VOL. XXV. No. 2. FEBRUARY 1940

MECCANO MAGAZINE

SOUTHBOUND! (see page 58)

6D.

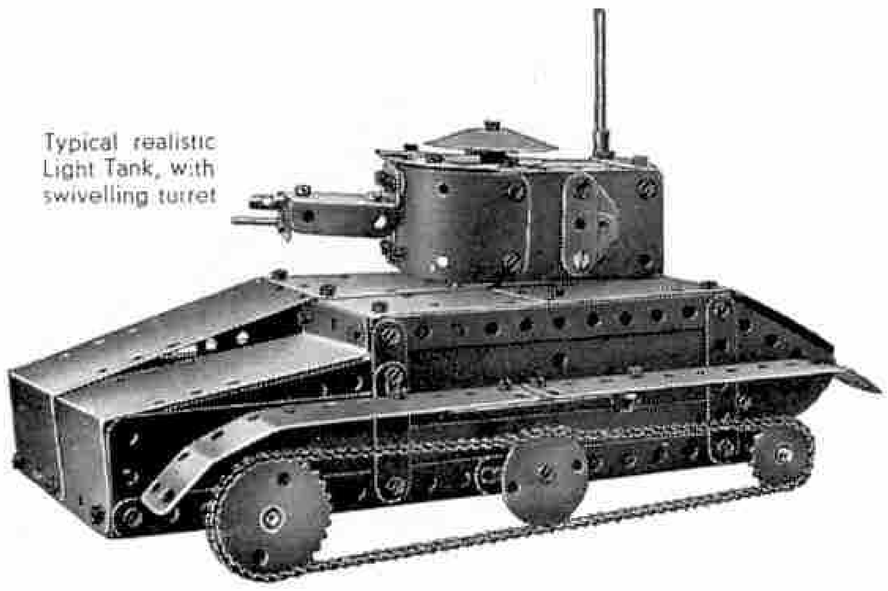
MECCANO
MECHANISED ARMY OUTFIT

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.

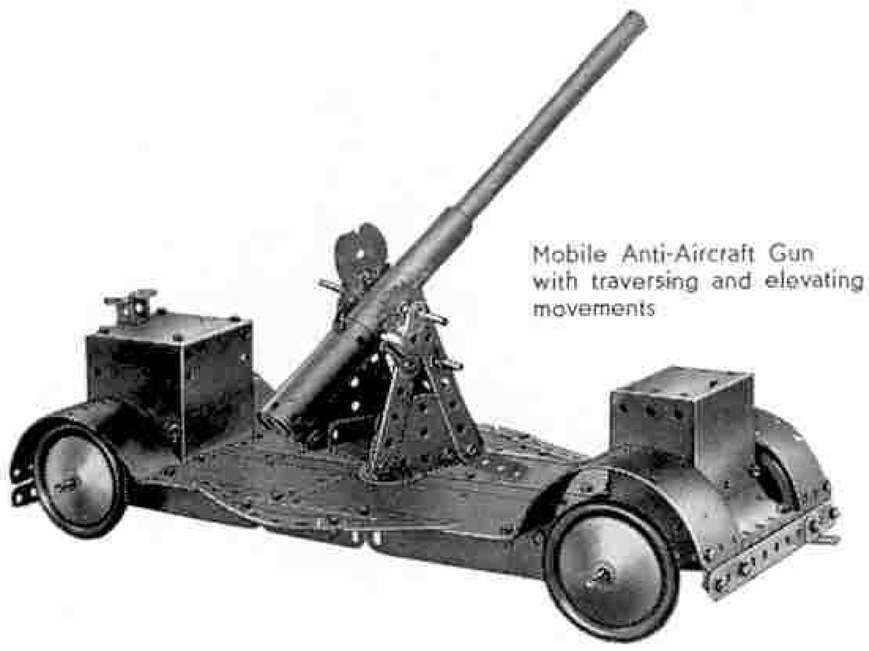
The Outfit consists of a big assortment of specially designed Meccano Parts, including gun barrels, with which realistic models of Tanks, Anti-Aircraft Guns, Field Guns, Transport Lorries, etc., can be built. The parts are finished in the correct shade of Service green.

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

Revised Price **13/6**



Typical realistic Light Tank, with swivelling turret



Mobile Anti-Aircraft Gun with traversing and elevating movements

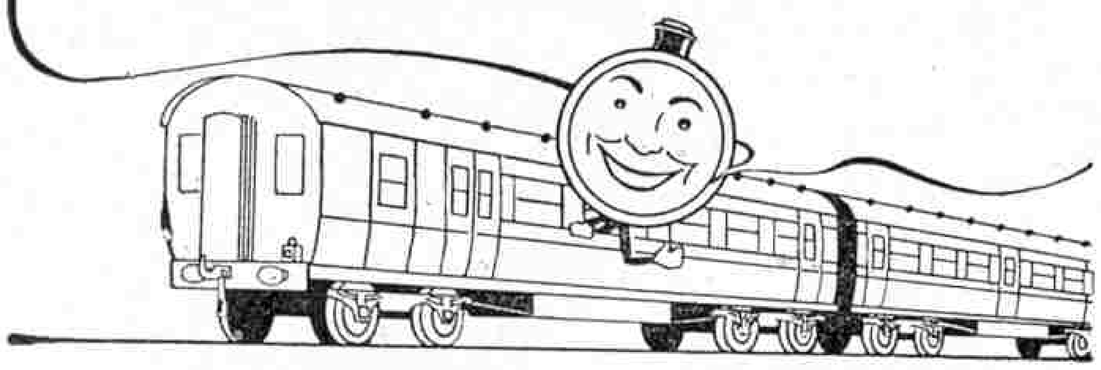
NEW PRICES OF MECHANISED ARMY OUTFIT PARTS

No.			
M1	12½″ Perforated Strips	... ½ doz.	1/6
M2	5½″ „ „	... „	9d.
M3	3½″ „ „	... „	6d.
M5	2½″ „ „	... „	5d.
M6a	1½″ „ „	... „	4d.
M10	Flat Brackets	... doz.	1d.
M12	Angle Brackets, ½″ × ½″	... „	3d.
M14	6½″ Axle Rods ...	... „	10d.
M15a	4½″ „ „	... ... „	7d.
M16a	2½″ „ „	... ... „	4½d.
M24	Bush Wheels	... each	3d.
M34	Spanners	... „	1d.
M35	Spring Clips	...box (20)	2d.
M36	Screwdrivers	... each	3d.
M37	Nuts and Bolts, 7/32″	...box (12)	2d.
M38	Washers	...pkt. (20)	1d.
M48a	Double Angle Strips, 2½″ × ½″	½ doz.	8d.

No.			
M51	Perforated Flanged Plates, 2½″ × 1½″	... each	3d.
M52	Perforated Flanged Plates, 5½″ × 2½″	... „	5d.
M90a	2½″ Curved Strips, Cranked, 1⅜″ radius, 4 to circle	... „	1d.
M94	Sprocket Chain	... „	6d.
M95a	Sprocket Wheels, 28 teeth, 1½″ dia.	... „	4½d.
M96	Sprocket Wheels, 18 teeth, 1″ dia.	... „	3½d.
M103	Flat Girders, 5½″ ...	... ½ doz.	1/3
M103f	„ „ 2½″ ...	... „	8d.
M111	Bolts, ¾″ long ...	... doz.	3d.
M111c	„ ⅜″ „ ...	... „	1½d.
M111d	„ 1⅛″ „ ...	... „	6d.

No.			
M125	Reversed Angle Brackets, ½″	½ doz.	3½d.
M126	Trunnions	... each	1½d.
M187	Road Wheels... ...	... „	5d.
M188	Flexible Plates, 2½″ × 1½″	... doz.	9d.
M189	„ „ 5½″ × 1½″	... „	1/3
M190	„ „ 2½″ × 2½″	... „	1/–
M190a	„ „ 3½″ × 2½″	... „	1/6
M192	„ „ 5½″ × 2½″	... „	2/–
M200	Curved Plates, 1 11/16″ radius	... each	1½d.
M212	Rod and Strip Connectors	... „	1d.
M214	Semi-Circular Plates, 2½″	... „	2d.
M217a	Discs, 1¼″	... doz.	9d.
M219	Wheel Discs	... each	1½d.
M220a	Gun Barrel, Large ...	... „	3d.
M220b	„ „ Medium...	... „	2d.
M220c	„ „ Small ...	... „	1d.
	Manual of Instructions	... „	3d.

COACH BUILDING— A FASCINATING PASTIME!



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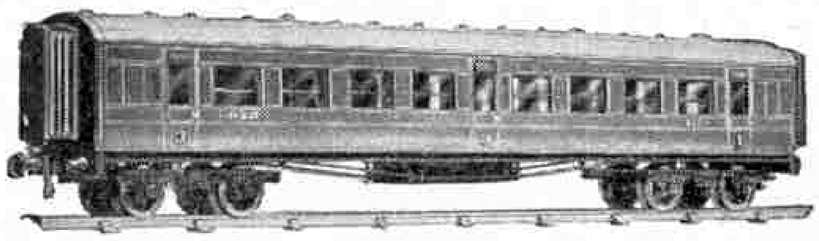

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You make each Battery last as long as Ten Batteries by using

TRE VITA BATTERY SAVER BULBS

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For **REAR LAMPS** use
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Finished Model, **price 10/-.** Post 6d.

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Finished Model, **price 10/-.** Post 6d.

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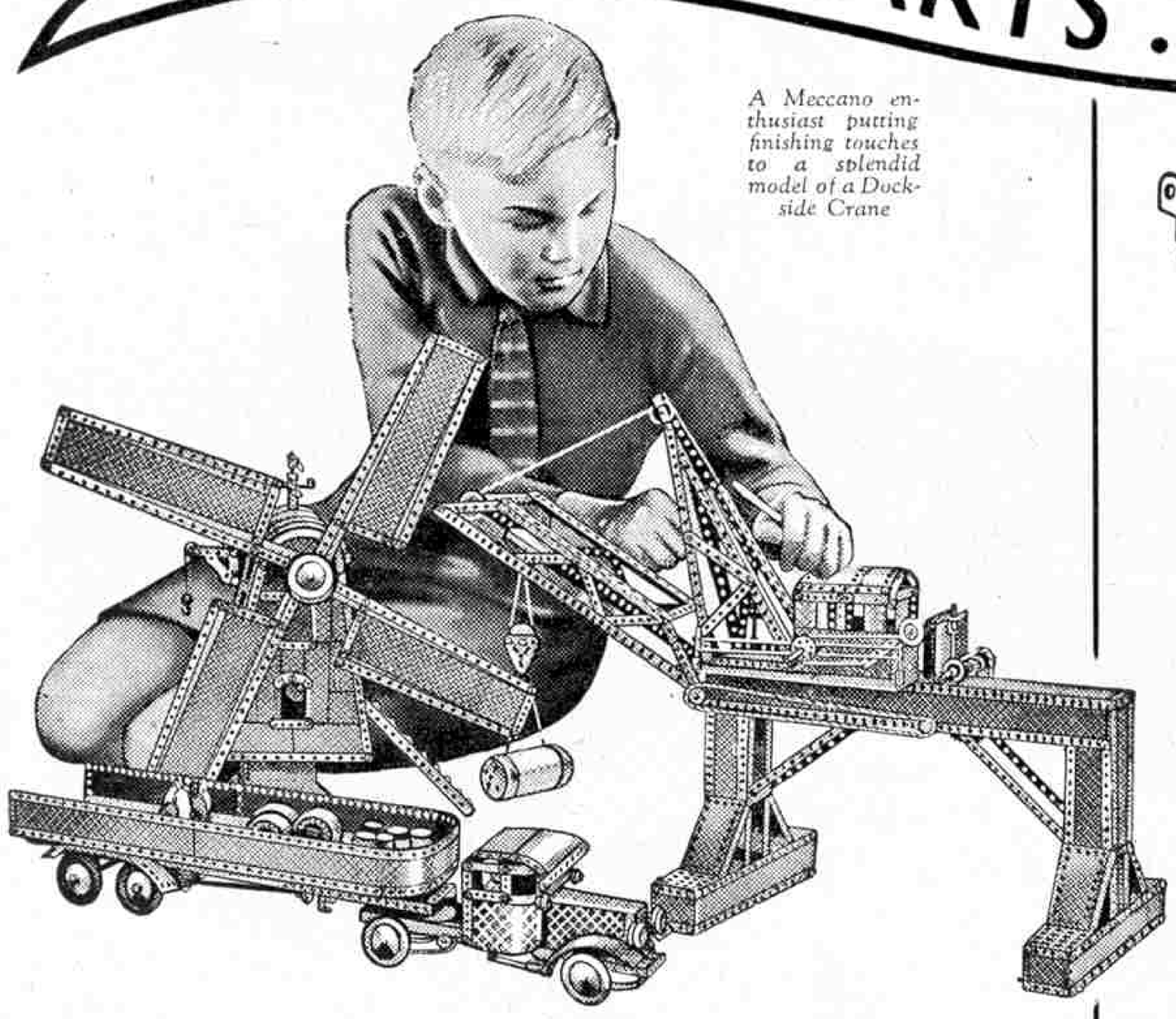
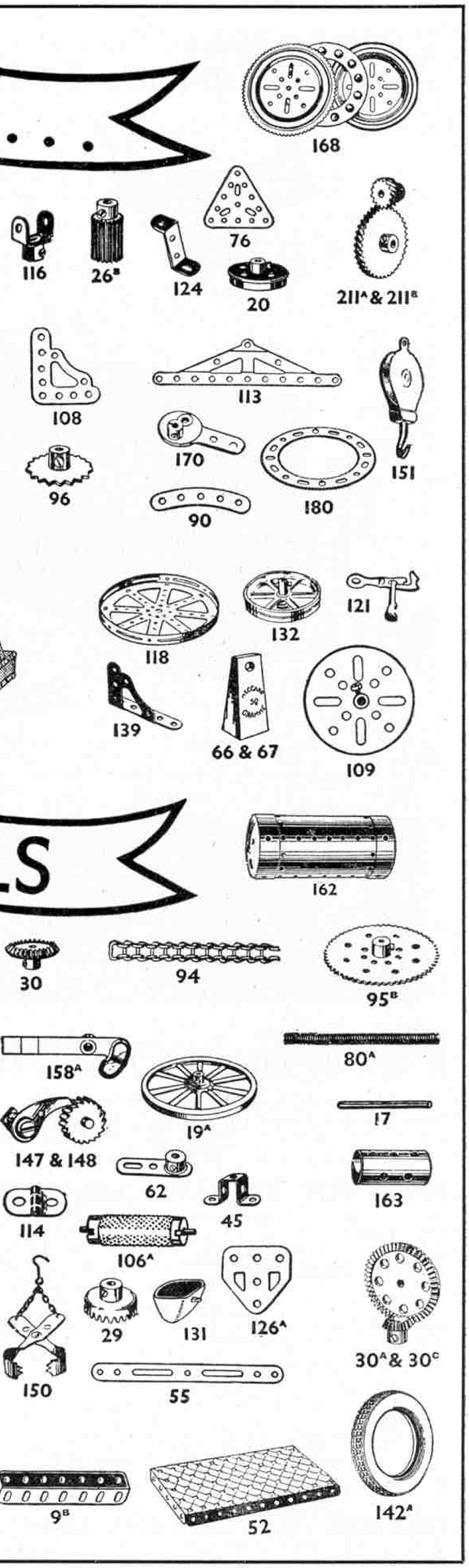
MORE PARTS . . .



A Meccano enthusiast putting finishing touches to a splendid model of a Dockside Crane



BETTER MODELS

Meccano parts, a small selection of which is illustrated here, combine to form a complete miniature engineering system with which practically any movement known in mechanics can be correctly reproduced. New parts are always being introduced in order to keep Meccano model-building in line with the most modern engineering requirements. Ask your dealer for the latest complete illustrated price list.

No.			s.	d.
9b.	Angle Girders, 3½" ...	½ doz.	0	10
17.	Axle Rods, 2"	doz.	0	4
19a.	Wheels, 3" diam., with set screws...	each	0	8
20.	Flanged Wheels, 1⅛" diam....	"	0	4
26b.	Pinion Wheels, ½" dia., ¾" face	"	0	7½
29.	Contrate Wheels, ¾" diam....	"	0	4
30.	Bevel Gears, ⅞", 26 teeth...	"	0	7
*30a.	Bevel Gears, ½", 16 teeth...	"	0	5
*30c.	Bevel Gears, 1½", 48 teeth...	"	1	9
45.	Double Bent Strips ...	"	0	1½
52.	Perforated Flanged Plate, 5½" x 2½" ...	"	0	5
55.	Perforated Strips, slotted, 5½" long	"	0	1½
62.	Double Arm Cranks ...	"	0	2½
66.	Weights, 50 grammes	"	0	10
67.	Weights, 25 grammes	"	0	8
76.	Perforated Triangular Plates, 2½"	"	0	2
80a.	Screwed Rods, 3½" ...	"	0	3½
90.	2½" Curved Strips, 2⅜" radius	"	0	1
94.	Sprocket Chains, 40" length	"	0	6
95b.	Sprocket Wheel, 56 teeth, 3" diam. ...	"	0	9
96.	Sprocket Wheels, 18 teeth, 1" diam. ...	"	0	3½

No.			s.	d.
106a.	Sand Rollers	each	1	6
108.	Architraves...	"	0	2
109.	Face Plates, 2½" diam.	"	0	4
113.	Girder Frames	"	0	3½
114.	Hinges	"	0	3½
116.	Fork Pieces, large ...	"	0	3
118.	Hub Discs, 5½" diam.	"	1	3
121.	Train Couplings... ...	"	0	1
124.	Reversed Angle Brackets, 1"	½ doz.	0	6
126a.	Flat Trunnions	each	0	1
131.	Dredger Buckets ...	"	0	3
132.	Flywheels, 2¾" diam....	"	2	3
139.	Flanged Brackets (R.H.)	"	0	2½
142.	Rubber Rings to fit 3" diam. rims	"	0	4
147.	Pawls, with Pivot Bolts and Nuts	"	0	3
148.	Ratchet Wheels... ...	"	0	6
150.	Crane Grabs	"	0	6
151.	Pulley Blocks, single sheave	"	0	9
158a.	Signal Arms, Home ...	"	0	5
162.	Boilers, complete with ends	"	1	0
163.	Sleeve Pieces	"	0	2
168.	Ball Bearings, 4" diam.	"	3	0
170.	Eccentrics, ½" throw...	"	0	9
180.	Toothed Gear Ring, 3½" diam. ... ... { 133 external teeth, 95 internal teeth }	"	1	3
*211a.	Helical Gears, ½" ...	"	1	0
*211b.	Helical Gears, 1½" ...	"	2	6

Can only be used together

MECCANO LTD., Binns Road
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FROG "PENGUINS"

They are exact replicas designed to the scale of 1 in. to 6 ft. and are sold either completely finished or in the form of assembly sets. All parts are correctly shaped and the kits include full-scale drawings, cement, etc. NO TOOLS ARE REQUIRED.

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Airspeed Envoy
Armstrong Scimitar
Avro 504K
Blackburn Shark
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Blackburn Skua
Bristol Blenheim
D.H. Diana
Empire Flying Boat
Empire Flying Boat de Luxe
Fairey Battle Camouflage
Fairey Battle Silver
Gloster Gladiator
Hawker Demon
Hawker Fury
Hawker Hart with Gun
Hawker Hind
Hawker Hurricane
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and TWO NEW MODELS—The Handley-Page Hampden and the Messerschmidt

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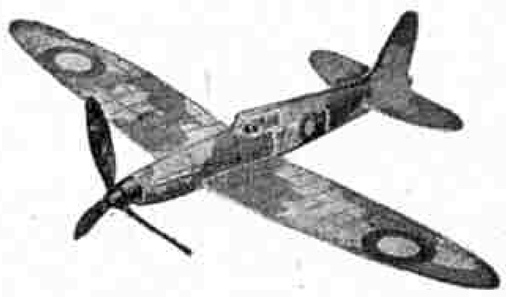
LINES BROS. LTD., MORDEN ROAD, S.W.19 Trade Mark Regd.

Have a really good hobby, such as model aeroplane construction. It is the best way of defeating boredom during the black-out. The experienced modeller knows the value of a well-designed kit as made by the 'FROG' engineers. The beginner could not have a better teacher than the detailed instructions included in every 'FROG' or 'PENGUIN' kit. Everything necessary is included and no tools are required. Make this resolution now — Write for the illustrated 'FROG' leaflet to Lines Bros. Ltd. (Dept. 5.).

See the new FROG flying model **SPITFIRE**



A ready-to-fly model of the most efficient machine in the R.A.F. fighter squadrons. **5/-**

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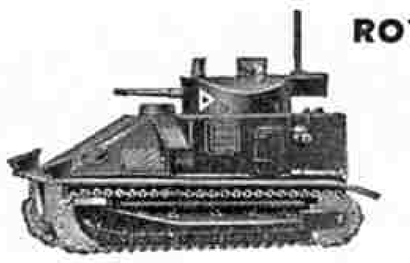
DINKY TOYS

PERFECT SCALE MODELS

Nowadays everybody is interested in the Mechanised Units of the British Army, and among the most popular Dinky Toys models are the two Royal Tank Corps Sets, which have been great favourites ever since their introduction into the Dinky Toys range. They have recently been followed by an accurately modelled Mobile Anti-Aircraft Unit, an 18-pounder Quick-Firing Field Gun Unit and Royal Artillery Personnel.

ROYAL TANK CORPS MEDIUM TANK SET



151A

151D

150D

151C

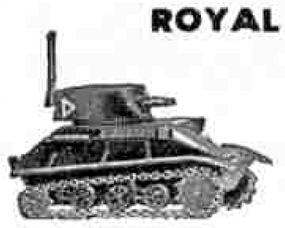
151B

Dinky Toys No. 151

No. 151a	Medium Tank	each **1'9**
No. 151b	Transport Wagon ...	" **1'2**
No. 151c	Cooker Trailer	" **7d.**
No. 151d	Water Tank Trailer ...	" **5d.**
No. 150d	Driver	" **2d.**

Price of complete set **4'-**

ROYAL TANK CORPS LIGHT TANK SET



152 a

150 d

152 b

152 c

Dinky Toys No. 152

No. 152a Light Tank ...	each **1'2**	No. 152c Austin Seven Car	each **5d.**
No. 152b Reconnaissance Car	" **1'2**	No. 150d Driver ...	" **2d.**

Price of complete set **2'11**

18-POUNDER QUICK-FIRING FIELD GUN UNIT

Dinky Toys No. 162

Comprises scale models of an 18-pounder Quick-Firing Field Gun, Trailer and "Light Dragon" Motor Tractor.

162a Light Dragon ...	each **1'6**	162c Gun	each **6d.**
162b Trailer	" **6d.**		

Price of complete set **2'6**

ROYAL TANK CORPS PERSONNEL

150a

150b

150c

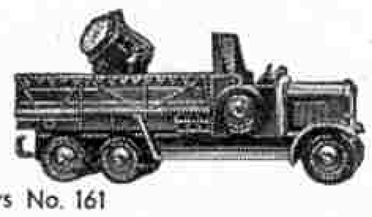
150e

Dinky Toys No. 150

No. 150a	Officer	each **2½d.**
No. 150b	Private, sitting (two in set)	" **2d.**
No. 150c	Private, standing (two in set) ...	" **2d.**
No. 150e	N.C.O.	" **2d.**

Price of complete set **1'-**

MOBILE ANTI-AIRCRAFT UNIT



Dinky Toys No. 161

Comprises scale models of a Quick-firing Anti-aircraft Gun mounted on a mobile platform and a Searchlight mounted on a lorry. Both Gun and Searchlight have elevating and traversing movements.

161a	Searchlight Lorry	each **1'9**
161b	Anti-Aircraft Gun on Carriage	" **1'9**

Price of complete set **3'6**

ROYAL ARTILLERY PERSONNEL

160A

160B

160C

160D

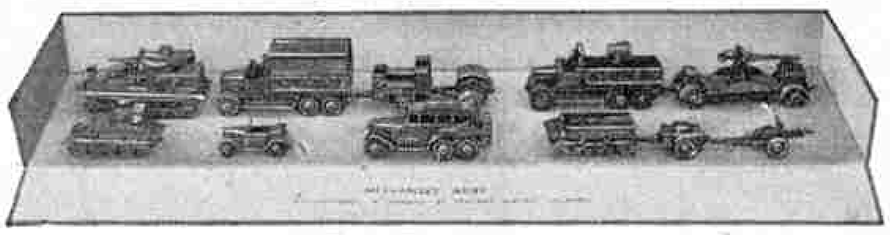
Dinky Toys No. 160

For use with Dinky Toys No. 161, Mobile Anti-Aircraft Unit and No. 162, 18-pounder Quick-Firing Field Gun Unit.

No. 160a	N.C.O.	each **2½d.**
No. 160b	Gunner, sitting (two in set)	" **2d.**
No. 160c	Gunlayer	" **2d.**
No. 160d	Gunner, standing (two in set)	" **2d.**

Price of complete set **1'-**

MECHANISED ARMY



Dinky Toys No. 156

This fine set contains the principal units of a modern mechanised army. It includes the following items:

Royal Tank Corps Medium Tank Set (Dinky Toys No. 151) without driver.
Royal Tank Corps Light Tank Set (Dinky Toys No. 152) without driver.
Mobile Anti-Aircraft Unit (Dinky Toys No. 161).
18-Pounder Quick-Firing Field Gun Unit (Dinky Toys No. 162).

Price **12'6**

A FASCINATING COLLECTING HOBBY

DINKY TOYS

OVER 300 VARIETIES

The Dinky Toys aeroplanes owe their popularity to their scale proportions, wealth of detail and attractive finish. Turn to page 78 for the splendid article on these aeroplanes.

EMPIRE FLYING BOAT

Dinky Toys No. 60r
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

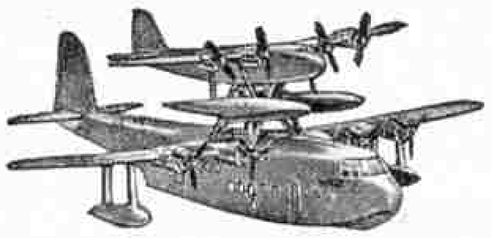
ARMSTRONG WHITWORTH "ENSIGN" AIR LINER

Dinky Toys No. 62p
Scale model of the largest British air liner. Six models available, named *"Ensign," "Elsinore," "Explorer," "Echo," "Ettrick"* and *"Elysian."* Price **1/3** each

AIRSPEED "ENVOY" MONOPLANE

Dinky Toys No. 62m
Scale model of the Airspeed "Envoy" twin-engined commercial monoplane. Assorted colours. Price **8d.** each

MAYO COMPOSITE AIRCRAFT

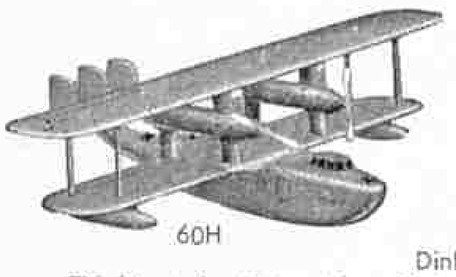


Dinky Toys No. 63
Scale model of the Mayo Composite Aircraft.
Price **2/6** each
The components of the above can be purchased separately.
No. 63a Flying Boat *"Maia"* ... each **1/6**
No. 63b Seaplane *"Mercury"* ... „ **1/-**

BOEING "FLYING FORTRESS"

Dinky Toys No. 62g
Scale model of B-17 "Flying Fortress," one of the fastest bombers in the world, and extensively used by the United States Army Air Corps. Price **1/2** each

R.A.F. AEROPLANES



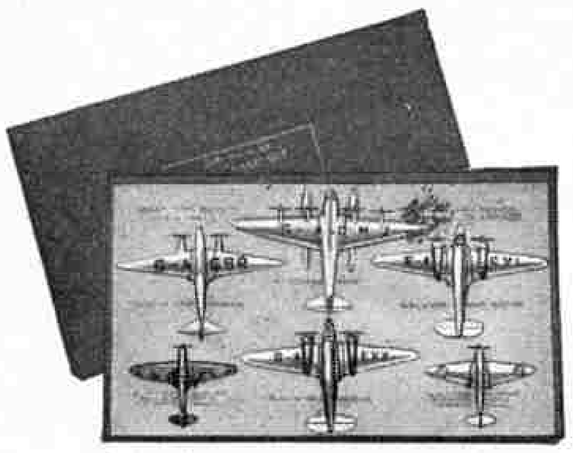
60H

60N

60P

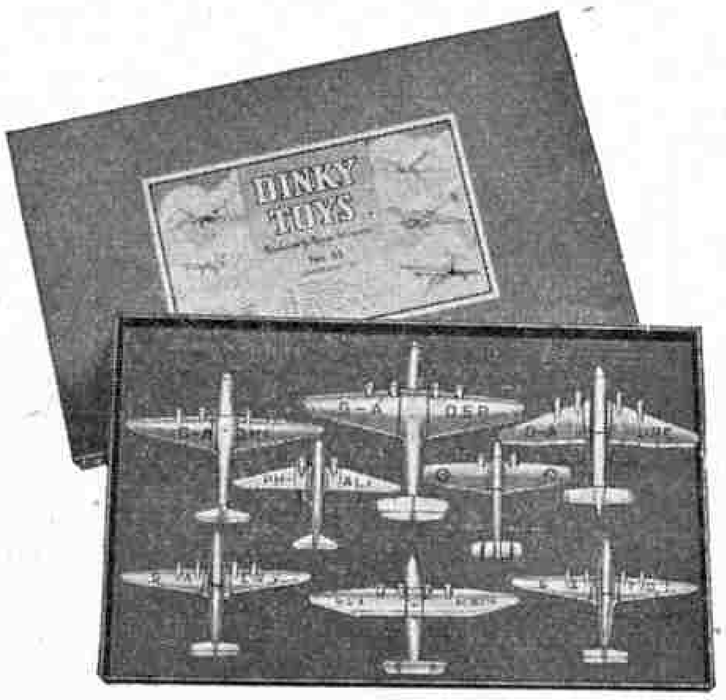
Dinky Toys No. 61
This interesting Set contains miniatures of three contrasting types of R.A.F. aircraft.
No. 60h "Singapore" Flying Boat ... ... each **1/-**
No. 60n Fairey "Battle" Bomber (2) ... ... „ **6d.**
No. 60p Gloster "Gladiator" Biplane (2) ... ... „ **7d.**
Price of complete set **3/-**

PRESENTATION AEROPLANE SET



Dinky Toys No. 64
This Aeroplane Set, in presentation box, consists of one each of the following Dinky Toys:
No. 60g D.H. "Comet" Aeroplane
No. 62h Hawker "Hurricane" Single-Seater Fighter (Camouflaged)
No. 62k The King's Aeroplane—Airspeed "Envoy"
No. 62m Airspeed "Envoy" Monoplane
No. 62s Hawker "Hurricane" Single-Seater Fighter (Aluminium Finish)
No. 63b Seaplane "Mercury"
Price **4/-**

PRESENTATION AEROPLANE SET



Dinky Toys No. 65
This Aeroplane Set, in presentation box, consists of the following Dinky Toys:
No. 60r Empire Flying Boat
No. 60t Douglas DC-3 Air Liner
No. 60v Armstrong Whitworth "Whitley" Bomber
No. 60w "Clipper III" Flying Boat
No. 62n Junkers Ju 90 Air Liner
No. 62p Armstrong Whitworth "Ensign" Air Liner
No. 62r De Havilland "Albatross" Air Liner
No. 62w Imperial Airways "Frobisher" Class Air Liner
Price **8/6**

HAWKER "HURRICANE" SINGLE-SEATER FIGHTER (Camouflaged)

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

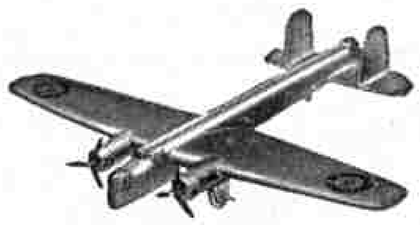
IMPERIAL AIRWAYS "FROBISHER" CLASS LINER

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

DOUGLAS DC-3 AIR LINER

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.
Price **1/-** each

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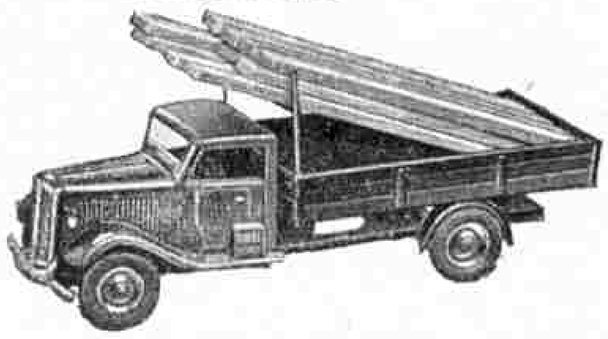

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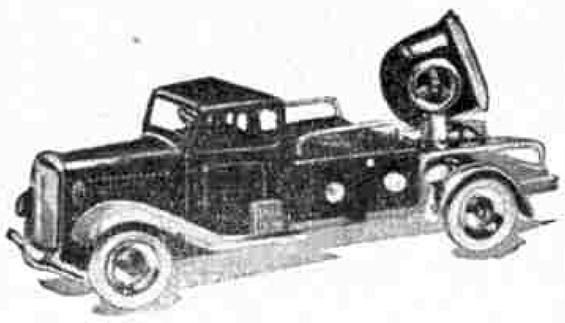

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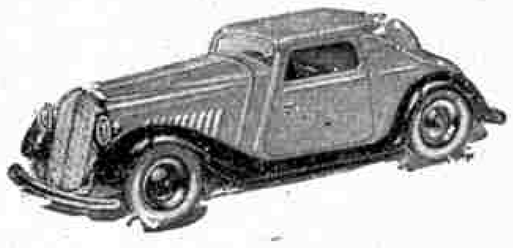

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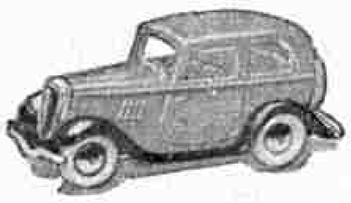

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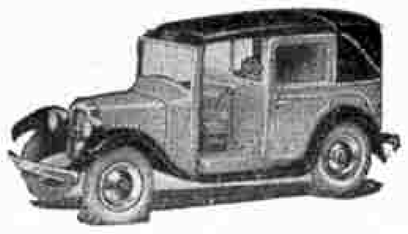

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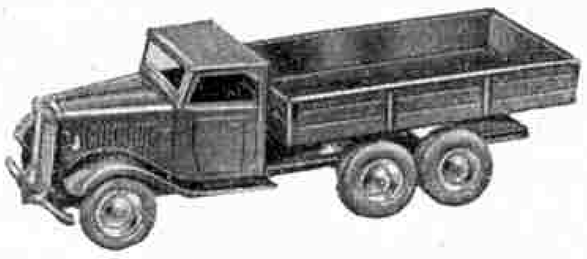

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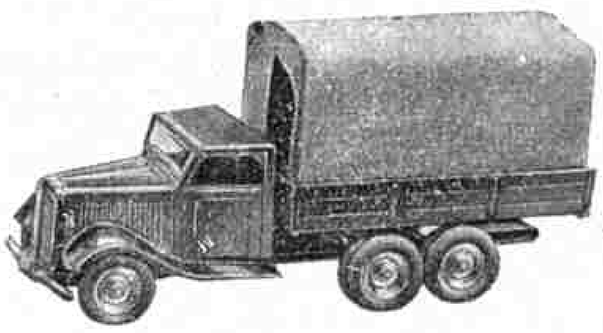

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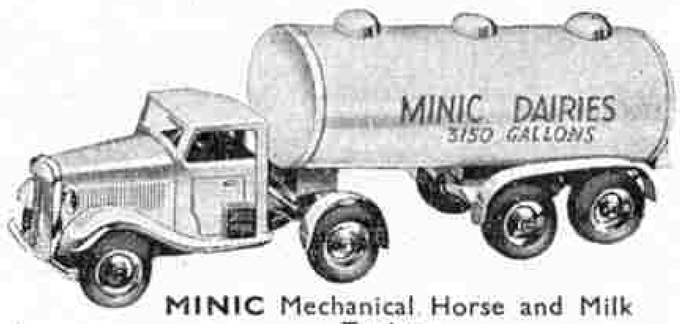

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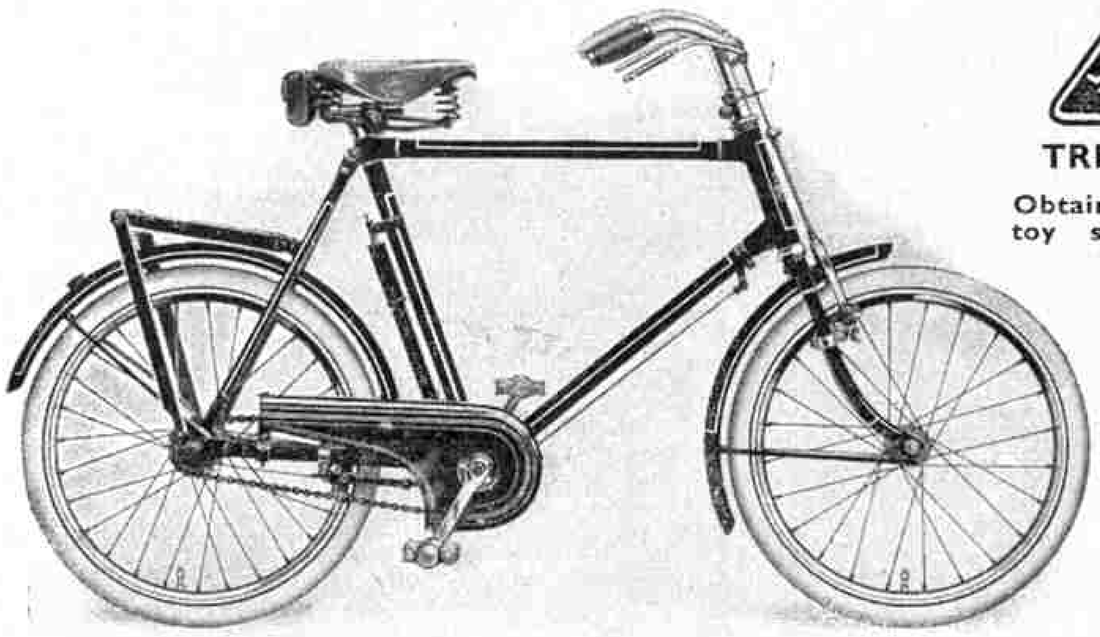

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MECCANO MAGAZINE

Editorial Office:
Binns Road, Liverpool 13
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Vol. XXV. No. 2
February 1940

With the Editor

Our R.A.F. Radio Fund

The "*M.M.*" Radio Fund for the R.A.F. is now progressing steadily, and I am confident that the final results will be very satisfactory. There has not been time to prepare a list of the subscriptions already received, but next month I shall publish a complete list of all contributions received up to date. A first cheque has been forwarded to the R.A.F. Comforts Committee, and this and any subsequent cheque will be included in next month's statement.

I have been greatly encouraged by the influential support I have received from many quarters. For instance, as soon as the fund was announced I received cheques of £5/5/- from John Waddington Ltd., Leeds, printers of the "*M.M.*"; £5/-/- from Gilchrist Bros. Ltd., Leeds, process engravers, who make the blocks used in the "*M.M.*"; £5/5/- from Messrs. Balding and Mansell, Wisbech, printers of the Meccano Manuals and Dealers' Catalogues; and £5/5/- from Ben Johnson and Co. Ltd., of York, who print the "*Hornby Book of Trains.*" All four firms sent congratulations on the initiation of the appeal, and expressed their sincere wishes for its success. These handsome cheques, following the contribution of £25 from the Directors of Meccano Limited, have given the fund an excellent send-off.

Now readers, come along! I want a contribution, no matter how small, from every one of you. Stir up all your friends and relations. Tell them all about the Fund and demand contributions.

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

Air Chief Marshal Sir Hugh C. T. Dowding, G.C.V.O., K.C.B., C.M.G., Air Officer Commanding-in-Chief, Fighter Command.

"M.M." Sold Out!

Many readers have written to express their disappointment at not obtaining copies of the January "*M.M.*" This was entirely due to the fact that the issue was sold out. In these days only sufficient copies are printed to meet the actual demand, and therefore it is very important that every reader should place a regular order. The Magazine can be obtained through any newsagent or Meccano dealer, and I urge every reader who has not already done so to place his order now in order to make sure that he is not disappointed.

There should be no difficulty whatever in obtaining the "*M.M.*" *if a regular order is placed.* Any reader who experiences trouble in this respect should write to me at once.

Leaders in the War

V. Sir Hugh Dowding

Air Chief Marshal Sir Hugh C. T. Dowding was born in 1882, and educated at Winchester and Woolwich. He was in the Royal Artillery when war broke out in 1914, but was soon transferred to the Royal Flying Corps. He played a very important part in connection with the developments of wireless signals in the R.F.C., and in 1915 he established at Brooklands what may be regarded as the first R.F.C. wireless school. He served with distinction in the Great War and was awarded the C.B. and the C.M.G.

Since that time Sir Hugh has held appointments in Iraq and Palestine, and has been Air Member for Research and Development on the Air Council. He is now Air Officer Commanding-in-Chief The Fighter Command, which means that on him falls the responsibility for intercepting and driving back bombing attacks by the enemy.

Ski-ing in Western Lapland, with snow packed and frozen on the trees.

Finland in Winter Time

By M. A. Savonius

FINLAND has suddenly become the most famous country in the world, and the Finnish men and women are setting an example to all other nations through their bravery and self-sacrifice. They are fighting for everything that is worth while, their lovely country, their homes, their personal freedom.

One of the reasons why the Finns have been able to hold their own so well against the enemy is to be found in the formation of their country. Along the Russian border, population in Finland is sparse, and there are not many roads or railways. The country is covered in thick forests of pine and spruce, and the ground is broken by innumerable craggy granite hills, which are not very high, but make progress extremely difficult. And then there are the famous Finnish lakes, and the perhaps even more famous Finnish mosses, which have given the country its Finnish name, Suomi, from the word "suo," which means a bog or moss. In some districts, and particularly on the Karelian Isthmus, there is almost more water than land.

The lakes are often separated from each other only by very narrow winding ridges of land, just wide enough to carry a motor road. In the winter all the lakes freeze over, and in February the ice is strong enough to bear cars and heavily loaded sledges. The thick snow and ice during the winter actually make transport easier in many districts where the roads are bad. As soon as the snow has fallen, the bumps and hollows are smoothed out on the forest tracks and it is easy to get along with horses and sledges, though of course motor transport is not possible.

Along the main roads, though, motor traffic is kept up all through the winter, even right up in Lapland. Powerful snowploughs clear the roads after each fall of snow, and the cars and lorries are all fitted with chains to prevent them from skidding. In the far north the big transport lorries have caterpillar wheels in winter time. The buses are all centrally heated, and they have a special device for blowing hot air from the engine on to the windscreen to prevent it from freezing over.

In the far North, in Lapland and the Petsamo area, reindeer are used for winter transport. Their big hoofs, which spread out at each step, prevent them from sinking down into the snow. They find their own food by scratching away the snow under the trees to get at the grey moss that grows in abundance in Lapland. Two types of sleighs are used with reindeer. The oldest type is the "pulkka," and is shaped like a boat. It has no runners, but just glides over the snow on its base, and cannot sink down however soft the snow may be. The pulkka is used on journeys over the fells when there is no proper track to follow. The other type of reindeer sleigh is rather the same shape, but is fitted with runners. It is lighter to pull than the pulkka type, as long as the surface is sufficiently hard to carry the weight of the narrow runners without breaking.

During the winter months it is often intensely cold in Finland. It is not at all unusual for the temperature to sink down to 40 degrees below zero, though usually it does not remain at this low level for more than a couple of days at a time. It is during clear calm weather that these spells of intense cold set in; while it is actually snowing it is never very cold. Even without looking at a thermometer it is possible to tell by various signs when the temperature is falling rapidly. There are sharp cracking noises, almost like gun shots, caused by forest trees splitting in the cold; and even the logs in the walls of the houses creak and bang at night.

Finnish soldiers building a shelter in the Karelian forests. The picture is taken outside the main line of defence.

When it is really cold the snow makes a peculiar squeaking and creaking noise under your feet as you walk. Sledge runners and skis do not glide anything like as well as they do in warmer weather, because the pressure is not enough to cause melting between the runners and the snow, and it is only this melting that makes for easy gliding. If there is a wind it generally causes great damage in the forests, as the trees are too stiff to bend, and just snap off as if they were dead and dry.

Of course the Finnish people are used to this cold weather, which occurs practically every winter, and they are well prepared for it. They wear very thick wadded overcoats, fur hats, and two or three pairs of gloves with all the fingers together and only the thumb free. These gloves are called "bag gloves," and are the only sensible thing to wear in cold weather. Boots, too, are important if you are to keep warm. In really cold weather the Finnish peasants often wear high boots made of thick felt and stuffed with hay. The snow is perfectly dry when it is really cold, and felt is warmer than leather.

The Finnish houses also are built to withstand the cold. They are built either of thick logs or several layers of boards with a packing of peat moss or sawdust in between. Floors also are several thicknesses of boards with isolating materials between each layer, and the windows have double panes of glass and all the cracks are sealed up with sticky paper. Every room has a huge stove that reaches right up to the ceiling. Fires are lit in these stoves in the morning, and as soon as the logs are reduced to glowing charcoal the dampers are closed and the whole stove becomes burning hot and keeps the room warm for many hours.

In spite of the cold winter weather there is a lot of important work that has to be done during this time of the year. Finland's chief industry is timber, and all the raw material the country will need during the year has to be felled during the winter months. Thousands of men and horses are employed in the lumber camps each year, and the amount of timber that is cut and transported to the rivers or railways is amazing. When the ice melts in the spring all these logs go down the rivers with the spring floods and arrive at the sawmills and factories by the coast, transported free of charge. The men who look after the timber on its journey down the rivers have a very dangerous task. Often the logs get stuck in the rapids, and the men have to run out into the middle of the river on the floating timber and dislodge the obstruction before the logs have time to pile up into a solid bank. Sometimes they slip and fall into the water between the floating logs, and even the strongest swimmer has hardly any chance of survival.

In a Lotta Cafe. In many villages members of the women's Lotta Svard Corps run canteens for the soldiers of the Territorial Army. They also help in medicinal activities, office work and the supply of provisions and equipment.

Another winter industry is cutting ice for the summer supply. Finland has a very large dairy industry, and it is important to have a good supply of ice for keeping the milk fresh during the hot summer weather. The ice is cut in huge blocks with large saws. Fresh-water ice is considered to be better than ice from the sea. When the ice has been cut, the floating blocks are hoisted out of the water and taken along on sledges to big dumps or ice cellars. When enough blocks have been brought up, the whole heap is covered with a thick layer of sawdust, and under this the ice will keep until the end of the summer.

The Finns drink a great deal of milk, both fresh and sour, and eat enormous quantities of bread and potatoes. There are dozens of different kinds of bread, and at least two or three kinds are served with every meal. The most popular bread is sour rye bread, baked in the shape of a gramophone record with a hole through the middle, so that the loaves can be strung up in the ceiling to dry and harden. When it is really hard it is rather difficult to eat, so in this way it is much more economical. Salted sprats and herrings are also eaten a great deal in Finland, and people are very fond of thick porridges and stews. Pea soup with pork is the staple dish of the Finnish Army, and soldiers call the field kitchens "soup cannons."

At the present time the women's Lotta Svard Corps is doing a great deal of important work, helping the Finnish army. These women, the mothers and sisters of the soldiers, are with them in the field, cooking, nursing, signalling, and even taking turns at lookout duty on the front line. In fact all in Finland, even quite young schoolboys, are helping to defend their country.

Reindeer are used for transport in northern Finland. Their hoofs spread out on the snow and are thus prevented from sinking.

The Story of Gdynia

Poland's Great Port of the Baltic

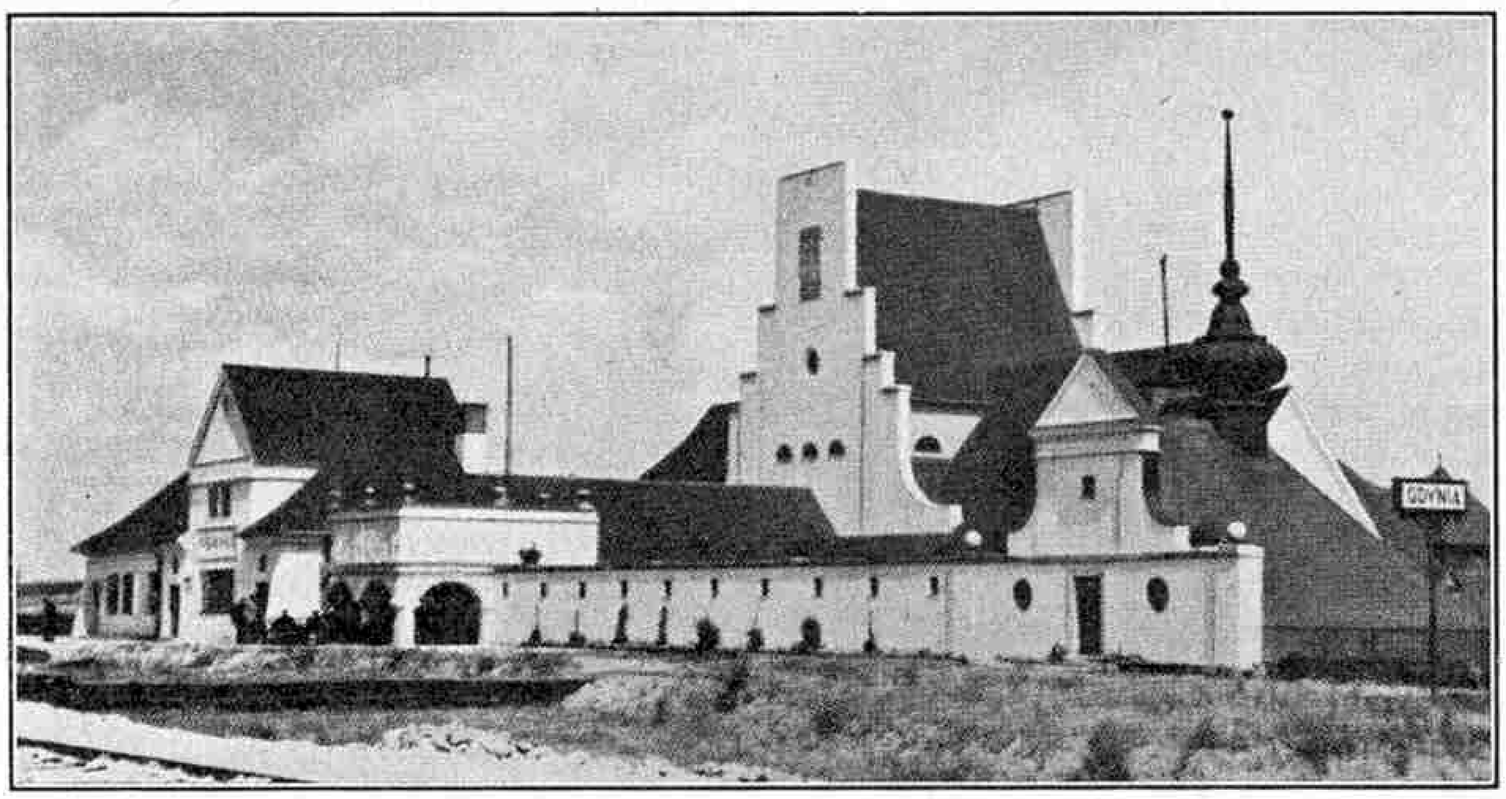
By Harold J. Shepstone, F.R.G.S.

THE story of Gdynia, Poland's recently lost port on the Baltic, is a remarkable romance of modern industry. It can claim to be the newest port in Europe. Where to-day stands a magnificent city with spacious boulevards, fine public buildings, wharves and docks capable of handling modern passenger and cargo steamers was, less than 15 years ago, a sandy waste dotted with a few fishermen's cottages. Not only is Gdynia Europe's newest port, but at the outbreak of hostilities it was the busiest port in the Baltic, actually handling more traffic than its neighbouring rival Danzig. To understand why Poland built this port, and her justification in doing so, we have to remember how the country came into being and her economic position.

When Poland gained her independence after the war of 1914-18, it was agreed at the Peace Conference, and most emphatically endorsed by President Wilson, as it was one of his famous "Fourteen Points," that the new State of Poland should be given access to the sea. She was accordingly voted a strip of territory some 20 miles in width—the much discussed Polish Corridor, then very sparsely inhabited. Meanwhile Danzig was declared a "free city."

Poland's first task after the war was to repair the ravages of the great conflict. It was one vast war-wasted region. Not only had German and Russian troops fought over her territory, but in 1919-20 she was invaded by Russia, whose troops swept almost up to the very gates of Warsaw, only to be eventually driven back. Cities and towns had to be rebuilt, agriculture revived, destroyed factories repaired, roads and railways built. Poland was enabled to do this by funds loaned by the American Government.

As prosperity returned it became evident that one port could not possibly satisfy the growing needs of the country's overseas trade. Poland at that time had an area of 150,000 square miles, about half as large again as Great Britain and Northern Ireland. Further, Poland felt she could not safely rely upon one harbour as her only doorway to the sea. It was therefore decided to build a new harbour that could usefully serve the trade of the country.



The railway station at Gdynia is built in the style of a Polish country house.

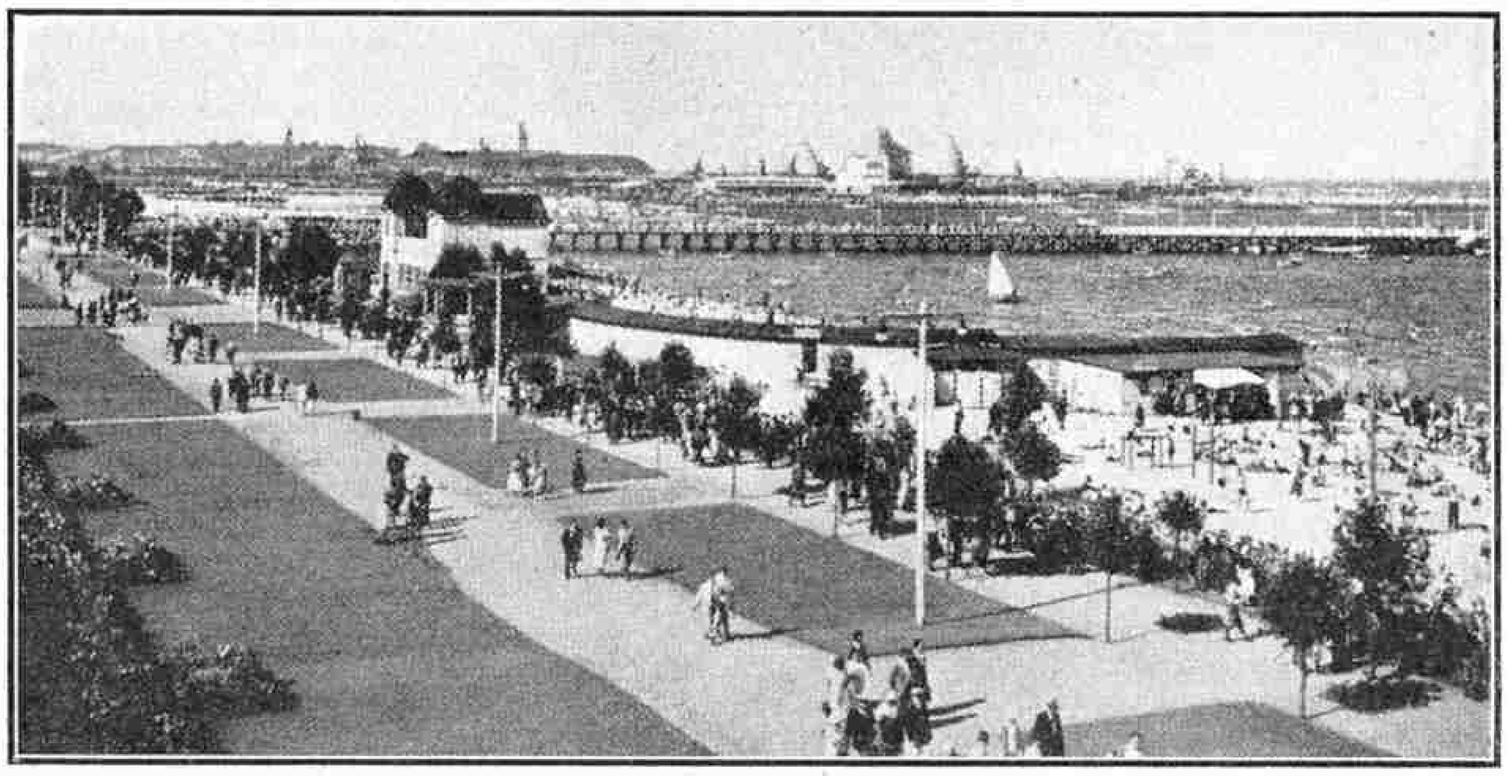
Poland had only some 20 miles of coastline along the open Baltic, and after an exhaustive survey of this coast it was decided that the only place suitable for a harbour was a mile-wide gap in the cliffs. In this flat space was a little hamlet, known as Gdynia, containing a few fishermen's cottages. The locality was marked only on the most detailed maps of the Military Survey; few people in Poland at that time had ever heard of Gdynia.

A few miles to the east lay the frontier, and beyond it the city of Danzig on the Vistula. The marshy character of the surroundings testified to the former existence of a sea creek, which later had disappeared, leaving behind it the soft, broad expanse of the Gdynia fields, framed in hills on each side. The flat space between the two cliffs was sandy in parts and contained large layers of peat, occasionally used by the villagers for fuel. The coastline was practically straight and the turf came nearly to the waterline, for there are virtually no tides in the Baltic.

Work on the new harbour was started in a small way in the summer of 1921. Though the coast

One of the main streets in the business centre of Gdynia.

is partially protected by the twelve-mile long narrow peninsula of Hel, it was quickly realised that if a really first-class harbour was to be built it called for the carrying out of very extensive seaworks. An outer breakwater at least two miles long was essential. The Baltic, though tideless, can be very stormy at times, while in addition there is the winter ice.



The promenade, showing the recreation centre of the city.

At that time money was scarce, and the work could only proceed at a slow pace. In 1924, however, the Polish Government were able to enter into an agreement with a French syndicate specialising in harbour construction. They continued the work, and six years later the first section of the harbour works was finished. Without delay a second contract was signed with the syndicate for the completion of a further section, which was opened to traffic in 1934. It was not until 1926, only 13 years ago, that the first mole was available for the discharging of ships.

There is an outer basin with deep-water wharves protected by a breakwater, and an inner basin with wharves occupying the site of the old sea creek, obtained by extensive excavation and dredging. The breakwater and wharves were formed by sinking caissons filled with sand. The caissons were each 75 ft. long, 20 ft. wide and 30 ft. and more deep, made of concrete reinforced with steel. Work on the breakwater in rough weather and in the winter months was trying, and often had to be suspended for days at a time.

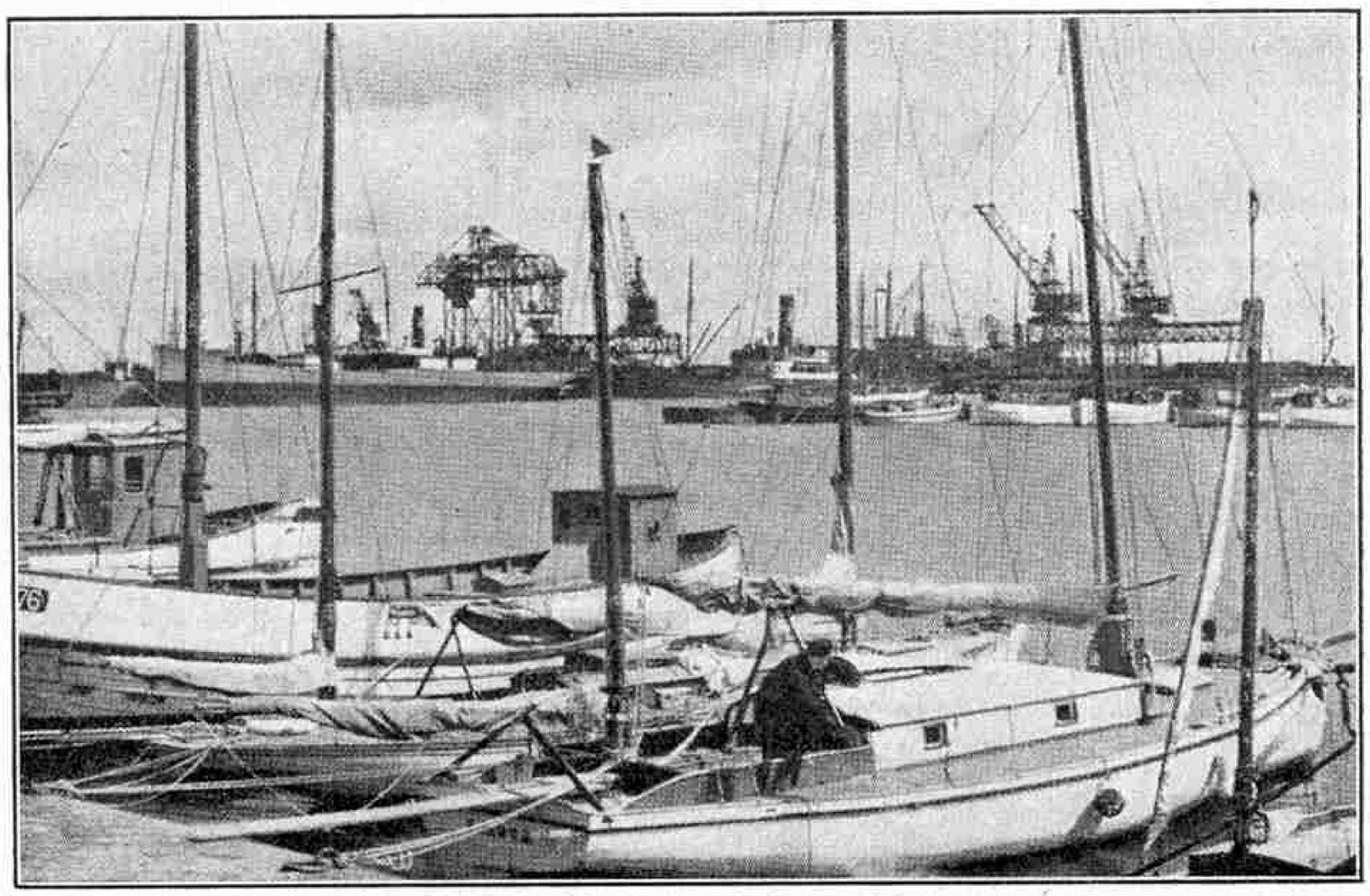
The amount of dredging that had to be done, partly in shallow water and partly in entirely artificial basins, may be judged from the following figures. The water area of the harbour is about 800 acres and its average depth is 30 ft.; before the work was started the depth of the sea was only 10 ft. at 200 ft. from the shore. At certain wharves there is a depth of water of just over 40 ft.

Coal has been one of the principal exports of Gdynia, some three million tons having been exported from this port in 1938. Some of the coal-loading machines, notably the one which, in less than five minutes, tips over the contents of a 15-ton truck directly into the hold of a ship, are among the first of their kind in Europe. All the appliances used by the constructors of Gdynia were the most modern that could be found.

Over 50 shipping lines made use of the port, connecting it up with almost 200 ports. Of Gdynia's regular shipping lines, 12 were to Baltic ports, 12 to Baltic and North Sea ports, seven to English ports, three to French, seven to Mediterranean, two to the Near East and Palestine, five to North America, three to South America, one to South and West Africa, and one to Asiatic ports.

That the building of Gdynia was justified is fully proved by the trade that was done. The tonnage of shipping entering the port when it was first opened some 13 years ago was 40,469 tons. The figure for 1937, the latest official figure available, was over five million tons, and in that year the port was called upon to handle 9,006,000 tons of merchandise. Here is a noteworthy fact that should not be lost sight of. This immense trade was not done at the expense of Danzig. Whereas the tonnage of shipping entering Danzig in 1913, the year before the Great War, was 925,000 tons, the figure for 1937 was just over four million tons. As the trade of Gdynia grew, so did that of Danzig. True, Gdynia slightly surpassed Danzig, and at the outbreak of hostilities Europe's newest port was handling more traffic than any port in the Baltic, eclipsing in this respect Stockholm, Helsingfors, and Riga. In a word, both ports were necessary to handle the overseas trade of the country.

Gdynia, which had a population of about 125,000, is most attractively laid out, possessing many fine public buildings. It is without question the most truly representatively Polish of all the towns in the country. Such is the story of Gdynia. What of its future? Time alone can tell.



Fishing boats in the inner harbour at Gdynia.

Anthony H. G. Fokker.

Anthony Fokker

A Famous Dutch Aviation Pioneer

ANTHONY H. G. FOKKER, who died in New York on 23rd December last, was one of the pioneers of aviation. This famous Dutch aircraft designer and producer had been interested in aeroplanes since his boyhood, at which time they were regarded only as a strange mechanical wonder, and few people thought they would ever be developed sufficiently to become a reliable means of transport. He designed and produced his first aeroplane when he was 20, and although he was only 49 when he died he had lived long enough to see his aircraft in regular use all over the world.

Fokker was born on 6th April 1890 at Kediri in Java, Dutch East Indies, where his father was a coffee planter. Four years later his parents returned to Holland, where they settled down in Haarlem, a town about 14 miles from Amsterdam, and the centre of the Dutch bulb-growing industry. Fokker received his early education at an elementary school, but later he entered a higher burgher school, which corresponds roughly to the English secondary school. He was a very unsatisfactory scholar, however, and became the despair of the teachers and his parents. Even his invention of an "examination passer," on which answers were marked on a revolving cardboard disc visible only through a slit in his desk, did not help him to achieve great distinction in ordinary school work!

On the other hand, practical mechanics and anything connected with engineering greatly attracted him, and in his spare time he was always busily employed with the construction of some toy or new appliance in the little workshop that he had fitted up in the attic of his father's house. In order to prevent unwelcome intrusions from members of the family he connected up a shocking coil with the knob on the door of his room. After an exciting scene when a relative tried to open the door and received a shock, he was left in peace.

A story is told that when his experiments were stopped by his father because of the amount of gas he was using, among other things to raise steam for engines he had made, he "tapped" a neighbour's gas pipe, and thus secured a free supply!

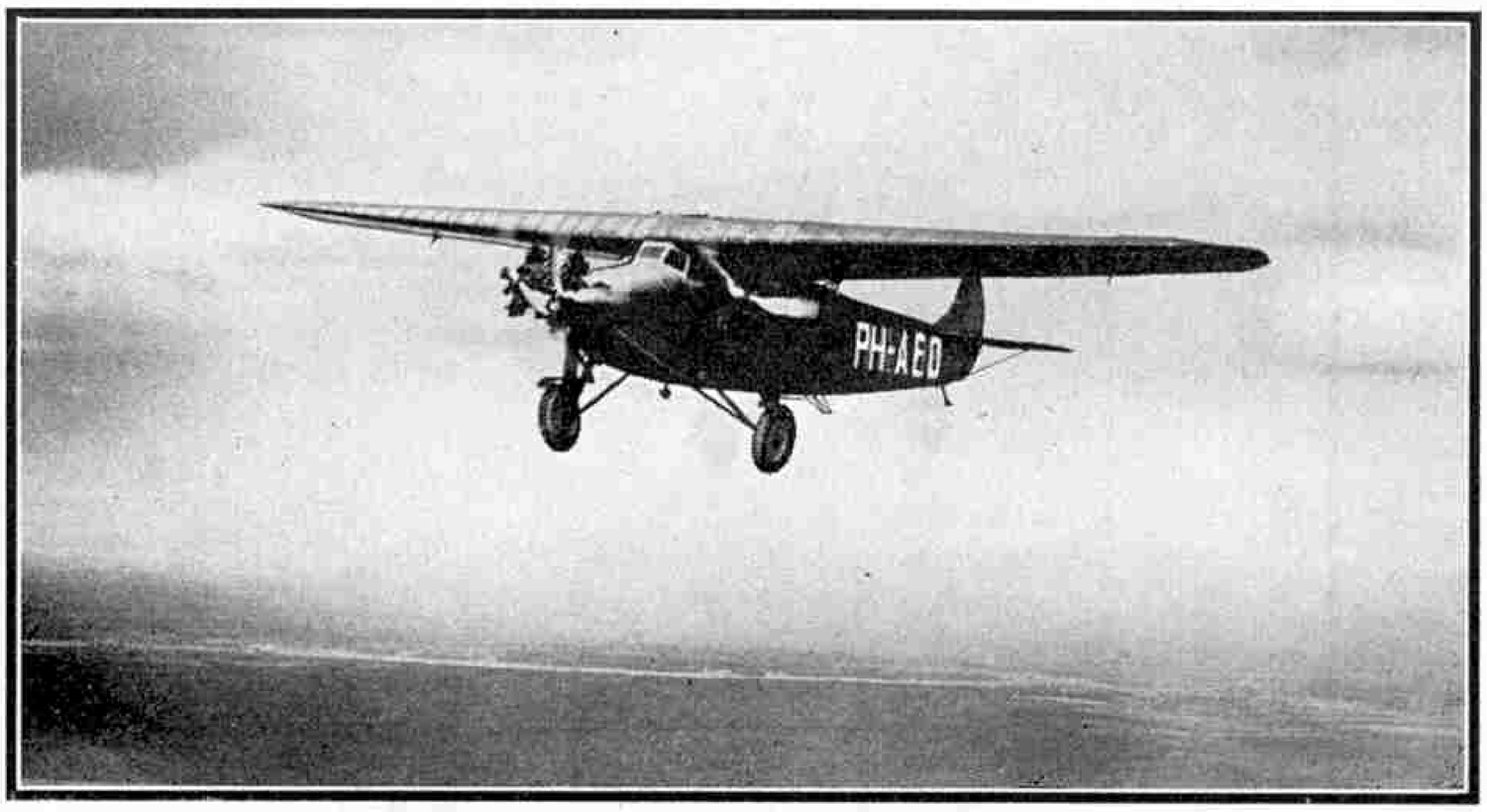
The many subjects to which his inventive mind was attracted included the aeroplane, and he read with interest of the early experiments of Farman and Blériot. During a visit to a motor show at Brussels he saw on exhibition an aeroplane built by Latham, another aircraft pioneer, and his interest was greatly increased. When Wilbur Wright surprised everybody by his excellent flights in Europe in 1908 and 1909 Fokker gathered together all the details available about the Wright machine and studied them. He came to the conclusion that a serious defect of the Wright aeroplane, as with those of Farman and Blériot, was lack of lateral stability, and he felt that he could design a machine in which this fault would be overcome. He tackled the problem in earnest, and in his attic workshop he constructed many small wood and paper gliders, and with them worked out his theories. This research led him to decide that his aeroplane would require swept-back wings of considerable dihedral, that is, they would have to slant upward fairly sharply from the fuselage.

The question of a suitable career for him kept cropping up, and eventually his father decided to send him to a German engineering school at Bingen, on the Rhine. Soon after arriving at Bingen, however, young Fokker learned that a school for motor engineers at Zalbach, near Mainz, was about to introduce an aviation course, but he did not mention this fact when persuading his father to let him go there instead of Bingen! Fokker helped to construct the school's aeroplane, but very soon afterward it was crashed by the so-called instructor, who knew very little about aviation. Fokker demanded, and obtained, the return of the fee paid by his father, and as his parent refused to buy him an aeroplane, he used the money to build one according to his own ideas. In this work during the winter of 1910-11 he had the co-operation of a fellow student.

Fokker called his first aeroplane the "Spider," and with it he taught himself to fly, patiently graduating by experience from taxying along the ground, taking short "hops," to straight flights of 1,000 ft. and more, and then to turns and circuits in the air. On 16th May 1911 he qualified for his pilot's license. His success is all the more remarkable when it is remembered that he was then only 21, and that all the knowledge he possessed had been obtained from his own successes and failures. While he was at home recovering from an attack of pneumonia contracted during his flights, his partner tried to fly the machine and crashed badly. Fokker repaired it as soon as he was well again, and at the same time further developed the design.

After a brief return to Holland to give an exhibition of flying at Haarlem, Fokker established his base at the flying field at Johannisthal, near Berlin. He gave a series of exhibition flights in Germany that marked the real beginning of his success, and in August 1912 he took part in a flying contest in Russia, where he had many successes in competition against Russian and French aircraft. He also became famous in Germany as the first man in that country to loop the loop. When not engaged in flying in displays he was busy designing new and better aeroplanes. His second machine was a two-seater monoplane, in which the seats were covered by a wooden fairing to protect the occupants. He used this machine for passenger flights and as a trainer.

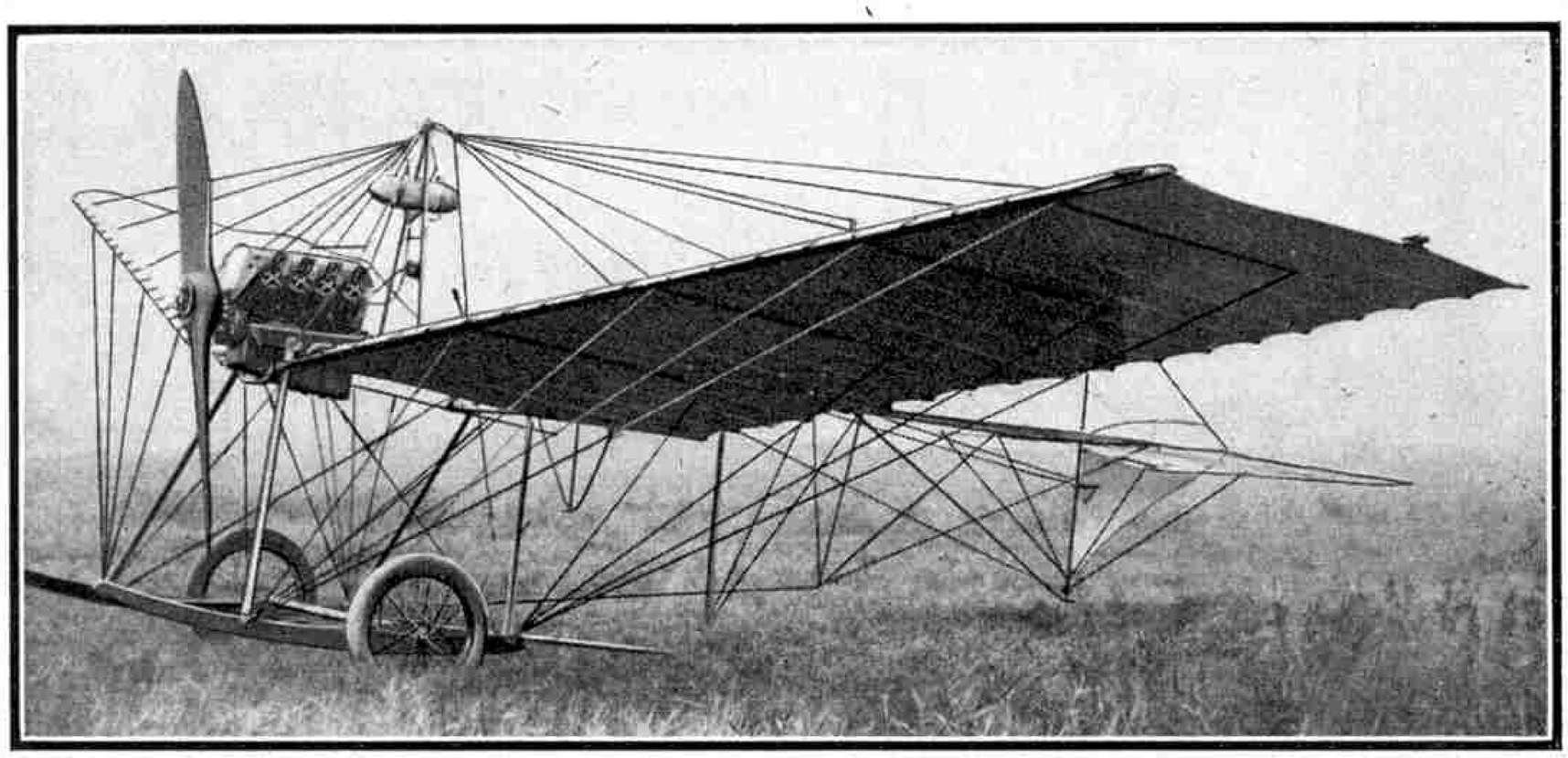
One of the early monoplanes built by Fokker was the "Safety Plane," which was notable for the great inherent stability it possessed. It is shown in the upper illustration on the next page. The "safety" features provided that when the rudder was moved to one side while the machine was in



A Fokker F.VIIb-3m triple-engined monoplane in operation in 1932 on one of the air services of Royal Dutch Air Lines, by whose courtesy this photograph is reproduced.

flight, the natural degree of bank was attained without the need of ailerons or warping wings; and if the engine was throttled down the machine assumed the natural gliding angle. The cockpit consisted simply of a seat slung between the longerons of the fuselage.

The wing construction was interesting, as the framework was of steel tubes covered with fabric, into which were sewn pockets to receive the ends of bamboo ribs. The correct aerofoil section was achieved by inserting the front ends of the ribs into the ends of curved steel tube pieces. The bamboo ribs were braced with elastic. All the joints were made by nuts and bolts, as Fokker had not then thought of welding tubular steel members together. Two long wooden skids were fitted between the wheels of the undercarriage. The "Safety Plane" had either a 50 h.p. or an 80-100 h.p. standard water cooled engine.



The Fokker "Safety Plane" of 1911, in which during flight the natural degree of bank was obtained without the need of ailerons or warping wings. The illustrations on this page are reproduced by courtesy of N.V. Nederlandsche Vlietuigenfabriek, Amsterdam.

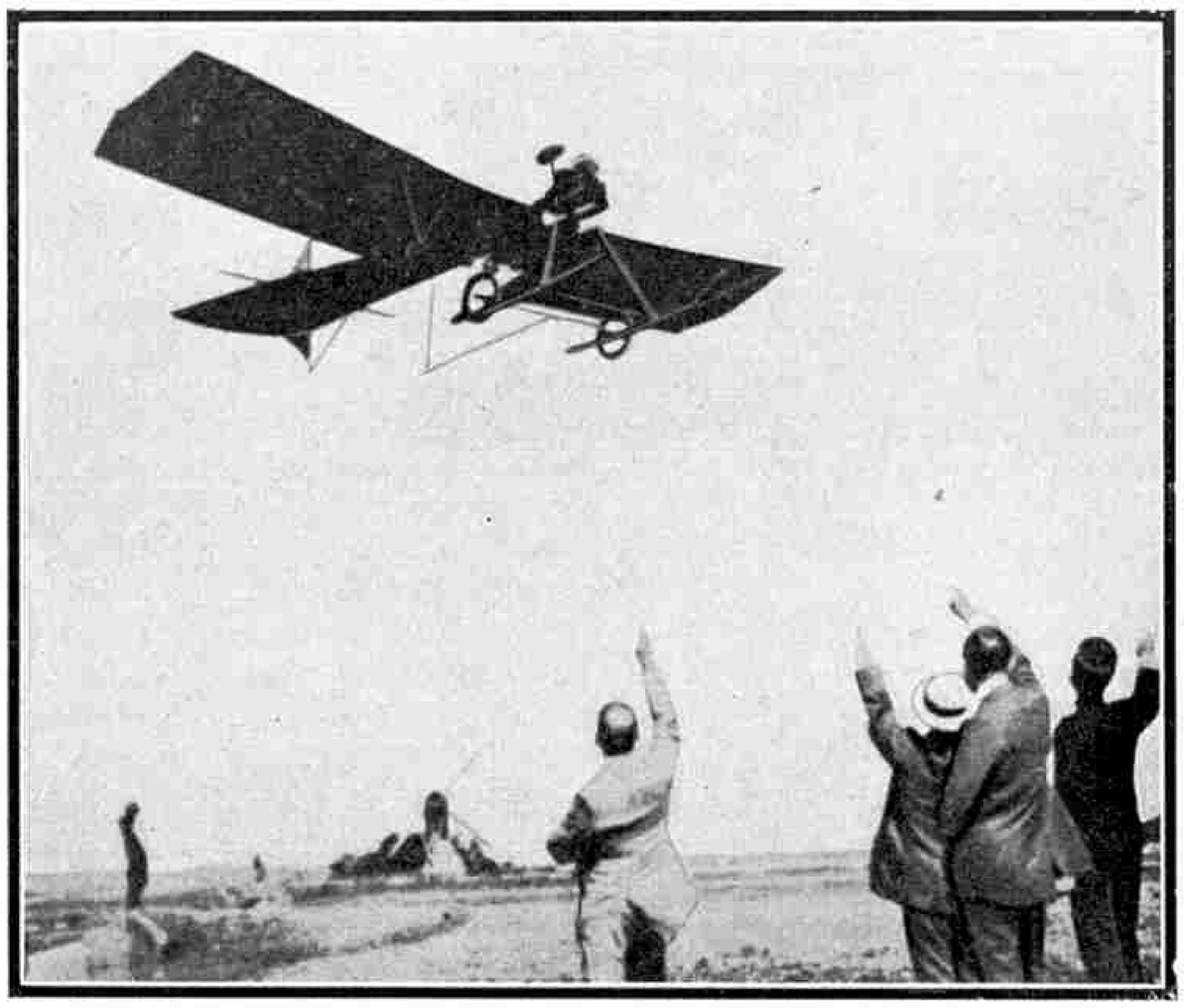
In those early days of flying Fokker had many remarkable escapes from death. On one occasion when he was demonstrating an aeroplane to a group of German Army officials the petrol tank burst. He shut off the engine, descended in a series of dramatic spirals, levelled out just in time, and leaped out as he felt the machine touch the ground. He had not run far when there was a terrific explosion and the machine became enveloped in flames.

When the German military authorities became interested in Fokker's work they gave him a trial order for two aeroplanes, in addition to requesting him to teach a number of officers to fly. Early in 1913 he decided that the time had come to set up a factory, and knowing that the Netherlands Government were looking for a constructor with whom to place orders for aircraft he flew in one of his machines to Holland, hoping to secure the contract, but he was unsuccessful. The machine flown to Holland was next offered to the British Government, but the Army authorities turned it down; and in France at that time the aircraft market was overcrowded.

A tournament held in Germany that summer solved Fokker's problems, and proved to be the turning point in his career. This tournament was organised to produce a military aeroplane that could be transported easily from one place to another by motor lorry; could be quickly reassembled, and after having made a flight could be taken to pieces and transported to another town. Cross-country flights as regular undertakings were unthought of in those days. Fokker won the first prize in the tournament, and was given an order for 10 machines. These proved so successful that Germany, in order to retain his services as a constructor, offered him a three-year contract for the establishment of a factory and flying school at Schwerin.

Soon after this factory opened war was declared, and the German authorities, afraid of losing this useful man, offered to allow him to be naturalised. The offer was refused by Fokker, and when the authorities threatened to compel him to take this step and to close his works if he did not become a German, he replied that he intended to leave the country as he wished to remain a Dutchman. He was then forbidden to leave the country until the war was over.

His first wartime order was for 24 aeroplanes. These were modified and improved until the Fokker scout machines became famous for their manœuvrability and high efficiency. The Fokker monoplane produced late in 1915 was really the first effective fighter machine to be used in the war. It was a small single-seater, and carried a fixed machine gun arranged to fire through the airscrew, a method then quite new. This machine had an 80 h.p. Gnôme engine and a top speed of 70 m.p.h., and for a time it was the fastest machine taking part in the war. Later Fokker produced his famous triplane, which became one of the outstanding machines of the war. It was a single-engined machine, with a top speed of about 100 m.p.h. and a very good rate of climb. Fokker also designed and built seaplanes during the war, and these were produced at a factory he established at Travemünde, on the Baltic Sea.



Fokker flying at Haarlem in the "Spider," his first aeroplane.

At the end of the war Germany was in a state of revolution, and after an Allied Commission had visited his factories and ordered that all his machines must be surrendered or destroyed, Fokker decided to return to Holland. The Commission did not find 200 or so aeroplanes and 400 aero engines that he had hidden, and after they had gone he tackled the problem of smuggling his huge hoard out of the country. By clever bluffing and a good deal of bribery he succeeded in getting his material away, a truly amazing achievement. It took six long trains, and the 200 aircraft transported in secrecy included 120 single-seater fighters, 60 two-seaters and about 20 of the well-known D 8 type machines.

Fokker managed also to conceal some of the money he had made, and at one time during the spell of revolution he carried it about with him in a battered suitcase, and was constantly protected by a personal bodyguard of four sturdy marines. Eventually he smuggled this money also out of Germany, and it is easy to imagine the storm that arose when this was discovered.

Back safely in Holland, Fokker established the present Fokker aircraft company, known as N. V. Nederlandsche Vlietuigenfabriek, at Amsterdam, and turned his attention to producing efficient civil and commercial aircraft. He began with the F 2 type, one of the earliest of cabin monoplanes, and followed it up with larger and better machines. First the Dutch air transport companies adopted Fokker types, and then orders began to come from abroad. Interest in military aircraft also revived, and a large order was received from the United States Government for machines for their Army and Navy. Later Fokker went to America and established a company there. During the past few years the Netherlands Fokker company have been engaged exclusively upon the production of military aircraft, and some of these types were described in the February 1939 "*M.M.*" A further group will be dealt with next month.

Aloft with the Interceptors

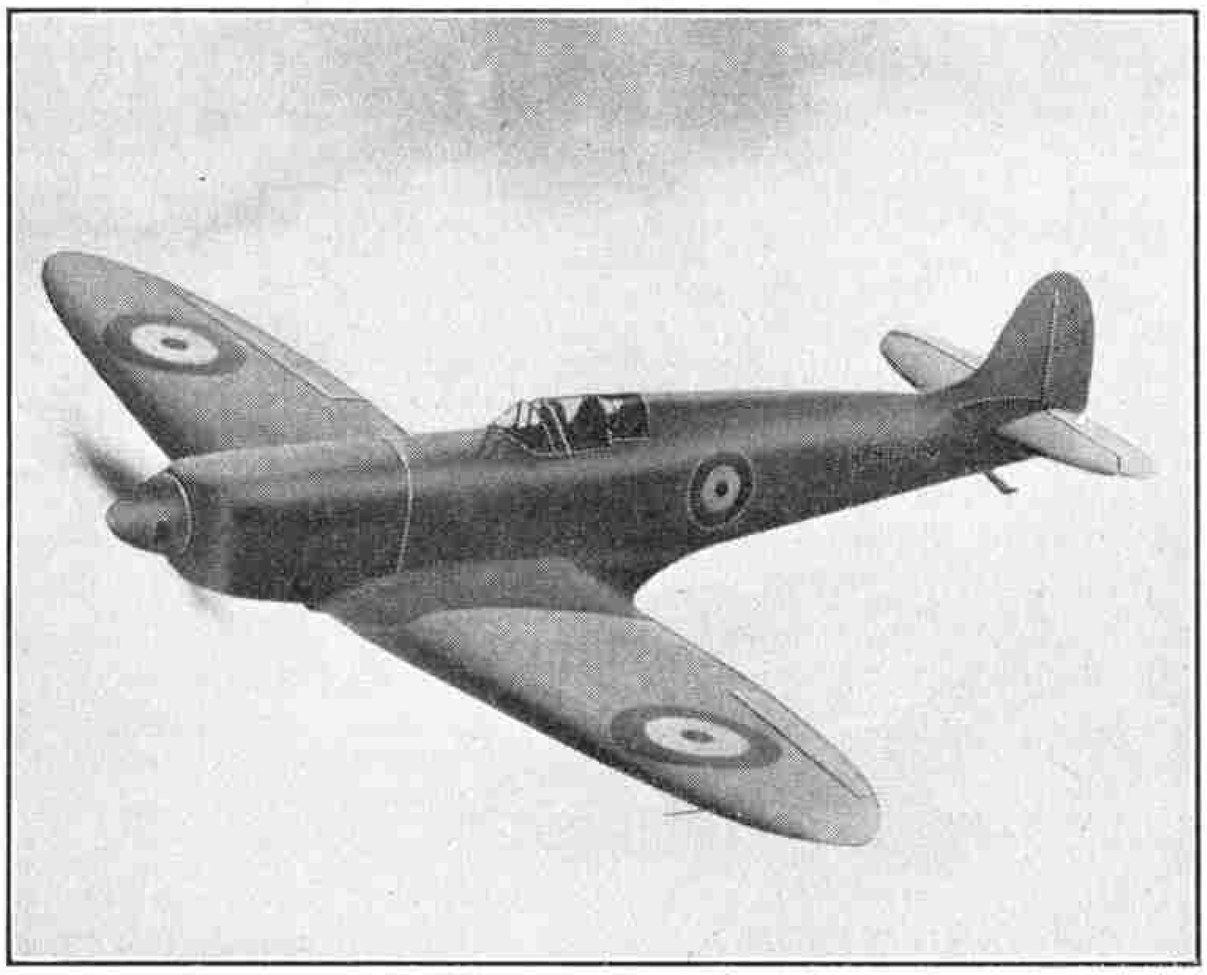
By Flight-Lieutenant "Tommy" Rose

Flight-Lieutenant Rose was an air pilot in the war of 1914-18, when he brought down at least 12 enemy aircraft. Once when shot down himself he managed to land in the British lines, and his descent was watched by King George V, then visiting the Front, who congratulated him. He won the King's Cup Air Race in 1935, and the best known of his many long-distance flights was that to South Africa. To-day Flight-Lieutenant "Tommy" Rose is chief test pilot to a British firm producing the fastest training aircraft in the world.

IF television had advanced a few stages further, what might it not have shown us at the present time! Who, for instance, would not have been thrilled to "view" a "Spitfire" or "Hurricane" pilot in action against raiding bombers! But such things can't be during the present war, so I will do my best to describe the scene in sufficient detail for you to see it, if not on the television screen, at least in your mind's eye.

It is mid-morning in the Control Room of the aerodrome at (heavily censored). Warning comes that a single enemy aircraft is approaching from N.N.E. It was reported 40 miles away at about 15,000 ft. apparently losing height. Thus it should be close at hand in about eight minutes, for it will be flat out now it is over dangerous country.

Three alert young men from No. — Squadron are called, and come hurrying up to the C.O.'s table for instructions. A few seconds later they are literally sprinting for the tarmac, where their three sleek little monoplanes were wheeled out and warmed up the moment the first warning was given.



The Vickers Supermarine "Spitfire" single-seater day and night fighter. This photograph and the upper one on the opposite page are reproduced by courtesy of Vickers-Armstrongs Ltd.

As they run they adjust helmets and goggles. While they settle into their seats they make sure that their oxygen masks are in place, and plug in the connections for their electrically heated clothing, for their scrap may take them up to altitudes where both these modern amenities will be necessary.

A moment later they take off in V-shaped formation. Let us follow young Bill in the starboard machine of the formation.

The moment his wheels are off the ground he moves his undercarriage selector lever into the "retract" position and presses the button that brings up the undercart. For even Rolls-Royce engines have been known to cut out near the ground, and at "Spitfire" speeds a forced landing on the belly of the 'plane is safer than on the wheels—you don't travel so far after the touch-down, and therefore whatever you hit, you don't hit it so hard or go head over heels.

The machine gathered speed with the kick-in-the-back acceleration of a racing motor-cycle, but Bill is used to that by now, and he pays more attention to juggling with his throttle so that he may remain eight or ten feet from the wing-tip of the machine slightly in front and to his left. They are rising sharply, at an initial climbing speed of thousands of feet per minute, for it is vital to be higher than the enemy machine at the moment of attack.

Hence in less than five minutes they have put the 10,000 ft. mark well below them, and are eagerly scanning the horizon for their opponent. Just as Bill's altimeter shows 13,000, he sights the raider, and evidently the flight leader has done the same, for he alters direction a point or so and makes straight for the marauder.

The latter would be six or seven miles distant, but approaching at a total speed of not less than 10 miles a minute, Bill knows they will be pumping lead into that speck in the sky in a matter of seconds! An amazing thought, which makes him glance subconsciously along his sights, and down at the button that operates the eight machine guns with which the "Spitfire" sends out about a hundred bullets per second.

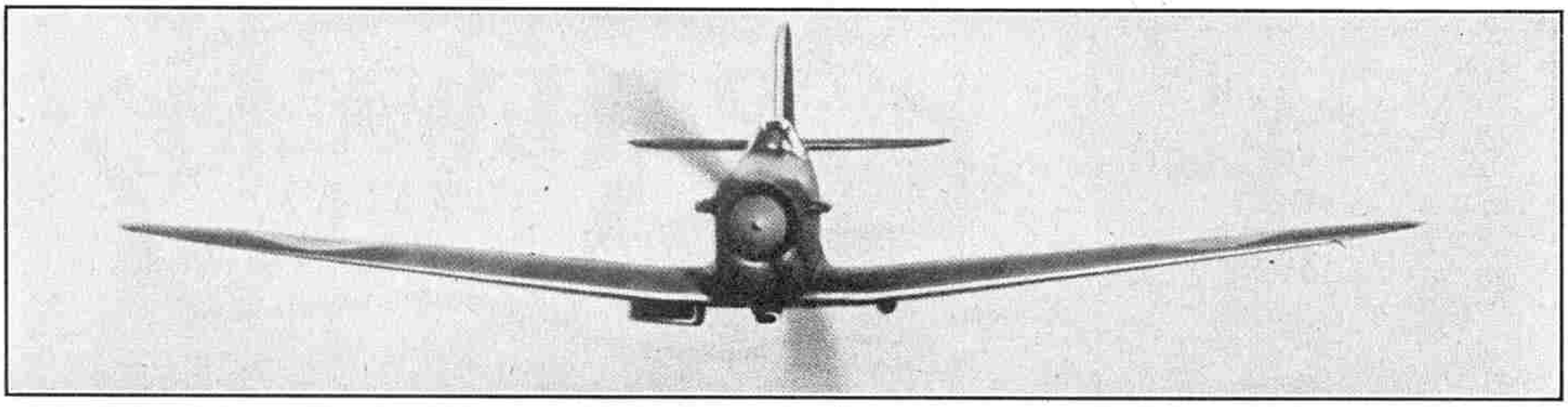
The leading fighter has flattened out somewhat, evidently because the pilot is sure of their quarry being beneath them. So Bill lets the stick go forward a little—so slightly that you would have had to watch for the movement, for at six miles a minute the effect of the air-flow over the elevators is terrific.

But what's this? They are just near enough to see that the distant raider has turned tail, and is in full flight. "What hopes!" thinks Bill, as, in order to keep his place in the formation, he slides forward the throttle lever to its full extent. Both pursued and pursuers are climbing somewhat, and at this game the "Spitfires" are much the better. Not only do they gain a commanding position thousands of feet above the German, but they are overhauling him at a mile a minute or more.

And so, in obedience to the prearranged signal, the three string out into line ahead for the actual attack, flying at half-mile intervals so that they dive at their foe one after the other.

The leader doesn't make for the enemy by the shortest route. Instead, he cleverly judges his distance so that the Englishmen will dive from between the raider and the Sun. The tail gunner's difficult task will thus be made hopeless indeed.

Now, little more than 12 minutes from the first alarm, the great moment has arrived. The leader suddenly lurches forward and dives at tremendous speed for the tail of the Nazi 'plane, now clearly seen to be one of the latest Dornier "Do. 215" bombers. "Well," thinks Bill, as this fact registers in his mind, "that disposes of the tale about their doing 310 m.p.h. This bloke's all out, and he is not doing a mile more than two-eighty."



What the rear gunner of the enemy bomber sees. A "Spitfire" rapidly overtaking him.

Suddenly the young pilot-officer grins happily. The flight-leader has dived past his quarry, clean underneath it and out to one side, where he quickly regains height for another attack in case of necessity.

Bill knows exactly what has happened. His respected superior attacked a trifle too impetuously, found at the last moment that he couldn't get the Dornier steady in his sights, and wisely forbore to waste his precious ammunition. "My chance now," thinks the younger man delightedly.

Steadily but firmly—a good deal of force is needed to keep it steady—he presses the stick forward and moves the controls fractionally to bring his sights to bear. No, not quite as steep as that—and the stick is allowed to come back slightly. There, that's the idea. One thumb is poised over the button that will release destruction in an irresistible stream at the aircraft a few hundred yards ahead.

"Here, not so fast," thinks the pilot, as he pulls the throttle lever back a trifle. In these steep dives the "Spitfire" gathers speed disconcertingly fast if allowed to do so, and he had almost made the mistake of letting it dive too fast for accurate shooting.

Almost, but not quite. He judges the distance now to be just over four hundred yards. The thumb is pressed home. The staccato rattle of the eight Brownings adds to the noise of the engine. He presses the button for perhaps three seconds, by which time he is within a hundred yards of the enemy, and several things have happened.

Having the Sun behind him, he can plainly see the rear gun position, and notes that every one of the transparent panels has collapsed. A small piece of something flutters free from the tail—probably a part of one of the control surfaces, literally cut adrift by the stream of lead. And a stream of smoke drifts back from close to the port engine.

At least, it looks like smoke, but Bill recognises it as petrol escaping from a punctured tank.

He has just time to take all this in at a single glance before he, too, dives under the stricken 'plane.

Very carefully he reduces the pressure that holds the stick forward. If he allows it to come back too quickly the machine will flick up out of the dive and, as his instructor once told him tersely, "you'll leave your guts sticking all over the tail-plane." It is a fact that he never comes out of a dive of this kind without remembering the American pilot who, through the fracture of a control surface, actually did flick upward and was found to have collapsed more or less as described.

"Must have been pretty well on the mark," he reflects, as the enemy disappears from his view. By this he means that if his bullets covered both the tail and the wing of the Dornier, he must have done a lot of damage. For at his most effective range, about two hundred yards, he was sending out a thick hail of bullets covering an area of perhaps thirty square feet, and any part of the enemy machine caught in that area would most certainly be torn to shreds.

And so it turned out. A wide turn brings Bill round facing the direction in which he expects to see the German. For a moment the sky seems empty. Then, already far below him, he sees the twin-engined machine diving steeply to earth, clearly out of control, and crash in a heap on the open moorland below.

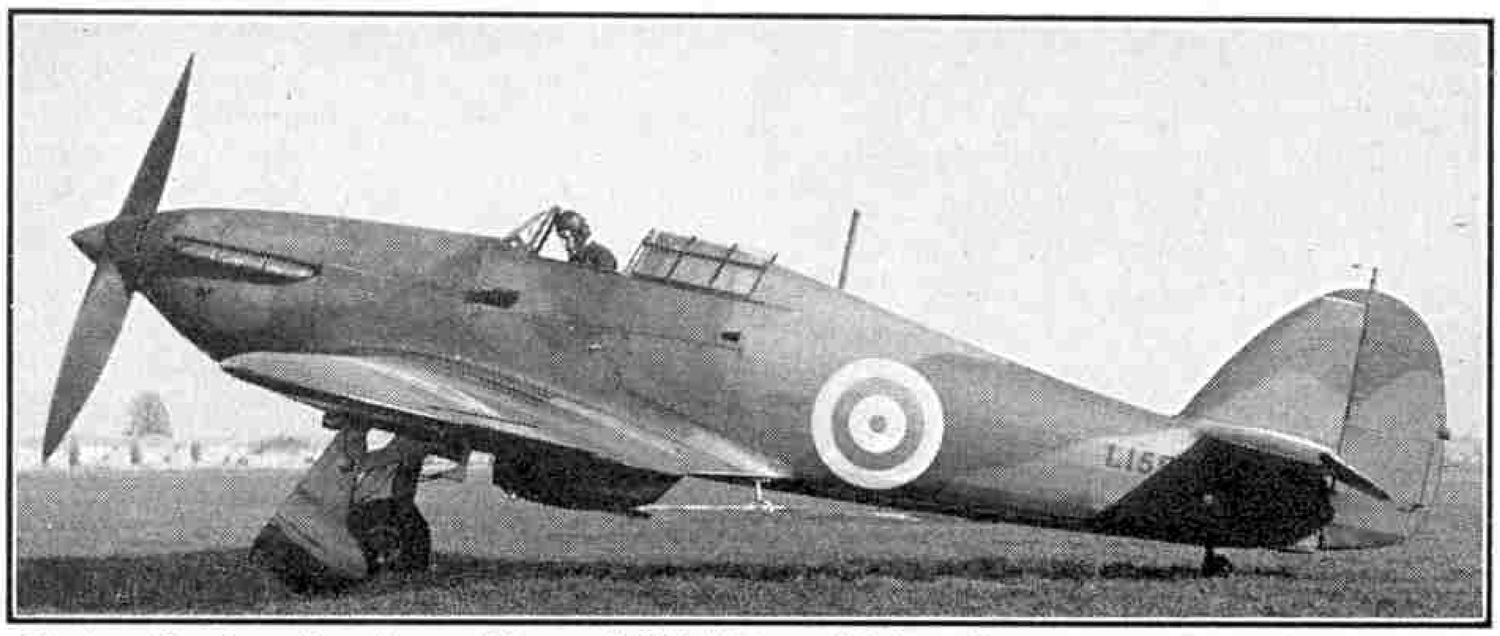
"So I got the pilot as well," he tells himself, and this, it turns out, was the case. For the third member of the triumvirate had no need to attack. He saw that the job had been done for him.

The three have been sent up for a special purpose, and, with their short range of something under two hours' flying, it is essential that the "Spitfires" should return without delay to their base to be refuelled, receive fresh ammunition, and so be ready, if need be, for another exploit.

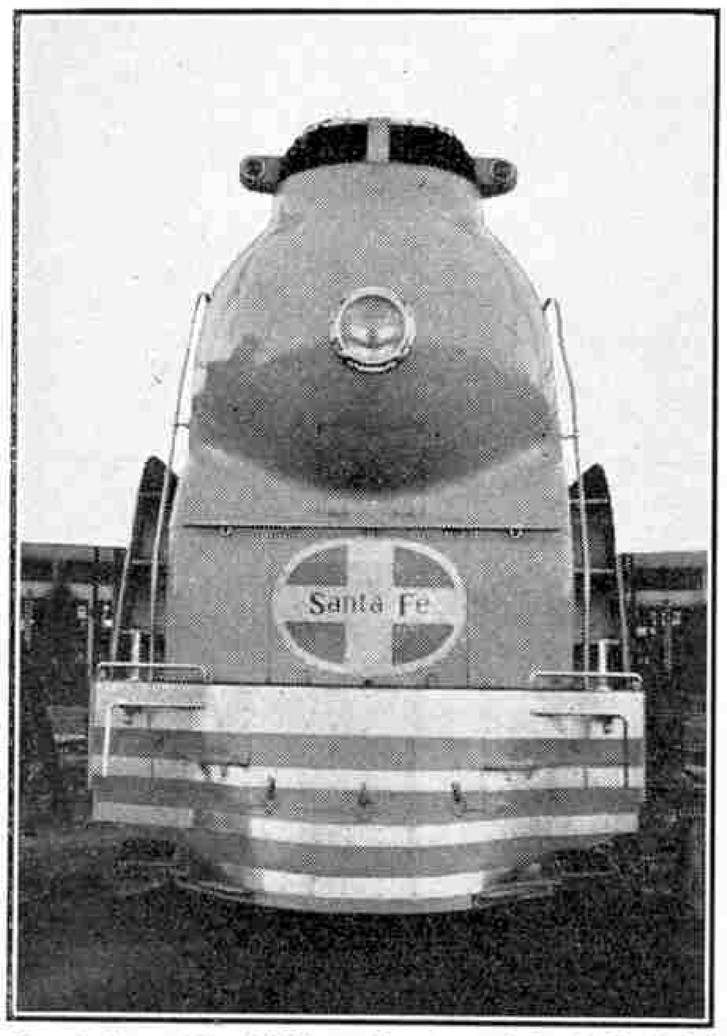
So, twenty-five minutes from the first take-off, the three little monoplanes are once more ticking over sedately on the tarmac, and the three young men are making the report which will lead to the appearance of the following short note in to-morrow's papers:

"An enemy aircraft appeared over the north-east coast yesterday morning. It was intercepted by our machines, and crashed after being engaged by them."

Thus do our newspapers sum up three seconds' work with a "Spitfire."



Hawker "Hurricane," another well-known British high-speed fighter. Photograph by courtesy of "Flight."



Front view of the Atchison, Topeka and Santa Fe 4-6-4 locomotive No. 3460. Photograph by A. Youell, Pasadena.

RAILWAY NEWS

Wartime Express Running

With main lines so crowded with special traffic, and the need for reducing permanent-way renewals to a minimum, fast running of the kind experienced in the last few years before the war is now quite impossible. Where circumstances permit the old-time enterprise of express engine crews shows itself, however, and substantial amounts of lost time are regained on the slower timings of to-day.

An excellent example of present-day locomotive work is provided by a recent run on the G.W.R. on the 8.23 a.m. from Chippenham to Paddington. The load of nine coaches was only moderate, totalling 315 tons behind the tender, but the start was 12 minutes late, and weather conditions were positively Arctic. The engine was No. 5014 *"Goodrich Castle."* Up the gently rising gradients leading to the foot of the Dauntsey bank speed rose to 56½ m.p.h.; then the stiff 1½ miles at 1 in 100 saw a slowing to 43½ m.p.h. But on the continuation of the former gradual rise, up at 1 in 660 through Woolton Bassett to the summit just west of Swindon, the engine accelerated to 60 m.p.h., and Woolton Bassett, 11.1 miles from the start, was passed in 14¼ minutes.

Then came a signal check to 35 m.p.h. approaching Swindon, but after that, on the stretch where the pre-war flyers made their great records, *"Goodrich Castle"* got going at a good steady pace. From Uppington to Wantage Road speed was continuously at 68-69 m.p.h., and 15 miles were run at an average of 67 m.p.h. Signals again caused a slowing as Didcot was neared, but the latter station was reached in 46½ minutes from Chippenham—a very good wartime run for a distance of 41 miles, including two slacks and the ascent of the Dauntsey bank.

The non-stop run of 53 miles from Didcot to Paddington of course was made over one of the most perfect racing tracks in Europe, all practically dead level and straight. There were no checks, and with the speed mostly kept at just over 60 m.p.h. an excellent start-to-stop average of 56 m.p.h. was achieved. Reading, 17 miles, was passed in 19¼ minutes; Maidenhead, 27¾ miles, was passed in 30½ minutes, and here the speed reached its maximum, only 65 m.p.h. To Southall, 44 miles, the time was 45¼ minutes, and at Old Oak Common West Junction the train was very near achieving even time from the start, 50 miles in 50¾ minutes.

A quiet and unhindered finish brought the train into Paddington in 56½ minutes from Didcot. The running time for the 94 miles up from Chippenham was thus only 103 minutes, and it seemed strange that the really smart average of 56 m.p.h. start-to-stop from Didcot to Paddington should have required no higher speed than 65 m.p.h. Such however is the nature of the superb railway route planned and built by Brunel, which permits of a high average speed with a minimum of wear and tear on the track.

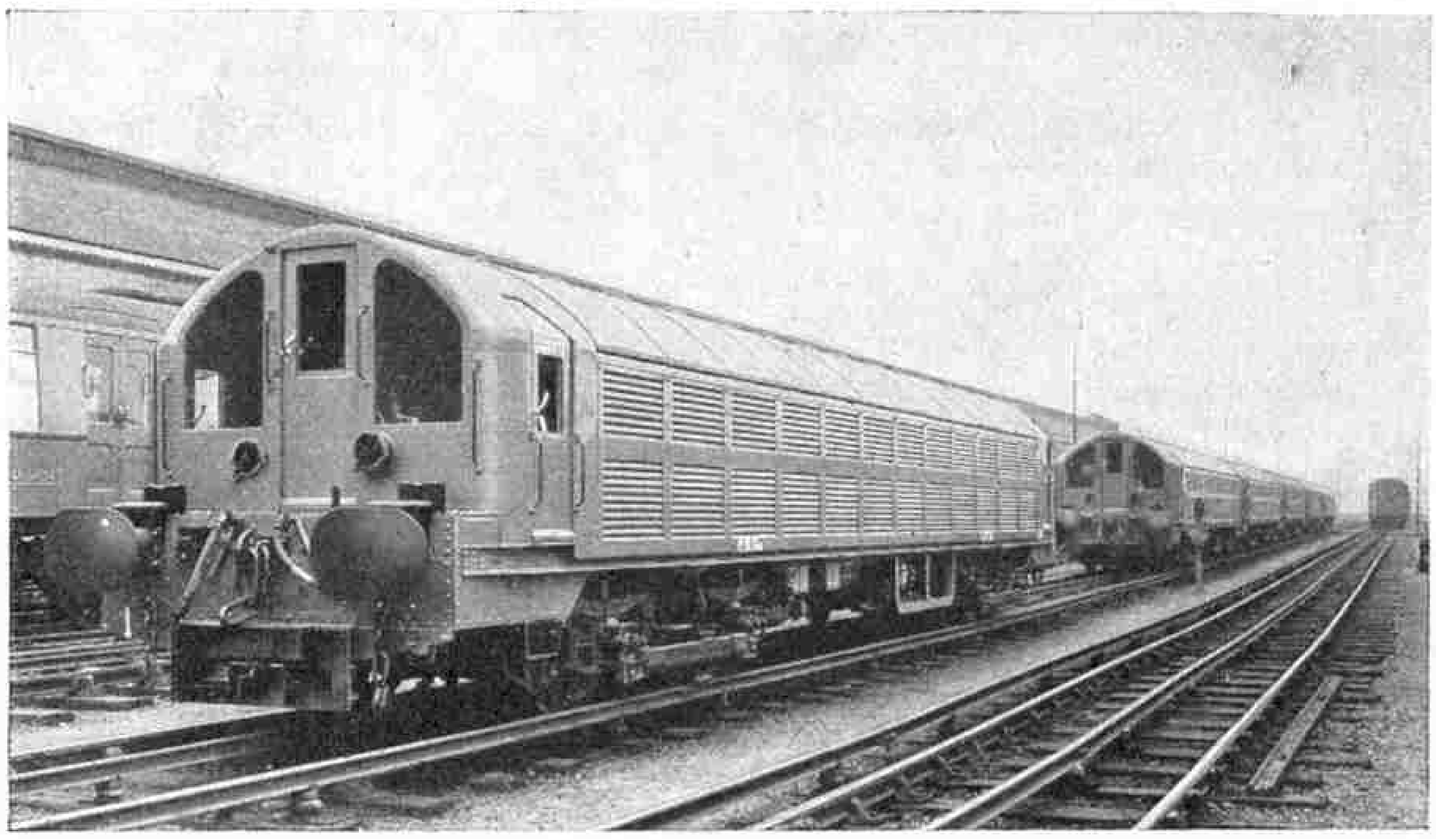
RAILWAY ENGINEER.

Battery Locomotives for London Transport

London Transport possess six special locomotives for constructional and maintenance work on its railway system. The appearance of these is shown in the lower illustration on this page. Each is arranged for either battery or third-rail operation, and they are called upon to meet very arduous conditions of service.

The work for which the locomotives are required includes the straightening of tunnels and the lengthening of platforms on the old Central London Railway, known as "The Twopenny Tube." The trains hauled by them operate over a distance of about 14 miles, picking up and unloading material such as rails, sleepers and ballast at different places en route.

Other work in which the locomotives are involved includes rail laying, concrete mixing, cable laying, ballast spreading, and yard shunting.



Battery locomotives used for maintenance and constructional work on the railway system of London Transport. Our illustration is reproduced by courtesy of The General Electric Co. Ltd., London.

Tank Locomotives for Malaya

Six 4–6–4 tank engines for the Federated Malay States Railways have recently been completed by the North British Locomotive Co. Ltd. They are known as the "C2" class and have two outside cylinders 14½ in. dia. by 22 in. stroke, with rotary-cam poppet valve gear driven off the middle pair of driving wheels.

The engines have a total wheelbase of 33 ft. 3½ in. and a coupled wheelbase of 10 ft. 11½ in. The diameter of the driving wheels is 4 ft. 6 in.

The total weight of the engines in working order is 74 tons 1 cwt., of which 37 tons 7 cwt. is adhesive weight. The boiler is pressed at 250 lb. per sq. in., and at 85 per cent. of the pressure the tractive force is 18,200 lb.

War Effect on American Railways

The European War against Hitlerism is having a marked effect upon railways in the United States. The expected rush of war orders has livened up the American steel industry, and the railways have been quick to profit by the increased traffic. Many of the railways are buying new box cars, the huge bogie covered wagons that are so characteristic a feature of freight trains in the U.S.A. There is also a boom in Diesel shunting locomotives, or "switches" as they are known in the United States.

Apart from the expected heavy freight traffic it seems likely that the American railways will have a bumper passenger traffic winter season.

O. S. NOCK.

The World's Most Travelled Dog

The story of the most travelled dog in the world was told in a recent issue of *"The Railway Gazette."* This was *"Owney,"* a little animal that crept into a post office at Albany, N.Y., one bitterly cold winter's night. He found some sacks on which he went to sleep, and next morning his pleading eyes and generally pathetic appearance made such an appeal to the clerks that they decided to adopt him.

The dog took a great interest in the work of the office, and often accompanied the sacks of mail to one of the stations. Later he travelled about with the sacks, and people hearing of his trips used to attach a label to his collar to show how far he had travelled. In time the weight of the labels became uncomfortable, and a special harness was made for him to carry these records in comfort.

"Owney" then went farther afield. He boarded a ship bound for Japan, and there attracted so much attention that he was decorated with a medal by the Emperor. After extensive travelling about the East, he was put on a ship sailing to New York and on arrival there he sought out a westbound mail car and set out for Tacoma, on the Pacific Coast, thus completing a journey round the world in 132 days.

At a dog show in San Francisco, *"Owney"* was given a silver medal as the most widely-travelled dog in the world. Unfortunately he grew ill-tempered with age and in August 1897 it was deemed necessary to destroy him, as he had severely injured a clerk in Toledo post office. His body was stuffed and is now displayed in a Museum at Washington, with the tags, labels, and harness he wore so proudly in life.

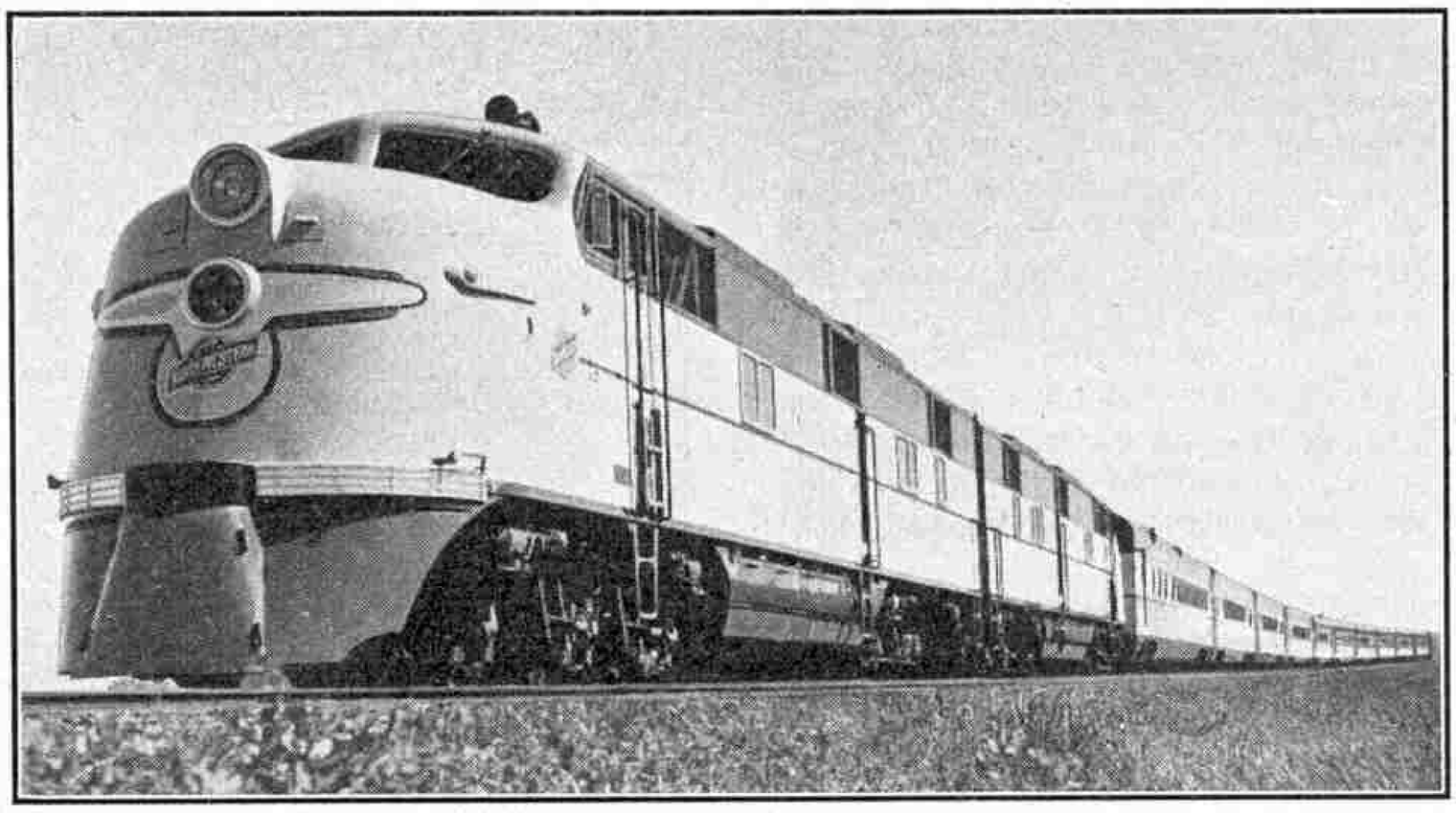
Speeding Up American Goods Trains

In the past 18 years there has been steady speeding up of American trains, with the result that in the first six months of 1939 the average speed between terminals was 64 per cent. greater than in 1920. Many freight trains now operate on what formerly were passenger train schedules.

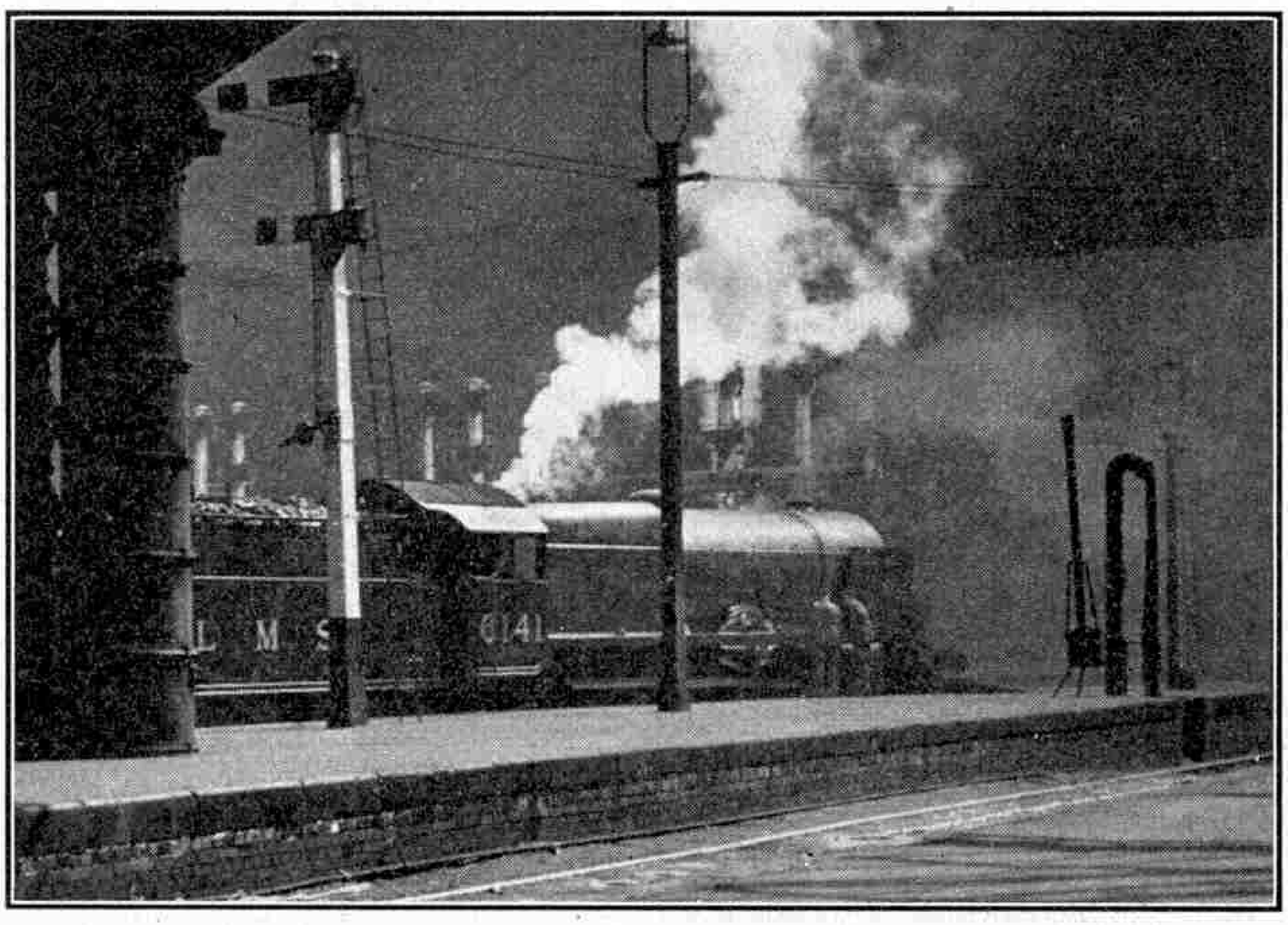
Tests under actual operating conditions have now been completed by the Association of American Railroads to see what improvements can be made in the construction of rolling stock bogies to make yet higher speeds possible. Twelve different types of bogies were used in the tests, which were made under varying speeds, loads, and in different weather and operating conditions. Each bogie was submitted to a series of separate test runs under a standard freight car that was part of a train containing electrical recording devices, gauges and other gear designed to record each impulse of the truck under different speed and load conditions.

Tests were made at the same time for the purpose of finding the impact effects on the track of the various makes of trucks. In order to do this an elaborate system of electrical devices was set up along the track to register the blows delivered by the wheels of the trucks passing over the rails.

The speed-up will facilitate the increasing goods traffic on American lines.



One of the 4,000 h.p. Diesel-electric engines hauling the new "400" of the Chicago and North Western Railway, to whom we are indebted for our photograph. The train runs between Chicago and the twin cities of St. Paul and Minneapolis.



Waiting for the "all clear." The scene in Lime Street Station, Liverpool, as the departure time of a London express approaches. Photograph by R. Watson, Burnley.

"The Railway Handbook" 1939-40

The sixth annual edition of *"The Railway Handbook"* provides the railway enthusiast with a concise and reliable collection of statistics and general information. It is chiefly concerned with the railways of Great Britain and Ireland, and has been revised and brought up-to-date with the latest available statistics. In it are such details as fastest runs, longest tunnels and steepest gradients, with sections on speed records, locomotives, carriages and wagons, permanent way and signalling. The electrification of steam railways also is dealt with, and the chronology of railway history has been extended to include recent items of outstanding importance. There is a useful index.

The price of the Handbook is 2/6, a low figure for so much information. It is published by The Railway Publishing Co. Ltd., 33, Tothill Street, London S.W.1.

L.M.S. Locomotive Stock Alterations

Since the commencement of war new engines put into traffic include 4–6–2s No. 6238 *"City of Carlisle"* and No. 6239 *"City of Chester,"* built at Crewe, and Class 4 0–6–0 freight tender engines Nos. 5686, 4596. Heavy oil engines Nos. 7085–7087 are also in service.

Among the engines condemned are the former L.N.W.R. 4–6–0s Nos. 25763 and 25805, and 4–4–0s No. 25323 *"Henry Ward"* and No. 25371 *"Moorhen."* D. S. BARRIE.

The Transport of Troops and Munitions

More than 5,500 special trains were run during the first three months of war for the conveyance of troops and munitions. The railways are connected by direct telephone lines to the War Office, the Admiralty and the Air Ministry, and every day they arrange at the request of the Service Departments to run special trains for transporting arms, guns, ammunition, wagons, baggage, stores and horses. Private sidings linked with Ordnance Depots and factories are served by trains that run to and from these centres direct.

A constant supply of gas cylinders is required to keep barrage balloons in the air and this has created an entirely new type of railway traffic. Special wagons known as "lowfits," the sides and ends of which drop, are employed on this work. Road vehicles loaded with gas cylinders are run direct on to the wagons.

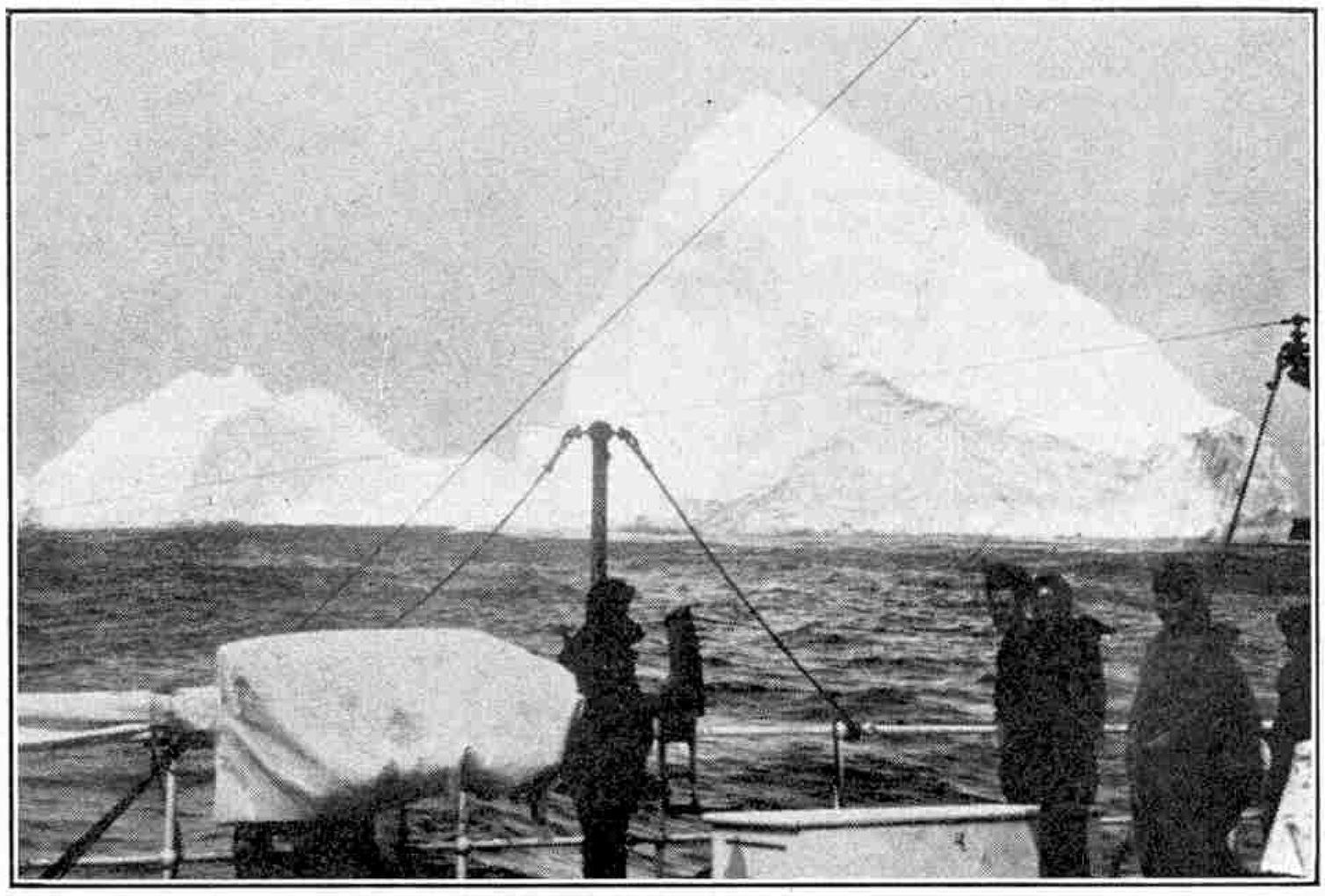
Artificial Eye that Detects Icebergs

Conquering an Atlantic Menace

By Pierre Devaux

THE North Atlantic has always been infested by icebergs, and these have always been a danger to shipping. The most notable case is that of the "*Titanic*," the 45,000-ton White Star liner that sank off Newfoundland with more than 800 passengers in 1912, after colliding with a giant iceberg. Early last summer iceberg fields held up King George VI's "*Empress of Australia*" for seventeen hours, making him late for the welcome that Canada had prepared for him and Queen Elizabeth.

The danger no longer lies in running head-on into a berg and so smashing up. Iceberg detectors have changed all that, so that with reasonable care the ship's captain can tell, miles in advance, of the approach of an iceberg or of a field of them. The danger lies in two facts about an iceberg. The first is that it drifts, sometimes at astonishing speed, and may bear down on a ship so fast that swift and sure manœuvring is necessary to avoid it. The second is that there is constant danger that the berg may turn over. It may melt so fast under water that from time to time it becomes top-heavy. When that happens to a berg that is 240 times the weight of the "*Normandie*," for instance, it would be fatal for any ship, of no matter what size, to be too close. The great caution used by King George's captain among the icefields seemed to a great many people excessive, but while the King coolly snapped pictures of the bergs, danger was constantly present.

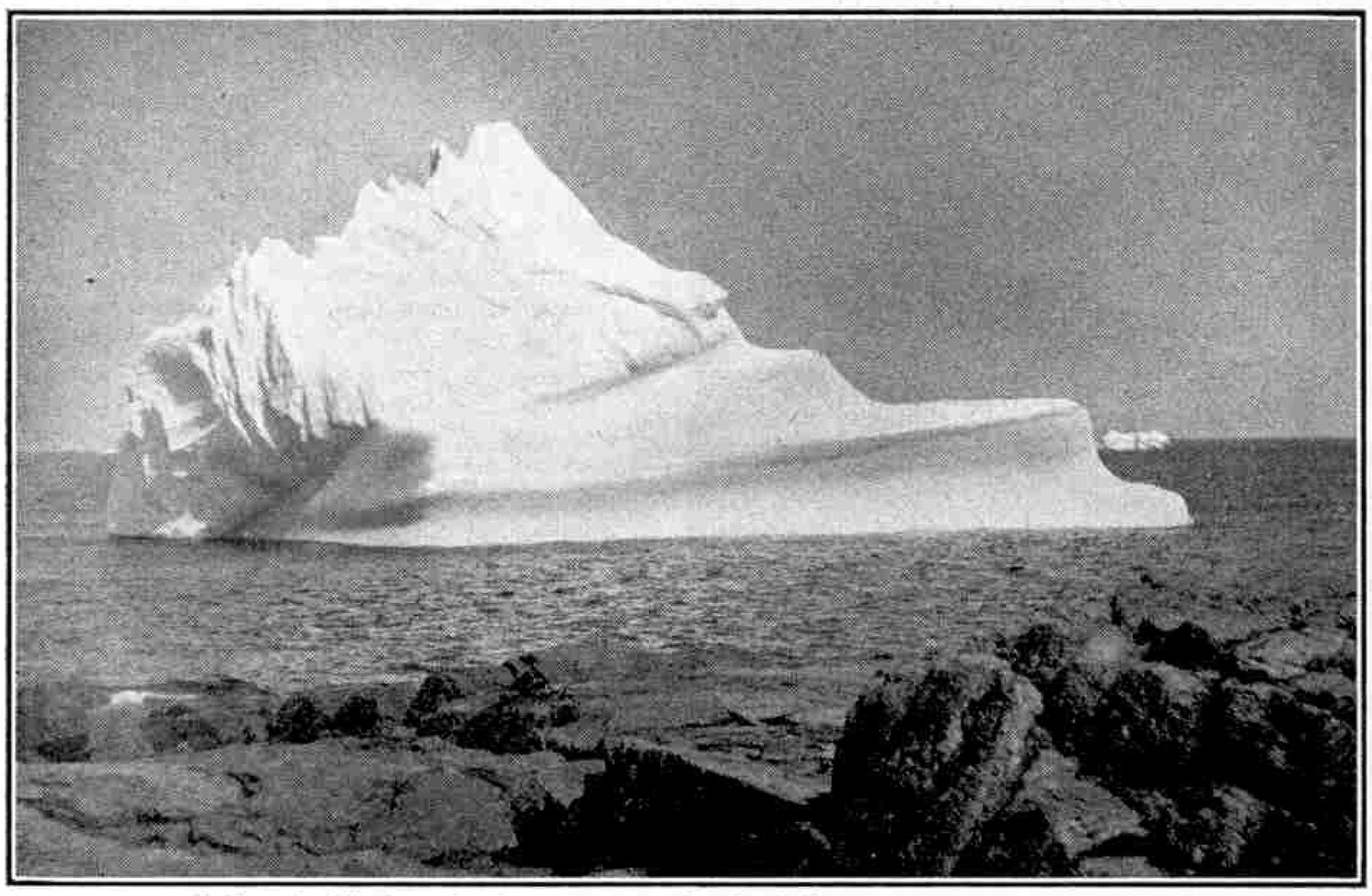


An iceberg in the North Atlantic Ocean, seen from the deck of a passing ship.

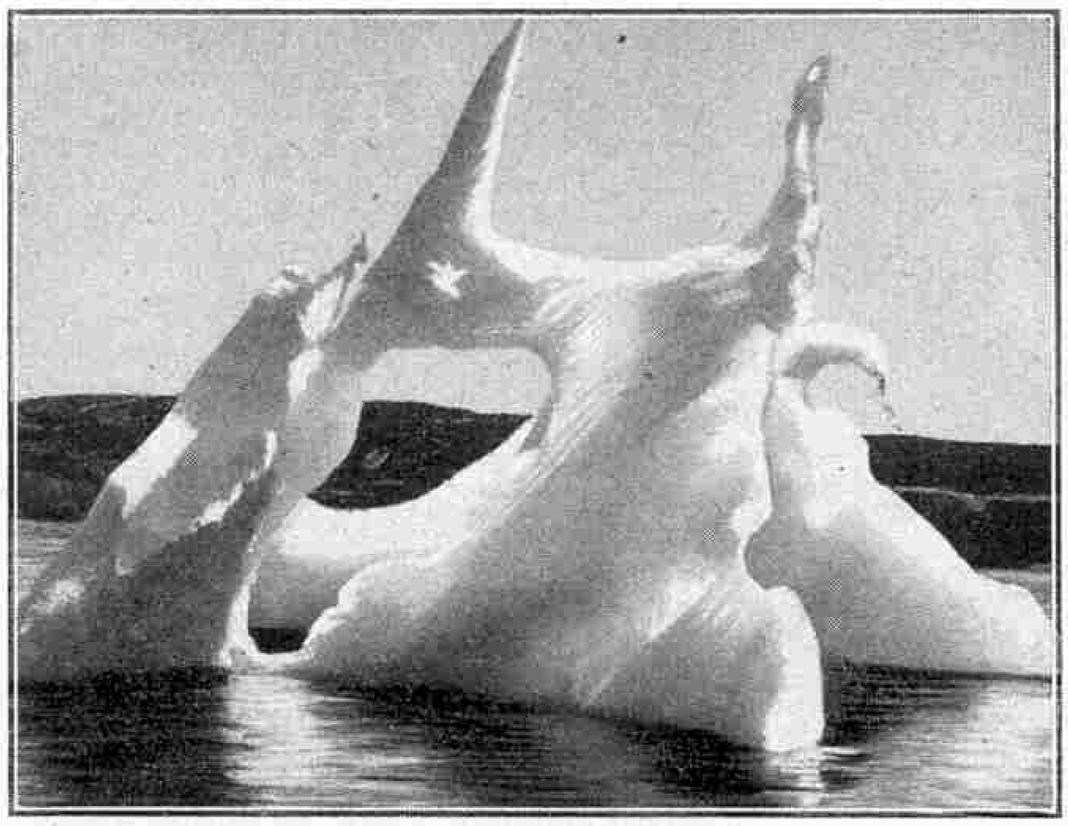
As is well known, icebergs are produced by glaciers, and Greenland is the chief purveyor of them for the North Atlantic. The glacier moves slowly down to the sea; scrapes along the coast bottom until the water is deep enough to float the ice; the end breaks off with a terrific crack, and there is your iceberg, starting off on its existence of floating about, turning over now and then with a tremendous commotion of the water around it, and generally annoying ships' captains.

The big blocks are caught by a north-south current that pulls them towards temperate waters. At the same time they are steered gently towards the North American coast by the action of the Earth's rotation. This rotation at the equator is more than 1,500 ft. per second, while at the poles it is non-existent. Thus, moving towards the part that plunges swifter and swifter eastward, they are deflected westward as they go south.

Icebergs dimensions are colossal. Specimens have been noted that rise more than 300 ft. out of the water, which means that at least another 2,400 or 2,500 ft. are under water, giving them a weight several hundred



A Greenland iceberg that has run aground on its drift southward towards the Atlantic.



A North Atlantic iceberg in decay.

times that of the biggest liners.

Since the Greenland glaciers are none of them as thick as that, it must be concluded that the berg started out as a flat piece and later turned on its side, from being horizontal becoming vertical. Imagine what would happen to the "*Normandie*" or the "*Queen Mary*" if caught near the berg at that moment. Sooner or later, with the water growing warmer and warmer as the berg drifts southward, the underwater section melts and presently there is another overturn.

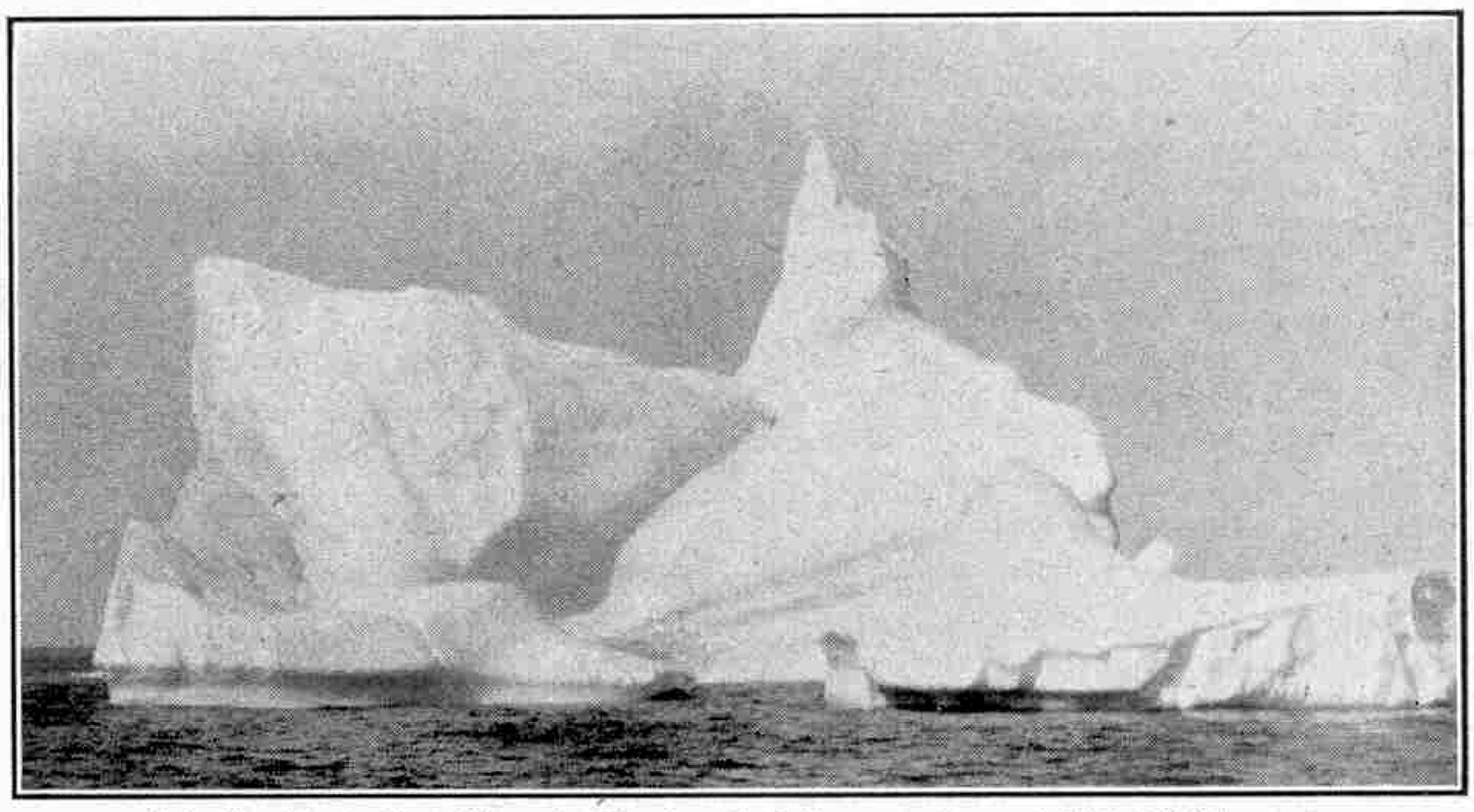
It is estimated that a total of nearly 7 cubic miles of icebergs, or about 32,000,000,000 tons, floats around in the Atlantic every year, disturbing the climate, causing rains, fogs, and snow. This drifting ice consists not only of bergs but also of ice floes, which have broken off from Arctic fields, and float southward. Such floes have been known to measure as much as half a mile by two miles, and when such floes collide the shock is indescribable.

To avoid danger an iceberg must be detected at a distance of at least six miles, in order to give the ship time to steer clear or to stop. The first safety contrivance was one for detecting cold, and consisted of a tiny thermo-electric battery or a special electric eye located at the focus of an oscillating parabolic mirror. Whenever the mirror happened to point to a mass of ice, it would set off an alarm.

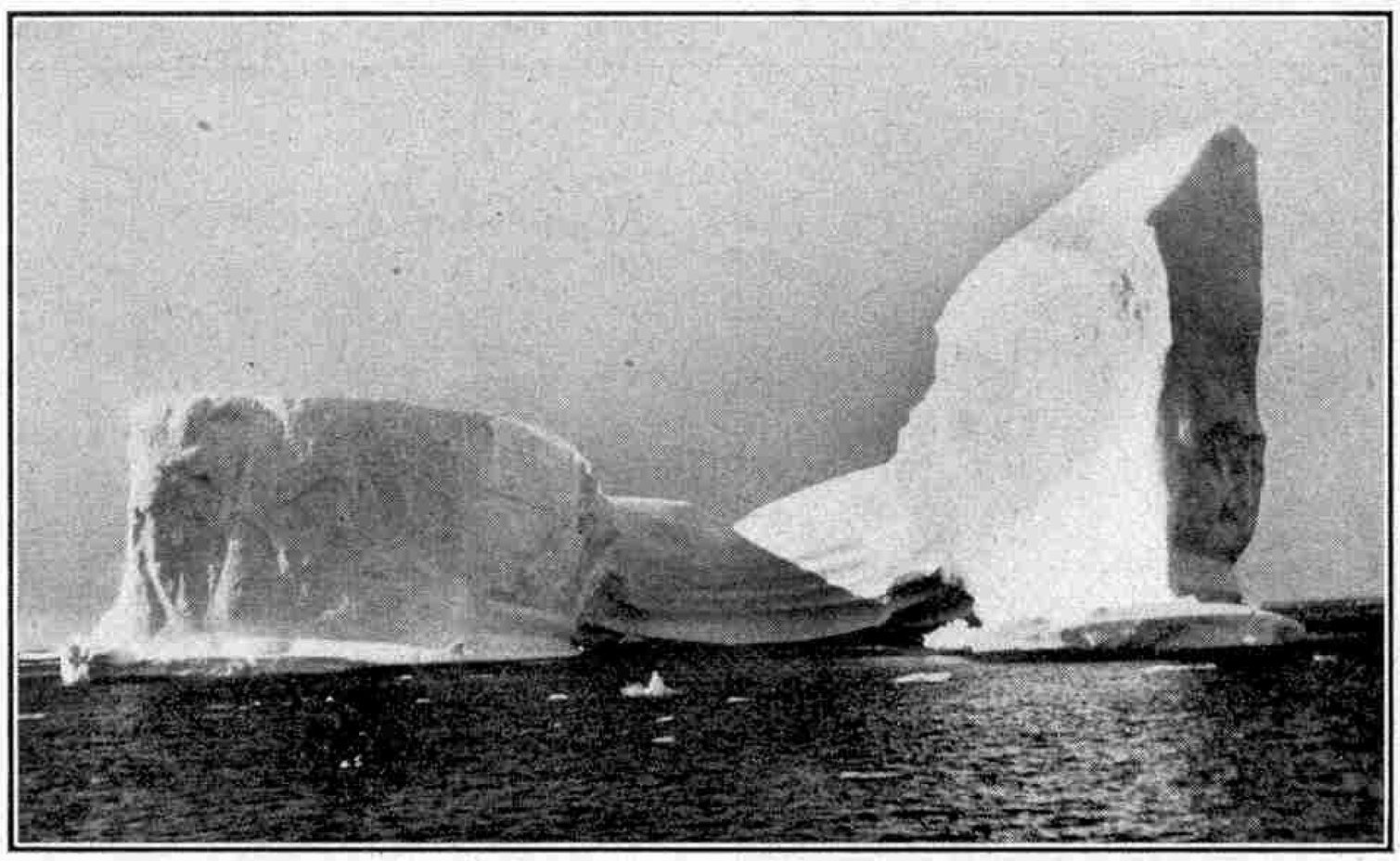
That method did not seem to give adequate results, and so another method was contrived, based on the principle of the echo. Vibrating piezo-electric quartz, producing and receiving back sound too fine for the human ear to perceive, revealed the presence of icebergs or other masses reflecting the sound. Reflected by the bottom of the sea, this fine vibration allowed a ship to proceed with constant sounding, like a blind man advancing with a tapping cane. Directed horizontally, the apparatus made it possible to detect submerged rocks and the bases of icebergs.

A different and complete solution of the problem has been found by a French company. This uses infra-red rays, sent out by a projector, reflected by the part of the mass that is above water, and received on their return by a parabolic mirror detector. One of the advantages of the infra-red ray method is its speed, that of light, which is some 180,000 miles per second, making the detection instantaneous as well as accurate. The sound in the echo method has a speed of only some 5,000 ft. per second in the water, so that with this method the ship advances measurably while the detection is being made.

The infra-red ray method apparatus includes two parabolic mirrors, one sending, the other receiving, oscillating synchronously. They are placed in the open at the bow of the ship, and are electrically connected with a cathodic oscillograph or television tube, located in some convenient place in the ship. When an obstruction occurs ahead, the mirrors turn in that direction, the alarm sounds, and the luminous spot on the oscillograph accurately indicates the distance away of the mass and in what direction it is.



A floating island of ice with a spire-like pinnacle. Icebergs may have a height of 300 ft. or more.



Icebergs often assume fantastic shapes as they melt and decay. This one suggests a ruined castle.

AIR NEWS

The "Chilton" Light Monoplane

The illustrations on this page show two views of the "Chilton," a very efficient British ultra-light monoplane. It was designed with the object of producing a light aeroplane that would be inexpensive to buy and maintain, cost no more than a motor cycle to operate, and yet have a sufficiently high performance to be really practical. The actual running costs of this single-seater amount to less than a halfpenny a mile at 100 m.p.h.

The "Chilton" is a low wing monoplane, with a wing that is only 24 ft. in span and is built in three sections. The parallel centre section is let into the underside of the fuselage and to it the undercarriage is attached. Split trailing edge flaps extend over half the length of the wing. The open cockpit is roomy, as the top illustration on this page indicates, and is well equipped; and there is a windscreen to protect the pilot. A metal bulkhead is fitted between the cockpit and the engine in the fuselage nose.

Any type of engine up to 180 lb. in weight can be used. When fitted with a 44 h.p. Train 4T engine, the "Chilton" has a top speed of 125 m.p.h. and cruises at 112 m.p.h., a fine achievement for such a small machine, and one that allows of really practical cross-country flying, even against strong headwinds. The standard range of this monoplane is 400 miles, and the all-up weight is 650 lb.

The 100th Transatlantic Flight

The arrival of the Boeing flying boat "*American Clipper*" at Washington, U.S.A., on 18th December 1939 marked the completion of 100 transatlantic passenger flights by Pan American Airways. A total of 1,786 persons have made the full trip, and many others have flown to intermediate call points. The total amount of air mail carried since the P.A.A. service started on 20th May last year up to the 100th trip was 81,013 lb.

The United States Civil Aeronautics Authority is reported to have sanctioned the proposed Pan American Airways service to New Zealand. The service will be a fortnightly one, and it is unlikely that passengers as well as mails will be carried at first. The route selected and prepared lies by way of Los Angeles, where the air liners will take off for the flight across the Pacific ocean to Honolulu. The next calling point is Canton Island, where an overnight stop will be made before the flight is resumed to Noumea in New Caledonia. The final section of the trip is from Noumea to New Zealand. Three survey flights over the route have been carried out.

New Japanese Air Services

An agreement between Japan and Thailand (Siam) signed in Bangkok on 30th November last year provides for a regular air service between Japan and Thailand, to be inaugurated this month. The service will greatly facilitate the transport of air mail to Europe, and letters from Japan to European destinations will then take only a week on the way.

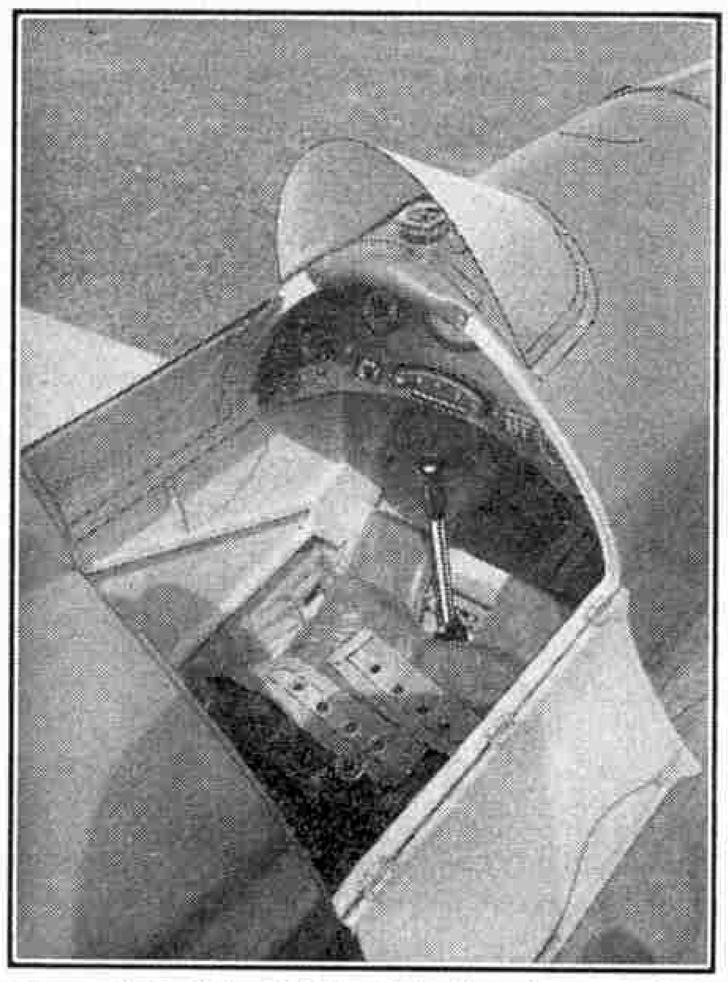
An air service between Tokio and the Japanese mandated islands in the South Pacific is to be established this year. These two new services and other projects being planned will increase the total mileage of Japanese air lines to nearly 17,000 miles, or more than double the present total of about 8,300 miles.

A Light Aeroplane Record

A new world distance record for ultra-light aeroplanes was set up recently by H. Chapman, an air pilot of New Orleans, U.S.A. He flew non-stop from New York to New Orleans, a distance of 1,186 miles, at an average speed of 88 m.p.h.

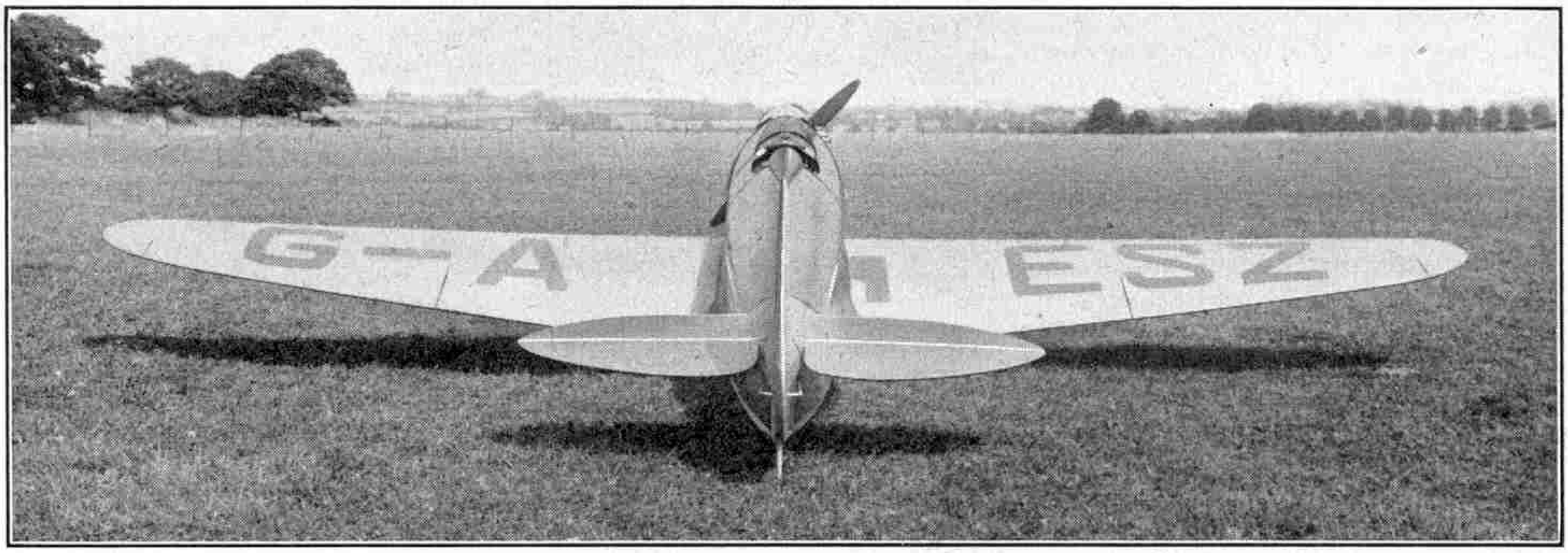
A Family Takes to the Air

A family named Young, of Fort Morgan, Colorado, U.S.A., must be one of the most airminded in the world, as the father, his three sons and his two daughters all possess air pilot's licenses. One of the sons has a commercial pilot's license, and has been flying for several years. After qualifying for his instructor's license he taught the other members of the family to fly. The solo flying that formed a necessary part of the tuition was accomplished by the pupils in turn in a Piper "Cub" light aeroplane belonging to two of the sons and kept at their own aerodrome.

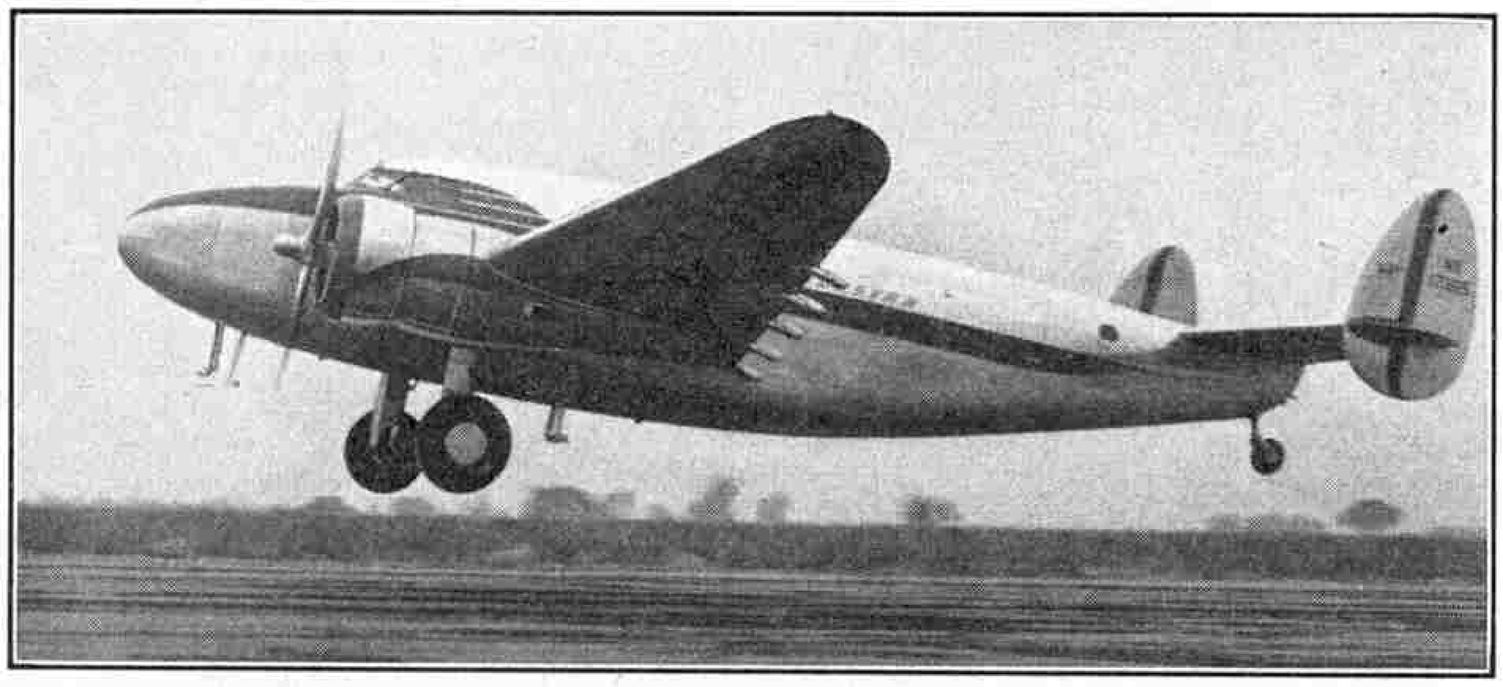


The cockpit of the "Chilton" single-seater monoplane.

The success of the Young family indicates that flying, like Meccano, suits all ages, as the father is 59 and the youngest daughter is only 17.



A rear view of the "Chilton" that shows the graceful wings and tail, and the nicely tapered fuselage. The photographs on this page are by courtesy of Messrs. Chilton Aircraft.



The "Lodestar," the latest Lockheed commercial transport. It is a middle wing monoplane seating 17 passengers. The photographs on this page are reproduced by courtesy of the Lockheed Aircraft Corporation, U.S.A.

New R.A.F. Appointments

The increase in the strength of the British Army in France has involved some modification in the organisation of the Air Forces required for the necessary co-operation and support to the Army. A new Air Command, called "British Air Forces in France," has been formed, with Air Marshal A. S. Barratt as Air Commander-in-Chief. He will be responsible, in consultation with Army Commanders-in-Chief, for ensuring the most effective support by the Royal Air Force for the B.E.F. and the French Armies on the Western Front.

Air Marshal Barratt has been closely connected with the Army and understands its needs. He served for a considerable period in France during the last war and in 1918-19 he was attached to R.A.F. Headquarters in Cologne with the British Army of Occupation. Recently he has been serving as principal R.A.F. Liaison Officer with the French Forces.

The new appointment does not involve any change in the principle that governs the relationship between the Army and the Royal Air Force, and it will assure the closest co-operation between the two Services in the field.

A change in the Air Council has also taken place. Air Marshal Sir Christopher Courtney succeeds Air Vice-Marshal Welsh as Air Member for Supply and Organisation. Air Marshal Courtney served in the naval wing of the Royal Flying Corps, and recently returned from Canada where he was a member of the Dominion Air Training Mission.

Big Hangar for Australian National Airways

A hangar 150 ft. wide, and said to be the largest in the southern hemisphere, was completed recently at Essendon, for Australian National Airways. The company have ordered two Douglas DC-3 air liners for use on their services between Melbourne, Sydney and Tasmania.

Flying Boat's New Colour

The Tasman Empire Airways flying boat "*Aotearoa*" now has a large area of the upper surface of its wings painted a deep pink, as this colour has proved to show up better against the surface of the sea than the familiar silver-grey shade. This flying boat last September carried out survey flights between Sydney, Australia, and Auckland, New Zealand.

The "*Aotearoa*" is one of three modified "C" class flying boats delivered to Tasman Empire Airways last year. The other two are named "*Awarua*" and "*Australia*" respectively.

Ranks of the Royal Air Force

The ranks of the Royal Air Force are generally recognised nowadays, but even the initiated are sometimes puzzled to align them with their naval and military equivalents. At the top is Marshal of the Royal Air Force. This ranks with Admiral of the Fleet and Field Marshal.

The next rank is Air Chief Marshal, corresponding with Admiral and General; then Air Marshal, which equals Vice-Admiral and Lieutenant-General. Sir Cyril Newall, Chief of the Air Staff, and Sir Hugh Dowding and Sir Edgar Ludlow-Hewitt, Commanders-in-Chief of Fighter and Bomber Commands respectively, are Air Chief Marshals. The remaining "Air" ranks are Air Vice-Marshal and Air Commodore, which have as their military equivalents Major-General and Brigadier.

In descending order the remaining commissioned ranks are Group Captain, Wing Commander, Squadron Leader, Flight Lieutenant, Flying Officer and Pilot Officer, including Acting Pilot Officer. These ranks correspond to the following ranks in the Army: Colonel, Lieutenant-Colonel, Major, Captain, Lieutenant and Second Lieutenant.

The airmen's ranks are comparatively easy. Warrant Officer is the erstwhile Regimental Sergeant Major, the modern Army name also being Warrant Officer. Flight Sergeant ranks with the Company Quartermaster and Colour Sergeant; while Sergeant and Corporal are the same as those ranks in the Army. Leading Aircraftman, Aircraftman 1st Class and Aircraftman 2nd Class rank with Trooper, Gunner, Sapper and Private of the Army, or with Able Seaman and Ordinary Seaman of the Navy.

Women "Ferry" Pilots

A Women's Section of the Air Transport Auxiliary Service, under British Airways Ltd., has been formed, and the qualified pilots accepted after test are employed to fly new R.A.F. light training aircraft from the factories where they have been produced to flying schools, or to aircraft parks for storage until required. The section has been placed in charge of Miss Pauline Gower, an experienced commercial air pilot who qualified for her "B" license as long ago as 1931. At present eight women pilots are engaged in this service.

Finnish Air Service Resumed

The regular air service between Sweden and Finland was resumed a few days before Christmas last year. It is operated by Swedish Air Lines, and one flight in each direction is made daily. The liner leaves Stockholm at 8.30 a.m., and after calling at Sundsvall it flies across the Baltic Sea to Vasa, on the Gulf of Bothnia and the present Finnish terminus of the service. The return flight begins at 12.10 p.m. Swedish time, and the machine arrives back at Stockholm at 3.35 p.m.

Guggenheim Medal Award

The Daniel Guggenheim Gold Medal for 1939 has been awarded to Mr. Donald Wills Douglas, President of the Douglas Aircraft Company, Santa Monica, U.S.A., for "outstanding contributions to the design and construction of transport aeroplanes." This is the second official recognition Mr. Douglas has had of his work in this direction, as in 1935 he received the Collier Trophy in respect of his valuable work in "the development of twin-engined commercial transport aircraft."

After graduating at the Massachusetts Institute in 1914 he was appointed Assistant in Aeronautical Engineering there, and later he was chief designer to the Aviation Section of the United States Army Air Corps.

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A new version of the Taylorcraft light monoplane has been produced. It is fitted with a 90 h.p. Cirrus "Minor" engine, and has a cruising speed of 102 m.p.h.

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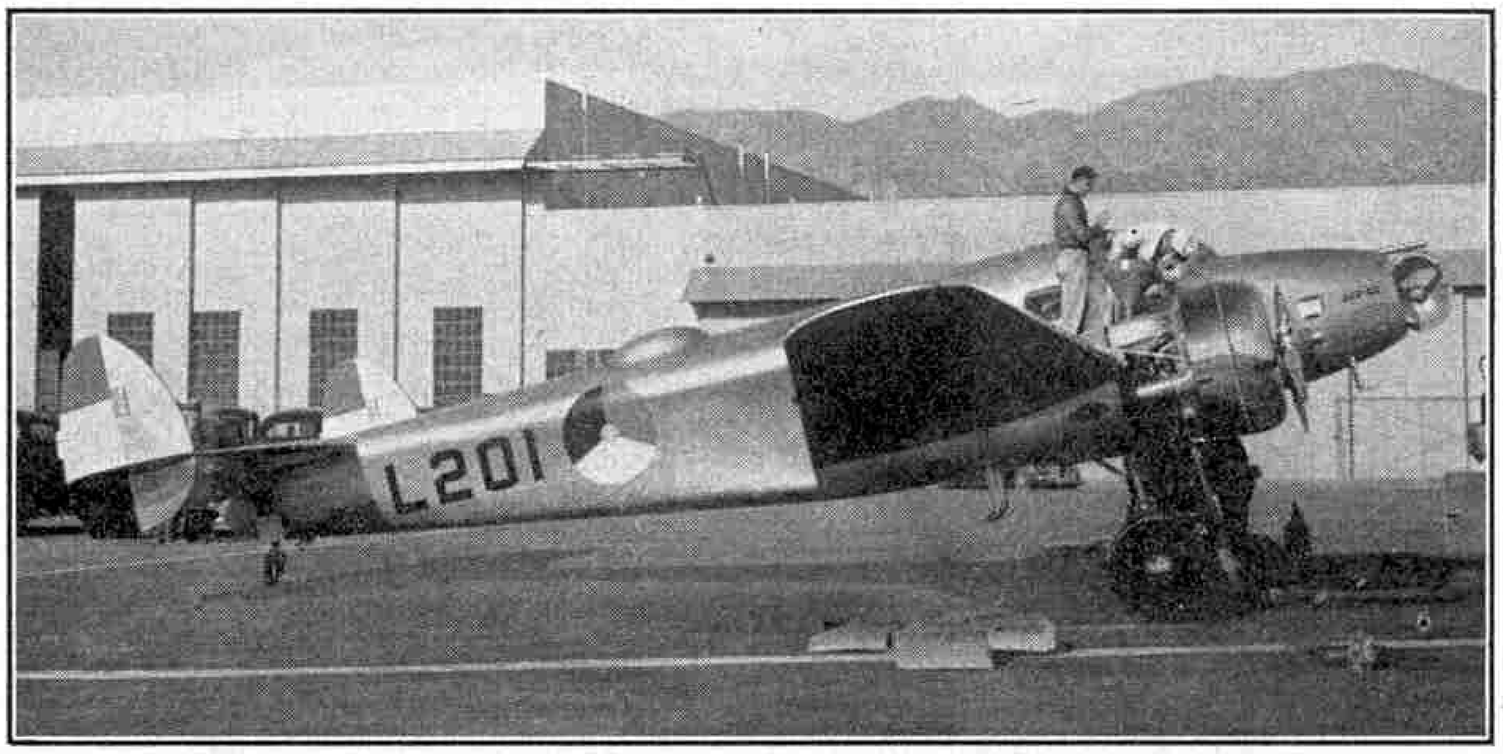
The aircraft of Trans-Canada Air Lines flew a total of over 2,500,000 miles during 10 months January-October last year.



A fine photograph of the first of a fleet of 12 Lockheed "212" military aircraft ordered by the Colonial Government of the Netherlands East Indies.

Building a Great Bridge

Novel Cranes for Work in India

THE upper illustration on this page shows one of two special creeper cranes that have been designed and built by the Wellman Smith Owen Engineering Corporation Ltd., in collaboration with the Cleveland Bridge and Engineering Company Ltd., for service in the construction of a great new bridge that is being built across the River Hooghly, India. Known as Howrah Bridge it is a cantilever structure having a central span of 1,500 ft. and two short arms of 325 ft. It will carry a roadway 71 ft. wide and two footways each 15 ft. wide, and its main towers will rise to a height of 320 ft. above water level. Construction is to be carried out simultaneously from the two banks of the river, and one of the special creeper cranes is being supplied for use on each side.

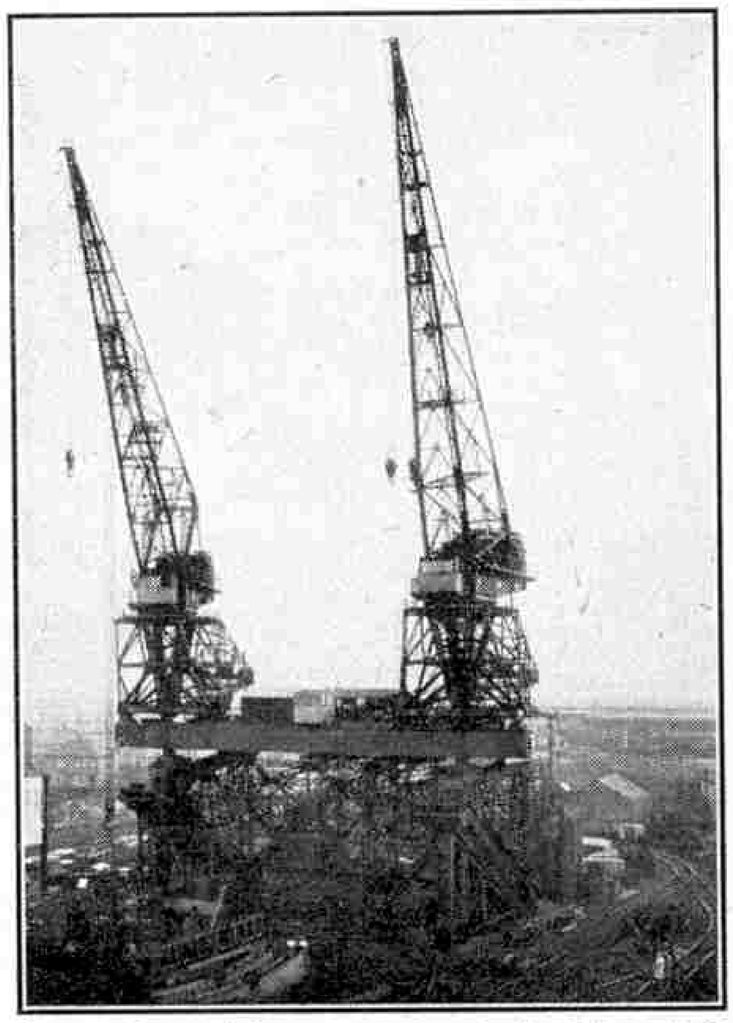
The mechanical parts of the cranes were all made by The Wellman Smith Owen Engineering Corporation Ltd., and the structural parts by the Cleveland Bridge and Engineering Company Ltd., the builders of the bridge itself.

Each crane will travel along the top chord of the bridge during construction and will handle loads up to 60 tons. At first each crane will be required to mount the chords of a shore arm, which lies at an angle of approximately 30 deg. to the horizontal. Then, after passing the apex of the tower, it will descend the cantilever chords at angles that vary from approximately 22 deg. at the tower to about 9 deg. near the end of the arm, finally passing on to the level surface of the suspended span.

Each crane assembly consists of two 60-ton slewing derricking cranes mounted on a single massive undercarriage. In order to allow for the varying angle of inclination of the girders on which the crane will work, the upper part is mounted on pivots, with heavy and powerful screw gear at the rear, by means of which the crane mast may be kept in the vertical position.

Since the section of the bridge chords varies from point to point, it is necessary for smooth travelling to provide "fleeting tracks," which consist of heavily stiffened box girders with rails on their upper surface, which can be placed on the bridge chords to form a uniform runway. These tracks will be laid in front of the crane, and as it travels forward those at the rear will be picked up and relaid in front. The same tracks will be used on the anchor arms as on the cantilever chords, but to provide for the large angle of slope, a special cradle will be placed between them and the crane proper when on the anchor arm. The upper surface of the cradle is sloped at such an angle that when the apex of the tower has been reached the crane will be able to run off it on to tracks laid on the cantilever arms.

In addition to the main 60-ton hoist each crane is provided with a 20-ton auxiliary hoist that has a change speed gear for loads up to 5 tons. Apart from handling light loads this smaller hoist will be used for giving a steadying pull when long girders are being lifted by the main hoist.



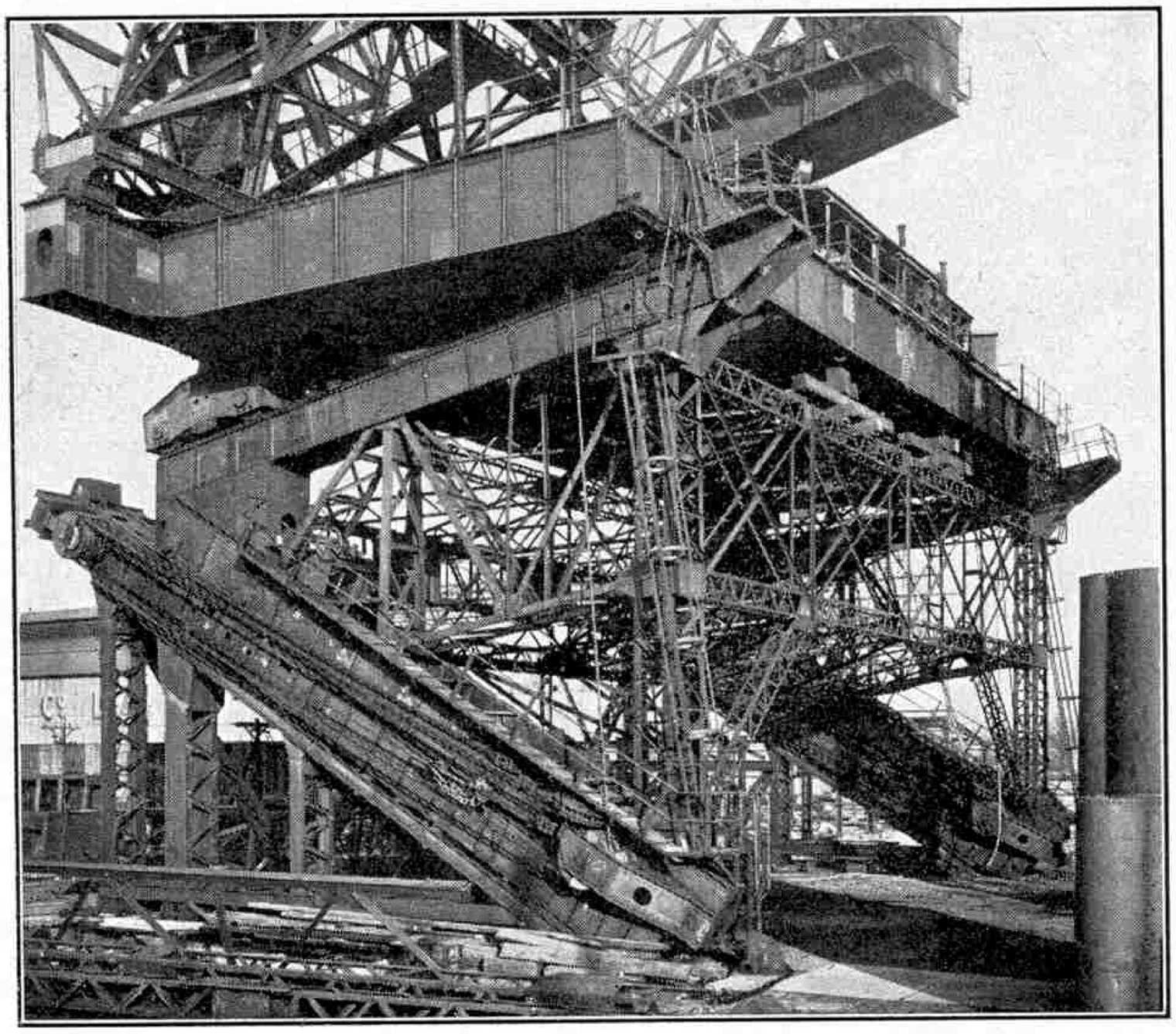
One of the special creeper cranes designed for use in the construction of Howrah Bridge across the Hooghly River, India, which are described on this page. This photograph and the one below are reproduced by courtesy of The Wellman Smith Owen Engineering Corporation Ltd., London.

On account of the great height of lift, which at the maximum is 459 ft., the hoisting rope is wound on the barrel in three layers, and a reeling gear is provided to lay the rope accurately. This feature is of real importance, since the increase in effective diameter of the barrel from layer to layer could appreciably alter the relative positions of the two hooks if the winding were not accurate. Safety devices are provided to prevent overload on the hoist gears, and in addition to electro-magnetic brakes, there is a powerful foot brake, capable of easily handling the full load.

The undercarriage on which the two cranes stand, and also the cradle when it is in use, are travelled by means of four hauling ropes attached to winches on the undercarriage. The ropes are in two duplicate sets, one set being on each side of the bridge and if the crane moves out of line it is possible to lock the winch on one side and operate the other and so bring the crane back to square with the sides of the bridge. The ropes are led over sheaves on the undercarriage and cradle and are anchored to the fleeting tracks.

Powerful hydraulic brakes of a special type are provided for controlling the cranes when working on the slope. When working on the level suspended span, one of the duplicate sets of hauling ropes and its winches will be removed in order to reduce weight. The other set of hauling ropes will then be used as a controlling medium and the crane hauled forward by means of hand winches mounted on the crane.

When the crane has taken up a working position, it will be securely locked to the fleeting tracks, and provision is made to ensure that this operation is carried out before current can be switched on to the hoisting motors.



A close-up of the cradle and "fleeting tracks" of one of the creeper cranes for Howrah Bridge.

HOW THINGS ARE MADE:

Handles

By F. W. Farley

NEARLY all the articles of every-day life are now made by machinery, but it was long before suitable machines for turning out tool handles quickly and in large quantities were invented, and the fashioning and shaping of handles to suit all uses was entrusted to craftsmen who had the skill necessary to produce, by hand methods, the smooth and perfectly balanced handles that we now take for granted. It is machinery that has made such a constant high standard possible, however, for when a suitable design has been evolved for pick, rake or hammer handle, one setting of the cutters of the modern handle-making machine will enable the operator to turn out as many exact replicas as required. There are many types of handle produced for the various tools, different designs for the same handle having grown up in the country as a result of the localisation of the old hand industry.

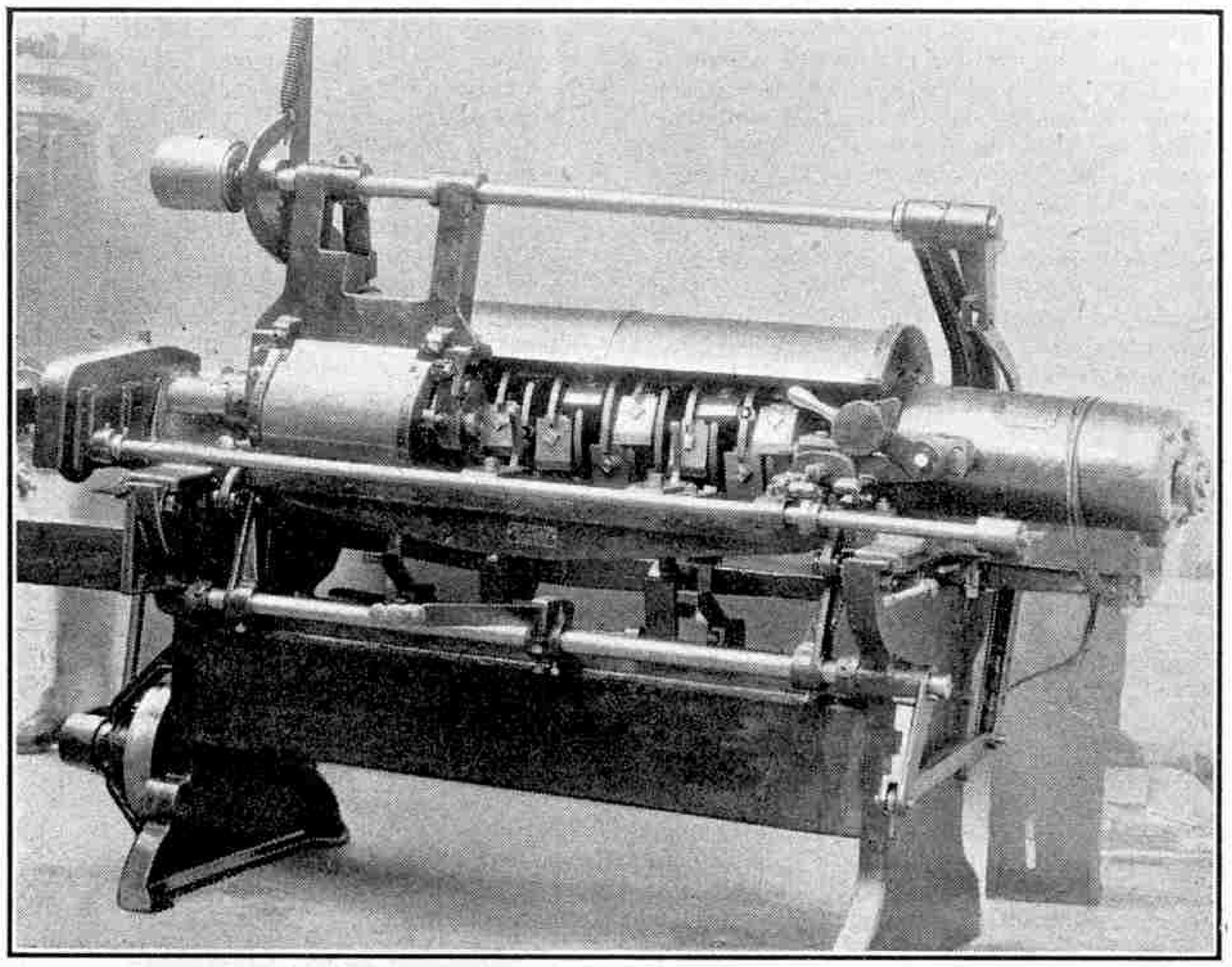
All varieties can be made by the latest machines, a typical example of which is illustrated here. The photograph shows a 42 in. combined spoke and handle turning machine, which can fashion the shafts for colliery axes, all kinds of sledge and hammer handles, pick handles and wagon spokes. The wood is held between centres in the same way as in a wood-turning lathe, but the shaping is carried out by means of revolving cutter heads with three knives, and turning on a carbon steel spindle at a speed of 2,500 to 3,000 r.p.m. Both sets of cutters come into action as the wood turns slowly in the lathe, and because of their design and speed they produce a remarkably smooth finish that needs very little sanding. This point is an important one that must be taken into account when a large output is required.

Not the least wonderful feature is the speed at which these machines turn out the finished work; heavy long handles are made at the rate of four per minute, and smaller ones at five or six per minute. When one considers the quite complicated shape of, say, an axe handle, this is no mean feat. The oval shapes are made by means of a cam on the work spindle, so that the wood moves from side to side as well as revolving.

When quantities of round handles or poles are required, these are made with a high-speed automatic rounding machine. To take an example, the 2 in. machine can make hickory shunting poles at the rate of about 2,500 per day. The squares of timber are drawn into the machine by a pair of toothed rollers at the front, which, with the metal guide on which the timber rests, are shaped to fit the square of wood. The rapidly revolving cutter head fitted with four knives rounds the pole, and the shaped withdrawing rollers help to draw the completed work out of the machine. The cutters and gearing are enclosed for safety and to protect all parts from the wood chippings, while the two electric motors that provide the power are housed in the body of the machine. The larger motor drives the cutter head, while the feed and drawing rollers are driven by a four-speed motor, by which poles can be fed through at speeds of 40, 60, 80, and 120 ft. per minute. These rollers are also self-centering, which means that whatever size of wood is put through, it is always kept opposite the centre of the cutter head, which is essential to ensure correct roundness. The same cutters can be adjusted in a few minutes to cut rounds of various sizes.

For all handles that have to stand up to heavy work and resist shocks, hickory is used, as for example in riveting hammers, picks and felling axes; while handles for chisels, brushes, rakes, hoes and hayforks are made of ash.

Hickory is not obtainable in this country, and most of the wood used is imported from America, where it grows in the Eastern United States. The four important varieties have the rather queer names Shagbark, Bigleaf, Pignut and Mockernut. The wood is specially important for its toughness, with which it combines great strength and resistance to bending strain. This is most necssary in such things as railway shunting poles.



Combined Spoke and Handle Turning Machine. Photograph reproduced by courtesy of W. A. Fell Ltd.

There is not sufficient English ash available to satisfy the demand, and the wood is imported from America, which produces seven commercially important kinds of ash, the most common being white, green and black ash. Handles obviously need a tough wood, and in this respect ash is particularly suitable.

ENGINEERING NEWS

500-ton Hobbing Press

The extensive use of plastic materials for making all kinds of commercial articles has led to the introduction of special machines for producing the moulds in which the articles are formed. Moulds of deep and complicated shape usually are made by a die-sinking machine employing a high-speed rotating cutter, the movements of which are guided either from a marked-out contour or from a pattern or former. There are many small and simple parts such as knobs and bottle closures, however, the moulds for which can be produced more rapidly and cheaply by indenting them in a hydraulic press. The larger of the two illustrations on this page shows a 500-ton press designed for this purpose by T. H. and J. Daniels Ltd., Stroud. The press is operated hydraulically and consists of a single steel casting that carries the ram cylinder, with a moving table at the bottom and a fixed table at the top. The working pressure is 2½ tons per sq. inch, and as the ram cylinder is 16 in. in diameter the total applied pressure is 500 tons.

The moulds are produced from what are known as a master "hob." This is an exact replica of the article to be produced and is prepared from special toughened steel. It is fixed to the top table of the press, and a blank of highly polished ductile mild steel is fixed on the bottom table, which is attached to the moving ram. The hydraulic pressure is then applied, the ram with the bottom table moves up and the blank is pressed against the master "hob," thus producing the required cavity. The surplus metal that has flowed out is then machined from the top of the blank, which is then case-hardened and repolished. The required number of these cavities are then assembled in a chase and the resultant mould is ready for use.

The pressure required on the hob to give a good impression in the blank is about 100 tons per sq. inch. Thus it will be seen that "hobbings" up to about 5 sq. in. in area or 2½ in. in diameter may be undertaken on a press of the size illustrated on this page. Larger presses capable of exerting pressures up to 3,000 tons are available for bigger or extra deep hobbings.

A Caravan Trailer Ambulance for A.R.P.

The lower illustration on the following page shows a trailer ambulance that has been designed by Coventry Steel Caravans Ltd., for A.R.P. work. The vehicle is suitable for towing behind a medium-sized private car and carries four steel wire mesh stretchers. Accommodation is provided also for three sitting cases and an attendant and additional sitting cases could be carried in the towing car if necessary.

The ambulance is available in two models, the larger one of which is 10 ft. long and 6 ft. 4 in. wide, and has an interior height of 6 ft. The inside is enamelled white and has flush-panelled walls that are easy to keep clean. The floor is arranged at as low a level as possible, so that the driver and his assistant can lift the stretchers into the ambulance with less effort to themselves and discomfort to the patients than is entailed when loading stretchers into a normal van.

A supply of water for drinking or washing is provided and a basin is installed beneath the water tap. The windows are paned with special safety glass, which admits a subdued light but makes the interior invisible to people outside the vehicle.

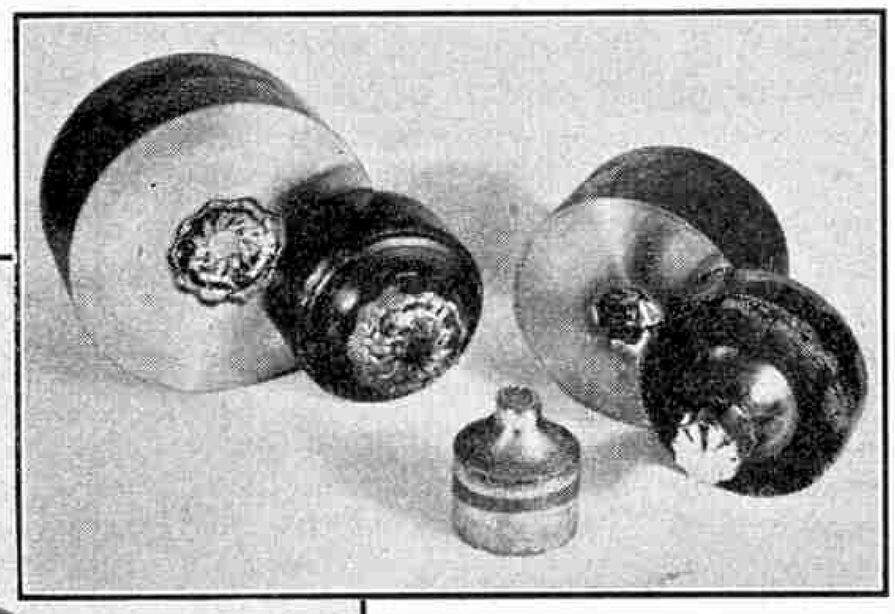
The heating arrangement in the larger model is a blue flame oil stove contained in a steel cabinet, which has a chimney passing up and along the length of the roof and out at the rear of the ambulance. Fumes and hot air pass along this pipe and at the same time heat it up very efficiently.

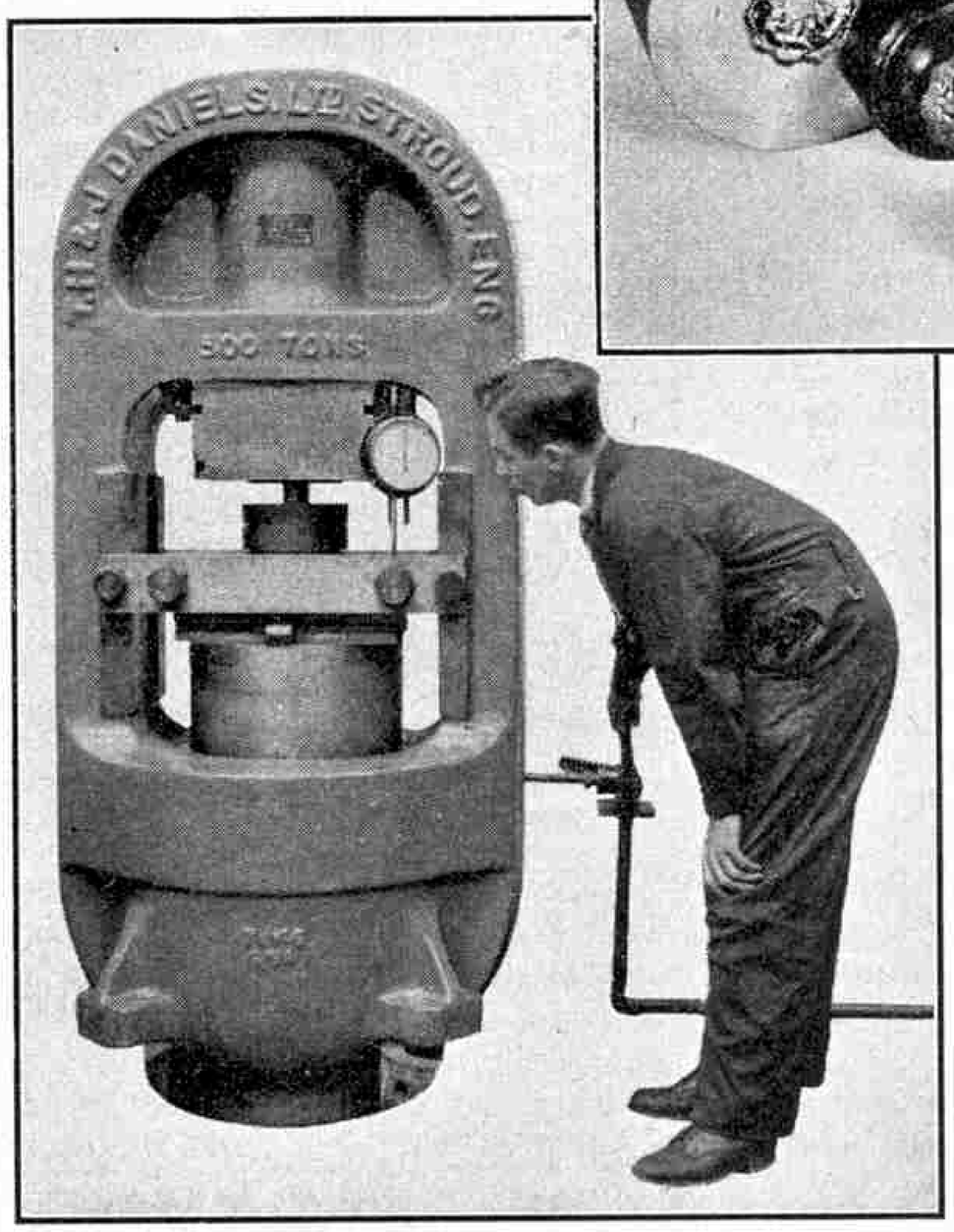
The ambulance can be towed at 40 m.p.h. without any discomfort to the passengers, and can be uncoupled quickly and manœuvred by hand into difficult places.

Vehicles for Use on Land or Water

The Dutch military authorities have developed a small amphibian armoured car for use on dry ground, swamps or flooded areas. The car is 11½ ft. long, 5½ ft. wide and has an overall height of 5 ft. 3 in. It is capable of travelling on land at a speed of 45 m.p.h. either forward or backward, and is fitted with one or two machine guns. It carries a crew of four men, seated in pairs in opposed directions. Two of the men act as drivers, each operating in one direction, while the other two operate the guns. When the vehicle is used on water it is propelled by a screw propeller and is steered by the wheels, which act as rudders.

Another amphibian vehicle, which is designed for a purpose very different from that of the Dutch vehicle, has been built in Florida. It is intended for exploratory and rescue work in swamps and jungles and incorporates many interesting features. It has a body 20 ft. long and 8 ft. wide, built in the shape of an open box with side pontoons that end in closed cabins fore and aft. A 110 h.p. engine is housed in the rear cabin while the forward cabin contains the controls. About 40 passengers can be accommodated in the amidships area, which is 9 ft. 6 in. long, 5 ft. 4 in. wide and 3 ft. 2 in. deep. Propulsion on both land and water is by means of endless chains fitted with treads. When the vehicle is used on land the treads grip the ground while in the water they act as paddles. Steering is effected by stopping the chain on the side to which the turn is to be made.

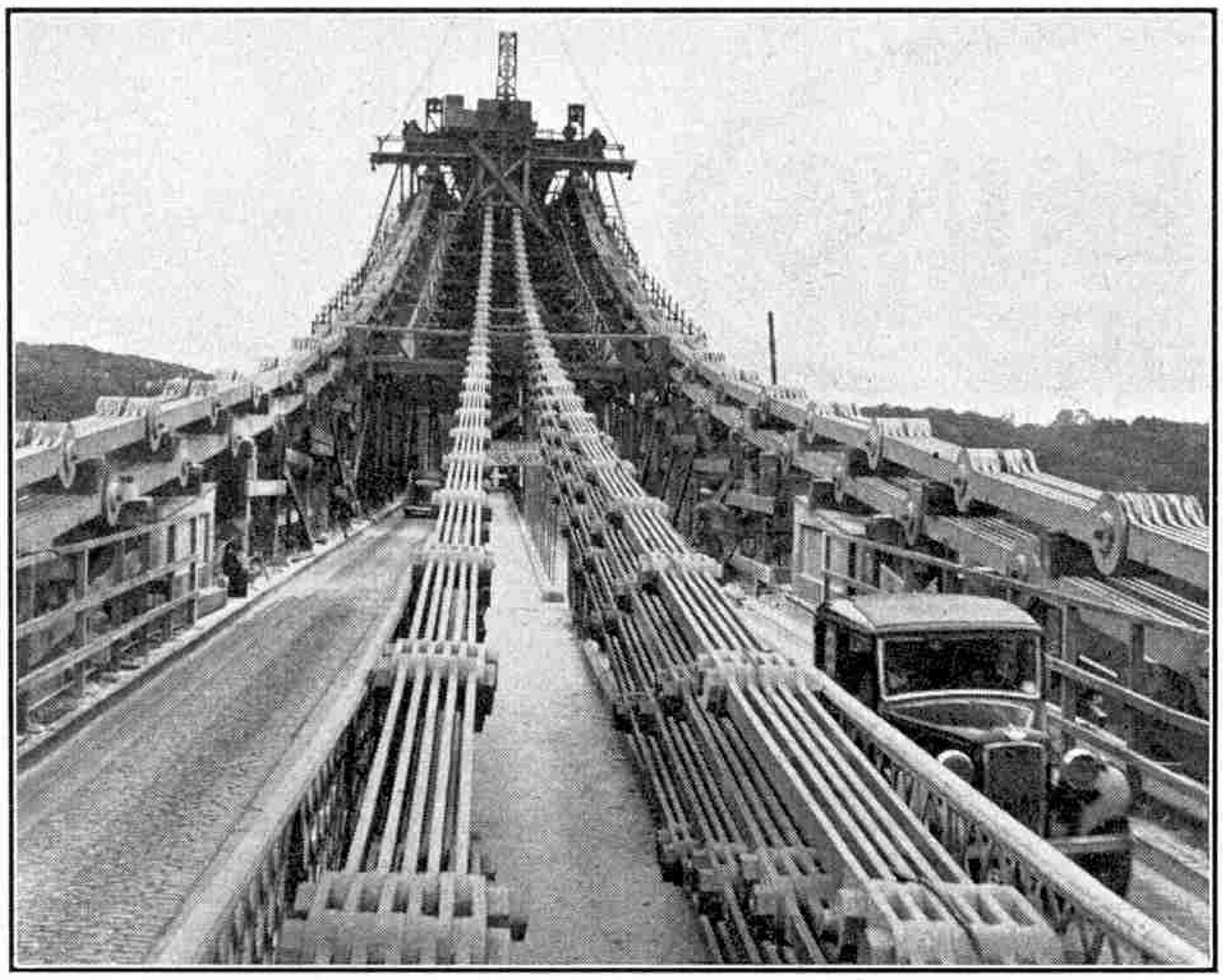




The 500-ton hobbing press described on this page. Above are specimen moulds and master hobs. Photographs reproduced by courtesy of T. H. and J. Daniels, Stroud.

* * *

Conveyors carrying coal at a large mine in Canada have been fitted with apparatus that rings an alarm bell when the flow of materials along the belts is interrupted. Over each conveyor is suspended a beam carrying a hinged arm, the lower end of which comprises a rubber-shod slipper that rests on the material flowing along on the



A general view from Anglesey of the Menai Suspension Bridge, which is now undergoing reconstruction. New suspension chains that have been fitted are shown on the left and right of the bridge, the chains in the centre being old ones.

belt. Near the upper end of the arm is a mercury switch connected in circuit with an alarm bell. When a break in the stream of coal occurs the arm drops and tips the mercury switch, which in turn closes the electric circuit, thus ringing the alarm bell.

An Automatic "Blackout" Switch

A special "blackout" switch, introduced by J. A. Crabtree and Co. Ltd., Walsall, is designed to give automatic protection against light leakage when doors leading to brightly lighted rooms are opened during the hours of "blackout." The switch automatically cuts off the light instantly as the door is opened, and switches it on again immediately the door has been closed sufficiently to prevent leakage. The switch unit is of sturdy construction, and is so designed that it can be quickly and easily connected to the existing electric wiring system.

Lloyd's Register Scholarship

The General Committee of Lloyd's Register of Shipping offer a scholarship, valued at £100 per year and tenable for three years, to be awarded on the results of the Studentship Examination of the Institute of Marine Engineers in May next. The scholarship is intended to assist marine engineering students to take an advanced course of instruction in engineering subjects. Candidates must be between 18 and 23 years of age and the closing date for entries is April 8th.

Further particulars, entrance forms, and copies of previous examination papers may be obtained on application to the Secretary of the Institute of Marine Engineers, 73, Amersham Road, High Wycombe, Bucks. The entrance form for the scholarship is distinct from the entrance form for the Studentship Examination, and a candidate for the Studentship Examination who wishes also to compete for the Scholarship must complete and return both forms by the dates specified.

The Busiest Year in Life-boat Service History

Life-boats were launched more often in 1939, and more lives were rescued from shipwreck round our coasts, than ever before in the history of the life-boat service. Altogether there were 677 launches, and the Royal National Life-boat Institution gave rewards for the rescue of 1,356 lives. The previous largest number of lives rescued was 1,348, in 1917.

By far the greater number of these launches have been made, and these lives rescued, since the outbreak of war. From 3rd September to the end of the year there were 411 launches and 1,101 lives were rescued. In the last war 21 lives were rescued on the average every week. So far during the present war the average has been 64 each week.

During the year the Institute awarded 24 medals for gallantry, to life-boatmen at the St. Ives, Cloughey (Co. Down), Cromer, Walton-on-the-Naze, Whitby, Yarmouth (Isle of Wight) and Humber stations.

During the year 17 new motor life-boats were completed and sent to their stations, and 10 more are under construction. There are now 145 motor life-boats and 15 pulling and sailing life-boats round the coasts of Great Britain and Ireland.

Engineering in Soviet Russia

Many engineering projects of an important type are at present being carried out in Soviet Russia. One of these is the construction of a large factory for the manufacture of gas-generators for cars. The new works will produce about 45,000 gas-generators each year, and will operate in conjunction with the great Stalin motor car works in Moscow.

A new floating dock, which is capable of lifting vessels of 6,000 tons, has been completed at Odessa. It is built of ferro-concrete and is intended for raising and dry-docking ships so that their hulls can be inspected and repaired below the water line. The dock is equipped with its own boiler installation and electric welding and compressor plant, and is 426½ ft. long and 100 ft. wide. The side walls have a height of 48 ft.

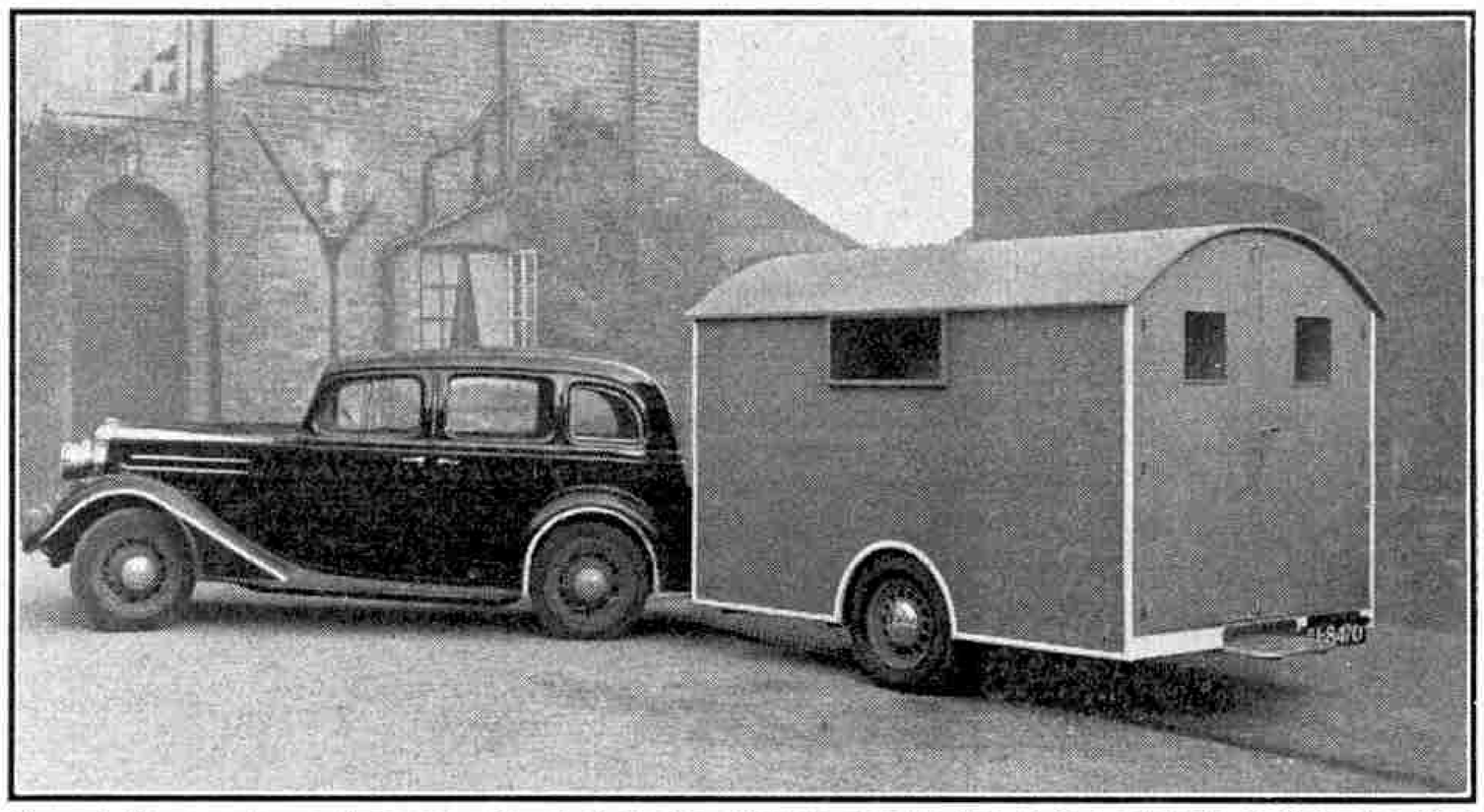
More Transatlantic Liners

Four 11,000 ton Prince Line ships employed before the war on the service between New York and South America are to be put into service between New York and London. These ships have a speed of 16 knots and are equipped to carry fresh fruit, frozen produce, and lengthy and heavy packages up to 50 tons in weight. In addition they have accommodation for 100 passengers.

A Novel Method of Tunnel Building

Unusual interest attaches to a new vehicular tunnel that is now being constructed under the Mobile River, Alabama, in the United States. It is being built up in sections on the shore, and the completed sections are launched into the river and sunk in position.

The tunnel will have a total length of 2,100 ft., consisting of a stretch of 1,100 ft. in length under the river and two 500-ft. approaches. The river section is being built of welded steel tubes 30 ft. long.



One of the caravan ambulances referred to on the previous page in tow. It is a product of Coventry Steel Caravans Ltd., Coventry, to whom we are indebted for our photograph.

From Our Readers

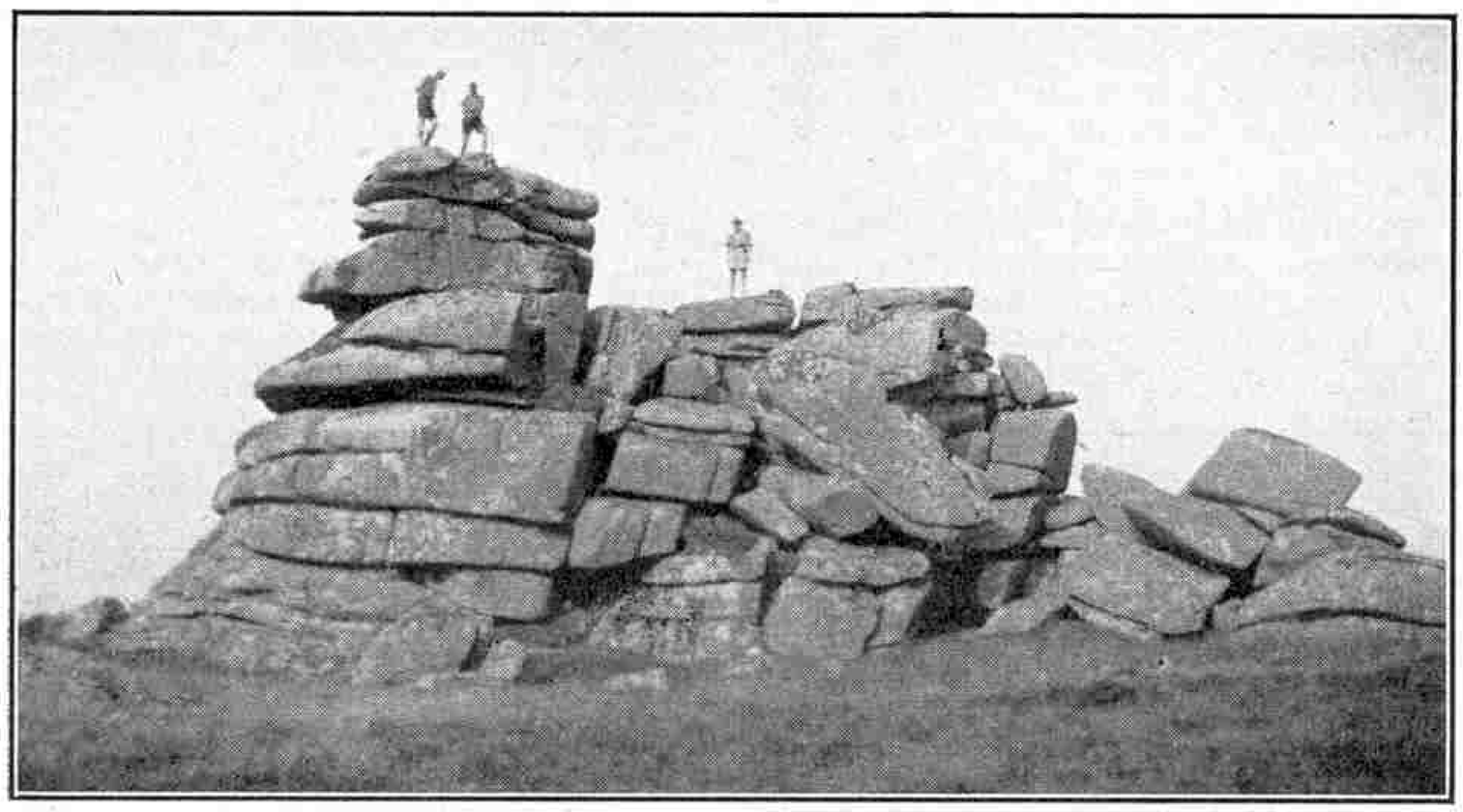
These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs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

On a Devonshire Tor

I have enjoyed many rambles over Dartmoor, and during my last stay there I visited Fingle Bridge, where the River Teign runs over rocks, winding its way through a deep gorge with thickly wooded slopes crowned with heather and gorse. From a distance the contrast of the green of the trees and the purple of the heather is very striking. The bridge itself is a typical Devon structure. It is just wide enough to take a car, and has little V-shaped projections jutting out from the supporting pillars.

Fingle Bridge is well known, and to provide a contrast I climbed the tor shown in the accompanying photograph. This is Fur Tor, which is 1,899 ft. in height and is rarely visited. Rough ground and many bogs have to be traversed in order to reach some of the Devon tors, which are irregular masses of granite standing starkly out of the hillsides.

G. C. Pitt (Harrow).



Fur Tor in Devonshire. Photograph by G. C. Pitt, Harrow.

An Adventure Underground

While camping in Derbyshire this year, I and two friends visited Gawthrop cave. Its entrance is at the top of a steep gulley. Down this a torrent of water was flowing and before entering the cave we had to dash through a waterfall that tumbled over a gaping black hole. Once inside, we closed our eyes for a few moments to accustom them to the darkness, and then lit our candles. We found ourselves in a large chamber through which water was flowing. To the left we saw a tunnel which, on investigation, we found to rejoin the main passage a few yards further on. We continued warily at first, but as the water was not deep our pace gradually increased.

The tunnel took a sharp turn to the left, and then the light from the entrance could not be seen. We soon discovered a narrow passage leading off to the right, but we decided to run no risks of losing ourselves, and continued along the main passage. It was very eerie in the darkness, with our flickering candles casting ghostly shadows on the damp walls of the cavern. There was a low echo as we talked, and when we were silent the only sounds were those of water dripping from the roof and the rippling of the stream.

The cavern continually turned first to one side and then to the other, and at the same time the roof became lower and lower. Finally we found that the water had become considerably deeper, and we could no longer walk along the passage.

In the distance we could hear the roar of rushing water. We turned back, and sat down on a boulder in the middle of the stream. We thought it would be interesting to see what it was like to be in total darkness, and then disaster almost overtook us, for we dropped the matchbox after we had blown out the candles! There followed a moment of breathless silence while we groped for the box, hoping that it had not fallen into the water. To our great relief we felt it on the stone.

After relighting our candles we went back to the narrow passage we had previously noticed, and were just able to crawl through it. This time we were in a perfectly dry tunnel, although there were potholes in the floor and roof caused by water swirling round and round perhaps thousands of years ago. From the roof hung many beautiful stalactites. and finally the ceiling sloped down almost to the floor. The dim light of our candles showed a further range of caverns beyond. We turned back, and when we came out, we resolved to investigate some day those inner recesses that so far had defied the entrance of man.

D. L. Chadwick (Buxton).

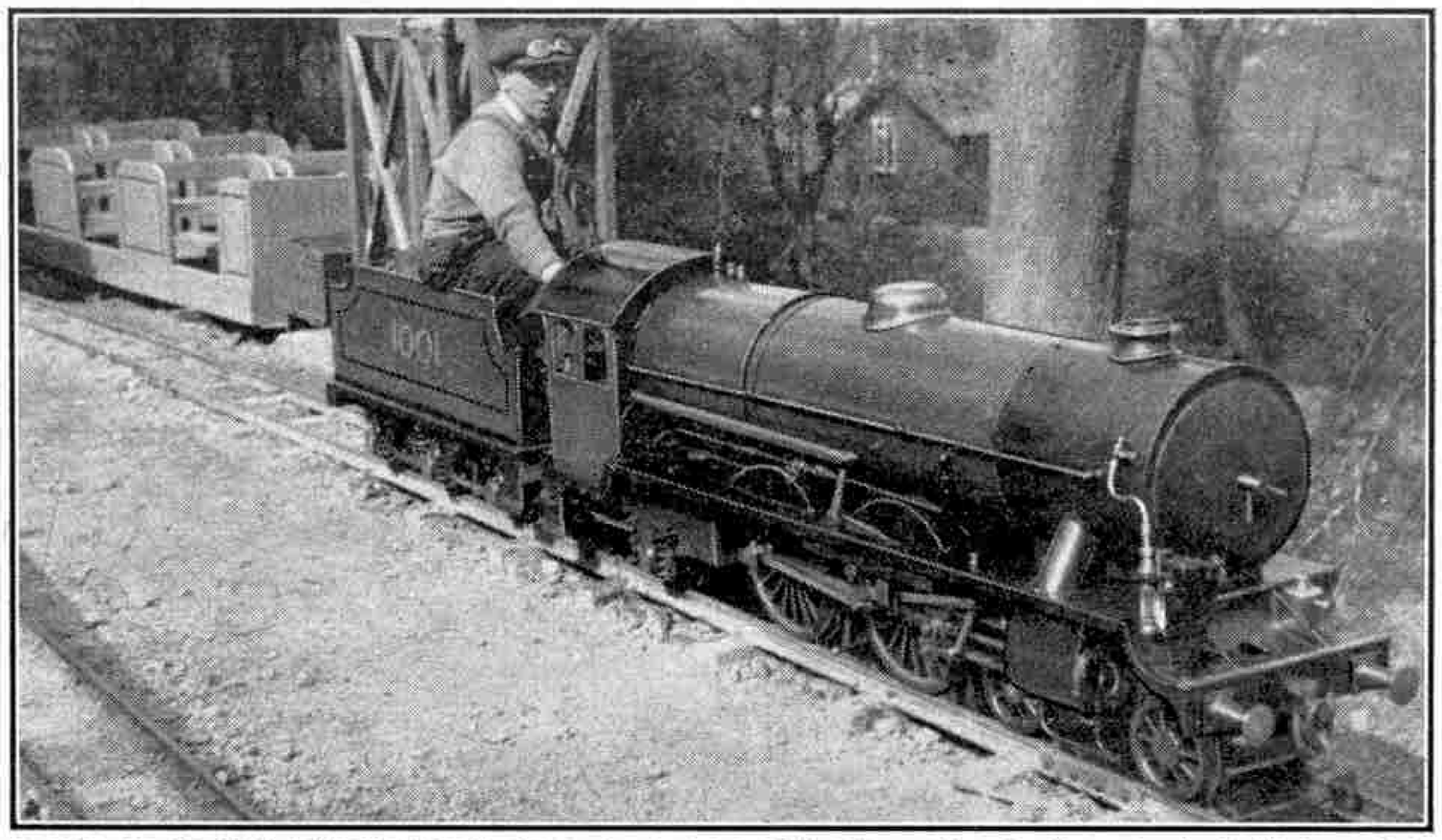
The Light Railway at Dudley Zoo

On a sunny day in summer a run on the light railway opened at the Zoo at Dudley in 1938 was a very enjoyable experience. The trip is about 1½ miles in length, and the popularity of the line can be gauged by the fact that during the Bank Holiday period last August 6,700 passengers were carried.

The track is of 10¼ in. gauge. It starts in the Zoo, running past the bears' enclosure and then on into the woods in the vicinity. Through these it passes on a single track that originally ended in a complete circle, around which the trains ran before beginning their return journey. The rolling stock consisted of two "Atlantic" locomotives and a set of four coaches, each accommodating six passengers.

For last year the track was overhauled and greatly improved. As the gradient of the loop proved too severe, this portion of the run was left out and points were installed so that the engine could run round the train in order to begin the return journey. A double track was built at the main station, with a spur to accommodate a train of coaches not in use, and to allow coaling and watering. A second set of coaches also was introduced. The running practice then was to load up one train while the other was making the circuit of the track. As a further improvement a locomotive was held on the loop at the outer end of the track in readiness to back on to each train as it arrived, thus minimising delays.

For 1939 a new 4-6-0 engine, a scale model of the G.W.R. "Hall" class, was added to the original two locomotives, and a blue and silver streamlined railcar with a petrol engine also was put into service.



A scene on the light railway at Dudley Zoo, showing one of the locomotives by the water tank. Photograph by A. D. Hamblin, Birmingham.

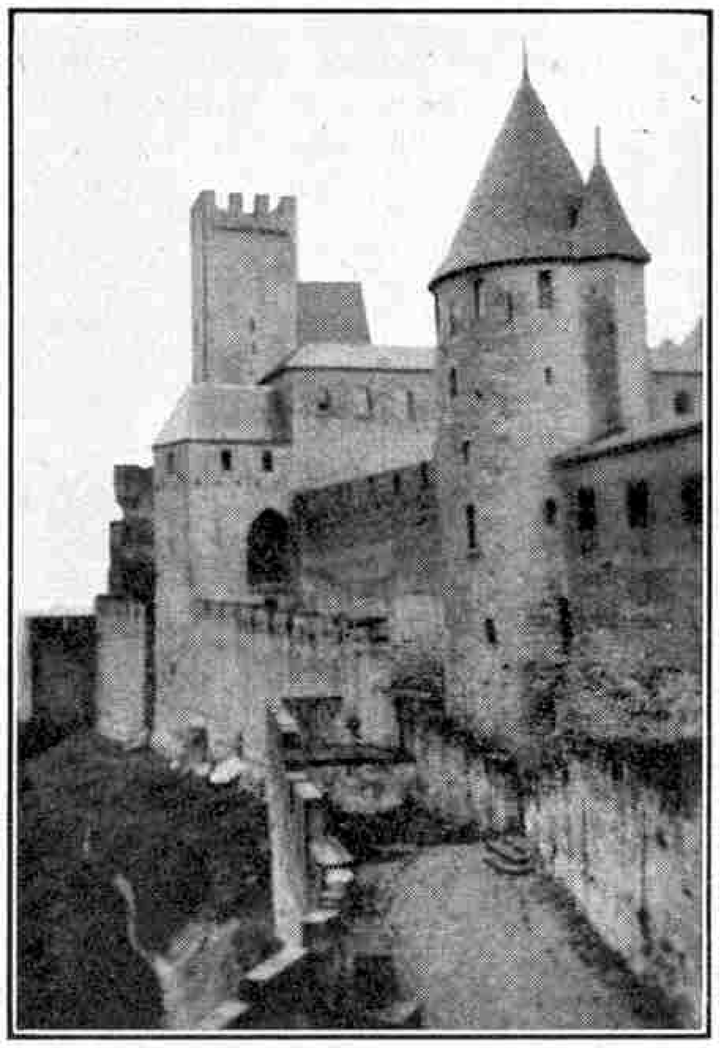
The signals were interesting. They were fitted on a gantry, and all points and signals were worked by compressed air from the signal box, in which a small compressor was installed. Later a colour-light signal was added to the siding at the main station. The two running lines there converge on to a turntable, from which access is given to a locomotive shed with four roads.

A. D. Hamblin (Birmingham).

A Mediæval Fortress in Southern France

The old town of Carcassonne, in Southern France, is on a tableland that commands the valley of the River Oude and the Toulouse-Narbonne road. Most of it was built in the 11th century, but underneath the castle are the foundations and mosaic floor of a Roman fort. It is surrounded by an inner and an outer wall. In these there are many gateways, and above every alternate one in the inner wall are great holes through which stones could be dropped on to the heads of assailants as they struggled to pass through. There is a museum in the castle, and this contains many relics of former times. The modern town of Carcassonne is at the foot of the hill on which the old city stands.

S. S. Adams (March).



Part of the walls of Carcassonne, showing a tower and the Count's palace. Photograph by S. S. Adams, March.

Flint Mines Nearly 12,000 Years Old

When travelling by car to Mundford, in Norfolk, some time ago, I saw a signpost showing the way to Grimes Graves, and decided to have a look at these ancient flint mines. We followed the road to Weeting for about 200 yards and then left the car and walked about a mile across the Breckland to the hut of the custodian of the mines. From there we were led to a circular concrete slab in which was a trap-door. Below the door was a ladder, down which we climbed until we were 30 ft. below ground level.

We were now in the ancient mine. There was a large gallery cut in the chalk, and from it were tunnels cut out during the Stone Age. It is probable that these pits were first worked about 10,000 B.C., but some of the flints mined there later were dug about 2,000 B.C. The tools used in digging seem to have been the antlers of deer. The flints themselves were required for making weapons and tools of all kinds.

The tunnels cover an extensive area, as we found by crawling as far as we could manage, with a candle to provide light. It was necessary at times to squeeze through very narrow passages. Among the interesting links with the industry of thousands of years ago that have been discovered in them is a pick-axe made of an antler, to the ends of which flints were fixed. Other antler picks have been unearthed in the gallery, with large quantities of bones of animals.

R. D. Barrett-Lennard (Banbury).

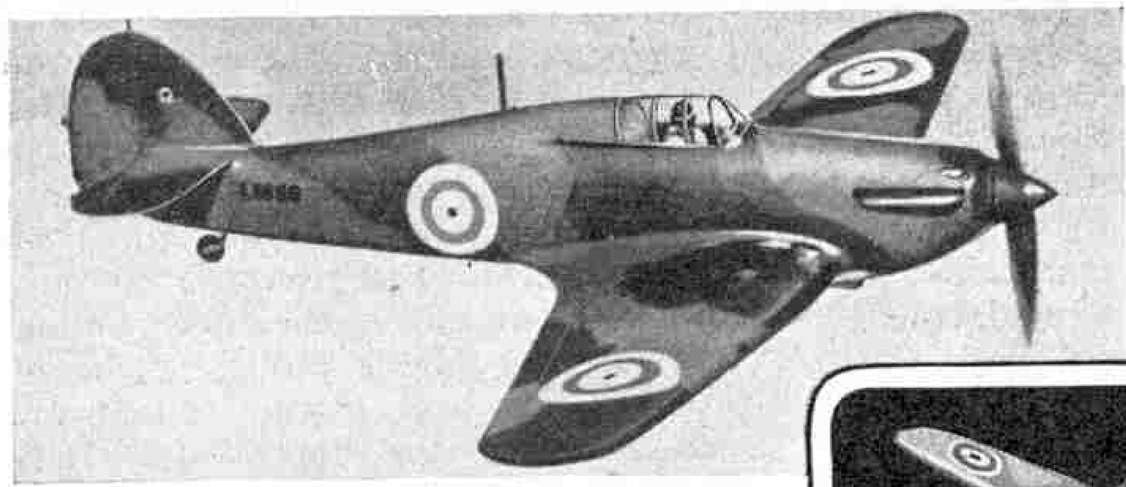
Aircraft in the Dinky Toys Series

Realistic Scale Models

THE keen interest of "*M.M.*" readers in aviation has been further stimulated during the past two or three years by the rapid expansion of the Royal Air Force, and by striking developments in commercial aviation. Descriptions and illustrations of the new types of military and civil aircraft have appeared month by month in the "*M.M.*" and have aroused undisputed enthusiasm, as is shown by the constant demand for more. The object of this article is to draw attention to the splendid Dinky Toys models of aircraft, which can be handled, examined and compared.

These delightful Dinky Toys models are unique in being designed to scale, with the typical features of each machine reproduced with the greatest possible accuracy. From photographs and dimensioned details supplied by the builders of the most famous aircraft, the Meccano draughtsmen prepare scale drawings from which skilled toolmakers produce dies of marvellous accuracy. By means of these dies specially designed machines in the great Meccano Factory produce in enormous numbers the perfect die-cast miniatures that are now being collected so enthusiastically in all parts of the world. There are now nearly 50 different Dinky Toys aircraft, and more are in preparation.

The "Frobisher" class air liner, and the Dinky Toys model No. 62w.



The Hawker "Hurricane" single-seater fighter and the Dinky Toys model No 62h.

At the present time military aircraft are the most in the news, and among the Royal Air Force machines represented in the Dinky Toys Series are the Hawker "Hurricane," Armstrong Whitworth "Whitley," Fairey "Battle," Gloster "Gladiator," and the Short "Singapore" flying boat. The Hawker "Hurricane" (No. 62h) is one of the fastest British fighters in service to-day. It is a low wing, single-seater monoplane of all-metal construction, and is armed with eight machine guns installed in the wings. It is credited with a top speed of 335 m.p.h. The neat Dinky Toys miniature of this formidable fighter is finished in the brown and green camouflage adopted by the British Air Ministry for Royal Air Force machines. There is also an aluminium finished model (Dinky Toys No. 62s).

An older type of British single-seater fighter is the Gloster "Gladiator" (No. 60p), which made its first appearance in 1935. It is an equal-span biplane, and in its latest form is armed with six guns. The 830 h.p. "Bristol" Mercury IX engine fitted gives the "Gladiator" a top speed of 250 m.p.h. when flying at a height of 15,500 ft.

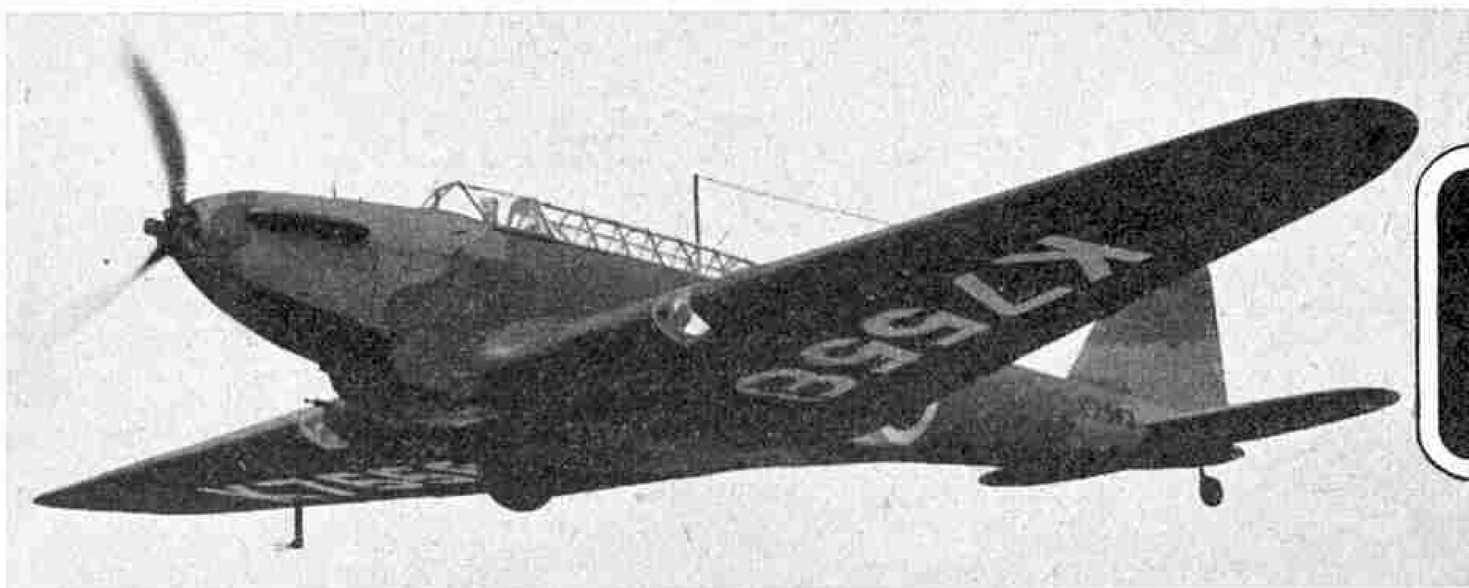
Bombers are a heavier class of military aircraft than fighters, and there are single-engined and twin-engined types in service. One of the best-known of the British twin-engined heavy bombers is the Armstrong Whitworth "Whitley," a middle wing monoplane of metal, stressed-skin construction. The splendid Dinky Toys model (No. 60v) accurately reproduces the severe design of the prototype, and conveys an impression of the grim purpose for which aircraft of this type are intended. The "Whitley" carries a heavy load of bombs, and in defence against pursuing enemy fighters it can reply effectively from three enclosed gun positions. The "Whitleys" of the R.A.F. are camouflaged, and a Dinky Toys miniature finished in the same way (No. 62t) is available.

An outstanding example of the modern single-engined medium bomber is the Fairey "Battle," one of the first modern monoplane types introduced into the Royal Air Force. The Dinky Toys miniature of this well-known fast bomber (No. 60n) reproduces the slim lines and neat appearance of the actual machine. A camouflaged model (No. 60s) is also available. The "Battle" carries a crew of three and a substantial bomb load, and is equipped with several guns with which to ward off attacks. When fitted with a Rolls-Royce "Merlin" IV engine it has a top speed of 257 m.p.h.

The Short "Singapore" flying boat (Dinky Toys No. 60h) is a sort of general purpose machine, used for long-distance reconnaissance, coastal patrol, and sometimes bombing operations.

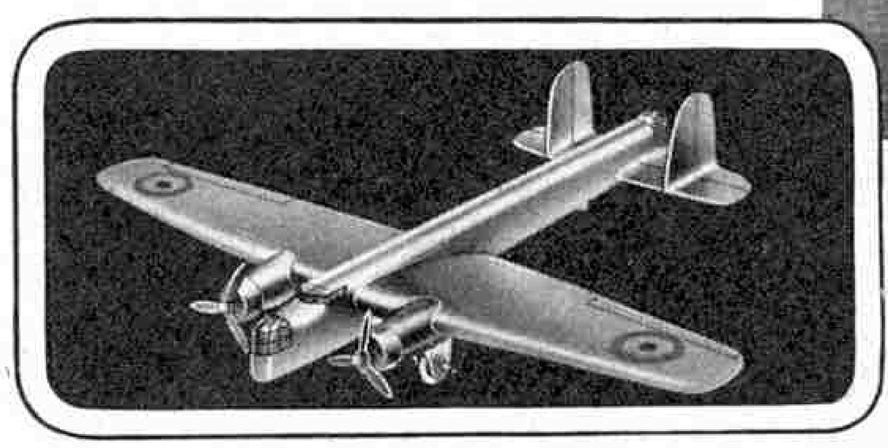
Giants among bomber aircraft are four-engined machines such as the United States Boeing B-17 "Flying Fortress." This middle wing monoplane is one of the fastest heavy bombers in the world, with a top speed of 250 m.p.h. A magnificent scale model of this fine machine is now included in the Dinky Toys Series under No. 62g. It is beautifully finished, and bears the correct markings of the United States Army Air Corps, by which the actual machines are extensively used. Several fine long-distance flights have been accomplished with these aircraft. In February 1938 six United States Army Air Corps "Flying Fortresses" made a record non-stop mass flight from Miami, Florida, to Buenos Aires, Argentina, covering the distance of 5,260 miles in a total flying time of 27 hrs. 50 min. The single stop en route was at Lima, in Peru. The "Flying Fortress" long-range bomber is an all-metal machine, and normally carries a crew of from five to seven men. There are five guns for defence.

On the civil aircraft side the Dinky Toys Series includes fine scale miniatures of the Armstrong Whitworth "Ensign" and the "Frobisher" class air liners, two recent types of four-engine transport monoplanes acquired by Imperial Airways, now British Overseas Airways Corporation. The "Ensigns" (No. 62p) have been designed for



service on the company's European and Empire air routes. The European type "Ensign" has seating for 40 passengers, and the Empire type for 27 passengers and up to 3¼ tons of freight and mails. The four engines of the "Ensign" are of the 935 h.p. Armstrong Siddeley "Tiger" IXc type, and give it a top speed of 205 m.p.h. and a cruising speed of nearly three miles a minute. Any two of these engines are powerful enough to fly the air liner fully loaded. The navigating equipment includes an "automatic pilot" that maintains a set course without guidance. Six models of these high wing aircraft are available.

The "Frobisher" class air liners were built by the de Havilland Aircraft Co. Ltd. The fine Dinky Toys miniatures (No. 62w) of this type show that a large air liner can be graceful in appearance. There are three

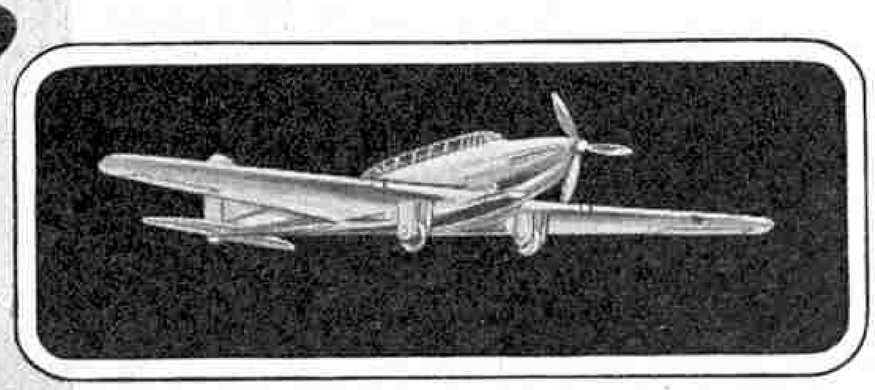


models available. The machine is a long wing streamlined monoplane with a wing span of 105 ft., and retractable undercarriage. It seats 22 passengers, and normally carries a crew of four, consisting of captain, first officer, radio operator and steward. The four engines are of the 525 h.p. D.H. "Gypsy Twelves" and give the air liner a maximum level speed of 225 m.p.h. at 8,750 ft.

The D.H. "Albatross" long-range mail liners produced for the British Air Ministry for experimental long-distance flights are similar to the "Frobisher" in general design, but differ internally. There is a beautiful Dinky Toys model (No. 62r) of one of these streamlined monoplanes. The actual machines are capable of a top speed of 222 m.p.h. at 8,750 ft. With full equipment and crew each liner can transport 1,000 lb. of mail for 2,500 miles non-stop against a continuous 40 m.p.h. headwind, at a cruising speed of 210 m.p.h.

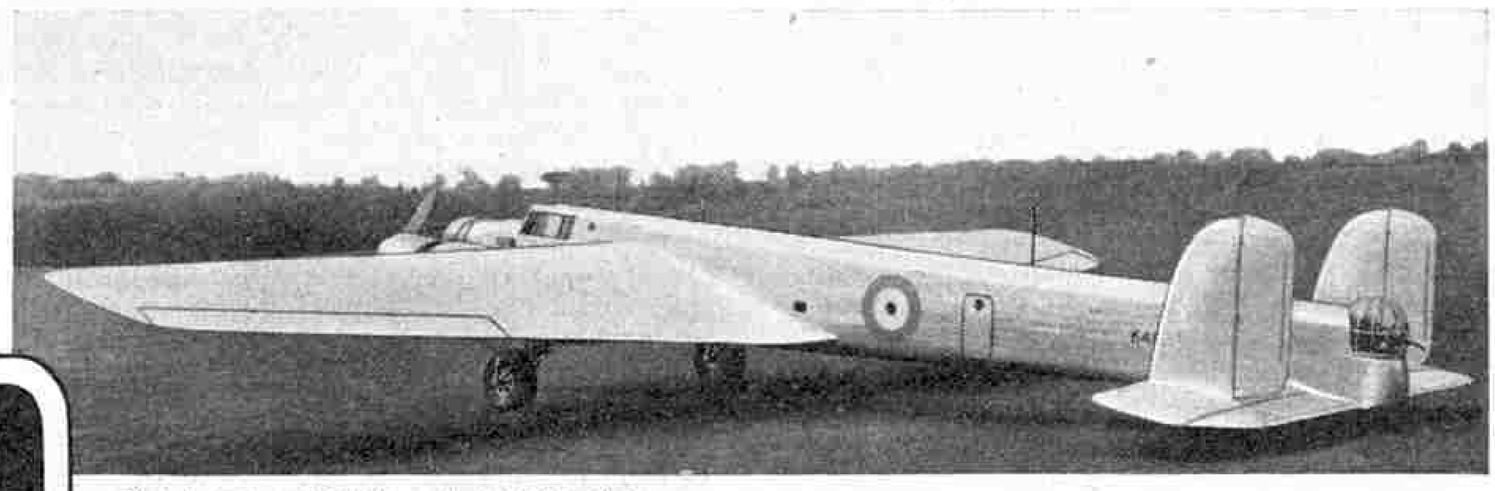
Among the most popular commercial aircraft represented in the Dinky Toy Series are the Empire Flying Boats (Dinky Toys No. 60r) that have become famous for their fine work in operating Imperial Airways' regular fast air services between this country and Africa, India and Australia. The 12 models of these aircraft available include *"Caledonia"* and *"Cambria"* which, before going into service on the normal Empire air routes, achieved fame in the experimental transatlantic flights between Foynes, Eire, and Botwood, Newfoundland, carried out in the summer of 1937 by Imperial Airways and Pan American Airways in preparation for the regular transatlantic air service to Canada and the United States inaugurated last year.

The Empire flying boats are high wing monoplanes, with hulls 88 ft. 6 in. long, and wings of 114 ft. span. Each boat has accommodation for 24 passengers by day, with sleeping quarters at night for 16, and carries a crew of four. The four 900 h.p. "Bristol" Pegasus engines give the flying boat a top speed of nearly 200 m.p.h.



The Fairey "Battle" medium bomber and the Dinky Toys model No. 60n.

For Pan American Airways the flying boat *"Clipper III"* made several experimental crossings of the North Atlantic in 1937, and a most realistic Dinky Toys model (No. 60w) of this huge boat is available. The *"Clipper III"* is a Sikorsky S-42-B all-metal high wing flying boat fitted with four Pratt and Whitney "Hornet" engines, and has a top speed of 168 m.p.h.

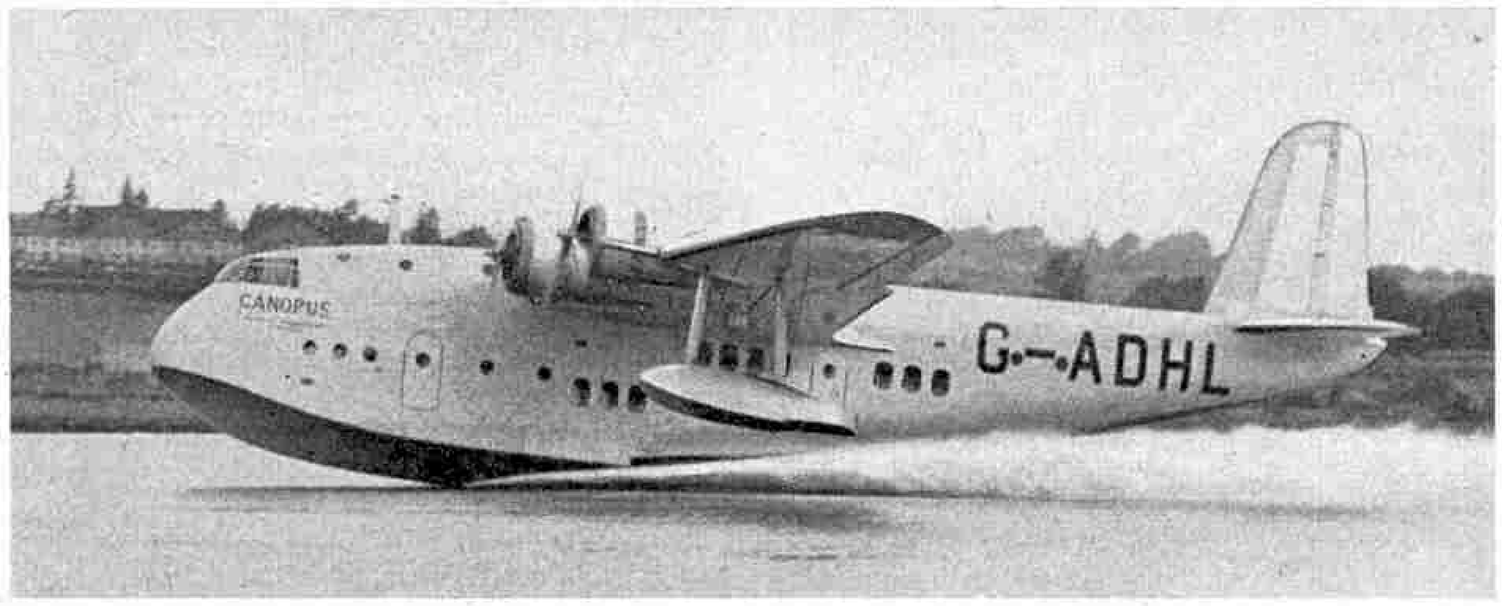


The Armstrong Whitworth "Whitley" heavy bomber and the Dinky Toys model No. 60v.

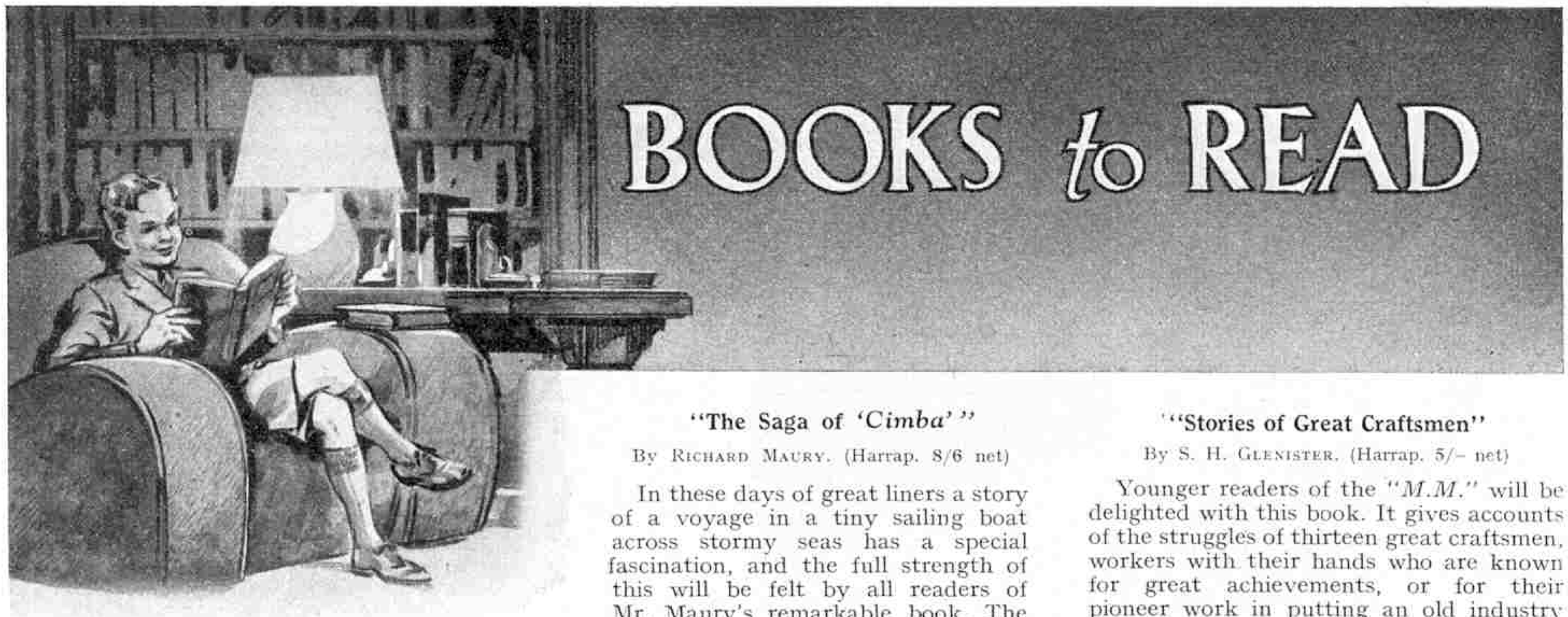
Sometimes a new type of aeroplane proves so exceptionally efficient that it becomes known and used all over the world. The American Douglas DC-3 is an example of this great popularity, and the excellent Dinky Toys model (No. 60t) of this machine shows a type of which more than 100 are in regular service on American air routes alone. The Douglas DC-3 is an all-metal twin-engined, low wing monoplane that seats 21 passengers. It has a top speed of 213 m.p.h. Douglas air liners are produced in America by the Douglas Aircraft Co. Inc., and in Europe are made under license by the Fokker Company, of Amsterdam.

The latest and fastest German air liner is the Junkers Ju 90, and the fine scale model (Dinky Toys No. 62n) gives an accurate impression of the massive proportions of these liners. The Ju 90 is, in fact, designed for heavy load carrying rather than for the attainment of extremely high speeds. It is a four-engined low wing monoplane, and its five passenger cabins seat 40. With Junkers "Jumo" 211 engines it has a top speed of 256 m.p.h.

No machine in recent years has attracted so much attention as the Mayo Composite Aircraft, and the introduction of a very fine scale miniature of it (Dinky Toys No. 63) has been greatly welcomed. 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 upon, and locked to, a four-engined high wing flying boat *"Maia."* Next month we shall describe this remarkable machine and its Dinky Toys counterpart, and continue our survey of aircraft in the Dinky Toys series.



The Empire Flying Boat "Canopus" and, on the left, the Dinky Toys model No. 60r.



Here we review books of interest and of use to readers of the "M.M." We can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/- for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

"Call of the Road"

By "Bywayman"
(R.T.S. Lutterworth Press. 2/- net)

The great army of cyclists among *"M.M."* readers will thoroughly enjoy the stories in this little book, and indeed these will be read with the greatest interest by those who are not cyclists, but are attracted by tales of out-of-the-way places in Great Britain and Ireland.

Sometimes alone, and at other times in the company of fellow cyclists, *"Bywayman"* has visited the Island of Skye and the far north of Scotland, the Giant's Causeway and the Bantry Bay district in Ireland, and almost every quarter of England and Wales, from the Roman Wall to the Devonshire Moors and from Snowdon to Cardiff. His stories are not dry descriptions of castles and historic places, but accounts of meetings with people of all kinds, of the places at which he stayed, and of wonderful meals of freshly-caught trout and similar provender that he enjoyed. The result is a very readable record of humorous encounters and strange experiences.

The comical side of the author's travels is well brought out by the excellent sketches by the well-known cycling artist Patterson.

"Captain Binnacle"

By Howard Pease. (Harrap. 4/6 net)

Captain Binnacle is master of the *"Pride of the River,"* a former Californian river steamer that is now high and dry and slightly tilted on a mud flat. With him and his dog, Renny and his two sisters sail on a voyage to China, but somehow bring up on the shore of Africa, where they are visited by natives. Pirates also appear on the scene and there is a desperate fight, ending in the discomfort of the pirate chief, who is finally revealed as Renny's grandfather. There are many other interesting adventures on this astonishing imaginary voyage.

The old steamboat proving to be a perfect place for play, and Captain Binnacle is a wonderful leader in "adventures" that make splendid story for our younger readers.

"The Saga of *'Cimba'*"

By Richard Maury. (Harrap. 8/6 net)

In these days of great liners a story of a voyage in a tiny sailing boat across stormy seas has a special fascination, and the full strength of this will be felt by all readers of Mr. Maury's remarkable book. The author's vessel was the *"Cimba,"* a tiny schooner that he discovered in Nova Scotia; and in it, with one companion, he set out from New York for Bermuda. It was winter, and a wild northeaster piled up gigantic seas. At the peak of the storm the schooner capsized, and stayed keel uppermost until another wave struck her and righted her by causing her to complete the circle. Three ships sank close by the *"Cimba"* in this gale.

This stormy episode was the prelude to a wonderful voyage to the West Indies through the Panama Canal into the Pacific, and across that great ocean to the famous islands of the South Seas. Tragedy overtook the adventurers on the reefs of Fiji, and there the author eventually was forced to abandon his stout little ship.

All who love the sea will revel in the author's story of storm and strife, and of the way in which his good little vessel met all efforts of the waves to crush her. He is no less interesting when he is dealing with quiet and happy times afloat and ashore, and with his desperate struggles to save the schooner after it has been wrecked.

Many excellent drawings by the author add greatly to the attractions of this fine book.

John Harrison, the watch and clock maker. From "Stories of Great Craftsmen," reviewed on this page.

"Stories of Great Craftsmen"

By S. H. Glenister. (Harrap. 5/- net)

Younger readers of the *"M.M."* will be delighted with this book. It gives accounts of the struggles of thirteen great craftsmen, workers with their hands who are known for great achievements, or for their pioneer work in putting an old industry on to a new basis or creating an entirely new one. None of these men succeeded without a struggle, and we have enthralling stories of their pride in their work and of their triumphs over disappointments.

We begin with the invention by John Gutenberg of printing from separate types. How the idea grew in Gutenberg's mind and how he put it into operation bit by bit are fully told, and we learn with regret of the death in poverty of this famous craftsman, whose invention made news and learning open to all of us. In our own country the name of Caxton is closely associated with the beginning of printing, and we have here also an interesting account of the manner in which he introduced the craft into England.

Next we turn to Sir Christopher Wren, the architect who built St. Paul's Cathedral; Grinling Gibbons, a skilled woodcarver; and Chippendale, the poor Yorkshire boy who went to London and became the most famous furniture craftsman in the world. Another Yorkshireman who claims recognition is John Harrison, the inventor of the first clock that did not lose time in summer and gain it in winter, and the constructor of the first chronometer that made navigation an exact science. The stories are then told of John Smeaton, the great engineer who built a lighthouse on the Eddystone Rock that withstood storms and tempests for 123 years; Josiah Wedgewood, the greatest of potters; and Arkwright, who after laborious struggles in dire poverty invented spinning frames that revolutionised the cotton industry. Then we come to James Watt, who made the steam engine the great source of power in industry; and George Stephenson who gave it wheels and provided tracks for his locomotive to run on, thus giving us our railways.

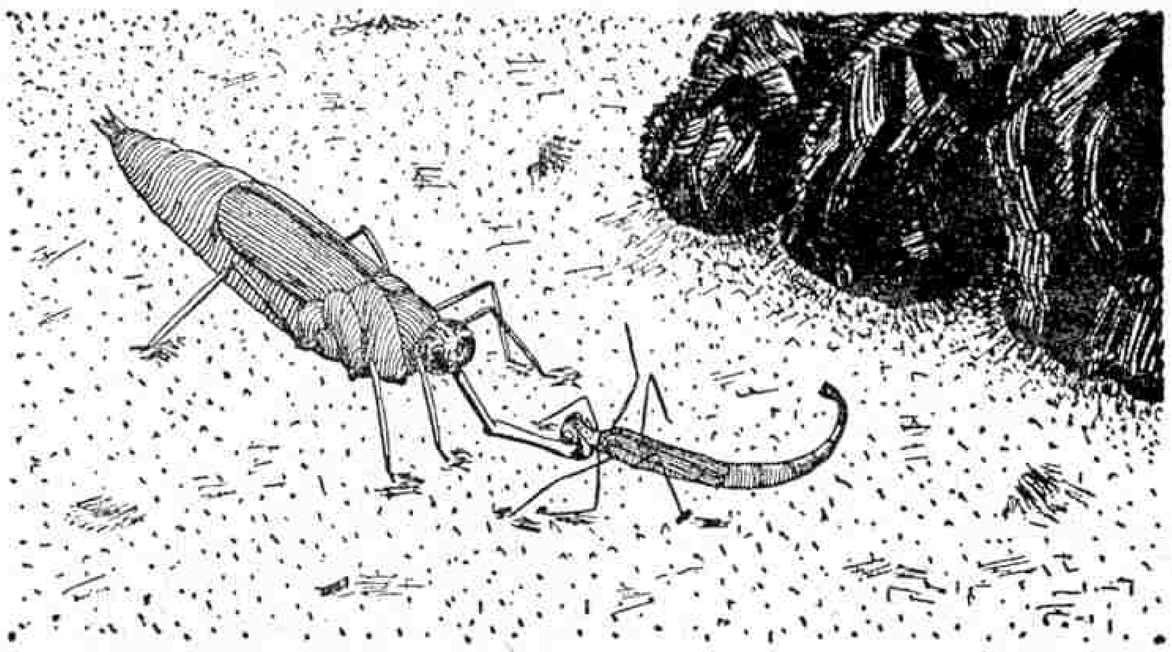
These stories bring us to the age of machines, and to a man who rebelled against them and advocated a return to hand work. This was William Morris, the creator of beautiful books, wallpapers, furniture and other craft productions. Finally there is Edison, a great pioneer of electricity in industry, who in his youth sold newspapers, chewing gum and sweets on trains to make money to pay for his chemical and electrical experiments. Edison was a great craftsman, always doing things himself, and as he grew older he went on from one triumph to another in the world of invention.

The book contains portraits of most of the men dealt with, and many line drawings and half-tone illustrations.

"The Underwater Zoo"

By T. McCLINTOCK. (Routledge. 5/- net)

The underwater zoo was only a home-made tank, and its inhabitants were creatures dredged out of ponds in the neighbourhood with the aid of a hunting outfit that came from the kitchen. It was truly a wonder world, however, and it is well described in a journal written up in days when the author had time to make entries. His story is so vivid and fascinating that his readers will be more than entranced—they will be sent careering off to the nearest streams and ponds to look out for themselves some of the amazing creatures that are described!



The dragon seizes his prey. From "The Underwater Zoo," reviewed on this page.

There were many surprises for the author and his friends when stocking and watching their underwater zoo. We meet with one at the very beginning, when they find a thing looking like a tube, about as thick as a pencil, made of bits of wood and gravel stuck together. This proved to be the home of a strange little creature, the young of the caddis fly, and it fell to pieces when its inhabitant climbed out of it to grow up. Dragonfly nymphs, beetles, minnows, tadpoles, snails, water-boatmen and many other strange creatures perform in the author's tank, and there is an underwater dragon that remained strangely inactive until visitors were peering into the tank, when it suddenly came to life by trying to seize a beetle. Then it was seen to be really alive, not very ferocious perhaps, but ready to snap up living prey when it felt like having a meal.

Every page of the book is filled with fascinating stories of life in the little world of the tank. The author gives valuable hints that will enable others to share his pleasures by creating a similar zoo for themselves, and many lively drawings add greatly to the attractions of this excellent little book.

"Give a Man a Horse"

By CHARLES FINGER. (Harrap. 6/- net)

This is a very unusual book that takes its readers across the United States and then on a voyage down the Pacific to Cape Horn and Patagonia, the starting point for a wonderfully interesting adventure in a remote part of South America. It is full of open air scenes, with shipwreck at sea, racing and sport on land, and excitements on almost every page. Every boy will read it with intense interest.

Bob Honore knew something about boats and horses, but seemed destined to spend his life in office work, which he hated. From this dismal prospect he was rescued by a sympathetic boss who sent him out to Seattle in charge of a miscellaneous shipment destined for South America. There he soon found trouble, for he fell in with horse thieves, whom he outwitted with the aid of boy friends he met. Then he headed for South America with the shipment. Storm and shipwreck followed, and eventually Bob was cast ashore on the Patagonian coast, where he met an Indian boy who showed him where to find food and generally how to take care of himself. Many excitements followed, from the capture of magnificent wild horses to the discovery of buried Inca treasure, before the story moves northward to New York, where Bob's Indian friend causes a sensation in a sort of Wild West show.

The whole story is brilliantly written and is full of humour as well as adventure. It has a coloured frontispiece and 12 other excellent illustrations.

"Badminton"

By T. P. DICK. (Bell. 2/6 net)

Badminton is one of the most popular and energetic of all indoor sports, and all who play will welcome this book by Mr. Dick, who is himself a first-class player and has captained England on many occasions. It is suitable both for beginners and for more experienced club and tournament players, and is written with a complete understanding and knowledge of the game.

The author deals first with the choice of a racket and the best way of handling the one selected. Then he passes to the service and its return. Serving seems simple to the onlooker, but actually it is very difficult to serve effectively and readers will welcome Mr. Dick's sound advice. The smash, the great attacking stroke, and other shots are the subjects of the next chapters, after which attention is given to tactics. There are many diagrams and action photographs.

"The Wonder Book of Aircraft"
"The Wonder Book of Things To Do"

Edited by H. GOLDING, F.R.G.S.
(Ward, Lock. 5/- net each)

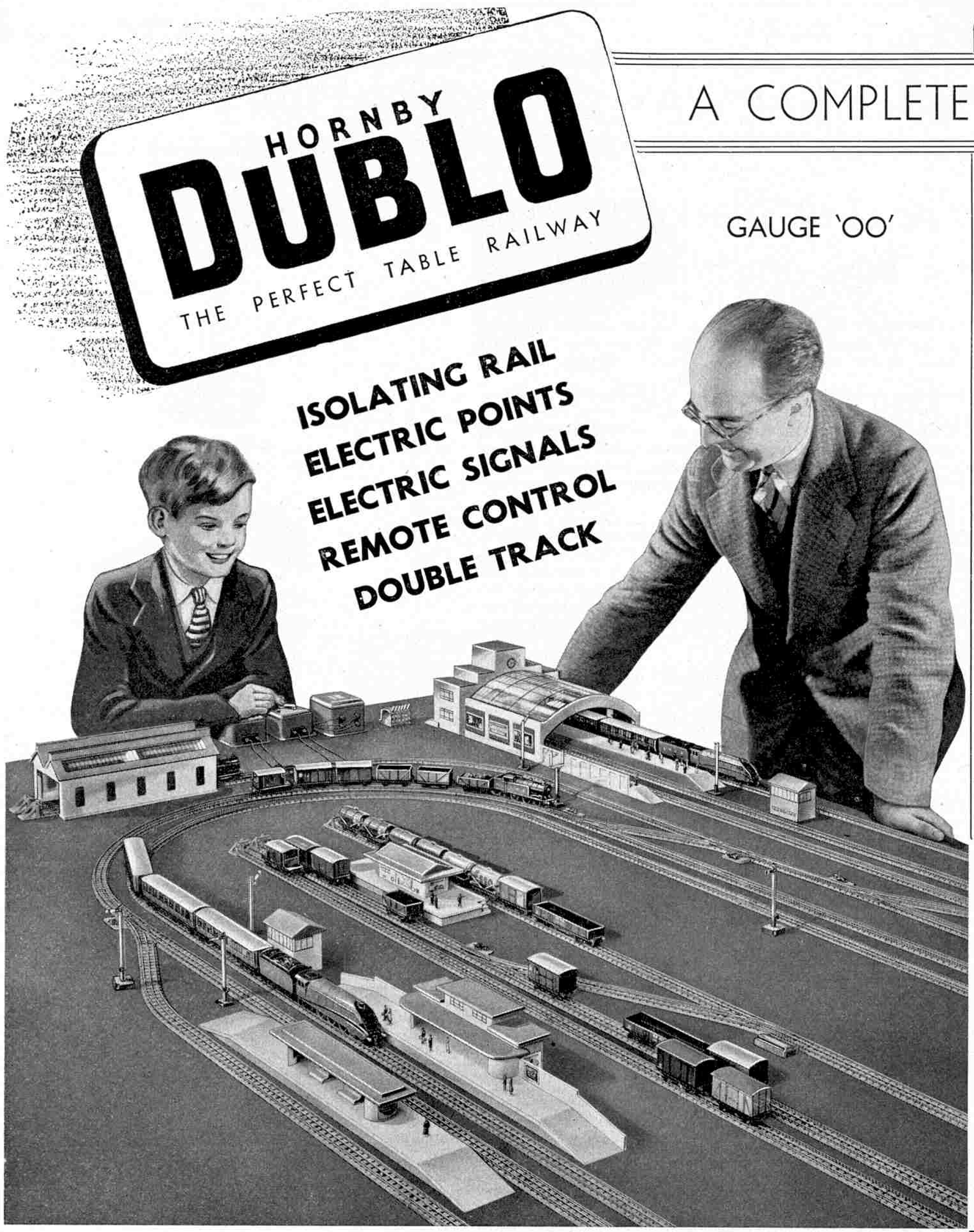
The "Wonder Book" Series is now too well known to need recommendation, and the two volumes reviewed here are excellent representatives. Both are full of good things, and they are exceptionally well illustrated, with reproductions of photographs or explanatory drawings on every page, and several plates in colour.

"The Wonder Book of Aircraft" has again been revised and brought up to date, and is now in its ninth edition. In picture and story it gives a thrilling survey of the Air Age in which we live, and it is a mine of information that will interest and surprise older people as well as those for whom it is intended. We read in it of the achievements of the pioneers of aviation, and of the great flights of such men as the Wrights in what now seem to us crude and flimsy machines. The book is mainly concerned with aviation as it is to-day, however, and there are fascinating articles on a career in the Royal Air Force, scenes at a great airport, pilots of the great air lines, and a flight along one of the great Empire air routes.

The wonders of the modern giant flying boats and landplane air liners and the marvellous efficiency of the high-speed fighters and bombers of to-day are described in a colourful but not exaggerated style. Photography from the air, aircraft and airways of the future, airships, aerobatics, famous flights and pilots, and how and why an aeroplane flies, are among other topics dealt with; and there is an excellent article on the romance of air mail stamps. Finally there is a summary of outstanding events in the story of flying.

"The Wonder Book of Things to Do" is equally well packed with information and is remarkable for its variety. It is devoted to both indoor and outdoor pursuits, describing among other things how to make model aeroplanes and a model aerodrome, and dealing with such hobbies as collecting butterflies. Sport such as football, rowing and canoing, swimming, cricket, hockey and athletics are dealt with, as well as indoor games, tricks, puzzles and simple experiments. There is an interesting out-of-doors series explaining what to look for in the various seasons of the year, with sections on model railways and electrical devices. In short, whatever the mood of the reader, he will find in the volume something to do or make in his leisure time.

A pupil flying alone for the first time. From "The Wonder Book of Aircraft," reviewed on this page.


HORNBY
DUBLO
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REMOTE CONTROL
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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.**

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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**
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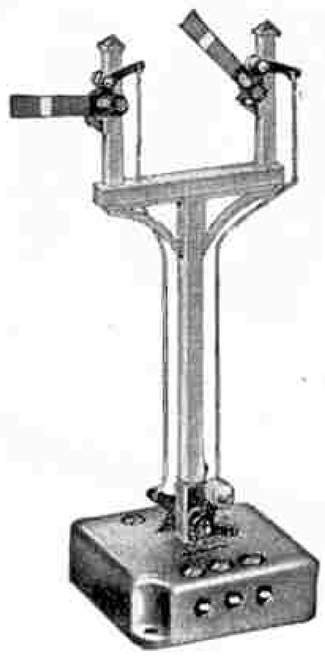
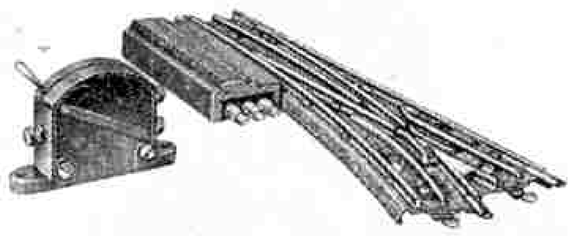


JUNCTION SIGNAL

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



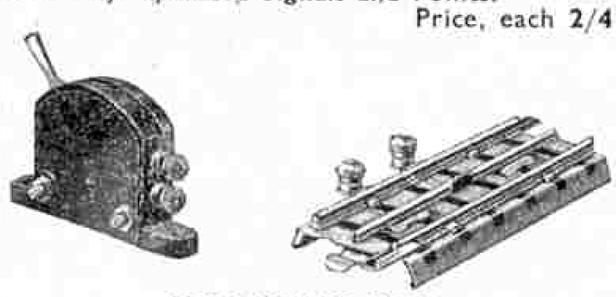
POINTS ELECTRICALLY OPERATED

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 DI

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

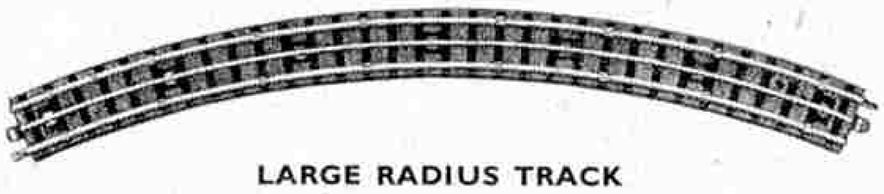


ISOLATING RAIL

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 **1/9** each

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

Empire Builders of Two Thousand Years Ago

Rome's Legacy in Britain

By Sydney Moorhouse, F.R.G.S.

THROUGHOUT the length and breadth of these islands are numerous evidences of Roman art and culture, of Roman skill in engineering and architectural design. It was this race of empire builders who, nearly 2,000 years ago, gave Britain its first real road system, built its first walled cities, and established its first country houses.

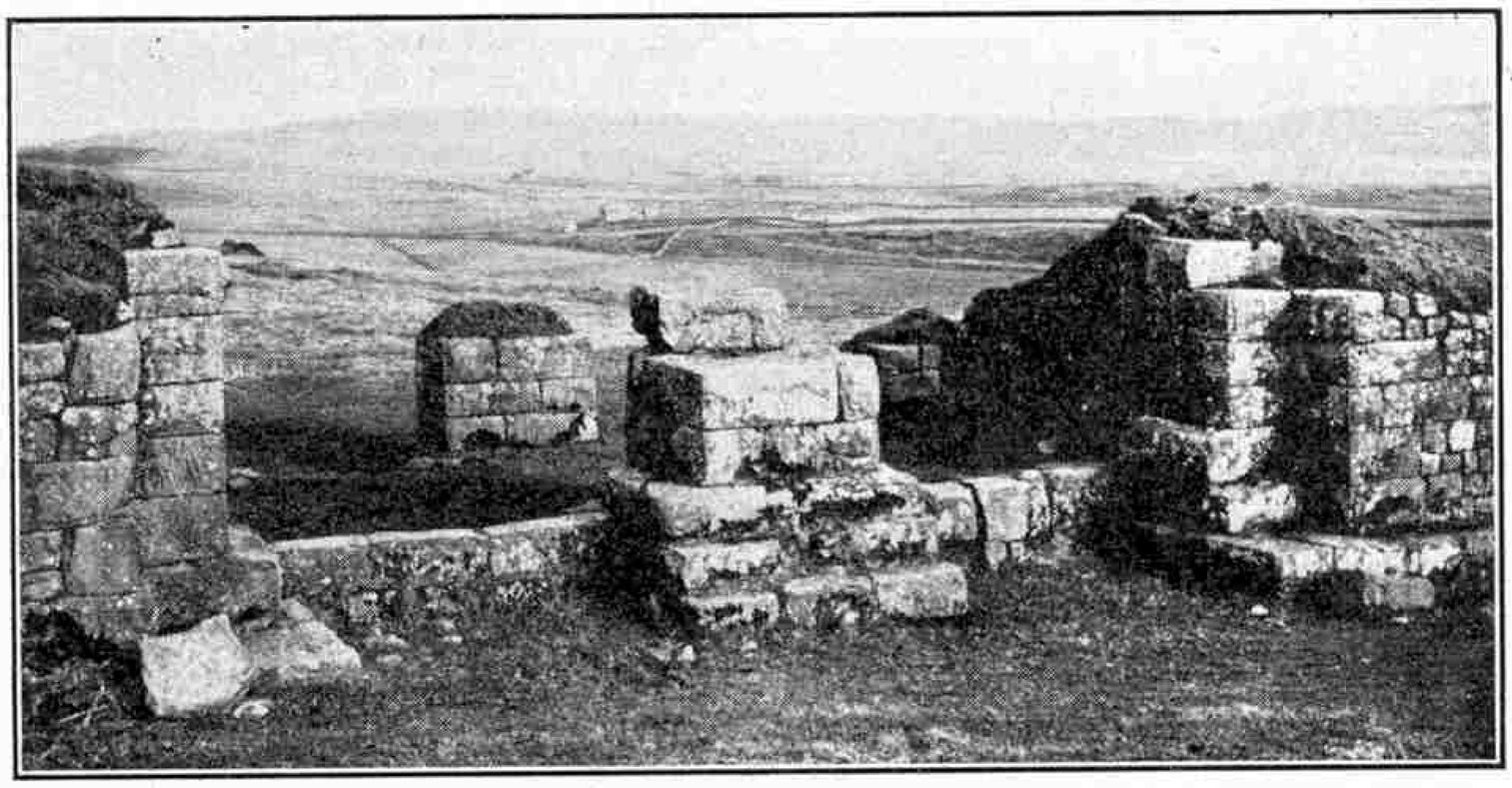
The Romans came to Britain in the first century of the Christian era and remained here for some 400 years, about as long a period as from the reign of Henry VIII to the present time. Then the Emperor Constantine found it necessary to remove all Roman troops from these islands. Four hundred years is a sufficient length of time for a race of people to make their presence felt, however, and it is not surprising that so many evidences of Roman Britain have been discovered at one time or another.

Sometimes the discoveries are made after a long period of extensive research by antiquarian or archeological authorities; at other times rare treasures are unearthed in a quite casual way. Not very long ago a farmer tilling a field near Steeton, Yorkshire, unearthed a copper chest, of nearly 100 lb. in weight, inside which were coins worth some £500.

Other farm folk have made useful, if chance, contributions to our knowledge of Roman Britain in similar fashion. A farmer at Southwick, Sussex, was ploughing a field for rhubarb when he drove his ploughshare into some flint bound together with mortar. A further search revealed some coins and a fragment of Samian pottery. News of these finds was communicated to a party of Sussex archeologists and in due course the entire foundation of a Romano-British manor house, some 1,700 years old, was discovered.

One of the most spectacular of the Roman country houses is that at Chedworth, in the Cotswold country. This is situated in a wooded amphitheatre and roughly forms three sides of a square. It was built of local stone in the late second century, and was only discovered some 70 years ago when a local sportsman, digging in a rabbit warren for a lost ferret, found a number of rabbits in a mosaic-floored Roman bedroom.

The south side has only been partly excavated, but the others are in a fine state of preservation, the chief rooms being in the west wing. The dining room is floored with wonderful mosaic designs that depict the seasons of the year. Spring is represented by a little girl holding a bunch of flowers, summer by a cupid carrying a bird in one hand, and winter by a cloaked and bearded man with a leafless branch in one hand and a rabbit in the other. Here, too, can be seen the flues for hot air let into the walls and the remains of the Roman hypocaust system of heating, which was the forerunner of our modern method of central heating.



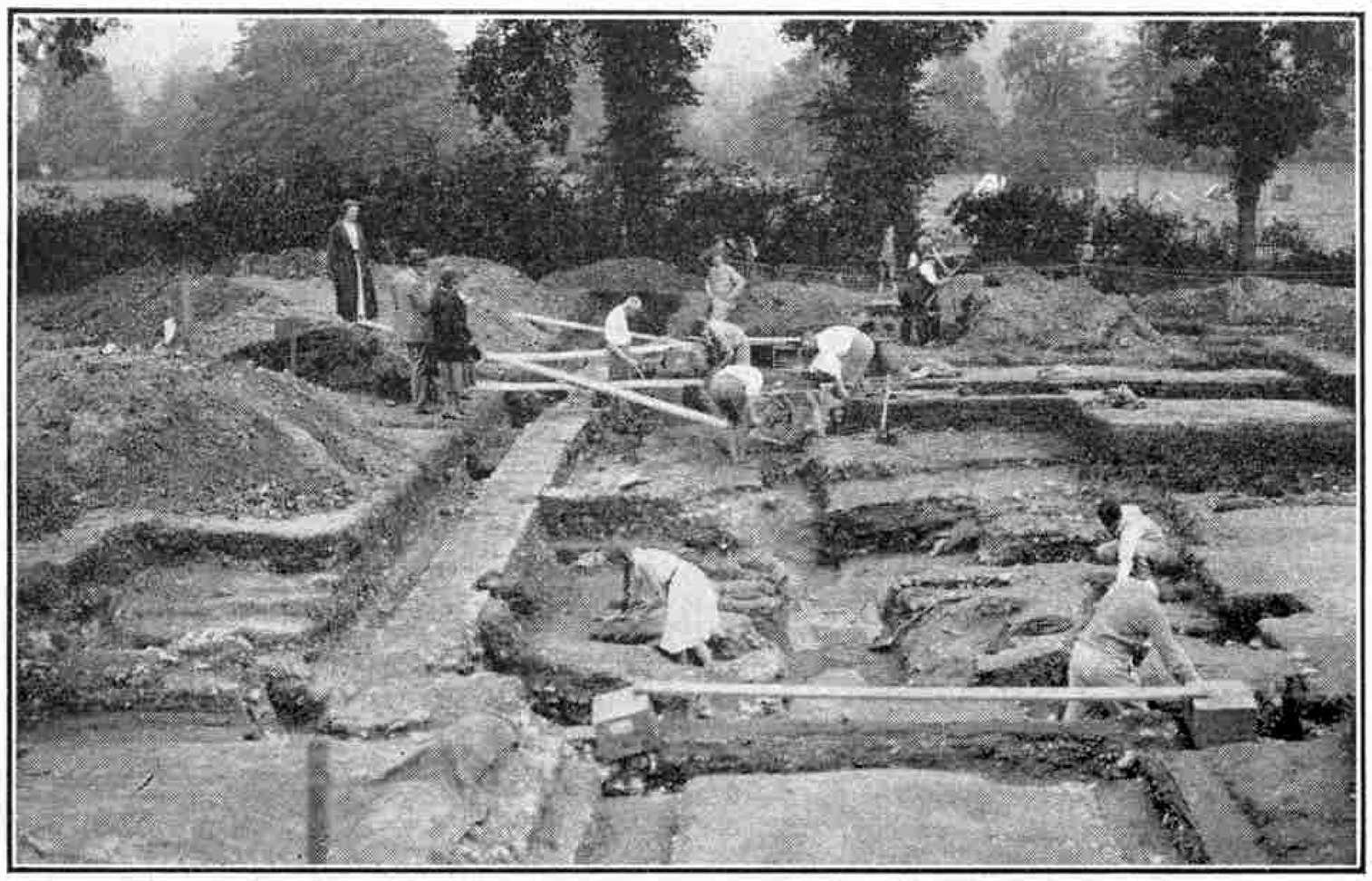
The remains of the west gateway at Borcovicum, a station on Hadrian's Wall, which originally stretched across northern England from the Tyne to the Solway.

Another compartment contains the cold plunge bath, lined with brick-cement, and with the plug hole and leaden waste-pipe still in position. Among the exhibits here are some large pebbles, which were heated and used for making steam quickly by wetting them when they were still hot, as is still done in such countries as Russia and Finland.

On the north side are the foundations of the smithy and bakery, along with two semi-circular stone tanks that were used for dyeing cloth in the later days of the villa. It is believed that heavy taxation drove away the original occupier early in the fourth century, and the building was then used for commercial purposes. The place was abandoned about A.D.375.

Aldborough, a small farming village near Boroughbridge, Yorkshire, is another place where many interesting Roman remains have been found. This was the Roman Isurium, and the centre of civil life so far as Yorkshire was concerned. Many beautiful tessellated, or mosaic pavements have been unearthed in the back gardens of the cottages and farms, and some of these can be seen by visitors. Two of the finest are behind the village inn, where one pavement displays a panther or tiger reclining under a tree and the other has a star as centre decoration with an intricate and lovely system of outer borders.

The largest Roman villa in the country is at Bignor, Sussex, and the farmer on whose land it is situated has realised how profitable it is to have a Roman villa in one's fields, for he makes a charge of one shilling to view his historic property! The mosaic work is exceptionally well preserved. The figures represent dancing nymphs, an eagle carrying



The hot air system of a Roman house at Verulamium. This illustration shows the excavators at work.

off the fair Ganymede, some cupids fighting as gladiators, and the head of Juno surrounded by her peacocks. This Sussex villa covers an area of 650 ft. long and 350 ft. wide, and was discovered about 120 years ago.

At Ravenglass, near the mouth of the Esk, Cumberland, is Walls Castle, the surviving part of the bath-house of Glanoventa, which has been described as "the finest existing Roman building in the North of England." Here the exterior walls still stand to a height of over 12 ft., and traces of the hypocaust heating arrangements can be seen in the two rooms. The building was of red freestone, and the walls were covered on the inside with a pink cement. Originally the entire length of the block would be some 90 ft., and the surviving part is about 50 ft. long and 40 ft. wide.

That the Romans enjoyed the pleasures of the drama is obvious from discoveries that have been made at St. Albans, Hertfordshire, the Verulam of the legions. In the year 1847 the remains of the only Roman theatre known to have been built in Britain were found and in 1933, thanks to the generosity of Lord Verulam, on whose estate they are situated, steps were taken to ensure permanent preservation of this unique monument. The part that served as the stage can readily be distinguished, as well as the bases of a range of 20-ft. pillars. It is believed that this theatre was built towards the middle of the second century and that it had seating accommodation for some 1,600 people.

Other interesting relics have been discovered at St. Albans, and the section of the original wall that enclosed the city of Verulam is particularly imposing. It is built of flint with courses of tiles and has a width of 10 Roman feet at the base. In addition, there are a number of mosaic pavements, one of which represents a shelly sea god, as well as some red tiles that still retain the footmarks of dogs and sheep treading on the soft clay when they were being made.

Within the last three or four years, valuable finds have been made on farm lands near Rudston, in the Bridlington district. Over a century ago remains of a Roman villa were found here, but were much mutilated by villagers searching for treasures. The relics were forgotten until scores of years later, when they were ploughed up by a local farmer. Soon Yorkshire archeologists were carrying out excavation work and one of the finest mosaics ever found in Britain was brought to light.

The Roman villas afford us an insight into the domestic lives of the people of that time, but many farmers of Northumberland have evidence of their military skill running across their fields and grazing land. This is Hadrian's Wall, which originally stretched right across northern England from the Tyne to the Solway, but is now seen at its best on the heights of the Whin Sill range between Chollerford and Thirlwall. In places, particularly near the two spots mentioned, only the line of the wall is visible above the ground, but in the centre there is a magnificent stretch, varying in height from 4 ft. to 8 ft. and faced with cubes of stone, which pursues a snake-like course across the heights.

Not only is the line of the wall to be seen, however, but many of the camps have been excavated and some of their wonders revealed. The farm of Aesica takes its name from an adjoining camp, where there is an altar in a fine state of preservation, and at Housesteads, the Roman Borcovicum, which is now cared for by the National Trust, the foundations and lower walls of the barracks and several other remnants have been exposed to view.

There are many other relics of Roman Britain on the farm lands of Britain. Traces of old roads can be seen crossing the fields, grass grown amphitheatres tell of the great deeds of gladiators of old, and there are remnants of lead mines on the sheep walks of the North and Midlands. But most fascinating of all are those remains that give us an insight into the lives of the Roman country dwellers, those early inhabitants of our countryside who placed cleanliness and sanitation second only to godliness.

Washing the mosaic pavement of the Roman villa unearthed two years ago at Dorchester. The ruins were discovered when building operations were begun on the site.

New Meccano Models

Hammer—Motor Launch—Roundabout—Delivery Van

THERE is splendid variety in the fare that we are able to offer Meccano model-builders this month. The models described include a simple Trip Hammer, a fine Motor Launch and an Aerial Roundabout that can be set in motion by means of a *Magic* Motor, while the fourth is a splendidly realistic working model of a tradesman's Cycle Delivery Van.

The Trip Hammer is shown in Fig. 1 and it can be built from the contents of Outfit No. 3. The constructional details of the framework are clearly shown in the illustration, and the mechanism that operates the hammer will be understood from the following details. A small Crank Handle mounted as shown carries a Bush Wheel, in one hole of which is bolted an Angle Bracket. The Angle Bracket is so arranged that it strikes the end of the hammer shaft once during each revolution when the Crank Handle is rotated.

The hammer shaft is a Rod pushed through the arms of a Double Bracket, which is bolted to an Angle Bracket pivoted on a bolt passed through a hole in the $3\frac{1}{2}''$ compound strip, as shown in the illustration. The bolt is lock-nutted and the Angle Bracket must be quite free to swivel on it. The Rod is held in place in the Double Bracket by means of Spring Clips placed on it, one on each side of the Bracket. The hammer head consists of a 1″ fast Pulley bolted to a Cranked Bent Strip, which in turn is held on the shaft by a 1″ fast Pulley placed between its arms and fixed securely to the shaft.

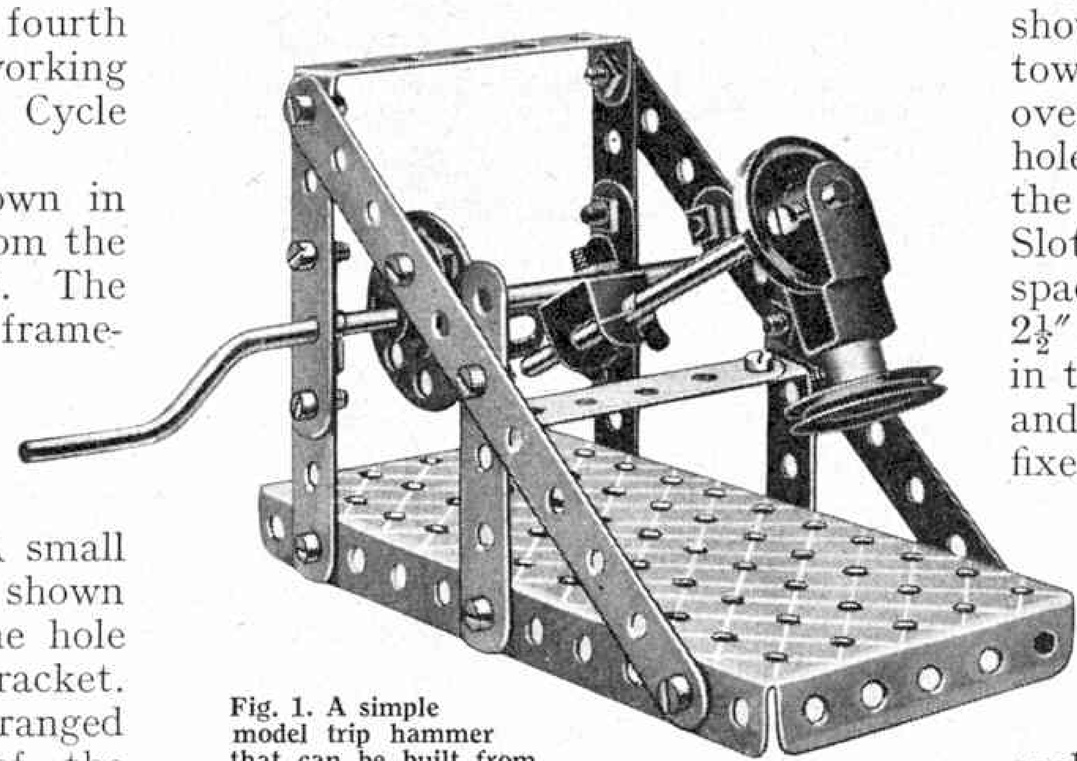


Fig. 1. A simple model trip hammer that can be built from the parts in Outfit No. 3.

Parts required to build the model Trip Hammer: 2 of No. 2; 7 of No. 5; 1 of No. 10; 1 of No. 11; 4 of No. 12; 1 of No. 19g; 2 of No. 22; 1 of No. 24; 2 of No. 35; 22 of No. 37a; 21 of No. 37b; 1 of No. 44; 1 of No. 48a; 1 of No. 52.

The well-built model of a Motor Launch illustrated in Fig. 2 is based on a special type of craft used by the Portuguese Government for salvage purposes in emergency cases. The model may be built from the contents of Outfit No. 4 and a few extra parts.

Construction of the hull is commenced by bolting $12\frac{1}{2}''$ Strips to the sides of $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates to form one side of the bows. The Plates are joined together at the stern by Angle Brackets and braced with $2\frac{1}{2}''$ Strips in the manner shown. The $12\frac{1}{2}''$ Strips are extended towards the stern by $5\frac{1}{2}''$ Strips overlapping the $12\frac{1}{2}''$ Strips two holes, the ends of the $5\frac{1}{2}''$ Strips at the stern being bolted to Formed Slotted Strips 2. The sides are spaced apart at the keel by a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip bolted in the seventh holes from the stern, and a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate is fixed to them to form the foredeck.

The after cockpit is built up on four $2\frac{1}{2}''$ Curved Strips centred by means of $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips attached to the inside of the hull with Angle Brackets. The cockpit is roofed by a compound plate made up of two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates, which are curved to form the sloping front.

The roof of the main cabin is supported by two $2\frac{1}{2}''$ Strips and two $2\frac{1}{2}''$ Curved Strips. Obtuse Angle Brackets bolted to $5\frac{1}{2}''$ Strips 3 attached to the $2\frac{1}{2}''$ Strips bear the curved roof, which is a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate. Two more $2\frac{1}{2}''$ Strips are bolted vertically to the sides of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate forming the fore deck, and they are joined together at their upper ends by a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip.

The forward cabin is roofed by a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate, which is bent over at the forward end and edged with a $2\frac{1}{2}''$ Strip. Two $2\frac{1}{2}''$ Strips 4 are held in inclined positions and attached by means of Flat Brackets to the $2\frac{1}{2}''$ uprights. At the bows the deck consists of two $2\frac{1}{2}''$ diam. Semi-Circular Plates and a Flat Trunnion. A $\frac{1}{2}''$ loose Pulley mounted on an Angle Bracket and spaced with washers represents the searchlight mounted on the roof of the forward cabin.

Parts required to build the Motor Launch: 4 of No. 1; 2 of No. 1b; 8 of No. 2; 1 of No. 2a; 2 of No. 3; 15 of No. 5p; 2 of No. 6; 2 of No. 10; 2 of No. 11; 10 of No. 12; 2 of No. 12c; 1 of No. 23; 108 of No. 37a; 108 of No. 37b; 8 of No. 48a; 1 of No. 51; 1 of No. 52; 2 of No. 89a; 4 of No. 90a; 2 of No. 125; 1 of No. 126a; 2 of No. 189; 7 of No. 190; 3 of No. 191; 2 of No. 192; 2 of No. 199; 2 of No. 200; 2 of No. 214; 4 of No. 215.

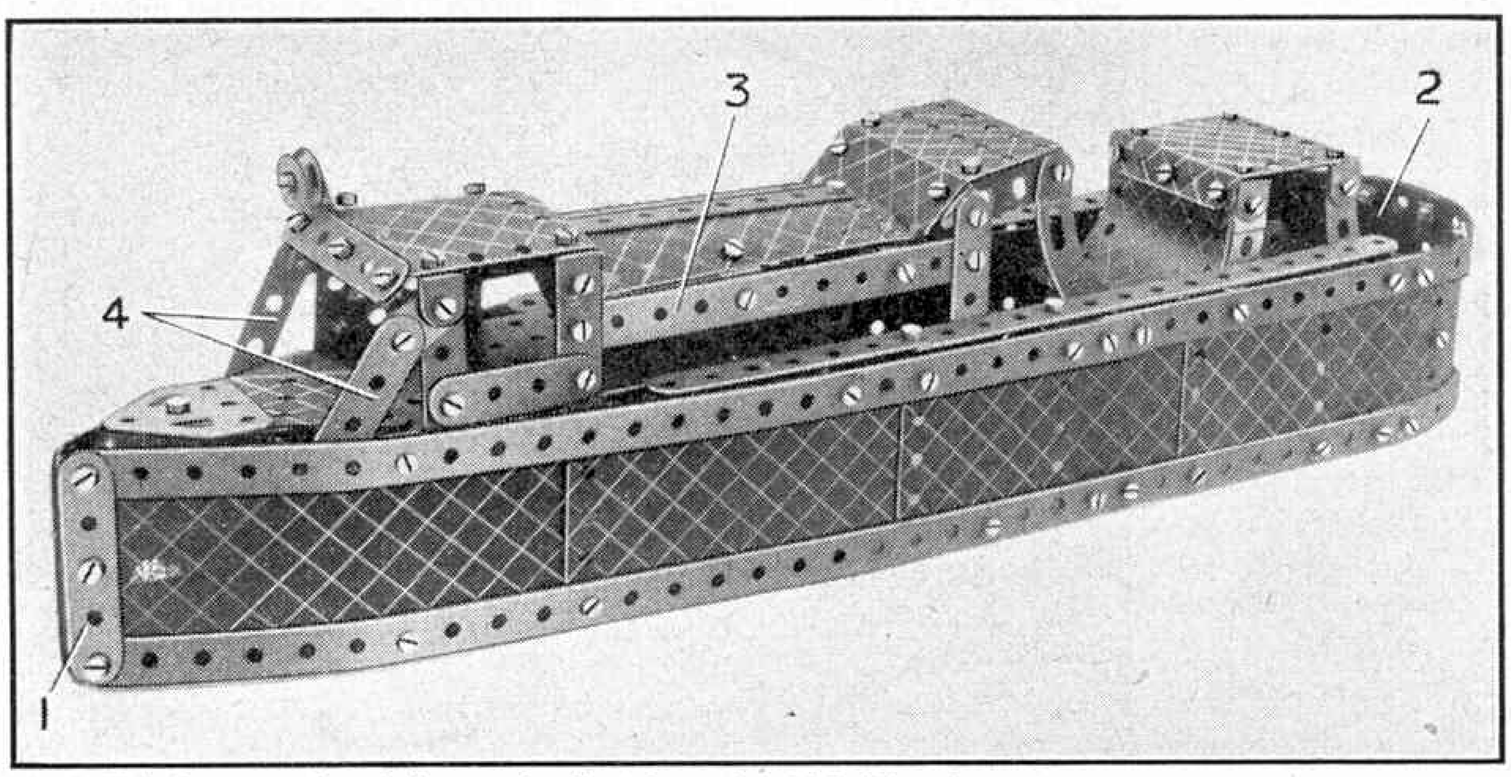


Fig. 2. This fine motor launch is a good subject for model shipbuilders. It can be built from the contents of Outfit No. 4 and a few extra parts.

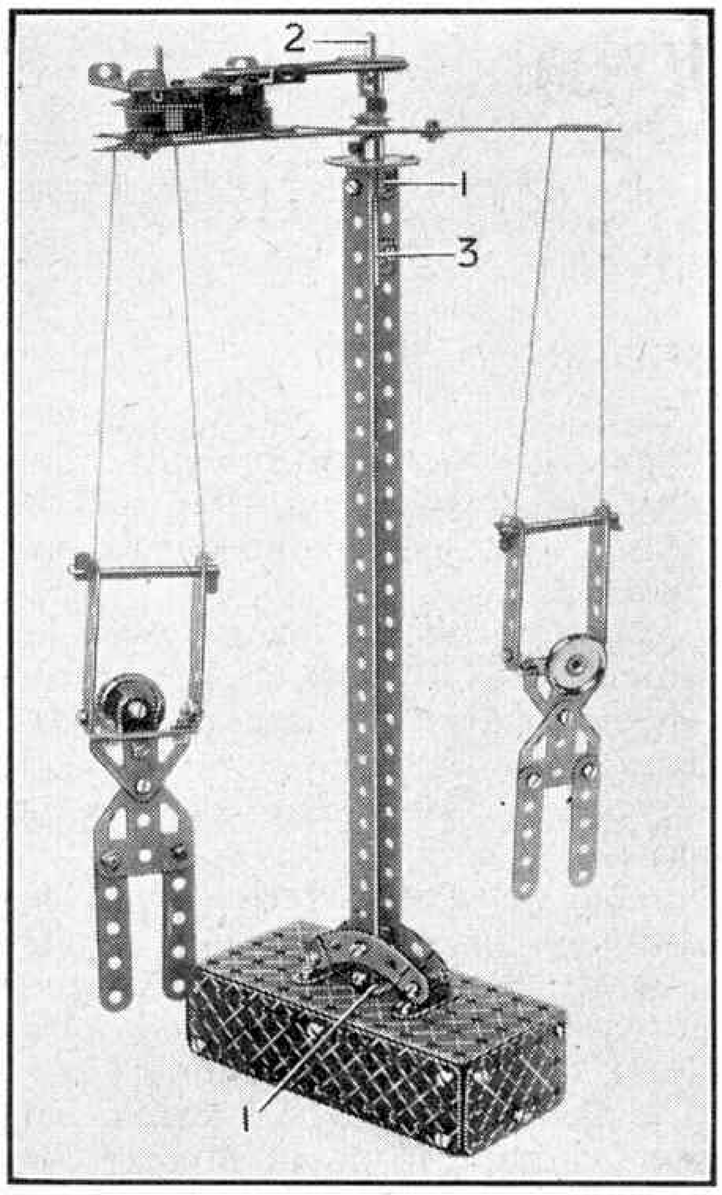


Fig. 3. A model aerial roundabout operated by a Magic Motor. It can be built from the parts in Outfit No. 3.

The model Aerial Roundabout shown in Fig. 3 is a fine subject for reproducing from the parts in Outfit No. 3. It is driven by a *Magic* Motor, and when this is set in motion the two figures swing round in gradually widening circles.

Construction of the model is commenced by building the base, which consists of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate mounted on two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates bolted to its side flanges and two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates bolted to its ends. The corners of the base are braced by two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips, which reinforce the Plates and keep them rigid. Two $12\frac{1}{2}''$ Strips are used to form an upright. They are joined at each end by Double Brackets 1. The Bracket at the bottom is bolted to the base, while that at the top forms a guide for a $3\frac{1}{2}''$ Rod 2. Two $2\frac{1}{2}''$ Curved Strips are bolted to each of the $12\frac{1}{2}''$ Strips, and held firmly to the base by three Angle Brackets and a Reversed Angle Bracket.

The $3\frac{1}{2}''$ Rod 2 is locked to a Bush Wheel and then passed through the Double Bracket 1 and Angle Bracket 3, being held in place by means of Spring Clips so that it is not free to revolve. A compound strip built up from two $5\frac{1}{2}''$ Strips overlapping five holes is pivoted at its middle on the Rod 2. It is held in place by two Washers, a Spring Clip and a $\frac{1}{2}''$ Pulley, on top of which is a 1″ fast Pulley that is used for taking the drive from the *Magic* Motor. The Motor is fixed to one end of the compound strip by means of two bolts, and a Driving Band is passed around the pulley on its shaft and the 1″ Pulley on the Rod 2.

The constructional details of the two figures are clearly shown in the illustration. The bar from which each figure is suspended is a 2″ Axle Rod, which is held by Spring Clips in the $2\frac{1}{2}''$ Strips forming its arms.

Parts required to build model Aerial Roundabout: 2 of No. 1; 2 of No. 2; 8 of No. 5; 2 of No. 10; 2 of No. 11; 8 of No. 12; 1 of No. 16; 2 of No. 17; 3 of No. 22; 1 of No. 23; 1 of No. 24; 5 of No. 35; 46 of No. 37a; 48 of No. 37b; 4 of No. 38; 1 of No. 40; 1 of No. 52; 2 of No. 90a; 1 of No. 125; 2 of No. 126; 2 of No. 126a; 1 of No. 186; 2 of No. 189; 2 of No. 190.

Fig. 4 shows an interesting model of a tradesman's Cycle Delivery Van of the kind used by bakers and dairymen for collecting and delivering purposes. It is fitted with a *Magic* Motor that drives it at a good speed, and its novelty and realism make it an attractive subject for readers who like constructing models that can be set in motion.

It is best to commence construction by building up the van. The base of this consists of two $5\frac{1}{2}''$ Angle Girders 1, joined at their ends by $3\frac{1}{2}''$ Angle Girders. At the four corners of the frame so formed four 3″ Angle Girders are bolted vertically. The sides of the van are $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates, and each end is made up of two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates overlapped and bolted to the vertical Angle Girders. The hinged lid is a Hinged Flat Plate, and one side of this is attached by means of Obtuse Angle Brackets to one side of the van. At the rear end of the van the top is partly enclosed by two $3\frac{1}{2}'' \times 1\frac{1}{2}''$ Flat Plates 3 overlapped and attached to the rear end of the van by Angle Brackets.

The bottom of the van is filled in by a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate, and underneath this is bolted a *Magic* Motor 5, the Motor being fixed so that its length lies across the width of the van. The bearings for the axle of the front wheels are two Angle Brackets bolted to the $5\frac{1}{2}''$ Angle Girders. To the front end of the van are fixed two $\frac{1}{2}''$ Reversed Angle Brackets 4, each carrying a $\frac{1}{2}''$ loose Pulley mounted on a $\frac{1}{2}''$ Bolt.

The framework that carries the rear wheel and the driver's seat consists of two $5\frac{1}{2}''$ Angle Girders, which are joined at their forward ends by a 1″ Corner Bracket. The Girders are then attached to the van by a bolt passed through the hole in the apex of the Corner Bracket and a hole in the floor of the van. In the fifth hole from the point where the Corner Bracket is bolted the Girders are bridged by means of a 2″ Strip, and the bolts that secure this Strip fix in position also two $\frac{1}{2}''$ Reversed Angle Brackets 7, which form steps.

The driver's seat is supported on a triangular structure built up from two $3\frac{1}{2}''$ and two $2\frac{1}{2}''$ Strips arranged as shown, the $3\frac{1}{2}''$ Strips being spaced apart by two Double Brackets 8. The lower end of these Brackets carries the rear wheel mudguard, which is made by bolting two Formed Slotted Strips end to end. The driver's seat consists of two Trunnions bolted together, but spaced apart by means of Compression Springs on the shanks of the bolts. The rear wheel axle is a 2″ Rod and it carries in addition to the 3″ Pulley a 1″ fast Pulley.

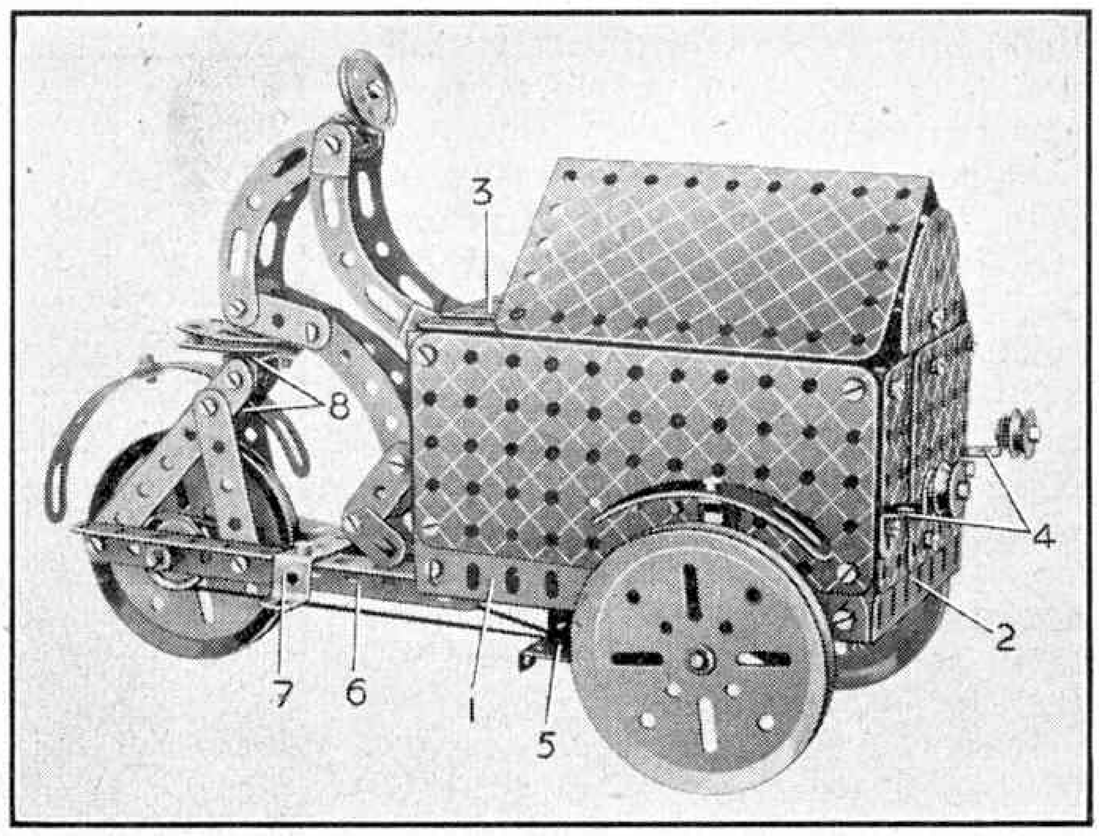
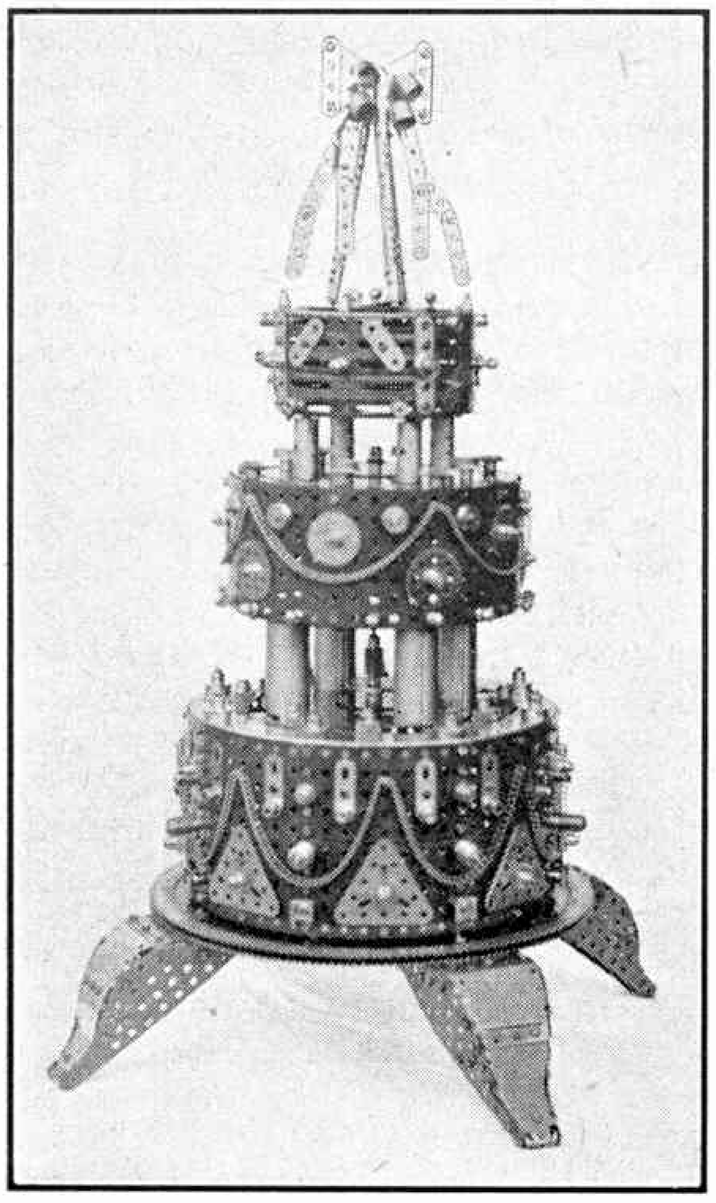


Fig. 4. A Magic Motor is used to drive this realistic tradesman's delivery van.

The parts that make up the figure of the driver are quite clearly shown in the illustration.

Parts required to build the Tradesman's Delivery Van: 2 of No. 3; 2 of No. 5; 1 of No. 6; 4 of No. 6a; 4 of No. 9; 2 of No. 9b; 4 of No. 9c; 3 of No. 10; 4 of No. 11; 7 of No. 12; 2 of No. 12c; 1 of No. 15a; 2 of No. 17; 3 of No. 19b; 1 of No. 22; 1 of No. 22a; 2 of No. 23; 54 of No. 37a; 54 of No. 37b; 8 of No. 38; 3 of No. 70; 4 of No. 72; 2 of No. 73; 2 of No. 90; 4 of No. 90a; 7 of No. 111a; 3 of No. 120b; 4 of No. 125; 2 of No. 126; 1 of No. 133a; 2 of No. 136; 1 of No. 198; 1 of No. 214; 4 of No. 215; 1 *Magic* Motor.



Novelty in Meccano model-building! A wedding cake constructed from Meccano ingredients by E. D. Clements, Orpington, to his own recipe.

"New Year" Model-Building Competition

Prizes all Readers may Win

In last month's *"M.M."* we published particulars of the *"New Year"* Model-Building Contest, in which cheques and a large number of other valuable prizes are offered for the best models submitted. The closing date of this Contest is 31st March, and as there is still plenty of time for readers to design and build entries we are again giving full details of how these should be prepared and submitted.

Models of any kind whatsoever may be submitted. All Meccano structures are eligible, whether they are simple model cranes built with small Outfits, or huge locomotives, battleships or giant bridges built from the larger ones. Every competitor will have the same chance whatever the size of his Outfit, for the judges will take this into account and will look for unusual ideas and neat construction rather than for elaboration.

Preparing an entry is very easy. 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 somebody 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 to be submitted.

Finally the drawing or photograph, with the accompanying written description, has to be placed in an envelope addressed *"New Year General Model-Building Competition,"* Meccano Ltd., Binns Road, Liverpool 13. That is all there is to do.

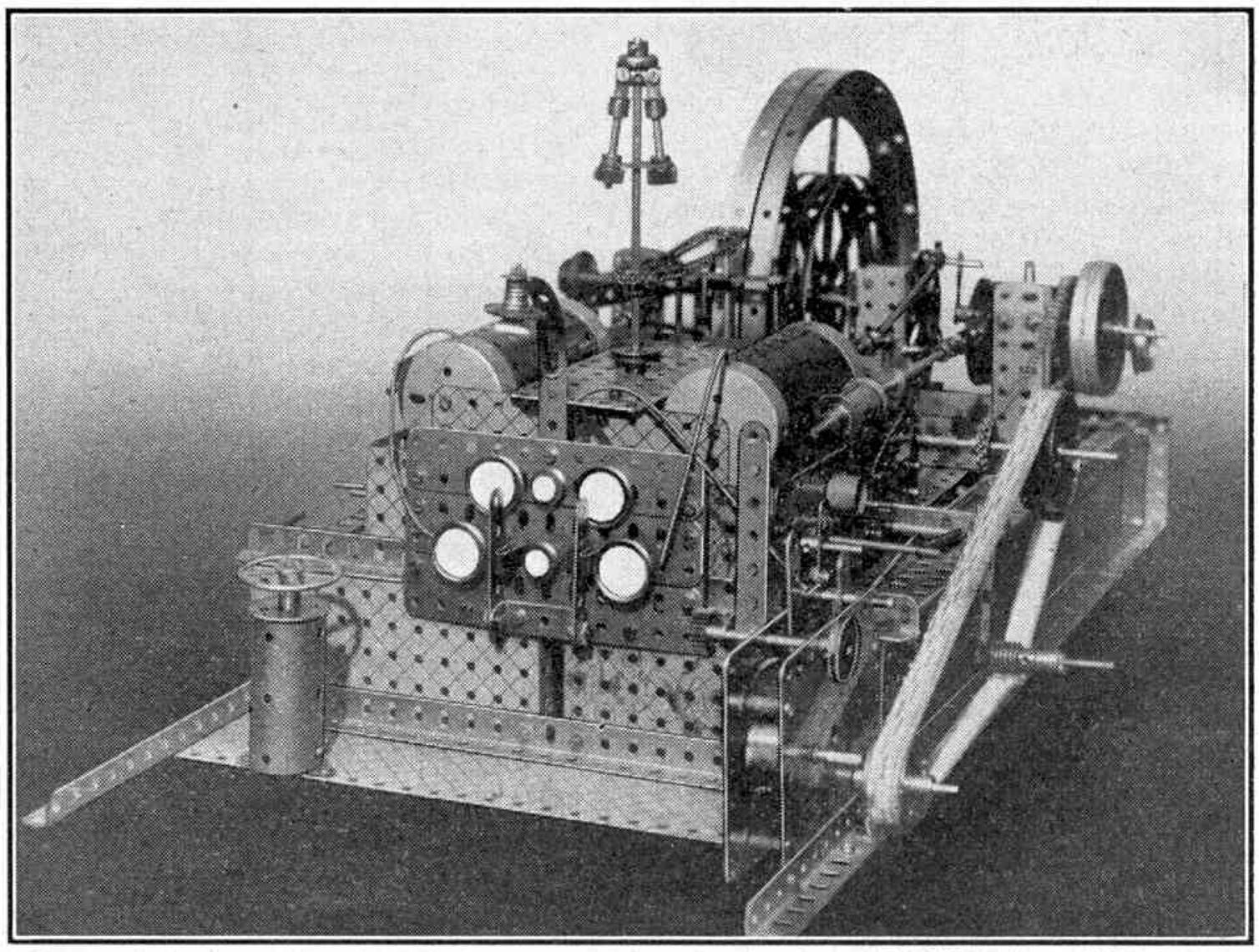
Competitors who would like to have their photographs or drawings returned to them after the entries have been judged should enclose with their entries a stamped addressed envelope for that purpose. Photographs or drawings of prize-winning entries will not be returned.

Entries will be divided into two sections according to the ages of competitors. Those from readers of 15 years of age or more will be placed in Section A, and those from competitors under 15 will be grouped together in Section B. In each section the age of the competitor will be taken into consideration by the judges.

The Contest will remain open for entries until 31st March, but entries should be posted as soon as they are ready so that they will reach Liverpool well before the closing date.

The following prizes will be awarded in each Section of the Contest to the builders of the most interesting models received. The First Prize is a cheque for £3/3/–. The Second and Third Prizes will consist respectively of Meccano or Hornby products to the value of £2/2/– and £1/1/–, and there will be 20 further prizes, 10 consisting of Meccano or Hornby products to the value of 10/6 and 10 of similar products to the value of 5/–. Every winner of a prize consisting of Meccano or Hornby products will be allowed to make his own choice from current lists.

A selection of the best models submitted will be described in the *"M.M."*



A fine model of a steam mill engine built by A. Foster, Bacup, for whom it won Third Prize in an "M.M." Model-building Competition.

Model-Building Competition Results

By "Spanner"

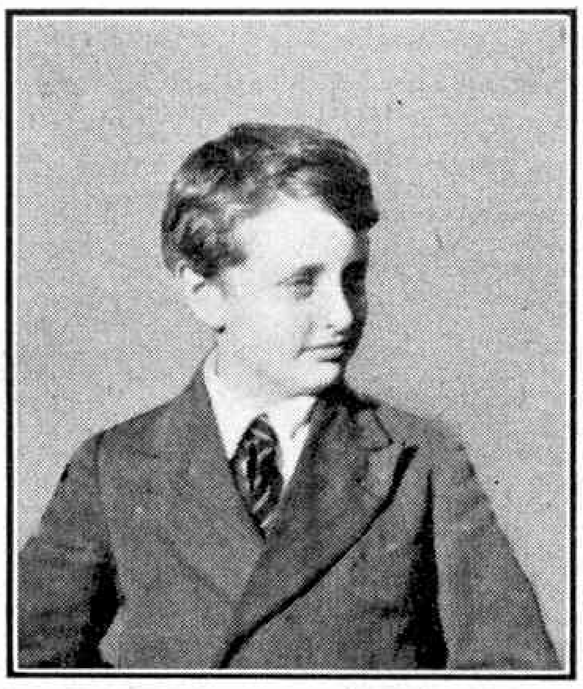
"Autumn," "Sharp Eyes" and "Governor" Contests

The "Autumn" Competition was open for Meccano models of all kinds and there were no restrictions as to size of Outfit to be used in building entries. Competitors of all ages were eligible and the chief qualities that the judges looked for in making their awards were good workmanship and ingenious applications for the Meccano parts used. Basing their decisions mainly on these points, therefore, the judges decided to allot the prizes for models built by the competitors named in the following list.

1st Prize, Cheque for £5/5/-: A. V. Butcher, Christchurch, New Zealand. 2nd, products value £3/3/-: F. Rich, Orpington. 3rd, products value £2/2/-: C. Grove-Jones, Cheadle Hulme.

Products value 10/6: E. C. Collins, Gt. Yarmouth; A. Cole, Broadchalk; E. D. Clements, Orpington; A. Turton, Ottawa; P. Wickham, Leicester; R. Gosselin, Quebec; I. Moss, Banbury; J. Blundell, Swindon; E. Collins, Leeds 9; J. McHutchon, Glasgow.

Products value 5/-: P. Robinson, Leicester; A. Letort, Paris; E. Druce, Bolton; B. Rivron, Nacton; T. Constantine, Haslingden; C. Owen, Hale; A. Featherstone, Widnes; J. Eyles, London W.13; D. Hall, Winchester; E. Bridle, Tunbridge Wells.

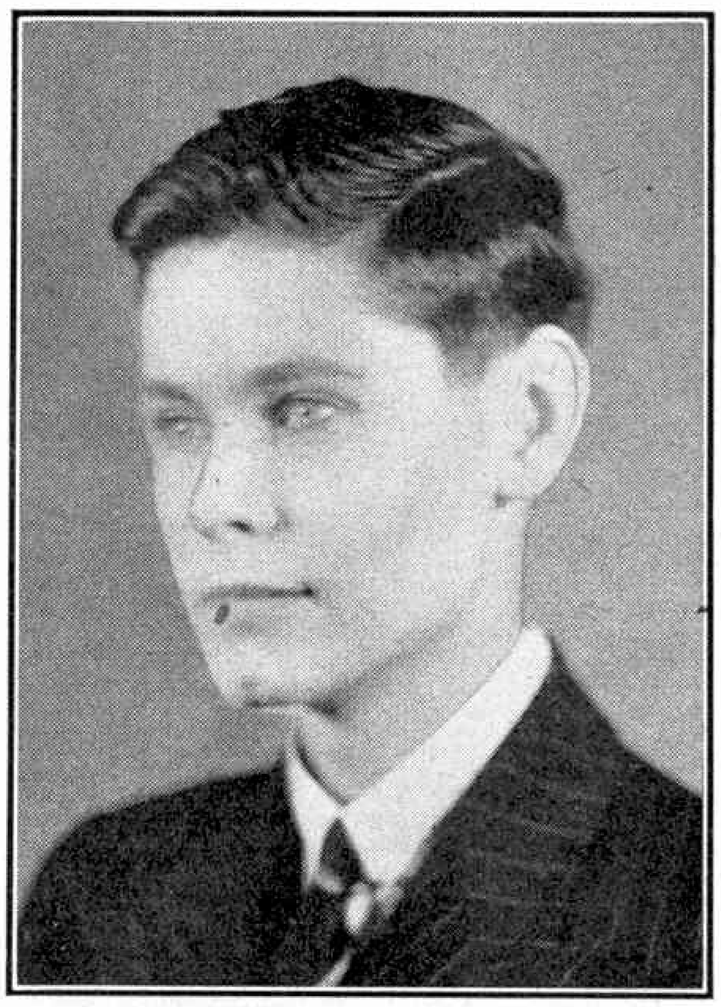


Ian Appleby, London N.1, won a prize in a recent Contest.

The First Prize was awarded for a model of a very unusual type. It is an almost completely automatic radio receiver, all the automatic operating mechanism of which is built up from Meccano parts. It is shown together with its builder, A. V. Butcher, Christchurch, New Zealand, in the smaller illustration below, and it incorporates many interesting features. There is a series of dial controls, which may be pre-set to give a whole evening's entertainment from a variety of stations, the automatic apparatus switching in the various stations at the appropriate times. The model is of such an interesting type that I intend to describe it more fully in next month's *"M.M."* together with other successful models.

The model that won Second Prize also is a very fine piece of work. I have not been able to illustrate it here, but hope to include it in a further commentary on this competition which will appear next month. The model is a very fine example of an industrial locomotive carrying a powerful crane, and it was built by F. G. Rich, Orpington.

The well-proportioned model of H.M.S. *"Hood"* shown below is the work of I. Moss, Banbury, and was one of the many interesting entries that won prizes of the value of 10/6. In building the model Moss used as a guide a Dinky Toys miniature of this ship.



B. D. Rivron, Nacton, Ipswich, a prizewinner in the "Autumn" General Model-Building Contest.

"Governor" Contest (Overseas Section)

The prizes for the best models submitted in the Overseas Section of the "Governor" Competition, details of which appeared in the September 1939 issue of the *"M.M."* have been awarded to the competitors named in the following list.

1st Prize, Meccano or Hornby products value £2/2/-: R. Patterson, Madras; 2nd, products value £1/1/-: N. Parker, South Perth, W. Australia; 3rd, products value 10/6: T. Wade, Johannesburg.

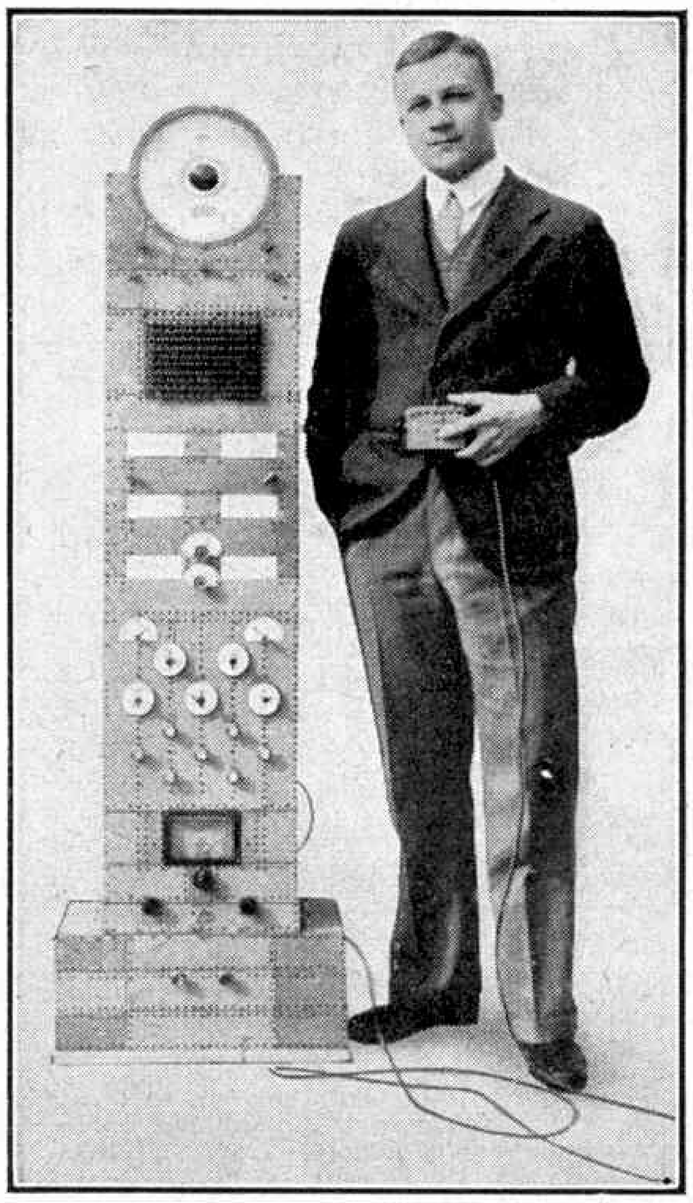
Products value 5/-: N. Candish, Opawa, New Zealand; D. Heeramaneck, Bombay; P. Gordon, Valetta; A. Cooke, Kingston, Jamaica; D. Hewitt, Cairo.

"Sharp Eyes" Contest No. 3

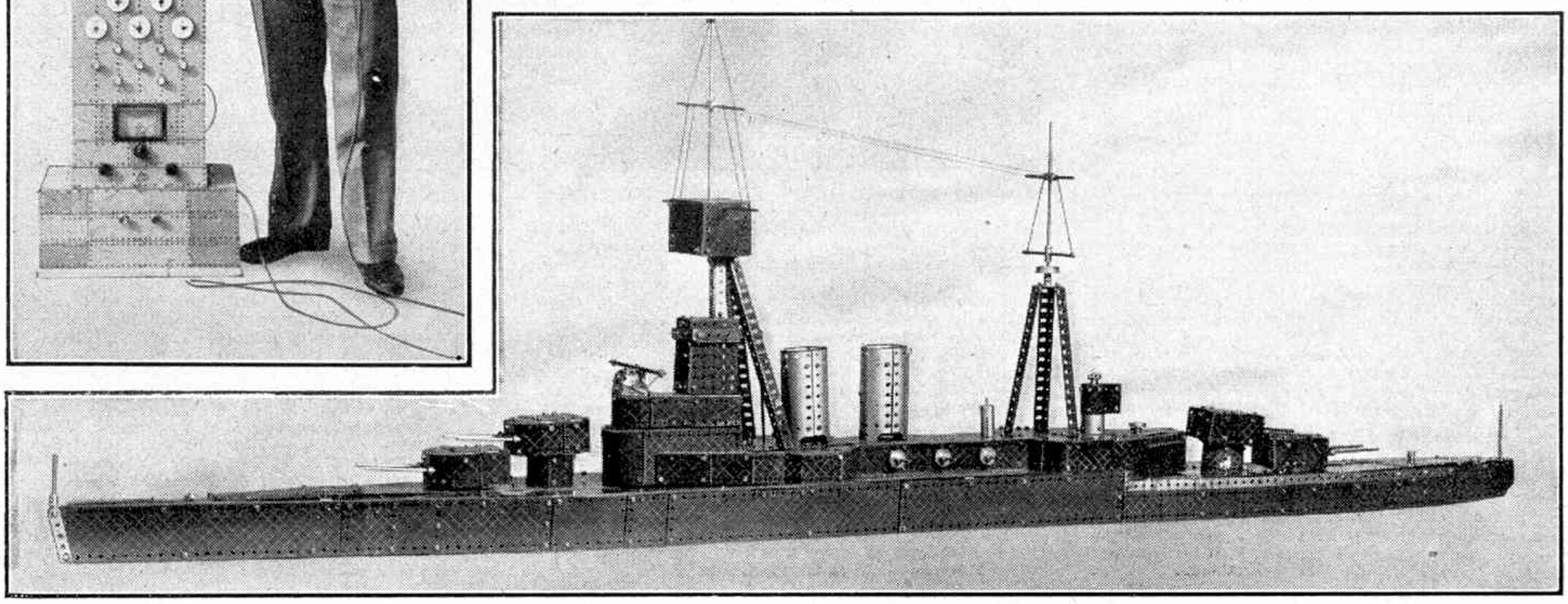
The complete list of prizewinners in the third and last of the "Sharp Eyes" Competitions, which was announced in the August 1939 issue of the *"M.M."* is as follows:

1st Prize, Meccano or Hornby products value £3/3/-: K. Costain, Bolton; 2nd, products value £2/2/-: L. Slater, Portsmouth; 3rd, products value £1/1/-: E. Hooper, Exeter.

Products value 5/-: C. Wrayford, Bovey Tracey; C. Climpson, New Malden; C. Bradshaw, Sheffield 9; E. P. Tapper, S. Perth, W. Australia; N. Parker, S. Perth, W. Australia.



The illustration on the left shows A. V. Butcher, Christchurch, New Zealand, and his automatic radio receiver. Below is a fine model of the battle cruiser "Hood" built by J. Moss, Banbury.



With the Model-Builders

FLYWHEEL CONSTRUCTION

I am constantly receiving queries regarding the assembly of flywheels in Meccano, and a few notes on this interesting subject will prove useful to constructors. Model-builders will know that a Flywheel is already included as a standard part, No. 132, in the Meccano range. This wheel is 2¾″ in diameter, and serves its purpose excellently. It is not suitable for models built to a large scale, but there is no difficulty in using standard parts for building up flywheels suitable for such models.

A splendid built-up flywheel can be assembled by securing a number of 7½″ Circular Strips, Part No. 145, together. The larger the number of Circular Strips used, the greater will be the mass of the wheel rim, and the bigger the momentum imparted, but six Strips will give quite a good flywheel effect. A still larger flywheel can be formed from Ring Frames, Part No. 167b, supported on a system of spokes composed of Strips. This wheel is most suitable for use on very large models of stationary steam engines, pumping plants and similar mechanisms. The advantage of the wheel lies chiefly in the realism provided by its large diameter, and as the Ring Frames are quite light, the wheel cannot be expected to provide a marked steadying effect on a mechanism to which it is connected.

It is possible to assemble a particularly neat flywheel of the type used in two-stroke petrol engines and light motors, from a number of Ball Race Flanged Discs (No. 168a), a 3″ Face Plate, and a Wheel Flange. For a flywheel of medium width six Flanged Discs will be required. The Wheel Flange and Face Plate are placed on the top disc and two ⅜″ bolts are passed through to hold these parts in alignment. An Axle Rod is then secured in the boss of the Face Plate, and the remaining five discs are slipped on to the axle. A Bush Wheel is bolted to the last Disc so that the complete unit can be clamped on the Rod. This assembly results in a compact yet heavy wheel that will be found very useful in various types of mechanism, in addition to model motor engines.

NOVEL USES FOR MECCANO MODELS

Meccano parts and completed models are often put to novel and interesting uses. The Meccanograph, for example, has often been used as a display model at church bazaars and charity fetes, and considerable sums of money have been raised by this means, visitors eagerly paying a few coppers for the privilege of turning a handle and watching a beautiful design being produced before their eyes! Another model that has often been used for display purposes is the Transporter Bridge with automatic reversing carriage, and the Loom.

I heard recently of a particularly interesting instance in which a Meccano model is to fulfil a useful practical purpose, this time in connection with the war. One of my readers is building a model loom for the purpose of weaving special woollen material required for use in first-aid work. I hope his model will be entirely successful and that his initiative and enterprise will result in ample supplies of the special material he requires.

HOW TO MAKE MECCANO SOLENOIDS

In reply to several readers who have written to me regarding the making of Meccano solenoids I give the following details, which no doubt will be welcomed by other model-builders.

If the solenoid is to be used on a 6-volt current supply the Bobbin, Part No. 181, should be wound with 23 gauge S.W.G. D.C.C. Copper Wire. Before commencing to wind an end of the wire should be pushed through the innermost of the small holes in one of the ends of the Bobbin, care being taken to pass through a sufficient length of wire to enable connection with the solenoid to be made when winding is completed. The wire should then be wound evenly on to the Bobbin, the turns being kept as close as possible together.

The operation should be continued until the Bobbin has been wound to its full capacity, with the top layer almost level with the rims of the end cheeks. The outer end of the wire should then be anchored, and this is done by passing it through the small hole near the edge of the appropriate cheek. A layer of brown paper wrapped around the coil will help to give a neat and tidy appearance, and can be secured in position either by gum or cotton.

If the solenoid is to be used on a 20-volt supply the best wire for the winding is No. 36 S.W.G. D.S.C., and in this case also the Bobbin should be wound to full capacity.

Solenoids of this type have many uses both in Meccano model-building and in electrical experimental work, and one or two of them should be wound and kept in the store cupboard for use when required.

A NEW MECCANOGRAPH

It would be difficult to find a Meccano model that has attracted so much attention or excited so much interest as the Meccanograph, which was described in a Special Instruction Leaflet issued some years ago. Young and old alike find pleasure in the variety of beautiful designs that can be produced on the machine simply by turning a handle. The special leaflet in which the model was described is now out of print, but readers will be interested to know that an improved version of the model with which an even greater variety of designs can be produced, is to be described and illustrated in the "*M.M.*" in the near future.

Many boys who built the original Meccanograph have written to tell me of various modifications they have made to it, while other model-builders have constructed designing machines of a similar type, but based on their own ideas and incorporating various gadgets that were absent from the original model. Some of these new features have been included in the model to be described in the "*M.M.*" and I advise all readers to look out for the article.

READERS' IDEAS FOR NEW MECCANO PARTS

Among the many interesting suggestions for new Meccano parts that have come to my notice recently is one from C. Bradshaw, Sheffield, a keen Meccano enthusiast who has many fine original models to his credit. He says that his experience leads him to believe that a useful addition to the Meccano range would be a new flat plate measuring 7½″ × 2½″, and similar in general design to either the existing Strip or Flat Plates. Among the more obvious applications for such a part is the making of bases for large models. For example, three of these plates bolted edge to edge would form a square with 7½″ sides, and this would be of great value in building cranes and similar models. Alternatively, two 7½″ × 2½″ plates and two 2½″ × 2½″ Perforated Flat Plates could be arranged to form a 7½″ square with an open space in the centre, an arrangement that would be suitable for certain models. The suggested new part would have many other uses in conjunction with 7½″ Angle Girders and Strips. The idea is one that merits careful consideration, and when circumstances permit we shall see if anything can be done in this direction.

Another suggestion was submitted by M. Black, London N.W.1, who recently built a model in which he required a wide-faced toothed bar that would mesh with standard Meccano Pinions. He suggests that special bars about ½″ × ¼″ section should be introduced, and should be cut with standard Meccano teeth across their ¼″ dimension. He thinks that bars of this kind would fill useful purposes in model lathes and other machine tools. A very serviceable substitute for these special toothed bars can be built up by bolting two or three of the existing 3½″ or 6½″ Rack Strips face to face, however. If greater lengths than 6½″ are required two or more of the compound rack strips can be joined end to end by means of Strips. In this way toothed sections of almost any required length and width can be readily assembled. In general we do not consider it necessary to introduce specially designed parts that would be required only very infrequently, and the Meccano system is so adaptable that in practically all cases, a suitable substitute can be devised.

Claude Wainwright, Stoke-on-Trent, suggests a special screwdriver somewhat like a carpenter's brace, with a cranked shaft by means of which it could be rotated. The screwdriver blade itself would be in the form of a detachable head, which could be screwed on to the lower end of the brace. Such a screwdriver would allow the blade to be easily replaced when it became worn, but it would be costly to produce and difficult to use in confined spaces.

CREEPER TRACKS

Many suggestions have been submitted in connection with creeper track suitable for Meccano model tractors, tanks, cranes, etc. The proposed designs vary from simple moulded rubber belts to more complicated stamped-out metal squares, usually interlocked with each other or bolted to lengths of Sprocket Chain. These suggestions have all been carefully considered, but none of them has been adopted, as it is possible to build really efficient creeper tracks from parts already in the Meccano system. For example, tracks for small models can be made from continuous lengths of Sprocket Chain passing around a number of Sprocket Wheels. Rubber Bands also may be employed with good effect when passed either separately over Pulleys or in the form of a solid track round Flanged Wheels.

Another neat type of endless track that is particularly suitable for small models can be constructed from Hinges. The required number of Hinges are secured rigidly together by nuts and bolts with the bolt heads inwards, the complete belt being passed around Flanged Wheels at each end. To enable the bolt heads to get a firm grip, the driving Flanged Wheel should be fitted with two or three small Meccano Rubber Bands. Alternatively, a thin strip of strong paper may be passed around the Wheel and held in position by glue.

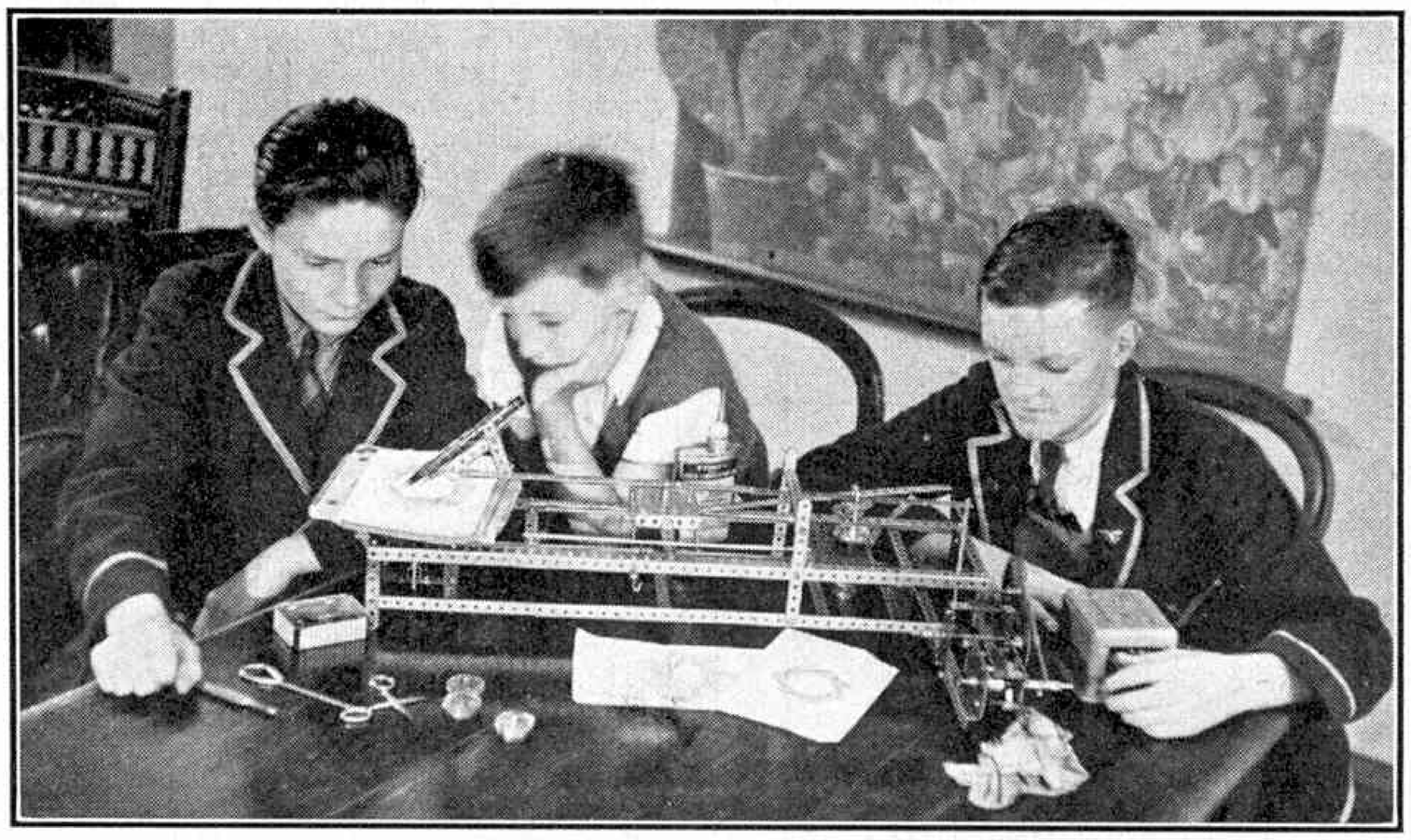
SHIP FITTINGS MADE FROM MECCANO PARTS

Building model ships from Meccano parts is a particularly fascinating pastime, and many splendid examples of this kind of work have been produced from time to time. Model battleships, passenger and cargo ships, ferry steamers, yachts, motor boats and many other different types of craft can be constructed.

One of the great attractions of ship model building is the opportunity this gives for detail work in the deck and super-structure fittings and rigging, etc. These details when well planned and constructed add considerably to the complete effect. We receive many letters from model-builders who wish us to introduce a range of special ship fittings in the Meccano system. In view of the ease with which such items can be built up from existing standard parts we do not think such special additions are necessary. For example, a realistic deck rail can be made by securing a number of short lengths of Threaded Rod at regular intervals round the deck to act as stanchions and linking these by lengths of copper wire. The wire is clamped between nuts placed on the Rods. If a model warship is being built, Sprocket Chain can be substituted for the copper wire. The rail will then be a close reproduction of the collapsible rail that is fitted into war vessels so that it can be removed when the ship "goes into action."

Capstans, bollards and anchors are fittings that are to be found in practically every vessel, and there are several ways of reproducing these with the aid of existing Meccano parts. For bollards, Meccano 6BA Terminals may be used, but there are many other parts such as Collars, Handrail Supports and Threaded Pins that may be employed for this purpose, the choice depending largely on the size of the model under construction. There are also several different ways of constructing realistic anchors for model vessels. A model anchor of the heavy naval pattern can be formed from a Coupling fitted with a 1″ Rod, and carrying a Flat Bracket at each end to represent the "flukes."

An effective capstan can be made by removing the spring from a Spring Buffer, Part No. 120a, and securing the Buffer and barrel to the deck by means of a nut screwed on to the threaded end of the Buffer plunger. Washers should be placed on the smooth portion of the Buffer plunger that projects below the deck so that the nut may be locked rigidly.



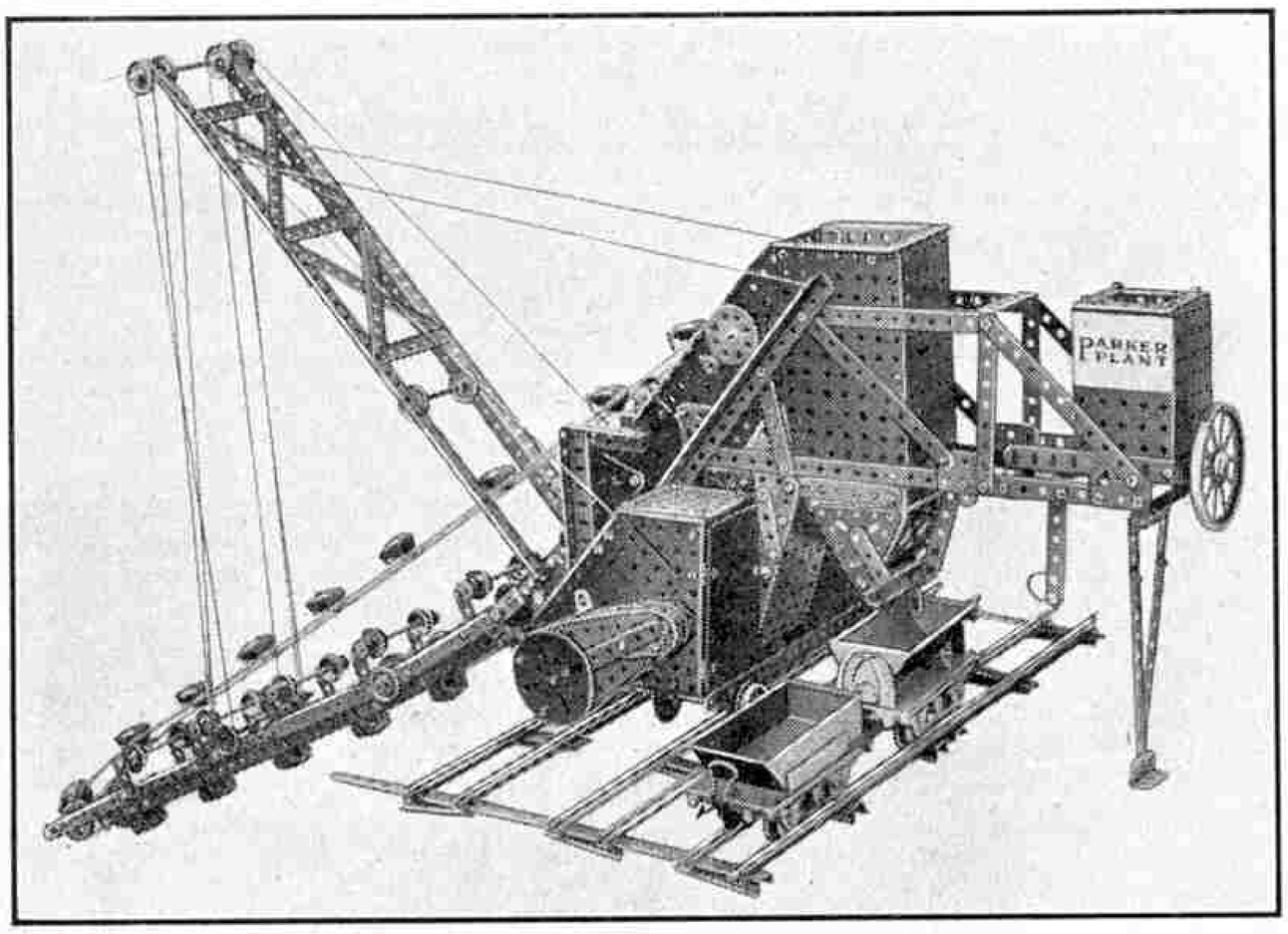
Keen Meccano model-builders absorbed in the operation of a Meccanograph they have built to their own design.

A Multi-Bucket Excavator

"M.M." Reader's Fine Model

MODEL-BUILDERS on the look-out for new subjects, and who have a good assortment of Meccano parts at their disposal, will be keenly interested in the fine working model shown on this page. It is a scale reproduction of a multi-bucket chain excavator and was built by K. J. Parker, Leicester.

Excavators of this kind are used for a variety of tasks, including the dredging of gravel and sand from the beds of rivers and making canals and irrigation channels. For dredging and similar work the machine travels on rails laid parallel with the banks of the river, and the material to be moved is dug out by buckets or scoops, with tough cutting edges. The buckets are attached to an endless chain running round rollers mounted on a stout arm, and bite into the ground as they move round the outer end of the arm. With their loads they continue along the upper side of the arm, and tip their contents into a separator when they turn over at the inner end of the arm. In the separator sand, gravel and other useful materials are sorted out and delivered into a hopper, while the waste is discharged.



A neatly-built working model of a multi-bucket Parker type excavator, constructed entirely from Meccano parts by K. J. Parker, Leicester.

In the model the bucket arm is suspended from a strong jib by means of cords, and is provided with hinged sections so that it can be placed at any desired angle in order to carry out special section excavations, such as canals or irrigation channels. The entire structure is mounted on a travelling chassis made from two $9\frac{1}{2}''$ Angle Girders spaced by $5\frac{1}{2}''$ Angle Girders. Flat Trunnions bolted to the $9\frac{1}{2}''$ Angle Girders form bearings for Axle Rods carrying Flanged Wheels, which run on two sets of Hornby Straight Rails.

A Meccano E6 Electric Motor is fastened at one end of the chassis and drives a special gearbox that is provided with three levers. One lever is used for engaging the traversing mechanism, a second for setting the bucket mechanism in play, and the third for bringing into operation a winch that raises or lowers the bucket arm. All these operations can be reversed simply by reversing the Motor, but for the sake of realism imitation controls are fitted to the model in the positions they occupy in the actual machine.

The hopper for holding the excavated material and the channel up which the loaded buckets slide are built of Flat Plates and Angle Girders, and Strips are used for strengthening purposes. The bottom of the hopper has a hinged door, which can be opened or closed as required.

Two horizontal Angle Girders project from the hopper, on the opposite side from the bucket arm, and they support two $4\frac{1}{2}''$ Angle Girders that form rails on which travels a large balance weight. The weight may be moved either towards or away from the machine by a screw-feed mechanism actuated by turning a hand wheel.

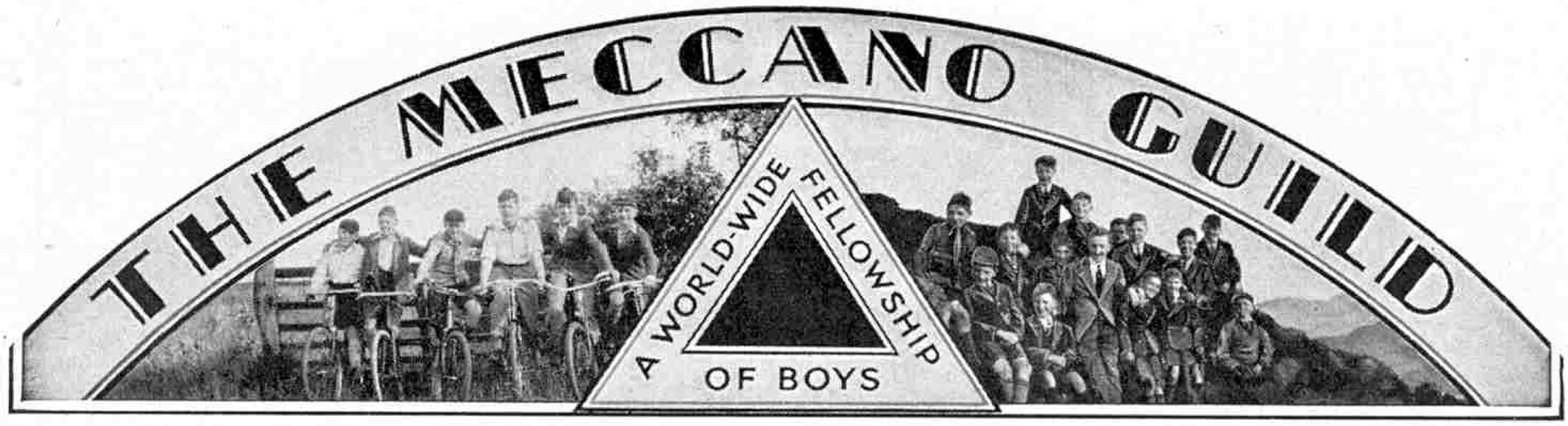
At the opposite end of the chassis from the Motor is a representation of the engine house. Although this does not contain any mechanism, it adds considerably to the realism of the model.

The bucket conveyor consists of three sections, one of which, at the inner end of the assembly, is the fixed trough up which the buckets slide to the hopper. The other two sections are pivoted and comprise a short centre section and a longer outer one. The sides of their framework consist of Angle Girders and to these are bolted vertically 2″ Strips at intervals of $3\frac{1}{2}''$. To the ends of the 2″ Strips $12\frac{1}{2}''$ Strips are bolted, and $\frac{1}{2}'' \times \frac{1}{2}''$ Reversed Angle Brackets fixed to the ends of the 2″ Strips provide bearings for $3\frac{1}{2}''$ Rods that support $\frac{3}{4}''$ Flanged Wheels. These wheels form rollers over which the bucket chains pass. Two large Flanged Wheels are provided at the end of the bucket arm and Eye Pieces mounted on their shaft form slides by means of which the conveyor chain can be tightened or slackened as required. The two movable sections of the arm are linked together by a Rod, which serves as a hinge, and the centre section is fitted with two Eye Pieces that slide to and fro on a framework of Strips and Angle Girders.

The bucket chain itself consists of two lengths of Sprocket Chain with Double Bent Strips secured between them at intervals of 3″. The Double Bent Strips are held in place by Dredger Bucket Clips, and to them are fixed Dredger Buckets.

The upper return part of the chain rests on rollers and after passing around the two large Flanged Wheels slides along the Angle Girders that form the under part of the bucket arm. Additional rollers are fitted at the junctions between the two movable sections of the bucket arm and the trough. At the top the chains pass around two 2″ Sprocket Wheels driven from the gearbox.

The jib is fitted at its outer end with two fast Pulleys and two loose Pulleys, and a corresponding set of fast Pulleys is fitted to the outer section of the bucket arm to take the operating cords.



The "M.M." Radio Fund

The *"M.M."* Radio Fund for the R.A.F., announced last month by the Editor, is now going ahead splendidly. I want to be quite sure that the Guild and H.R.C. play their full part in furthering this magnificent effort. To do something on behalf of the Fund is a splendid way of showing appreciation of the pleasure and profit that has been derived from Meccano and Hornby Trains, and I am sure that every member will contribute. The size of the subscription does not matter in the least, for the smallest will be welcomed with as much enthusiasm as the largest. With organised bodies such as clubs and Branches the best plan is to arrange for small weekly or monthly subscriptions, which can be collected by the Leader or secretary, or some member specially appointed for the task, and forwarded to the Editor.

I look to Leaders and members to tell all their friends about the Fund, especially former members and others known to have been actively interested in Meccano or Hornby Trains, so that a continual flow of contributions will reach headquarters through clubs and Branches. Special efforts also should be organised. For instance, in many cases the example of the Plymouth M.C. could be followed. Mr. Ellis, Leader of this club, writes to tell me of an "Afternoon of Variety" that he and his members presented on behalf of the Fund in the club room, all the turns being provided by members themselves. These and similar efforts in other clubs should swell the Fund, and I should like to hear of more schemes of this kind that have been worked out. In view of the widespread interest in making provision for the men who are sacrificing their comfort to help to guard us all from air raid devastation such exhibitions and entertainments should be made as widely known as possible.

Lone members also can do much to make the fund known. They cannot organise concerts or exhibitions, but they can make collections. One member indeed has already adopted this plan, and has forwarded the contents of a collecting box to be added to the Fund. Here is a good example for all lone members to follow.

Club Reports and Photographs

There is an important matter to which I wish to draw the special attention of Leaders. The Guild pages of the Magazine are intended to help and encourage clubs generally to improve their programmes, and to attain greater prominence in the Guild world. One way of helping to attain a good position is to keep up regular reports, with special notes on particularly interesting events. Reference to such matters, either on this page or on the *"Club Notes"* page, is evidence that a club is thoroughly alive and progressive.

Another way in which to convey this impression is to send in portraits of officials and club photographs of members for reproduction on these pages. There are few clubs in which opportunities of taking such photographs cannot be arranged. This is possible even where evacuation has removed members to another part of the country, and indeed the interest of a club group is increased in these circumstances. Whether work is continued at home or "somewhere in Great Britain" therefore, the first opportunity of obtaining portraits of members should be taken, and these should be sent to me so that I can use them to show Guild members generally how the club concerned is going ahead in spite of all difficulties.

Members of a club like to see news of its programmes and portraits or group photographs in the Magazine. It gives them a feeling of pride and a conviction that they are doing something that is worth while. For this reason no effort should be spared to keep me fully informed and to obtain suitable photographs.

Merit Medallions in 1939

In the panel on this page is a list of members of clubs who have been awarded Merit Medallions during 1939. Although it is not quite as extensive as that of last year, which was the largest since 1932, it is a very creditable one in view of the circumstances that prevailed during the last four months of the year.

I want everybody to make an effort to create a new record during 1940, in spite of the war. I wish Leaders in particular to keep the award in mind, and to make as much use as possible of it to encourage their members. There is no restriction as to the kind of work that qualifies for a Merit Medallion. It may be excellent model-building, successful recruiting, organising work in some official position in connection with the club, or any activity that brings the club into favourable prominence in its district. Long and faithful service also can be rewarded in this way. Each club is entitled to two Medallions a quarter, that is eight Medallions for the year, and the recipients are nominated by the Leader. I am looking forward to receiving many more nominations during the present year, when the Guild celebrates its 25th birthday, than in any year since the award was instituted.

Merit Medallions Awarded in 1939

BELFAST (Malone)—S. Clenaghan, H. A. Courtney, I. Reid, D. Maniece. BURNLEY (Todmorden Road Central School)—W. Hargreaves, J. Hetherington. CLYDEBANK (Morison Memorial)—J. Ewing. EDINBURGH (St. Giles' Schoolboy Model Club)—J. Bell, W. Cockburn, G. Dykstra, C. Gibson, D. Kerr, E. Robinson, W. Wallace, D. Wightman. (Twenty-Eight)—R. McDonald, D. S. McKay. EXETER—R. Anstey, A. Aplin, A. Causley, C. G. Coldridge, E. Edworthy, M. Golesworthy, M. M. Howe, D. Pearson. HORNSEA—P. Richardson. ISLANDMAGEE—A. Forsythe, I. Forsythe, J. Hunter, T. Hunter, B. McCready, F. McKee, T. Maitland, B. Ross, A. Storey. JERSEY (The Beeches)—K. Buxton, A. Garrick. KIDDERMINSTER—R. Bowyer, R. Randle. LONDON (Holy Trinity)—P. Bowles, J. Brooks, H. Colbourne, L. Gordon, D. Norsworthy, F. Wankling. (Old Charlton)—C. James, J. Philpott. (Winchmore Hill)—F. J. Hearn, D. G. Smith, K. C. Stringer. MANCHESTER (Stretford Public Libraries)—F. Greenbank, P. Laws. MIDDLESBROUGH—J. Morton, J. Padgett, K. Richardson. NORTHAMPTON—P. W. Samwell. PLYMOUTH—D. Hutton, D. Steer, R. Wannell, D. Wheeler. THORNTON HEATH (St. Oswald's)—R. Davis, J. Potter. WEST CALDER (Breich)—R. Lumsden, A. Turner.

OVERSEAS CLUB MEMBERS

AUSTRALIA (Maylands)—R. Knight, C. Petersen, W. Petersen, F. Winnett. EGYPT (Cairo)—S. F. Awad, S. M. Awad, R. A. Daher, M. El. S. Hassanien, E. Libnan. HOLLAND (Maastricht)—L. Mulders. ITALY (Milan)—G. De. Corrado, D. Giovanni, E. Vigo. MALTA (Lasallian)—A. Caruana, A. Gatt. NEW ZEALAND (Ashburton)—J. Kelleher, N. Kruse, C. H. Taylor. (Christchurch)—D. Collett, I. W. Gibbs. SOUTH AFRICA (Malvern)—D. Farrow, J. Farrow, E. W. Sykes, G. Sykes. (Pioneer)—S. Coleman.

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:

CHESTERFIELD—R. Kirkland, 20, Alma Street, Brampton.

HORNSEA EVACUEES—Mr. R. W. Shooter, The Gowans, Cliff Road, Hornsea, or Mrs. Highley, 9, Westbourne Road, Hornsea.

KENTON—B. C. Butler, Warboro House, Kenton, S. Devon.

KIRN—F. W. Cairns, Brook Ville, Hunters Street, Kirn.

LONDON S.W.19—Miss H. Francis, 7, Lucien Road, Wimbledon.

PAIGNTON—C. Wright, 65, St. Mary's Park, Collaton.

SLEAFORD—J. K. Meikle, 25, Newfield Road, Sleaford, Lincs.

Malone (Belfast) M.C.—Meetings were resumed in the New Year. Before then Mr. A. S. Courtney, Leader, kept in touch with members, who also discussed club affairs among themselves, in particular the prospect of recommencing meetings. Most members have taken part in an official scheme for collecting waste paper, and older members are engaged in A.R.P. work. Club Roll: 8. *Secretary:* H. A. Courtney, 60, Maryville Park, Belfast.

Islington M.C.—Meetings are being held on Saturday afternoons for members still available, and the club room is open at other times by arrangement with Mr. V. Miller, Leader. Besides model-building and other hobbies special interest is taken in the club's Hornby Railway. The track of this has now been taken up, and a new layout using double track is being constructed. Club Roll: 12. *Secretary:* F. Warren, 48, Leigh Road, London N.5.

Coloured Mission (Cardiff) M.C.—More members have been recruited. Interesting models completed include a giant derrick crane driven by two clockwork motors, a travelling crane and a refuse lorry. A cargo boat also has been constructed. This is armed defensively with a gun at the stern. Arrangements have been made for the club's third Birthday Party, and plans are already being made for the Exhibition in March. Club Roll: 15. *Secretary:* D. H. Binstead, 37, Penhill Road, Cardiff.

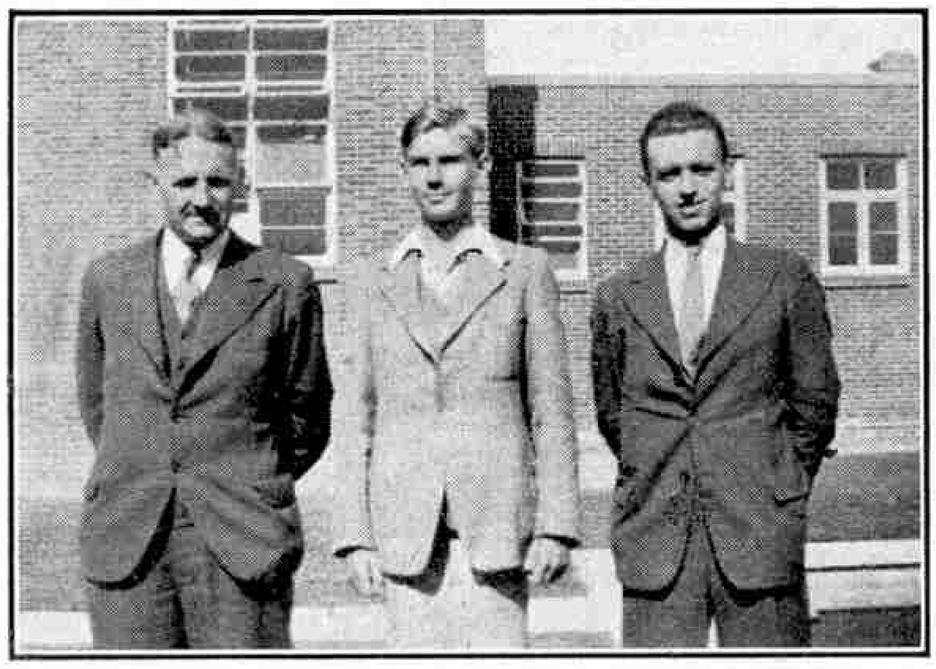
West of England School for the Blind (Exeter) M.C.—The club has continued its activities in spite of difficulties created by war conditions. Members cannot do much war work, but they are making special efforts to save pocket money to buy Savings Certificates. Recreational activities are continued. A football match played against a team from the Exeter M.C. resulted in a win by 9 goals to 8. The Annual Christmas Tree party has been held. Members chose their own presents and many selected Meccano Parts. Leader: Mr. S. G. Prince, West of England Institution for the Blind, St. David's Hill, Exeter.

Regent St. Selective School (Heywood) M.C.—At present school is closing early and this has made regular meetings impossible. Model-building continues, however, members constructing models at home, and preparations are being made for an Exhibition early in the year. Club Roll: 150. Leader: Mr. G. N. Chaplin, "Esscar," Bury Old Road, Heywood.

Morison Memorial (Clydebank) M.C.—Many of the members have been evacuated, and others are engaged on A.R.P. work. The rest meet together, and carry on the work of the club as far as possible. Prospects for the present session are much brighter, as an increase in membership is expected. Club Roll: 36. *Secretary:* J. Muir, 6, Stanley Street, Clydebank.

Queen Elizabeth's Grammar School (Barnet) M.C.—The blackout and other inconveniences due to the war have curtailed activities. General model-building and other work is being continued as far as possible, however. A meeting of special interest was devoted to a Lecture by a master of the school on *"Perfumes."* The lecturer has made a special study of this subject, and the event was a great attraction to club members, and also to others from the School who were invited to be present. Leader: R. J. Beale, 99, Salisbury Road, Barnet, Herts.

Cold Harbour Church Boys' Club M.C.—Meetings are being continued in a modified form. On account of the blackout, and also for reasons of economy, two of the smaller rooms in the Vicarage have kindly been placed at the disposal of the club by the Rev. L. W. Wale, Leader, and membership of the club at present is restricted to the Church choir. The model railway is being constructed in the new club rooms, and other work is being carried on eagerly by members. Club Roll: 16. *Secretary:* R. S. Hill, Anstie Farm, Cold Harbour, Nr. Dorking, Surrey.



Officials of the Pettit's Senior Boys School (Romford) M.C. From left to right they are Mr. H. Skinner, President, A. Dawson, secretary, and Mr. W. M. Richards, Leader. This club was affiliated to the Guild in May 1939, and has done splendid work under the able guidance of Mr. W. M. Richards. Model-building is the central feature of the programme, and fine exhibitions have earned for the club a very high reputation.

Islandmagee M.C.—A scheme of points for attendance and for good work at meetings and on behalf of the club has been introduced. The member with the highest marks at the end of each Session will be awarded a prize. Model-building has been carried on regularly, and special meetings have been devoted to Hornby Railway operations. A large Meccano gantry crane has been designed and built by the Junior members for use on the club's miniature railway. Fretwork has been introduced. The Library continues to flourish. Club Roll: 19. *Secretary:* S. McCready, "Hillmount," Islandmagee, Co. Antrim.

Great Baddow M.C.—Varied and attractive meetings have been held. At one there was a competition to test members' knowledge of Meccano Parts. At another a special demonstration of cycle tyre repairing was given. Blindfold Model-building Competitions have aroused interest, and senior members have built special large models, one of which was the Meccano Grandfather clock. Table Tennis has been introduced, and enjoyable games evenings have been held. The Library is now operated very efficiently, and the number of books in it have been increased. Club Roll: 12. *Secretary:* R. C. Willis, Ivydene, Maldon Road, Gt. Baddow.

Barnard Castle School M.C.—After the r nt successful Exhibition a new Hornby Railway was designed and built up. Both clockwork and electric trains are now run on it, and special interest is taken in the running of the Hornby-Dublo rolling stock owned by the club. Model-building activities have included the construction of working models of original design for a special contest, in which a small mechanical navvy was the prize-winner. Club Roll: 20. *Secretary:* A. Coates, The School, Barnard Castle.

South Yardley (Birmingham) M.C.—This newly-affiliated club is now holding regular meetings. Models built have included a seaplane, a steam tug and a bridge. A Games Meeting has been held, at which Darts, Draughts and Dominoes Contests were organised. A derrick crane also has been built. A Hornby Train section is now being formed. More members are required and Meccano boys interested should apply to the secretary at the address given below. Club Roll: 7. *Secretary:* N. Austin, 92, Richmond Road, South Yardley, Birmingham.

AUSTRALIA

Maylands (Perth) M.C.—At a special Exhibition the Green-Gold Faction arranged a display demonstrating the construction of the Grand Coulee Dam in the United States, floodlighting the model very effectively. The Blue-Gold exhibit was a fortified island, and members of both Factions made excellent use of Dinky Toys. A Blindfold Model-building Contest also has been held, and other models built by members including the Grandfather clock, a railway breakdown crane, a traction engine, a factory and a machine gun. The Red-Blue Faction also held an Exhibition. The subject was coal-mining and many interesting models were built for the display. A special night was devoted to competitions between the three Factions. Club Roll: 27. *Secretary:* Werner Peterson, 1, Warne Street, Maylands, Perth, W. Australia.

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If you are a stamp collector or intend to start collecting you should send for this wonderful packet of 31 varieties. It includes the set of stamps featuring our King and Queen and War Memorial at Ottawa, issued to commemorate the historic royal visit to the American Continent. You will be proud to own this set, and for this month it is free to "Meccano Magazine" readers. Also included are stamps from Malta, Ceylon (new K.G. issue), India, set of Italian, New South Wales (old Q.V.). Don't delay as supplies are very limited. Just send 2d. for postage and request our famous approvals (known all the world over for over a quarter of a century).

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Name.....

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.....

Turn to page x for other Stamp Advertisements

STAMP COLLECTING

Building and Displaying a Collection

BOYS who take up stamp collecting, however they begin, want to make a good show right from the start. They want a collection they will be proud to show to their friends, and that will interest them although they may not themselves be stamp collectors.

The problem is complicated for the beginner by the fact that usually he starts with equipment that has been presented to him and therefore is not ideal. Most boys also have to content themselves, for a time at any rate, with building up their collection with stamps given to them by relatives and friends in business offices. In these cases the albums usually are of the fixed leaf type, with printed spaces for row upon row of stamps that leave little scope for more than a formal style of laying out. The stamps have to be taken as they come, and they range over all the countries of the world and rarely provide a complete set of any issue from any country.

The collector starting in this way cannot make a perfect display. But our advice to him is to get on with his collecting and not to worry about it. Almost every great collection that the stamp world has known

started as a schoolboy collection and owes its development to the love of stamps born in schoolboy days. Here is an example. A few days ago it was our privilege to look through the collection formed by an eminent London physician. This has a catalogue value running into several thousands of pounds, and it is contained in some twenty or thirty beautiful leather bound albums. That famous doctor's greatest treasure however is "Album No. 1," his first album of schoolboy days. This contains many of the sets he collected then, still laid out in the original fashion.

There are ways of improving on a difficult start, and it is of these that we wish to talk this month.

The young collector will soon find that there is little fun in just accumulating a mass of stamps for the sake of numbers. The fun is in arranging that mass into something orderly, and something that tells a simple story. Just as few boys would want to read the "*M.M.*" if we allowed our printers to use broken battered type that was hard to read, so the collector must realise that his collection will hold no interest for others if he includes a lot of dirty torn stamps. He must make it a strict rule to leave out unclean or heavily postmarked copies, and stamps that are badly damaged.

Most boys have to be content with odd stamps as they come. But as time passes it will be found that those packets of stamps from relatives concentrate on a few countries principally. Obviously a collection fed in this way must tend to become specialised around those few countries. After a time the flow of new specimens becomes slower and slower, and only as new issues are made by these countries does the collection grow, unless the collector has a little pocket money to devote to extending his collection.

Now it is no use ignoring facts. The boy who imagines when he buys stamps that he will make money when he wants to sell is usually on a hopeless trail. The stamps the average boy can afford to buy are issued in such large numbers that they will not increase in value until many years have passed. The guiding principle that should be followed in spending money on a stamp collection therefore is to increase its interest. At the same time there is no reason why the collector should not buy in such a way that he will stand a chance of getting back a fair sum if he ever wishes to sell. This can be done by concentrating the buying on those countries that are already strong in the album, and seeking to achieve a moderate degree of completeness in those countries.

Stamps provided by relatives are usually odd ones. Well then, when buying stamps, attention should be concentrated on building up those odd stamps into complete sets by purchasing the missing values as far as funds permit. Any stamp dealer is interested to buy a complete set of stamps if the price is a fair one, but he will rarely look at a similar number of odd stamps at any price. More important to the collector is the point that each complete set is, in fact, a complete little collection in itself.

Up to this point we have concerned ourselves with the right method of collecting. That, of course, is the essential preliminary to displaying the stamps in an interesting way. One must have the stamps before a good display can be made.

The fixed leaf album leaves little scope for individualism in display. Most keen young collectors, and that means most "*M.M.*" readers, will have discovered this fact for themselves by the time they reach the stage of buying stamps to complete sets. They will have found also that the great handicap of the fixed leaf album of moderate price is that it does not provide space for a large display of any one country. Any overflow has to be accommodated on adjoining pages rightly belonging to other countries.

The solution of course is to acquire a second album that will provide all the desired space for those strong countries. The obvious choice is a loose leaf album to which additional pages can be added as each country overflows the pages already devoted to it. It is at this point that the collector gains his opportunity to make his collection really bright and expressive of his own ideas. The loose leaf album provides a set of blank pages on which he can lay out his stamps in such a way that each set is given a chance to reveal its interest and to tell its own story.

Next month we will explain exactly how to sort out and handle the stamps, and how they should be laid out to show to the best advantage in the album. There is a

lot of fun in doing this well, apart altogether from the pride that the collector himself naturally will take in an album that is enjoyed by all who see it.

Stamp Gossip

and Notes on New Issues

The Christmas Charity Issues

Once again the Christmas charity issues have given a most interesting range of new designs to our stamp albums. Among them pride of place must be given to the Swiss Pro Juventute issue, the present issue being the 25th of an unbroken series. Once again the designs are mainly drawn from cantonal costumes. Those of Fribourg, Nidwalden and Basle are depicted on the three low values, two of which are shown on page 95. The high value shows a portrait of General Hans Herzog, Commander-in-Chief of the Swiss Army that guarded the country's frontiers during the Franco-German War of 1870.

The Belgian issue, devoted to Anti-tuberculosis charities, comprises eight stamps bearing designs showing famous Flemish belfries. The eight belfries depicted are at Bruges, Thuin, Lierre, Mons, Furnes, Namur, Alost, and Tournai respectively. The first two are illustrated on page 95.

The five values in the Dutch series use the same design, showing a child carrying a cornucopia over his shoulder. This symbolises the Child Welfare charities to which the proceeds of the sale of the stamps are to be devoted. The design is reproduced on page 95.

The Dutch Indies issue is specially interesting. Six stamps are included in the series, but only five values are used, the 10c. denomination, as shown in our illustration on page 95, being duplicated by the provision of twin printings in different styles, the two styles being repeated alternately throughout the sheets. The proceeds in this case are to be devoted to social work among natives and distressed Europeans in the Colonies, and the designs illustrate the nature of work that is being done in this connection.

Luxemburg clings to tradition and uses portraits of members of the Royal House. In this year's issue the Grand Duchess Charlotte, her consort Prince Felix, and the heir Prince Jean are shown, each portrait being used on two of the six stamps in the series. Our illustration on page 95 of the 35c. value carries a portrait of Prince Felix.

Last comes the popular New Zealand Health issue, which, as our reproduction on this page shows, depicts three boys playing with a beach ball. The issue of this stamp was delayed owing to alterations in the postal tariff, and for the same reason new figures of value 1d. and 2d. were surcharged over the original figures, ½d. and 1½d.

Finland and the Wartime Stamp Collection

In concluding our talk in the December "*M.M.*" on the building of a stamp history of the war we indicated the probability that it would be necessary soon to include stamps from Finland in such a collection.

The amazing courage of the Finns in standing up to the pressure of Russian demands, and the marvellous defence that has been brought to bear against the Soviet onslaught, have been an inspiration to all of us, and when the history of European events of 1940 comes to be written, it will be difficult to pay sufficiently high tribute to gallant Finland.

The stamps of Finland are of great interest and there are many that make highly suitable inclusions in our War collection. The ancient port of Abo, much bombed in the early Russian attacks, was shown on three stamps issued in 1929 to commemorate the 700th anniversary of its foundation. The 1mk. value in this series showed the steamship "*Bore*" leaving the port; Abo Cathedral is shown on the 1½mk., and Abo Castle on the 2mk.

The splendid natural defences of the country, consisting of hundreds of square miles of swampy land, has proved one important factor in Finland's resistance, and the wild nature of this country is excellently shown on the 10mk. value from the 1930–36 issue, illustrated here. Another important factor has been the brilliant strategy of the aged Field-Marshal Baron Carl Von Mannerheim, a portrait of whom is shown here on the stamp issued in 1936 to commemorate his 70th birthday.

Various views of Helsinki, the capital, have appeared on Finland's stamps, and we have chosen the view of the General Post Office from a 1939 issue for illustration here because it shows in striking manner the very modern trend of development of the country.

There is not space to list all the stamps that Finland has to offer for inclusion in this War collection, but readers will have no difficulty in selecting a range for themselves and illustrating this aspect of the war in very graphic form.

* * * *

In connection with the Philatelic Congress to be held this year at Bournemouth instead of London, as announced in the January "*M.M.*," it is proposed to stage a special exhibition of British stamps during the week commencing on the centenary date, 6th May, and all the proceeds from the admission fees will be devoted to Red Cross funds.

We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations for our stamp pages have been made.

Centenary Commemorative Stamps

Readers will be gratified by the announcement that the Government has reconsidered its decision not to proceed with the production of stamps to commemorate the centenary of the Adhesive Stamp in May next.

The official statement, made fittingly enough on 10th January, the centenary date of the introduction of Penny Postage, was to the effect that it has been decided to issue a series of stamps of small denominations to mark the centenary. The actual values to be issued were not stated, but it is believed that they will be ½d., 1d., 1½d. and 2½d.

The Reliant Catalogue

Inadvertently two slight inaccuracies were permitted to creep into our reference to the new Reliant Catalogue in the January "*M.M.*" In the first place we credited Messrs. H. Burgess and Co. with being the publishers, but in fact the catalogue is produced by Reliant Stamp Press Ltd., a firm independent of any stamp dealing operations. Messrs. Burgess and Company are one of several firms that have undertaken to use the pricings of the catalogue in their trading operations.

The second point is in the grading of the catalogue's prices. The three gradings, unused, lightly postmarked, and average postmarked, are to be used for the stamps of Great Britain only. For all other sections only two gradings will be given, used and unused.

The Whitfield King Price List—1940

It is appropriate that the 1940 edition of Messrs. Whitfield King and Company's annual price list, and the 71st of the series should come to hand just as we have completed writing this month's article on methods of collecting, for the best way to make a start is to acquire a really good packet.

The Whitfield King list contains details of over 5,000 sets and packets. These range in price from a few pence up to several pounds, and include Air Mail packets, country sets, subject packets, lists of stamps and miniature sheets in variety.

Every young collector should possess a copy of this price list and Messrs. Whitfield King and Co., whose address is Ipswich, England, will send a copy free of charge to every reader who writes for one, mentioning the "*M.M.*"

Competition Corner

MISSING WORDS

It is a long time since we arranged a competition in which readers were asked to choose the right words to use in expressing simple ideas. These contests have always been particularly popular with readers, and we feel sure that they will welcome a further opportunity of trying their skill in such a competition.

In the panel in the centre of this page is a summary of the racing and speed events of 1939, matters of great interest to all "*M.M.*" readers. Certain words, 21 in number, have been taken out of the story, and their places are marked by dashes. Each dash indicates one word, and there is no correspondence between the length of the dash and that of the word.

The words removed are arranged in alphabetical order at the foot of the panel, and what we wish readers to do is to replace them in their correct positions. Every one of the words must be used, but each must be put in only as often as it appears in the list. When the story has been completed by putting the words in what the competitor thinks are the right places, the entire paragraph should be written out carefully with the inserted words underlined.

The 1939 motor racing season was unfortunately cut — by the — of hostilities, but the — part of the year was full of — motoring events and many notable things occurred. The — British E.R.A. cars as usual achieved — victories in many important races. Chief among these were the British Empire Trophy Race run at Donington, in which the — E.R.A. was — by A. P. R. Rolt, and the Nuffield — Race won by "B. Bira" at a speed of 75.87 m.p.h. Another great E.R.A. victory was obtained in the race for the Crystal Palace —, run over the Crystal Palace —, at the beginning of July. The winning machine was driven by R. Mays at an average speed of 59.93 m.p.h.

On the Continent the — Mercedes-Auto Union — took place in the principal Grand — events, and a feature of the season was the — performance put up by a new type of Maserati, the famous Italian racing car.

Two — splendid — achievements to the — of British motorists during 1939 were the — of a new world record of 369 m.p.h. by John Cobb in August, and Major Gardner's 207.37 m.p.h. with an M.G. fitted with an — of only 1,100 cc. in the previous May. Major Gardner's speed was an — record for a car with an engine of such small capacity.

Creation	**Famous**	**Prix**
Credit	**Good**	**Short**
Cup	**Interesting**	**Speed**
Driven	**Notable**	**Track**
Duels	**Notable**	**Trophy**
Earlier	**Outbreak**	**Usual**
Engine	**Outstanding**	**Winning**

The competition will be divided into the usual two sections—Home and Overseas—and in each prizes of Meccano or Hornby Train products (to be chosen by the winners from our current catalogues) to the value of 21/–, 15/–, 10/6 and 5/– respectively will be awarded to the senders of the four most nearly correct solutions in order of merit. A number of consolation prizes also will be awarded. In the event of a tie for any or all of the prizes, the judges will take into consideration the neatness of the entry or its novelty of presentation.

Competitors are reminded that they must write only on one side of each sheet of paper used for their entries, and that their names and addresses must appear on each separate sheet.

No competitor may submit more than one entry and this must be addressed to "*Missing Words, Meccano Magazine, Binns Road, Liverpool 13,*" and sent to reach this office not later than 29th February if it is an entry for the Home Section. The closing date for competitors residing outside Great Britain and Ireland will be 31st May.

February Drawing Contest

This month we are renewing 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 "*February Drawing Contest, 'Meccano Magazine,' Binns Road, Liverpool 13.*" The closing date for Home entries is 29th February and for those in the Overseas section 31st May.

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

Missing Words Contest ...	... **29th February**
February Drawing Contest	... **29th February**

OVERSEAS

Price Codes	... **29th February**
November Drawing Contest	... **29th February**
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**

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

December Jig-Saw Advertisement Contest.—1. T. Hill (Bolton). 2. N. Bouchier (Bridgwater). 3. R. J. Biggs (Bristol 6). 4. W. Kenneth Cocking (Redruth). Consolation Prizes: E. A. Lee (London N.15); T. D. Tasker (Barnsley); A. M. Tompsett (Lewes).

December Photo Contest.—First Prizes: Section A, A. G. Dell (London S.E.27); Section B, J. Gittens (Weybridge). Second Prizes: Section A, W. Barr (Birkenhead); Section B, A. Featherstone (Peterborough). Special Editor's Prize: J. Taylor (Bradford).

December Drawing Contest.—First Prizes: Section A S. Radford (Bilsthorpe); Section B, G. J. Lewys (St. Mellons, Nr. Cardiff). Second Prizes: Section A, G. D. Hughes (Penylan); Section B, D. Green (Hyde). Consolation Prizes: M. Bowey (Aspley Cuise); L. Gardiner (Kettering); J. Laing (Dunstable); J. Mathews (Exeter); E. J. Roberts (Plymouth); G. Whalley (Nottingham).

OVERSEAS

September Photo Contest.—First Prizes: Section A, L. W. Humm (Geraldine, N.Z.); Section B, G. A. Cavin (Victoria, B.C.). Second Prizes: Section A, P. Galea (Valletta, Malta); Section B, R. W. Hunter (Capetown). Consolation Prizes: G. Inson (Cootamundra, N.S.W.); J. S. Manduca (Sliema, Malta); W. L. Tsun (Potchefstroom, S. Africa); T. A. Wadi (Johannesburg).

September Sketchogram Contest.—First Prizes: Section A, T. Wade (Johannesburg); Section B, F. Fletcher (Vancouver, B.C.). Second Prizes: Section A, B. Williamson (Wellington, N.Z.); Section B, G. H. Miller (Melbourne).

SOUTH WEST HOUNSLOW.—It is hoped to resume track meetings shortly, and the programme to be followed was made the subject of a Debate. In the meantime meetings have been devoted to games of various kinds. A Mock Trial had been held at which the prisoner was proved guilty and sentenced. Secretary: R. Bower, 12, Walnut Tree Road, Heston, Middlesex.

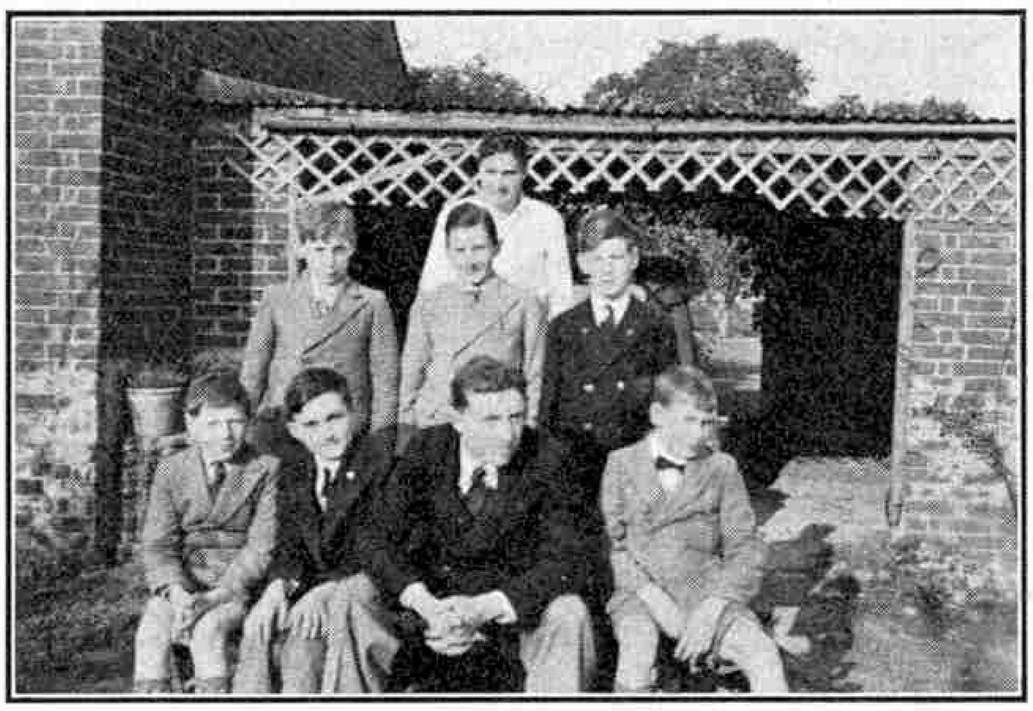
TWYFORD GROVE (BANBURY).—The Branch has gained a very large number of new members, and work has proceeded rapidly with the construction of the layout. Meetings are devoted simply to railway operations on the Branch track, and various excursions were organised for the holiday season. Many boys evacuated from London have joined the Branch. Secretary: J. W. C. Prescott, 6, Twyford Grove, Banbury.

ISLANDMAGEE.–Different layouts are planned for each meeting. On one occasion a main line track was laid down and express services run on it; on another the layout represented a goods yard, and shunting operations were carried out. Members now work efficiently and the layout is in splendid order, so that operations proceed smoothly. Last month the Branch celebrated its second Birthday. Secretary: S. McCready, "Hillmount," Islandmagee, Co. Antrim.

ROCKPORT SCHOOL (CO. DOWN).—Activity in the Branch room has increased considerably during the present winter. A terminal station has been constructed for the layout and a locomotive coaling plant has been built in Meccano. The Branch layout has been given full air raid protection with miniature sandbags, and model searchlights and anti-aircraft batteries also have been installed. Plans are now being made for the construction of a signal box to be incorporated in the layout. Secretary: P. C. L. Cosgrave, Rockport, Craigavad, Co. Down.

CARMARTHEN.—This newly incorporated Branch is making excellent progress and gaining new members. As recruits come in they are given instruction in controlling trains, and trained in operations generally. The Branch layout is an extensive electric one, and a clockwork layout also is built up and operated. Branch problems are discussed regularly, each member speaking for two minutes. Good use is made of a cinematograph, films being shown regularly. A Debate has been held on the relative merits of clockwork and electric motors for model railways. A casting vote had to be given by the Chairman to settle the argument, and this was given in favour of electric motors. Secretary: J. D. Lewis, 7, Spilman Street, Carmarthen.

ST. BEDE'S (MANCHESTER).—The Branch has been "somewhere in the country," where the track was laid down on baseboards erected in the Parish Hall. Hornby-Dublo trains have been introduced into Branch work. Cinematograph entertainments were given for the benefit of evacuees in the neighbourhood. Films are being made of the Branch layout and operations on it, and these are to be displayed. Plans are already being made for the electrification of the Branch layout on returning to Manchester, and funds are being raised with this in view. Secretary: L. Shepherd, 92, Cheetham Hill Road, Dukinfield, Cheshire.



A group of members of the Denville (Havant) Branch, No. 358. Chairman, Mr. T. W. Marshall, who in our photograph is second from the right in the front row; secretary, L. S. J. Adkin. This Branch was incorporated in October 1938. Members have laid down a fine Hornby railway with steel track screwed down to baseboards, and both clockwork and electric services are run. A flourishing Library has been established.

BEDFORD SCHOOL.—Great progress has been made with the construction of an entirely new layout. This has five stations, which are named after stations on the London, Tilbury and Southend line of the L.M.S. Members worked hard to complete the layout, and to build viaducts and other accessories. A timetable of operations was then prepared. Secretary: F. E. B. Webb, Rosamund Road, Bedford.

AUSTRALIA

MELBOURNE.—Keen and intensive railway work has been carried on by members of this Branch. Each member has his own railway task, and changes are continually being made so that every member gains experience of all branches of work. Automatic train control has been installed on part of the Branch layout, and has proved thoroughly satisfactory in tests. On one evening special visitors were present, and operations were carefully planned to allow them to follow what was being done. Other events have included a visit to Oakleigh, when new searchlight signals now installed were seen, and a programme of gramophone records reproducing train sounds and railway monologues. Club roll: 10. Secretary: L. Ison, 8, Hayes Street, Northcote N.16, Victoria, Australia.

NEW ZEALAND

WELLINGTON WEST.—Excellent track meetings have been held and good attendances recorded. A 3C "Royal Scot" has been introduced, and is now giving good service. The layout has been extended to include an incline running from a low level station through a circular tunnel to a station at high level. The gradient is 1 in 40. Other programme items have included a general knowledge test, a draughts championship, and games evenings. The promised visit to the New Zealand Railways workshops at Woburn was a great success. Members saw repair work in operation as well as constructional work, including the pouring of molten steel, and were greatly interested in quaint old locomotives that were being scrapped. Secretary: K. R. Cassells, 26, Sugarloaf Road, Brooklyn, Wellington, New Zealand.

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.

BLETCHLEY—A. Harvey, Two Wells, Bow Brickhill.

GREENFORD—J. Smith, 147, Woodhouse Avenue, Perivale Park.

HUDDERSFIELD—A. P. Cordey, 3, Hope Cottage, Daisy Lea Lane, Edgerton.

LEICESTER—G. Trubshaw, 74, Welford Road.

LOUGHBOROUGH—M. L. Squires, 19, Bedford Street.

LONDON N.3—J. Wilde, 12, Wentworth Close, Finchley.

PAIGNTON—C. Wright, 65, St. Mary's Park, Collaton.

PENWORTHAM—J. Pennington, 9, Crookings Lane, Penwortham.

Branches Recently Incorporated

384. WALLINGTON—Mr. F. A. Tatford, "Hillside," Ingleby Way, Wallington.

385. BUXTON—Mr. C. D. Britten, 1, Woodlands, Dale Road, Buxton.

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.

A Novel Engine Names Contest

Competitions dealing with the names of famous locomotives have always been very popular with H.R.C. members, and for this month we have devised one of a novel type. In the panel in the centre of this page are 20 short sentences or phrases, each of which is a clue to the name of a well-known British locomotive. Competitors are asked to find the 20 names, using the phrases in much the same way as clues in a crossword puzzle. This interesting competition is designed for all H.R.C. members, and in order to ensure that our younger readers will have a fair chance the contest is being divided into two sections, Senior and Junior.

As an example of what is required we may take the first of the clues. This reads *"Could evade the hounds."* The question that a competitor must put to himself therefore is *"Who or what could evade the hounds?"* It does not need much imagination to jump from hounds to fox, and we therefore look for a fox that could escape from the hounds. It must be a speedy one, and the knowledge of engine names that all H.R.C. members possess very soon points to the L.N.E.R. "Pacific" locomotive No. 4475 *"Flying Fox."* We feel sure that all members will find the task of solving the rest of the clues very interesting indeed. It is one that calls for general knowledge and alertness, as well as knowledge of locomotive names.

In addition to the name of the locomotive, the owning Company must be given. This information should be summarised in a neat list and forwarded in an envelope marked *"H.R.C. Names Contest"* in the top left-hand corner to Headquarters, Meccano Ltd., Binns Road, Liverpool 13. Before sealing their envelopes competitors should make sure that they have written their H.R.C. numbers on their entries, and have marked on them the section of the H.R.C. to which they belong. Senior members are those of 12 years of age and over, and Junior members are those of ages up to 11 years.

The contest will be divided into two sections, Home and Overseas, and in each there will be separate sections for Senior and Junior members. In each section there will be three prizes of any products manufactured by Meccano Ltd. to the respective values of 15/–, 10/6 and 5/–. It will be seen that altogether there are 12 handsome prizes, and consolation prizes also will be awarded. Thus members will have a splendid chance of distinguishing themselves.

In the case of a tie for any one of the prizes, the award will be made to the competitor whose entry is neatest and is presented in the most novel manner. The closing date in the Home Section is 29th February. The latest date on which entries from competitors in the Overseas Section can be received is 31st May.

CLUES.

1. **Could evade the hounds.**
2. **A river, a long tunnel.**
3. **Member of a boys' organisation.**
4. **Ships from the window.**
5. **Three letters form a name.**
6. **Unusual timepiece.**
7. **On the hill.**
8. **A place suggestive of wealth.**
9. **Royal Tennis.**
10. **Proud of his colours.**
11. **Famous for lights.**
12. **Connects York with riding.**
13. **Its road is space.**
14. **Every theatre needs one.**
15. **A water highway.**
16. **The seas are free from him to-day.**
17. **Are necessary when making socks.**
18. **A drink.**
19. **Drop a letter and you have a common ailment.**
20. **Angry.**

1940 Drawing Contest No. 1

We have pleasure in announcing this month the first of our 1940 Drawing Contests. All members enjoy drawing their favourite locomotives, interesting trains in attractive situations, or some other type of railway scene, and the present contest is the first of a special series in which fine prizes are being offered. In this series there will be three contests, to be announced in successive months and locomotives will be the subjects of all of them.

In the first contest of the series members are required to make a drawing of an old-time locomotive, and they can choose for themselves the old-time railway scene in which they set it. Prizes consisting of Hornby Train or Meccano goods to the value of 21/–, 15/– and 10/6 respectively will be awarded to the senders of the three best drawings received in each of the two sections, Home and Overseas, into which the competition is divided. There will be also a number of consolation prizes.

The sender's name, age, full postal address and H.R.C. membership number must be written on the back of each sheet of his entry, and the envelopes in which these are sent must be clearly marked *"H.R.C. Drawing Contest No. 1."* Entries in the Home Section must be posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 29th February. The closing date for the Overseas Section is 31st May.

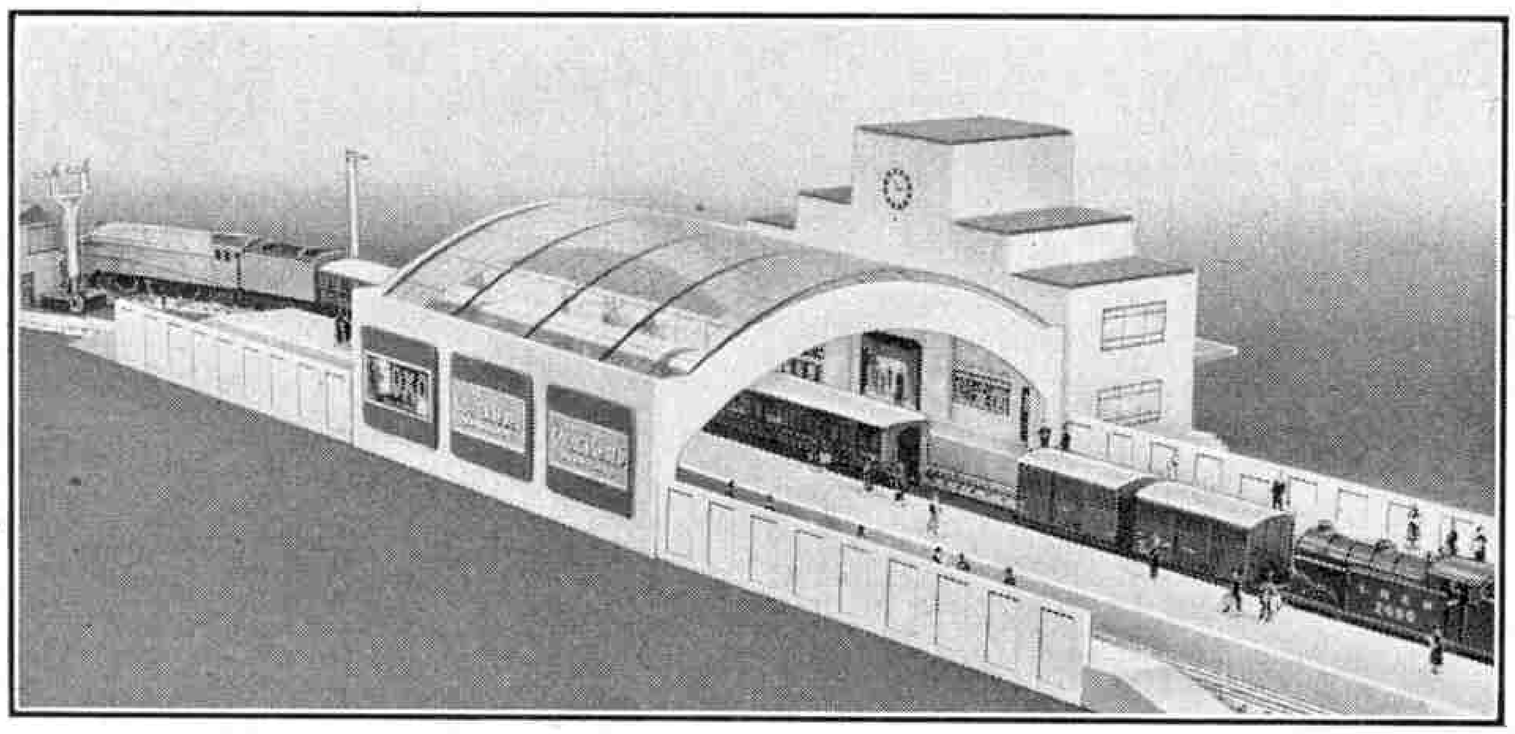
COMPETITION RESULTS

HOME

November "Errors Contest" (Senior Section).—First: N. Turner (41824), Glasgow W.1. Second: R. F. Stephens (65845), Keston, Kent. Third: J. McCann (63815), Wallasey, Cheshire. Consolation Prizes: J. A. Stephens (52796), Tamworth, Staffs.; E. Nobles (31397), Duston, Northants.; A. Elvey (59159), London S.E.9; B. L. Ramsbottom (65202), Greenmount, Nr. Bury, Lancs.; F. Mills (31), Kearsley, Nr. Bolton; J. McIntyre (31781), Paisley.

November "Errors Contest" (Junior Section).—First: H. G. Davies (58104), Heworth, York. Second: J. Warren (66174), London S.W.14. Third: R. W. Cooke (66405), Birmingham. Consolation Prizes: D. W. Beale (61675), South Croydon, Surrey; T. Murphy (65559), Newcastle, Staffs.; G. Hurst (58620), St. Helens, Lancs.; A. Bradbury (44424), Draycott, Nr. Derby; W. Wigginton (52618), Stamford, Lincs.; D. Peart (41756), Grimsby, Lincs.

November "Articles Contest."—First: J. E. Sharp (65605), Brigg, Lincs. Second: L. R. Hollyoak (3310), Coventry, Warwickshire. Third: G. Balfour (57921), Upminster, Essex. Consolation Prizes: E. A. Smith (18407), Liverpool 7; D. Stevens (56160), Dagenham, Essex; D. M. Watson (44513), Crewe, Cheshire.



Attaching vehicles in rear of an express at a passing station. The express is standing on an isolated section.

Fun With Your Hornby-Dublo Railway

Some Fascinating Traffic Operations

LAST month we gave some idea of the possibilities in service of the new items recently introduced into the Hornby-Dublo range. This month we deal with some of the fascinating traffic operations that can be carried out by means of the new material.

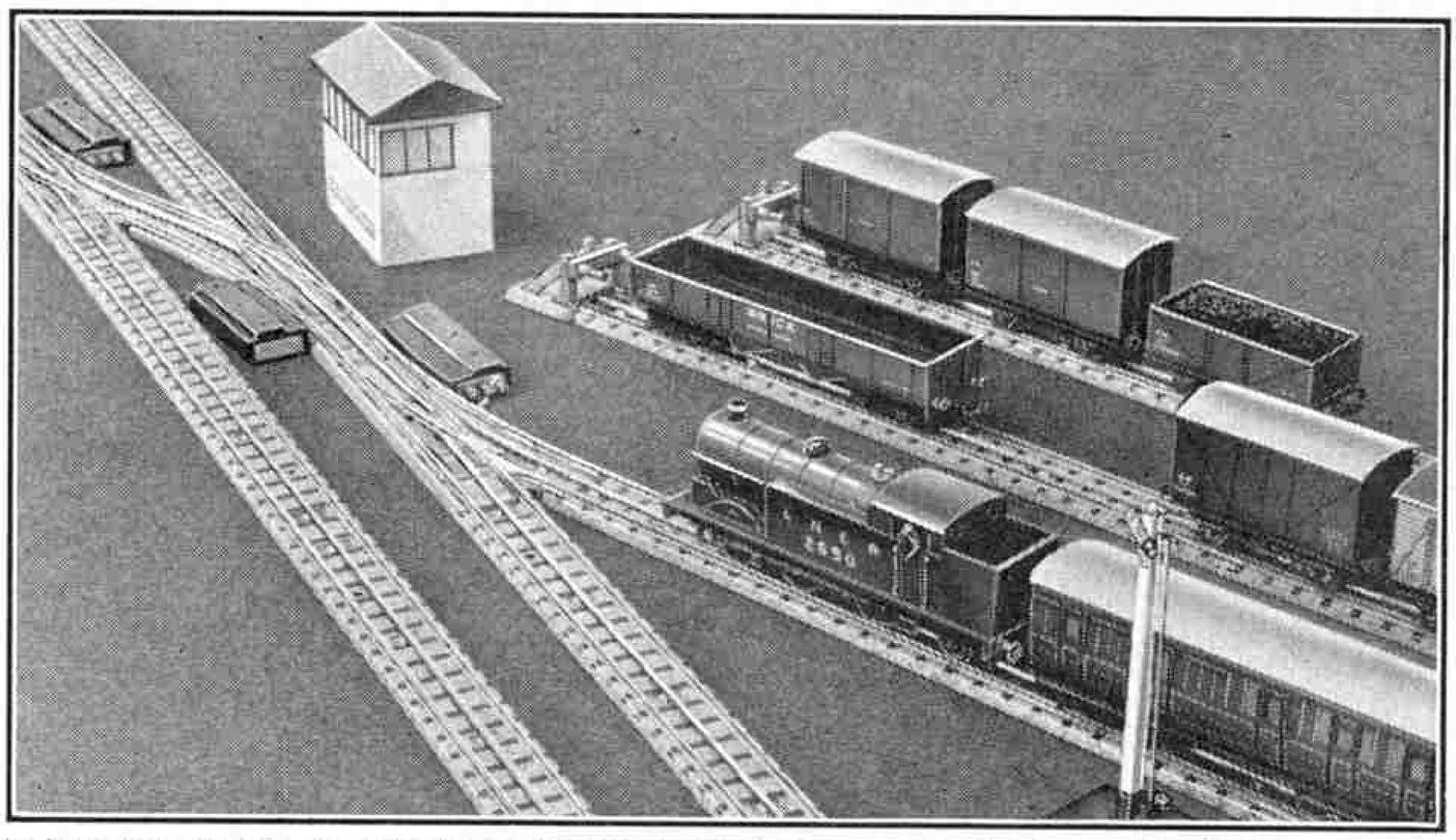
Readers will already have grasped the principle of the division of a layout into separate electrical sections by means of the new Isolating Rail and Switch D2. A special example of the use of these items is found in terminal stations, where the presence of two locomotives on the same length of line is often necessary in the course of traffic working. The terminal station itself takes up a good deal of room, and in most cases there is not sufficient space available to allow crossovers to be inserted at the buffer stop ends of the platforms, so as to allow arriving engines to be released from their trains.

Now suppose an engine has brought in a train alongside one of the platforms, and we want to leave the engine where it is and run the train out again in charge of another engine that we have backed on to it. In the ordinary way this cannot be done; but by means of sectionalising it becomes quite easy. All that is necessary is to arrange at the buffer stop end of the platform a section just sufficiently long to accommodate an incoming engine. Then, as soon as the train has come to a standstill, the engine is uncoupled and the section cut out by means of the Switch D2. We can now back up our second engine on to the train, where it couples automatically; and then run the train out of the station to wherever we wish it to go.

There is a great deal of fun to be had in carrying out the operations thus made possible. Let us suppose a local train consisting of, say, the Twin Articulated Unit hauled by a 0–6–2 Tank Locomotive, runs into the platform. The train is eased to a gentle stop by means of the Controller. The next step is to uncouple the engine, which can be done easily and in a railwaylike manner by means of the standard Hornby Shunter's Pole. The best way is to use the hook of the Pole to determine whichever of the two automatic couplings is the lower, at the same time backing the engine very slightly in order to "slack the coupling," as is done regularly in actual practice. The engine is then moved forward up to the buffer stops so that it is fairly well separated from the train. This is advisable in order to prevent the two from becoming coupled up again if the train should be pushed back slightly when the second engine is being attached at the other end of the train. Now this second engine is backed on and automatically coupled, and the train is away again on its return journey.

As soon as the train has left the station, the section on which the first engine is standing can be switched in again, and the engine is then ready to be run out on to a siding to await its next turn of duty. This siding also should be sectionalised, so that it can be cut out until the engine is again required. Two or three sidings connected with the main line and sectionalised in this manner provide endless possibilities for engine control, and allow very interesting schemes to be worked out. If at all possible, a separate engine section should be provided at the buffer stop end of each platform of the terminal station.

In addition to the inclusion of separate platform sections at the terminal station, it is a good plan to arrange them at passing stations along the route. They are then available for attaching vehicles to, or detaching them from, a train stopping at the station. The section at the



An interesting junction scene; the three points and the signal shown are wired together, as described in this article.

passing station must not be simply for the engine alone, but must extend along the platform for a distance longer than the longest train that is likely to arrive. The general idea is shown by the diagram on page 33 of last month's issue.

At the same time if there are any sidings at the station it will be as well to include an Isolating Rail in each of them, so that movements of a train calling at the station do not interfere with an engine that is standing in these sidings. To make such isolated sections as useful as possible the Isolating Rails should be placed as close as they can be to the points that lead to the sidings. Readers who have the leaflet "*Suggestions for Hornby-Dublo Electric Rail Layouts*" will see how this scheme is followed in the layouts shown there. Those who have not yet got copies of the leaflet should certainly get them. The leaflet is free, from all Meccano dealers.

The simplest way to carry out the attachment and detachment of odd vehicles, such as Horse Boxes or Fish Vans, that are conveyed by passenger train, is to make the train engine carry out the shunting movements necessary. When this is done the van concerned will travel "inside the engine," to use the railwayman's term meaning between the tender and the train.

Let us suppose that the train comes to rest at the platform, the van to be attached being already in position in the station siding. The engine is uncoupled by means of the Hornby Shunter's Pole as described previously, and is then run forward alone until it is clear of the siding points. Backing into the siding, the engine is coupled automatically to the van, which is then drawn out on to the main line. Then engine and van are backed on to the waiting train; coupling up is automatic, and the whole train is then ready to continue its journey.

When detaching of a van behind the engine is carried out, the engine and van are first separated from the rest of the train. They are then run forward until clear of the siding points, and the van is propelled into the siding and uncoupled. The engine returns to the main line and picks up its train again.

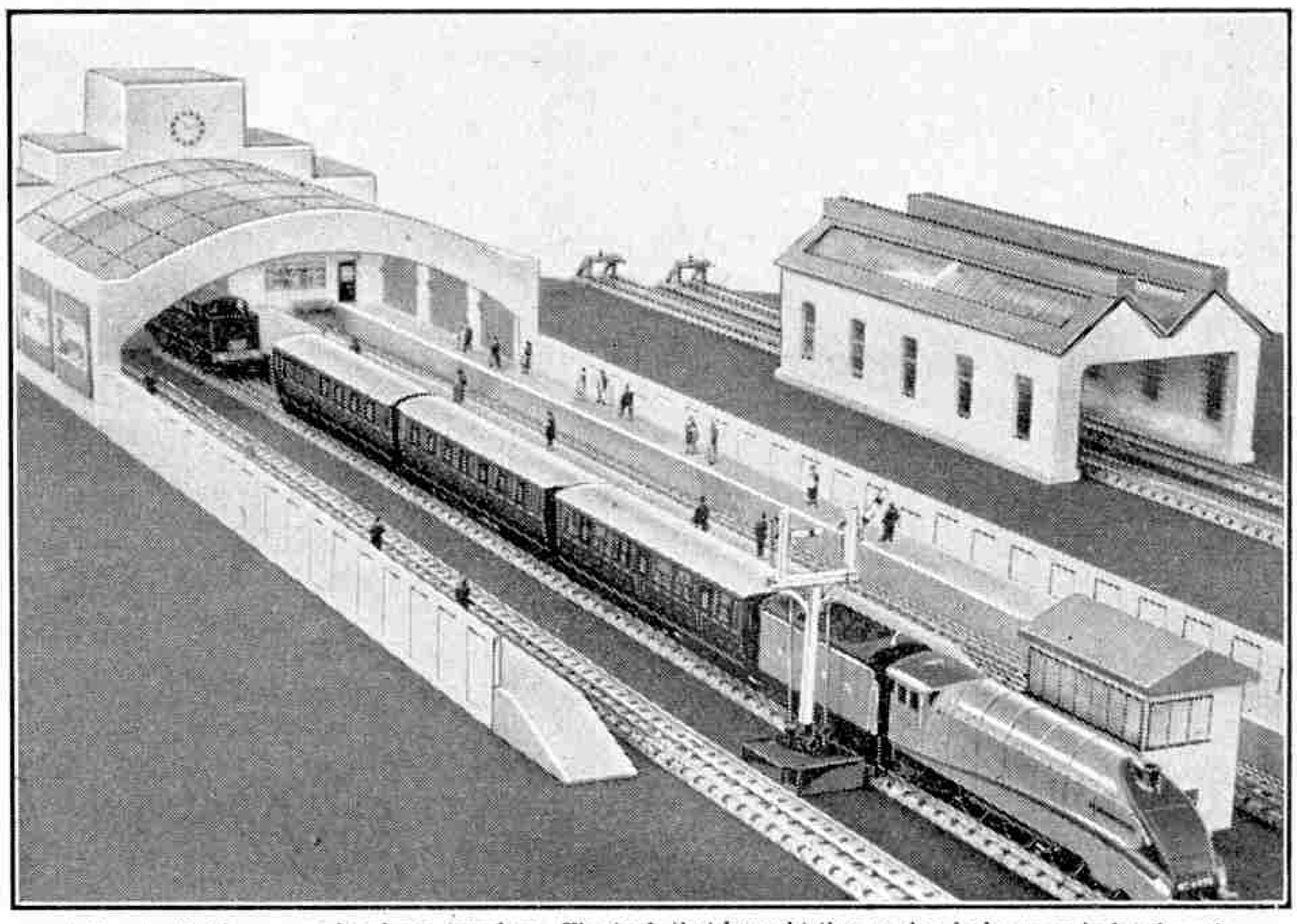
When the van, or possibly a coach, is conveyed in the rear of the train, the movements for attachment and detachment are similar; but instead of the engine only being moved into the siding and so on, the whole train takes part in the evolution. This method is sometimes seen when a separate shunting engine is not available.

It is naturally more fun to have a separate shunting engine or "station pilot" to carry out track work, and it is in these circumstances that the fullest advantage can be taken of the sectionalising arrangements. For the most part, too, the vehicle to be dealt with will be conveyed at the rear of the train; otherwise there will be no special point in having the movements carried out by a separate engine.

While the train is traversing the main track the shunting engine is standing on a siding that is arranged as a separate section and is for the moment isolated. The train is stopped on the platform section and this is immediately switched out. Stopping of the train must be carefully done or the last vehicle may be too far away from the break in the Isolating Rail. A little practice soon gives the "driver" a good eye for this sort of thing, and avoids the need for any setting back. If the train stops too far along the section and the attempt is made to propel a van on to its rear end, the shunting engine doing the job will probably get on to the section already occupied by the train engine.

However, assuming that the operator has made a good stop, the platform section with the train on it is isolated. The siding where the shunting engine has the vehicle ready for attachment is electrified, and the engine is then made to work the van out of the siding and so on to the end of the train. This is a job calling for "careful driving," or the van will be pushed too hard against the train and a mishap may occur. The Controller handle should be brought to the "stop" position the instant the couplings of the van and the tail of the train engage. The shunting engine is then uncoupled and moved back to its siding. The siding is isolated, the platform section is cut in, and the train is then ready to proceed.

To remove a vehicle from the rear of the train the working is similar. A point to watch is the uncoupling of the van from the train; actually the couplings can be parted while the shunting engine is just starting to move off.



A Hornby-Dublo express leaving a terminus. The tank that brought the coaches in is on an isolated section.

Among other places where excellent use can be made of sections are Engine Sheds and locomotive yards generally. If each of the roads serving the new Hornby-Dublo Engine Shed are provided with Isolating Rails either of the two engines that can be accommodated by the Shed can be moved without disturbing the other.

One of the great features of the Isolating Rail and Switch D2 is that they can be used in layouts of every description. We shall be glad if readers who carry out interesting schemes on their own layouts will let us have a description and if possible also a photograph. We shall be glad to publish such details where suitable for the help and interest of other readers.

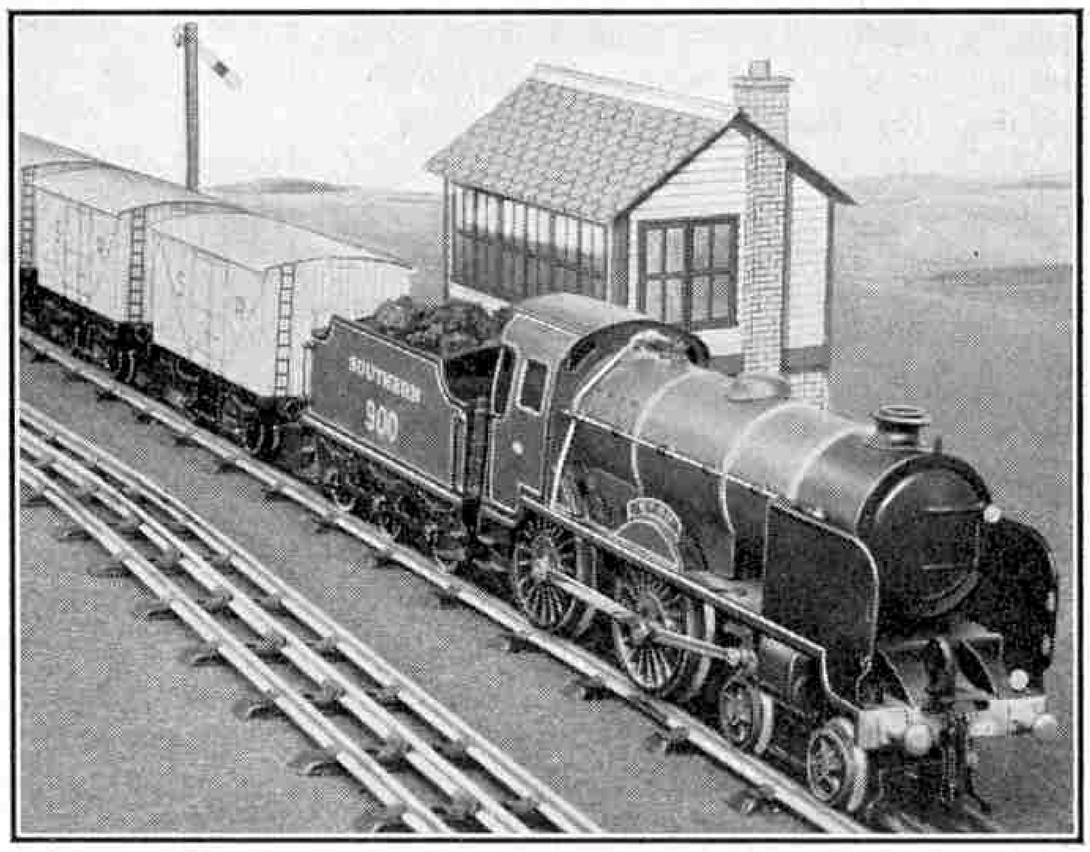
Hornby Rolling Stock and its Uses

FEW of those who commence the great hobby of Hornby railways are content to use merely the Coaches or Wagons contained in the Train Set with which operations usually begin. In order to cope with the growing traffic on a busy line it is necessary to add various vehicles from the wide selection available in the Hornby Series, and the purpose of this article is to help Hornby railway owners in the choice of their rolling stock.

Assuming that curves of 2 ft. radius—the standard large radius for Hornby Tinplate Rails—are available, the most important passenger traffic will be conveyed by large vehicles. Luxury travel in miniature is provided for by the splendid Pullman Coaches of No. 2 Special and No. 2 patterns, which represent very well the handsome cars of actual practice that are so popular on the L.N.E.R. and the S.R. All-Pullman trains, with the coaches vestibuled together with the Corridor Connections provided, and decorated with Train Nameboards such as "*Queen of Scots*" or "*Bournemouth Belle*," can be made up with these cars. Alternatively, they can be used singly in trains composed of other coaches; this is a popular practice on the S.R.

Similar arrangements can be followed on less ambitious layouts with the smaller Pullmans, but these are not provided with corridor connections nor can they be fitted with Nameboards.

The Standard main line expresses of each group can be run on Hornby railways, using the excellent No. 2 Corridor Coaches. These are faithfully copied from the latest practice of the big companies and are thoroughly up-to-date productions in every way. Corridor Connections are packed with these Coaches, and they are provided with special brackets for the accommodation of Hornby Train Nameboards, which comprise a splendid selection of titles representing well-known trains of each main line system. The upper illustration on page 103 shows a train made up of L.M.S. No. 2 Corridor Coaches hauled by a Standard Compound Hornby Locomotive.



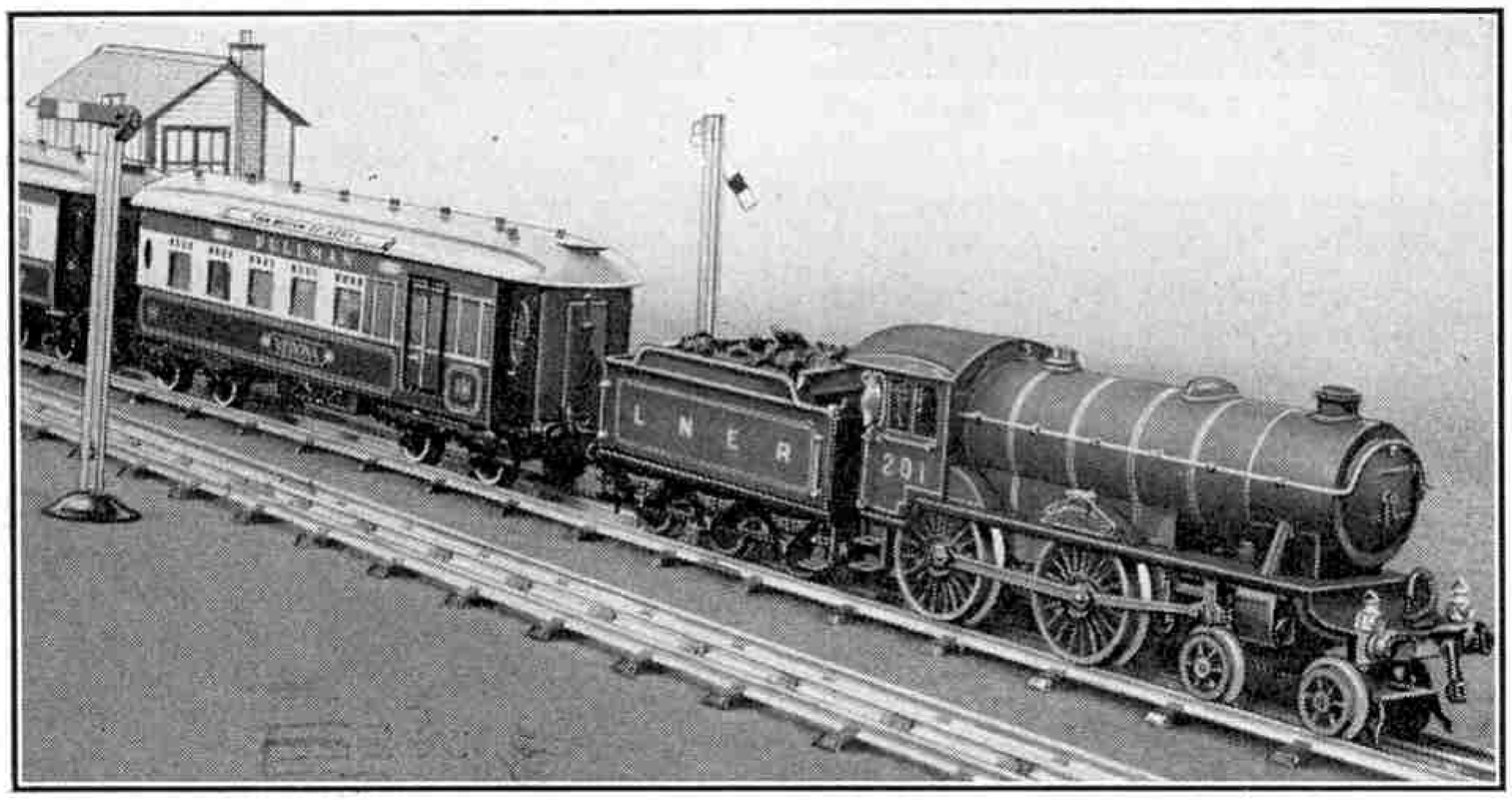
A train of S.R. Refrigerater Vans hauled by a "Schools" class engine. This is typical of many express goods trains of actual practice.

Of similar general design and construction are the Hornby No. 2 Coaches. These represent the familiar compartment type of vehicle, and therefore have no provision for the fitting of Nameboards as they are specially intended for suburban work, nor are they provided with Corridor Connections. Very smart-looking suburban set trains can be made up with these vehicles. An attractive feature of these, as of the No. 2 Corridor stock, is the fitting of lamp brackets on the coach ends, suitable tail lamps being packed with each coach. Thus a train of either kind of coaches can be correctly completed by the display of a tail lamp at the end.

For suburban trains, especially on smaller layouts or on systems employing 1 ft. radius curves, there are the No. 1 Coaches and the corresponding Guards' Vans. These are four-wheelers, but apart from this their general design and finish is closely similar to that of the No. 2 Coaches. The two kinds can be used together in the same train if required. Some Hornby railway owners in fact, for reasons of platform space, make a habit of using a No. 1 type Guard's Van on trains made up otherwise of No. 2 stock. This is quite an interesting and effective arrangement, and it does not prevent the correct display of a tail lamp as the No. 1 vehicles have brackets for these fittings.

The very smallest layouts, employing 9 in. radius rails, have a special range of rolling stock to themselves. This includes the M0 Pullman and the articulated No. 0 "Silver Jubilee" unit. Special couplings are provided on M0 stock that prevent their use in conjunction with the larger Coaches. Apart from this, the difference in size of the two kinds of stock would make their employment together look very odd. This is an important point to bear in mind when selecting additional rolling stock.

Turning now to freight vehicles



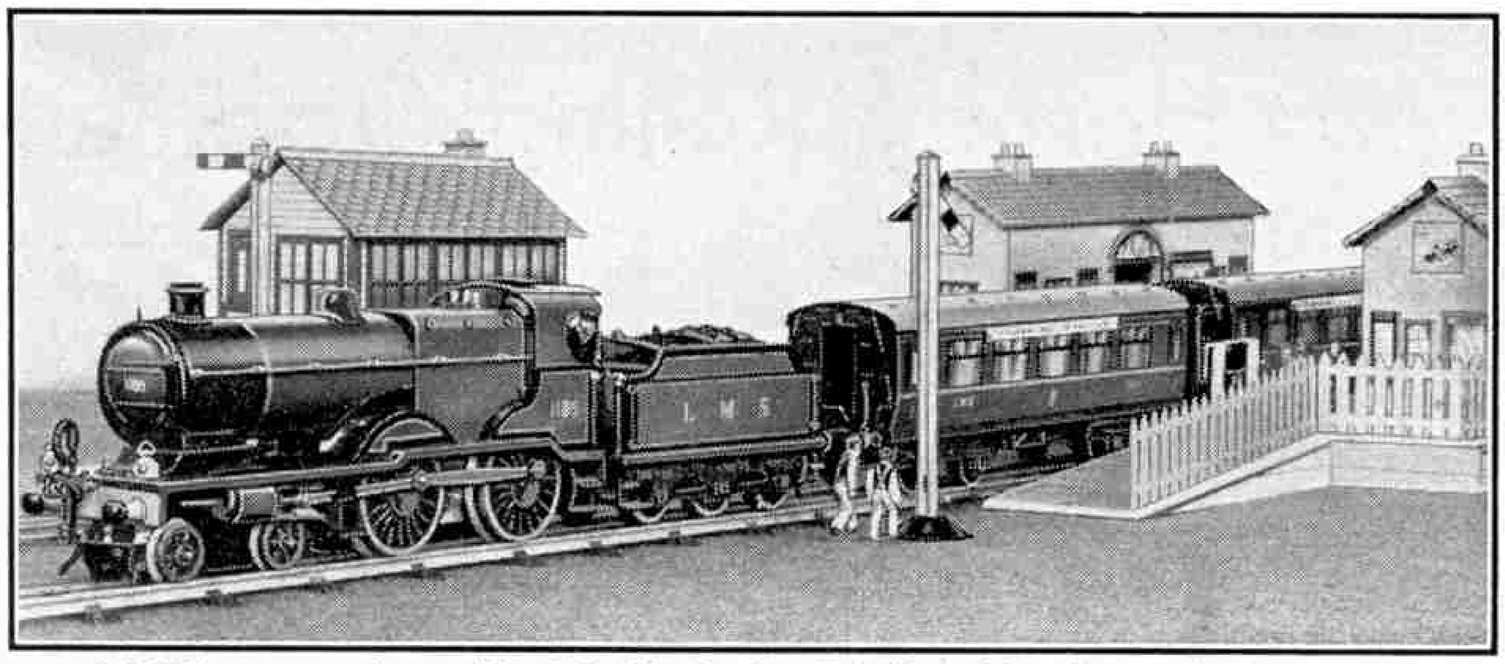
The "Queen of Scots" Pullman on a Hornby railway. The vehicles closely resemble those actually used on the L.N.E.R.

of the Hornby Series, there is a very wide selection for almost all classes of traffic. Specially attractive are the No. 2 High Capacity Wagons, which are made in three types, L.M.S., G.W.R. and L.N.E.R. They are eight-wheelers, and like all Hornby No. 2 bogie stock they cannot be used on curves of 1 ft. radius. Each of the three types represented is a special vehicle developed by its owning company for use on its own line more or less exclusively. Thus it would be most unusual for any two types to be seen together. The L.M.S. and G.W.R. Wagons are intended for the conveyance of coal, more particularly for locomotive purposes. The L.N.E.R. Wagon is for brick traffic, and interesting hints on loading these Wagons are given elsewhere in this issue.

Another large special type is the Trolley Wagon that is made with a well in the centre for the accommodation of heavy or bulky loads. It can be obtained alone or loaded with two Hornby Cable Drums. The Trolley Wagon is specially suitable for layouts that are supposed to serve heavy engineering districts.

The conveyance of round lumber or poles and sawn timber, which is peculiar to certain areas, is well catered for in the Hornby Series. There are No. 2 bogie and No. 1 four-wheeled Wagons for each of the two kinds of load, and these vehicles are great favourites.

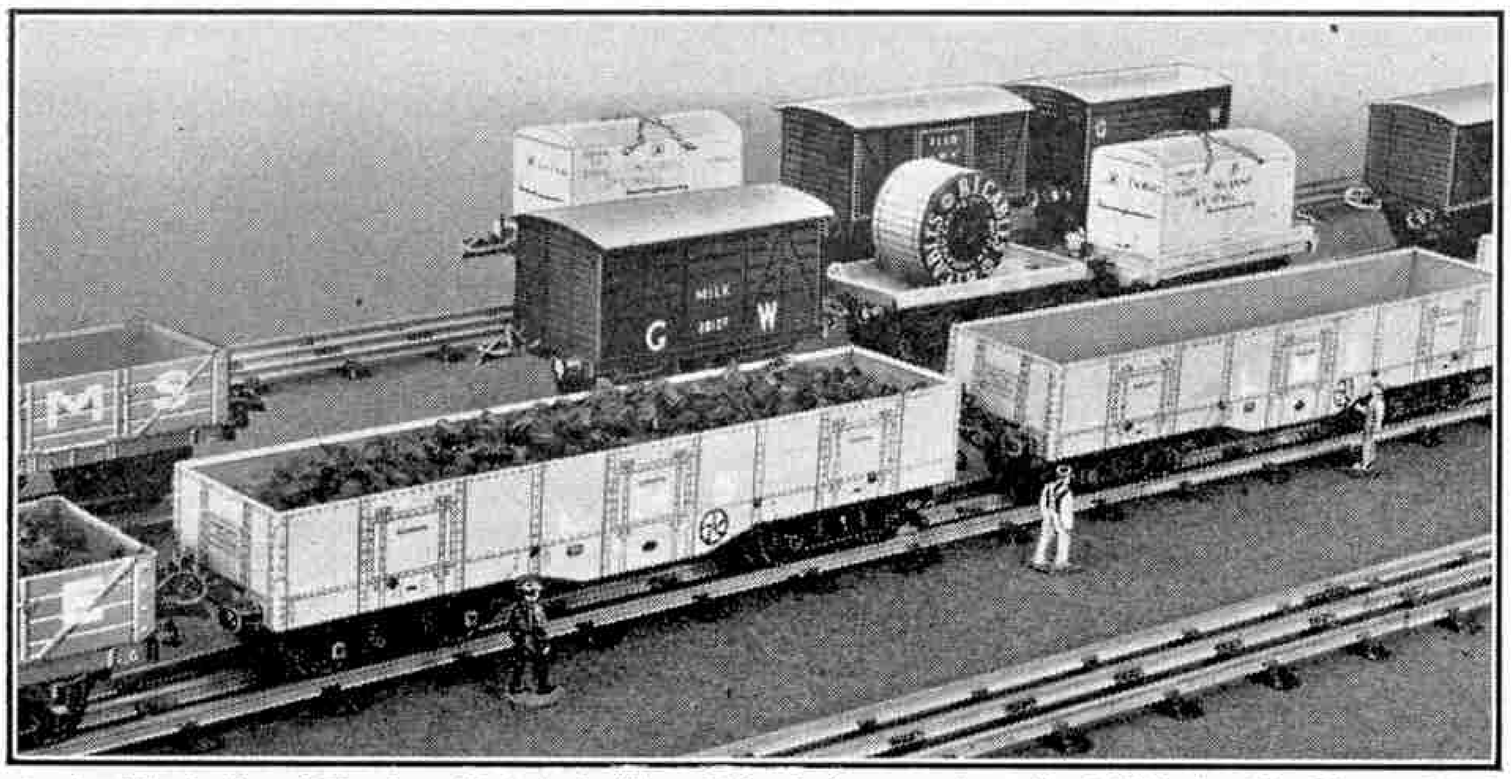
A feature of modern practice is the carriage of liquids such as oil or petrol in tank wagons, and this type is well represented in the Hornby Series. The No. 1 Tank Wagons are all of the same general design, but the Bitumen Tank Wagons and the Milk Tank Wagon are more elaborate in detail. The Petrol, Oil and Bitumen Tanks are suitable only for inclusion in goods trains, but the Milk Tank, owing to the perishable nature of its "cargo," can be run in a passenger train. Where milk traffic is heavy, a complete train of such Tank Wagons will represent up-to-date practice in a most attractive manner.



A L.M.S. express made up of No. 2 Corridor Coaches. Note the position of the Train Name Boards.

Another type of wagon that can be grouped with the tank vehicles is the Gas Cylinder Wagon, which, like the Milk Tank Wagon, can be conveyed by passenger train if required. Gas cylinder wagons are used to carry compressed oil gas from the works where it is produced to stations where the "gassing" of vehicles for lighting, or in these days more particularly for cooking, is carried out.

Apart from a few odd vehicles for special purposes, such as Crane Trucks, Breakdown Vans and the Snow Plough, the remainder of Hornby freight stock can be divided roughly into open wagons and closed vans. For general traffic there are the open Wagons of the No. 1, No. 0 and M1 types, and there is also the Coal Wagon, which is similar in design but is provided with a realistic load. For the No. 1 and No. 0 Wagons there are available the useful Hornby Wagon Tarpaulins. A special rail raised above the centre of the wagon body is fitted to the Open Wagon "B" to assist in stretching the Tarpaulin over the load.



A splendid selection of Hornby rolling stock. The vehicles in foreground are No. 2 High Capacity Wagons L.M.S.

Mineral traffic and constructional work on the line are provided for by the Hopper Wagons and the various kinds of Tipping Wagon. These can be made to carry actual loads and can also discharge them, either through bottom doors in the case of the Hopper Wagon or by movement of the body in the case of the Tipping Wagons. Such vehicles can be assembled into quite a realistic "Engineering Department" train proceeding to work on any part of the line.

The Flat Truck can be classed with the open wagons as it is in effect a low-sided vehicle of this type. In addition to the carriage of Hornby Containers and Cable Drums, for which it is specially suitable, it can be used for loads of small individual items of different kinds, and the Wagon Tarpaulin also can be used with it. The Flat Truck also makes a useful wagon for the transport of Dinky Toys motor vehicles such as the Tractor, Dinky Toys No. 22e. The Flat Truck can be attached either to goods or passenger trains as necessary to suit the traffic in operation.

The Hornby Vans include a large number of special types, but for general purposes the No. 2 and No. 1 Luggage Vans are quite suitable for a layout of any kind, according to the curves available. The No. 2 Van has large double doors which, as suggested last month, make it very suitable for Dinky Toys Motor Car traffic and so on. There are also No. 2 and No. 1 types of Cattle Trucks of the general type used for livestock.

Loads for Hornby Railway Vehicles

Suggestions for Greater Realism

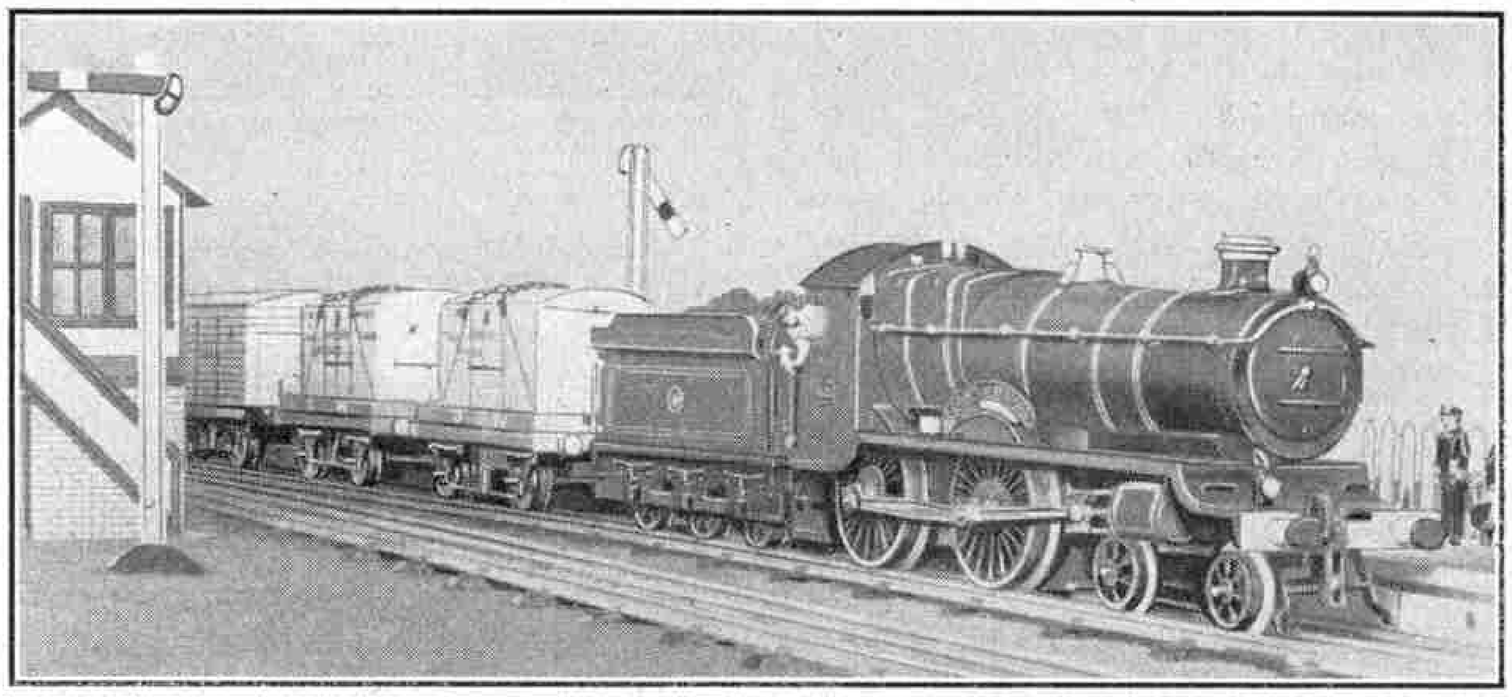
IN the development of greater realism in the operation of a Hornby railway layout, an early step is usually the carrying of loads in suitable goods vehicles. At the same time there are various places such as goods platforms and the platforms of passenger stations where loads can be part of the "effects" of the railway, rather than belong to the actual working items. In this article it is proposed to deal particularly with the loads of different kinds that are available in the Hornby Series.

Coal traffic is most important to the real railways, and it is possible to reproduce its working in miniature by means of the Hornby Coal that is specially made for loading into wagons. This material is light, which is a great advantage as it does not add to the weight of a train to any great extent. A special feature is that it is perfectly clean in use. It is thus superior to real coal, which is liable to be crumbly or dusty, and can be the cause of much trouble if a derailment occurs to a miniature coal train so that its load is upset.

Hornby Coal is packed in special boxes, the lids of which are made to fit inside the bodies of the popular No. 2 High Capacity Wagons, L.M.S. and G.W.R., to form a false base on which the Coal can be spread. This allows a realistic effect to be obtained without the use of a great amount of the material. Similar false bases are easily made for other vehicles such as the well-known Hornby No. 1 and No. 0 Wagons.

In addition there is the Hornby Coal Wagon, which is provided with an embossed representation of coal. This is quite realistic, but the use of Hornby Coal has the advantage where loading and unloading operations are carried out.

Equally attractive are the Bricks that are intended as freight for the High-Capacity Wagon L.N.E.R. This vehicle represents the well-known bogie wagons used on that line for the conveyance of bricks, road stone and similar materials. The loading arrangements for the Hornby Bricks are similar to those for the Coal, the box lid forming a false base on which the Bricks are placed. They should not be thrown in anyhow, but should be neatly stacked as in actual practice, even though the number conveyed in a single wagon in miniature is nowhere near the 19,800 or so forming the load of a real 40-ton brick wagon!



Hornby Containers make splendid loads. In this illustration G.W.R. Insulated Containers are shown on the Flat Trucks specially intended for their conveyance.

Modern practice in road-rail transport can be represented most realistically by means of the Hornby Containers, of which there are four, each representative of the equipment of one of the four great railways. Containers are literally separate van bodies that can be carried equally well on a railway wagon or a road lorry. They are used to provide a door-to-door service by road and rail without the bother and loss of time involved in the transhipment ordinarily necessary with loose loads.

The Hornby L.M.S. Container represents the type specially intended for furniture removal purposes, and is finished in the attractive red with yellow lettering of the original. The L.N.E.R. Container in the characteristic red-brown of the real thing is for general goods purposes. Perishable traffic forms the freight of the G.W.R. and S.R. Containers, the former being of the insulated type and the latter ventilated.

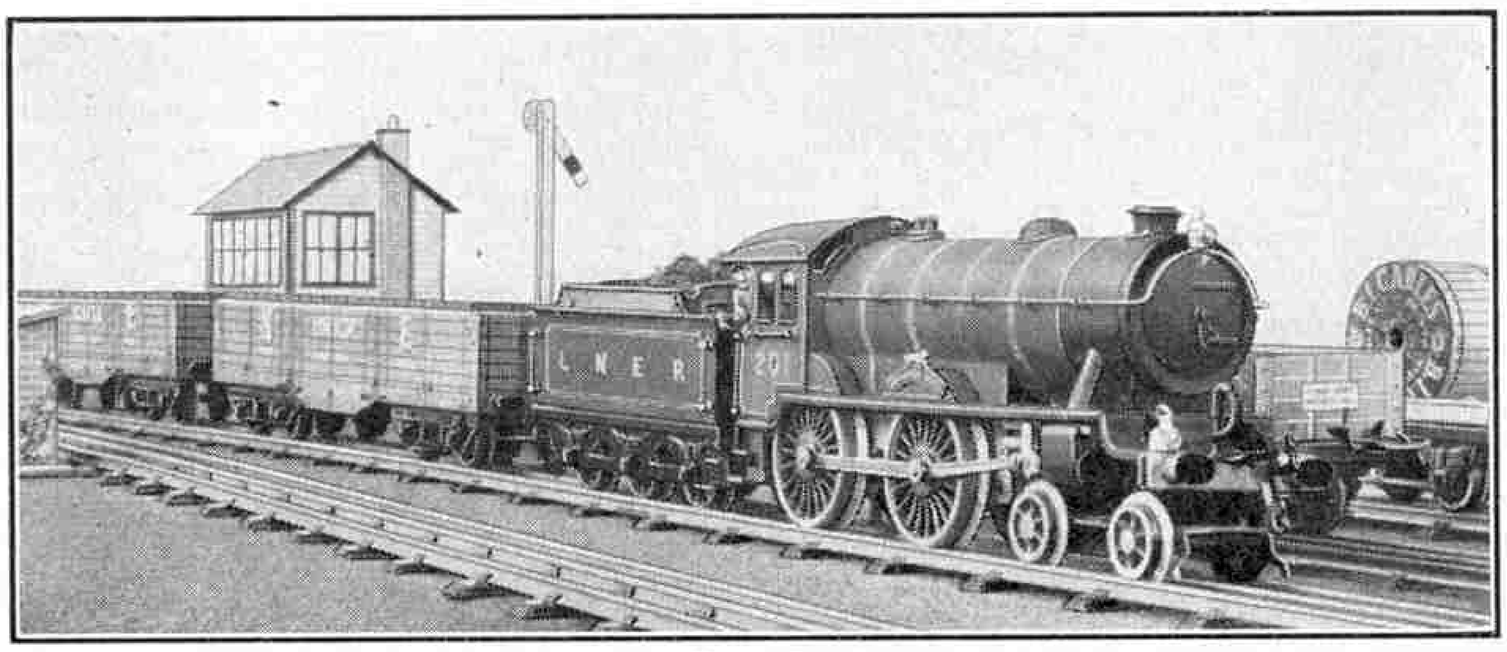
A special Flat Truck is made for Container transport on Hornby railways. This is a most useful and attractive vehicle with low sides, forming a realistic counterpart of the wagons used for the purpose in actual practice. It is available in the colours and lettering of each group, so that each type of Hornby Container can be carried on a suitable wagon.

The Flat Truck is used also for cable drum transport in miniature. Cable Drums are popular Hornby items, for they make interesting loads in connection with real or imaginary extensions of an electric railway, or for a power system being developed in an area served by the line. The Drums are "roped," by means of Meccano Cord, through an opening pierced in their centres to rings attached to the sides of the Flat Truck. One or two Cable Drums also look well "stored" in a corner of the goods yard, as if they have been delivered by rail but are waiting until required.

While dealing with items particularly adapted for use on the railway premises themselves, we must not overlook the items of luggage contained in the various sets of Railway Accessories. These include Milk Cans, which look most realistic when placed on the station platform, and different pieces of passenger luggage. Included among the latter is a splendid miniature hamper, several of which can be placed on the loading "bank" of the Goods Platform as well as on the passenger Station. They can be used for a variety of purposes, and are particularly useful in connection with parcels traffic, for they can represent the "skips" sometimes used to convey smaller parcels.

The Meccano System, too, can be made use of to provide freight for Hornby Trains. Meccano Loaded Sacks, Part No. 122, can be used quite effectively in Hornby Wagons, and to protect them from the "effects of the weather" the Hornby Wagon Tarpaulin should not be forgotten. Loads of an engineering character, for the carriage of which the Hornby Trolley Wagon is ideal, can also be made up in Meccano. In addition to built-up loads, items such as a number of Meccano Rods representing a load of tubes, and so on, are very effective.

Other loads of a special character can be made up by the model railway owner from material to be found in every household.



An L.N.E.R. brick-train on a Hornby railway. The No. 2 High Capacity Wagons are loaded with Hornby Bricks.

FIRESIDE FUN

TAKING NO RISK

"Are your neighbours honest?" the old negro was asked.

"Yassir, dey is."

"But you keep that loaded shotgun near your hen coop."

"Yas, da's to keep 'em honest."

* * * *

Lillian (aged four): "Mamma, you're not a girl, are you?"

Mamma: "No, dear. I used to be a little girl, but now I'm a woman."

Lillian: "Then what became of the little girl you used to be?"

* * * *

Landlady: "If you don't stop playing that saxophone I'll go crazy."

Sax Player: "Guess it's too late. I stopped an hour ago."

* * * *

Teacher: "Now, children, what is it we want most in the world to make us perfectly happy?"

Bright Youngster: "The things we ain't got."

* * * *

"One of my ancestors won a battle against the Normans by his skill in handling the artillery."

"But wait a minute—in Norman times gunpowder hadn't been invented.

"I'm well aware of that, and so was my ancestor."

"How did he win the battle, then?"

"Well, he brought the artillery to bear on the Normans, and the idiots, seeing the guns, thought gunpowder had been invented, so they hopped it!"

* * * *

"Do you make good money as a ventriloquist, Mr. Smith?"

"Oh, yes, I have a good job in the city."

"Where do you work?"

"In a bird store. I sell talking parrots."

* * * *

The last of a great family of fighters was talking haughtily to a Scottish soldier.

"My family," he said, "has had the right to bear arms for 200 years!"

"Och," retorted the Scot. "Mine's had the right to bare legs for 2,000!"

* * * *

The teacher had given the subject "water" and asked the pupils to write a short essay on the subject.

One boy wrote: "Water is a white wet liquid, which turns black when you wash in it."

* * * *

Small Boy: "Please have you got any castor oil?"

Shopkeeper: "Yes. How much do you want?"

Small Boy: "None, thank you. I'm looking for a shop that's sold out."

* * * *

BEAVERS!

A Scot, returning to his country after nearly 30 years, arranged to meet his two brothers at the station. When he alighted from the train he was surprised to see two men with enormous beards whom he hardly recognised as his brothers.

"Why the beards?" he asked.

"Don't you remember?" one of them replied. "You took the razor with you when you went away!"

SAFETY FIRST

The manager of a theatre interviewed an applicant for the position of attendant. After asking the man several questions as to his suitability for the job he finally asked him: "What would you do in case of fire?"

"Oh," said the man, "don't worry about me. I'd soon get out."

* * * *

Scotsman (at riding school): "I wish to hire a horse."

Groom: "How long?"

Scotsman: "The longest you've got; there are five of us going."

* * * *

Mother: "What are you crying for, Tommy?"

Tommy: "Johnny hit me."

Mother: "Well, why didn't you hit him back."

Tommy: "Because if I did it would be his turn to hit me again."

* * * *

The Diner (swallowing soup noisily): "Jolly good soup, this."

The Listener: "Yes, it sounds good."

* * * *

NOT A TOASTING FORK!

"We're not so 'ard on you blokes as we used to be," snapped the sergeant to the young soldier, "so just a word of kindly advice. . . . Next time you're to be reviewed by the general, don't come on parade ground with a bit of 'alf-done toast on the end of yer bayonet!"

* * * *

Judge: "Why did you steal the purse?"

Prisoner: "Well, your honour, I was ill and I thought the change would do me good."

* * * *

"How," asked the officer on the rifle range, "did you get those four straight hits? Your range is 600 yds., but your sight is set at 300."

Young soldier: "See that little rock half-way along? Well, I'm bouncing 'em off that!"

* * * *

A laddie at college named Breeze,
Weighed down by B.A.'s and M.D.'s,
Collapsed from the strain.
Said the doctor: "It's plain,
You're killing yourself by degrees."

* * * *

Railway Agent: "Here's another farmer suing us on account of his cows."

Official: "One of our trains has killed them, I suppose?"

Agent: "No, he claims our trains run so slow that the passengers lean out of the windows and milk the cows as they go by."

* * * *

After his first ride in an aeroplane, the coloured man said to the pilot: "I want to thank yuh for both dem rides."

"What do you mean?" said the pilot, "you only had one."

"No, suh," replied the passenger. "Ah done had two—mah first and mah last!"

* * * *

"I wish you wouldn't keep whistling that tune over and over again."

"But I've got to. There are 20 verses."

* * * *

THIS MONTH'S HOWLER

Prose are men who play games for money and are quite different from poets.

HIS CHANCE!

Flying over the Bay of Naples, an air pilot turned to his passenger and said: "Have you heard that phrase, 'See Naples and die'?"

"Yes," said the passenger.

"Well," said the pilot, "take a good look—the propeller's come off."

* * * *

A young sailor was showing an old lady around his ship.

"Awfully interesting," she said. "And tell me, do you close the portholes when the tide rises?"

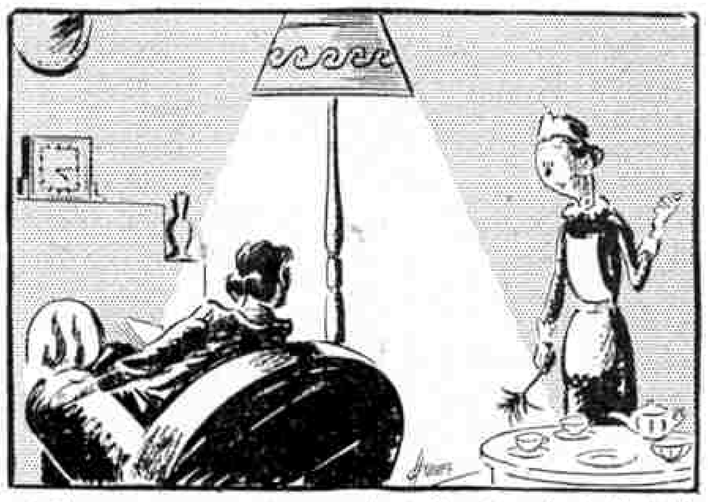
* * * *

Judge: "Prisoner, it is your right to challenge the jurymen you object to."

Pugilist: "All right, my lord; I reserve the right until after they make their decision."

* * * *

A NON-STOP JOURNEY



"I'm ever so sorry, mum, but I've knocked that big marble clock off the mantelpiece."

"Did it stop?"

"No, mum. It went straight through into the cellar."

* * * *

Judge: "Are you sure you are not guilty?"

Defendant: "Quite sure! The police say they found my finger prints on the safe, but I know I rubbed 'em off."

* * * *

Teacher, to pupil. "Can you tell me a sentence with 'fascinate' in it."

Pupil: "Yes sir. Father has 10 buttons on his waistcoat and he can only fasten eight."

* * * *

"When you speak I should imagine people listen open-mouthed."

"They do, I'm a dentist."

* * * *

Tom: "Are you doing anything for that cold of yours?"

Dick: "I sneeze whenever it wants me to."

* * * *

Bill (to his Mother as she prepares his lunch for school): "Say, mother, put in lots of that cheese like you gave me yesterday. It's great."

Mother: "I'm sorry, dear, but it's all gone."

"That's a shame. Teacher said that if I came back another day with any more cheese like that she'd have to let the whole school out."

* * * *

"How did you learn to use both hands equally well, Pat?"

"Shure now and me faether, he always said to me: 'Pat, learn to cut your finger-nails with yure left hand, for some day ye might be afther losing yer right hand'."

* * * *

Teacher: "Charles, come here and give me what you have in your mouth."

Heyton "I-I-I'd certainly like to, teacher. It's a toothache."

* * * *

They were on the barrack square, going through musketry drill.

"I told you to take a fine sight," said the sergeant to a new recruit. "You ought to know by now what a fine sight is. What is it?"

"A very big boat full of sergeants sinking in mid-ocean," answered the recruit.

* * * *

"Jones is a cheat."

"Why?"

"He won the walking race three times running."

* * * *

Milkman: "I am in need of a boy about your age. I would pay you five shillings a week."

Boy: "Shall I have a chance to rise?"

Milkman: "Oh, yes, I want you to be here at four every morning."

* * * *

"Mose," said Eph, "what animile is de mos' noted fo' its fur?"

"De skunk," said Mose, positively. "De fur yo' gits away fum he de bettah it am fur you."

* * * *

Teacher: "Dream you are a lark flitting through the welkin."

Jimmy: "I'd rather be an elephant and squirt water through my nose."

* * * *

Jones: "I don't know what to do about my son. He wants to be a racing motorist."

Smith: "Well, my advice is: "don't stand in his way."

Amber
A Relic of Prehistoric Times

By A. Harold Bastin

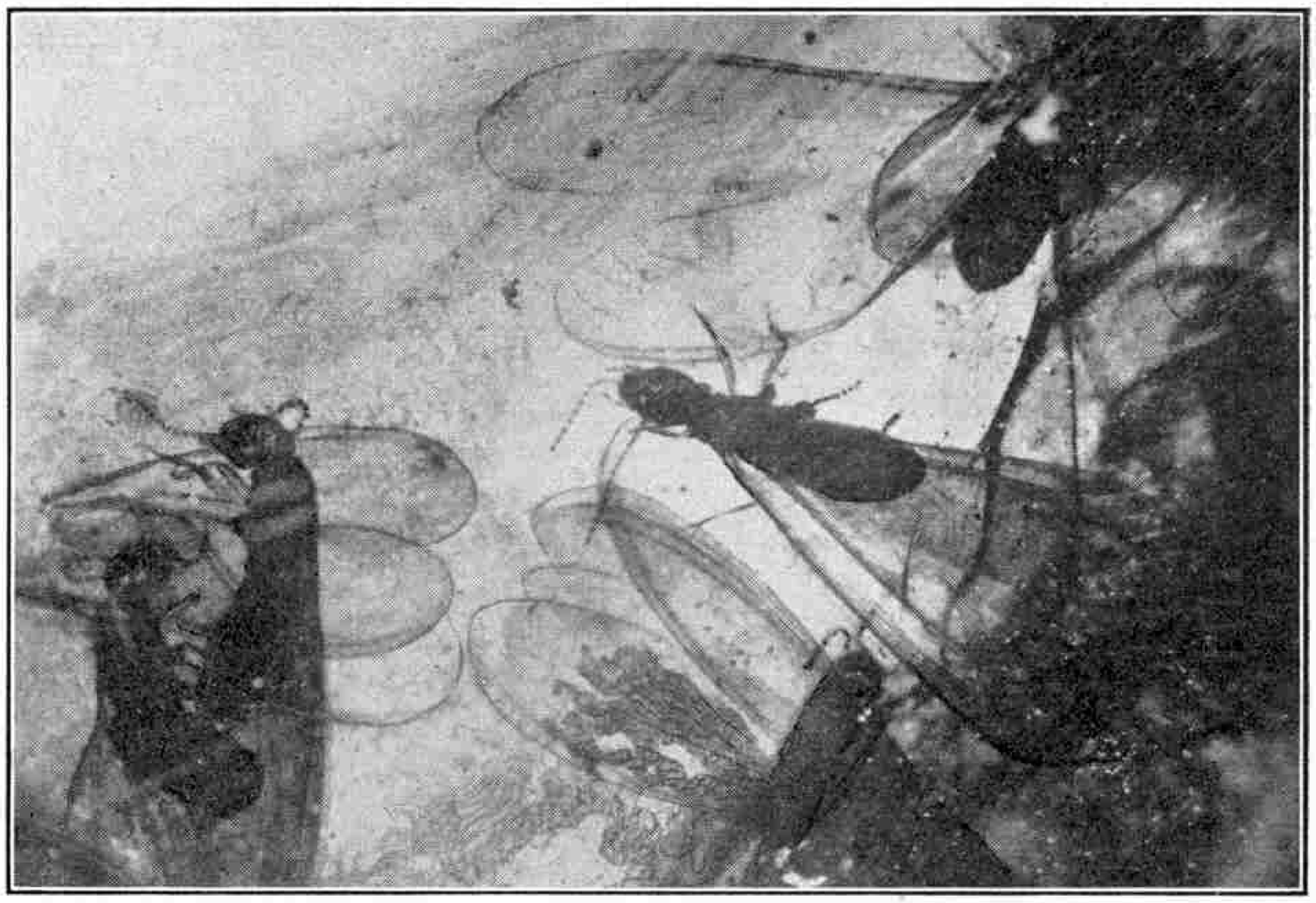
THE ancients regarded amber as a gift of the sea, mysterious in its origin, yet valuable on account of its beauty, and its ready adaptability to personal adornment. In the sixth century B.C., Thales, one of the "Seven Wise Men" of ancient Greece, discovered that when amber is rubbed it has the power of attracting light bodies, this being the first recorded experiment in electricity. Our modern word "electricity" is derived from the Greek word electron, signifying amber. Tacitus, the Roman historian, gives a graphic account of how in his day amber was collected on certain sea beaches, piled in small heaps, and traded in exchange for skins, ivory, silver and other commodities. But it was only in comparatively recent times that the origin and true nature of amber were established. Thanks to the discoveries of geologists we now know that amber is fossilized resin, the once fluid secretion from long-dead pine trees of various kinds, now turned to stone. Originally a vegetable substance, it has been so changed by natural processes that it must now be classified as a mineral!

Amber is found in many parts of the world, including the East Coast of England, where small quantities are collected by longshore folk each year, and either sold locally or sent to merchants in London. But the chief supply comes from the Baltic shores, more especially some 50 miles of the coastline extending from Memel to Dantzic. From time immemorial amber has been collected from these beaches in the form of "nuggets," or dredged from the sea bottom. Since 1875 it has also been systematically mined at a place called Palmnicken, near Königsberg. The outbreak of war in Europe has for the time being brought the trade in Baltic amber almost to a standstill, but in the past these Palmnicken mines have proved profitable undertakings. Occasionally masses of amber weighing 12 lb. to 18 lb. are unearthed, and these, if of good quality, may be worth as much as £1,000 each. An outstanding characteristic of Prussian amber is its peculiar richness in succinic acid, a yellow-coloured crystalline substance which is usually prepared by a process known as dry distillation.

The great forests of amber-yielding trees flourished during a period of the Earth's history known as the Eocene fifty million years ago, or more; long before primitive man appeared on the scene. Geologists tell us that what is now Central Europe was then a vast archipelago, while the climate, even within the Arctic circle, was sub-tropical. "The sea covered South East England, part of France, Belgium, Holland, North Germany, Holstein, Bavaria, Hungary and Italy. A great continent existed in the North, embracing Norway, Sweden, part of Russia, and extending to the Arctic zone beyond Spitzbergen. A broad belt of land embraced the Danish Islands, Jutland, and the whole basin of the Baltic."

Much of this land-belt was clothed with dense forests, formed for the most part of trees rich in the resin which, resisting decay, and being buried in a "matrix" of rotting vegetation, was in process of time converted into amber. At a much later period these deeply buried deposits were torn up by the action of glaciers, or broken into by the sea, with the result that quantities of amber were brought from their original resting places to the surface. The so-called "blue earth" from which to-day amber is chiefly obtained consists largely of the sediments deposited at the mouths of rivers that flowed through the ancient forests.

From the scientific standpoint, the chief interest of amber lies in the fact that it frequently contains natural objects such as leaves, twigs, seeds, insects, birds' feathers and tufts of hair. By studying these relics, which were sealed up in the resin while it was still viscid, geologists have obtained valuable information as to the kinds of living things that inhabited our Earth in the far distant past. Insects and spiders of many sorts are numerous, including some that are quite recognisably the remote ancestors of flies, ants, crickets and so forth that are alive to-day. Frequently these are so perfectly preserved that their colours and the smallest details of their structure are clearly visible through the translucent substance in which they are entombed. Nowadays, apart from its use in charms and trinkets, amber is chiefly in demand for the mouthpieces of pipes and cigarette holders, although a considerable quantity is still consumed as incense, more especially at the tomb of Mahomet at Mecca.



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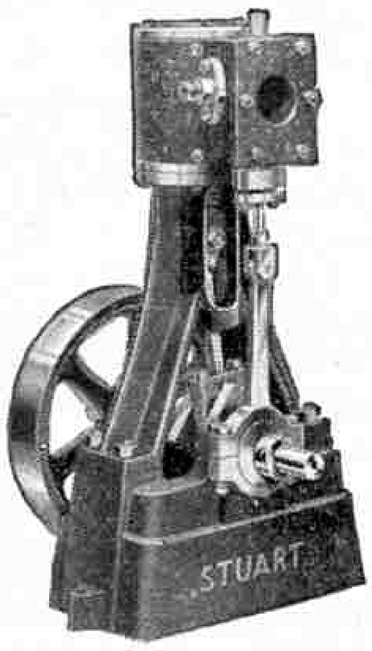

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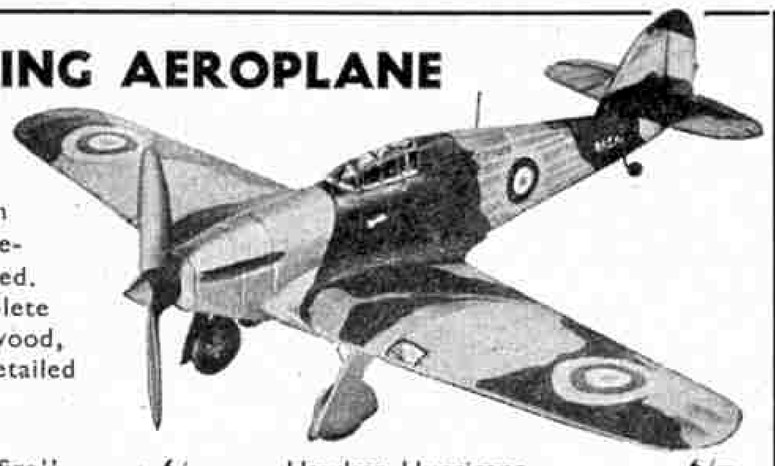

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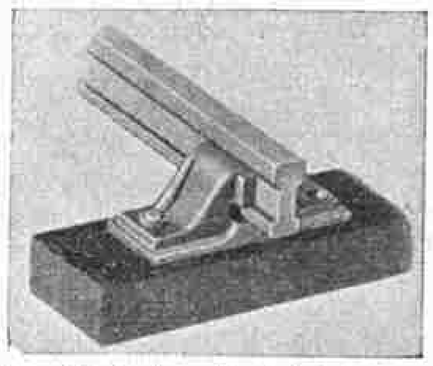

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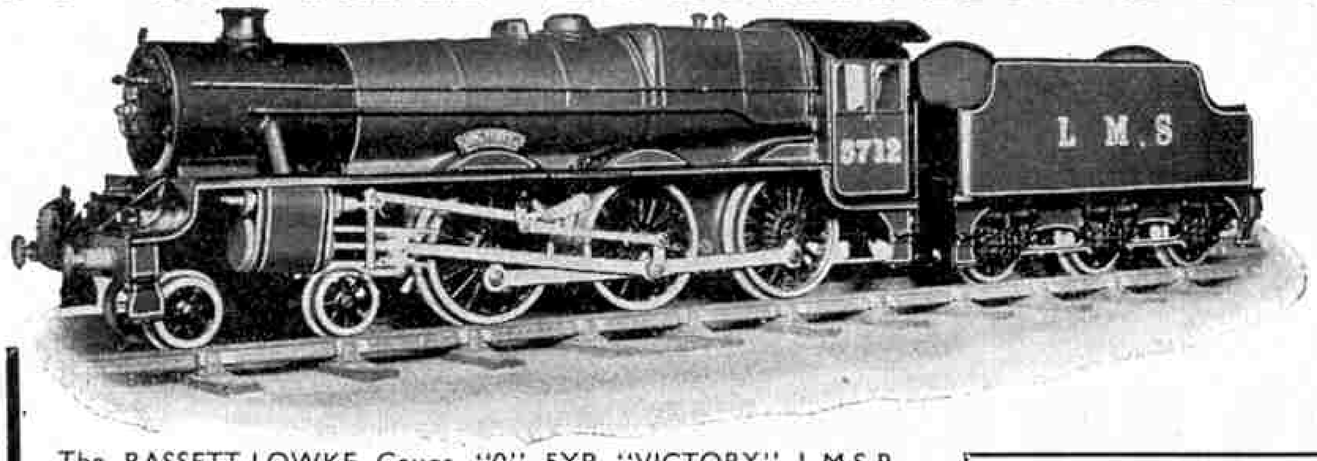

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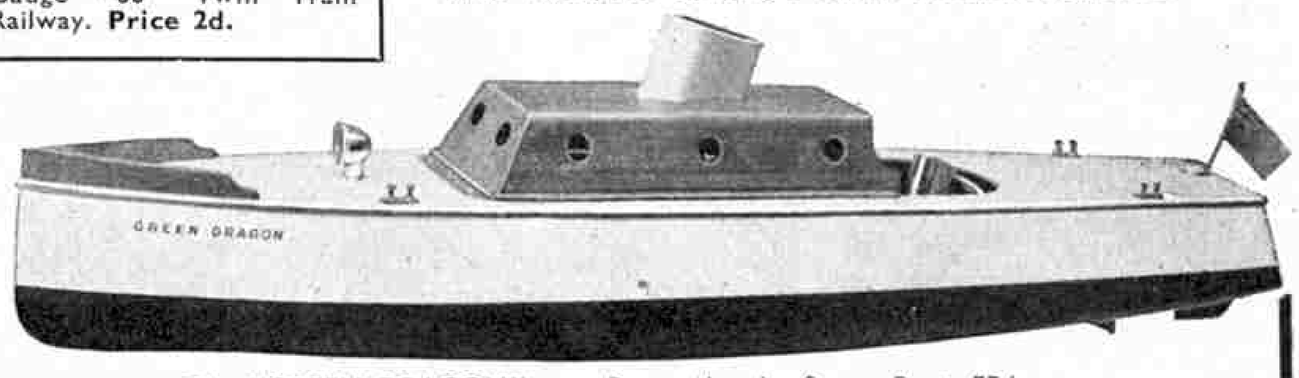

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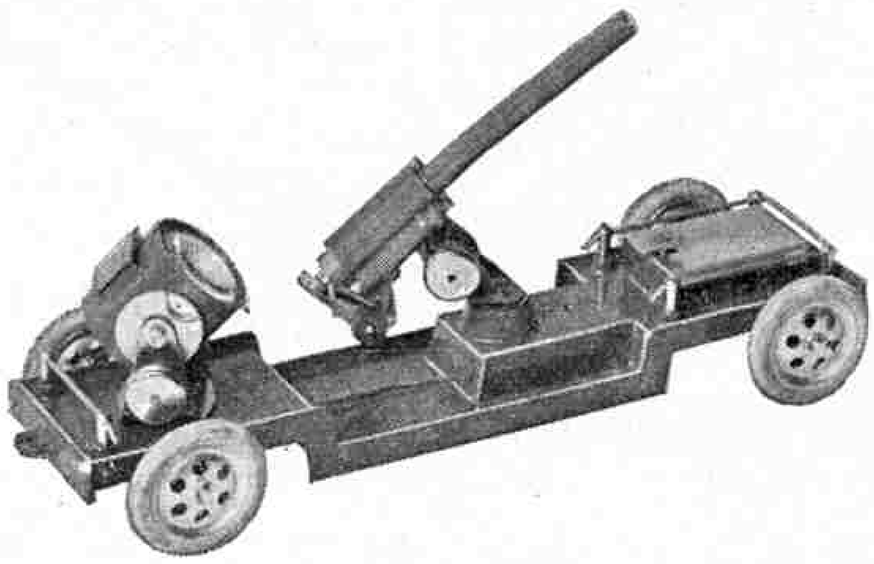

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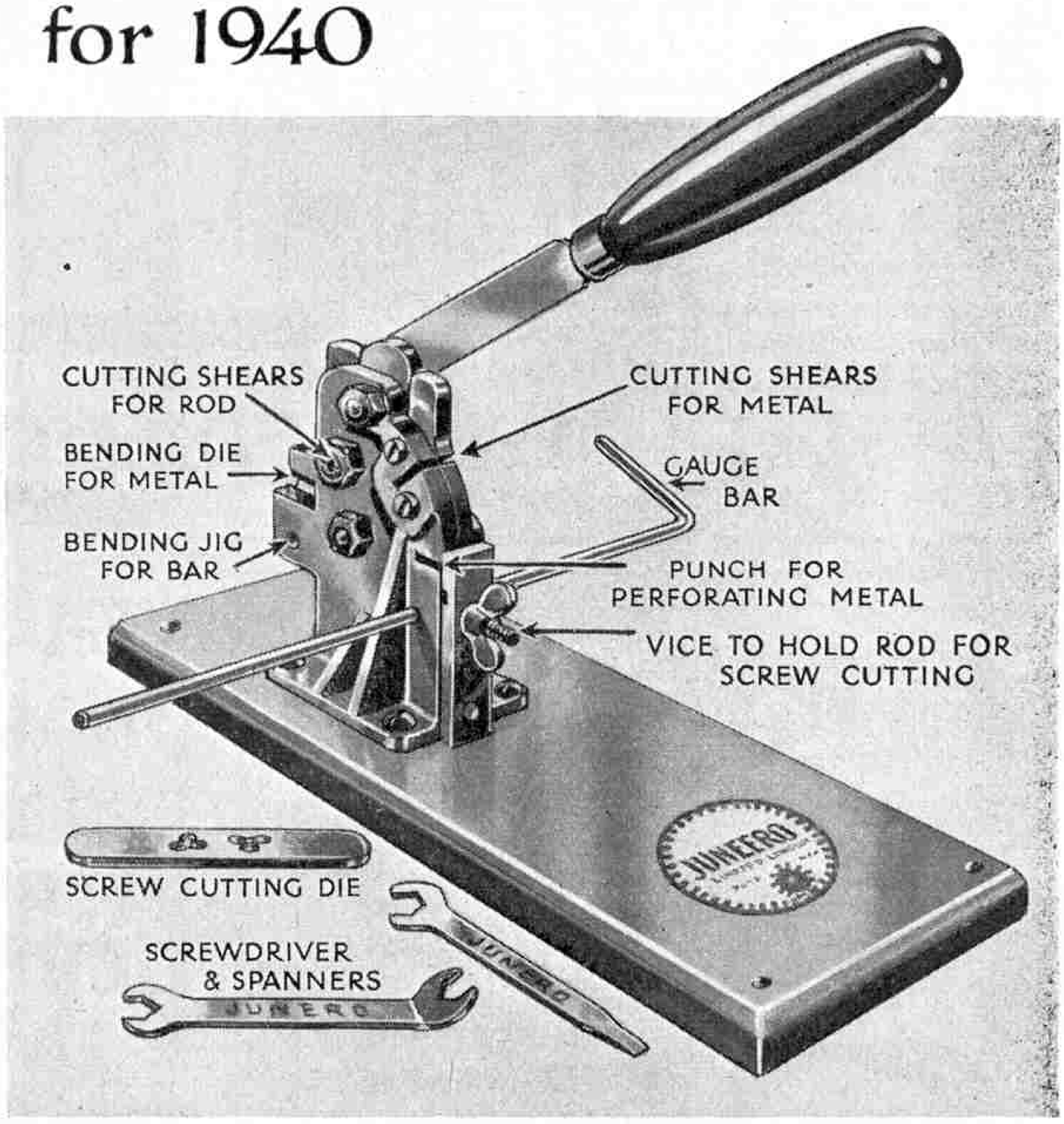

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18 exposures 35 mm. film.

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GAUGE O

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

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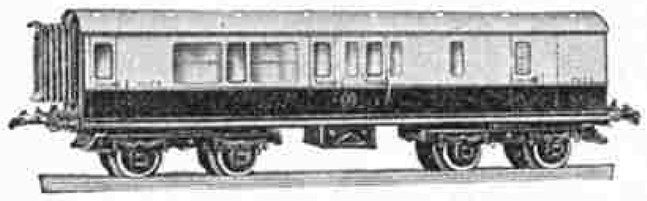
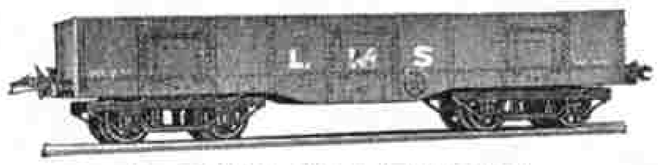
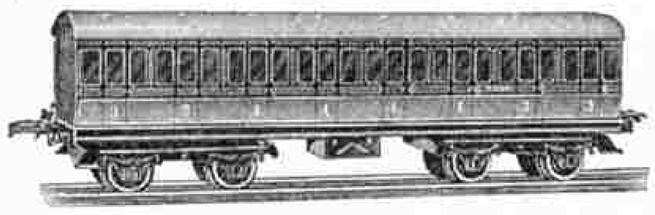


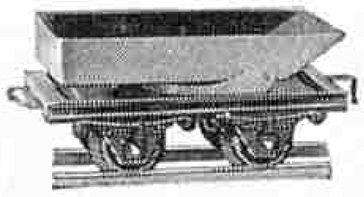
No. 2 CORRIDOR COACH
G.W. Brake-composite. Not suitable for 1 ft. radius rails.
Price **8/9**



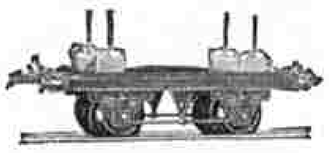
No. 2 HIGH CAPACITY WAGON
Finished in correct colours of G.W. and L.M.S. "Loco Coal" Wagons, or L.N.E.R. "Brick" Wagon. Not suitable for 1 ft. radius rails. Price **4/6**



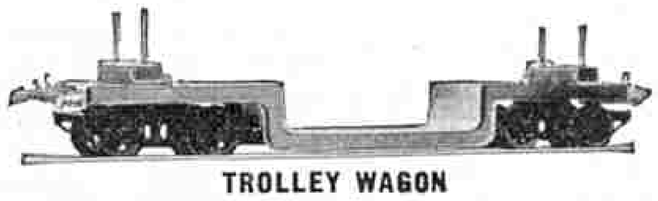
No. 2 PASSENGER COACH
First-third or Brake-third. Not suitable for 1 ft. radius rails.
Price **7/6**



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

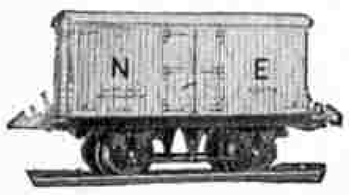


No. 1 LUMBER WAGON
Fitted with bolsters and stanchions for log transport.
Price **1/6**



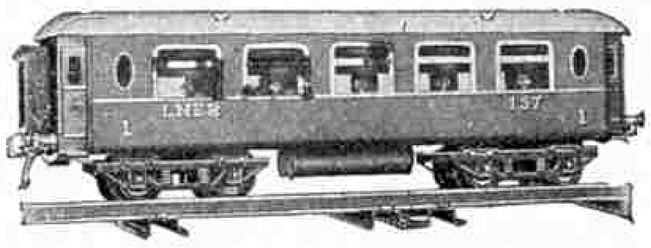
TROLLEY WAGON
Not suitable for 1 ft. radius rails. Price **4/3**

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

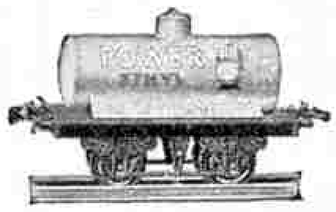


No. 0 REFRIGERATOR VAN
Lettered L.M.S., G.W., N.E. or S.R. Finished with the appropriate details. Price **1/9**

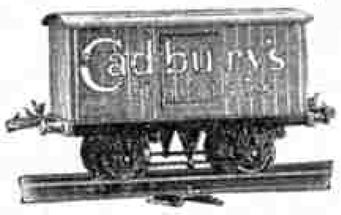
SAUSAGE VAN "PALETHORPES"
Fitted with sliding doors.
Price **2/6**



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



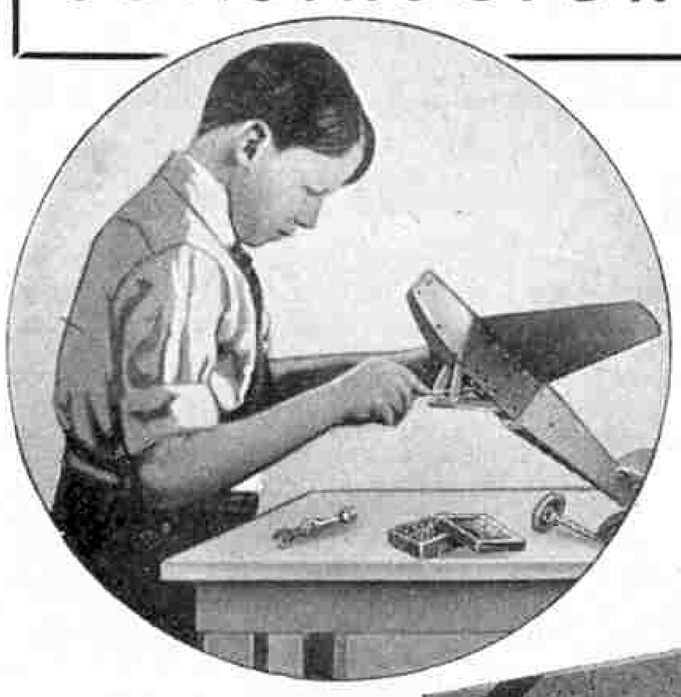
No. 1 PETROL TANK WAGON "POWER ETHYL"
Price **1/11**



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

MECCANO LIMITED — BINNS ROAD — LIVERPOOL 13

MECCANO AEROPLANE CONSTRUCTOR OUTFITS



The parts in these Outfits are all interchangeable on the famous Meccano principle, and splendid miniature aircraft (non-flying) can be built with them. The instruction manuals included in the outfits show clearly how to construct a number of interesting models.

REVISED
PRICES OF OUTFITS

No. 00 Outfit. Price 3/6
No. 0 " " 4/9
No. 1 " " 9/-
No. 2 " " 14/6
No. 1 Special Outfit. Price 16/-
No. 2 Special Outfit. Price 26/-

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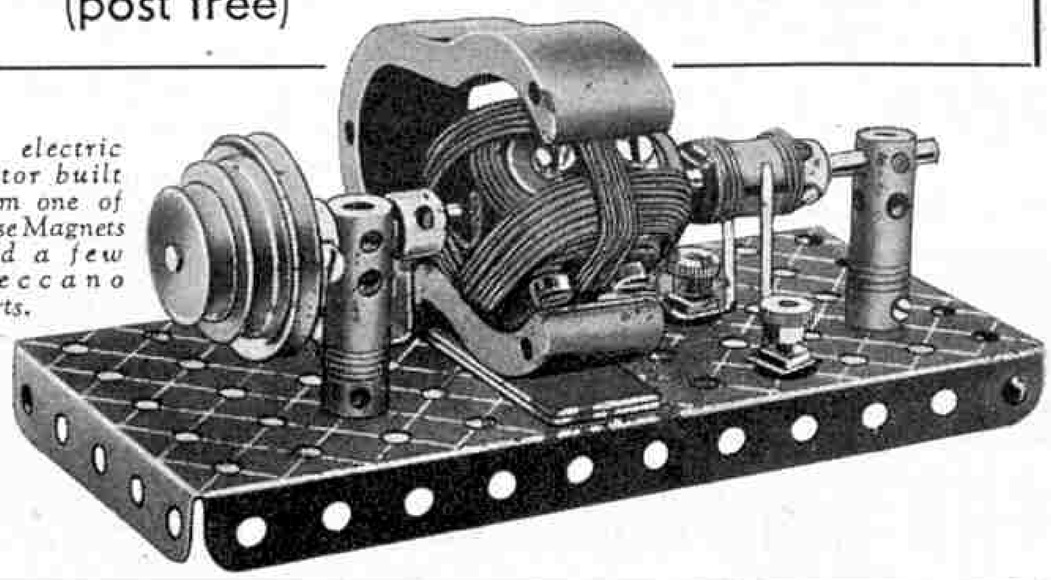
★Build your own Electric Motors and Dynamos

Cobalt Steel Magnets 2/9 each (post free)

We have a limited supply of surplus permanent magnets suitable for use in building up small dynamos, electric motors and other experimental electric apparatus. These magnets are made from high-grade cobalt steel and are exceptionally powerful for their size. They can be obtained only from Meccano Ltd., Binns Road, Liverpool 13.

This offer cannot be repeated when the present stock is disposed of, and readers should order immediately.



An electric motor built from one of these Magnets and a few Meccano parts.

USE ONE OF THESE FOR EASY TYRE INFLATION

EXCEPTIONAL QUALITY

15″ × 7/8″
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BAILEY'S "SUPER" PUMP. Steel Lined; Celluloid Covered

The linings are solid drawn; cartridge fashion; each pump being drawn from its own metal blank, therefore there are no solderings or loose pieces to leak

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Made of best quality celluloid; strongly constructed and beautifully polished

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STAMP ADVERTISEMENTS (Continued from page 94)

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on issue for **A LIMITED PERIOD ONLY AND NOW SCARCE**, together with other **COLONIAL COMMEMORATIVES. LARGE K.G.VI PICTORIALS**, set of **5 AIRMAIL**, set of **4 LARGE KING CAROL OF ROUMANIA. SIAM. LATEST ISSUES** from **GREENLAND. BOLIVIA. ABYSSINIA. RUANDA. GREECE** (Large Charity), etc., etc. **IN ALL**

35 STAMPS CATALOGUED 13/- FREE

to every **GENUINE** applicant enclosing 2d. (abroad 9d.) for my WORLD-FAMOUS **"VALUE"** APPROVALS, containing only perfect stamps at **SUCH LOW PRICES** which enable you to buy TWO stamps instead of one.

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Our Bargain "Discount" Approvals contain a fine range of picked Modern and New Issues, Pictorials and Commemoratives, etc., from 1d.–6d. each (higher if required) less a generous discount. Send to-day with confidence. Approvals or details are post-free, and we do NOT send again unless requested. State whether you want Br. Cols., Foreign or both. You'll be delighted with our PERSONAL service.

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An approval sheet from our limited number will be sent on request.

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During this month I will include a stamp catalogued at least 3/-. Can you find it?

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Collection 30 NEWFOUNDLAND for 2/6
" 50 CANADA, nice lot, for 1/6
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100 all different, 2 Indian Silver Jubilees and 1 Mozambique Triangular Air Mail to introduce my low-priced approval books containing stamps from ½d. Liberal discount given, and a list of 133 further bonus gifts of Coronations, Jubilees, Commemoratives. Please send 2d. for postage.

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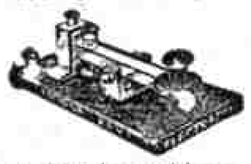

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A.C. MAINS MOTORS. Enclosed, self-start on load. A.C. repulsion, 1/60 h.p., with pulley. Type 36, 1,500 revs., **18/6.** Ditto, 1/16 h.p., G.E.C., 3,500 revs., **27/6.** Induction 1/10 h.p., 2,500 revs., **35/-.** ¼ h.p., 1,425 revs., **49/-. D.C. MAINS MOTORS.** 1/40 h.p., 110 v. or 220 v., K.B. series, 1,750 revs., **15/-.** Ditto, 1/40 h.p., G.E.C., 230 v. series, 2,000 revs., **16/-.** Ditto, 1/12 h.p., Croydon 110 and 230 v. shunt, **30/-.**

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If You're a Shirker you'll always wish for success but never do anything about it. The earth is cluttered with that kind of man.

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ICS

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.

Collector's British Colonial Duplicates, 1,000. Half are different. 20/- the lot.—26, High Street, Penge, S.E.20.

Sale. Nickel Meccano including two Clockwork and Electric Motors, Steam Engine and No. 6 Wooden Cabinet. Many additional parts and gears. Cost £20. Also "Meccano Magazines," September 1926 to December 1939. Good condition. Offers?—Bell, 101, Lynton Road, Acton, London.

Wanted, for cash, Marx Electric Train parts.—Crawford, Emneth, Wisbech.

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

Scale Flying Aeroplanes. "Frog," "Hawker-Hart," cost 42/-: 15/-; "Spitfire," cost 14/6: 6/-.—Lyonel Pritchard,. Oakhurst, Brooks Green, Nr. Horsham, Sussex.

Wanted "Scoops." Please write, stating numbers, price.—Pascoe, 126, Sussex Road, Harrow.

Stuart Turner Steam Plant, hardly used. Cost 17/6 when new. Will sell for best offer above 7/6.—100, Beacon Lane, Billinge, Wigan.

"Popular Science Educator," 2 vols., perfect, cost £2, at 12/6. "M.M.'s," 1930–37, some incomplete, 2/- year; odds 2½d. "Practical Mechanics," Vols. 2-5 (October 1934–September 1938), at 2/6 year, odds 3d. "Railway Gazettes," recent, 5d. each. Other magazines, "Listener," "Home Photographer," etc. Hornby Speed Boat, original 12/6 model, at 4/6.—J., 5, Oaks Close, Leatherhead, Surrey.

Bargain! Chemistry Set, cost 40/-, 21/-. Ukelele, 5/-, perfect.—West, 197, Ancona Road, Plumstead.

For Sale. "M.M.'s," January 1936–December 1939. Good condition. What offers?—P. Bursby, 12, Moray Road, Finsbury Park, London N.4.

Pathescope Kid Projector with Resistance. No Lamp. 16/-.—Fanshawe, 195, Hale Drive, N.W.7.

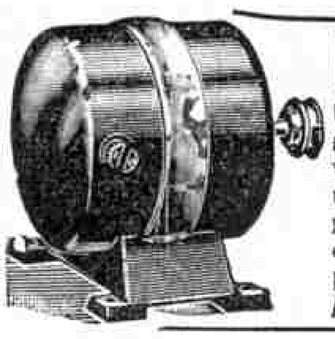
Collection 2,550 Stamps, arranged and mounted in album, many hundred British Colonial. Accept 40/-.—26, High Street, Penge, S.E.20.

Sale. Bassett-Lowke Gauge 0 Electric Rails with raised centres, 6 straight, 12 curved (3 ft. radius). Offers.—G. Watson, 3, Somerset Place, Glasgow.

Wanted, 9 mm. Pathe Films. Any length.—Hunt, 205, Heath Road, Hounslow.

Sale. "Meccano Magazines," January 1928–December 1936. Complete. Excellent condition. Offers.—Hunter, 18, Park Drive, Rutherglen, Glasgow.

CASTING MOULDS for Lead Soldiers, Indians, Animals, etc. Sample mould 2/9. Catalogue stamp. Industries, 2, Waldegrave Park, Twickenham.



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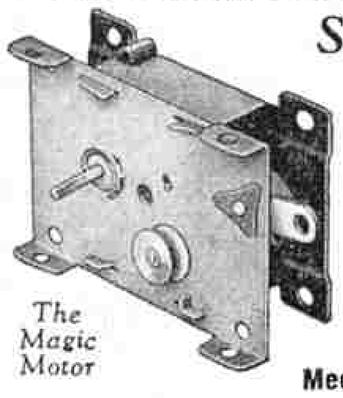

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Telegrams: "Meccano, Liverpool."

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.

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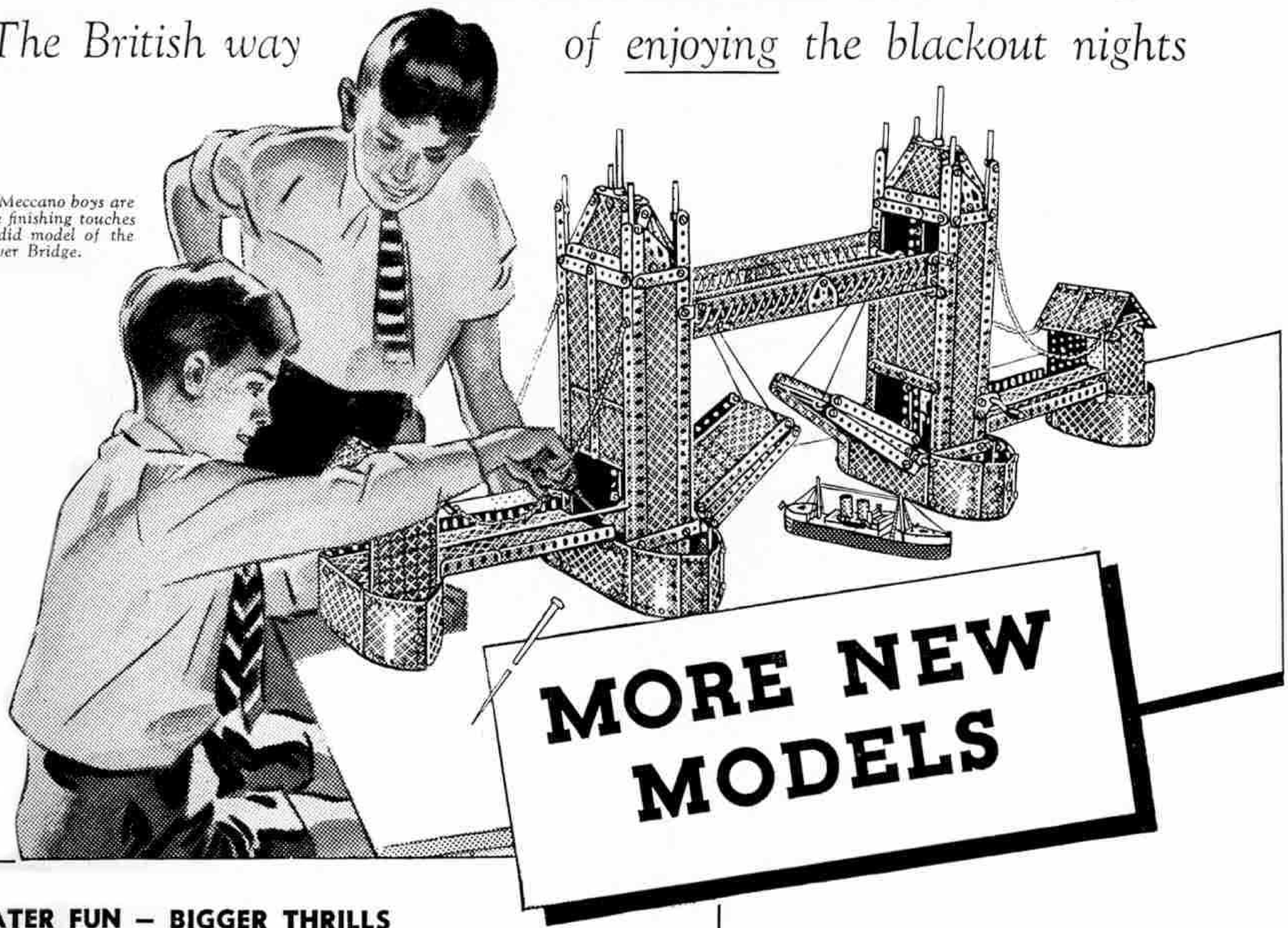

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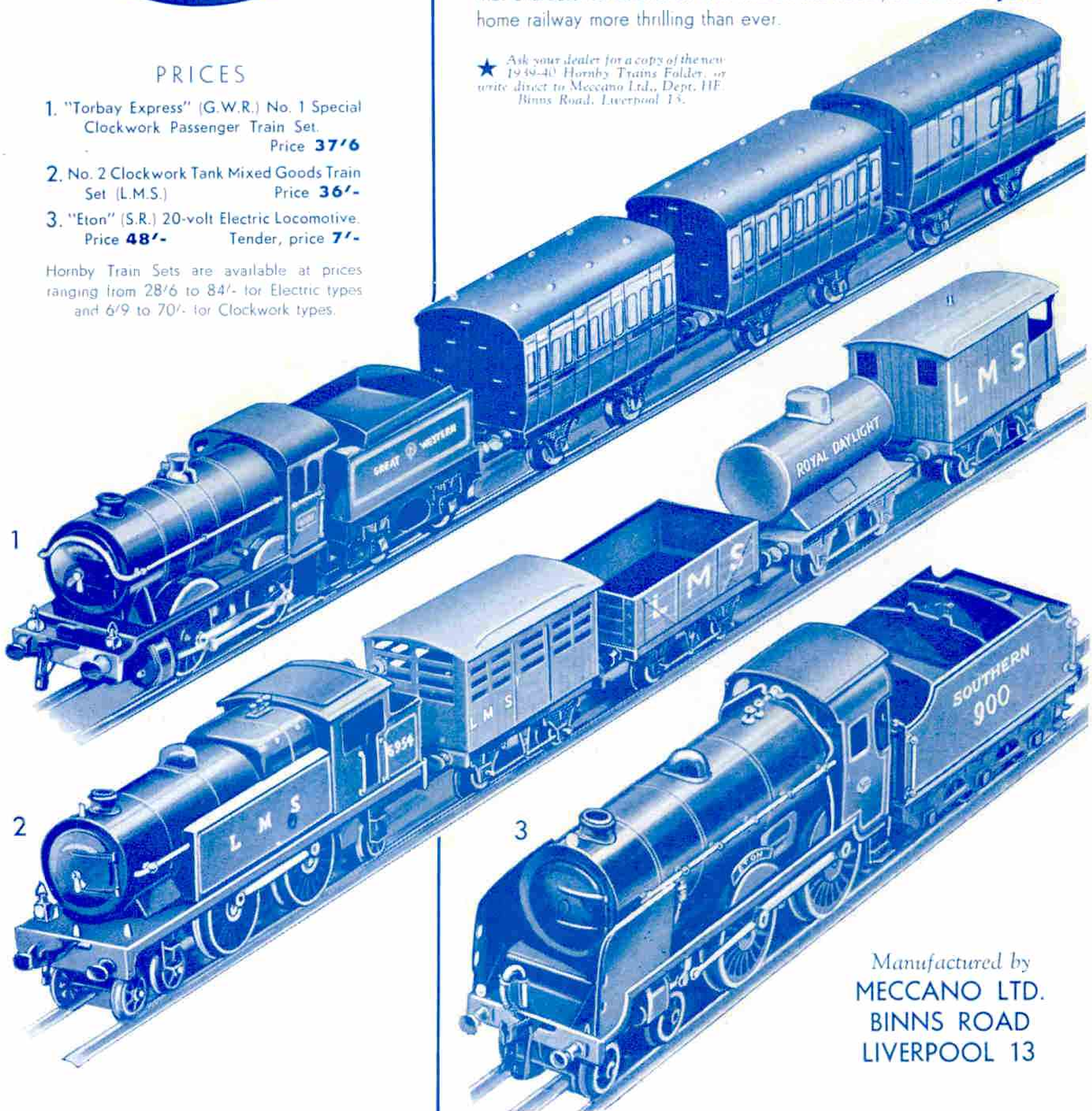

Manufactured by
MECCANO LTD.
BINNS ROAD
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PUBLISHED BY MECCANO LTD., BINNS ROAD, LIVERPOOL 13, ENGLAND.
Printed by John Waddington Ltd., Leeds and London.