * * *

The midday whistle had blown when Murphy shouted: "Has anyone seen me vest?"
"Sure, Murphy," said Pat, "and ye've got it on."
"Right and I have," replied Murphy, gazing down solemnly at his bosom, "and it's a good thing ye seen it or I'd have gone home without it."

THIS OFFER APPLIES ONLY TO HORNBY & HORNBY-DUBLO LOCOS

HORNBY PART-EXCHANGE SCHEME

Important Notice

All locomotives returned under this scheme must be accompanied by a Coupon cut from the "M.M."

Under this scheme every owner of a Hornby Gauge 0 or Hornby-Dublo Locomotive is entitled to an allowance on his old Locomotive against the purchase of a new one.

The age or condition of the old Locomotive does not matter, but the following should be noted:

(1) Only one old Locomotive can be accepted in part-exchange for each new Hornby Locomotive, or Hornby-Dublo Locomotive and Controller.

(2) The price of the new Locomotive chosen must be at least equal to the original list price of the old one returned.

MECCANO LIMITED
Binns Road - Liverpool

HORNBY LOCOMOTIVE PART-EXCHANGE COUPON

Complete this Coupon, and hand it, with your old Locomotive, to your Meccano dealer, who will allow you from the price of a new Hornby Locomotive, orHornby-Dublo Locomotive and Controller, the amount shown in the official list published in the June 1939 *"Meccano Magazine."*

Type of Hornby Locomotive Returned:— ..... *New Hornby Locomotive Purchased:—* .....

Please register my name to receive details of future Hornby and Hornby-Dublo developments.

(Signed).....

Address.....

CERTIFICATE

The above exchange has been effected in accordance with the terms of the Hornby Part-Exchange Scheme.

(Signed).....*Meccano Dealer*

Address.....

Cut along here

ELEKTRON ELECTRICAL OUTFITS

Elektron Electrical Outfits provide the necessary material for carrying out a series of fascinating experiments in magnetism, frictional electricity and current electricity.

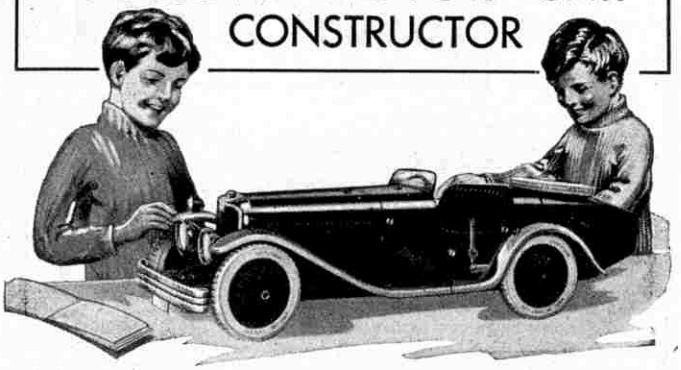
Each Outfit is packed in a handsome box, and includes a Manual, splendidly illustrated, giving full directions and explaining every experiment in simple language.

NEW PRICES FROM 1st JANUARY

No. 1 Outfit ... Price **9/-**
No. 2 Outfit ... Price **21/6**

MECCANO LTD.
BINNS ROAD
LIVERPOOL 13

MECCANO MOTOR CAR CONSTRUCTOR



MECCANO MOTOR CAR CONSTRUCTOR OUTFITS

Perfect miniature reproductions of many different types of car can be built with these Outfits. All the models are driven by means of a powerful Clockwork Motor (included in the Outfit).

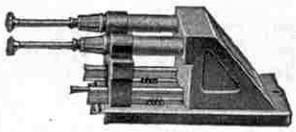
No. 1 Outfit ... ... Price **10/6**
No. 2 Outfit ... ... Price **21/-**
Motor Car Garage to accommodate any model made with either Outfit ... ... Price **6/-**

MECCANO LIMITED, BINNS ROAD, LIVERPOOL 13

HORNBY ACCESSORIES

Here are a few items from the splendid range of accessories of the Hornby Railway system. See how realistic they are—all built in perfect proportion and all beautifully finished. Add some of them to your Hornby Railway and give it a realism that will be the envy of all your friends.

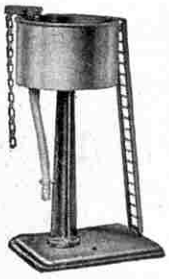
Ask your dealer to show you the complete range of Hornby Accessories.



No. 2A BUFFER STOPS
Hydraulic type. Price **2/9**

No. 3A BUFFER STOPS
Similar in design to No. 2A Buffer Stops, but fitted for use with Hornby Solid Steel Track. Price **3/6**

No. 2 SIGNAL CABIN
Dimensions: Height 5¼ in., width 3¼ in., length 6¼ in. Price **4/-**



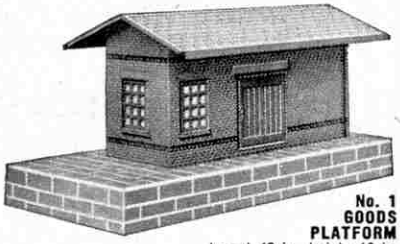
No. 1 WATER TANK
Fitted with flexible tubes and valve lever. Stands 6¼ in. high. Price **2/6**

No. 2 SIGNAL. DOUBLE ARM
Price **2/6**

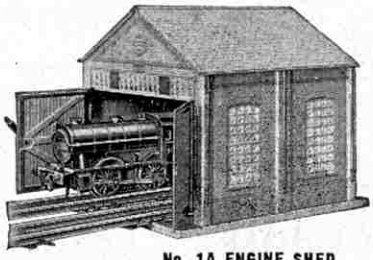
STATION OR FIELD HOARDING
Price **4d.**

No. 1 TUNNEL (STRAIGHT)
Base measurement: Length 7 11/16 in., width 6¼ in.
Price **1/9**

No. 2 LEVEL CROSSING
Measures 13¼ x 10¼ in., with two gauge O tracks in position.
Price **6/-**



No. 1 GOODS PLATFORM
Length 13 in., height 6¼ in., width 6 in. Price **5/-**



No. 1A ENGINE SHED
Price **6/6**

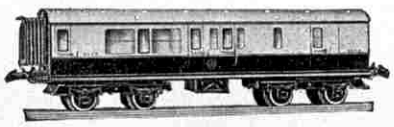
No. 7 RAILWAY ACCESSORIES
Watchman's Hut, Brazier, Shovel and Poker. Price **10d.**

HORNBY ROLLING STOCK

GAUGE O

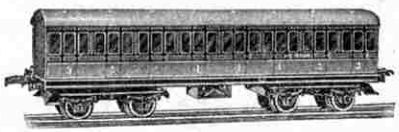
The Hornby Series includes a splendid range of realistic Rolling Stock, fitted with automatic couplings.

An attractive selection of Hornby Rolling Stock is illustrated and described here. Ask your dealer for a complete price list.



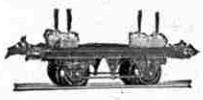
No. 2 CORRIDOR COACH
G.W. Brake-composite. Not suitable for 1 ft. radius rails.
Price **8/9**

No. 2 HIGH CAPACITY WAGON
Finished in correct colours of G.W. and L.M.S. "Loco Coal" Wagons, or L.N.E.R. "Brick" Wagon. Not suitable for 1 ft. radius rails. Price **4/6**



No. 2 PASSENGER COACH
First-third or Brake-third. Not suitable for 1 ft. radius rails.
Price **7/6**

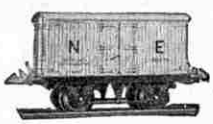
No. 0 ROTARY TIPPING WAGON
Container revolves and tips.
Price **1/6**



No. 1 LUMBER WAGON
Fitted with bolsters and stanchions for log transport.
Price **1/6**

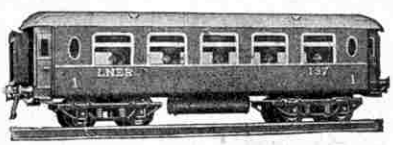
TROLLEY WAGON
Not suitable for 1 ft. radius rails. Price **4/3**

TROLLEY WAGON
Fitted with two Cable Drums Price **4/9**



No. 0 REFRIGERATOR VAN
Lettered L.M.S., G.W., N.E. or S.R. Finished with the appropriate details. Price **1/9**

SAUSAGE VAN "PALETHORPES"
Fitted with sliding doors.
Price **2/6**



No. 2 SALOON COACH
L.M.S. or L.N.E.R. Price **11/-**
Not suitable for 1 ft. radius rails.

No. 1 PETROL TANK WAGON "POWER ETHYL"
Price **1/11**

CHOCOLATE VAN "CADBURY'S"
This van is beautifully enamelled in blue with white roof.
Price **2/6**

MECCANO LIMITED — BINNS ROAD — LIVERPOOL 13

WHEN WRITING TO ADVERTISERS

Readers are urged to observe the following points when writing to advertisers:

1. **Mention the "M.M." and any special reference number quoted in the advertisement. This helps the advertisers to give prompt attention.**
2. **See that the full amount of the price and any postage is included. It is unfair to expect advertisers to fulfil their undertakings promptly if short remittances are sent.**
3. **Give your full address, and most important of all, WRITE PLAINLY.**

THE ADVERTISEMENT MANAGER,
MECCANO MAGAZINE, BINNS ROAD, LIVERPOOL 13

Boys! this magnificent Signalling Station

is but one of the many hundreds of fascinating working models or articles which you can easily make with the new super 1940

JUNEERO

Multi-Purpose TOOL and Materials —the ALL-BRITISH HOBBY

You will get great fun out of making and using this signalling Outfit which will also help you to quickly send and read the famous Morse Code.

Design Sheets Nos. 65 and 66, showing you how to make this Transmitting Station, are given away with the current issue of the Juneero News-letter, price 3d. Order it regularly from your local Juneero dealer.

Free! design sheets for this model

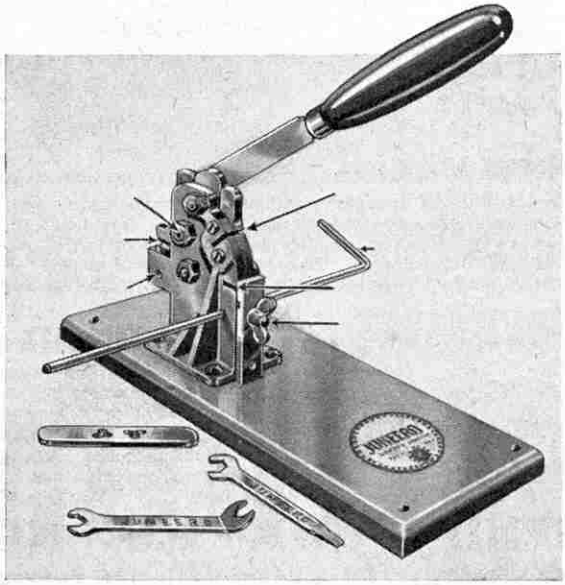
With a Juneero Set you can actually make real things in metal. PUNCH holes in strips —as many or as few as you like, or BEND them to any angle and in any position.

CUT strips or rods to any length you require. CURVE your strips or rods on the Juneero Scroll tool. There is a CUTTING DIE for cutting threads on the rods—for axles, etc. SHEARS for cutting Juneero metal, glass substitute, etc. Juneero Materials include: METAL SHEETS ruled all ready for you to easily cut to shapes required. CORRUGATED metal for roofs, etc.—very realistic. GLASS SUBSTITUTE for windows, roofs, etc., easily cut to shape or holes punched as desired. GEAR WHEELS, also Pulleys and similar parts for making working models, all ready for you to

DESIGN, MAKE AND FINISH HUNDREDS OF DIFFERENT ARTICLES!

The No. 1 JUNEERO OUTFIT still costs only 12/6. The No. 2 OUTFIT still costs only 25/-. Despite the inclusion of the Super Model Multi-Purpose Tool—prices remain unaltered. You buy JUNEERO OUTFITS from JUNEERO dealers only. If owing to war conditions you have any difficulty, please send your order direct, adding 1/- for carriage and packing, and we will arrange for a set to be sent.

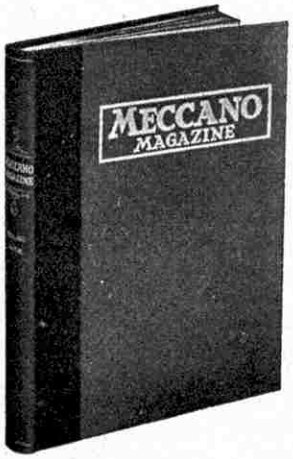
Juneero Ltd., 25, White Street Moorfields, London E.C.2



The 1940 Super Multi-purpose JUNEERO TOOL

Binding the "M.M."

There are two methods of binding the *"M.M."* to preserve back copies from the mutilation that inevitably will be theirs should they be handled for any lengthy period without protection. First there is the spring-back binder system, that permits the copies to be inserted or removed from the binding case at will. This is intended primarily as a temporary arrangement for the protection of copies during the currency of their volume.



Handsome spring-back cases specially prepared for the *"M.M.,"* with the name blocked in gold letters on the front cover, can be obtained from Meccano Limited, Binns Road, Liverpool 13, price 2/6 and 3/6 for sizes large enough to hold 6 and 12 copies of current issues respectively.

Permanent binding cases for back numbers of the Magazine can be supplied by Messrs. O. H. Bateman and Co., 23, Hanover Street, Liverpool. These cases are supplied in two sizes (1) for six copies, price 3/3 and (2) for twelve copies, price 4/9, post free in each case. The binding cases are supplied in what is known as "Quarter Basil, full cloth"—that is to say three-quarters of the sides are dark crimson cloth and the back and a quarter of the sides are dark crimson leather as shown above. The case is tastefully embossed in gold with the name "Meccano Magazine," and on the back is the name and volume number.

Binding Six or Twelve Copies

These binding cases are supplied so that readers may have their Magazines bound locally, but where desired, the firm mentioned above will bind Meccano Magazines at a charge of 5/9 for six issues or 7/6 for twelve issues, including the cost of the binding and also return carriage. The covers of the Magazines may be included or omitted as required, but in the absence of any instructions to the contrary they will be included.

Whilst the binding of the twelve Magazines is quite satisfactory, they form a rather bulky volume and for that reason arrangements have been made to bind six months' Magazines where so desired, as explained above. Back numbers for any volume can be bound and the case will be embossed with the volume number.

Readers desiring to have their Magazines bound need only make a strong parcel of them, include a note of their name and address together with the necessary remittance, and send the parcel direct to Messrs. O. H. Bateman and Co., carriage paid.

READERS' SALES AND WANTS

Readers should note that all advertisements of Hornby Trains and other Meccano products included in this column relate to items no longer featured in the catalogue. Advertisements of current products cannot be accepted for this column.

Wanted. Old Hornby L.N.E.R. "Yorkshire." Reasonable condition. Apply—Clark, 44, Seymer Road, Romford, Essex.

Sale. "Meccano Magazines," March 1927–September 1939. Perfect condition. 40/– or nearest offer.—Elliott, Potmon's Heath, Wittersham, Kent.

Meccano Super Model Instruction Leaflets (clean condition). State Nos. and price required.—Box No. 3401.

Joining Up. Dispersing large Stamp Collection. Pick what you like at quarter the original cost of stamps. Marvellous opportunity to build valuable collection. Write now.—Michie, Victoria Crescent, Alnwick, Northumberland.

Sale. Red-Green Meccano (cost £6), including No. 2 Clockwork Motor. Good condition. £3 or nearest.—Guest, 15, Grove Park, Wall Heath, Brierley Hill.

16mm., 35mm. Cinematograph Films. Amateur offers cheap. Stamp list. Also few films wanted.—Ward, 13, Forfield Place, Leamington Spa.

For Sale. 140 "Modern Wonders." Good condition, 8/6.—Cowles, Stickney, Boston, Lincs.

Stamp Collection. Over 2,000 different. Album. 35/–.—93, St. Marks Road, Henley-on-Thames.

Set, "Wonders of World Aviation," 1-40. Half price, 12/6.—Ross, 70, Beechwood Drive, Jordanhill, Glasgow.

For Sale. Marx Electric Engine and Transformer. Offers above 15/–.—H. Travis, 181, Windsor Road, Torquay, Devon.

For Sale. Collection 3,000 Stamps in two Albums. Good condition. Also several thousand loose, unsorted. High catalogue value. Price 5 Guineas.—Cox, 8, Edgerton Park Road, Exeter.

For Sale. Good selection Red/Green Meccano parts, some almost new, £3. Six chamber Blank Cartridge Repeating Revolver with box Ammunition, 7/6.—Ian Macfarlane, 16, Tunstall Avenue, West Hartlepool.

This Month's Special Articles

MECCANO MAGAZINE

Registered at G.P.O., London, for transmission by Canadian Magazine Post.

EDITORIAL AND ADVERTISING OFFICE:—
LIVERPOOL 13, ENGLAND.
Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/– for six issues and 8/– for twelve issues.

To Contributors. The Editor will consider articles and photographs of general interest and payment will be made for those published. Whilst every care will be taken of articles, etc., submitted, the Editor cannot accept responsibility for any loss or damage. A stamped addressed envelope of the requisite size should be sent where the contribution is to be returned if unacceptable.

Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/–. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

Small Advertisements. 1/6 per line (average seven words to the line), or 16/– per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

Press Day, etc. Copy should be sent as early in the month as possible for insertion in following issue. We usually close for press on or before 6th of each month for following issue. Half-tone blocks up to 100 screen.

Proofs of advertisements will be sent when possible for space bookings of not less than half-an-inch.

Voucher copies. Sent free to advertisers booking one inch or over. Other advertisers desiring vouchers should add 8d. to their remittance and should order voucher copy at same time.

Remittances. Postal Orders and Cheques should be made payable to Meccano Ltd.

Ordering the "M.M." Overseas

Readers Overseas may order the "*Meccano Magazine*" from regular Meccano dealers or direct from this office. The price and subscription rates are as above, except in Australia, where the price is 1/– per copy (postage extra), and the subscription rates 7/– for six months and 14/– for 12 months (post free), and Canada, where the price is 10c. per copy, and the subscription rates 65c. for six months, and $1.25 for 12 months (post paid).

The U.S.A. price is 15c. per copy, and the subscription rates $1 and $2 for 6 and 12 months respectively (post free).

Overseas readers are reminded that the prices shown throughout the "*M.M.*" are those relating to the United Kingdom and Northern Ireland. Current Overseas Price Lists of Meccano Products will be mailed free on request to any of the undermentioned agencies. Prices of other goods advertised may be obtained direct from the firms concerned.

CANADA: Meccano Ltd., 187-189, Church St., Toronto.
UNITED STATES: Meccano Co. of America Inc., New Haven, Conn., Meccano Co. of America Inc., 200, Fifth Av., New York.
AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.
NEW ZEALAND: Models Limited, Third Floor, Paykel's Buildings, 9, Anzac Avenue (P.O. Box 129), Auckland, C.1.
SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), 142, Market Street, Johannesburg.
INDIA: Karachi: Daryanamal and Bros., Elphinstone Street. Bombay: Bombay Sports Depot, Dhobi, Talao. Calcutta: Bombay Sports Depot 2, Lindsay Street. Madras: Bombay Sports Depot, 162, Mount Road.

The Editor wishes to make known the fact that it is not necessary for any reader to pay more than the published price. Anyone who is being overcharged should lodge a complaint with the Meccano agent in his country or write direct to the Editor.

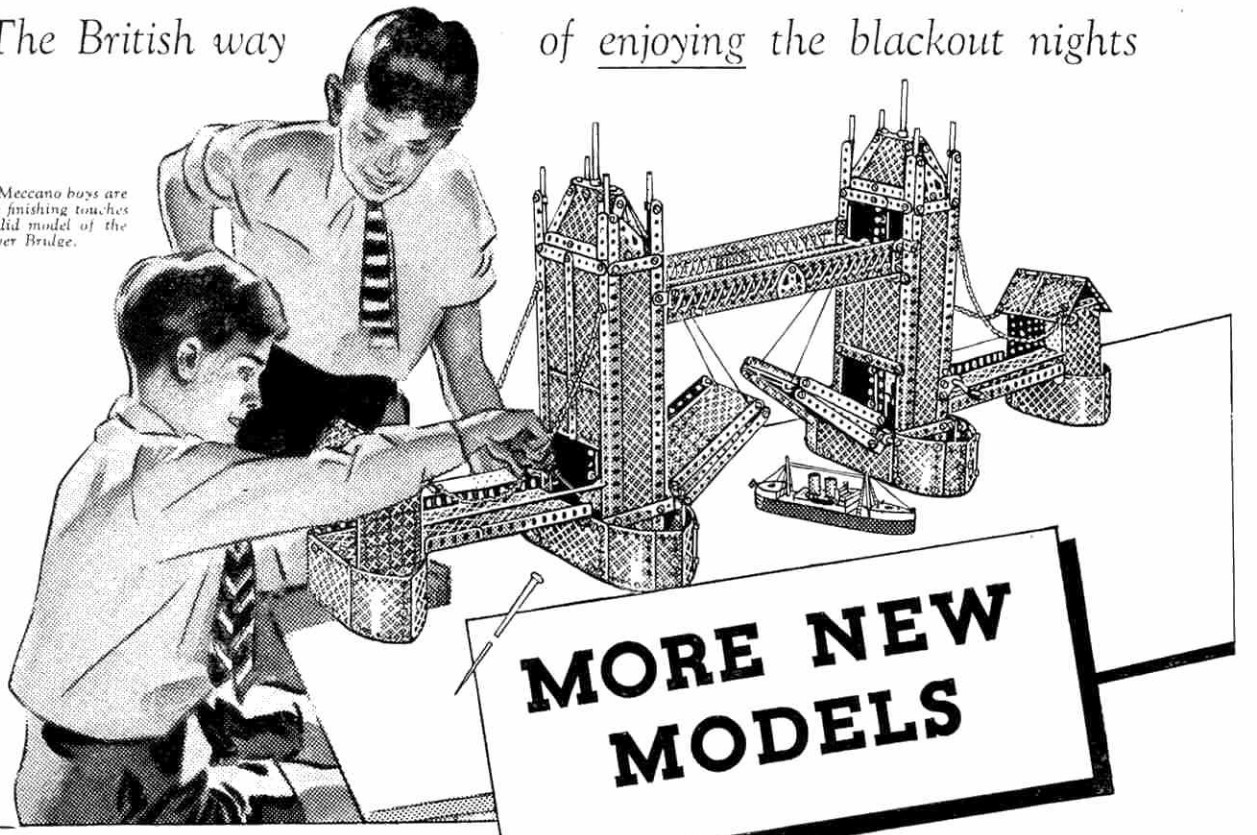
How to obtain the "M.M."

The "*M.M.*" may be ordered from all Meccano dealers, or from any newsagent or bookstall. Price 6d. per copy. As a rule, back numbers cannot be supplied, because we print only sufficient copies to fill our standing orders. To prevent disappointment, therefore, place a regular order either with your dealer, newsagent, or direct with this office.

Meccano Limited, Binns Road, Liverpool 13

MECCANO

The British way of enjoying the blackout nights



★ *These two Meccano boys are putting the finishing touches to a splendid model of the Tower Bridge.*

MORE NEW MODELS

GREATER FUN — BIGGER THRILLS

Something new is always being added to Meccano—to increase the fun and realism! The latest models are the most thrilling and interesting ever designed! Every boy can build them—and make them work, just like the real thing. Meccano parts are real interchangeable engineering parts in miniature. They build a never-ending succession of superb models—bridges, block-setting cranes, great towers with lifts, aeroplanes and hundreds of others. You can't start Meccano too soon; and you'll never lose interest—there is always something new to make.

Meccano Limited, Binns Road, Liverpool 13

Prices of Meccano Outfits

No. 0 Outfit ...	3/6	No. 6 Outfit ...	27/-
No. 1 ,, ...	5/-	No. 7 ,, ...	37/6
No. 2 ,, ...	6/6	No. 8 ,, ...	72/6
No. 3 ,, ...	10/-	No. 9c ,, ...	110/-
No. 4 ,, ...	14/6	No. 9w ,, ...	140/-
No. 5 ,, ...	21/-	No. 10 ,, ...	280/-

SPECIAL NOTICE TO READERS

THE DEFERRED PAYMENTS SCHEME FOR MECCANO AND HORNBY TRAINS IS NOW DISCONTINUED

HORNBY TRAINS

Perfect Model Railways

Hornby Trains not only look like actual trains, but work like them. The Hornby Railway system includes everything that is required to reproduce in miniature almost all the operations that are carried out day by day on the real railways. You can operate long-distance expresses with fast passenger locomotives, or local trains with splendid little tank engines; and for freight working there are vans and wagons of almost every kind.

Look at the magnificent models below from the wide Hornby range. Note the wealth of detail and the perfect lines that characterise each one.

Get to know more about Hornby Trains. Go and see them at your local dealer's.

Ready to go! Departure time for the Hornby express draws near

PRICE LIST

CLOCKWORK TRAIN SETS

M1 Passenger Train Set (reversing). Price **11/6**

M3 Tank Goods Train Set (reversing). Price **17/6**

No. 1 Tank Goods Train Set (reversing). Price **25/6**

No. 1 Special Passenger Train Set (reversing). Price **37/6**

No. 2 Tank Mixed Goods Train Set (reversing). Price **36/-**

No. 2 Special Passenger Train Set (reversing). Price **63/-**

ELECTRIC TRAIN SETS

E120 Tank Goods Train Set (20-volt) reversing. Price **36/-**

E120 Special Passenger Train Set (20-volt) automatic reversing ... ... Price **51/-**

E220 Tank Mixed Goods Train Set (20-volt) automatic reversing ... ... Price **50/-**

E220 Special Passenger Train Set (20-volt) automatic reversing ... ... Price **85/-**

E320 Riviera "Blue" Passenger Train Set (20-volt) automatic reversing ... ... Price **77/-**

● *Ask your dealer for a copy of the Hornby Trains Folder, or write direct to Meccano Ltd., Dept. HF, Binns Road, Liverpool 13.*

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Printed by John Waddington Ltd., Leeds and London