VOL. XX. No. 7 JULY 1935

MECCANO MAGAZINE

COOLER FOR GIANT CEMENT KILN

(see page 395)

6D.

MECCANO

MOTOR CAR CONSTRUCTOR OUTFITS

MECCAUTO 538189



No. 1 Motor Car Constructor Outfit

One of the most fascinating of all boys hobbies, either indoor or outdoor, is model car operation with cars built from Meccano Motor Car Constructor Outfits. Perfect miniature reproductions of many different types of car can be built with these splendid Outfits, including sports four-seaters, speed cars, sports coupés and others.

Now is the time to get a Meccano Motor Car Outfit. You will never grow tired of building and running the superb models that you will be able to build.

No. 1 Meccano Motor Car Constructor Outfit

The motor car models that can be built with this Outfit are the finest you ever saw. Look at the examples illustrated at the left-hand side of this page and think of the fun you could have building these and other types equally graceful and realistic.

No. 1 Outfit is available in four different colour combinations and is supplied complete with powerful Clockwork Motor.

Price **13/6**

No. 2 Meccano Motor Car Constructor Outfit

Larger models of a superior type can be built with No. 2 Outfit. Their handsome and realistic appearance may be judged from the illustrations at the right-hand side of this page.

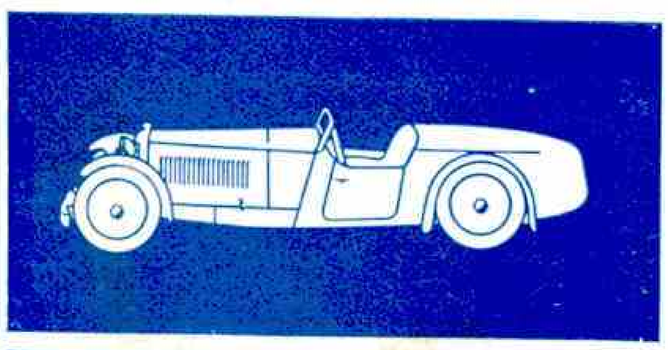
No. 2 Outfit is available in four different colour combinations, and a powerful Clockwork Motor that gives a run of 150 feet on one winding is included. Price **25/-**

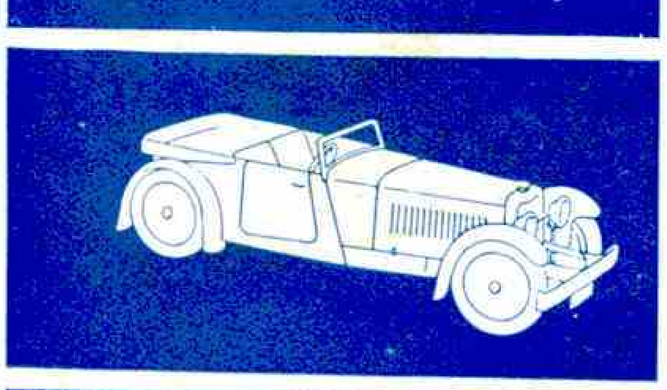
Manufactured by

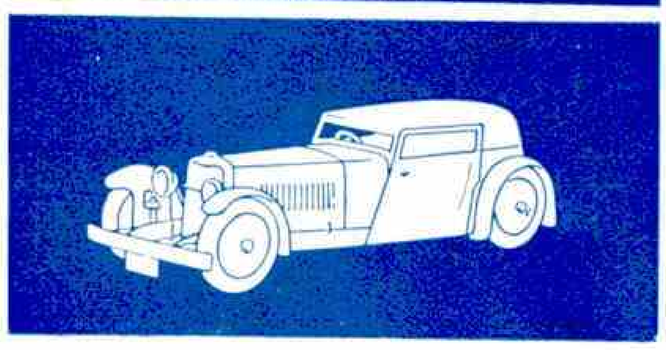
Meccano Ltd., Binns Rd., Liverpool 13

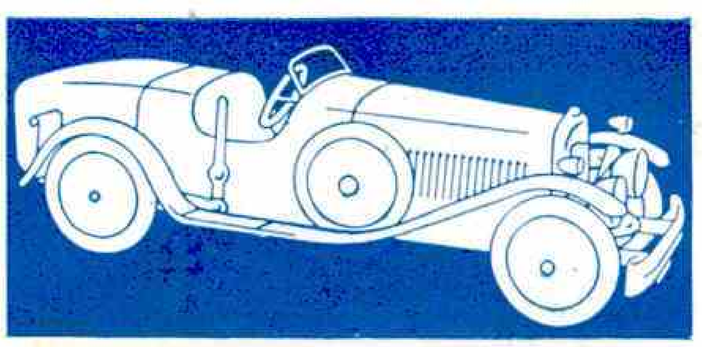


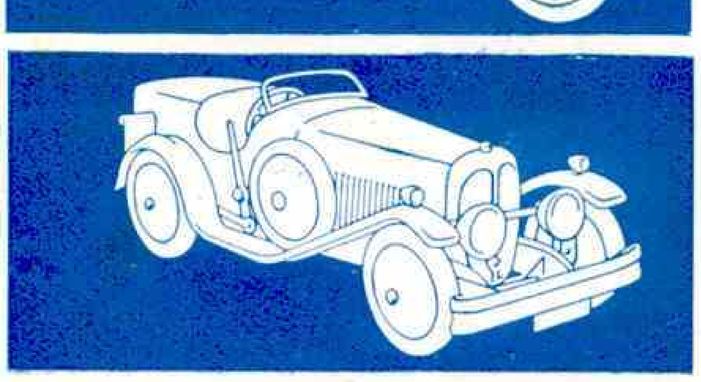
No. 2 Motor Car Constructor Outfit

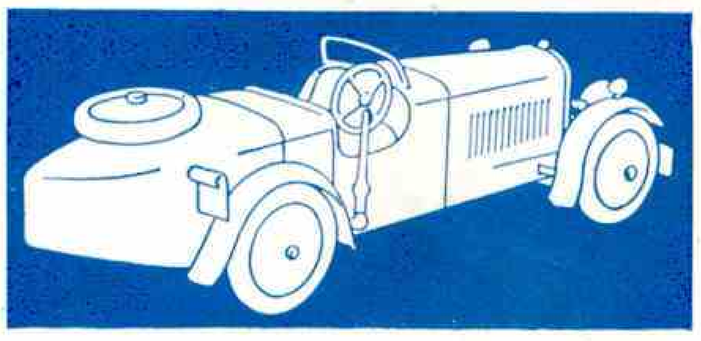








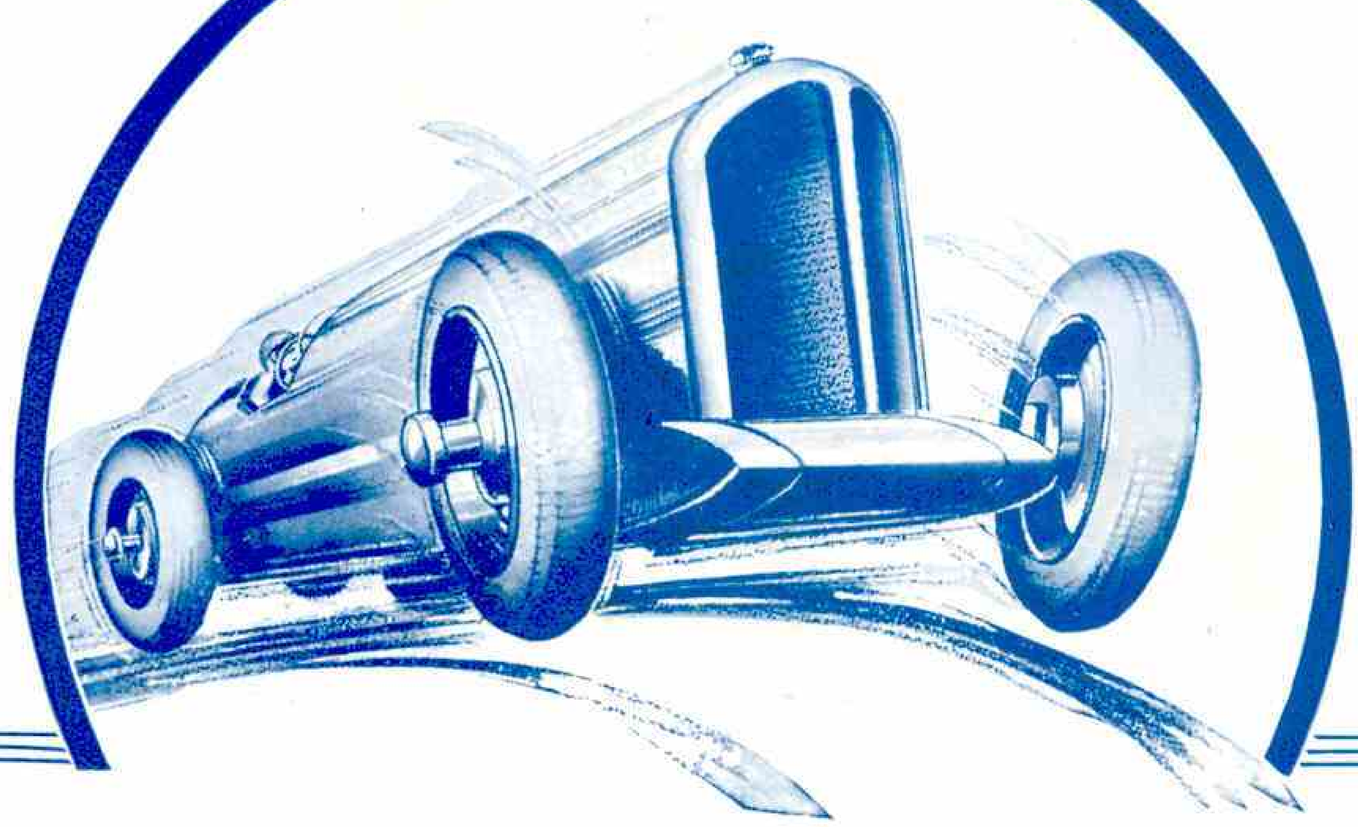




Motor Car Lighting Set

This Lighting Set enables the headlamps of Motor Car models built with the No. 2 Motor Car Outfit to be electrically lighted. Price **2/6**

PRODUCT of MECCANO LIMITED LIVERPOOL



Motor Car Garage

The Meccano Motor Car Garage provides accommodation for any Meccano model motor car or other car of suitable size. It is strongly built, with imitation rough-cast finish. Inside dimensions: Height 5 in. Length 13 in. Width $7\frac{3}{4}$ in. Price **5/6**

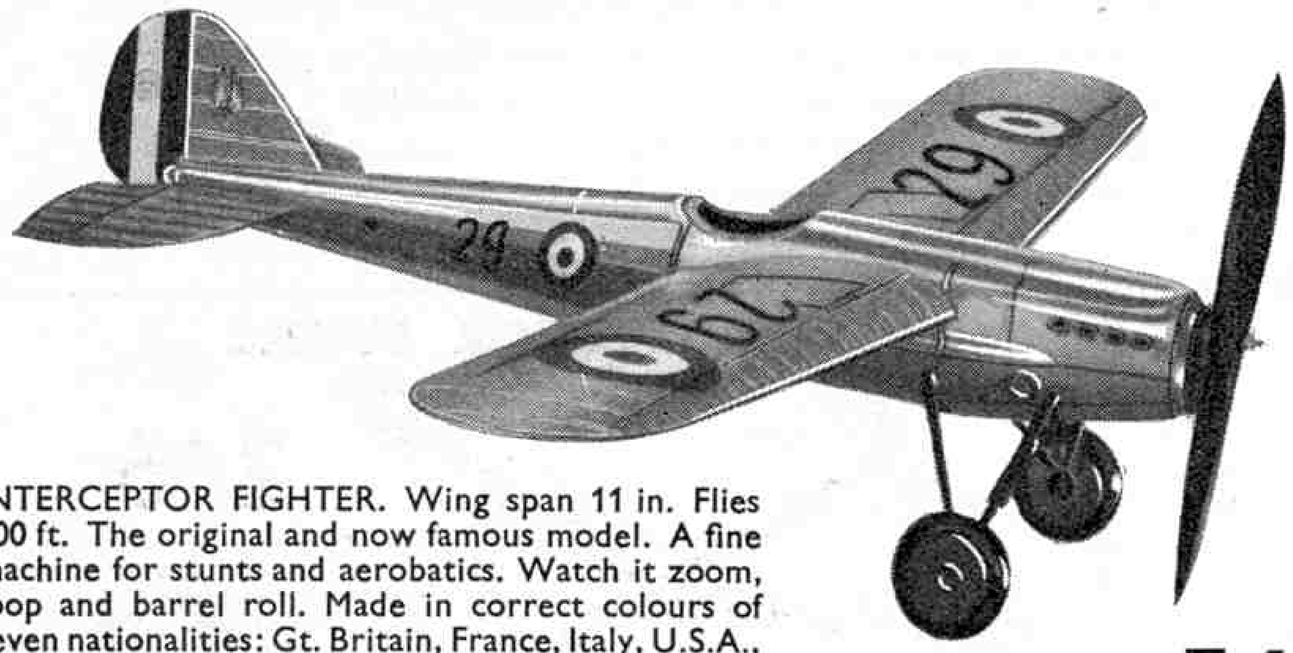
Hamley's News

·HAMLEY·BROTHERS·LTD·ESTABLISHED·1760·

200-202, REGENT STREET, LONDON, W.1 **OUR ONLY ADDRESS**

Number Twenty-seven *July, 1935*

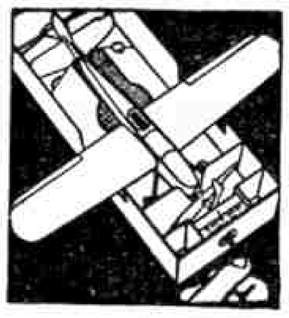
THERE'S SOMETHING HERE FOR EVERY BOY



INTERCEPTOR FIGHTER. Wing span 11 in. Flies 300 ft. The original and now famous model. A fine machine for stunts and aerobatics. Watch it zoom, loop and barrel roll. Made in correct colours of seven nationalities: Gt. Britain, France, Italy, U.S.A., Holland, Belgium and Argentina. Complete with high-speed winder box, spare motors, gear box oil, lubricant and illustrated flying manual. Price **5/-** Post 6d.

Machines with squadron markings, 7/6.

Whatever you want in the way of equipment for games, aeroplanes, boats, cameras, come to us—we're sure to have it. This page shows a few of our many sides.



The mechanical winder enables all "FROG" Model Aircraft to be quickly wound for flight; this is an exclusive "FROG" feature. Other "FROG" Models: PUSS MOTH, **17/6**; Postage 1/-; Hawker-Hart, **42/-**.



THE NEW KODAK CAMERA

Black bakelite case, instantaneous shutter, standard vest pocket 8-exposure roll film. Wonderful results are achieved with this little camera marvel.

Price **5/-** Post 4d.

Film **1/-**. Case **1/-**.



THE LATEST NOVELTY IN MINIATURE MOTOR CARS

A mysteriously marvellous effect is achieved when car is placed with the winding hole side against an upright object such as a pencil or tumbler, it immediately drives round the object in question. This car does any number of tricks. Perfect model of a streamline car finished in high gloss enamel.

Price **2/-** Post 2d.



MICKEY MOUSE CAMERA

The first step in photography, simple daylight loading, time and instantaneous shutter. Fine quality lens, sharp pictures. Wire eye level view-finder.

Price **6/6**

6-exposure film **6**d. Canvas case **1/-**. Post **3**d.



ASTRA KITE OUTFIT

Three high-speed kites, cord, winder, mending tape and tail. The kites are already bridled for flying. Special carrying box.

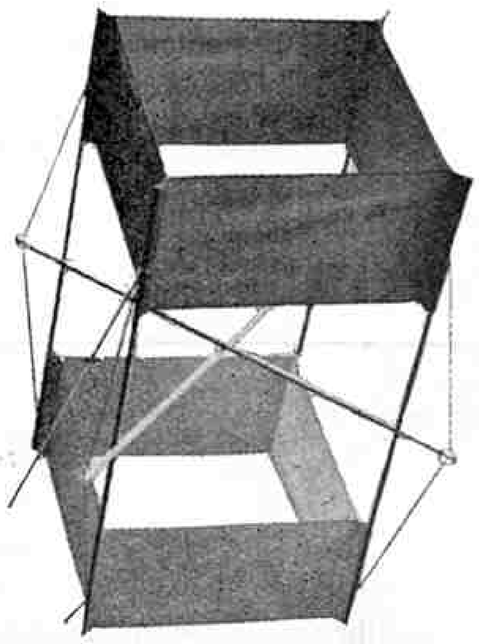
Price **2/-** complete Post 6d.



WRIST COMPASS

A great novelty, self-adjusting dial, leather strap. This is your guide when hiking, cycling, etc.

Price **1/6** Post 2d



BOX KITE

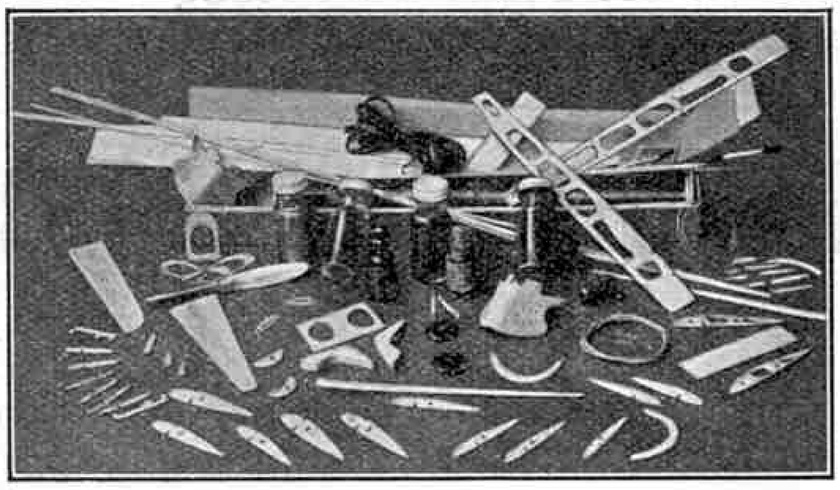
Two diamond cells, strong construction, a stable flyer, good performance in low winds. Total area, five square feet.

Price **3/6** Post 6d.

JUST OUT—a scale model of the MILES "HAWK-MAJOR"!

Holder of England-Australia record for light planes

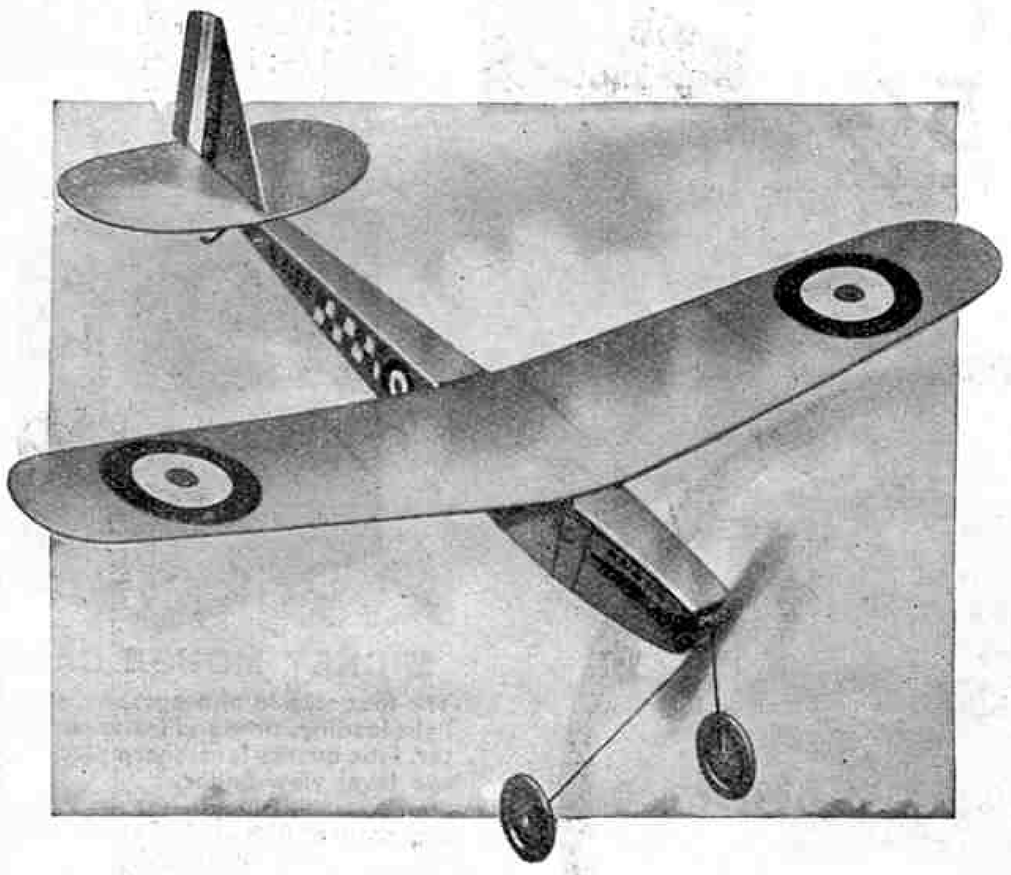




A new "Frog" model—for you to build yourself—and a record breaker as well! This Miles "Hawk-Major" (wingspan 16½ inches) comes to you as a constructional set with a step by step instruction sheet and all important parts blanked out. It is quite easy to assemble, most instructive while you're doing it, and when finished your Miles Hawk model has a fine performance with a flight of up to 500 feet. Price, complete with finished airscrew, step-up gearbox, aluminium wheels, and wind shields ... **10/6**

Meet the **METEOR!**

Another new "FROG" Aeroplane



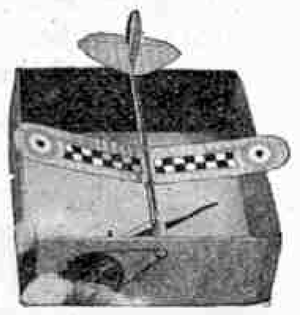
Here is a fast and sure flier—safe and steady in the air—easy to manipulate—**will fly at least 100 yards.** Wing span approximately 15 in. Price **5/-** complete

FOR OUTDOOR FLYING



2/6

Including spare motor, lubricant, flying hints and high-speed winder-box. Wing span 9 in. Flies 200 ft.



THE "BANTAM"

This splendid new model flies anywhere out of doors, even in a wind. Remarkable performance. The wings are printed in the colours of a famous squadron. Patent high-speed winder with each model.



The "ELECTROSTATIC" Aeroplane

Here's a new thrill, the "Electrostatic" aeroplane. By rubbing the vulcanite wand supplied with the set, these little gliders can be made to "loop-the-loop," do "Immelmann" turns and all kinds of real aerobatics. Simple—and very good fun.

The set, consisting of vulcanite wand, 12 gliders, woollen cloth and booklet of instructions, costs only **2/6**

Designed and made by International Model Aircraft Ltd., London, S.W.19.

"FROG" FLYING CLUB

Owners of "Frog" model aircraft are eligible for membership of the "Frog" Flying Club. The badges illustrated are obtainable by those members who pass proficiency tests. Price **6**d. each. Send Coupon for particulars.

POST COUPON FOR FREE COLOURED LEAFLET

To Lines Bros. Ltd. (Dept. L),
Morden Road, London, S.W.19.

Please send me your "Frog" coloured leaflet with particulars of the "Frog" Flying Club and of how to obtain handsome enamelled Air Force pilot badges.

Name .....

Address .....

.....

Get a "Frog" and get "air-minded"

The Famous "FROG" INTERCEPTOR FIGHTER

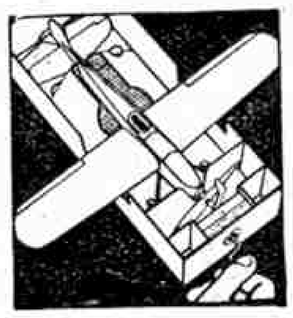


REDUCED PRICE Now Only **5/-**

has improved specification. Better performance

The "Frog" Interceptor Fighter is the best introduction to the principles of flying and a valuable means of obtaining a sound knowledge of aeronautics. The "Frog" is an accurate scale model of a life-size machine—beautifully designed and assembled. It is built to fly well and fly far, and can be made to run through the whole repertoire of aerobatics and stunt flying.

The "Frog" (wing span 11½ in.) with its tubular construction, patented quick detachable fittings, and high efficiency airscrew, is sold complete with spare motors, lubricant and gearbox oil, patent high-speed winder-box and illustrated manual, price 5/–.



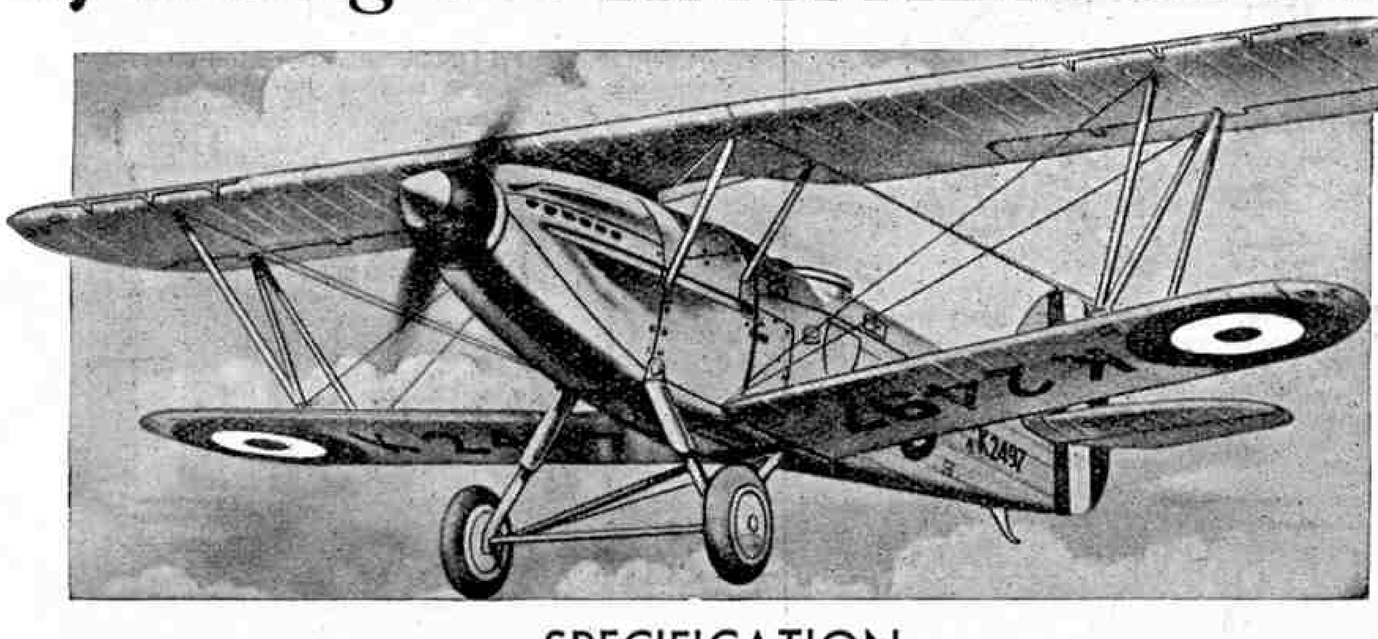
Patented all over the world

Make a point of seeing the HAWKER HART

THE WORLD'S FINEST FLYING MACHINE

The "Frog" people have done it again! This time with an accurate scale model of the HAWKER HART—the most redoubtable fighting plane yet built.

Complete with extra strong PATENT HIGH-SPEED WINDER-BOX, lubricant for gearbox and motors, triple insertor rod, spare motors and profusely illustrated flying manual. **Flies 700 feet** if handled skilfully. **42/-**



SPECIFICATION

Telescopic spring-loaded under carriage. Unique fuselage built up on a reinforced structure of steel, duralumin and timber, covered either with aluminium, alloy sheet or a cellulose-paper—the only material capable of reproducing the exact form, shape and appearance of full-size aeroplane parts. Wings reinforced with internal ribbing and attached to fuselage with quick detachable fittings.

Triple 4-strand motor and watch type gearbox. Precision cut airscrew and spinner.

Wing Span, 18.75 in. Overall Length, 15.36 in. Average Length of Flight, 700 ft.

Owners of a "FROG" PUSS MOTH or HAWKER HART are eligible for the handsome badges, price 6d. each, when the proficiency tests have been passed.

ON SALE AT ALL GOOD TOY SHOPS AND STORES.

MADE BY INTERNATIONAL MODEL AIRCRAFT LTD., LONDON, S.W.19.

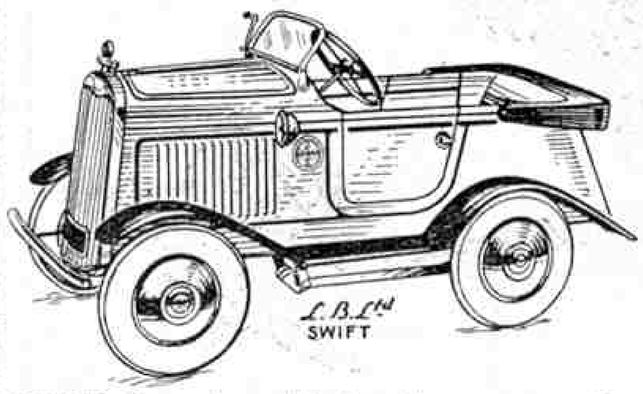
Sole Concessionaires:

LINES BROS. LTD., Tri-ang Works, Morden Road, Merton, S.W.19.

FROG TRADE MARK REGD.

DEPENDABLE TRI-ANG TOYS

ALWAYS AHEAD IN DESIGN, CONSTRUCTION and FINISH



SWIFT. Pressed steel body with rear streamline effect. New style sloping radiator. Improved mudguards. 9″ balloon disc wheels. Latest type Magna hub caps. $\frac{5}{8}$″ rubber tyres. Ball bearing back axle. Price **35/–.**

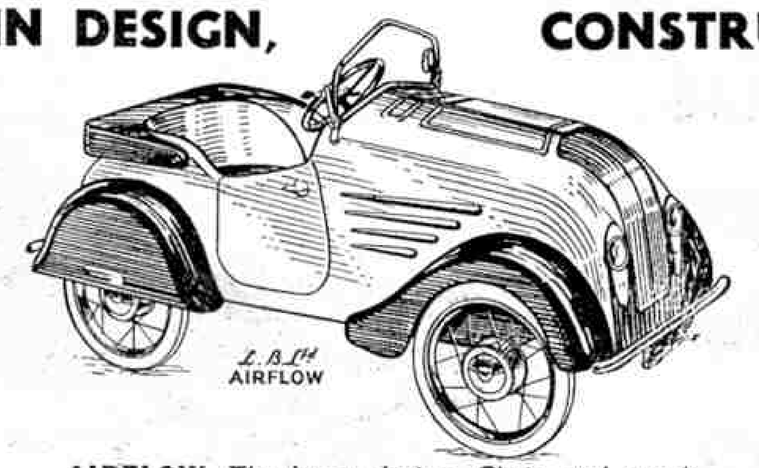


UNITY "JS" SPORTS MODEL. Specially designed for boys and girls. 18″ frame, 20″ x 1$\frac{3}{8}$″ wheels. CHROMIUM-PLATED hubs and rims. Dunlop red sports pattern tyres. Shallow North Road drop handlebars. Roller lever pattern brakes. Three-coil leather saddle. Complete equipment. Finished in enamelled maroon with gold lines. Price **£3/2/6.** Girls' model same price.



22W DOLL'S PRAM. New boat-shape body with stylish design. Outside springs. 6″ spoke wheels. $\frac{3}{16}$″ white tyres. Nicely upholstered. Laced hood. Apron with storm flap. Long black levers. Two pair dressguards. Price **29/6.**

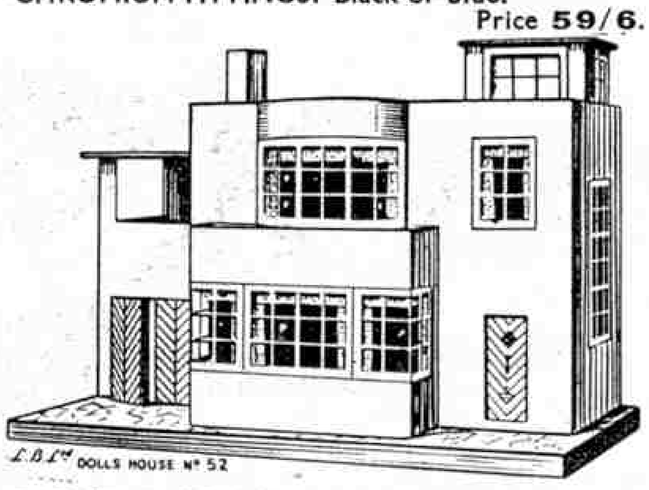
"A" ROLL TOP DESK. A real scale model desk complete with chair and fitted with pigeon holes, pen rack and inkwell. Two useful shelves. Beautifully finished in light oak. Price **29/6.**



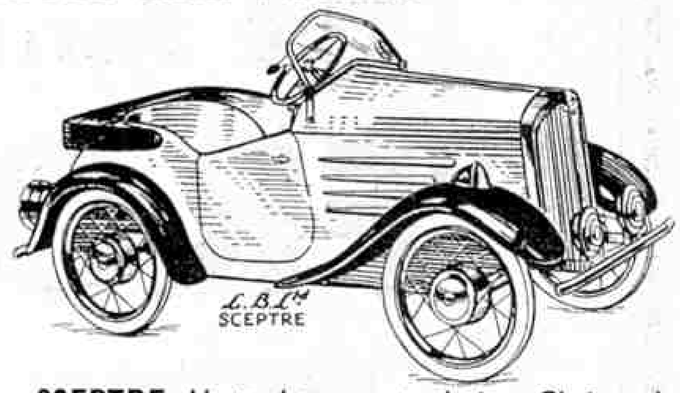
AIRFLOW. The latest design. Chain and crank drive. Tubular chassis. Tangent spoke wheels and CHROMIUM-PLATED hubs and rims. Latest type Magna hub cap. 10″ x 1$\frac{3}{8}$″ jointless sponge rubber tyres. Facsimile airflow radiator with mascot. Two sunken ELECTRIC headlamps and two dummy lamps embodied in the wings. Tubular bumpers back and front. Length 45″. Price **84/–.**



TRI-ANG TRICYCLE No. 5. (Regd. Trade Mark.) Now fitted with rear mudguards. Cycle chain drive with free wheel. Frame best quality weldless cycle tubing. 14″ wheels. 1$\frac{3}{8}$″ jointless sponge rubber tyres. Rim brake. Coil-spring saddle. CHROMIUM FITTINGS. Black or blue. Price **59/6.**



DOLL'S HOUSE No. 52. Ultra-modern design with opening front and movable SUNTRAP. Two large rooms fitted with fireplaces. Two electric wall lights. Built-in garage with opening doors. Metal frame windows with curtains. Beautifully finished in cream and green with imitation crazy paving. Price **35/–**



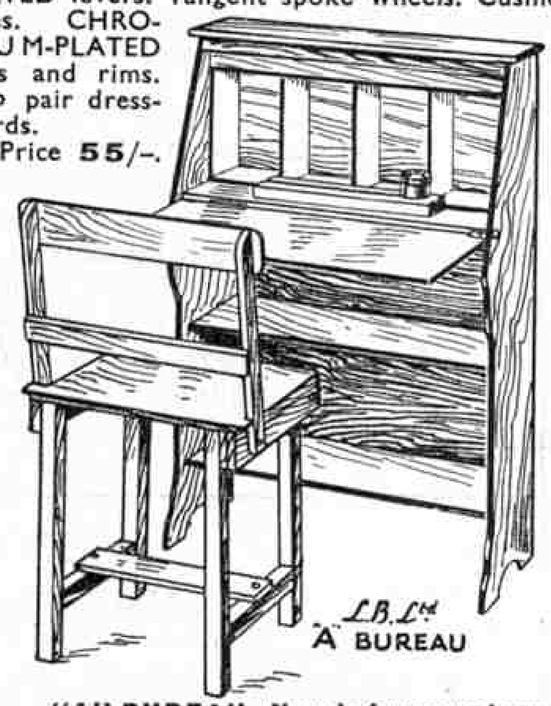
SCEPTRE. Up-to-date sports design. Chain and crank drive. Tubular chassis. Tangent spoke wheels fitted with latest type Magna hub caps. 10″ x 1$\frac{3}{8}$″ jointless sponge rubber tyres. CHROMIUM-PLATED hubs and rims. Modern type radiator with mascot. Two ELECTRIC sidelamps embodied on wings. ELECTRIC STOP & GO and BUZZER HORN. Length 45″. Price **79/6.**



FAIRYCYCLE (Regd. Trade Mark) No. 2. Tubular frame, best quality British steel. Tangent spoke wheels. 1$\frac{3}{8}$″ imitation pneumatic tyres. Raised handlebars. Coil-spring saddle. Chain cover carrier. Rim brake and ball-bearing pedals. Black or blue. CHROMIUM-PLATED FITTINGS. Price **39/6.**



24/M DOLL'S PRAM. A handsome boat-shape with streamline effect. Well upholstered with piped arms. Leather-cloth head and apron. Celluloid-covered pump joints. Long CHROMIUM-PLATED levers. Tangent spoke wheels. Cushion tyres. CHROMIUM-PLATED hubs and rims. Two pair dressguards. Price **55/–.**



"A" BUREAU. New design very strongly constructed. Fall flap with lock and key. Pigeon holes, pen rack with inkwell. Two useful shelves. Complete with chair and nicely finished in light oak. Price **18/–.**

Tri-ang Toys are unsurpassed for realistic design and finish

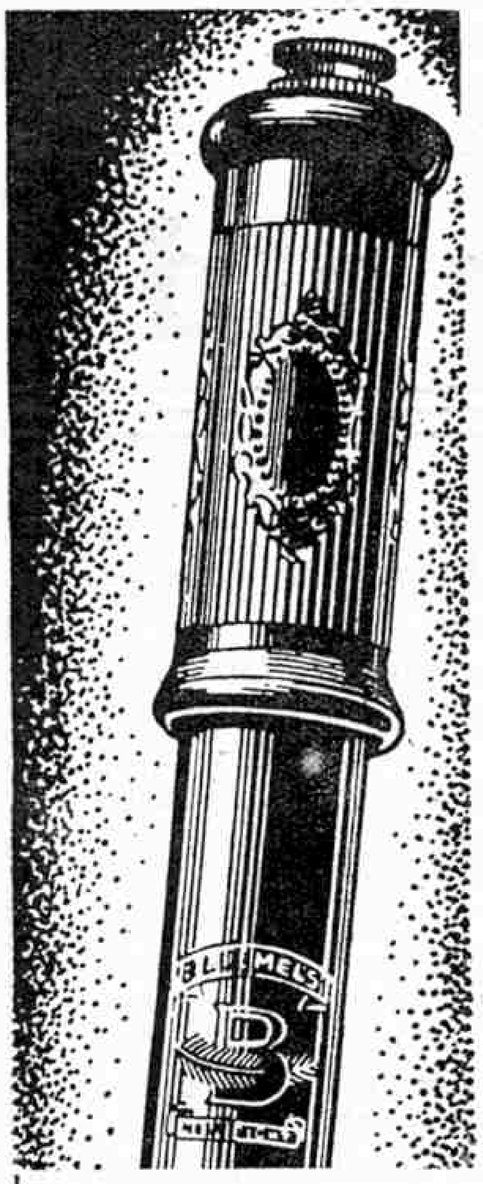
CAN BE SEEN AT ALL GOOD TOY SHOPS AND STORES

MADE WITH THE FINEST BRITISH MATERIALS

By **LINES BROS. LTD.**

TRI-ANG WORKS

MORDEN ROAD, LONDON, S.W.19



IT'S TRUE ECONOMY TO BUY THE BEST

● You cannot get a better pump than Bluemel's "Noweight," no matter how much you pay. Of superb quality, it will outlast many bicycles. Light in weight, easy to use, undentable! The 15 inch by $\frac{7}{8}$ inch "Noweight" costs only **2/6.** Other models from **1/6.**

● Send postcard for complete new list of "Noweight" accessories — mudguards, reflectors, lamps, horns, etc.

Bluemel's

Bluemel Bros. Ltd., Dept. 27, Wolston, Coventry



A joy to drive with!

THE NEW ESSO PETROLS are definitely ahead of engine design, giving engineers scope for higher compression than ever. Esso Ethyl, for example, will actually give knockless performance in an engine of 7 to 1 compression! Esso gives incredible acceleration and top-gear performance in all cars.

ESSO

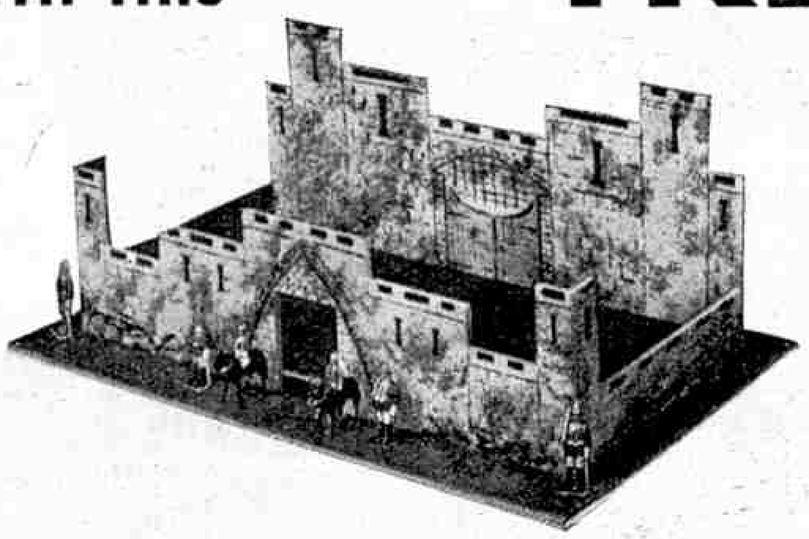
ESSO ETHYL
ESSO BENZOL MIXTURE
ESSO HIGH TEST
PETROLS

ANGLO-AMERICAN OIL COMPANY LTD., WESTMINSTER, S.W.1

Established 1888

SIX SOLDIERS FREE

WITH THIS



2'6 GIANT FORT 2'6

POST FREE — POST FREE

SIZE 18" × 12" × 7". ALL WOOD

SEND POSTAL ORDER FOR 2/6 TO:

THE ALDERSGATE PRESS, 31, BARBICAN, LONDON, E.C.1

BLUE RIBAND CHALLENGERS

Never has there been greater interest than now in the great vessels that cross the Atlantic, and their struggle for the Blue Riband of the Atlantic.

Since 1929, when the famous "MAURETANIA" lost this coveted honour after 25 years' British supremacy, it has passed into foreign hands; first to the German "BREMEN," next the Italian "REX," and most recently to the French giant "NORMANDIE." Now all eyes will look to the English challenger "QUEEN MARY," who sets forth next spring on her eagerly awaited maiden voyage.



In order to offer to the Public replicas of these vessels which make history on the ocean, we have produced metre size working models of the four famous ships:" BREMEN," "REX," "NORMANDIE" and "QUEEN MARY," and have also included 100 ft. to the 1 in. waterline miniatures in our Tinycraft series.

PRICES. Metre models: Electric **16** gns. Steam **17** gns. Waterline miniatures: "BREMEN" **37/6**, "REX" **35/–**, "QUEEN MARY" & "NORMANDIE" **45/–**: **S.17,** our Model Ship Catalogue, contains descriptions and illustrations of a wonderful assortment of Marine Models . . . Power Boats . . Yachts . . . Parts . . . Drawings . . . nothing is left out! Price 6d., post free. Also A.17 and B.17, Model Railways and Engines, at 6d. each.

BASSETT-LOWKE LTD.
NORTHAMPTON

London: 112, High Holborn, W.C.1.
Manchester: 28, Corporation St.

Look here, Boys !..... NEW Locomotives for old

Here is a plan to secure a fine new Hornby Locomotive in exchange for your old one.

First of all, study carefully the latest Hornby Train Catalogue, and select from it the new up-to-date Hornby Locomotive you want. Then pack up your old Hornby Locomotive and send it to us addressed "Special Service Department," Meccano Ltd., Binns Rd., Liverpool 13. Your order for the new Locomotive and the necessary remittance should be enclosed. You can easily ascertain how much to send by deducting the part exchange allowance indicated in the list given here from the price of the new Locomotive, and adding 1/– for postage on the new model you purchase. It is important to note that the catalogue price of the new Hornby Locomotive you purchase MUST NOT BE LESS THAN DOUBLE THE PART EXCHANGE ALLOWANCE MADE FOR YOUR OLD LOCOMOTIVE.

If you prefer to do so, you can effect the exchange through your dealer, who will be very pleased to give you any further information you require.

PART EXCHANGE ALLOWANCES

CLOCKWORK MODELS

M2930 Locomotive	1/–
MO Locomotive	1/4
M1/2 Locomotive	2/3
George V Locomotive (*These models were identical*)	3/3
No. OO Locomotive	
M3 Tank Locomotive	3/9
M3 Locomotive	4/3
Zulu Locomotive	5/3
No. O Locomotive	5/3
Zulu Tank Locomotive	6/3
No. 1 Tank Locomotive	6/3
No. 1 Locomotive	6/3
LEC 1 Locomotive (Swiss Type)	6/3
No. 1 Locomotive, fitted for Hornby Control	7/6
No. 1 Tank Locomotive, fitted for Hornby Control	7/6
No. 1 Special Locomotive	8/3
No. 1 Special Tank Locomotive	8/3
No. 2 Locomotive	10/–
No. 2 Tank Locomotive	10/6
No. 2 Special Tank Locomotive	10/6
Metropolitan C Locomotive	10/6
No. 2 Special Locomotive	11/3
No. 2 Locomotive, fitted for Hornby Control	11/3
No. 2 Tank Locomotive, fitted for Hornby Control	11/9
No. 3C Locomotive	12/–
No. 3C Riviera "Blue" Locomotive	12/–

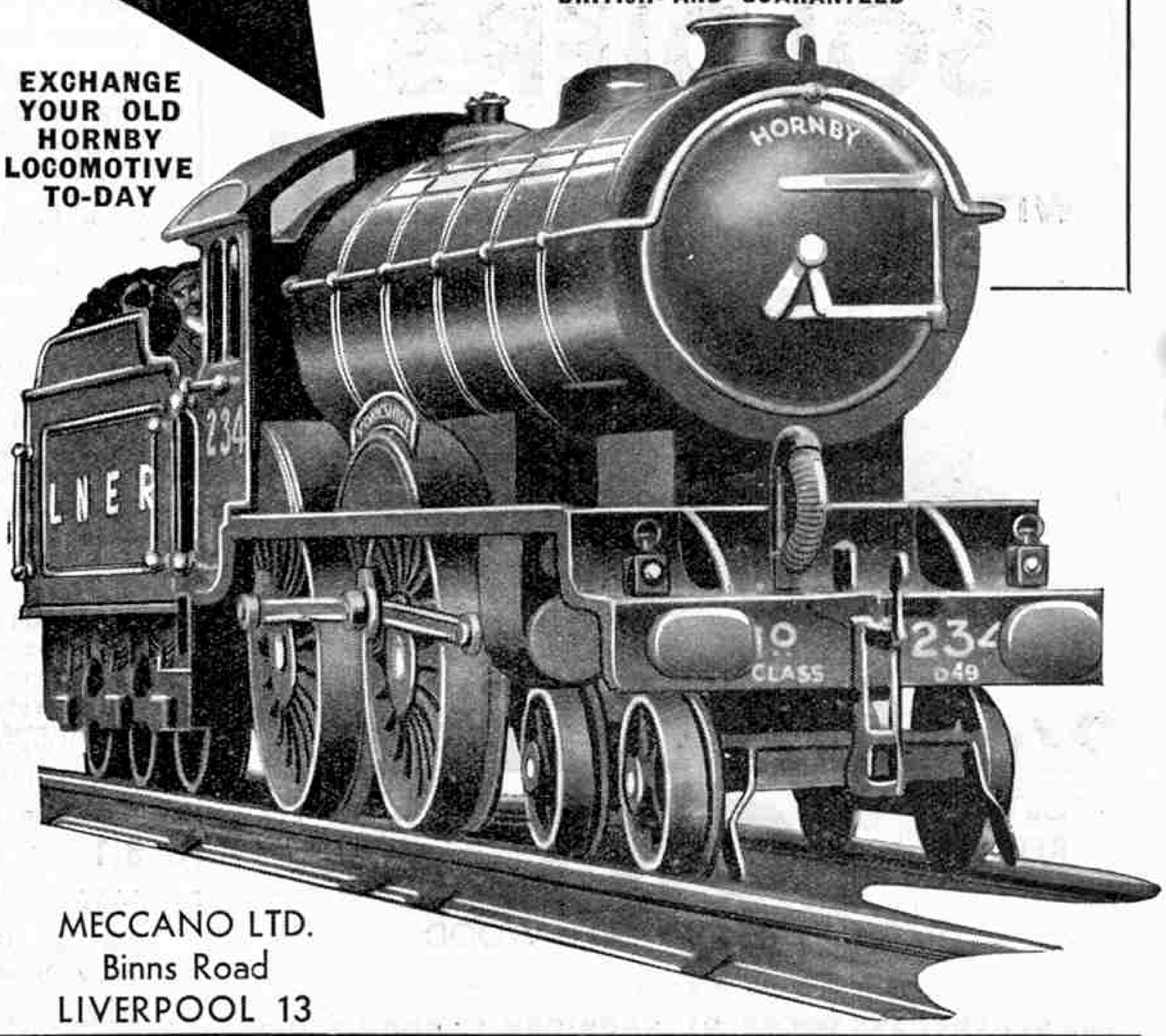
ELECTRIC MODELS

EM16 or EM120 Locomotive	4/3
No. 1 Electric Tank Locomotive, Permanent Magnet	7/6
EM36 or EM320 Tank Locomotive	8/3
LST M3/20 Tank Loco (20-volt)	8/3
EO6 or EO20 Locomotive	11/–
E16 or E120 Locomotive	12/–
E16 or E120 Tank Locomotive	12/–
LST 1/20 Tank Locomotive (20-volt)	12/–
LE 120 Loco (Swiss Type), 20 volt	12/6
LST 2/20 Tank Locomotive	12/6
E3/20 Locomotive	12/6
E3/20 Riviera Locomotive	12/6
LE120 Locomotive	12/6
EPM16 Special Tank Locomotive	13/9
Metropolitan L.V. Locomotive	15/–
E26 Special Tank Locomotive	15/–
E36 Metropolitan Locomotive	15/–
E120 Special Locomotive (automatic reverse)	15/–
No. 2 Electric Tank Locomotive	15/–
E120 Special Tank Locomotive (automatic reverse)	15/–
E36 Locomotive	16/3
E36 Riviera "Blue" Locomotive	16/3
E220 Special Tank Locomotive (automatic reverse)	16/3
LE2/20 Locomotive	16/6
LE220 Locomotive (automatic reverse)	16/6
E320 Locomotive (automatic reverse)	17/6
E320 Riviera Locomotive (automatic reverse)	17/6
E220 Special Locomotive (automatic reverse)	18/9
Metropolitan H.V. Locomotive	20/–

HORNBY TRAINS

BRITISH AND GUARANTEED

EXCHANGE YOUR OLD HORNBY LOCOMOTIVE TO-DAY



MECCANO LTD.
Binns Road
LIVERPOOL 13

Boys, Start a Railway of your own!

The illustration below shows a Hornby No. 2 Special Locomotive. This is a true-to-type model of the real L.M.S.R. Standard Compound Locomotive.



A Perfect Miniature Railway

You have spent many happy hours watching real trains; now start a railway of your own and have the thrill of operating Engines, Rolling Stock, Signals and Points on actual railway principles. Everything under your own control!

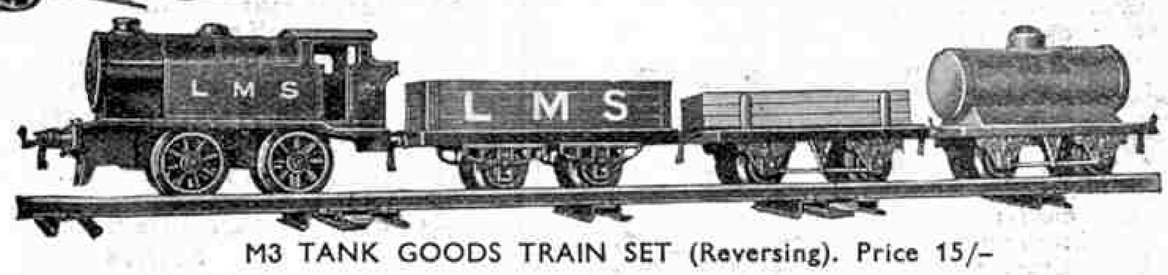
Almost every operation in modern railway practice can be carried out with a Hornby Railway. The Locomotives, both Electric and Clockwork, are the best in the world for reliability and hauling power. A magnificent feature of the Hornby Railway System is the series of 20-volt Electric Locomotives fitted with Automatic Reverse for Remote Control. These Locomotives can be started, stopped, controlled for speed, and reversed **entirely from the side of the track** without any manipulation by hand from the cab. You can now run your own fully electrically-operated railway.

The Rolling Stock includes every type in general use, and is fitted with automatic couplings. The Accessories, built in correct proportion and finished in attractive colours, provide the final touch of realism.

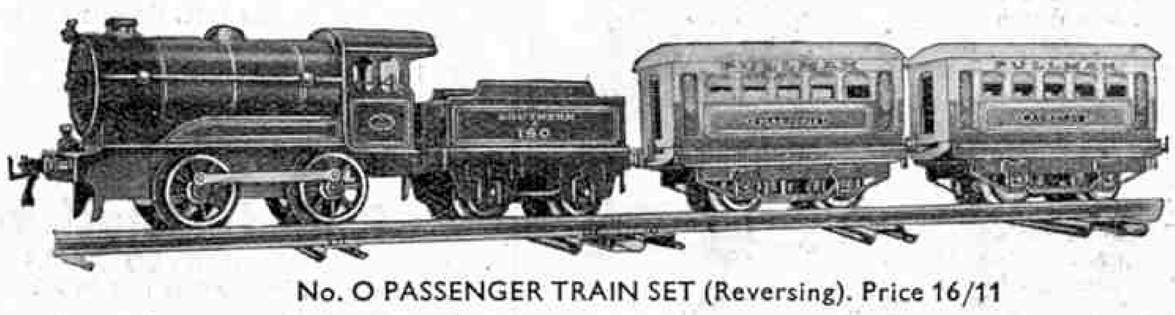
If you do not possess a Hornby Railway, now is the time to start. Ask your dealer for a copy of the latest Hornby Train Price List.

PRICES OF HORNBY TRAIN SETS

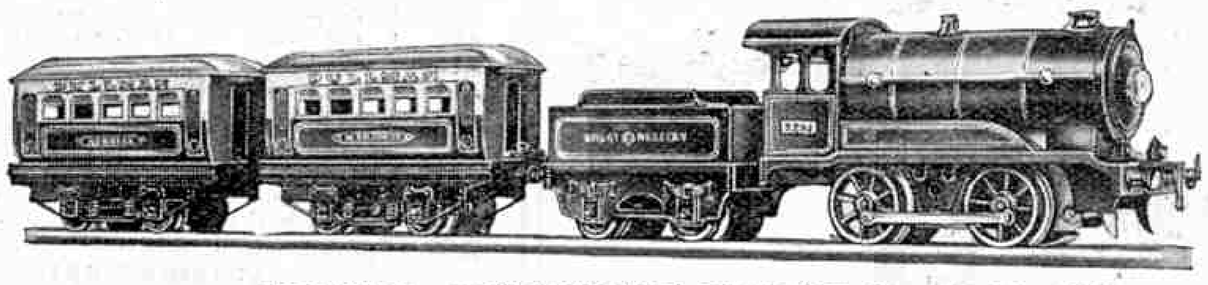
Electric Sets..... from 15/– to 75/–
Clockwork Sets..... from 4/11 to 65/–



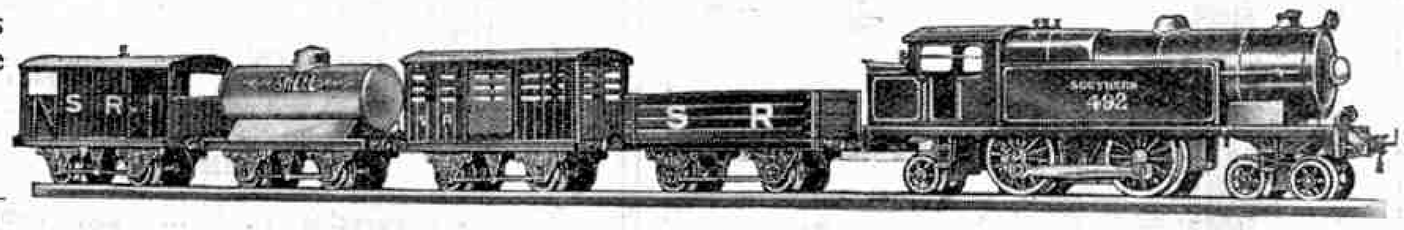
M3 TANK GOODS TRAIN SET (Reversing). Price 15/–



No. O PASSENGER TRAIN SET (Reversing). Price 16/11



HORNBY No. EO20 PASSENGER TRAIN SET (20 volt). Price 31/6

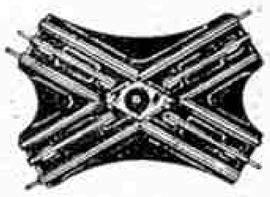


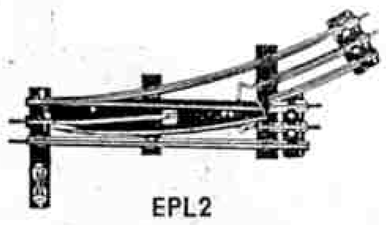
HORNBY No. E220 MIXED GOODS TRAIN SET (20 volt). Price 47/6

HORNBY ELECTRIC & CLOCKWORK TRAINS

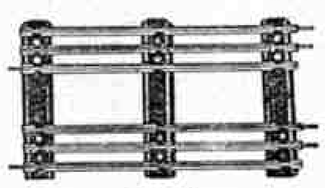
MANUFACTURED BY MECCANO LIMITED, BINNS ROAD, LIVERPOOL 13

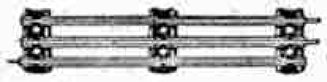
HORNBY RAILS, POINTS AND CROSSINGS

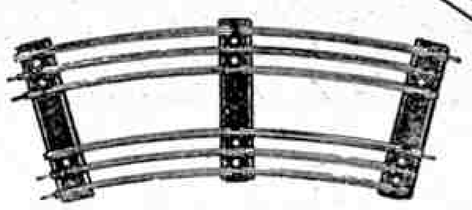

ECA


EPL2

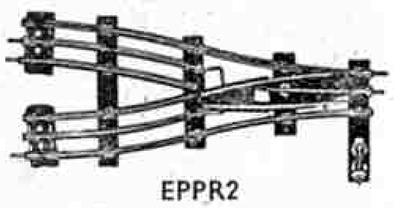
EA2½

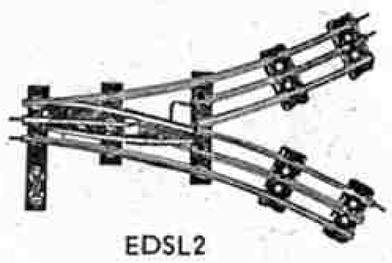

EDS1

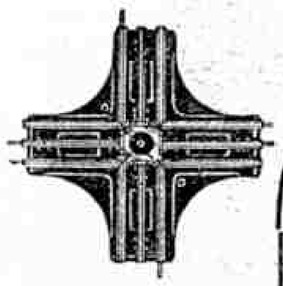

EB1

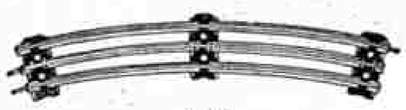

EDC2

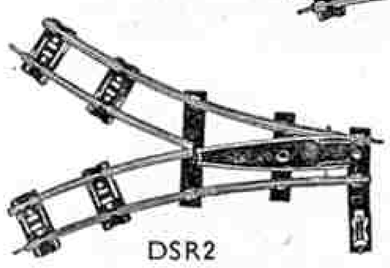
EB½

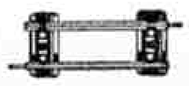

EPPR2

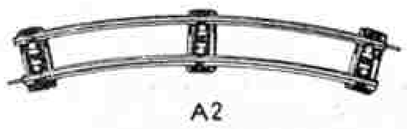

EDSL2


ECR

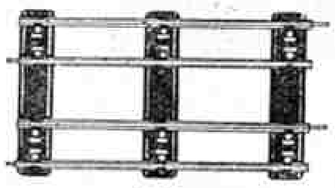

EA2


DSR2

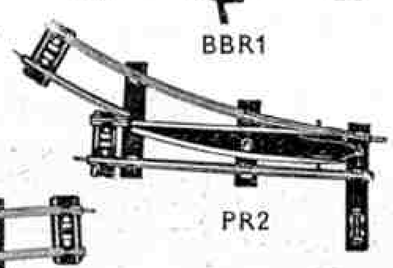

B½

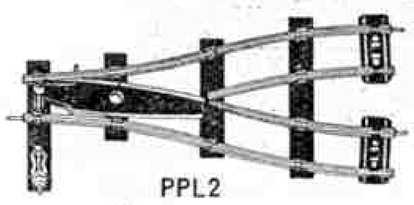

A2


CA2

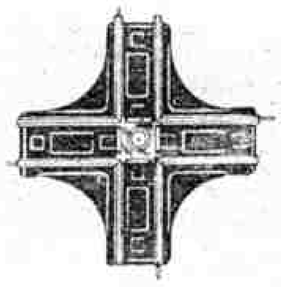

DS1


BBR1

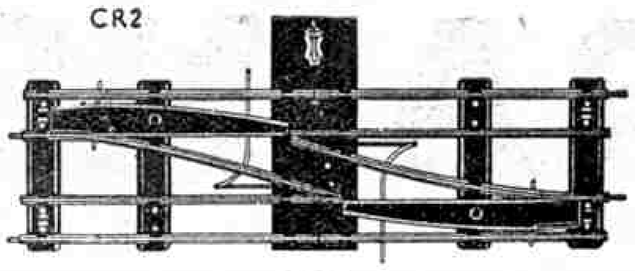

PR2

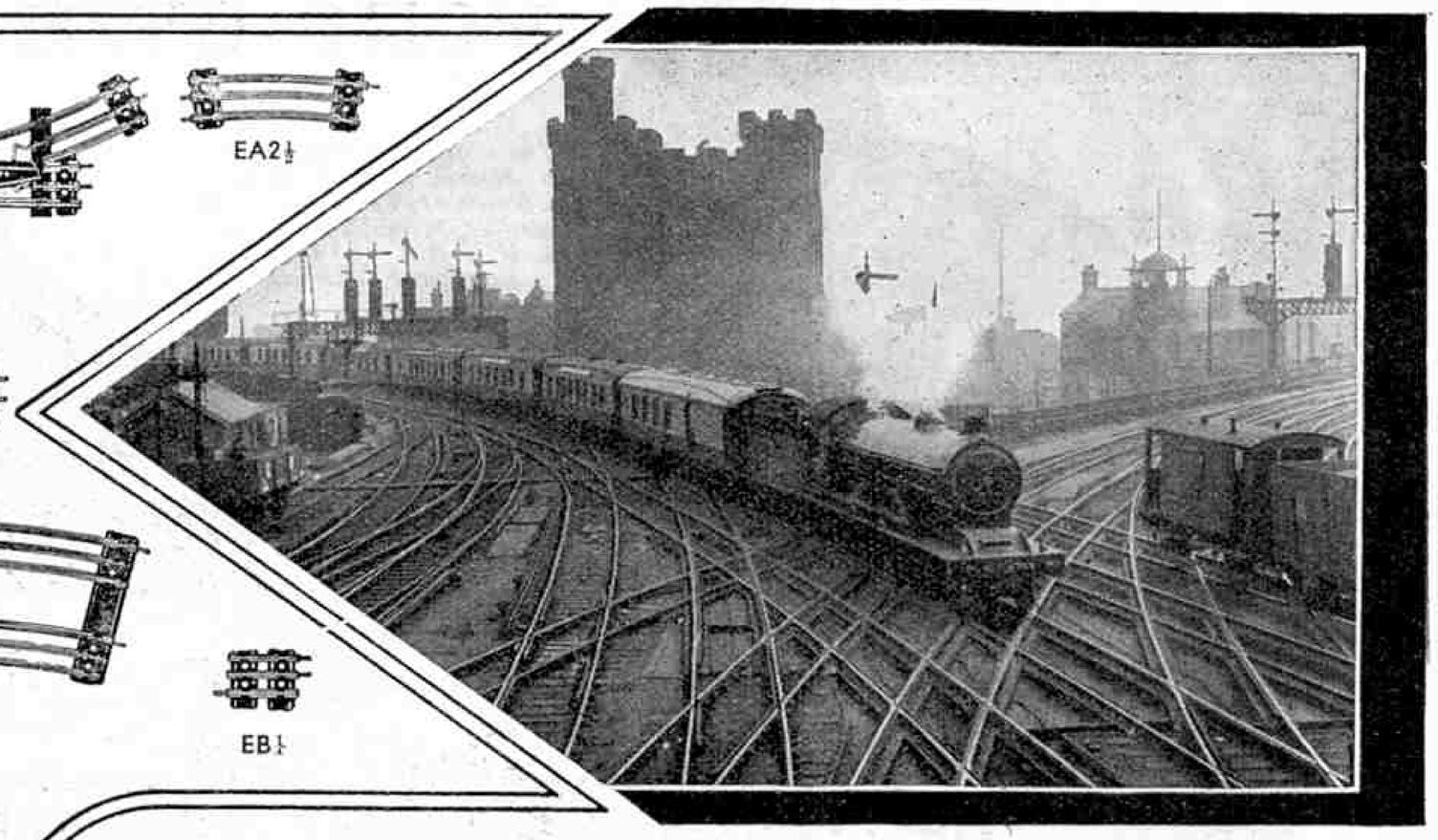

PPL2


A2½


CR2


B1


COR2



There is practically no limit to the number of rail formations that can be built with Hornby Rails, Points and Crossings. A supply of Rails is included in every Hornby Train Set, but the owner is certainly not getting the best out of his set if he is satisfied with merely running it round a simple oval track. The addition of extra Rails and of Points and Crossings to his equipment lends a delightful realism to the game and greatly enhances the fun.

Rails for Electric Trains, Gauge 0, 1¼"

CURVED RAILS

1-ft. Radius

EA1	Curved rails	per doz.	5/–
EA1½	Curved half rails	,,	4/6
EA1¼	Curved quarter rails	,,	4/–

2-ft. Radius

EA2	Curved rails	per doz.	5/–
EA2½	Curved half rails	,,	4/6
EA2¼	Curved quarter rails	,,	4/–
EDC2	Curved rails, double track ...	½ doz.	9/–

STRAIGHT RAILS

EB1	Straight rails	per doz.	5/–
EB½	Straight half rails	,,	4/6
EB¼	Straight quarter rails	,,	4/–
EDS1	Straight rails, double track ...	½ doz.	8/6

POINTS

For 1-ft. Radius Curves

EPR1	Right-hand points }	per pair	5/9
EPL1	Left-hand points }		

For 2-ft. Radius Curves

EPR2	Right-hand points }	per pair	6/6
EPL2	Left-hand points }		

CROSSINGS

ECA	Acute-angle crossings	each	2/9
ECR	Right-angle crossings	,,	2/9

DOUBLE SYMMETRICAL POINTS

For 1-ft. Radius Curves

EDSR1	Double symmetrical points, right-hand,		
EDSL1	Double symmetrical points, left-hand,	per pair	6/–

For 2-ft. Radius Curves

EDSR2	Double symmetrical points, right-hand,		
EDSL2	Double symmetrical points, left-hand,	per pair	7/–

PARALLEL POINTS

EPPR2	Parallel points, right-hand }	per pair	7/–
EPPL2	Parallel points, left-hand }		

CROSSOVER POINTS

ECOR2	Crossover points, right-hand }	per pair	24/–
ECOL2	Crossover points, left-hand }		
EMC20	Switch rail (20-volt)	each	1/3
EMC6	Switch rail (6-volt)	,,	1/3
TCP20	Terminal connecting plates (20-volt)	,,	1/3
TCP6	Terminal connecting plates (6-volt)	,,	1/3

Rails for Clockwork and Steam Trains, Gauge 0, 1¼"

CURVED RAILS

9-in. Radius (for MO Trains)

M9	Curved rails	per doz.	2/6
MB9	Curved brake rails	each	3d.
A1	Curved rails (1-ft. Radius) ...	per doz.	3/6
A1½	Curved half rails ... ,, ...	,,	3/–
A1¼	Curved quarter rails ,, ...	,,	2/6
AB1	Curved brake rails ,, ...	each	4d.
A2	Curved rails (2-ft. Radius) ...	per doz.	3/6
A2½	Curved half rails ,, ...	,,	3/–
A2¼	Curved quarter rails ,, ...	,,	2/6
AB2	Curved brake rails ,, ...	each	5d.
DC2	Curved rails, double track ,, ...	½ doz.	6/–

STRAIGHT RAILS

BM	Straight rails (for MO Trains) ...	per doz.	2/6
B1	Straight rails	,,	3/6
B½	Straight half rails	,,	3/–
B¼	Straight quarter rails	,,	2/6
BB1	Straight brake rails	each	4d.
BBR1	Straight brake and reverse rails...	,,	1/6
DS1	Straight rails, double track ...	½ doz.	5/3

CROSSINGS

CA1	Acute-angle crossings (for 1-ft. radius tracks)	each	1/9
CA2	Acute-angle crossings (for 2-ft. radius tracks)	,,	1/6
CR1	Right-angle crossings (for 1-ft. radius tracks)	,,	1/9
CR2	Right-angle crossings (for 2-ft. radius tracks)	,,	1/6

POINTS

9-in. Radius (for MO Trains)

MR9	Right-hand points... ... }	per pair	3/–
ML9	Left-hand points ... ... }		

For 1-ft. Radius Curves

PR1	Right-hand points... ... }	per pair	3/–
PL1	Left-hand points ... ... }		

For 2-ft. Radius Curves

PR2	Right-hand points... ... }	per pair	3/–
PL2	Left-hand points ... ... }		
PSR2	Points on solid base, right-hand }	per pair	8/6
PSL2	Points on solid base, left-hand }		

PARALLEL POINTS

PPR2	Parallel points, right-hand }	per pair	3/6
PPL2	Parallel points, left-hand }		

DOUBLE SYMMETRICAL POINTS

For 1-ft. Radius Curves

DSR1	Double symmetrical points, right-hand,		
DSL1	Double symmetrical points, left-hand,	per pair	3/6

For 2-ft. Radius Curves

DSR2	Double symmetrical points, right-hand,		
DSL2	Double symmetrical points, left-hand,	per pair	3/6

CROSSOVER POINTS

COR2	Crossover points, right-hand }	per pair	12/–
COL2	Crossover points, left-hand }		
RCP	Rail connecting plates ...	½ doz.	2d.

Many interesting illustrations and much useful information regarding Hornby Railway layouts are given in the booklets "How to plan your Hornby Railway," and "Hornby Layouts—100 Suggestions." Each of these booklets is obtainable from your dealer, price 3d., or from Meccano Ltd., Binns Road, Liverpool 13, price 4d. post free.

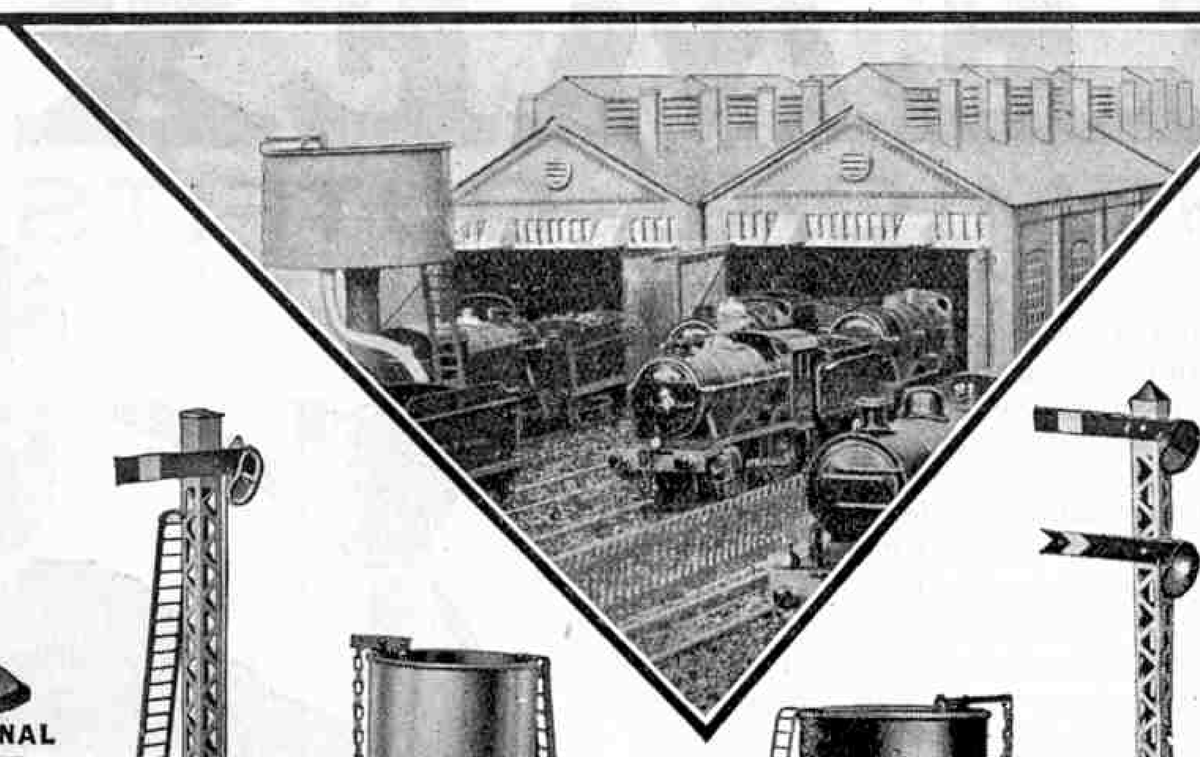
MECCANO LTD., LIVERPOOL 13

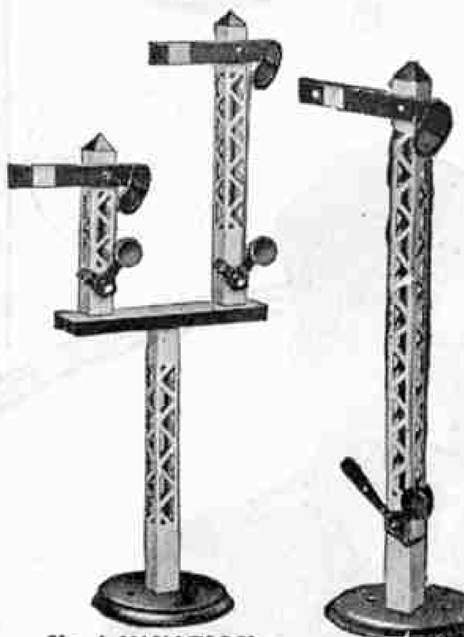
Hornby Series

HORNBY ACCESSORIES

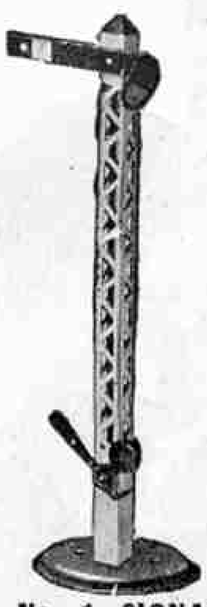
Gauge O

There is a splendid range of Railway Accessories in the Hornby Series, built in perfect proportion and beautifully finished. With these realistic accessories the most elaborate model railway may be constructed and operated in exactly the same manner as a real railway. A selection of Hornby Accessories is shown on this page. Ask your dealer to show the full range.

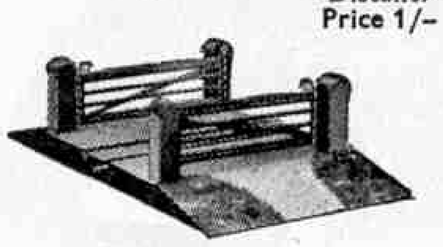




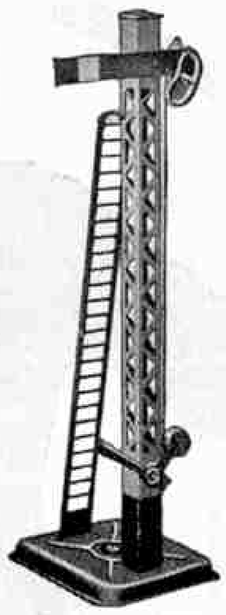
No. 1 JUNCTION SIGNAL
Price 2/9



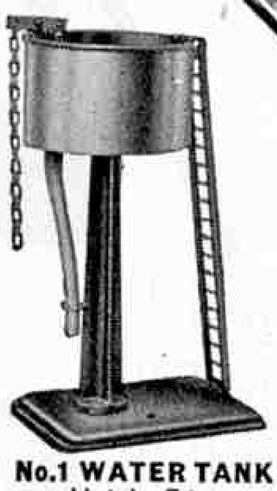
No. 1 SIGNAL
"Home" or "Distant."
Price 1/-



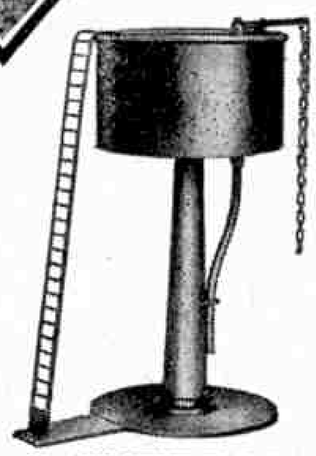
No. 1 LEVEL CROSSING
Suitable for a single track only and has gauge O rails in position.
Price 2/11



No. 2 SIGNAL
"Home" or "Distant."
Price 2/-



No.1 WATER TANK
Height 7 in.
Fitted with flexible tube and valve lever.
Price 3/-



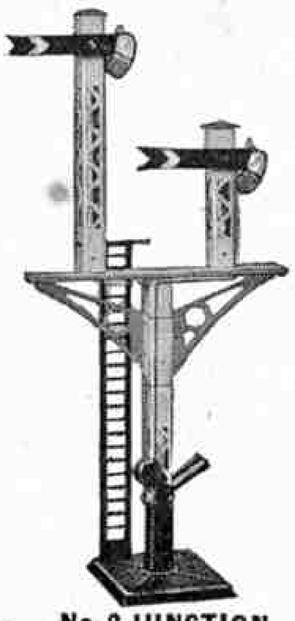
No.2 WATER TANK
Height 9 in.
Fitted with flexible tube and valve lever.
Price 5/9



No. 1 SIGNAL, DOUBLE ARM
Price 1/6

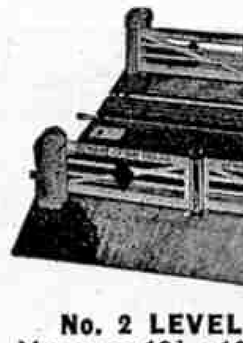


No. 2 SIGNAL, DOUBLE ARM
Price 2/6



No. 2 JUNCTION SIGNAL
"Home" or "Distant." Signal arms operated by levers at base. A very realistic model. Price 4/9

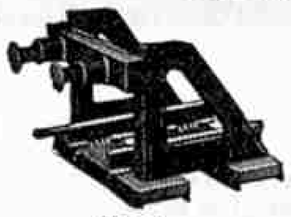
MECCANO LUBRICATING OIL
Price per bottle 6d.



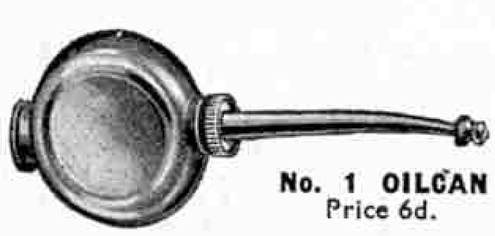
No. 2 OILCAN
("K" Type). The oil is ejected drop by drop by depressing the valve. Polished copper. Price 3/6

No. 2 LEVEL CROSSING
Measures 13½ x 10½ in., with two tracks of gauge O rails in position.
Price 5/6

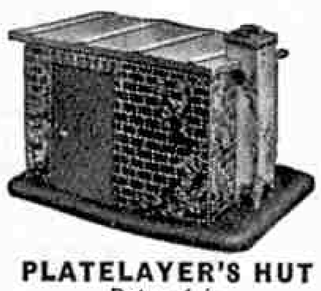
No. E2 LEVEL CROSSING (Electrical)
Similar to Level Crossing No. 2 excepting that a third rail is fitted in each of the two tracks.
Price 7/6



No. 1 BUFFER STOPS
(Spring type)
Price 1/-



No. 1 OILCAN
Price 6d.



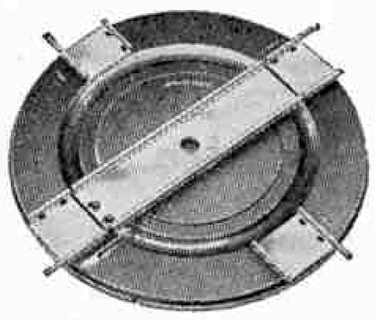
PLATELAYER'S HUT
Price 1/-



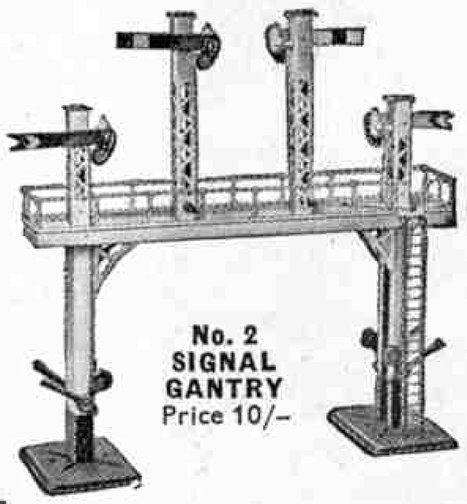
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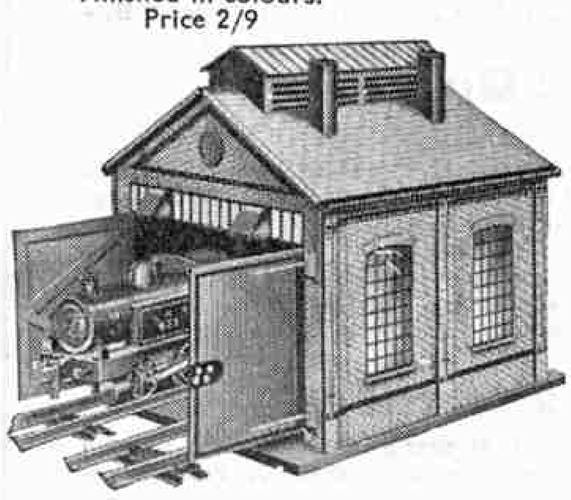
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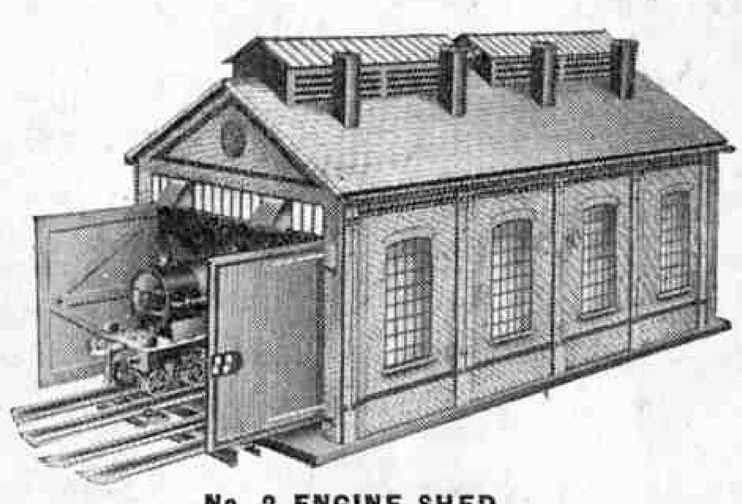
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MECCANO LIMITED — BINNS ROAD — LIVERPOOL 13

MECCANO KEMEX

CHEMICAL OUTFITS

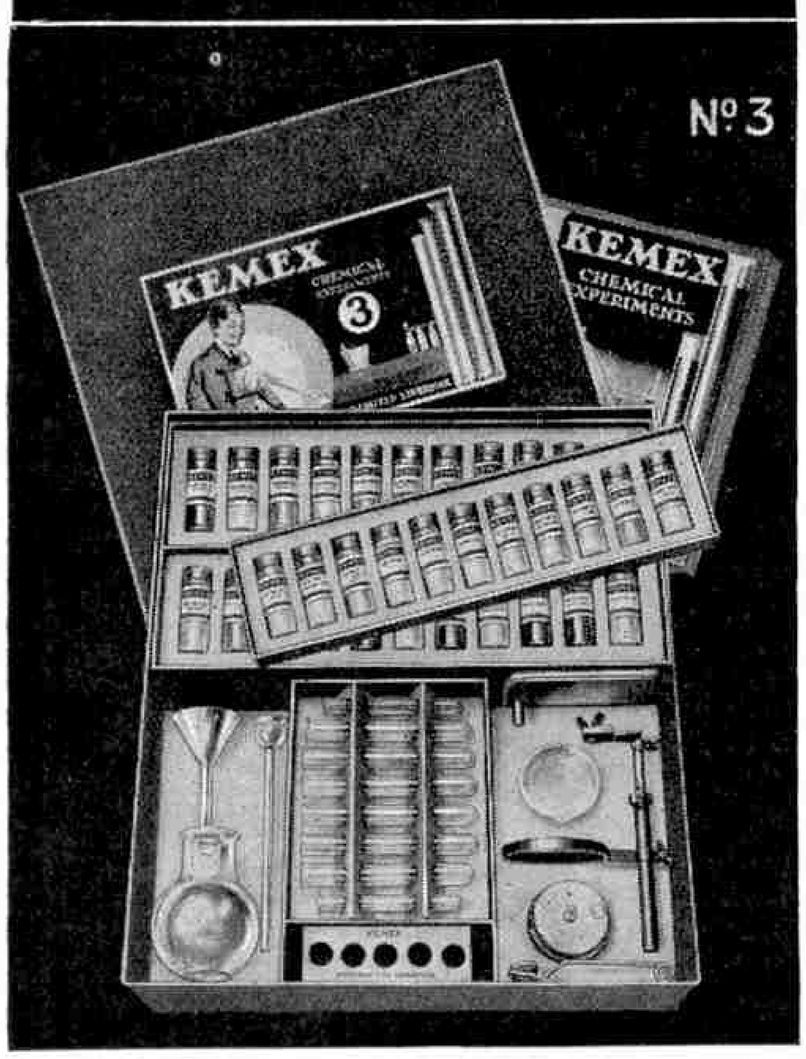
PRODUCT of MECCANO LIMITED LIVERPOOL

The contents of the Meccano Kemex Chemical Outfits provide many hours of fascinating fun. With the apparatus and materials contained in them a boy can make inks and soaps; dye wool, cotton and silk, and bleach fabrics that are already dyed; test foodstuffs for impurities; analyse air and water; grow crystals; write with electricity; smelt metals from their compounds; make invisible inks and a chemical garden; prepare gases, and perform a host of other interesting chemical experiments.

The Outfits include everything necessary, and the hundreds of experiments that can be made are described in a simple manner in an attractive Manual that is included in each Outfit. The Manuals are illustrated with a series of actual photographs showing how the apparatus required is fitted up, and the manner in which each experiment is carried out.







No. O Meccano Kemex Outfit

75 Experiments

This Outfit includes a supply of specially selected chemicals, packed in airtight containers, together with a length of Magnesium Ribbon, sufficient to perform 75 attractive and varied experiments. The apparatus provided includes Test Tubes, Test Tube Brush, Delivery Tubes and Corks, and a simple and highly efficient Spirit Lamp that makes the Outfit completely self-contained ... ... Price **5/-**

No. 1 Meccano Kemex Outfit

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This Outfit includes the whole of the contents of the No. O Outfit, together with further chemicals that increase the number of experiments that can be performed to 130. The additional apparatus includes a Test Tube Holder, Glass Stirring Rod, Funnel and Filter Papers ... ... Price **7/6**

No. 2L Meccano Kemex Outfit

250 Experiments

This Outfit includes the whole of the contents of the No.1 Outfit, and further chemicals that increase the range of experiments up to 250. The additional apparatus includes a porcelain Evaporating Dish, Special Test Tubes to withstand high temperatures, a handsome Test Tube Stand, and an Evaporating Stand including a Ring, with Wire Gauze ... ... Price **15/-**

No. 2B Meccano Kemex Outfit

This is exactly the same as the No. 2L Meccano Kemex Outfit, except that a highly efficient Bunsen Burner, with the necessary length of rubber tubing, is included in place of the Spirit Lamp ... Price **15/-**

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This is a splendid complete Outfit that provides a boy with all he requires to carry out between 350 and 400 experiments, and thus enables him to acquire a sound knowledge of the fascinating principles of chemistry. The Outfit includes the contents of the No. 2 Outfit, with additional chemicals and apparatus. The latter includes a gas-generating apparatus, consisting of a large Wide-necked Flask with Thistle Funnel and Delivery Tubes, a Blowpipe and a Charcoal Block. These items open up a series of experiments of outstanding interest. There is also an extension for use on the Evaporating Stand, to which apparatus can be readily fitted on similar lines to those adopted by actual chemists ... ... Price **25/-**

No. 3B Meccano Kemex Outfit

This is exactly the same as the No. 3L Meccano Kemex Outfit, except that a highly efficient Bunsen Burner, with the necessary length of rubber tubing, is included in place of the Spirit Lamp ... Price **25/-**

The apparatus included in Meccano Kemex Outfits and refills of Kemex chemicals can be obtained separately. Ask your dealer for the leaflet giving a list of Kemex parts and their prices, or write for a copy to the address given below.

MECCANO LTD., Binns Road, LIVERPOOL 13

MECCANO ELEKTRON
ELECTRICAL OUTFITS



No. 1 Elektron Outfit Price 6′6

In these days of radio, X-rays, and electric trams and trains, every boy should have a knowledge of electricity. The only way to gain this knowledge is by means of experiments, and the Meccano Elektron Outfits have been produced for this purpose.

These Outfits contain all the materials for carrying out a splendid series of fascinating experiments, commencing with Magnetism and passing on through Frictional Electricity to Current Electricity. In addition many interesting mechanisms can be constructed, including a Reading Lamp, an Electric Bell, a Telegraph, a Shocking Coil that gives real shocks, and Electric Motors.



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Electricity is the most wonderful force of the age in which we live.

■

Learn some of its marvels by means of experiments with a Meccano Elektron Outfit.

No. 1 MECCANO ELEKTRON OUTFIT

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The No. 1 Outfit contains two powerful Bar Magnets and a reliable Magnetic Compass, together with everything necessary for the carrying out of a series of fascinating magnetic experiments. In addition there are materials for experiments in frictional or static electricity, and for the construction of an Electric Compass and two forms of Electroscope. Price **6/6**

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Magnetism, Static and Current Electricity

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MECCANO LTD., BINNS ROAD, LIVERPOOL 13

An Elektron Outfit will open up to you a fascinating hobby of endless variety.

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Visit your dealer to-day and ask him to show you one of these wonderful Outfits.



THE TRI-ANG PEOPLE GIVE SOME HELP ON THE BIRTHDAY PROBLEM

SCALE MODEL PERIOD DOLLS' FURNITURE FOR SISTERS AND COUSINS

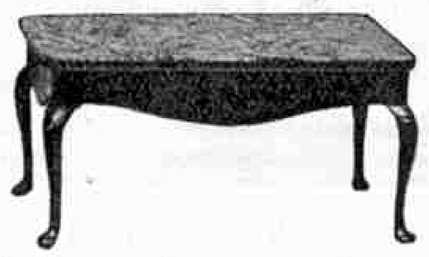
TRADE MARK

WHEN YOUR SISTER'S BIRTHDAY COMES GIVE HER A PIECE OR A SET OF THIS WONDERFUL **SCALE-MODEL PERIOD DOLLS' FURNITURE.** SHE WILL LOVE COLLECTING IT PIECE BY PIECE, AND THE PROBLEM OF PRESENTS FOR HER WILL BE SOLVED.

This month we should like to describe the

QUEEN ANNE DINING ROOM SET

Perfect proportion is one of the keynotes of the Queen Anne Period. The sideboard, as we know it, only came in at the end of the eighteenth century, but this SIDEBOARD TABLE— with its marble top on a walnut frame, is a replica of a design much used about 1720.



The CONSOLE TABLE— and leans against a wall, was table and often held the drink.



which has three legs used as an extra side

Another interesting piece in this set is the oval topped DINING TABLE— with its graceful legs. (All the pieces have the beauti- fully turned cabriole legs which were one of the leading characteristics of the period.)



The four ordinary CHAIRS— have a well marked inlaid splat, while at each end of the table go two ARMCHAIRS.





SIDEBOARD TABLE, QA10, **1/9.** CONSOLE TABLE, QA11, **1/-.** OVAL DINING TABLE, QA14, **1/9.** CHAIR No. 1, QA5, **1/-.** ARMCHAIR, QA3, **1/3.**

A complete set including all the above and also Dining Cabinet QA1, Firescreen QA6, Hanging Mirror QA13, four No. 1 Chairs, Two Armchairs, in a handsome box **19/6.** Obtainable from all good Toy Shops and Stores.

PERIOD SCALE MODEL DOLLS' FURNITURE

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NEXT MONTH: "BRITISH RAILWAY RECORDS." PUBLISHING DATE: 1st AUGUST

MECCANO MAGAZINE

Editorial Office:
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Volume XX. No. 7
July, 1935

With the Editor

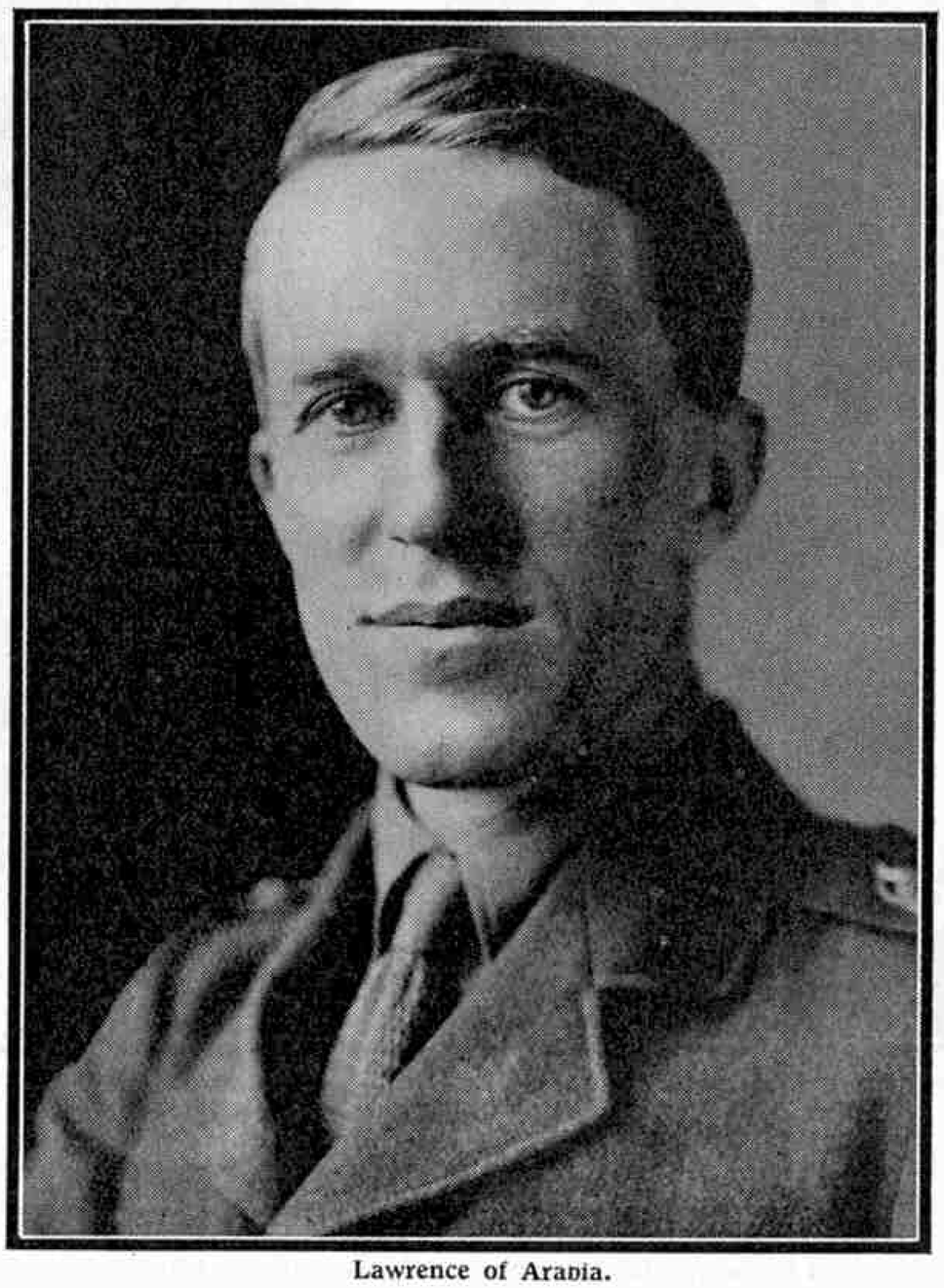
Hero Worship

Hero worship is rather out of fashion nowadays, and to me this seems a great pity. I have always had my heroes, and although, as the years have passed, some of my boyhood's idols have faded, others still remain in all their old glory, and to them from time to time I have added new ones.

To me the greatest thing in life is enthusiasm. It is the driving force that urges us on to do something a little better than those around us, and to develop our special abilities to the utmost. There are times when it is not easy to be enthusiastic. We fail in something we have tried to do; others get ahead of us by what seems sheer luck; and we feel that all our efforts are useless. I have had this experience often, and I have found that the best way to shake off my down-in-the-dumps feeling and recapture my enthusiasm is to turn again to my heroes and remind myself that they went through exactly similar experiences.

One of my heroes, Fridtjof Nansen, the famous Norwegian explorer, tackled at the age of 60 the enormous task of relieving famine in Russia, and at one time nearly 12 million people were being provided with food by organisations under his direction. It was said that the task was impossible; Nansen did it. He used to say that difficulties are things to be done at once, impossibilities take a little longer. Nansen had the burning enthusiasm that breaks down all obstacles, and it is almost impossible to read about him without feeling that some of this enthusiasm is passing to us.

There has recently died another of my heroes—Lawrence of Arabia. He was one of the most picturesque figures of the Great War, and a striking example of what can be done by real enthusiasm. From his early boyhood he was fascinated by the Arabs and their wonderful history, and gradually there came to him the great ambition to free these people from the dominion of the Turks. Confident that, sooner or later, his chance would come, he prepared himself for it in every possible way. He spent his holidays in lonely tramps in Syria and Palestine, perfecting his knowledge of the language and customs of the Arabs, familiarising himself with every part of the country, and training himself to the utmost physical fitness. Then came the War and his opportunity. He appeared in the desert as the guiding spirit of revolt, and by his remarkable personality gained the complete confidence of the Arabs and welded them into a fighting force that struck terror into the Turks. Lawrence's exploits, and in particular his daring raids on the Turkish railways, were carried out in the spirit that animated Drake and the other great sea-dogs of Elizabeth's day. The centuries pass, but the breed of heroes lives on.



Lawrence of Arabia.

"Safety First"—On the Road and Elsewhere

We are now approaching the holiday season, when the stream of motor and cycle traffic reaches its maximum. Too often this time produces also another maximum—that of road accidents. I am more than ever convinced that a large proportion of these accidents are the result of sheer thoughtlessness. "Safety First" is a bad rule for life in general; if it were followed by everybody we should have no Nansens or Lawrences. But it is a good rule for the road. I know that large numbers of my readers are cyclists or motor cyclists, and I want to ask them all to resolve that, as far as they are concerned, there shall be no accidents this summer through carelessness. Do not take it for granted that the road will be clear round the next corner; and keep a sharp eye on youngsters playing on the footpath, any one of whom may dash out unexpectedly into the road, perhaps after a ball. Finally, learn the highway code thoroughly; give your signals clearly so that there is no doubt as to what you mean; and be courteous to all other road users.

Speaking of "Safety First" reminds me of a curious habit of a kangaroo rat I read about recently. This small creature lives in the desert, and as he can do little in the way of defending himself against an enemy he has apparently decided that it is better to be safe than sorry. Whenever he approaches an object that arouses his suspicions, and he is not sure whether it is alive or not, he pauses at a safe distance, turns round, and kicks on to it with his strong hind legs a miniature storm of sand. Then he whips round again quickly to see what is the result of his efforts. If the thing does not move, then presumably it is not alive, and all is well. But if it is alive it will certainly show resentment of the sand bombardment, and the rat then loses no time in getting away as fast as his little legs will carry him.

The "*Normandie's*" Triumph

The "*Sirius*," the first vessel to make the Atlantic crossing entirely under steam power, completed the voyage from London to New York in 1838 in 16½ days; last month the French liner "*Normandie*" crossed from Southampton to New York in little more than four days, and the return journey of the great new vessel was completed in even shorter time. Thus in less than a century the time required to travel across the Atlantic Ocean has been reduced by three quarters.

The "*Normandie*," an illustrated description of which appears on page 392 of this issue, is a triumph of shipbuilding, and France may well be proud of her.



How "Mickey Mouse" Films are Made

Behind the Scenes at the Walt Disney Studio

THE delighted laughter and chuckles that always greet the screening of "Mickey Mouse" or "Silly Symphony" films testify to their genuine humour, and to the great popularity of these animated cartoons with cinema audiences of all ages. Consideration of these films inevitably leads one to wonder how they are made, and how Walt Disney, their producer, first thought of them. He declares that he does not know how the idea came to him, but it came at an opportune time, for he had just made his second start in business for himself.

The drawing of cartoons first interested Disney in his high school days, when he drew illustrations for the school magazine. He had the wisdom to realise that cartooning was his particular gift, and in order to perfect it he attended evening classes in this subject at the Chicago Academy of Fine Arts. Then the entry of America into the Great War intervened. On his return to civil life late in 1919 he began to earn his living by drawing, and was employed by a Kansas City firm to produce animated advertising films.

During his spare time he made a cartoon film in a studio at his home, and succeeded in selling it for exhibition in three large cinemas in Kansas City. Greatly encouraged, he decided to make a series of animated cartoons each about 500 ft. long and based on old fairy tales. His enthusiasm must have been contagious, for he was able to enlist the help of several young men who were eager to establish themselves as cartoonists, by promising them free instruction and permanent appointments in his employ if the films were a success. The first film, entitled *"Red Riding Hood,"* was completed in six months and was bought by a firm of film distributors. Disney then resigned from the Kansas City firm in order to give his whole time to producing his cartoons, and organised a small company to make them. Unfortunately the distributors who bought the *"Red Riding Hood"* film went bankrupt before paying for it, and Disney was ruined at the very outset of his venture.



Studying preliminary drawings in preparation for work on a new cartoon film at the Walt Disney Studio, Hollywood. The portrait in the heading is of Walt Disney.

Hollywood was already attracting many ambitious artists and actors to its rapidly growing film industry when Disney went there in 1923, and he obtained a contract to produce a series of cartoon films. He completed them by 1927, and began a further series, in which he introduced Oswald the Rabbit. Then he decided to launch out as an independent producer, and in considering what character to feature in his own films he hit upon the idea of "starring" a mouse. This character was to have been named Mortimer Mouse, but finally Mickey was chosen instead, chiefly because it was shorter. He was to be one of a family of animals that already included Oswald the Rabbit and some others.

The first Mickey Mouse film was made in humble surroundings, the cartoons being drawn at Disney's home and the filming done in his garage, where he was assisted by his brother Roy, and a group of fellow enthusiasts. The film was despatched to a New York distributor and work was begun on the second picture.

The appearance of the first two Mickey Mouse films coincided with the introduction of sound films, the immediate success of which made it clear to Disney that any further adventure of Mickey would have to be accompanied by sound effects, if the films were to be acceptable to exhibitors. It was then, in the late spring of 1928, that he had the inspiration that was to bring him success. He decided to synchronise Mickey's actions to music, and this was done for the first time in his third film, which was given the title of *"Steamboat Willie."*

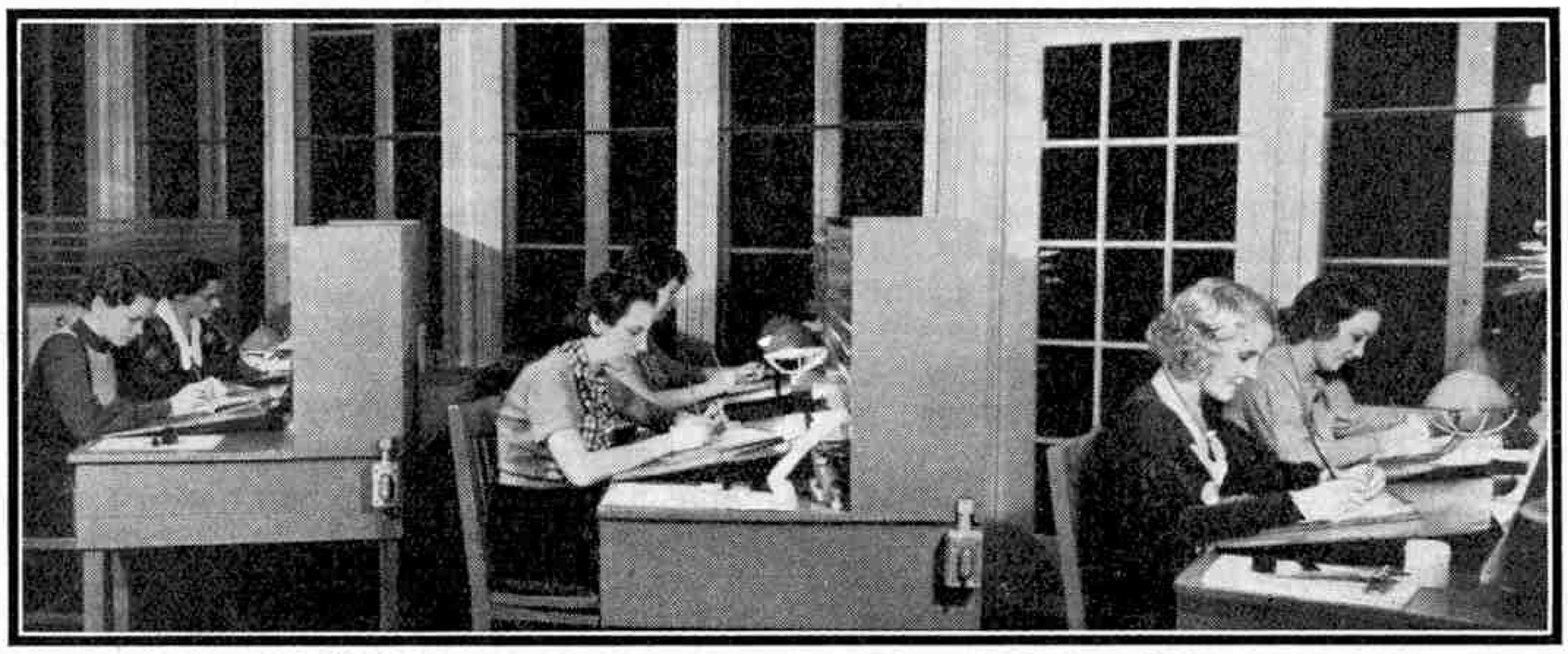
At that early stage in the history of sound films Hollywood did not possess facilities for synchronising sound and picture, and the Mickey Mouse film was taken to New York for this purpose. The musical cartoon did not impress New York film exhibitors, but eventually Disney found one who was willing to give it a trial, and it made its debut on the screen of a small New York theatre one day in September 1928. *"Steamboat Willie"* was an immediate success, and in a few days it was showing to tremendous applause at the Roxy Theatre in the city. The public demand for this novel type of film was quickly noted by exhibitors, and they clamoured for it.

History repeated itself when Disney produced his first Silly Symphony early in 1929. This film differed from the Mickey Mouse series in lacking a "star," and in having all the action centred around a musical theme. It was entitled *"The Skeleton Dance,"* and like the Mickey Mouse films was synchronised in New York. The exhibitors did not fancy it, but Disney continued trying to sell it, and at last he found an exhibitor who was willing to give the film its chance. *"The Skeleton Dance"* made its first appearance at the Carthay Circle Theatre, in Los Angeles, and again the public proved the exhibitors to have been wrong in their judgment. Delighted audiences loudly applauded the film every time it was screened, and before long it was being shown with equal success at the Roxy Theatre, New York.

To-day the Mickey Mouse and Silly Symphony films are produced in a fine modern studio built and equipped at a cost of more than £50,000, just off Hollywood Boulevarde, on the outskirts of Los Angeles. In the daytime the building is made conspicuous by its white stucco exterior, and after dark by an electric sign surmounted by Mickey himself with his hand stretched out in welcome. At this studio 26 cartoon films are produced every year, either a Mickey Mouse or a Silly Symphony film being delivered to the United Artists distributing office every fortnight. The movements shown in the films are obtained, of course, by minute changes in a series of drawings. Each film requires about 9,000 separate drawings, and the preparation of these is carried out by a large staff of experienced cartoonists known as animators.

It takes about two months to make a Mickey Mouse film, even though the various stages in the process go on simultaneously. The first stage is to invent or select a story. Usually, but not always, Disney has the first germ of the idea that is to carry Mickey through

another adventure, but sometimes it is the "brain wave" of a member of his staff, or an inspiration obtained from the large library kept in the story department of the studio. It may be that in the new film Mickey is to be an explorer and to go on an expedition through the jungles of Africa; or perhaps he is to be an Olympic star, taking part in the games in progress in Los Angeles. The idea, whatever its source and character, is discussed at a story conference attended by some 25 or 30 of the Disney staff, and a rough plot is worked out. The humorist "gag men" then take a hand, and ingeniously get Mickey into and out of scrapes, and invent the novel touches that bring the laughs.



Girl artists tracing drawings for "Mickey Mouse" and "Silly Symphony" films.

The next step is the preparation of a series of "key" drawings, in the form of a comic strip, showing the principal episodes of the story. In the old days of silent cartoon films these drawings would have been passed direct to the animators, who would immediately have prepared the thousands of intermediate, or detailed pictures. Disney's idea that sound was not only to be added, but that Mickey's movements were to be synchronised to music, complicated the process enormously. The creation of the musical score is therefore done immediately the story is completed, and prior to the drawing of any detailed pictures.

When the musical score is finished it is passed to the chief "layout" man, more or less similar to a director in an ordinary "talkie" studio. He carefully works out the number of movements in each episode. It may be that Mickey is to do a little dance to a phrase from Mendelssohn's "Spring Song." There are 11 beats to this phrase, and therefore there is time for Mickey to take 11 steps while it is being played. Certain of the beats also give him a fraction of a second in which to perform a stunt or two, and at these moments he can, if he desires, take time to pull the tail of Pluto his dog, or annoy Minnie Mouse and Clarabell the Cow, or spring on the back of Horace Horsecollar.

Perhaps the story necessitates Mickey entering a jungle. From the time that he does so until he emerges just ahead of a ferocious lion, he performs a specific number of motions. Each of these motions requires a group of separate drawings to depict it, and the chief layout man makes each group correspond exactly to the number of beats in the musical score. He then compiles a list of all the various scenes in the story and of the drawings required for them. The scenes are allocated to the different cartoonists, who are informed of the relation of their part to the remainder of the film. Each cartoonist draws the pictures for the beginning, end and critical moment of each action in his scenes, and his assistants then draw the required number of intermediate pictures. It is remarkable that although many artists are engaged in this work the style of their drawings is so similar that no difference is discernible when the film is flashed on to the cinema screen. Much time is saved by tracing the parts of successive drawings in which no movement takes place.



A member of the Disney staff studying his own expression in a mirror as inspiration for the homorous drawing on which he is engaged.

One of the most pleasing features of the films produced in the Disney studio is the lifelike mannerisms of the characters, and in the case of unusual creatures, such as penguins, this realism is obtained by studying living specimens brought to the studio for the benefit of the cartoonists.

The scene of the action may be the same for a considerable number of drawings, and a single pen and ink drawing of the background is made to serve for all these pictures. The various characters are also drawn separately, and without a background, and afterwards are traced on transparent celluloid sheets. When these tracings are finished the pictures that make up the film are assembled one at a time. The background is pinned down on the camera table, and the celluloid tracings of the characters in the scene are placed on it one over the other, and pinned down. A hinged glass plate is pressed down upon the drawings to prevent them from curling, and the built-up picture is then photographed. The camera is overhead, with the lens directed downward toward the table, and it is moved up or down as required in focussing by a mechanism operated by compressed air.

While the drawings are being made and photographed the recording of the music and the sound effects is carried out in a sound-proof room in another part of the studio. This room is similar in appearance to the average broadcasting studio, and is the strangest of all the departments of the Disney building. In the left-hand corner, as one enters the room, there is seated a small orchestra, and at the opposite end is a glass-enclosed control room from which it is conducted. At the right is a long table that extends almost the length of the room, and on it there is an extraordinary array of instruments for producing different sound effects. The four or five men who stand in front of the table are the sound experts, and they can simulate any noise imaginable. There is a microphone in front of each man, and several near the orchestra. The conductor, musicians and sound-effects men all wear headphones, the lines from which are connected to a tempo-producing mechanism devised by the Disney staff. In this apparatus a vacuum-tube oscillator creates a continuous sound, which is mechanically interrupted at regular intervals, corresponding in frequency to the required tempo, and these interruptions give the beats.

When the processes just described are completed the photographic pictures of Mickey have been recorded on one film and the sound track on another. The two records are then transferred on to a single film, a simple operation that is done in all film studios. A negative of this new adventure of Mickey is then sent to the United Artists distributing office. All that remains to be done then is to print the required number of positives for distribution to cinemas.

The Silly Symphonies are made on the same lines. They are fully coloured by hand, and the making of the thousands of colour prints that comprise each film is a very complicated and highly skilled job.

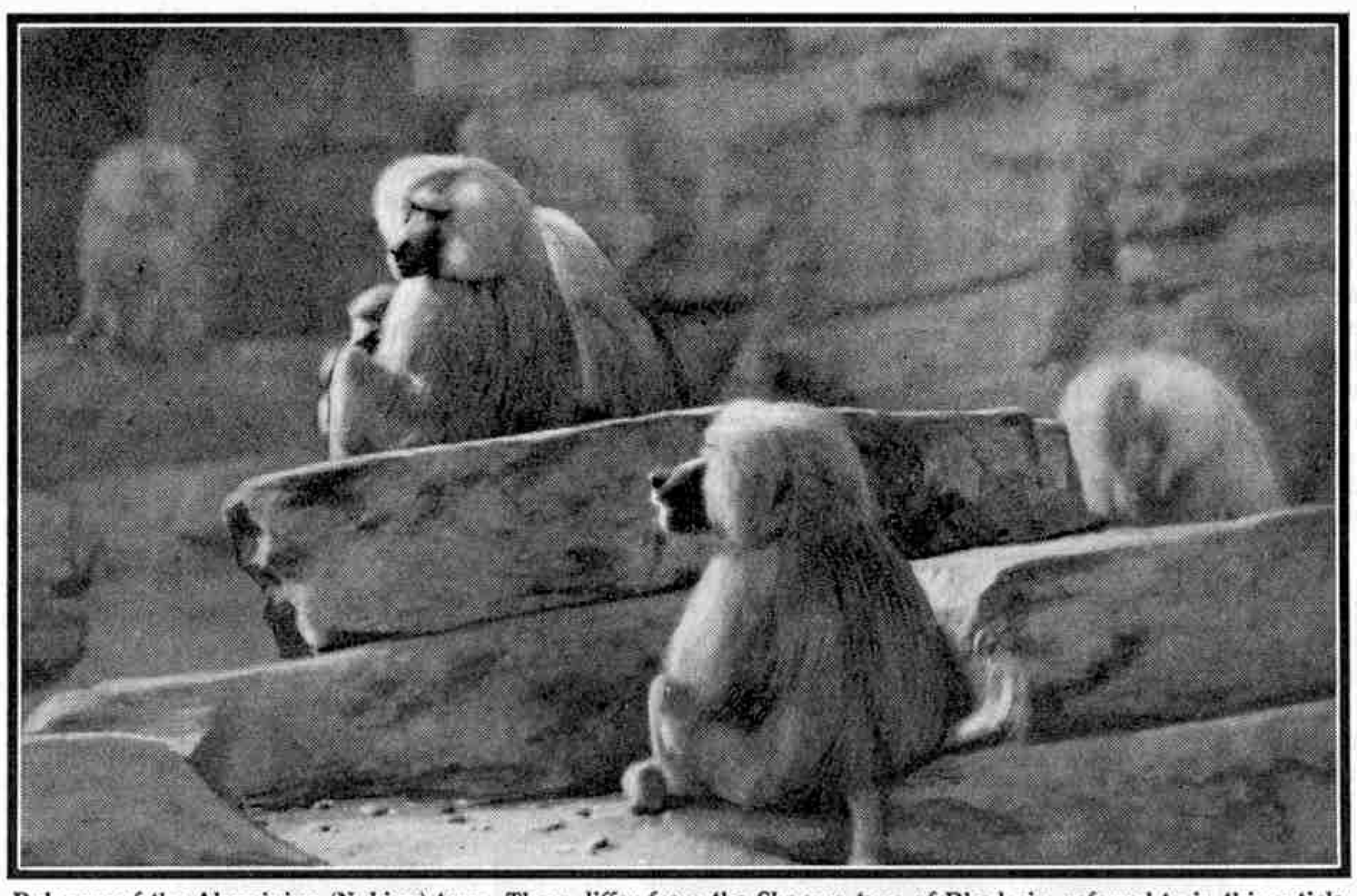
Baboons in the African Hills

The Challenge of the Great Apes

By Wilfred Robertson

WAUGH! There is no other combination of letters that so adequately represents the deep note that echoes and re-echoes among the forest-clad hills. Glancing up, it is difficult to locate the maker of that sonorous bark, for the African sunlight is dazzling, and the old baboon, the sentry guardian of the unseen troop, is hidden high among the hillside foliage.

Waugh! Again the warning call. Ah, there he is; from his high perch in a tree the grey-headed patriarch shifts along a bough to a better position for observation. Once more the challenging note; and half a dozen of the unseen troop become visible, thrusting aside the grass and bushes to peer down at the intruder into their solitudes. A minute later the whole troop is on the alert; and the human traveller below is undergoing the scrutiny of a hundred pairs of simian eyes.



Baboons of the Abyssinian (Nubian) type. These differ from the Chacma type of Rhodesia, referred to in this article, principally by their heavy mane.

Moving through the jungle, deep in the gorges of the mountains, there is something strangely threatening in the scrutiny and the defiance. It is a menace to which twenty years of wandering in African baboon-country has not inured me. Experience has taught me a wholesome respect for the great apes of the hills, those challengers with their four-handed strength, their great numbers and their almost human brain. To watch a big troop of baboons moving, halting and wheeling at the hoarse cry of command from their leader is to realise that if they did decide to attack, a single man armed would have little hope against the onset.

Usually I left baboons alone, passing on my way in pursuit of big game and letting them pass on theirs. Only on my own ranch had I to take steps against them, and frustrate their descent from the hills and attacks on the crops. For during the season growing maize in fields near the hills will attract the baboons for miles, and regular pickets of armed natives are necessary to keep the marauders at a distance.

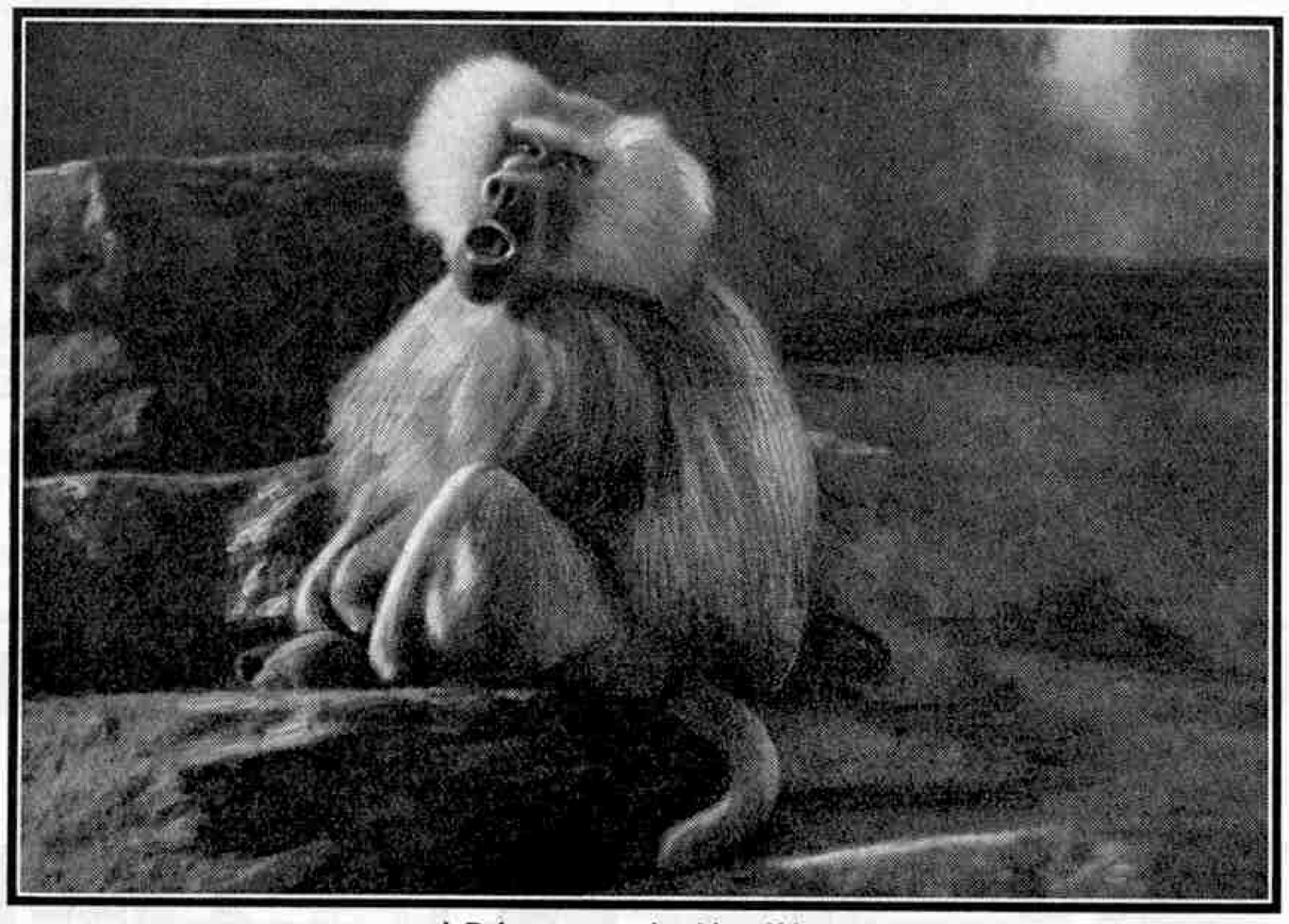
Though the raiders of my maize always scattered for the safety of their hills when chased by the native guards, their defiant attitude returned once they were among the trees and rocks. Only the crack and smack of rifle bullets and the fall of some of their members would drive them into full retreat. The youngsters and the females led the van, while the battle-scarred patriarchs brought up the rear; the troop, meanwhile, making the air throb with their barking, notes ranging from the shrill cries of the yelling ones to the deep-chested roars of their sires.

The biggest baboon I ever encountered I shot at very close quarters. My head native and myself were scrambling up a hillside in pursuit of a raiding party of the enemy. One of my bullets had wounded a female, and the native with me sprang ahead to despatch it with his spear. He never saw the brute coming, and the pandemonium kicked up by the fugitives prevented him from hearing it. Bounding down the hillside was a huge baboon, its eyes glaring hate and its fangs gleaming in the sunlight as it opened its mouth to roar. I yelled to the native to spring aside, and as he did so I took the charging brute straight in the chest with an expanding bullet. The beast threw up its hands and collapsed, nearly colliding with me; and its body rolled down the hillside till it lodged with a thud against the trunk of a tree. Half-human cries rang out from the baboons that had witnessed the fall of their king, and the result of the shot was that the whole troop vanished for a considerable time from the locality.

The only baboon that came up to this fellow in size was one that I met in the Zambezi Valley. Followed by about 20 natives I came on a troop of baboons in the forest. The animals scattered but their king stood his ground, roaring defiantly at me as I approached. I did not want to shoot as I was in elephant country, and the report would have disturbed the quarry. I walked straight towards the old king, and not until I was close to it did the hairy monster step from the path. From the range of about three yards the beast watched with intolerant eyes, myself and my party pass in single file before it.

Perhaps the most disconcerting thing about baboons is the way they apparently obey the orders of their chief. One day on my own land I had pursued a big raiding troop far into the hills. When I came on them they were on the far side of a steep-sided gulch, and I opened fire on them across the valley. The barking of the enraged

animals became deafening, but above all I could hear the deep-throated roar of their leader. And then I heard a fresh party approaching along the hill to my right; a moment later another lot nearing me on my left. Several hundreds of baboons were rapidly converging on my position. I was quite alone and had only about half a dozen cartridges left. I cleared out!

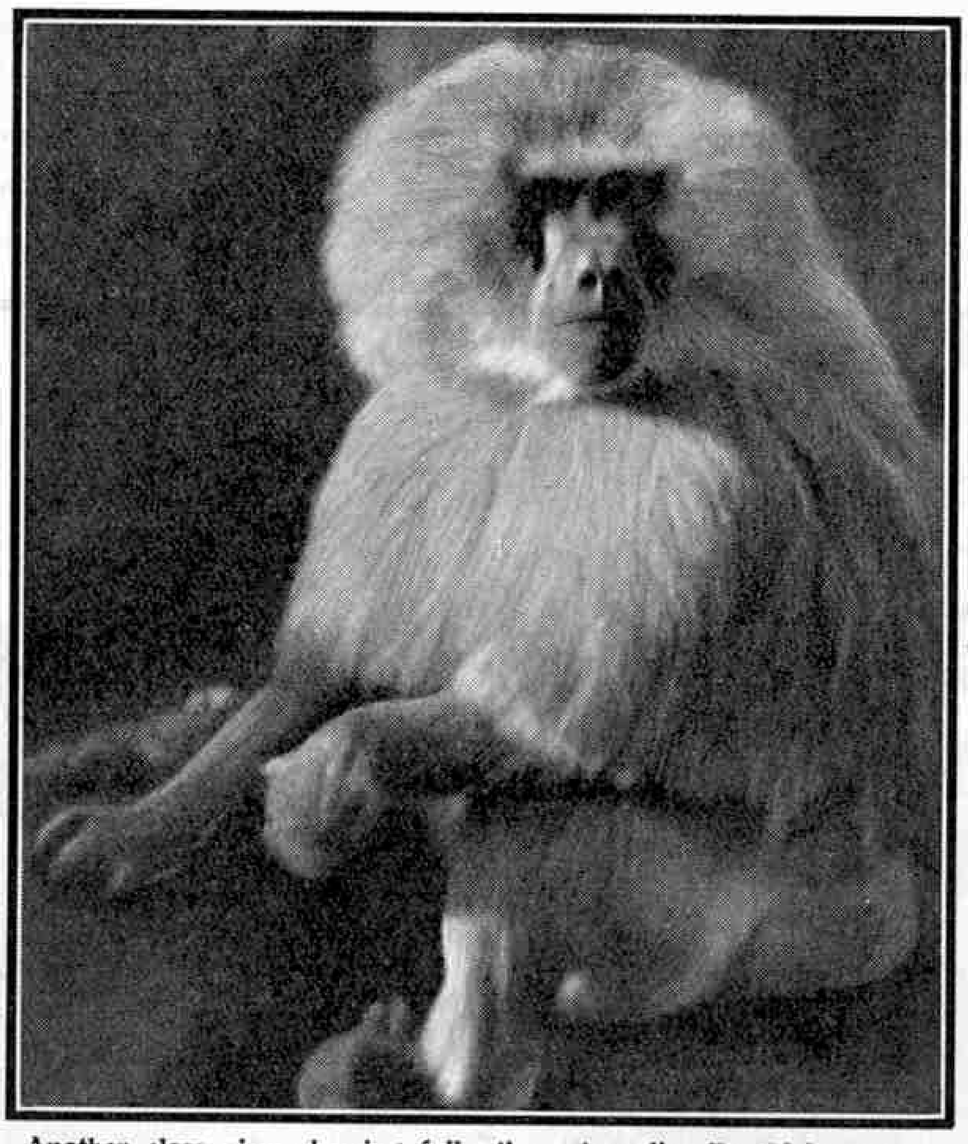


A Baboon expressing himself in song.

Much native folk-lore and legend is woven round baboons, for to the villagers living near or among hills the sub-human creatures are continually within sight or hearing, and are almost part of their lives. Natives are convinced that baboons have a definite and recognisable language of their own, and there are men who contend that they can not only understand what the great apes say, but can also hold conversation with them. It may be said that natives look upon baboons almost as a lower and less developed branch of the human race, and order their dealings with them accordingly. For instance, though natives are passionately fond of meat and will go to almost any lengths to obtain it, and eat everything from antelope to water lizards and tortoises, very few tribes will touch baboons. Though they will attack and kill, if they can, the raiders of their crops, the villagers will not eat the bodies of the slain. To them it savours too much of cannibalism. I have only once seen a baboon used as food, and that was in a village of a very low type of native in the wild country near the Zambezi River.

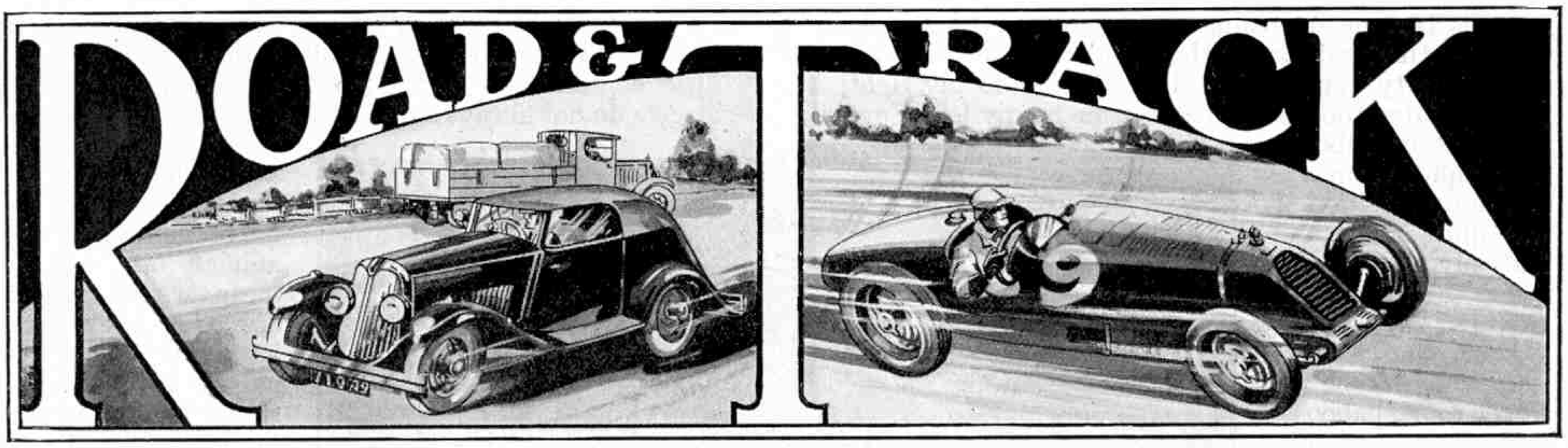
I was marching through the forest, with a dozen or more native carriers behind me. As I reached the outskirts of a tumbledown village I saw a troop of baboons raiding the encircling fields, and to help the local people I fired on the animals and shot one of them. I left the creature where it fell, but it did not remain there long, for the exultant savages rushed out and dragged the body in triumph to the village. A big fire was hastily made, into which was cast the body in order to singe off the hair, and then it was pulled from the fire, and the local heathen began to cut it up for cooking and eating. My own natives were horrified. As soon as they realised what was about to happen they cleared out of the village and made camp in the bush, close to mine; and from that moment until we left again they refused to have any more dealings with those who participated in what they regarded as a cannibalistic orgy.

The depredations of baboons on the property of the villagers do not always stop at the theft of growing crops. The adventure tales and films that are based on children being brought up by wild animals are by no means wholly imaginary. There are several authentic cases of native babies being stolen by baboons and brought up by them. Only a year or two ago a striking example of this was recorded. The local natives had noticed that among a certain troop of baboons in the hills was one that seemed to be different from the rest. Though it was only seen at a distance, the natives realised that its movements were more human than those of the rest of the troop, and they observed that it did not appear to be covered with hair. They spoke of the matter to the English District Commissioner. Their report aroused his interest and he organised a search, and after some days a successful round-up was effected and the strange-looking young baboon was netted and captured. It proved to be a 14-year-old native lad, a one-time baby that had been missing since it was a few months old. The wild thing bit and fought wildly on its capture, but time and kindness slowly weaned it from its ways and it was taught human speech. At first it refused food, especially cooked dishes, but this aversion was at length overcome.



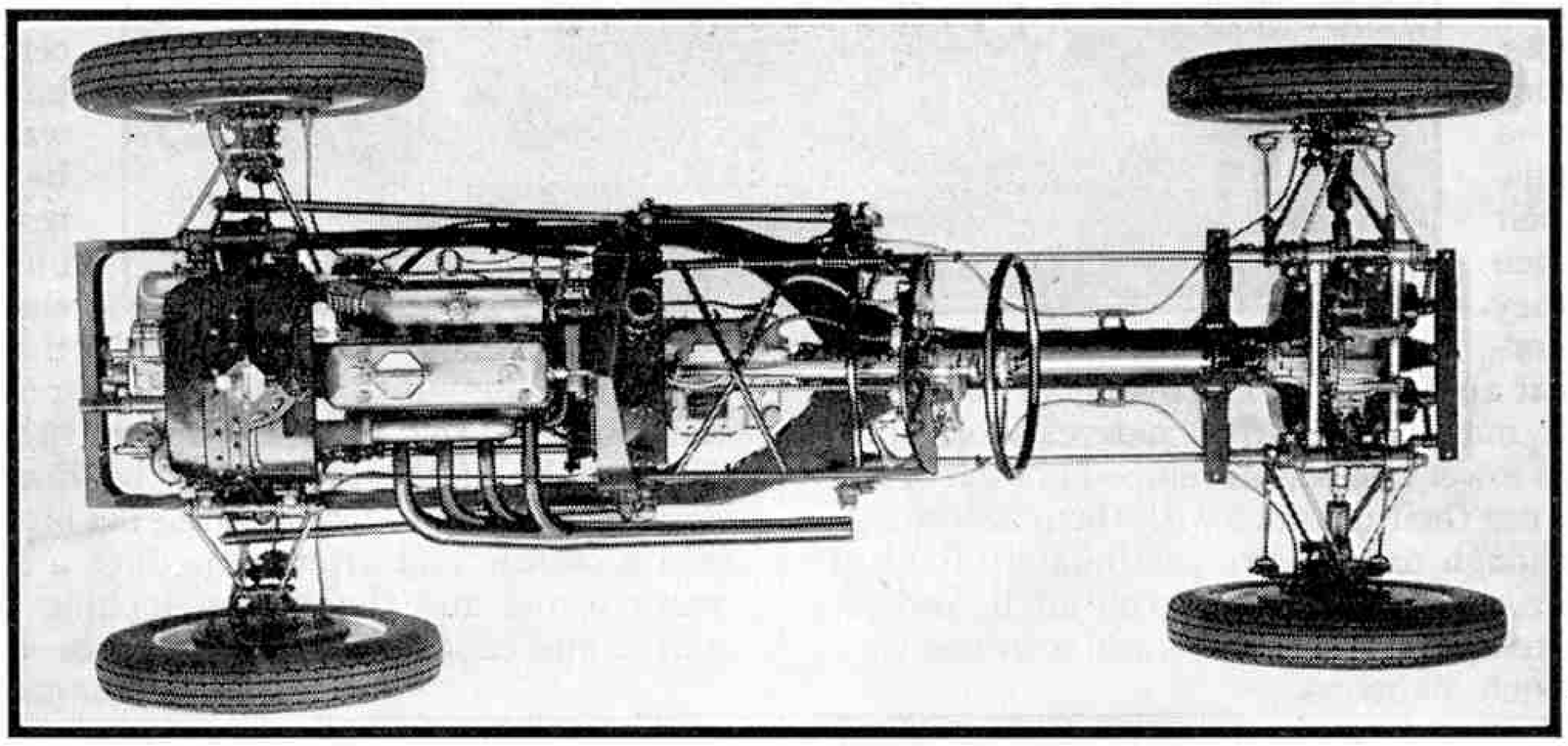
Another close view showing fully the extraordinarily thick mane.

The natural food of baboons is more varied than that of any other creature except man; indeed little comes amiss. Besides grain raided from the fields of human beings they eat many kinds of wild fruits in the forest, and innumerable tuber-like roots are dug for with the fingers. Creatures such as young antelope or lambs fall victims to the appetite of baboons, and the insect tribes also figure largely on the menu. The big black millipedes, thick-bodied creatures six inches in length, are scrunched up with gusto; locusts go down like shrimps at the seaside; and even such aggressive things as the scorpions and centipedes that live under the rocks are sought for eagerly. How the baboons manage to avoid the poisonous stings is a mystery, and on any hillside can be seen loose stones recently turned over by the seekers of these vicious-tempered dainties.



A New British Racing Car

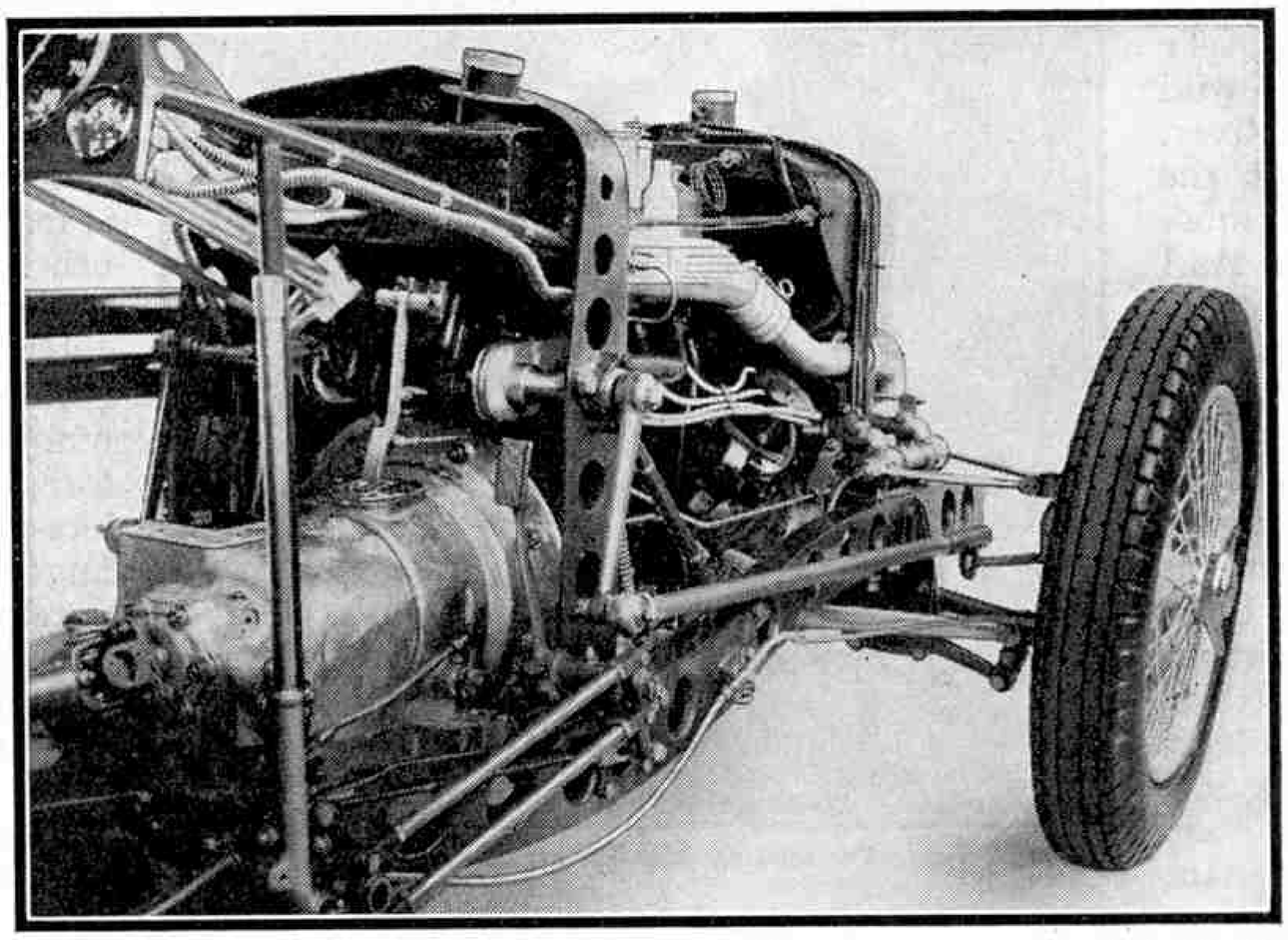
A new racing car that possesses many unique features of interest to admirers of high speed machines has been designed by the M.G. Car Co. Ltd., a firm that has done much to uphold British prestige in motor racing circles. The new car is known as the Monoposto M.G. Midget R-Type Racing Model, and it is provided with a light alloy body of unusual form, with the single seat of course placed centrally. Its chief novelty is the frame, which consists of a single member shaped like a tuning fork with the prongs at the front end of the car. This is composed of thin steel plates welded together in box form, and weighs only 57 lb. A second novelty is that its wheels are independently sprung by means of torsion bars, and it is the first British racing car so equipped to go into production.



A plan view of the chassis of the new Monoposto M.G. Midget R-type racing car. This car has many novel features, including four independently sprung wheels and a twin steering box.

The 750 c.c. four-cylinder engine of the car is a modification of the supercharged "Q" type, which already has won many racing honours. It has larger section connecting rods and an improved three-branch water manifold, and a Zoller M.G. compressor fitted between a large bore S.U. carburetter. The engine gives a maximum boost of 28 lb. per sq. in. At 6,500 r.p.m. it develops 110 b.h.p., which is higher than that of any other engine of the same capacity in the world.

Engine torque is transmitted to the rear wheels through a Wilson preselector gear-box. The speed and ease with which changes of gear can be effected with this box is a temptation to drivers to save time by quick work that may be rough on the mechanism, and as a safety device a multi-plate clutch not under the control of the driver is fitted.



Another view of the Monoposto M.G. Midget showing the dual steering, drop arm, brake lining and hand-brake assembly. Photographs on this page by courtesy of the M.G. Car Co. Ltd.

Each road wheel is carried on a pair of "V" shaped brackets mounted one above the frame and the other below it. To the lower bracket in each case is attached the fixing for the torsion bar, which passes parallel to the side of the chassis frame to a bracket in the centre of the frame. Provision for adjustment is made at the fixed ends of the torsion bars.

There is no track rod between the two front wheels, each of which is provided with its own steering gear, the two steering mechanisms being linked together. The twin steering box is bolted to the bulkhead, and the drop arms are fitted to cross-shafts carried outside the body on each side, a pair of long drag links passing alongside the body to the front wheel steering arm. The brake gear is of the Girling type, in which the shoes are expanded by the movement of a wedge, the operation of which is controlled by cables instead of the usual rods.

A Travelling X-Ray Service

Five Commer motor vans equipped with modern X-ray apparatus are now in service in this country. The vans are owned by Portable X-Rays Ltd., London, and the object of the scheme is to provide doctors, hospitals and nursing homes with an efficient X-ray service.

An illustration on the opposite page shows an interior view of one of these vans and gives a good idea of the neat layout of the equipment. Provision for developing X-ray photographs is made in the van, the interior of which has been made lightproof, the necessary chemical tanks being accommodated at the forward end of the body.

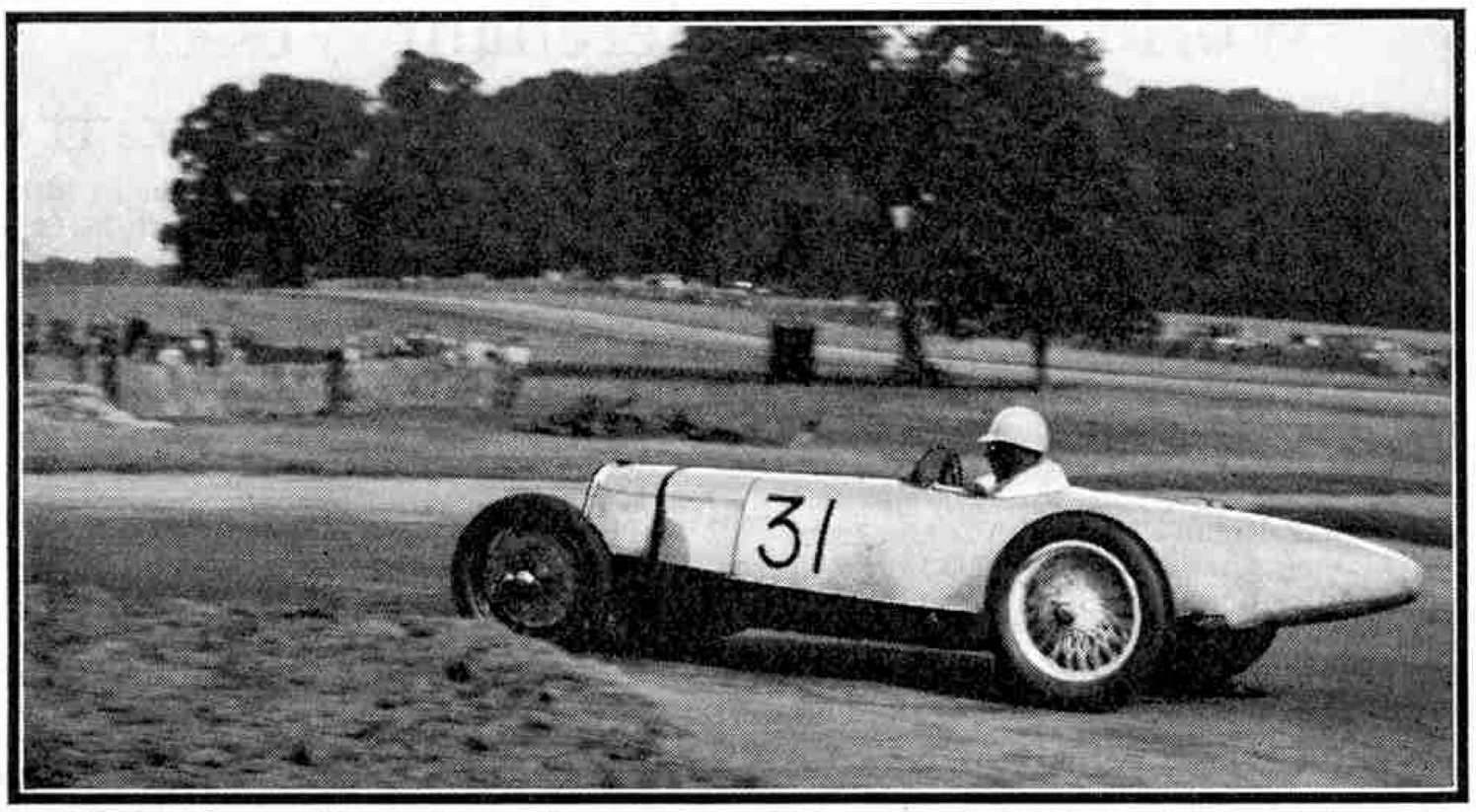
The plant carried in each car comprises X-ray tubes, a high tension transformer and a switchboard. The necessary current is supplied by a 1½ kW alternator driven from the flywheel of the engine and housed between the driver and the passenger, and cupboards are provided for the accommodation of films and other accessories. The vans operate chiefly in London and the home counties, but they are available for visits to distant places in any part of the country.

Trolley-Buses Replacing Trams

Corporations now contemplating the replacement of tramways by fleets of modern trolley-buses include those of Manchester and Huddersfield. In Manchester trams are being discarded at the rate of two a week, and it is proposed to seek Parliamentary powers authorising their complete abandonment and the substitution of trolley-buses. At Huddersfield trolley-buses are already being used on a number of routes, and as they have proved satisfactory it is now proposed to scrap the existing tramcars and to run trolley-buses over all routes inside and outside the borough.

Europe's Largest Garage

The largest public garage in Europe is in Venice, in spite of the fact that cars cannot be used to any great extent in that city of canals. It is built at the end of the Littorio bridge between Venice and the mainland, and accommodates 2,000 cars on its seven floors, which are connected by two spiral ramps, one for up traffic and the other for descending cars. Venetian motorists and visitors reaching the city by road leave their cars in this garage and pass about the city itself by gondola in the usual manner. Italy boasts also Europe's next largest public garage, which is in Rome.

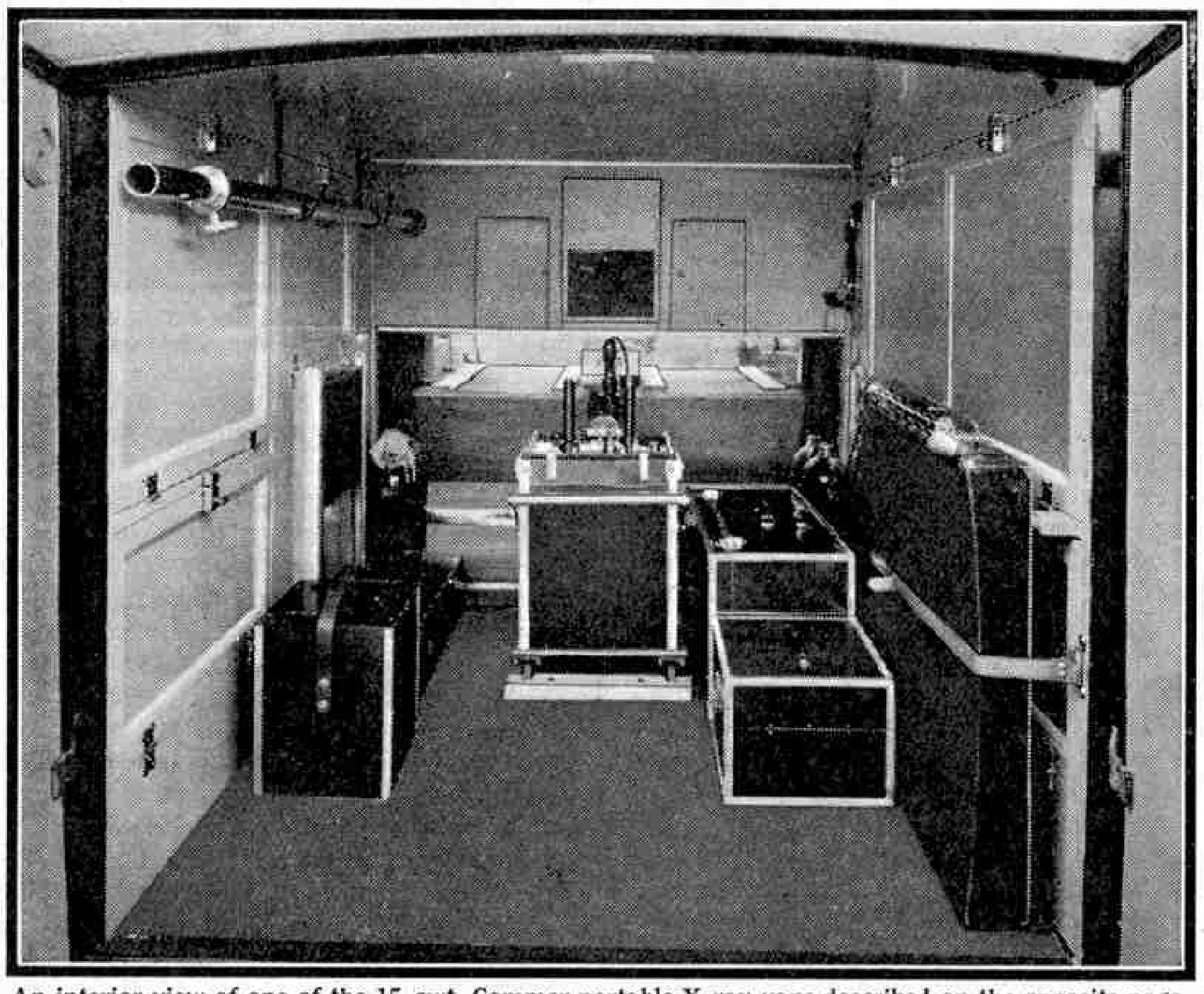


Cyril Paul piloting one of F. W. Dixon's Riley cars round a right-angle bend at Donington. Photograph by courtesy of "The Riley Record."

How "*Bluebird*" was Timed

An ingenious electrical machine was used for timing Sir Malcolm Campbell's world speed record runs at Daytona this year. This was developed by Mr. Porter, an Indianapolis electrical engineer, for use on the Indianapolis speedway; and has been employed in all the 500 mile races held there since 1912, and also in the Pulitzer and Schneider Trophy air races, and in regattas, motorboat trials and many other speed events.

During "*Bluebird's*" runs wires attached to electric circuits and the timing machine were stretched across the course at various points over the middle distances of the 11½-mile course to form eight "traps." Each trap was a mile long, and they were so spaced that the total distance covered was five miles. This arrangement enabled Sir Malcolm to be timed over distances of one and five miles, and also one and five kilometres, for the instant when "*Bluebird's*" wheels hit each wire was automatically registered on a roll of paper passing through the timing machine. The times were measured with accuracy in minutes, seconds and hundredths of seconds.



An interior view of one of the 15-cwt. Commer portable X-ray vans described on the opposite page. Photograph by courtesy of Commer Cars Ltd.

England's Huge Motoring Bill

Some idea of the increasing importance of the motor industry in this conntry may be gained from the fact that 256,866 private motor cars of all types were manufactured in 1934. This number was 36,087 more than that for the previous 12 months. Production of commercial vehicles showed a more striking increase, the figures for 1934 being 85,633, and for 1933, 65,508. Overseas trade also revealed notable improvement, 45,253 private cars and 12,260 commercial vehicles being exported in 1934, the corresponding figures for 1933 being 41,359 and 9,877 respectively.

The total number of licensed motor vehicles up to November 30th last was 2,116,582. This figure does not include tramcars or any vehicles that require trade licences. The huge sum of £32,587,000 was paid in licence fees by the owners of these vehicles, and a rough estimate of the total amount spent annually on motoring in this country, including the cost of new cars, repairs, petrol, oil and accessories, is £200,000,000, which is about one quarter of the amount spent in governing it!

The Longest English By-Pass Road

An interesting road now under construction is one designed to provide an outer semi-circular route north of London. It is known as the N.O.R. and when completed will be the longest by-pass in England. It starts from the Bath Road at Colnbrook, passes through the counties of Buckinghamshire, Hertfordshire and Essex, and terminates at Tilbury. Eventually it will link up all the main radial routes from London at a distance from the centre of the city of about 20 miles, and will provide a splendid direct traffic course from east to west.

A 10-mile section of this new road between the Barnet by-pass and the Waterford by-pass was opened to traffic two or three years ago, together with a 2-mile section north of the London-Oxford Road. Work is now proceeding on part of the connecting portion between these sections, and in order to conform with the other parts of the North Orbital Road, this will have a width of 100 ft. between fences. A 30 ft. wide concrete carriageway is to be provided and it is expected that work will be completed in about 18 months.

A Novel Traffic-Warning Device

As a means of warning drivers when their vehicles are loaded too high to pass along an underground roadway in Paris, a novel photo-electric system has been installed. It consists of two projectors that direct their beams into photo-electric cells placed above the street. If a lorry moving towards the passage intercepts the two beams of light, a loud-speaker is set in action and calls out in French: "Lorry too high, go around the tunnel." Simultaneously a warning lamp is switched on over the entrance to the roadway.

British Attempt on 24-Hour Record

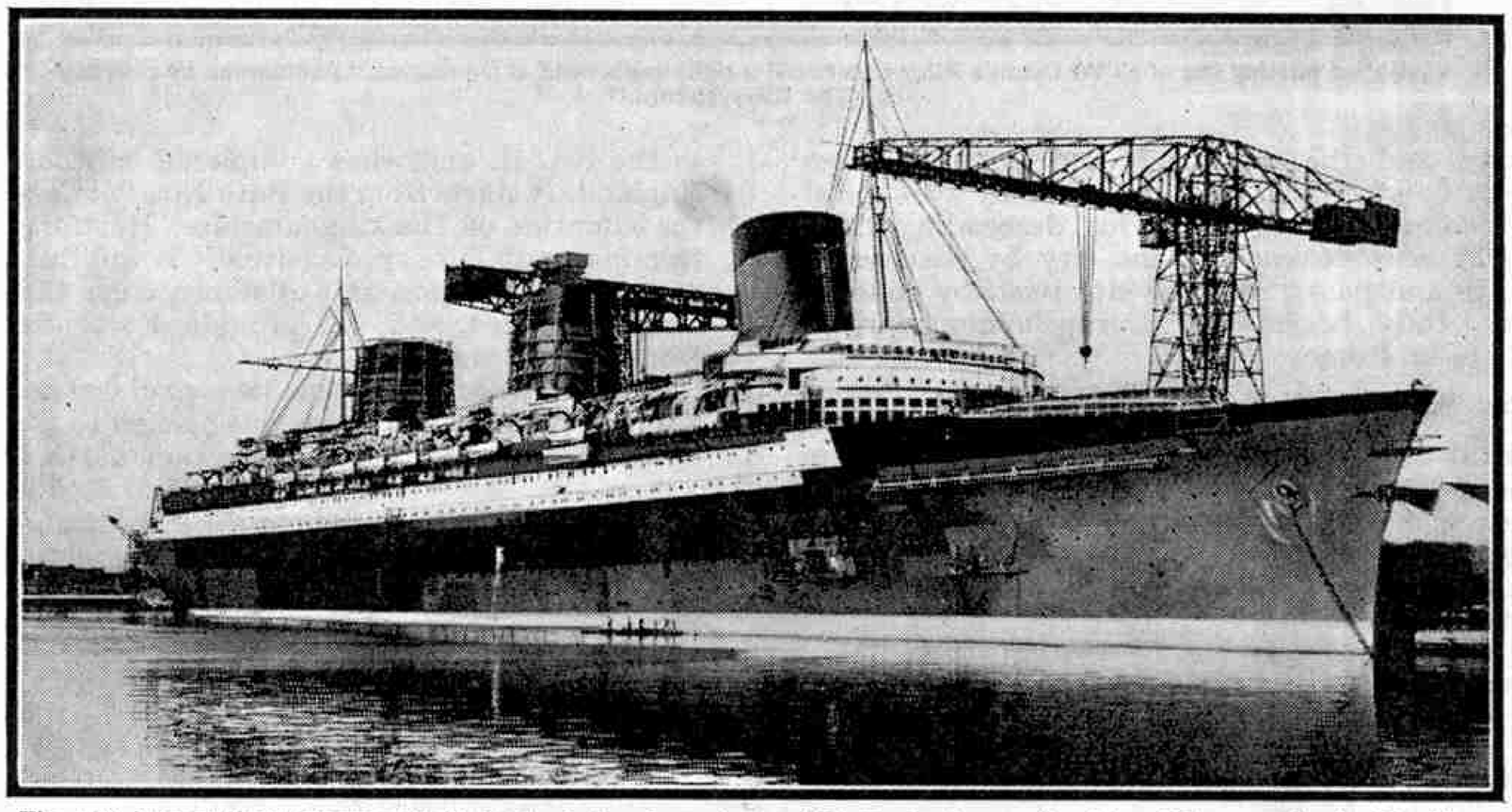
A determined attempt is to be made this month to regain the 24-hour record for Great Britain. With this purpose in view, J. Cobb has taken his 450 h.p. Napier-Railton car to Salduro, in the United States, where the bed of a dried up salt lake provides a course 12 miles long. He will be assisted in his task by T. E. Rose-Richards and C. J. Dodson, and hopes to beat the record of 127.22 m.p.h. set up by D. A. Jenkins, an American driver.

The French Liner "*Normandie*"

World's Fastest Merchant Vessel

THE wonderful story of the struggle for supremacy on the North Atlantic crossing was carried a stage further on Monday, 3rd June, when the giant French liner "*Normandie*" arrived at New York at the conclusion of a maiden voyage in which she broke all transatlantic records. The vessel covered the distance of 3,192 miles from Southampton to the Ambrose Lightship, off the entrance to New York harbour, in 4 days 11 hrs. 42 mins., her average speed being 29.68 knots; and from Bishop Rock, in the Scilly Isles, long the traditional starting point of the transatlantic speed course, her average speed actually was 29.98 knots. Thus the "*Normandie*" has now wrested the coveted "Blue Riband" of the Atlantic from the "*Rex*," the famous Italian liner that in August 1933 crossed from Gibraltar to New York, a distance of 3,181 miles, in 4 days 13 hrs. 58 mins., at an average speed of 28.92 knots. Previously the record had been held by the German vessel "*Bremen*," which four years earlier had brought to an end the 22 years of supremacy enjoyed by the "*Mauretania*."

The record made by the "*Normandie*" on her maiden voyage does not represent the full measure of her capabilities, for she was slowed down for 11 hours by a broken condenser tube. Her longest day's run was 754 miles, completed in 23 hrs. 2 min., and on the last day of the voyage she maintained an average speed of 31.55 knots, the highest ever achieved for so long a period by a liner regularly engaged on this route. It is almost certain that she will reach even higher speeds when her machinery has settled down, and she may have established a new and more imposing record by the time this article is in print.



The new French liner "Normandie," the largest and most powerful ship in the world, at her fitting out berth. The illustrations to this article are reproduced by courtesy of the Compagnie Generale Transatlantique, Paris.

The "*Normandie*" is not only the fastest, but also the largest and most powerful merchant vessel in the world. She is the first vessel to exceed 1,000 ft. in length, and actually measures overall 1,029 ft. 5 in. She is therefore 114 ft. longer than the "*Majestic*," formerly the largest ship in the world. The great increase in size that the "*Normandie*" represents is even more strikingly shown by a comparison of her tonnage of 79,280 with the 56,621 of that of the "*Majestic*." The French vessel is 119.5 ft. in breadth at the promenade deck, and the ceiling of her wheelhouse is 128 ft. above the keel, and the forward funnel rises 56 ft. higher. Her draught is 36.6 ft.

The "*Normandie*" has many novel constructional features that make her of special interest. The form of hull adopted was tested exhaustively before construction began, and is remarkable for a bulbous bow that reduces water resistance to an extent that is not affected when the vessel is down by the stem or the stern. The forward part of the hull is concave at the water line and is flared outward above it, and the bottom of the ship is flat in the main section of her length. About 30,000 tons of Siemens-Martin steel was used in building the hull, and 6,400 tons of special high tensile steel was incorporated in those parts of the structure where extra strength is required. The stern post, which weighs more than 100 tons, is of cast steel, as is the lower part of the stem, and riveted steel plates of special section have been used in the construction of the upper part of the stem. Bilge keels, about four feet in width, are fitted for a distance of just over 206 ft. on each side of the hull in order to check any tendency to roll in heavy seas.

Special care has been taken to secure the maximum degree of safety in the event of collision or other accident. The double bottom of the vessel is in 40 sections, and the double hull, which extends the full length of the engine and boiler rooms, is divided into 62 parts. The space below the upper decks is divided by means of 11 watertight cross bulkheads, and there are no fewer than 61 watertight doors, of which 32 are hydraulically operated. It is interesting to note that this part of the "*Normandie's*" equipment is British. Some of the doors are large enough to allow a motor car to pass through, and those in certain positions are capable of withstanding a load of 56 tons while remaining watertight.

The "*Normandie*" is fitted with turbo-electric drive and is the first great liner on the transatlantic service to be equipped with this system. Her owners decided to adopt this system because they consider turbo-electric machinery quieter and less productive of vibration than geared turbines. An important advantage of turbo-electric drive that also was taken into consideration is that the highest possible power can be developed when going astern, for all that is necessary is to reverse the transmission by means of a suitable current reverser on the cables leading to the motors. This greatly facilitates manœuvring operations.

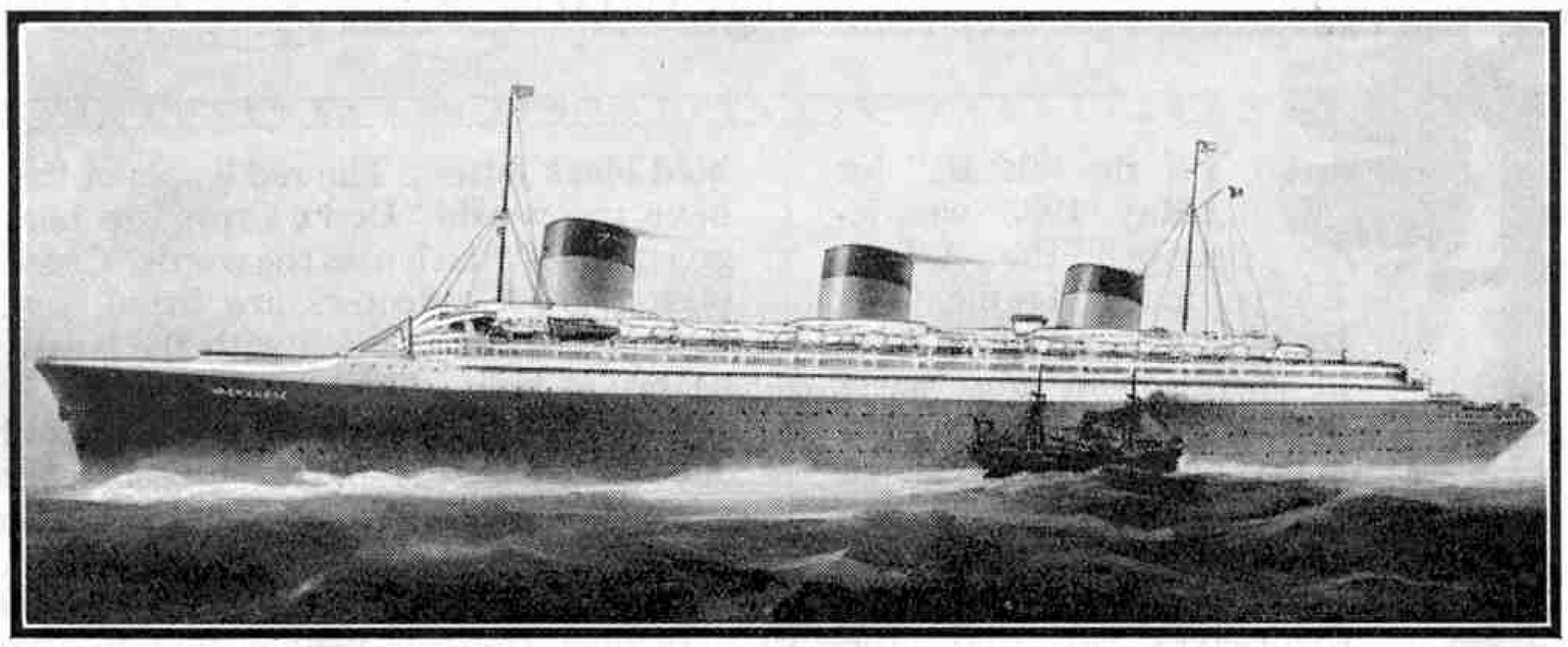
The main propelling machinery consists of four steam-turbine-driven alternators with a total output of 133,600 kW, which supply current to four 40,000 h.p. electric motors each of which drives one of the "*Normandie's*" four propellers. The whole of the machinery is contained in six watertight compartments. Four of these are devoted to the steam generating plant, and aft of them are the two accommodating the propelling and electrical machinery. Of the latter compartments, the forward one contains the four groups of alternators and their auxiliaries, six auxiliary turbo-dynamos, the main control station and switchboard and the high tension electric equipment; and the four propeller motors, the exciters, and the thrust-blocks of the two outside propeller shafts are in the one farthest aft.

Steam for the main turbines and auxiliaries is supplied by 29 Penhoet water-tube boilers working at a pressure of 400 lb. per sq. in. and with steam superheated to 680 deg. The boilers are oil fired, and each is equipped with four burners with a capacity of 500 kg., or nearly half a ton. Each boiler has three drums, a large one in the upper part being connected by means of two groups of water-tubes and two groups of superheating tubes to two smaller drums in the lower part. The boiler tubes are of large diameter and an interesting feature is that they are bent only at one end in order to make inspection easier. Loss of heat is avoided as far as possible by covering the boilers with glass silk mattresses. Tubular air heaters recover most of the heat carried away by the gaseous products of combustion in the furnaces, and the air which passes through these is conducted again through the space around the boilers in order to receive radiated heat that otherwise would be lost. There are also four oil-fired auxiliary boilers, working at a pressure of 145 lb. per sq. in., that supply steam for the make-up feed water for the main boilers, and for the feed heaters, fuel oil heaters, air pumps, and other appliances. These boilers work under forced draught with tubular air heaters.

Each of the four alternators is driven by two impulse type

turbines, one of them being a high pressure unit, and the other a low pressure unit exhausting into a condenser. The blading is of British steel, specially chosen for its high resistance to corrosion, and the maximum turbine speed is 2,430 r.p.m. Each alternator is directly driven by its own set of turbines, and in each case the stator is in one piece, built up from its parts by electric welding.

Regulation of the speed of the turbo - generators is given by means of an electric motor, which at speeds from 175 r.p.m. to 500 r.p.m. acts on a governor operated by oil pressure, and at higher speeds, up to the maximum of 2,430 r.p.m., on a centrifugal governor or regulator, in each case to control the admission of steam to the turbines. This motor is provided with remote control from the main control deck.



An impression of the "Normandie" at sea. Her after funnels are lower than the forward funnel in order to facilitate the dispersal of fumes, and the top of the forward funnel is 194 ft. above her keel.

The main driving motors are of the three-phase synchronous type and a separate motor is provided for each of the vessel's four propelling shafts, each of the four groups of turbo-alternator motors forming an independent unit with an output of 40,000 h.p. on its propeller. The propellers are of "Turbiston" bronze and are of British make. Each is 16 ft. in diameter and 23 tons in weight, and the casting from which it was made weighed 37 tons.

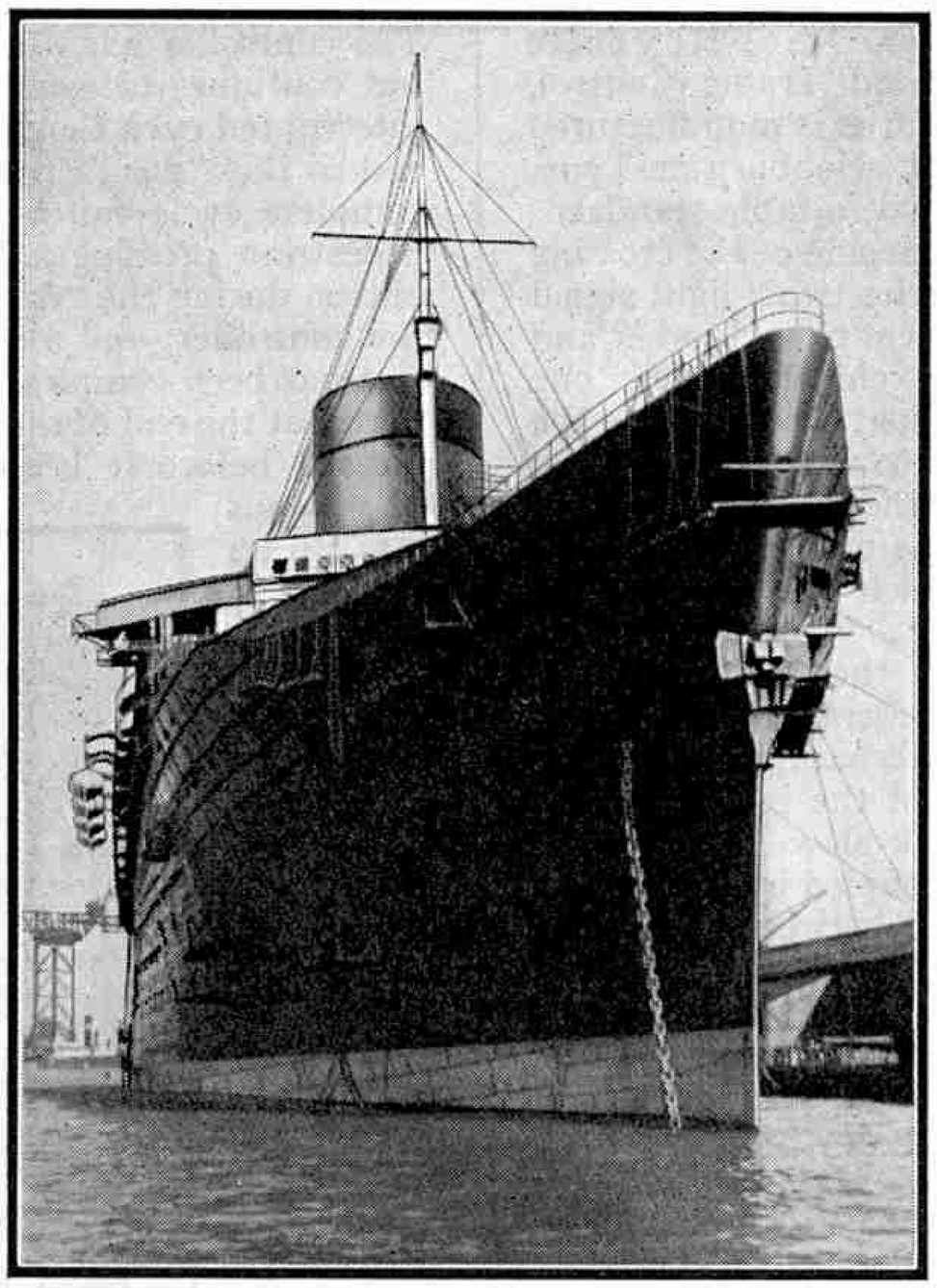
The machinery of the *"Normandie"* is easily controlled from two desks, equipped with the means required for independent operation of each of the four motors. Each unit contains two levers, one of which controls the speed regulator and with it the speed of the appropriate shaft; the other operates the current reverser, which controls the direction of rotation of the propellers, and also starts the motors. Indicators show the speeds of the turbines, and the speeds and directions of the propellers respectively, and it is interesting to note that a speed of 1,000 r.p.m. corresponds to one of 120 r.p.m. at the screw. The normal full speed of the propellers is 243 r.p.m. and their manœuvring speed is 60 r.p.m.

In addition to the main machinery there is an imposing array of auxiliary machinery to supply the power required for various services. Six groups of turbo-dynamos, each with an output of 2,200 kW at 220 V, generate the direct current required to excite the propelling motors and for other purposes, and electric motors of varying power outputs drive pumps and ventilating fans in addition to the windlasses and capstans required for deck work.

The accommodation provided for the 2,033 passengers the *"Normandie"* can carry is on a luxurious scale. The 448 first-class cabins are distributed over seven decks, and very few of the rooms lack a direct outlook to sea. On the promenade deck there are 24 luxurious staterooms, 12 on each side of the ship, and each has a private verandah 16 ft. in length. The Grand Salon, or first-class dining saloon, which is the largest room in the ship, is on this deck. It is 300 ft. in length, 45 ft. in width and three decks in height, and as it is not provided with windows or skylights it is illuminated and ventilated artificially. Light is provided chiefly by 12 huge glass vases lit internally, and 38 luminous glass brackets mounted on the walls. Forward of the Grand Salon is a theatre with seating accommodation for 380 people, and with spacious galleries at the back and sides providing standing room for many more. The theatre has a fully equipped stage, and is provided with sound film projectors so that it can be used also as a cinema.

The accommodation for the 665 tourist passengers is roomy and comfortable, and is distributed over three decks. The many public rooms are beautifully decorated, and include a gymnasium and a nursery, and there is also an open air swimming pool. The third-class accommodation, for 468 passengers, is situated in the aft part of the ship, the reverse of the usual practice in large liners.

The heating and ventilating of great liners is an intricate problem. In the *"Normandie"* more than 160 air - conditioning thermotanks and fans have been installed in special sound-proof compartments fitted at suitable points throughout the ship, and connected by a complicated network of main and branch trunks nearly 50 miles in length. The plant is operated by 160 special d.c. motors of from 3 h.p. to 17 h.p., and the fans move over 100,000,000 cu. ft. of air every hour. The air is drawn into the ventilating shafts leading to the various fan rooms through special louvre intakes designed to conform with the general lines of the ship's structure. This unobtrusive arrangement has made it possible to dispense with the usual array of cowls and fans on the various decks, resulting in greater unobstructed spaces for deck promenades and sports.



Bow view of the liner, showing the stem anchor to be used for holding the vessel when it is not necessary to employ the main anchors.

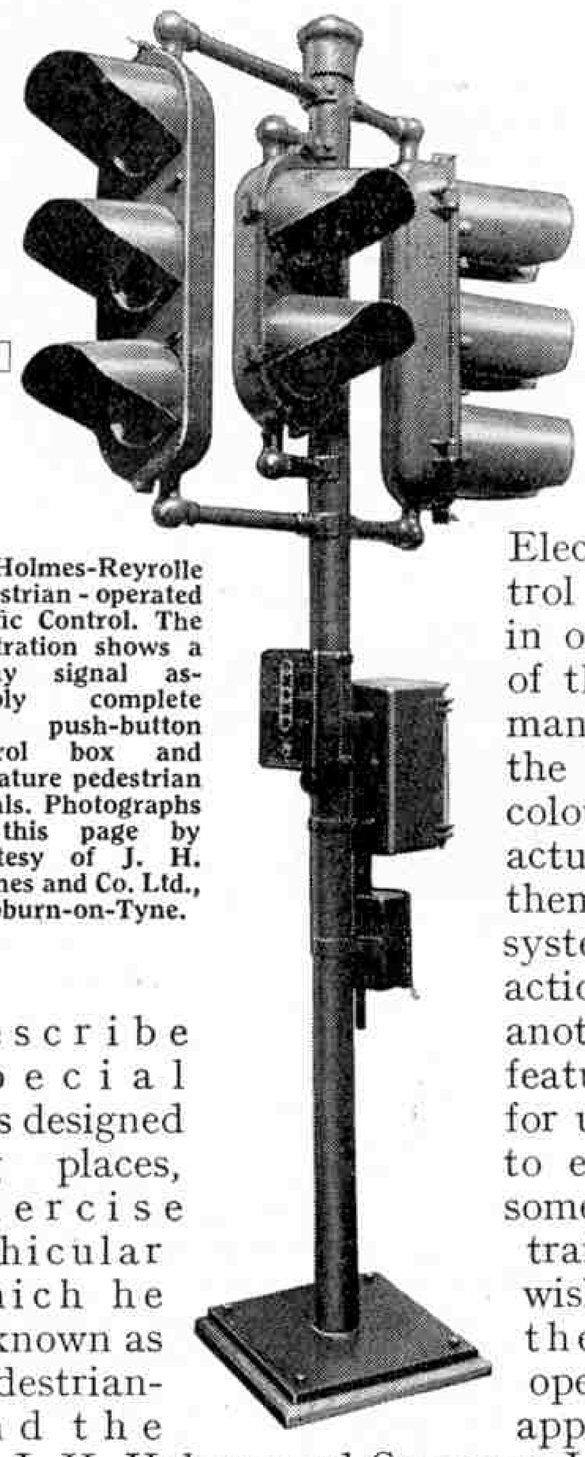
Every effort has been made to reduce the risk of fire to a minimum. The passengers' quarters are divided into 36 fireproof sections by vertical bulkheads which are really a continuation of the main watertight bulkheads. Wood has been employed only where absolutely necessary, and the decks are covered with compressed cork glued firmly in place. Metallic furniture is installed in the tourist and third-class rooms, and the fittings in the crews' quarters are also of metal. The floor coverings in the passenger accommodation are of a resilient material that is 75 per cent. fireproof, and the walls, carpets, curtains and hangings have been fireproofed. There is a trained fire brigade of 46 men, with headquarters on A deck amidships, and their routine work includes a constant patrol of the ship, during which they keep in touch with their headquarters by check switches, of which 84 have been installed at various points on their rounds.

The *"Normandie"* is equipped with automatic steering, and the gyroscopic apparatus provided for this purpose is of British design and construction throughout. It probably is the most comprehensive ever installed on board ship, and includes many bearing, rudder angle and course repeaters in the wheelhouse, on the bridge, in the wireless room and elsewhere, in addition to the master gyro-compass and the automatic helmsman.

As this article went to press, the *"Normandie"* completed her first round voyage across the Atlantic and made a new record on her return trip by maintaining an average speed of 30.31 knots from the Ambrose Lightship to Bishop Rock. The distance between these points is 3,015 miles and it was covered in 4 days 3 hrs. 25 min., or 12 hrs. 50 min. less than the fastest eastward run of the *"Bremen"* on the same course.

Pedestrian-actuated Signals

An Ingenious Safety Device



A Holmes-Reyrolle Pedestrian-operated Traffic Control. The illustration shows a 3-way signal assembly complete with push-button control box and miniature pedestrian signals. Photographs on this page by courtesy of J. H. Holmes and Co. Ltd., Hebburn-on-Tyne.

IN the "*M.M.*" for May 1933 we described the A.T.M. Electro-matic Traffic Control system, which is now in operation in most parts of the British Isles and in many big cities abroad. In the A.T.M. system the colour light signals are actuated by the vehicles themselves so that the system is fully automatic in action. This month we describe another control system, the feature of which is that it is designed for use at pedestrian crossing places, to enable a pedestrian to exercise some control over the vehicular traffic along the road over which he wishes to cross. The system is known as the Holmes-Reyrolle Pedestrian-operated Traffic Control, and the apparatus is manufactured by J. H. Holmes and Company Ltd., Hebburn-on-Tyne.

The equipment is mounted on two suitable standards erected on the pavement, one at each side of the crossing to be controlled. Each standard carries two 3-light signal lanterns mounted at about 180 degrees to each other and facing along the road to direct the vehicular traffic; one 2-light signal lantern mounted at about 90 degrees to the other two and facing across the road to direct pedestrians; and one push-button control box for the use of pedestrians. The equipment is completed by the addition of a controller and a high-speed relay, which are mounted on one of the standards.

The mechanism for controlling the lights can be operated on either an alternating-current or a direct-current supply. For operating on alternating current the mechanism is worked by a motor of the induction-disc type, but for direct current a small slow-speed direct-current motor is used. The period occupied by a complete cycle of the controller can be varied between 30 and 90 seconds. For vehicles the lights go through green, amber, red and red-amber back to green again; and for the pedestrian signals there is a corresponding sequence of red and green colours, amber being omitted. The amber and red-amber signals for vehicles each occupy from $6\frac{1}{2}$ to $13\frac{1}{2}$ per cent. of the total duration of a cycle, according to their settings; and the remainder of the period of the cycle is taken up by the green vehicle signal and the pedestrian green signal, the period allotted to each signal being adjustable. In order to meet local requirements the amber and red-amber signals can be set independently, so that either of them can be made to show for shorter or longer periods than the other. Provision is made also for manual operation of the controller in emergency.

The lanterns are fitted with special diffusing lenses. The red lenses of the vehicle signals bear the word "Stop" in bold black letters. The red lenses of the pedestrian signals have the words "Don't Cross" in black letters, and the green pedestrian lenses the words "Cross Now." Chromium-plated brass reflectors are fitted, and they have been designed in conjunction with the lenses to give maximum beams of light.

Two push-button pedestrian control boxes are required one for each side of the crossing. Each box contains miniature signals, which indicate to pedestrians how the actual signals are set at any moment. A push-button box with its miniature signals is shown on this page.

In operation the vehicle signals normally show green, and the pedestrian signals simultaneously show red, which of course signifies "Don't Cross." Operation of the equipment begins only when a pedestrian presses one of the push-buttons. This action causes the controller to make the vehicle signals change through amber to red, and the pedestrian signals change to green. The signals remain in this condition for a predetermined period, and then all return automatically to the normal setting, which the vehicle signals reach through the red-amber stage. The controller has not then finished its complete cycle, but continues to work through a period that cannot be interrupted even though a push-button is pressed. At the end of this "dead" period of the cycle, a fresh identical complete cycle can be initiated exactly as before by a pedestrian pressing a button. If a pedestrian presses a button during the "dead" period, his request is noted by the controller, and a second cycle begins as soon as the first has been completed. Otherwise the controller comes to rest at the end of the cycle, and waits for a button to be pressed before it begins to operate again.

By means of this arrangement it is impossible for vehicular traffic to be interrupted for an indefinite period, and pedestrians cannot monopolise the right of way since both pedestrian and vehicular traffic have fixed periods in each cycle.



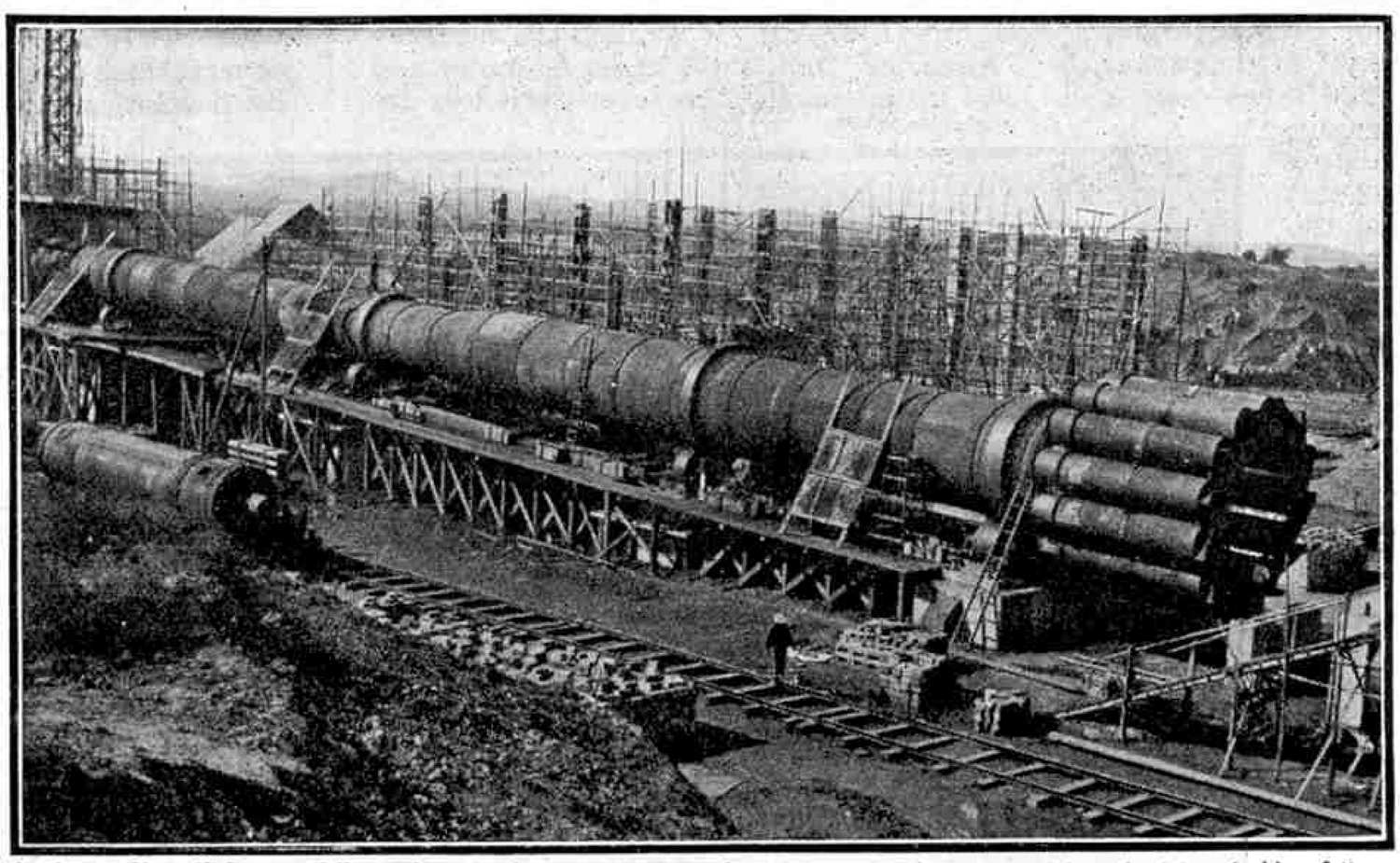
One of the pedestrian push-button control boxes.

Giant Kilns and Coolers

Interesting Processes in Cement Making

THE cover of this issue shows the cooler for a giant "Unax" rotary cement burning kiln manufactured by F. L. Smidth and Company Ltd., London, for use in a large Portland cement works. In order to understand the purpose of the cooler it is necessary to know something of the processes carried out in a modern cement works. Briefly, in the usual process, known as the wet process, calcareous material, which is generally hard limestone or chalk, and clay are first finely ground with water to form a "slurry." The slurry is then evaporated and sintered in large rotary kilns, an example of which is shown on this page, and the resulting clinker, together with a certain quantity of added gypsum, is later ground to a fine powder, which is the finished cement. The purpose of the gypsum is to retard to a convenient rate the setting of the cement in use.

The clay is thoroughly washed before use in a special mill in order to remove gravel and other foreign matter, and the limestone is broken into small pieces in crushing machines. The washed clay and the limestone are then ground together in what are known as wet mills, the proportions of clay and limestone being carefully checked by automatic measuring apparatus during the process. The resulting mixture or slurry from the wet mills then passes to the kiln house, where it is fed into the upper ends of huge rotary kilns.



A giant "Unax" Cement kiln and cooler in course of erection. The cooler is shown at the right-hand side of the illustration, which is reproduced by courtesy of F. L. Smidth and Co. Ltd., London.

The kiln house of a modern cement works is a most impressive sight. The kilns are long steel tubes, which may be anything from 200 ft. to 520 ft. in length, with a diameter of from 8 ft. to 11 ft., and they rest on roller supports on which they are rotated slowly by means of electric motors. The kilns are lined inside with firebricks, and are mounted in a slightly inclined position, the firing zone being at the lower end. As the kilns rotate the slurry is carried along continuously owing to the slight incline. It loses its water by evaporation, and is finally sintered in the white heat of the firing zone.

Some kilns are fired by gas and others by oil, but pulverised coal is most generally used. At the lower end of the kiln the resulting clinker leaves the kiln tube and then has to be cooled. This was formerly done in a separate machine, but in the Unax cooler the cooling chambers form part of the kiln itself and consist of a number of tubes fixed round the outside of the lower end of the kiln and revolving with it. The air necessary for combustion in the kiln is drawn in through the cooler tubes, and by this means the heat in the cement clinker is transferred to the indrawn air.

When revolving kilns were first introduced into the cement industry the great amount of fuel consumed by the kilns was not considered an important item. Nowadays, however, kilns have grown to such an enormous size, and fuel has become so expensive, that the industry has been compelled to regard kiln economy seriously. The economical working of a rotary kiln is largely dependent on the temperature of the firing fuel gases when they leave the kiln, and the temperature of the clinker; and in the Unax kiln special arrangements have been made to utilise as much as possible of the heat in the gases and clinker that otherwise would pass out of the kiln and be wasted. The clinker cooling tubes are provided with cooling devices that transmit the heat from the clinker very efficiently to the air, which thus becomes preheated and gives better economy when utilised for the combustion of the fuel in the kiln. Another important advantage of the Unax kiln is that the drop of the clinker from the kiln to the cooler is very short compared with the drop when a separate cooler is used. The amount of dust raised is therefore small, and does not interfere with the operator's view of the burning zone, which is an important feature when first quality cement is required.

When the clinker leaves the cooler it passes to storage bins, and from there it is taken to dry grinding mills in which it is ground into the finished cement. The dry mills run at about 22 r.p.m., and to dissipate the heat developed in the grinding process cooling water is run over the mills while in operation. After grinding the finished cement is conveyed into storage silos. At one big works in England the cement from the dry mills is carried by a screw type conveyor and delivered to two containers, from which it is blown by compressed air into the storage silos, each of which is capable of holding about 2,000 tons. From there the cement is carried by compressed air into ingenious packing machines that automatically weigh and pack it into bags and deliver these direct into railway trucks.



French Heavy Oil Engine Contest

It is expected that the designing and manufacture in France of heavy oil engines for aircraft will be greatly stimulated by an interesting competition announced by the French Air Ministry. A prize of £143,000 is to be awarded to the first aeroplane, equipped with one or more heavy oil engines of French origin, that breaks the present international record for a flight of 6,200 miles over a closed circuit. The average speed attained in the existing record was 93 m.p.h., and this must be exceeded to win the Government prize. Other conditions of the competition are that the crew must be of French nationality, and that the flight must be carried out over France or over French territory in North Africa. The award will be halved if the engines of the winning machine have been made in France under foreign licence.

A jury of nine members under the chairmanship of the President of the French Aero Club will be the judges in this competition.

Speeding Up the South Atlantic Air Mail Service

The Dornier "Wal" 10-ton flying boats used on the South Atlantic Air Mail Service of Deutsche Luft Hansa are to be superseded by a new and faster type of Dornier flying boat. The new aircraft will be equipped with Junkers "Jumo 6" Diesel engines.

At present the South American terminus of the service is Buenos Aires, but negotiations with the Chilean authorities are in progress with a view to extending the service to the port of Santiago. If the proposed extension materialises it will be run by the Syndicato Condor Limitada, the company operating the Buenos Aires–Natal portion of the service.

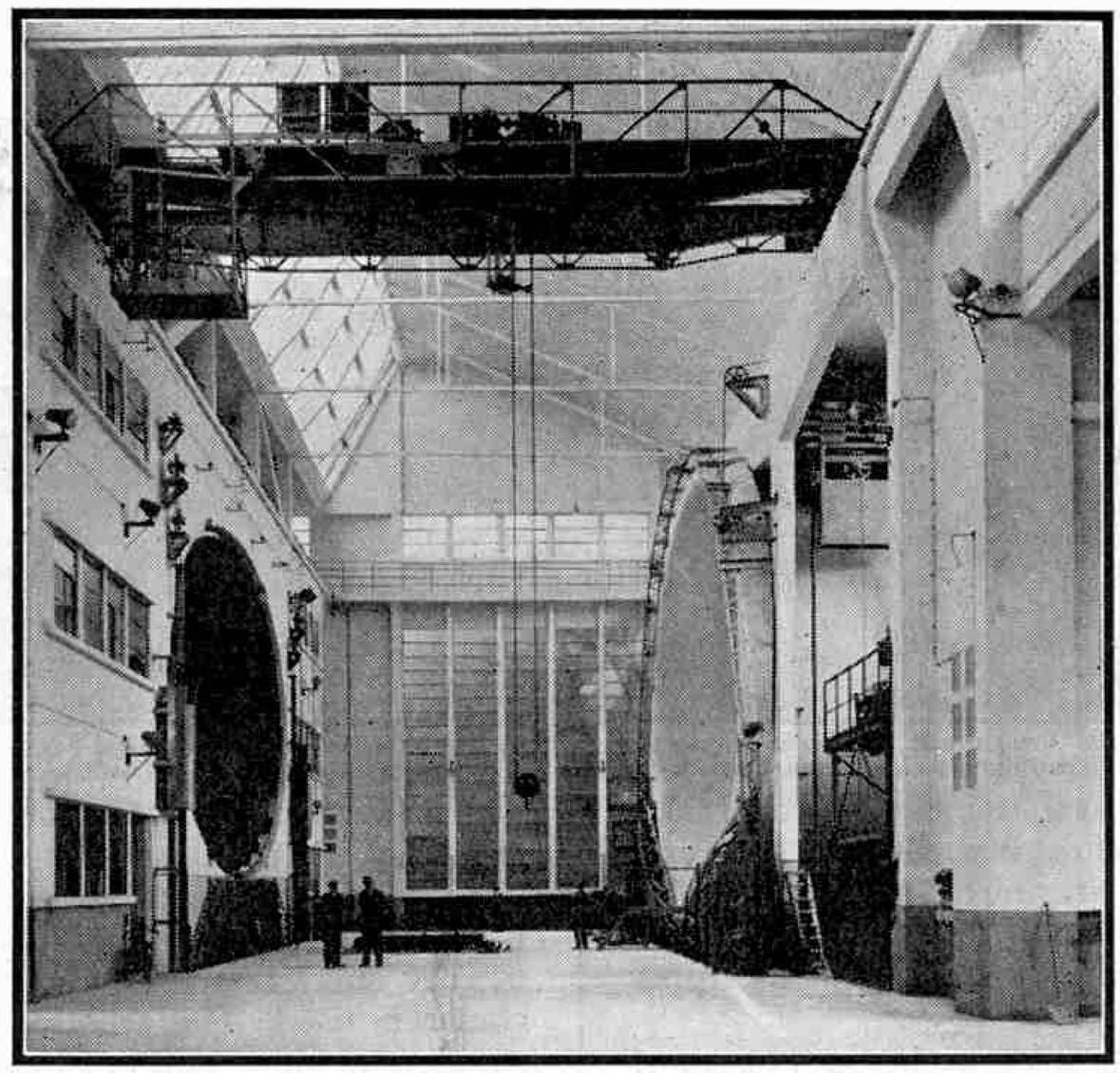
Russian Airship Development

In Russia much attention is being paid to the subject of operating regular air services with airships instead of heavier-than-air machines. Several airships have been built for this purpose, under the direction of General Nobile, the Deputy Chief of Soviet air construction, and they will be used at an early date to operate an airship service between Moscow and Sverdlovsk, in the Ural Mountains, a distance of about 900 miles. Another airship service, between Moscow and Leningrad, may be started later in the year.

New Wolseley Aero Engine

A new air-cooled radial aero engine designed primarily for use in training machines has been produced by Wolseley Motors (1927) Ltd. It is called the Wolseley "Aquarius" and is 40¼ in. in diameter and 36.4 in. in length. The seven cylinders are of 4 3/16 in. in bore and 4¾ in. stroke. Each cylinder consists of a machined cast steel barrel to which a cast aluminium alloy head is secured by means of a shrunk and screwed joint and reinforced by a pressed-on steel band. The cylinder head has an inlet and an exhaust valve operated by rockers carried on roller bearings.

The "Aquarius" can attain a maximum speed of 2,475 r.p.m., when it develops 170 b.h.p.; the normal speed is 2,250 r.p.m. and it then develops 155 b.h.p. The engine has successfully passed the Air Ministry type tests, which were extended to include a 100-hr. endurance test. Other new Wolseley aero engines are in course of production.



The spacious Test Room in the Aeroplane Testing Station at Chalais-Meudon, France, described in a special article on page 398. Photograph by courtesy of S. A. des Enterprises Limousin, France.

Another Russian Stratosphere Balloon

A new high-altitude balloon for ascents into the stratosphere is under construction in Russia. It will be known as "*Osoaviakhim 11*," and its envelope will be made of a new type of rubberised cambric muslin. The gondola will be of all-welded stainless steel and the upper portion will be provided with two glass-covered windows so that observations can be made, but they will be hermetically sealed while the balloon is in flight. The instruments to be installed in the gondola have been designed to work automatically as far as possible.

Readers of the "*M.M.*" will remember that the previous Russian high-altitude balloon "*Osoaviakhim 1*" reached a record height of 22 km., which is 67,580 ft. or approximately 13½ miles. This wonderful flight ended in disaster, as mentioned in these pages in our April 1934 issue, the gondola breaking away from the envelope during the descent of the balloon, and the three occupants being killed. One of the many interesting facts revealed by the records retrieved from the wreckage was that as the balloon rose the sky appeared to change colour gradually, and that when the maximum height was reached it looked black-grey.

The disaster resulted in a fund being established to finance further exploration of the stratosphere. The new balloon, which has been designed to attain a higher altitude than did the previous one, and to provide greater safety for its crew, is probably an outcome of this fund.

Proposed Record Flights

Mr. T. C. Campbell Black, who with Mr. C. W. A. Scott won the Melbourne Air Race last year, is to attempt this month a flight to Capetown and back in record time. He will then endeavour to fly to Canada and back, and afterwards will attempt a record flight to the Far East. Mr. Black's destination on the last mentioned flight has not yet been decided.

An improved "Comet" is being built by the de Havilland Aircraft Co. Ltd., for use on these attempts. It will have the same fuel capacity as the "Comets" that were so successful in the MacRobertson Race.

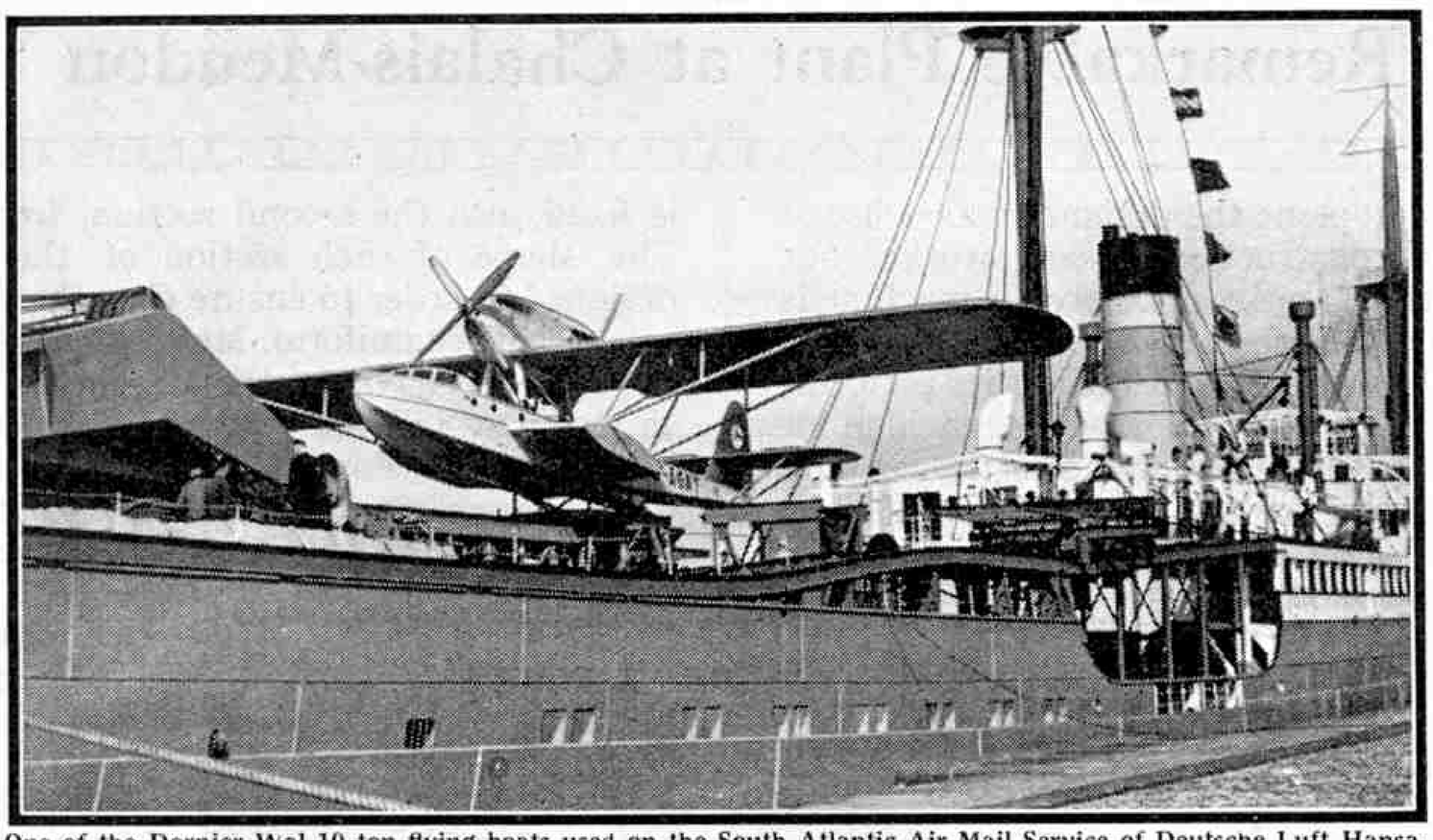
New "General Purpose" Flying Boat

The Saro "London" flying boat shown in the lower illustration on this page is a recent production of Saunders-Roe Ltd., Cowes, and has a span of 80 ft., a length of 57 ft. and a height of over 20 ft. It is built entirely of metal, except that the wing covering is of fabric.

The hull is subdivided into watertight compartments. It is claimed that the machine can remain afloat for six months without attention to the hull. The enclosed cabin for the pilot is well forward and provides a good range of vision for him; and behind it are compartments for the navigator, engineer and wireless operator. A special feature is the quietness of the hull, conversation being easily possible when the engines are running at full throttle.

The armament consists of three machine guns, one mounted in the nose, a second just behind the main planes, and the third in the tail of the hull between the twin rudders; all placed so as to give the gunners a good field of fire. The two "Bristol" Pegasus 620 h.p. engines are carried in nacelles in the leading edge of the upper wing, one on each side of the centre section.

Much of the work done by flying-boats consists of the patrol and reconnaissance of thousands of miles of coastline, and in the design of the Saro "London" special attention has been paid to maintenance in service and the facilities for rapid repairs, both of which are facilitated by the accessibility of all the controls and the provision of inspection panels.

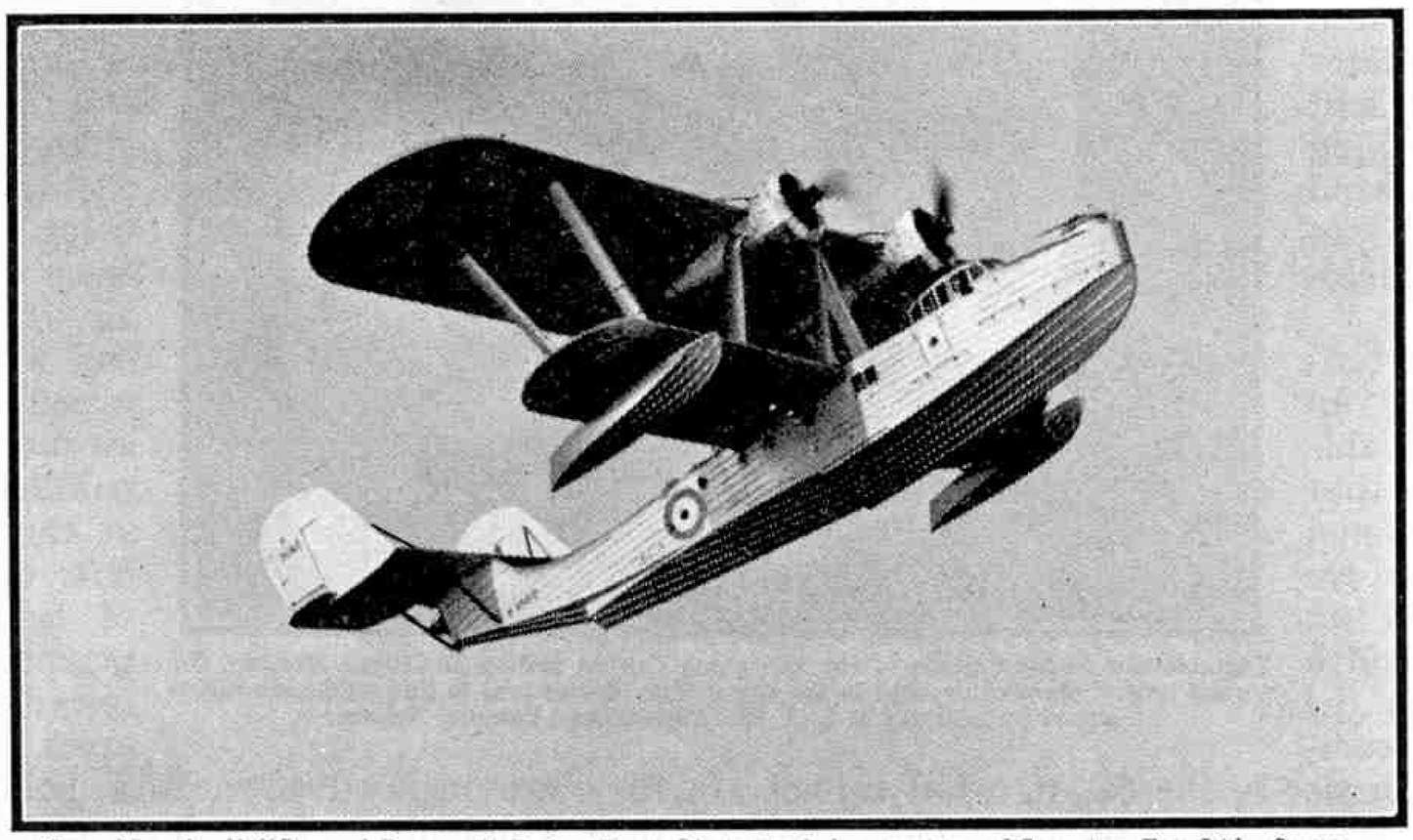


One of the Dornier Wal 10-ton flying boats used on the South Atlantic Air Mail Service of Deutsche Luft Hansa, here seen on the deck of the catapult ship "Schwabenland." Photograph by courtesy of "The Aeroplane."

Imperial Airways Notes

The extent of Imperial Airways' services continues to increase, and recent developments include the opening of an express air service between London, Rome and Brindisi. This service, via Paris, Marseilles and Rome, was begun on 28th April last by the *"Ava,"* one of the two Avro 652s recently added to the company's fleet. These machines were described in last month's *"M.M.,"* and an illustration of the *"Ava"* was given on page 340. By the new service passengers from London can reach Rome in less than 9 hrs. and Brindisi in 11¾ hrs., a saving of 31 hrs. and 38¼ hrs. respectively over the fastest surface transport to those places.

A branch line of the London to Capetown service is to be opened before the end of this year. This line will be from Khartum to Lagos, Nigeria, and therefore will provide direct communication between London and Lagos. A joint company called Elders Colonial Airways has been formed by Imperial Airways and the well-known shipping company Elder Dempster Lines, to operate internal air services in West Africa that will connect Imperial Airways' service at Lagos and the Elder Dempster mail vessels at Takoradi with the principal towns in Nigeria and the Gold Coast. The first of these services will extend the Khartum-Lagos line just mentioned to Accra, and when ground organisations have been completed at Kumasi and Takoradi the line will be further extended to link up with those places.



Saro "London" "General Purpose" Flying Boat. Photograph by courtesy of Saunders-Roe Ltd., Cowes.

The vast extent of the services operated by Imperial Airways Ltd., and its associated companies is shown by the fact that the aircraft concerned fly daily a total of between 15,000 and 16,000 miles.

Meeting Trans-Atlantic Liners

A project is in hand by British-American Air Services Ltd., of Heston, for the running of air services in the British Isles to meet trans-Atlantic liners arriving in port, and to swiftly convey passengers to their destinations. One proposed meeting place is Cobh, but an agreement with the Irish Free State Government is necessary before the company can include this port in their scheme.

"Dragon Rapide" for Prince of Wales

The Prince of Wales has acquired a D.H. "Dragon Rapide." It is painted in the Guards' colours of red and blue, like his other aeroplanes and bears the registration letters G-ACTT. The pilot's cockpit is provided with two seats, but not with dual control. According to *"Flight,"* from which our information is taken, the wireless equipment is installed against the partition separating the cockpit from the cabin, and enables communication with the ground to be maintained throughout a flight, both for navigational and personal purposes. The cabin is equipped with six comfortable chairs, and a table for writing, reading maps, etc.

The "Dragon Rapide" has a span of 48 ft., a length of 34 ft. 6 in. and a height of 9 ft. 10 in. It is a twin-engined biplane fitted with two 200 h.p. D.H. "Gipsy Six" six-cylinder engines that give it a maximum speed of 165 m.p.h. at 1,000 ft., and a cruising speed of 140 m.p.h. It takes off in 250 yds., and its rate of climb at sea level is 845 ft. per min.

More British Internal Air Lines

Almost every week new internal air services are added to the large number already operating in Great Britain. A twice-daily service between Croydon and Guernsey by way of Portsmouth and Bournemouth has been started by Cobham Air Routes Ltd. Airspeed "Envoys" are being used for the Croydon-Bournemouth part of the trip, and Westland "Wessex" triple-engined machines for the sea portion between Bournemouth and Guernsey. The machines take off from Croydon at 9 a.m. and 2.30 p.m., and from Guernsey at noon and 5 p.m.; and the full flight, including the calls at Portsmouth and Bournemouth, takes two hours.

Another important development is a group of services recently begun by United Airways, who possess three D.H. "Dragon Rapides" and two Spartan "Cruisers." The new lines consist of a direct high-speed service between London and Blackpool, run twice each way daily; a Blackpool-Isle of Man service flown four times each way daily, and daily Isle of Man–Carlisle and Isle of Man–Glasgow services.

Railway Air Services Ltd., are operating a weekday service between Liverpool and Brighton, with many calls en route giving connection with other air lines. The service is being worked with "Dragon Rapides."

Testing Aeroplane Designs

Remarkable Plant at Chalais-Meudon

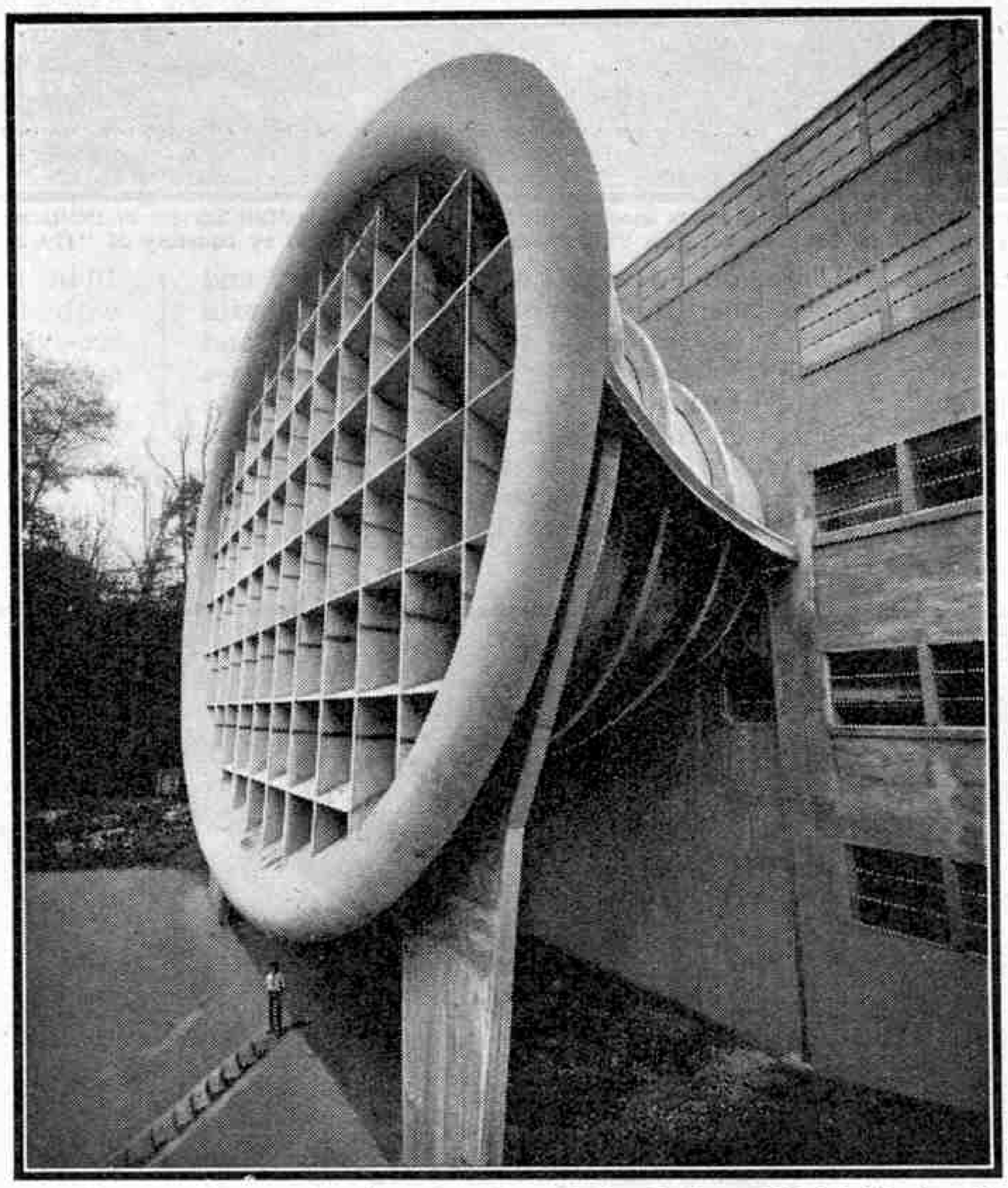
IN producing a new aeroplane the designer makes use of general principles of construction already worked out by aeronautical engineers; and even before his machine is built he is able to calculate the greatest speed it should have, and to predict various other details of its performance. Naturally he is eager to learn how the machine for which he is responsible will behave when in the air, and to obtain some idea of the manner in which it will fly he constructs a scale model and tests it in conditions similar to those in which the finished machine will operate.

The tests are carried out in what are known as "wind tunnels." In these tunnels the usual procedure in flying is reversed. An aeroplane in flight is propelled at high speed through the air, but in wind tunnel tests the model is fixed and a stream of air is driven past it by means of a powerful fan or fans. The results obtained from these tests are very helpful, and during recent years efforts have been made to achieve even greater accuracy, and to represent more closely actual flying conditions, by using wind tunnels large enough to deal with full-size aeroplanes.

There are now wind tunnels of this capacity in America, France and this country. The largest is that of the American National Advisory Committee for Aeronautics, in which an air stream 70 ft. in width can be passed through the test room. It was completed in 1931. Next in size is the 52½ ft. wind tunnel completed last year at Chalais-Meudon, France, for the Aeronautical Department of the French Government. This tunnel was built to the aero-dynamic designs of M. Lapresle, Chief Engineer of the Aeronautical Department, and to the architectural plans of M. le Marec, Director of Research at S. A. des Enterprises Limousin, the firm who built the plant and to whom we are indebted for our details of it.

The Chalais-Meudon tunnel is of the type that is built in two sections placed almost end to end, with a space between them in which the model is hung. Fans installed at the outer end of the second section suck air into the tunnel, through the inlet passage at the outer end of the first section, and the air stream thus produced is drawn across the space in which the model is fixed, into the second section, from which it escapes. The shape of each section of the tunnel is carefully designed in order to ensure that the air stream across the space shall be uniform. Measuring instruments show how the model behaves in the air stream, and the tests made in this way tell the designer what he may expect when his machine is flown.

The tunnel is in four main parts, the collector, the test room, the diffuser and the suction chamber; and we will describe them in this order.



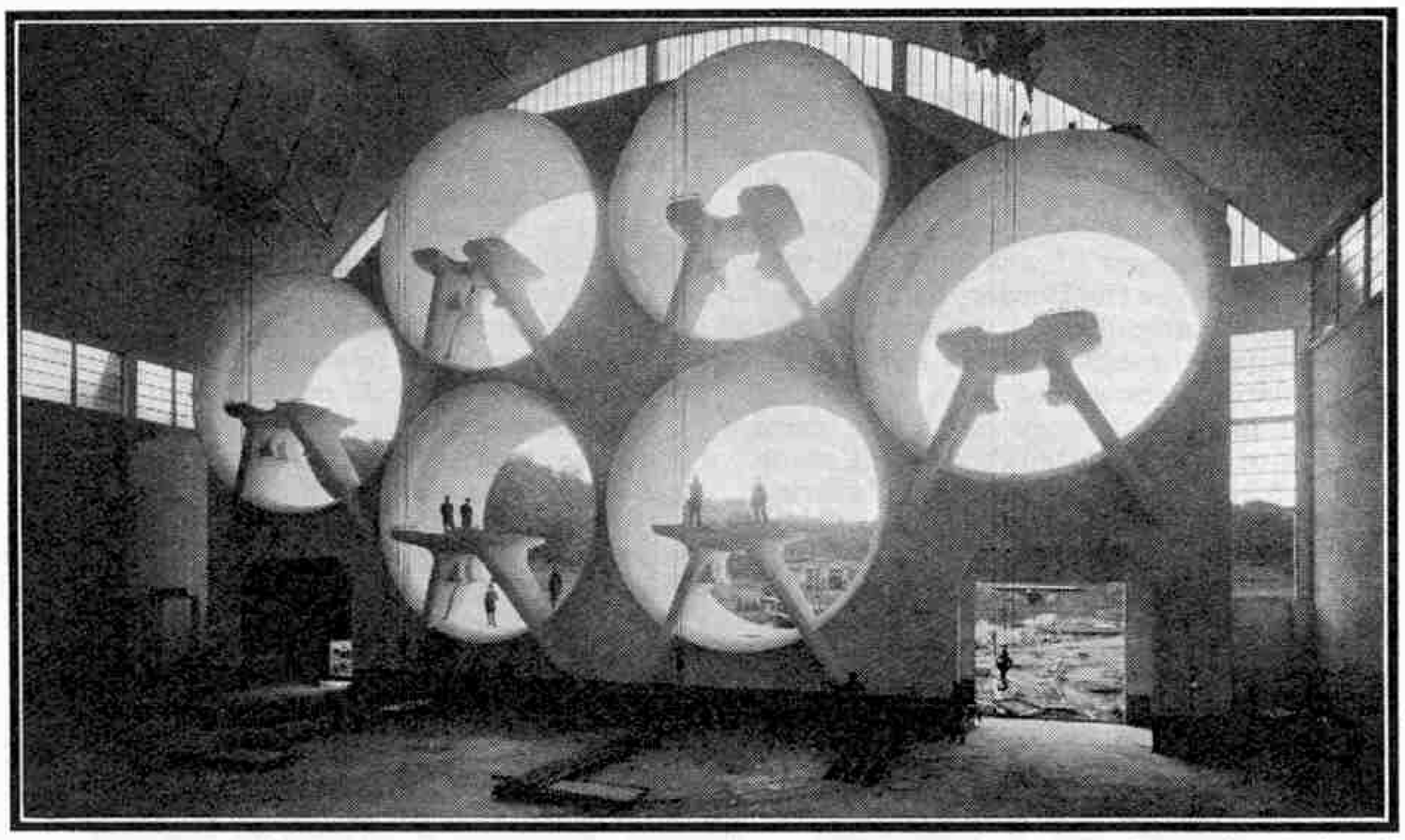
The collector or inlet nozzle of the Aeroplane Testing Station at Chalais-Meudon, the second largest plant of its kind in the world. The illustrations to this article are reproduced by courtesy of S. A. des Enterprises Limousin, France.

The collector is a huge reinforced concrete tube 50½ ft. in length and of elliptical cross-section. It is a tapering structure, and diminishes from a width of 81 ft. 4½ in. at the outer end to 52½ ft. at the other end, where it is attached to the test room. The illustration on this page gives a good idea of its construction and, by comparison with the man, of its great size. The collector is supported at the outer end by a gantry and is strengthened by ribs on the outside. In addition to being carefully shaped to ensure a uniform flow of air, it is equipped at each end with a screen, or filter, which divides the blast of air into a number of smaller parallel streams. The filter at the outer end is nearly 5 ft. deep and is built up of thin vertical and perpendicular slabs of reinforced concrete spaced 6½ ft. apart and fixed so that they are inclined towards a point at the middle of the second filter. The edges of the slabs are bevelled so as to reduce air resistance as much as possible. The filter at the test room end of the collector is of similar design, but is constructed of metal.

The test room is a remarkable chamber, and to a visitor unacquainted with its purpose it presents an unusual sight. It is lofty, spacious and at first sight seems to be devoid of equipment. There is a huge circular hole in one wall where the collector opens into the room, and an even larger aperture in the facing wall where the diffuser begins. The room is 225 ft. 4¾ in. long, 55 ft. 7 in. wide, and 68 ft. 10 in. high, and the part of the room that is in the path of the air stream is unobstructed up to a height of 49 ft. 3 in. Above that height there is a 5-ton travelling crane that runs

the full length of the room, and an observation gallery along three of the walls. The powerful device that supports an aeroplane in position during a test is normally out of sight, as it is accommodated in a recess in the floor of the room and its top is flush with the floor. Large metal shutters cover the two huge apertures in the walls, and when the tunnel is required for use the shutters move downward into the basement.

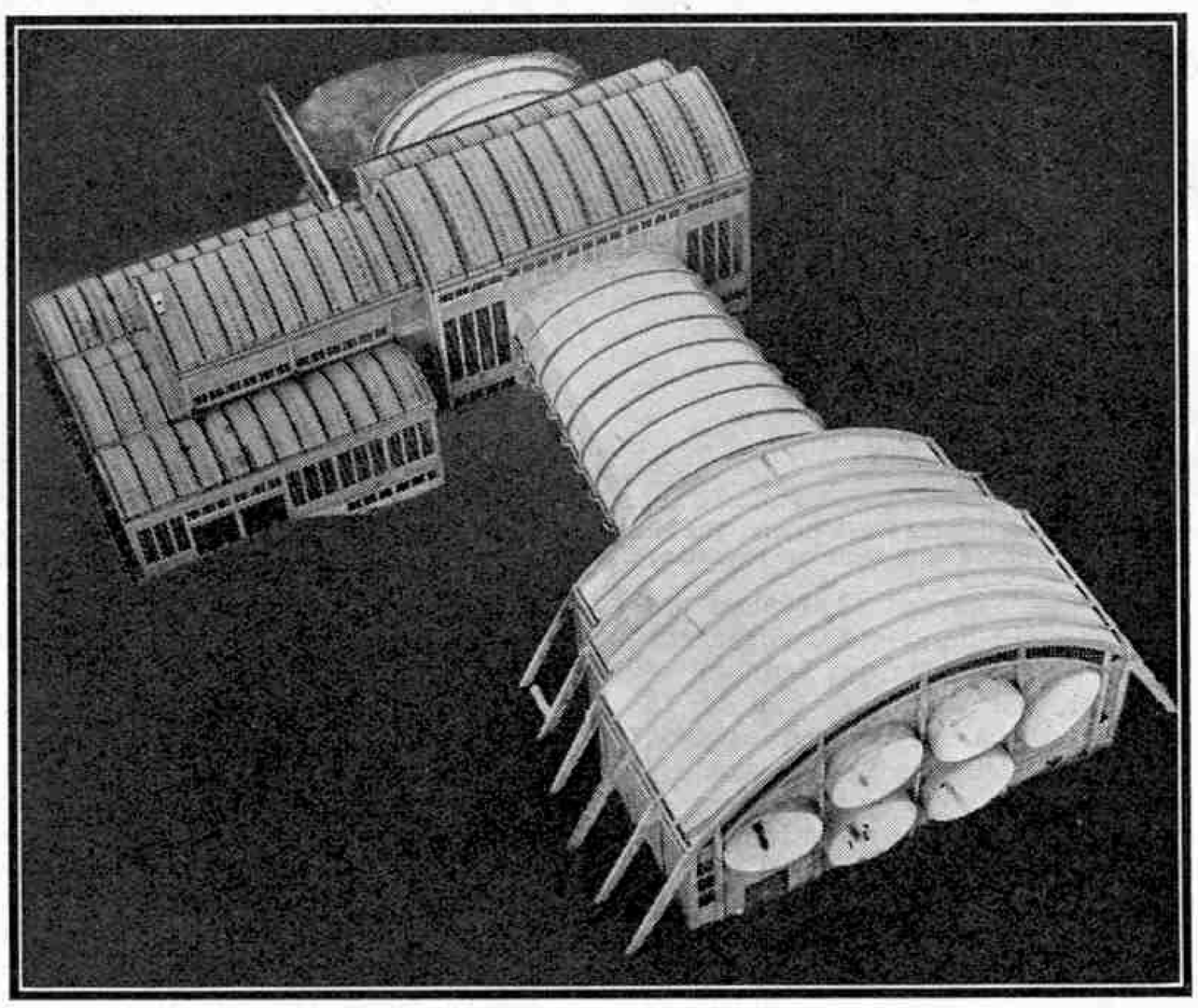
The diffuser is similar to the collector in being a reinforced concrete tube of elliptical cross-section, but it is on a much larger scale. It is 124 ft. 7 in. long and has a maximum width of 75 ft. 6 in. and a maximum depth of 49 ft. 3 in. It is strengthened externally by ribs spaced about 11 ft. 9 in. apart, and is supported only at its mouth and at its other end, where it is attached to the suction chamber, a lofty room with an arched roof and varying in height from 74 ft. to 85 ft. The upper illustration on this page is an interior view of the chamber, looking towards the outside end wall. The six reinforced concrete frames are seen ready for the installation of the fans that draw the air through the tunnel and pass it out of the structure. The frames are of cylindrical cross-section and are shaped like truncated cones, and the "stool" arrangement shown attached to each one is a platform, mounted on brackets corbelled into the wall, to carry the fan and its motor. The frames and the platforms are built between two concrete walls, the end wall of the chamber serving as one of them. The two walls are independent of the remainder of the structure so as to reduce vibration in it, and the space between the top of the outside wall and the arched roof is filled in with glass. Each fan is of $28\frac{1}{2}$ ft. diameter and is driven by a 1,000 h.p. electric motor.



The interior of the Suction Chamber, showing the six concrete frames and platforms ready for the installation of the fans and their 1,000 h.p. electric motors.

The construction of the wind tunnel was begun on 1st July, 1932, and was completed on 1st October of last year. A total of roughly 176,500 cu. ft. of reinforced concrete and 70,600 cu. ft. of ordinary concrete were used in the work; and 700 tons of iron and 38,830 cu. ft. of wood also were required.

A 24-ft. wind tunnel, just under half the size of the one at Chalais-Meudon, has been built at the Royal Aircraft Establishment, South Farnborough, and was officially opened on 5th April last by the Marquess of Londonderry, Secretary of State for Air. It is a different type from the French plant. A six-bladed fan of 30 ft. diameter and driven by a 2,000 h.p. electric motor produces the air stream, which is drawn through an inlet nozzle to the test room, and across this into an outlet nozzle, in which the fan is situated. The fan, in passing on the air, sets up rotation in it and this is removed by tapered deflectors, after which the air stream flows through the tunnel by a route that brings it back to the inlet nozzle, so that it can be used again. The test room is large enough for a machine of up to 56 ft. span to be mounted in the path of the air stream, but as the working diameter of the stream is only 24 ft., a considerable portion of each wing of such a machine would be outside it.



A general view of the Chalais-Meudon plant. The Collector is at the top of the photograph and the Suction Chamber is in the lower foreground.

The aeroplane for test is lifted by a 3-ton crane and swung on to a platform where it is attached to the upper ends of five movable struts, or arms, which then raise it into the path of the air stream.

The wind tunnel is used also for testing scale models of up to approximately 18 ft. span. A model for test is hoisted through an opening in the ceiling of the test room into one of two model aircraft bays on the first floor of the building, where it is slung upside down, by means of wires, from a device called a balance car. The car and its suspended load are then run along an overhead track to the underside of a lift which lowers them until the model is correctly aligned in the centre of the air stream. Test observers are stationed on the car.

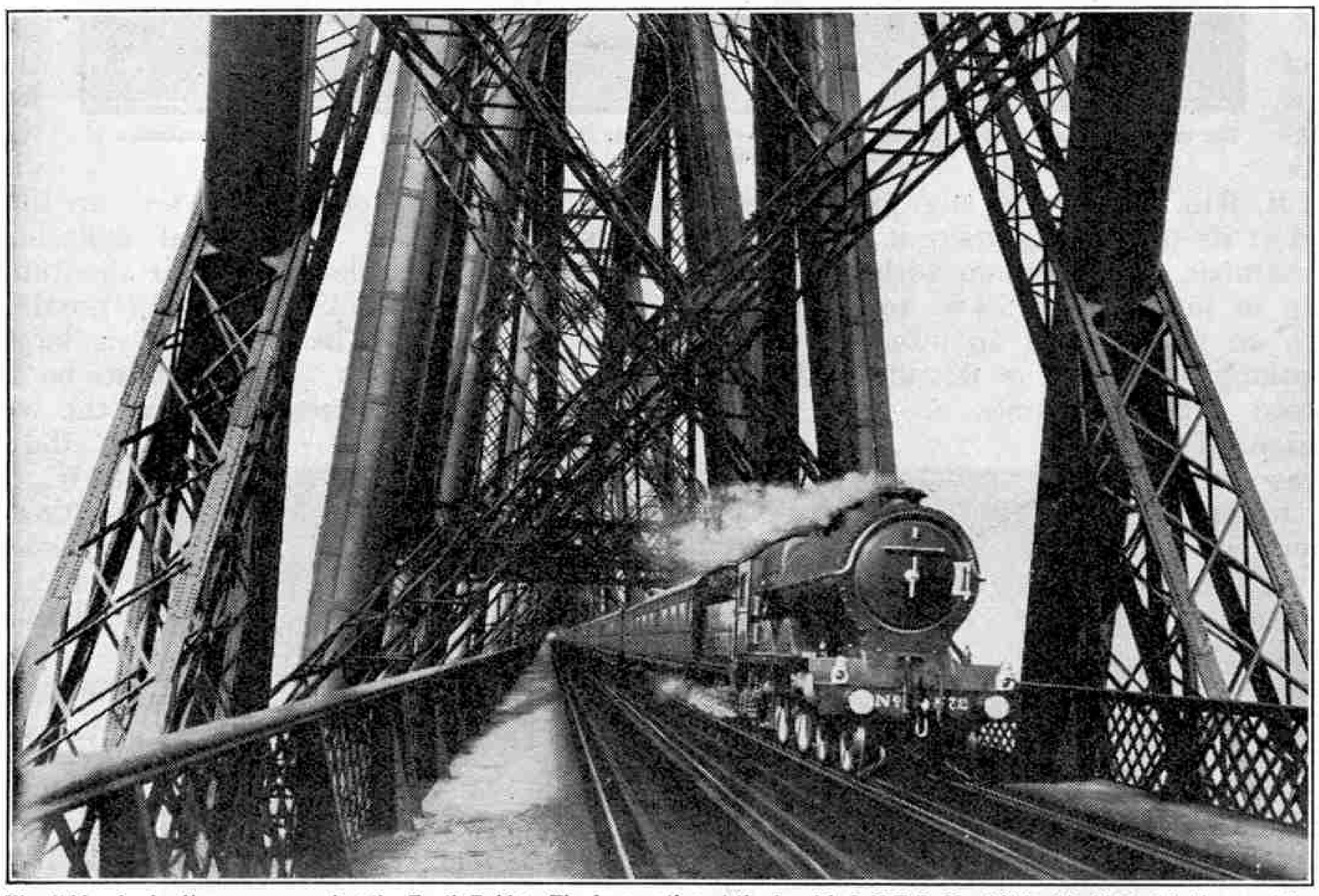
Footplate Runs on the L.N.E.R.

III.—The "*Aberdonian*"

By a Railway Engineer

MY down trip on this express actually began at King's Cross, but over the English part of the journey the "*Aberdonian*" makes considerably slower running than the day Scottish expresses, and in the warmth and comfort of a "sleeper" I was quite oblivious of the locomotive work until we were over the Border. At 3.20 a.m., just as we passed Dunbar, the attendant called me and brought the cheerful news that we were running through a heavy snowstorm. The wind howled in the ventilators, snow and sleet spluttered against the window panes, and inside this cosy berth the mere thought of riding on the footplate from Edinburgh onward made one shudder involuntarily. However, when we reached Waverley the snow had ceased, but at that hour in the morning it was mighty cold all the same.

During the winter this train, in addition to its main portion for Aberdeen, carries through coaches and sleeping cars for Inverness and Fort William, and at Edinburgh extensive re-marshalling takes place. A Great Central "Director" class 4–4–0 took charge of the Inverness portion, while a "Shire" class 3-cylinder 4–4–0 was waiting near by to take over the Fort William section, which of course travels via Glasgow. Our engine was a "Super Pacific," No. 2795, "*Call Boy*," in charge of Driver Donaldson and Fireman Park of Haymarket shed, Edinburgh. The cab arrangements of these engines are exactly the same as those of the ordinary "Pacifics," which I described when dealing with the 1.20 p.m. "Scotsman," except that they are driven from the left instead of the right-hand side. After the addition, to the portion that had come through from London, of several heavily-freighted parcel vans, our load was one of 13 coaches, 401 tons tare, and 420 tons with passengers and luggage.



The "Aberdonian" express crossing the Forth Bridge. The locomotive at the head is L.N.E.R. No. 9872, "Auld Reekie," one of the N.B. "Atlantics" long identified with the most important East Coast duties, but now partially displaced by the "Pacifics."

This route, like the continuation from Dundee to Aberdeen, is very severe. The actual gradients are neither so steep nor so long as on the latter section, but at the foot of many of the worst banks are complicated junctions that demand speed reduction to 25 m.p.h. or less. The accompanying gradient profile will help readers to appreciate what a handicap to fast running these service slacks are. The hindrances are well reflected in the timings, for this train, the fastest between Edinburgh and Dundee, is allowed 81 minutes to cover the 59¼ miles, an average speed of only 44 m.p.h. Nevertheless, as we shall see in a minute, it means real hard going to keep time.

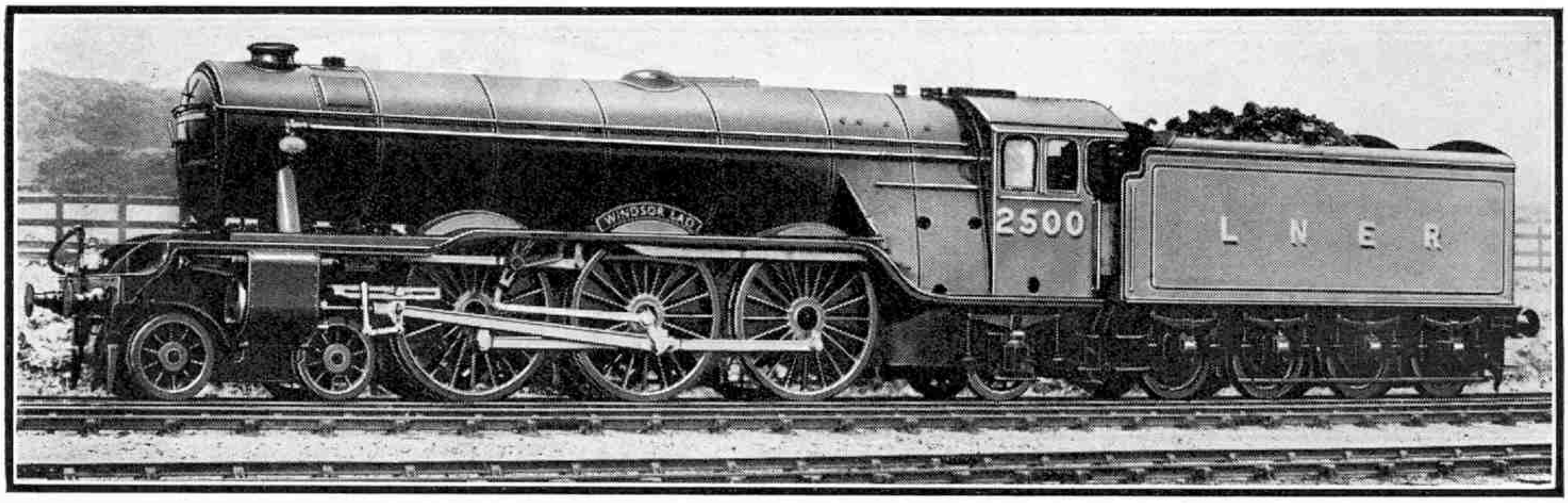
We got away in good style. Attaining 65 m.p.h. at Turnhouse, and taking the subsequent rise without going below 50, we were through Dalmeny, 9½ miles in 13¼ minutes; so, on to the Forth Bridge. The passage was an unforgettable experience. Through rifts in the stormy sky the moon shone out and revealed great banks of snow-laden clouds over the sea. The mighty girders were silhouetted weirdly against the night sky; as we passed underneath, each cross member was lit up by the glare of the fire.

After passing over the bridge at reduced speed we accelerated rapidly, but had not got above 57 down the steep subsequent descent when the brakes went hard on again for the 25 m.p.h. slack through Inverkeithing. We passed this junction, where the line to Perth goes off, in 18¾ minutes for the distance of 13¼ miles from Edinburgh. The driver now opened out to full regulator for the ascent to Dalgetty. At first 33 per cent. cut-off was used, but about half way up Donaldson opened out still further to 40 per cent., and the engine steadily accelerated until we breasted the summit at 27 m.p.h. For the first two miles of the ensuing descent to Burntisland the curves preclude any high-speed running, but beyond Aberdour, where the line is just above the shore of the Firth of Forth, we got up to 55 m.p.h. At this point Edinburgh is directly across the water, only six miles away as the crow flies; and even at this early hour the port of Leith was ablaze with lights. We slackened severely through Burntisland and then swung round northward.

Working on full regulator and 33 per cent. cut-off, "*Call Boy*" picked up to 52 m.p.h. through Kirkcaldy and then mounted the 3¼ mile rise to Dysart, where the grade varies between 1 in 100 and 1 in 130, at the fine minimum speed of 38 m.p.h. Almost immediately afterwards came the severe slowing to 15 m.p.h. through Thornton Junction, which station, 30¾ miles from Edinburgh, was passed in 45¾ minutes. Recovery of speed now had to be made up the ascent to Lochmuir, the highest point between Edinburgh and Dundee. Donaldson gave the engine full regulator and 40 per cent. cut-off, and the result was an extraordinarily fast climb with speed rising to no less than 46 m.p.h. at Markinch, and not dropping below 38 on the steep final pitch, which is at 1 in 102½. A moment or so later we were sweeping merrily down the Falkland Road bank at 68 m.p.h., but such gay progress cannot be sustained for long over this winding route, and we were soon easing up for the 35 m.p.h. slack through Ladybank Junction. We passed this important Fifeshire railway centre, 39 miles from Edinburgh, in 57½ minutes.

Immediately beyond came a severe slack for permanent way repairs, but after this the grades are more favourable and we were able to run the 12¼ miles from Springfield to St. Fort in 13½ minutes, though even this time included the careful observance of two less severe service slacks, at Cupar and Leuchars Junction. Through both these stations speed is limited to 55 m.p.h.

Now we swung over Tay Bridge South Junction, and there two miles across the Firth was Dundee. It was just after half-past five, the waterfront was a far-stretching chain of twinkling lights, and out across the sea there was a faint gleam of dawn. We coasted smoothly over the Tay Bridge and then, curving round through Esplanade station, completed the 59¼ miles in 83¼ minutes. We were 2¼



minutes late, but this loss was due to the permanent way check between Ladybank and Springfield. At Dundee "*Call Boy*" came off and was replaced by "*Duke of Rothesay*" and "*Lady of Avenel*"—a N.B. "Atlantic" and a 4–4–0 of the "Scott" class. I have already recorded, in the June 1935 issue of the "*M.M.*," how these two engines in partnership more than recovered a late start of four minutes and brought us into Aberdeen three minutes early.

The up "*Aberdonian*" leaves the Granite City at 7.35 p.m. For half-an-hour before starting time the scene on the platform is very animated. A connecting train arrives from Elgin, nowadays in charge of an ex-Great Eastern 4–6–0, and conveying in the summer months a through sleeping car from Lossiemouth to King's Cross. Another connection arrives from Ballater, bringing passengers from Balmoral and Braemar. Sleeping car attendants, standing at the doors, check off their lists as patrons arrive; occasional kilts and plaids add a flash of brilliant colour to the scene. Meanwhile, at an adjacent platform, the L.M.S.R. "*Royal Highlander*" is drawn up, a big Stanier 4–6–0 at its head; this train leaves for Euston at 7.50 p.m.

On this occasion our load was one of 414 tons tare and 440 tons loaded. Once again the North British 4–4–2 "*Duke of Rothesay*" was the train engine, piloted on this trip by No. 9729, an early N.B. 4–4–0 of Holmes design, with 6 ft. 6 in. driving wheels. I travelled in the train over the northern part of this journey and with good team work between the two engine crews we ran slightly ahead of time the whole way, reaching Dundee in 104 minutes, inclusive of stops at Montrose and Arbroath.

Here the two North Britishers were exchanged for one of the very latest "Super Pacifics," No. 2500, "*Windsor Lad.*" There is always a subtle fascination about riding on the footplate at night, but on this trip I found it more exhilarating than ever. Perhaps the abrupt change from travelling as a passenger heightened the effect. The confused noise and racket, the icy-cold steel of the cab sides, the tang of coal, the smell of hot oil, and no light save that of the fire—all that goes to make up that strangely fascinating atmosphere of the footplate—made a vivid contrast indeed with that of the dining car I had just left, with its tasteful upholstery and soft shaded lights on the tables.

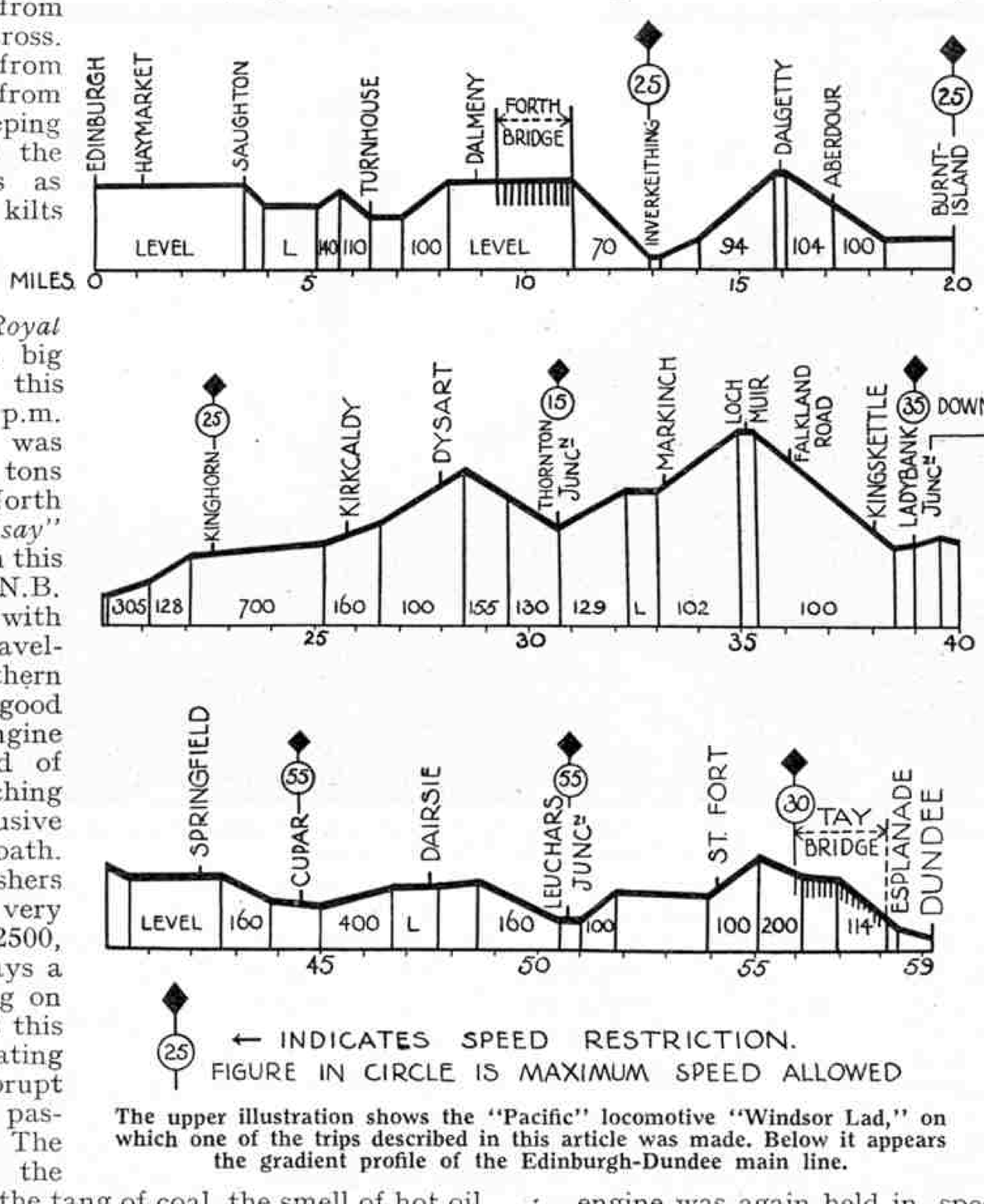
Driver Douglas and Fireman Hood, another Edinburgh crew, were in charge. Sharp on time came the "right away," and we started up the steep rise on to the Tay Bridge. Douglas began with full forward gear, 65 per cent. cut-off, with the regulator only partly open; but by Esplanade, ¾ mile out, he had linked up to 40 per cent. and opened the regulator to the full. We got across the Firth in great style, passing Tay Bridge South Junction, 2¾ miles in 7¾ minutes. Here cut-off was brought right back to 20 per cent. and we were soon travelling at a mile a minute.

We touched 64 m.p.h. beyond St. Fort, eased to 55 through Leuchars Junction, and then, still going on 20 per cent., tackled the rising grades beyond "at the double." Despite two lengths of 1 in 160 ascent, one over two miles long, speed never went below 50 m.p.h., and we passed Ladybank Junction 20 miles in 26½ minutes—2½ minutes early already. Here speed was eased to 50 m.p.h. for the curve, but as we passed through the regulator was pulled out to full open and cut-off advanced to 25 per cent. Accelerating with tremendous rapidity we passed Kingskettle, only a mile farther on, at 62, and then tackled the 3¼ mile climb at 1 in 100 to Lochmuir. Speed gradually fell to a minimum of 31½ m.p.h., a notable rate with only 25 per cent. cut-off and a 440 ton load.

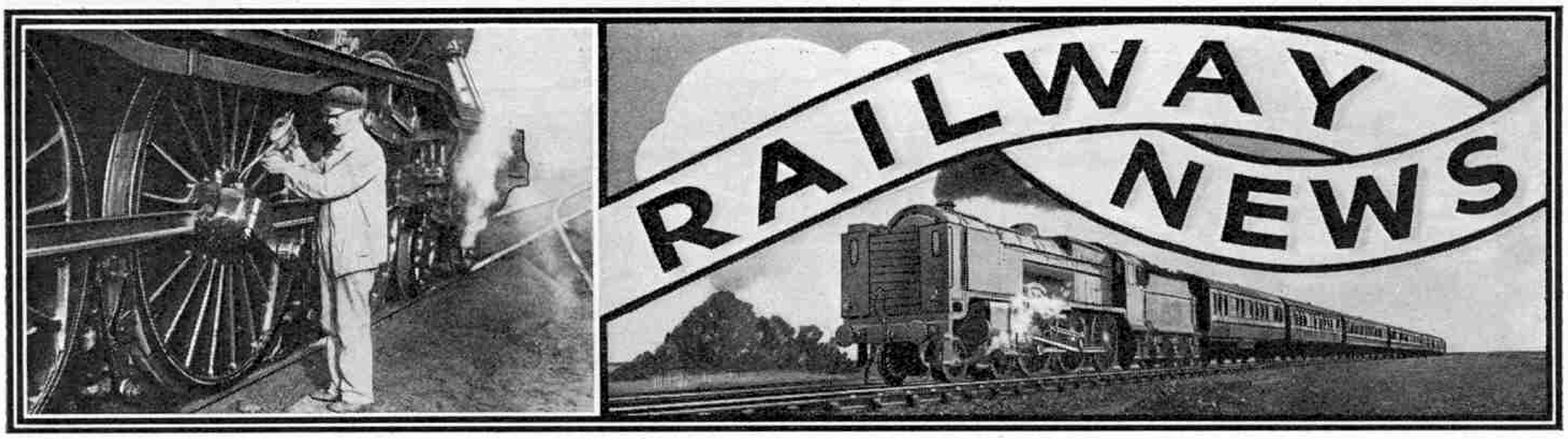
On the succeeding descent speed was not allowed to exceed 57 m.p.h., and then came the 15 m.p.h. slack through Thornton. The driver now opened up to 30 per cent., and, at the summit of the stiff rise at 1 in 130-155 that follows, "*Windsor Lad*" had accelerated to 27½ m.p.h. The descent past Kirkcaldy is one of the few stretches where speed can be worked up to 70 m.p.h. with safety, but on this occasion permanent way repairs were in progress, and instead of doing 70 or so we had to slow up to 15! We had not recovered much speed when there came the regulation slack to 25 m.p.h. at Kinghorn, and then 2½ miles farther on, to 25 again through Burntisland. In spite of the two slowings coming so close together, we worked up to 50 m.p.h. between them.

Now came the ascent past Aberdour to Dalgetty. From passing round Burntisland curve at 25, there is a mile of level on which to get a run at it. On full regulator and with 30 per cent. cut-off, "*Windsor Lad*" attained 44 m.p.h., and then took the bank at a minimum speed of 31½ m.p.h. On the steep down grade to Inverkeithing that follows, the engine was again held in, speed not exceeding 60 m.p.h., and we passed through this junction, 46¼ miles from Dundee, in 66 minutes at the prescribed speed of 25 m.p.h. The effect of the colliery slowing before Thornton and the permanent way check at Kirkcaldy was to make us lose 4¼ minutes, and we passed Inverkeithing just over a minute late; but by a fine concluding effort nearly half a minute was won back over a section having a very stiff point-to-point timing.

Immediately following the Inverkeithing slack comes the fearsome ascent on to the Forth Bridge—2 miles at 1 in 70. Douglas opened out to 40 per cent. cut-off, but despite this strenuous working speed steadily fell off until we passed on the bridge at no more than 17½ miles per hour. Once again (*Continued on page 440*



The upper illustration shows the "Pacific" locomotive "Windsor Lad," on which one of the trips described in this article was made. Below it appears the gradient profile of the Edinburgh-Dundee main line.



L.M.S.R. Locomotive News

Following its exhibition at Euston, the "5X" class locomotive No. 5552, *"Silver Jubilee,"* has been in traffic since 8th May. It is being allocated to various Motive Power Depots in turn, and used on various routes in order to allow as many people as possible to see it.

The 4–6–2 locomotives Nos. 6200 and 6201 are now provided with high-sided tenders of the latest pattern. The double chimney has been removed from No. 6201.

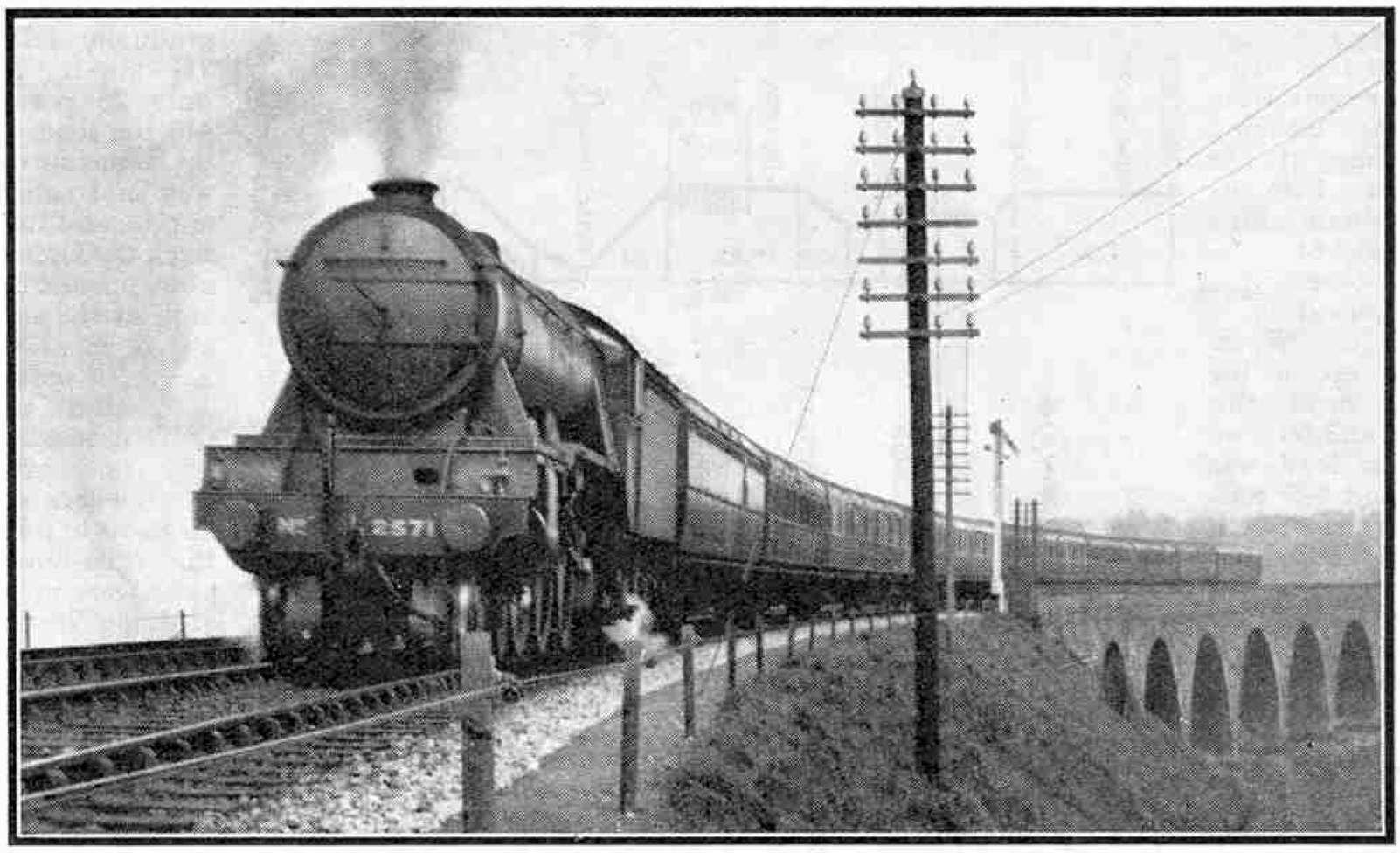
New mixed traffic locomotives of the 2-cylinder 4–6–0 "5P5F" class are in course of delivery from Sir W. G. Armstrong Whitworth and Co. Ltd. This series commenced with No. 5125, and the engines are being delivered at the rate of three or four per week. The delivery of the order for 100 engines will be completed by the end of the year.

The withdrawal of the ordinary unrebuilt "Claughtons" continues, and among those recently taken out of service is No. 5900, *"Sir Gilbert Claughton,"* the first of the class built at Crewe in 1913. It will be interesting to see whether No. 5964, *"Patriot,"* of this class, the War Memorial engine of the late L.N.W.R., will be allowed to suffer the same fate. Possibly the L.M.S.R. will find it possible to preserve it in view of its special associations, and also as an example of a distinct and interesting design.

The withdrawal of No. 5235, *"Moonstone,"* the last of the 4–4–0 "Precursor" class using saturated steam, closes another chapter of Crewe locomotive history. It was built in January 1906 as L.N.W.R. No. 2583, *"Teutonic,"* but in November 1914 its title was altered to *"The Tsar."* Then in December 1915 it became *"Moonstone,"* as the name *"Czar of Russia"* had been allocated to a "Prince of Wales" class engine built just previously. Following the renumbering scheme introduced after the formation of the L.M.S.R. group it became No. 5235.

The "Royal Scot" class locomotive No. 6130, originally named *"Liverpool,"* is now *"The West Yorkshire Regiment."* No. 5536 of the "Baby Scot" class is now named *"Private W. Wood, V.C.,"* thus perpetuating the title of the "Claughton" locomotive that it has replaced.

The introduction of the standard 2–6–4 3-cylinder tank locomotives on to the L.T. & S. Section has resulted in the displacement of several of the characteristic "Tilbury" 4–4–2 tanks. These have been transferred to other districts on the Midland Division of the L.M.S.R. The engines concerned are Nos. 2092 to 2109. Of these Nos. 2092 and 2093 are at Leicester, Nos. 2094/5/6/7 and 2102/3 are at Nottingham, and the remaining 10 are stationed at Saltley (Birmingham).



An L.N.E.R. express hauled by Gresley "Pacific" No. 2571 "Sunstar." The train is just coming off the Royal Border Bridge at Berwick. Photograph by O. S. Nock, Bushey.

Electrical Indicator at Paddington

To the numerous improvements for the benefit of the travelling public that have been made at Paddington Station, there has been added an electrical indicator that shows the time, destination and the platform of departing trains. Platform numbers are worked independently so that any alterations that occur can be effected immediately. The aspect of the indicator is changed by an electric motor situated inside the casing which operates automatically at intervals, thus removing one setting of the indicator and bringing into view the next series of trains. The total number of trains that can be shown daily on the indicator is 290.

New G.W.R. Excursion Trains

There are now in service on the G.W.R. two new trains consisting of 10 coaches each that are specially adapted to the requirements of long-distance excursion traffic. Each train is constructed on the centre-corridor plan so that meals can be served throughout, from the two kitchen cars conveniently situated in the formation, without the necessity for passengers leaving their seats and proceeding to a separate dining car. The new vehicles are uniformly 60 ft. long and 9 ft. wide and they are of pleasing external elevation. They have fireproof floors, and the roofs and the outside body panels are of steel. The underframes also are of steel and are carried on pressed steel bogies having a wheelbase of 9 ft.

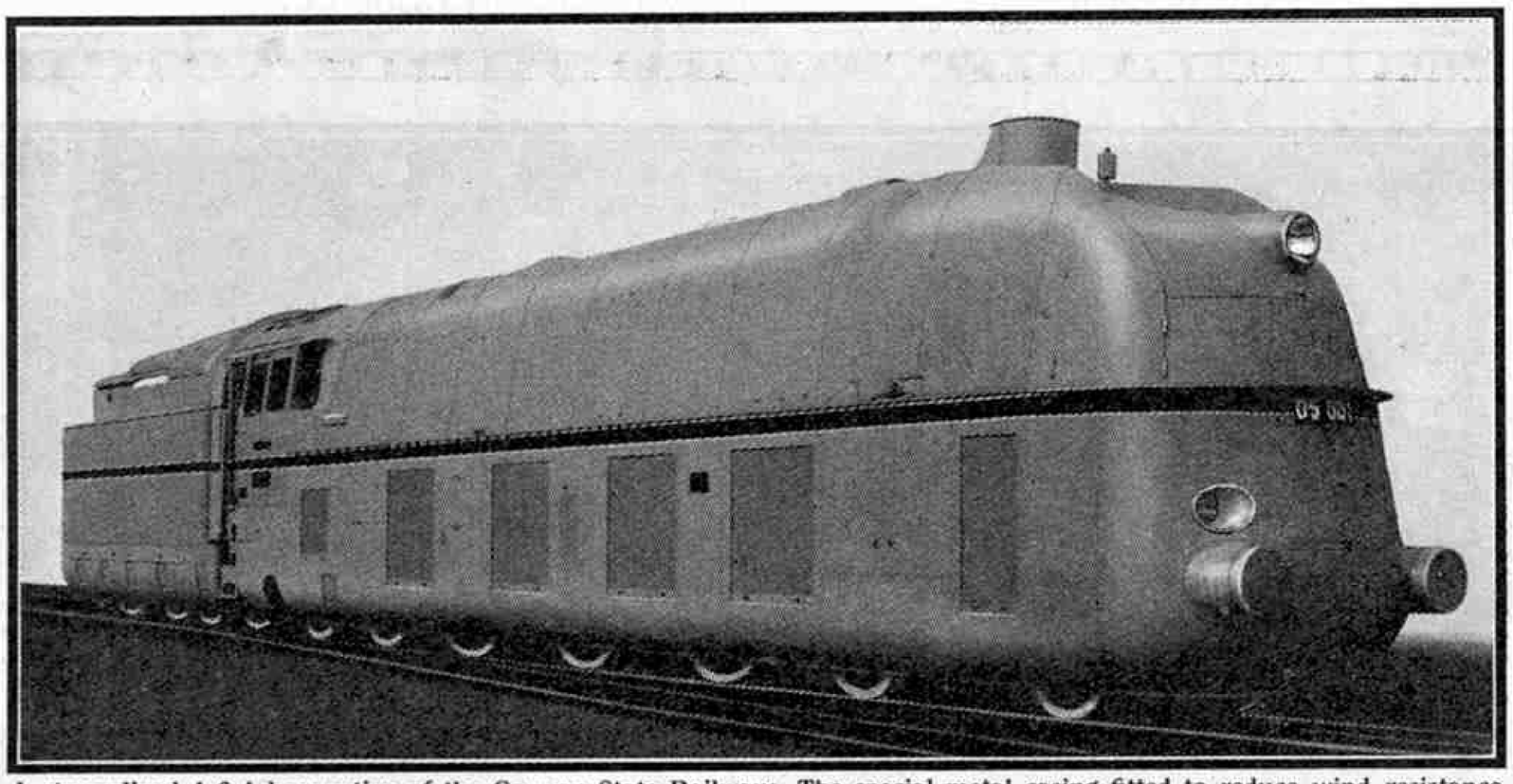
Doors are provided in the centre and at one end of each complete passenger vehicle, and the seats, which are numbered for the convenience of passengers, are arranged in groups of four to each table on each side of the centre corridor. Each table has a bell-push to enable passengers to summon the attendant, and the appointments are of a high standard.

Standard Colours for Railway Tickets

It has been decided to standardise the colours used for all British railway tickets. This will enable any kind of ticket to be identified readily, thus assisting in their issue and checking, and minimising the chance of confusion. Ordinary first-class and third-class tickets are to be white and green respectively. First-class tickets for day, half-day and evening excursion purposes are to be yellow, and third-class buff. Children's tickets will be coloured the same as those for adults, and workmen's tickets will be grey. Tickets for bicycles, dogs and perambulators will be terra-cotta, red and pink respectively. The new colours will come into use as soon as existing stocks of tickets are exhausted.

German Streamlined Locomotive

With a view to examining the possibilities of a streamlined steam locomotive, the German State Railways have had built by the Borsig Lokomotiv-Werken a 4–6–4 tender engine that is almost totally enclosed in a metal casing of smooth external contour. This casing shrouds the various projections above and around the locomotive boiler, except for the chimney, and it has also been found possible to provide almost complete covering for the wheels and the outside motion. Hinged cover plates and sliding shutters are provided to render the motion and wheels accessible. With a view to the easy maintenance of high speeds the driving wheels have the exceptional diameter, for a coupled engine, of 7 ft. 6 in. The usual driving wheel diameter for the standard passenger locomotive of the German State Railways is 6 ft. 6.7 in. This streamlined locomotive is of the 3-cylinder type, and steam is supplied from a boiler pressed at 284 lb. per sq. in.



A streamlined 4-6-4 locomotive of the German State Railways. The special metal casing fitted to reduce wind resistance gives the engine and tender a remarkable appearance. Photograph reproduced by courtesy of the builders, Borsig Lokomotiv-Werken, G.m.b.H. of Berlin-Tegel.

The tender is a 10-wheeler holding 10 tons of coal and 8,143 gallons of water, and is of improved capacity as compared with the existing standard tenders of the German State Railways. Special coal-pushing apparatus in the tender is operated by compressed air and forces the coal forward for the fireman. The fire-door also is automatically operated through the same medium. The fireman's work is thus lightened to some extent, and the enginemen are enabled to give as much attention as possible to watching the track and the signals. Sufficient brake power is ensured by the fitting of brake blocks to all the locomotive wheels, with the exception of the leading wheels on the front bogie. The total weight of the engine and tender in working order is 212 tons, and it is designed to be able to draw an express train of five vehicles at a speed of 108 m.p.h.

G.W.R. Locomotive Names

Two G.W.R. 4–6–0 locomotives have recently had their names changed. These are No. 4066, formerly *"Malvern Abbey,"* which is now named *"Sir Robert Horne"* in honour of the G.W.R. Chairman; and No. 2978, formerly *"Kirkland,"* which is now named *"Charles J. Hambro"* after the Deputy-Chairman.

A Notable Miniature Locomotive

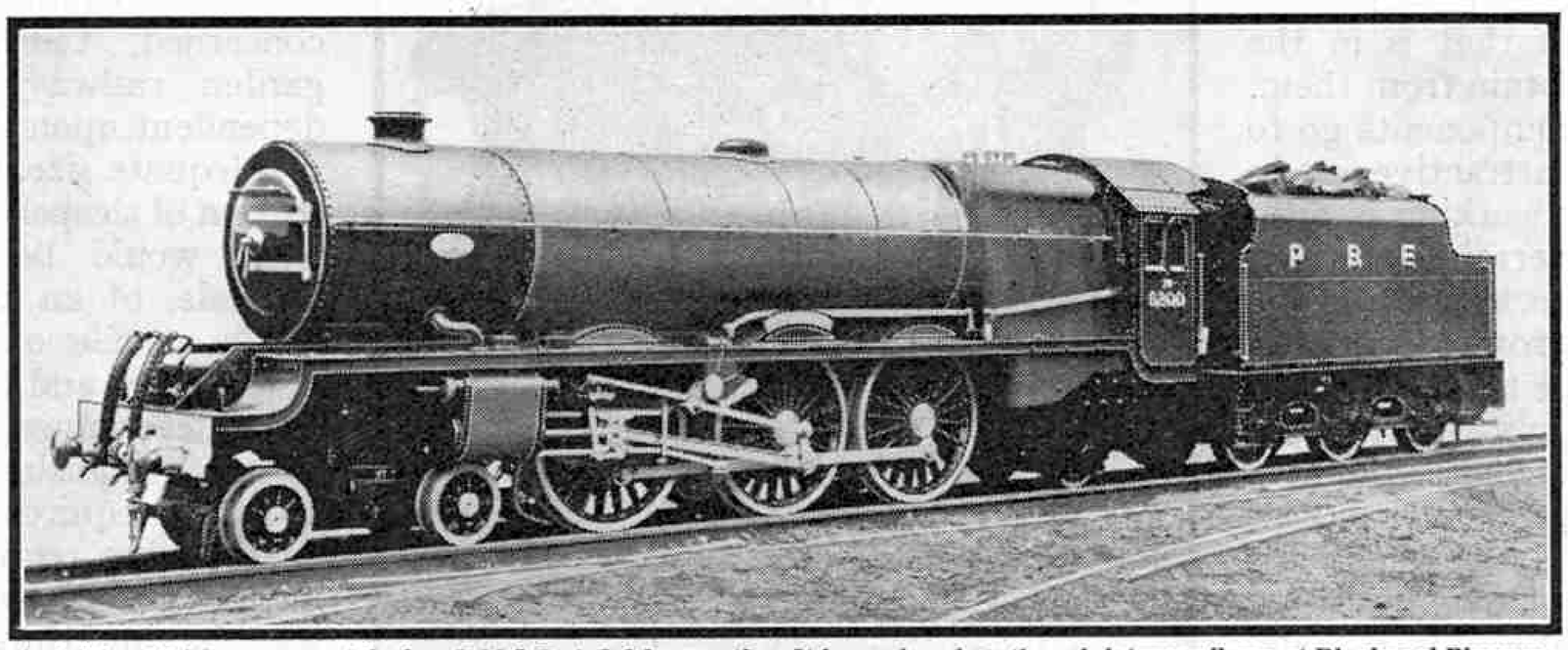
In the lower photograph on this page is illustrated a very fine reproduction in miniature of the famous L.M.S.R. locomotive No. 6200, *"The Princess Royal."* It is used on the 15 in. gauge Pleasure Beach railway at Blackpool, and is an interesting instance of the never-failing attraction of the steam-type locomotive. Although the locomotive is actually driven by a Diesel engine, its external design has been made to reproduce closely the various characteristic features of the famous L.M.S.R. 4–6–2 class. Power is supplied by a 32.5 h.p. 2-cylinder Diesel engine running at 1,000 r.p.m. A torque converter is situated between the engine and the gear-box, which was supplied by David Brown and Sons Ltd., of Huddersfield.

Veteran "Single-Wheeler" Retires

After running 780,000 miles during its career of almost 50 years, the last "single-wheeler" locomotive to remain in regular passenger service in Great Britain has now been withdrawn. This is L.M.S.R. 4–2–2 locomotive No. 14010, originally built in 1886 for the Edinburgh Exhibition of that year, and subsequently acquired by the Caledonian Railway. It was a consistent performer in the 1888 "Race to Edinburgh" that was contested between the East Coast and the West Coast Routes. On one occasion it ran the 100¾ miles from Carlisle to Edinburgh, with a load of four coaches, at an average speed of 59 m.p.h. For a "single-wheeler" this was a notable performance over a heavily graded road.

After a period of express train running, increasing loads compelled the allocation of the engine to inspection saloon working, and on these duties it was long a familiar sight on C.R. metals. Remarkably enough, however, after being reboilered in 1927 it was reinstated in traffic in 1930, being engaged in passenger service between Perth and Dundee and in piloting heavy summer trains between Perth and Stirling. Now, however, it has been retired and, as announced some time ago in the *"M.M.,"* it is fortunately to be preserved at St. Rollox Works as an example of a historic type and a famous engine individually.

A complete account and an illustration of No. 14010 appeared on page 762 of the *"M.M."* of October 1933.



A striking 15 in. gauge model of an L.M.S.R. 4-6-2 locomotive. It is employed on the miniature railway at Blackpool Pleasure Beach and is driven by a 2-cylinder Diesel engine. Photograph by courtesy of the makers, Hudswell Clarke and Co. Ltd., Leeds.

Steel Signal Posts for the L.M.S.R.

It has been decided by the L.M.S.R. that steel is to be used in future for the majority of their signal posts. The new steel posts will be erected in place of the existing timber ones as the latter require renewal, so that it will be some time before the timber post disappears from the L.M.S.R. system. The steel posts will be of two types. For all signals less than 30 ft. high above rail level they will be of tubular form; for signals of a greater height than 30 ft. posts of lattice construction will be employed. Lattice steel posts have been used for many years for signals on the Scottish lines. It is interesting to note that the shorter tubular posts will be painted in a special manner in order to render them more easily distinguishable. They are to be finished in alternate bands of black and white, similar to the posts used for road signs.

The decision to standardise steel posts on the system generally will be of benefit to British industry. In recent years there has been some difficulty in obtaining timber of the requisite length for very tall posts, some of which, on the main line between Euston and Carlisle, are as much as 70 ft. high.

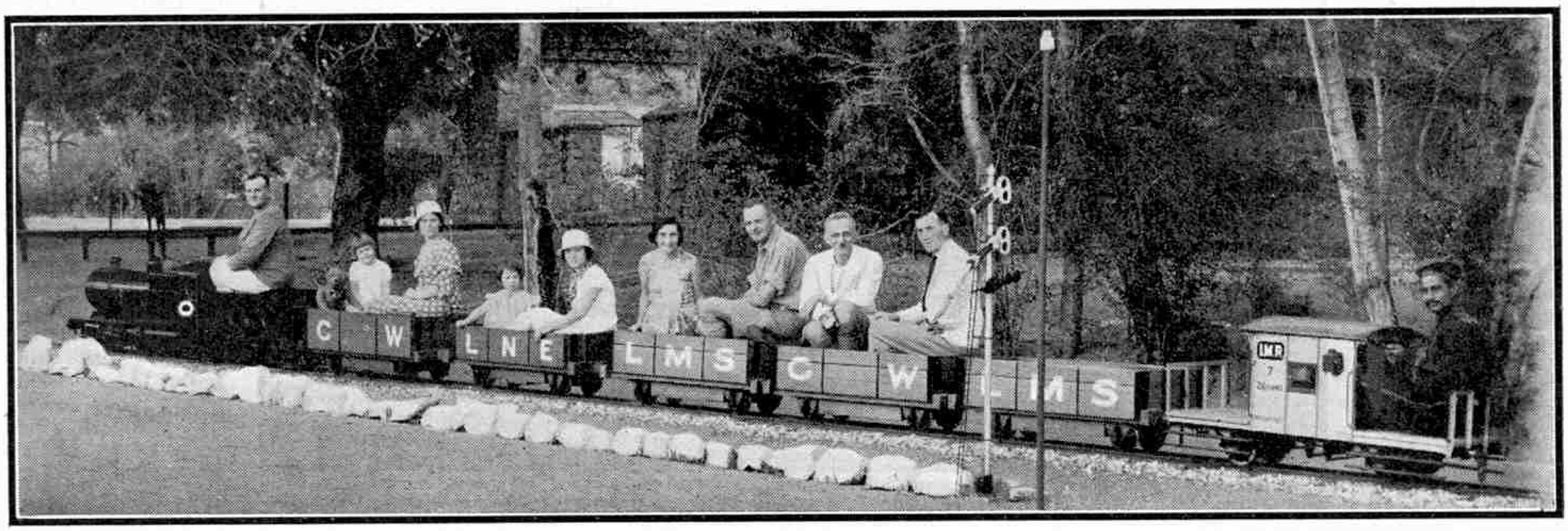
Hastings and Eastbourne Electrification

The S.R. Hastings and Eastbourne electrification will be inaugurated on the 4th of this month.

The "Indian Midland" Railway

An Interesting Outdoor System

By R. Horsfield, E.D., A.M.I.Mech.E., M.I.Loco.E.

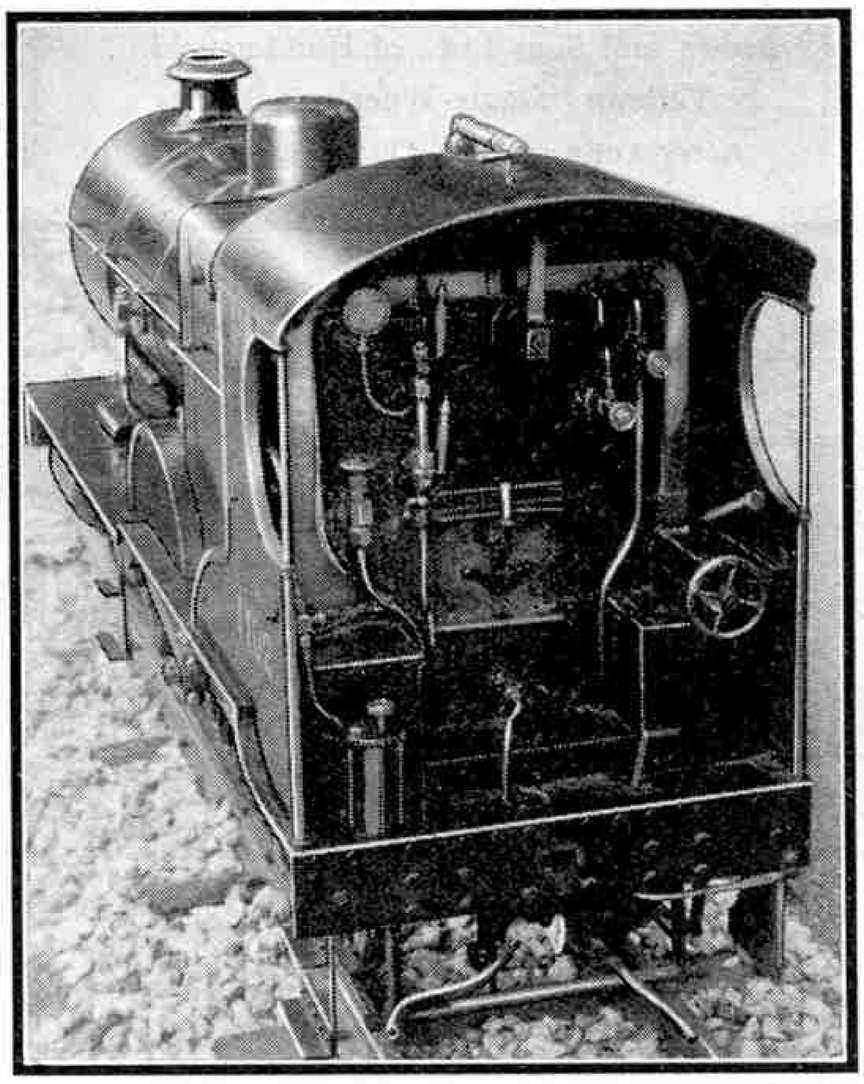


THE extraordinary attraction exercised by railways and particularly by steam locomotives, over boys and men alike, finds its expression in a multitude of different ways. One of the most popular methods of indulging this interest is the construction of a miniature railway system, on which real practice is reproduced to an extent varying with the nature and scope of the equipment and other factors. Although there are numerous varieties of miniature railways differing in type, plan, equipment and size, yet their owners all agree on one point, and that is in the enjoyment they obtain from them.

Exactly what components go to make the sum of attractiveness in miniature railway working is difficult to say. It is certain, however, that with most of us the fascination of this pastime grows no less as years advance. The thrill of steam-driven models only reaches its zenith when the model locomotive pulls its owner, his family and his guests. Fortunately this is possible on the "Indian Midland" Railway, a $9\frac{1}{4}$ in. gauge line owned and operated by the author at Jhansi for the benefit of his staff there on the Great Indian Peninsular Railway, and their children.

While the locomotive is perhaps the greatest, it is but one of the many-sided fascinations of the miniature system. This particular line covers a wide diversity of operations, including mechanical, civil, electrical and signal engineering. The layout is that of a single track line about a quarter of a mile in length, and is provided with gradient and distance posts, the latter being placed at intervals of 100 ft. instead of the conventional mile. The maximum gradient on the main line is 1 in 100, although a gradient of 1 in 40 exists from the turn-out or branch that leads to the locomotive shed. The curves are laid out to a radius of 100 ft.

The track consists of flat-bottomed rails 15 ft. long, weighing 9 lb. per yard. These are dog-spiked to sleepers of creosoted teakwood that are spaced one foot apart, and the track is ballasted with morum and broken white stone, the latter having all the appearance of actual railway ballast. As far as track is concerned, the soundness of a garden railway is very largely dependent upon the use of sleepers of adequate size. Consequently the section of sleeper adopted is double what would be the equivalent, to scale, of an actual sleeper.

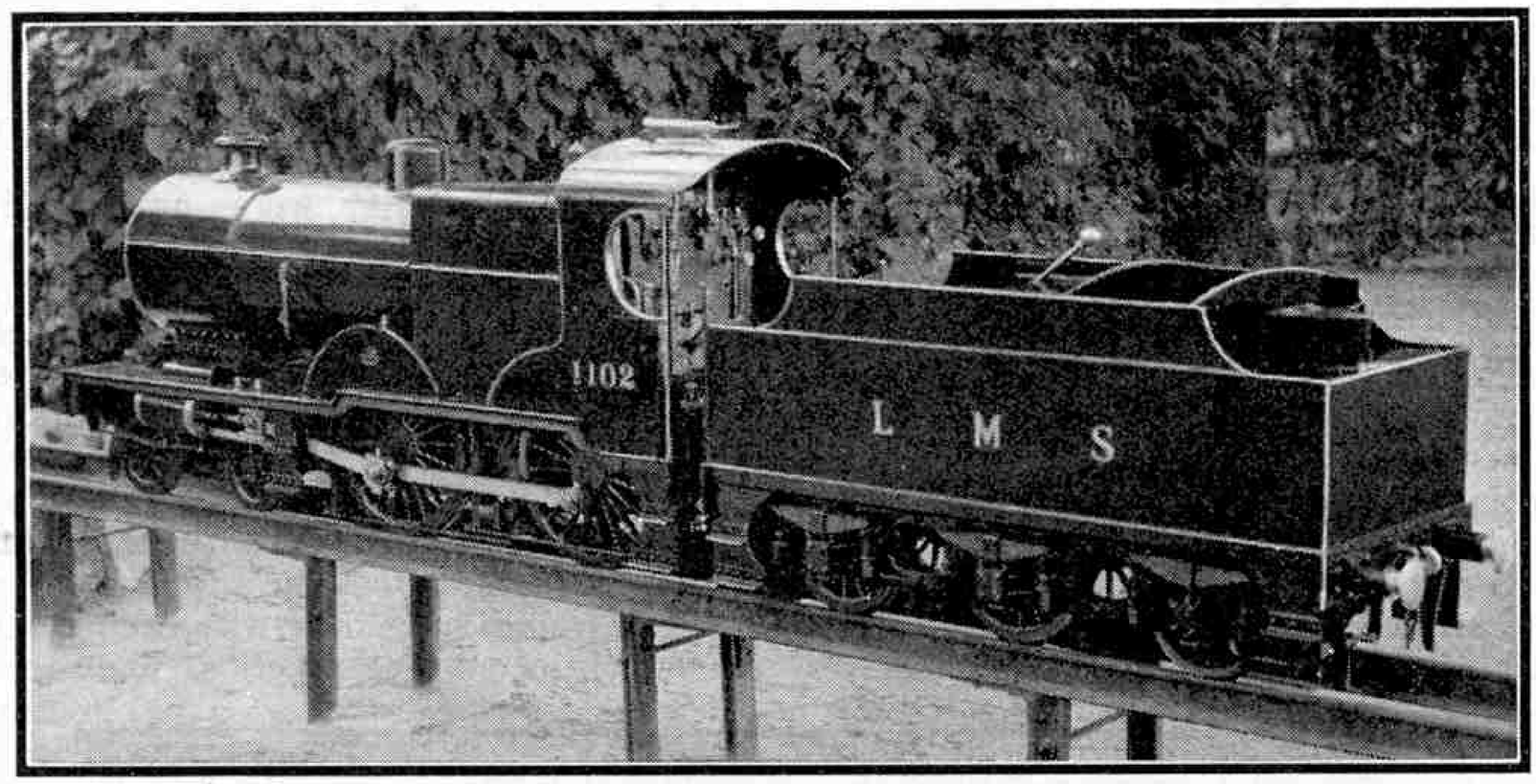


A typical train on the "Indian Midland" Railway appears in the upper photograph. In the lower illustration the various cab fittings of the locomotive are shown.

The profile of the ground was first plotted and then the gradients were determined, largely with an eye to equalising the amount of material required to be excavated against that required for embankments. The disposition of the railway having thus been settled, a profile was set out to a suitable scale, horizontal 50 ft. to the inch, vertical 2 ft. to the inch. To enable the permanent way to be maintained at the pre-determined levels, the line was pegged out along the centre line of the track, the pegs being driven down so that their tops coincided with the final rail level.

Two main stations, "Dilkusha Terminus" and "Kaisar Bagh," have special signal and telephone instruments installed for train-working over block sections. The starting signal at Dilkusha is interlocked with the

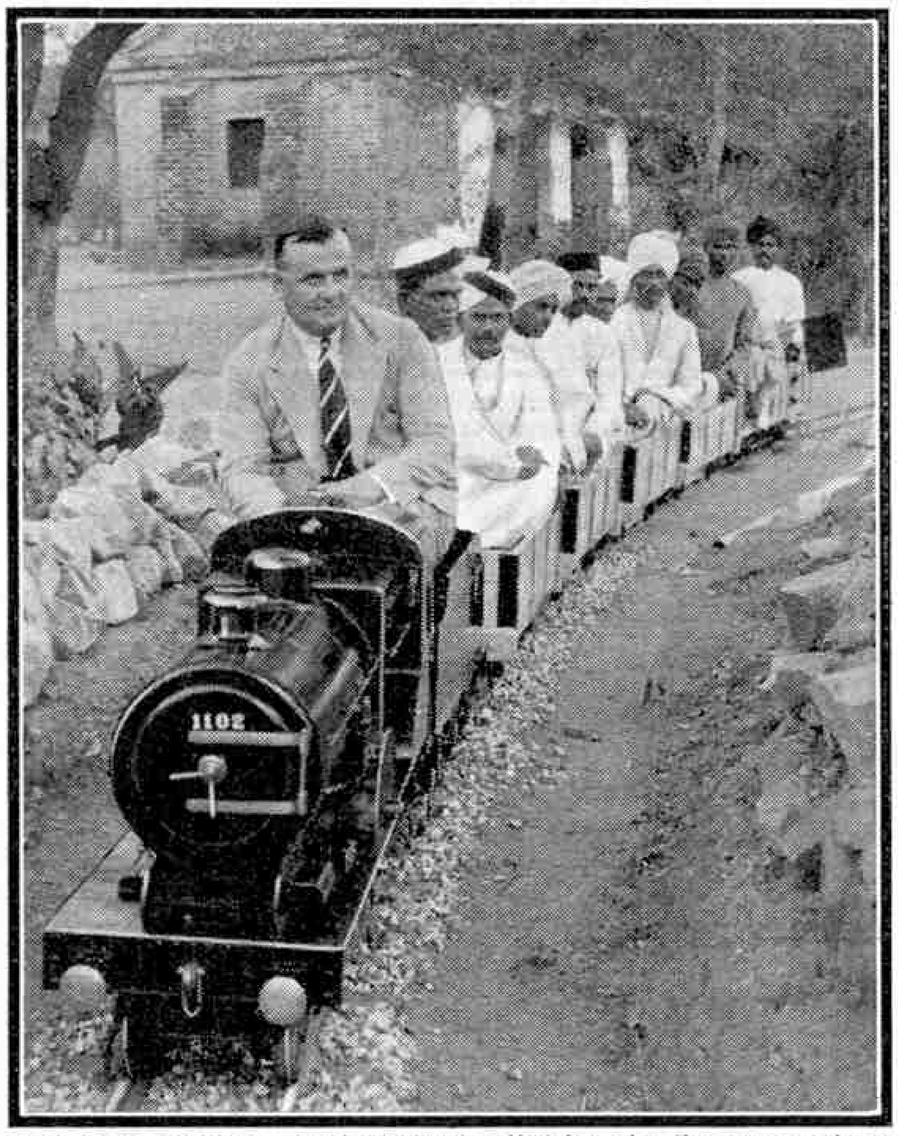
level-crossing gates to prevent the lowering of the signal arm without the gatekeeper first having closed the gates, and so released the main signal-frame at Dilkusha station. Likewise the "home" signal at Kaisar Bagh is similarly interlocked with the second level-crossing gates. The "home" and "outer home" signal levers have been interlocked to prevent the "outer" lever being pulled "off" unless the "home" is already "off," and to prevent the reverse action. At the present time the main line is fully signalled to comform with Indian Railway non-interlocking practice, although it is intended to provide a certain amount of interlocking as new works are proceeded with from time to time.



The miniature locomotive that operates traffic on the "Indian Midland" Railway. The design is based on that of the well-known "Standard Compound" class of the L.M.S.R.

The railway, which is worked on the "One engine in steam system," makes a circuit of the author's garden, starting and terminating at Dilkusha Terminus. "Halt" or "flag" stations, where trains stop when required, named "Hermitage Halt," "Cabbage Patch," and "Kaisar Bagh," are provided at intervals along the route. Eventually these stations will be equipped with hand-manipulated signals to be operated by passengers desiring to entrain—a feature of railway working prevalent in sparsely populated parts of the world, such as the Rocky Mountains section of the Canadian Pacific Railway.

Dilkusha Terminus is equipped with low-level brick-edged platforms that are white-washed by the Station Master daily. There is a ground-frame signal cabin and the booking office is equipped with platform and travel tickets. Fire buckets and train-destination and departure time boards are provided. The station is enclosed by a neat palisade fence intended to prevent passengers from having access to the platform, except through the ticket gateway in front of the Booking Office.



A head-on view of a "staff excursion," driven by the owner of the railway.

The locomotive shed is equipped with an examining pit, and there is a special plate carrying a short length of track within the length of the pit that can be removed to allow of the dropping of the wheels of the engine or tender for repairs, thus reproducing the functions of an actual "wheel-drop." The shed is complete with a repair bench and the necessary tools, and an oil and waste store.

Immediately outside the shed, which conforms to the "round house" type, there is a turntable serving various tracks radiating from it. Any possibility of running away from them into the turntable pit is provided against by the use of the several types of equipment, including scotch blocks of different designs, a Hayes derail, and ordinary standard trap points. One radiating track for a length of 9 ft. is carried on rail uprights serving a dual purpose, namely, as an overbridge to allow for storm water flow, and as an outdoor inspection pit for the purpose of cleaning the fire and for the very necessary examination of important details of the running gear of the locomotive. This pit is invariably used for raising steam, and by means of a Root's blower, an air jet is placed in the chimney to encourage the draught from the fire-box through the tubes, with an alternative arrangement of air blast under the fire-box grate. The normal time required for lighting up and attaining the working pressure of 100 per lb. per sq. in. is 2 hours.

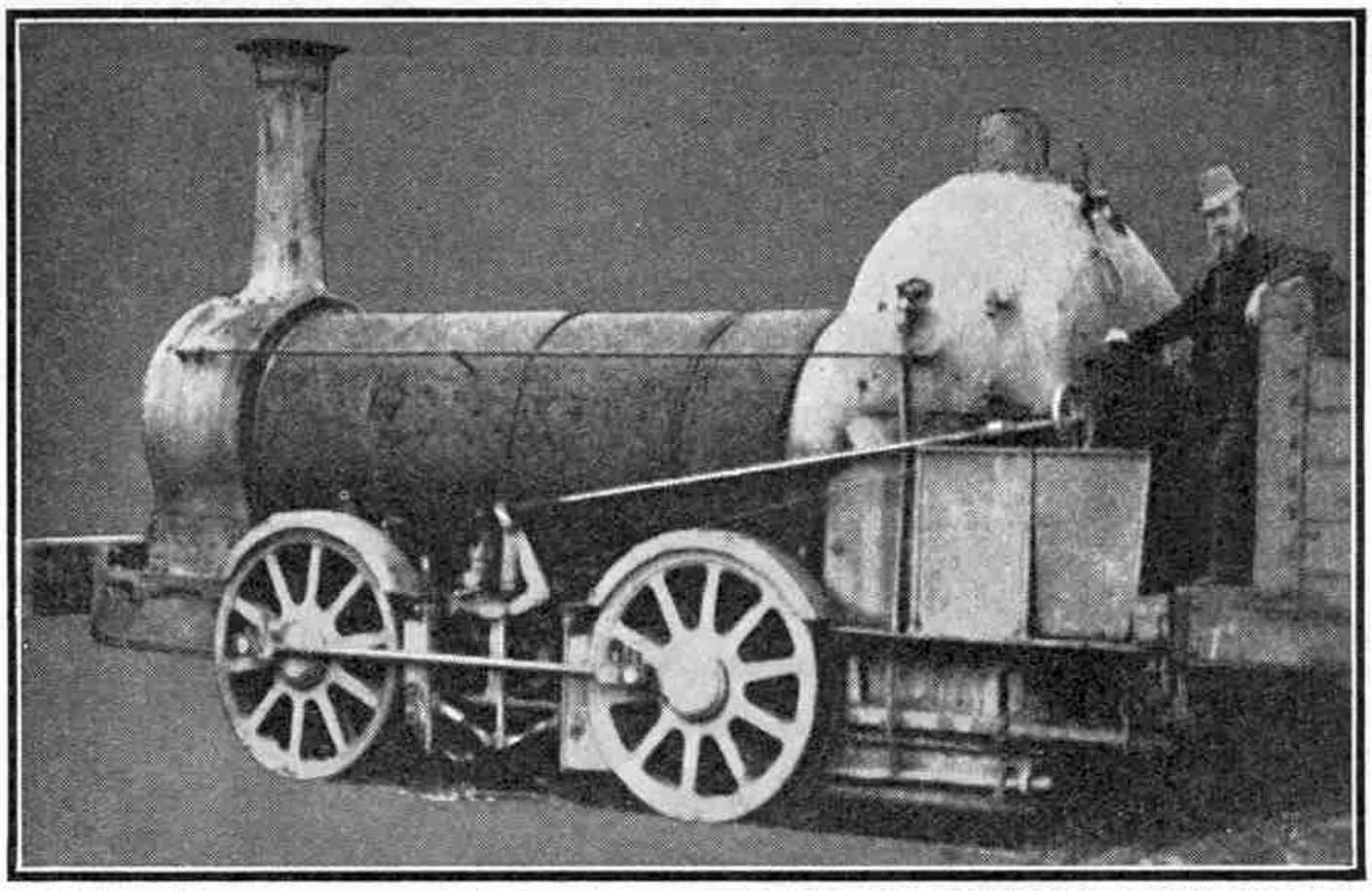
A high-service conical water tank, modelled to the standard practice in vogue on German Railways, and on the recent Chemin de Fer Ottoman de Bhagdad, between Constantinople and Nizibin, has been installed. The tank itself consists of an inverted dome of a real engine erected on vertical rails about 6 ft. above rail-level. This gives adequate water storage, and from this a one-inch pipe feeds the water column situated at the west end of Dilkusha station platform at a point beyond the overbridge. This, with the provision of an ash-pit, permits of fire-cleaning and watering while passengers detrain and entrain. The water column, incidentally, is constructed by the use of an outerhousing of a motor car back axle!

The locomotive employed takes the form of the L.M.S.R. engine No. 1102, being a one-sixth scale model of a 4–4–0 "Standard Compound." This engine has a working pressure of 100 lb. per sq. in. and is complete with steam-brakes, an injector working between pressures of 40 lb. and 95 lb., and a feed pump. Steam and water gauges are of course provided, and a boiler blow-down cock and cylinder drain cocks are fitted. The cylinders are lubricated by a hand-forced system. *(Continued on page 440)*

A Locomotive Type of Former Days

Edward Bury's "Copper Nobs"

IN the early days of railways the then small companies did not build their own locomotives but obtained them from various outside makers. The earliest steam engines to run at all were constructed by individual engineers, but a locomotive building establishment was set up in 1823 at Newcastle by George Stephenson. This was the original Forth Street Engine Works of the firm Robert Stephenson and Company, this being the name under which the business was inaugurated. Several engine builders or designers came into prominence, particularly in connection with the historic "Rainhill Trials" that were held in 1829 to decide whether the Liverpool and Manchester Railway should be operated by locomotives, or by fixed engines and cable haulage. As soon as the future of the steam locomotive was assured by the result of this contest, several locomotive building firms sprang up.



The old "Bury" locomotive referred to in this article, as it appeared in 1890 when lying derelict at Wingfield. The photograph shows the various characteristic features of "Bury" designs, particularly the "Haycock" fire-box.

In those early days each of the various makers of locomotives evolved more or less standard designs of engines, and it frequently happened that examples of the same type were supplied to different railway companies. Instead of identification according to the practice of the company being possible, as is the case in these days, the different engines in service were identified according to the standards of the different makers. Some of these standards became recognised as types, irrespective of the companies owning them. Thus a Stephenson "long-boiler" goods engine, or a "Jenny Lind" express engine as originated by E. B. Wilson and Company, in service on one railway, would look much the same as similar types in the service of another company.

A notable figure among the early locomotive engineers was Edward Bury, of Liverpool. He established a locomotive building works, the Clarence Foundry, and supplied locomotives to many of the early railway companies, including the Liverpool and Manchester Railway. One of the latter, appropriately named "*Liverpool*," was the first engine to have inside cylinders underneath the smoke-box. He contracted to supply locomotive power to the London and Birmingham Railway at ½d. per ton-mile for goods trains and ¼d. per ton-mile for passenger.

Bury locomotives became quite a type and were characterised by several features by which they could be distinguished at once from the productions of any other maker. They were, until 1845, 4-wheeled only, and as a result few of the Bury engines were ever very large, even in comparison with contemporary locomotives. Any loads heavier than usual, therefore, required not only two but sometimes several engines. On the London and Birmingham Railway goods trains were frequently operated by four Bury engines together, and on one occasion, as Bury himself admitted, seven engines were employed on a train of 45 vehicles during a heavy gale! Another feature was the adoption of bar frames, whereas plate frames have otherwise been invariably preferred in British locomotive practice. The most notable external feature of Bury locomotives, however, was the fire-box casing, which was not made flush with the top of the boiler barrel, or even raised slightly above it as was frequently the case in former days. Instead, the Bury fire-box casing was extended upward far above the level of the boiler barrel in order to form a dome, and the resultant shape gave rise to the name of "Haycock" fire-box which was familiarly applied. As this outer fire-box casing was frequently covered with sheet copper brightly polished, the term "Copper Nobs" was often used in reference to Bury engines.

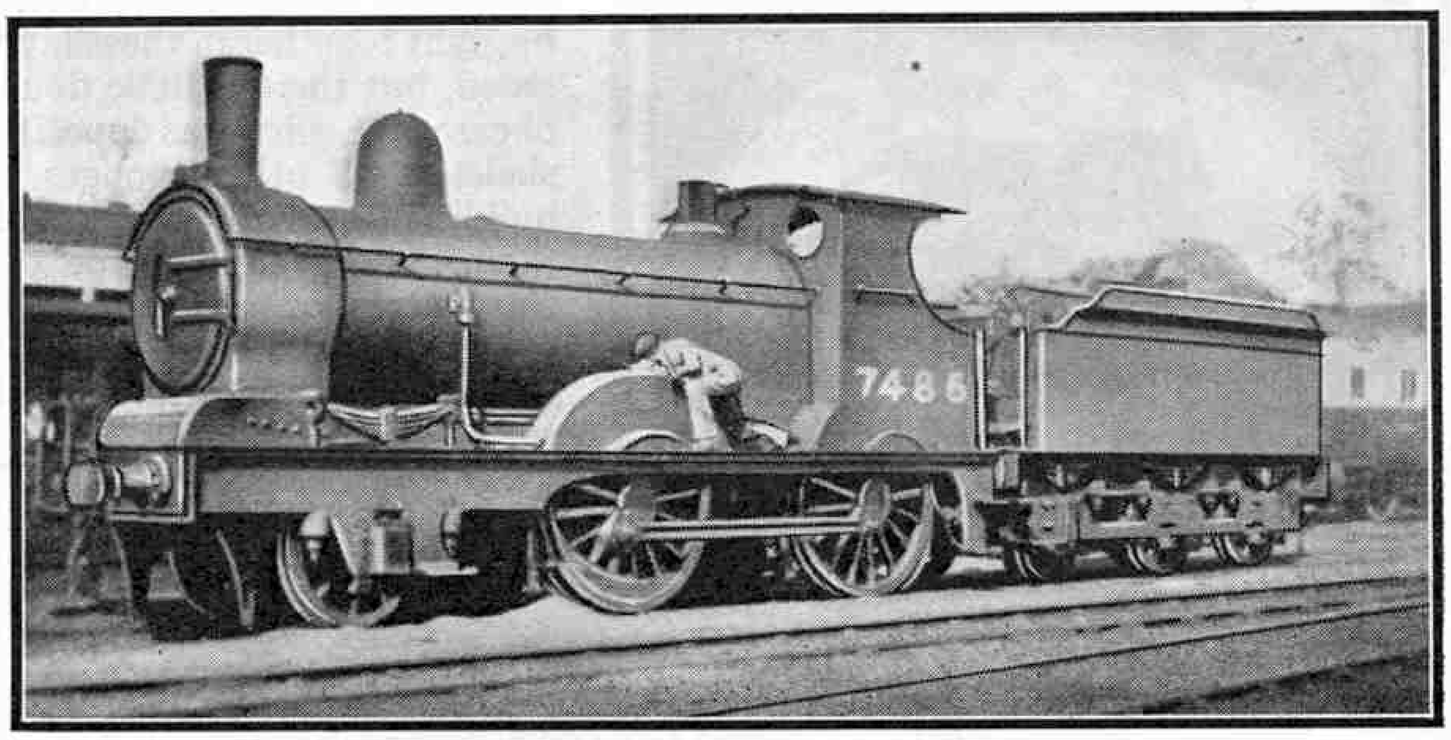
There is at least one Bury type locomotive still in existence in this country, but not at work, although it was in service until a comparatively late period. This was No. 3 of the former Furness Railway, and was one of the first engines owned by that company, having been built in 1846. Well known as "Old Copper Nob," it has luckily been preserved. A similar locomotive, but one not so fortunate, is the one shown in our illustration. It was employed at the old Oakathorpe Colliery, and belonged to a Mr. J. B. Wilson who worked the colliery. As the result of a legal dispute with the colliery owner, Wilson was compelled to remove all his plant, including the locomotive, which was ignominiously taken away by four horses! It was apparently abandoned on the disused colliery branch line off the Midland main line.

Later it was moved to a short siding near to the signal box at Wingfield, and was there used as a stopblock. Then it was moved to the goods yard and there seems to have served as a plaything for the local boys. In 1890 it was disposed of to a Sheffield firm and put to work at an iron-ore works at Frodingham.

A Useful "Mixed Traffic" Class

Old G.E.R. 2-4-0 Locomotives

IN the course of British locomotive history there have been frequent instances of the chief characteristics of a class of passenger engines being applied to other locomotives, with suitable modifications, for what are usually termed "mixed traffic" duties. Such an arrangement is a convenient and economical one for the boilers, and frequently other details of the passenger design can be reproduced exactly for the mixed traffic engines, thus promoting standardisation. Modern mixed traffic locomotives such as the L.M.S.R. "5P5F" class, the G.W.R. "Halls," and the S.R. class "A" 4–6–0s, closely resemble, except in the matter of wheel diameter, corresponding express classes. Of older classes, the resemblance of the L.N.W.R. mixed traffic engines to the "Experiment" passenger class was reflected in the nickname of "Experiment goods" that was frequently applied to the "19 inch goods," as they were officially known. Whereas all these designs are of the 4–6–0 wheel arrangement, which is used on all four groups for mixed traffic locomotives, the subject of the illustration on this page is a 4-coupled engine, and not even a bogie engine at that.



L.N.E.R. 2-4-0 Locomotive No. 7486, one of the useful mixed traffic engines of the former Great Eastern Railway. This photograph showing the chief characteristics of the design, including the "stove-pipe" chimney, was taken by our reader G. Field, of Alexandra Park, N.22.

The locomotive in question, L.N.E.R. No. 7486, is one of a class that formerly was very numerous, and to be found practically everywhere on the parent system, the former Great Eastern Railway. After examples of bogie engines of different kinds had been put into service by various locomotive superintendents, including two of the earliest British 4–4–0 locomotives with inside cylinders, the 2–4–0 wheel arrangement was reverted to. Bogies did not appear again on new engines for many years, possibly because the then Locomotive Superintendent, Mr. J. Holden, had come from the Great Western Railway, which did not adopt the leading bogie as a standard until quite late in the 19th century. The express engines from which were derived the mixed traffic locomotives under notice were the once well-known G.E.R. "710" class with 7 ft. diameter coupled wheels. These were excellent engines in their day, and performed a great deal of useful main line work for many years. Until the appearance of the famous 4–4–0s of the "Claud Hamilton" series in 1900, these 2–4–0 engines shared the working of the most important expresses with the very similar 2–2–2 single-wheelers, and with the larger 4–2–2 engines.

The Great Eastern system, however, with its many long country branches, is essentially one requiring the services of numerous mixed traffic engines. With the scrapping of the various older types that had to deal with such traffic, some of them not very satisfactory "ex-passenger" engines relegated to miscellaneous duties, it became necessary to produce a suitable design to replace them. The chief features of the successful "710" class were therefore duplicated in the mixed traffic engines of "417" class, except that the driving wheels were reduced to 5 ft. 8 in. in diameter. These locomotives commenced to appear from Stratford Works in 1891, and by the end of 1896 there was 90 of them at work. Even in 1902, which was perhaps a late date for the building of 2–4–0 engines, more of them were put into service.

The cylinders of most of the engines of this class had a diameter of 17½ in. and the stroke was 24 in. The boiler pressure was 140lb. per sq. in., but in the last 20 engines this was raised to 160 lb. The provision of outside frames and bearings for the leading wheels in conjunction with inside frames for the driving wheels is an interesting point. This practice was much favoured at one time for 2–4–0 locomotives, particularly on the Midland and on the North Eastern Railways. The Great Western also employed such a frame design, and its origin can be traced back to quite an early period in locomotive history. It was applied by the locomotive builders E. B. Wilson and Company, and Kitson and Company, of Leeds, and for this reason it has sometimes been termed "Leeds" or "Yorkshire" framing.

The simplicity of the external design of the engines is characteristic of the earlier "Holden" engines of the G.E.R., and the plain stove-pipe chimney was standard for some years. The far more pleasing design with an ornamental copper top first appeared on the 4–2–2 single-wheelers mentioned above. It is interesting that, since the formation of the L.N.E.R., these mixed traffic engines, in common with many of the other older types with plain chimneys, have been fitted with more shapely chimneys of standard design. Yet on the other hand the handsome copper and brass caps on other G.E.R. engines have been done away with!

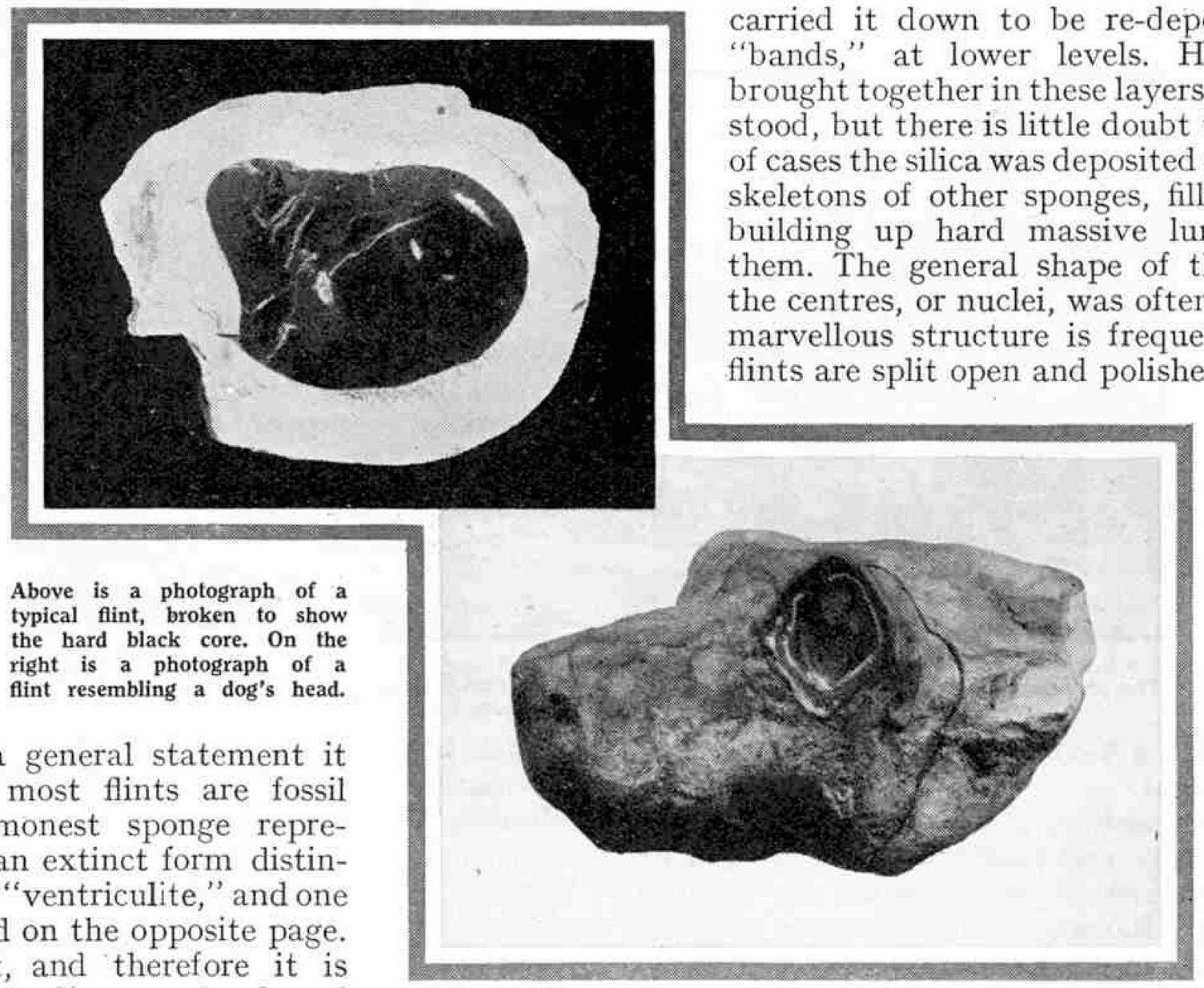
These engines were to be found practically all over the Great Eastern system, as might be expected in view of their extreme usefulness, and their numbers. For the haulage of goods trains of moderate weight they were quite suitable, and for perishable traffic and secondary passenger work they were very satisfactory.

Stones That Mimic Living Creatures

Flints and Their Origin

By W. Shepherd, F.G.S.

GEOLOGISTS constantly encounter curious and grotesque examples of the strange tricks that Nature plays, and these show that she not only writes sermons in stones, but also carries out chemical experiments, writes letters in unknown alphabets, is skilled in solid geometry, paints landscapes and indulges in sculpture! A favourite medium for her fancies is flint, and when we examine this interesting stone we find that we are confronted by many puzzles. What is flint, and why is it found in layers in the chalk hills and practically nowhere else? The first of these two questions can be answered, but no satisfactory reply has yet been given to the second, although many ingenious suggestions have been made from time to time.



Above is a photograph of a typical flint, broken to show the hard black core. On the right is a photograph of a flint resembling a dog's head.

Flint is practically pure silica, one of the constituents of glass. Sand, and quartz or rock crystal, also are forms of silica, but flint differs from them in appearance, and also in origin. As a general statement it may be said that most flints are fossil sponges. The commonest sponge represented by them is an extinct form distinguished by the name "ventriculite," and one of these is illustrated on the opposite page.

Sponges are soft, and therefore it is surprising to find that flints are hard, and it is equally remarkable that they are black, since rock crystal, which has practically the same chemical composition, is as clear as pure water. The explanation of these strange differences lies in the history of flints. The chalk in which they are found was formed ages ago as a soft mud, or ooze, on the floor of a deep sea, and consists chiefly of the skeletal remains of sea creatures. Most of these were microscopic in size, but innumerable skeletons of sponges, sea urchins, shell fish and lamp shells also were embedded in the ooze, which was similar to that now being formed at the bottom of most of the great oceans. Dredgings from the Caribbean Sea, in fact, show that on its floor a chalk ooze is accumulating that is almost identical in its constituents with well-known varieties of chalk.

As the ooze of the prehistoric sea became thicker, its lower layers were compressed into hard rock, for at a depth of three miles the pressure of the water in the ocean is 2½ tons per sq. in. It therefore is scarcely surprising to find that flints embedded in the chalk thus formed are hard and dense. The constituents of the ooze concerned in the story of the flints are the sponge skeletons, for they consist chiefly of silica in a soluble form. Changes in level took place and the sea floor on which they were deposited was raised by imperceptible stages until, after immense periods of time, it was lifted above sea-level and became dry land. As the water in the ooze drained away it dissolved the silica of the sponge skeletons from extensive tracts in the rock, and carried it down to be re-deposited in layers, or "bands," at lower levels. How the flints were brought together in these layers is not clearly understood, but there is little doubt that in the majority of cases the silica was deposited round the individual skeletons of other sponges, filling their pores and building up hard massive lumps of flint round them. The general shape of the sponges forming the centres, or nuclei, was often retained, and their marvellous structure is frequently revealed when flints are split open and polished.

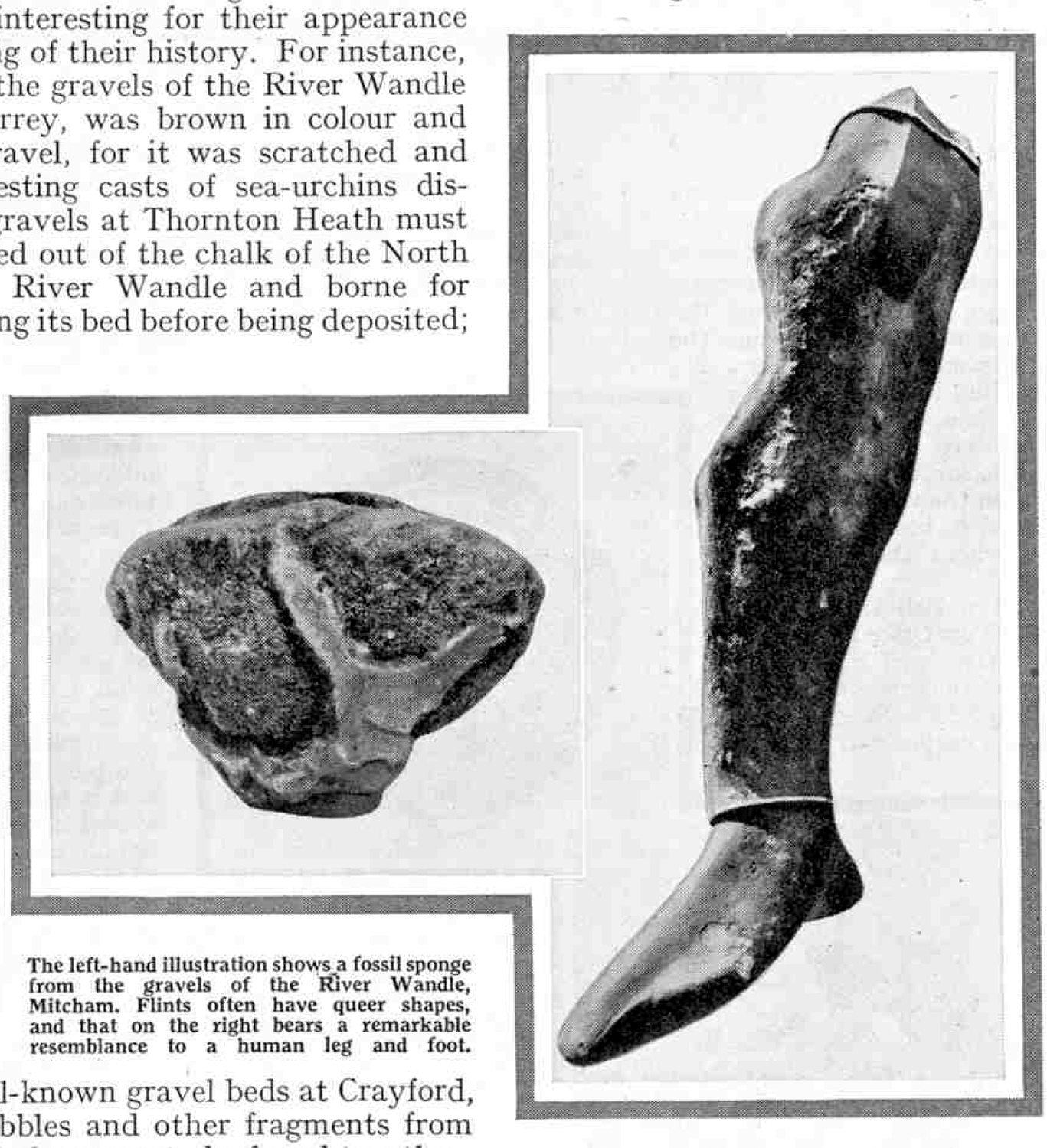
When a typical flint is broken it is found to have a black core, the colour probably being due to carbon derived from the living tissues of the sponge around which it was formed. It is in strong contrast to the white crust, which was acquired later and was produced by a chemical action between the core and the surrounding chalk. Flints that have been washed out of the chalk by a river, and thus have become part of the river gravel, often are stained brown, or even red, by compounds of iron; and at the same time they become rounded and polished into pebbles by friction as they are rolled along by the action of the stream and ground against other stones.

Flints often have queer shapes. Some of the quaint forms they assume are accidental, and by mere chance many of them closely resemble familiar objects. These flints are of no scientific interest, but their amazingly realistic shapes tempt people to collect them, and even to mount them on suitable wooden bases. How remarkable some of these forms are can be seen from the photographs of a realistic "Leg and Foot" and a deceptive "Dog's Head" that are reproduced as illustrations to this article.

Some of the strangely shaped flints from the chalk

hills tell us interesting stories of prehistoric life, for they were formed inside the shells of certain sea creatures of past ages. They are therefore internal casts of those shells, and reveal their interior shapes and the character of their inner surfaces. Other flints have the shapes of the prehistoric sponges about which they were formed, and casts of sea-urchins—popularly known as "Shepherd's Crowns"—and other sea creatures of millions of years ago can be picked up at various places on the North and South Downs, under which lie the chalk formations of Southern England.

Most of these objects are ordinary flints, with black cores; and flints discovered in gravels and other situations are more interesting for their appearance tells us something of their history. For instance, a flint found in the gravels of the River Wandle at Mitcham, Surrey, was brown in colour and bore signs of travel, for it was scratched and rounded. Interesting casts of sea-urchins discovered in the gravels at Thornton Heath must have been washed out of the chalk of the North Downs by the River Wandle and borne for several miles along its bed before being deposited; and a similar story is told by a flint discovered as a pebble in the River Test, for it must have been carried all the way from the Hampshire Downs to Southampton.



The left-hand illustration shows a fossil sponge from the gravels of the River Wandle, Mitcham. Flints often have queer shapes, and that on the right bears a remarkable resemblance to a human leg and foot.

Even more interesting examples of the travels of flints is provided by the remarkable stones to be found in the well-known gravel beds at Crayford, Kent. There pebbles and other fragments from widely scattered places are to be found together. Some have come from as far north as the Cheviot Hills and have been carried down the East Coast by tidal currents; others have been brought from Shropshire by the glaciers of the Great Ice Age. The flints, in which we are most interested, have been washed out of the chalk hills, possibly in the neighbourhood of Reading, and brought to their present site ages ago by the Thames, when its course lay farther south.

Apart from its scientific interest, flint deservedly is highly valued, for no other stone has played so great a part in human history. For thousands of years it was as important to our prehistoric ancestors as iron and steel and other metals are to us, for from it they fashioned the tools and implements that enabled them to rise from savagery to civilisation. Its astonishing hardness was one cause of its widespread use, for it is the fifth hardest substance known; but the manner in which it can be flaked by the impact of a small hammer was an equally valuable feature. The flakes have sharp edges, and wonderful knives, spear heads, saws and even finer implements such as needles can be made from them by those who are skilled in flintknapping, or the art of working flint.

The first flints used by the men of the Stone Age were the rounded pebbles found in gravels. Later came the discovery that larger and better flints were embedded in the chalk beds, and a great flint mining industry then sprang into existence. The prehistoric flint miners sank deep shafts into the chalk, and traces of their underground workings can still be found in many places. One interesting example in Norfolk is known as Grimes Graves. There are three shafts passing down through several layers of inferior flint until they reach a bed of good material, through which galleries have been driven in all directions by miners who used the antlers of deer for picks and the shoulder blades of animals for shovels. A prehistoric pick actually has been discovered at Grimes Graves with the impress on its handle of the chalky thumb of the man who left it in the mine.

Many flint mines in Norfolk and in the Eastern Counties of England were worked in prehistoric times, and certain districts have yielded flint right down to the present day. Flint knives and spears of course are no longer used, but throughout the Middle Ages, and indeed little more than 100 years ago, flints were in demand for use with steel in striking fire, and the coming of the flintlock gun provided another use for them. Very little flint is worked to-day, however, and the village of Brandon, Suffolk, is the last surviving centre of an industry that endured for thousands of years. Even there flintknapping is the secret of one man, who has followed the trade carried on by his ancestors for generations. His activities include cutting flints to form pieces of mosaic designs for ornamental floors, and the copying of the tools and implements that were made by his predecessors of thousands of years ago. He also provides flints for the natives of semi-savage countries, where ancient flintlock guns are the only firearms allowed.

It is interesting to find that the ancient art of flint working has not been lost. Our ancestors of thousands of years ago must have acquired it by long and arduous practice, and they must have gained a wonderful knowledge of the peculiarities of flint. It is really a trimming process, and to see its modern practitioner at work enables us to realise how skilful were the men of the Stone Age who fashioned the wonderfully efficient flint tools and implements that are unearthed from time to time. A large flint is first broken into quarters and each piece in turn is given a series of short, quick blows with a hammer that has a sharp point at each end, and thus resembles a stunted pickaxe. The hammer is not swung, and each blow produces a flake of flint 3 in. or 4 in. in length of the form and shape desired.



By P. A. Tent

Rivalry of Inventors

I often wonder how many inventors there are whose products have never seen the light of day because they have been too late. It is by no means uncommon for several inventors to be at work on a problem at the same time, and their efforts then become a race for priority, although the competitors seldom know this. The classical instance of a race of this kind was revealed when the telephone was patented, for Graham Bell was only a few hours ahead of Elisha Gray, who actually applied for protection for his own design in the very Patent Office where Bell had previously filed his own specification. Even these two men were not the only competitors in the race, for a third inventor living in Torquay appears to have been on the verge of success when news of Bell's invention put an end to his experiments, and there may have been others of whom the world has never heard.

The existence in England of a rival to Bell and Gray is revealed in an interesting article in *"The Post Office Magazine"* for May. The writer of the article was stationed in Torquay in 1876 and actually took part in a trial of the crude telephone that the inventor was endeavouring to perfect. He distinctly heard tapping and humming through the earpiece at one end of the line, but was unable to distinguish actual words, much to the disappointment of the inventor, who claimed to have done so earlier on the same day. A few weeks later ultimate success was reported to be certain. Then came a bombshell in the shape of a newspaper report of Graham Bell's success, and this of course shattered the British inventor's hopes.

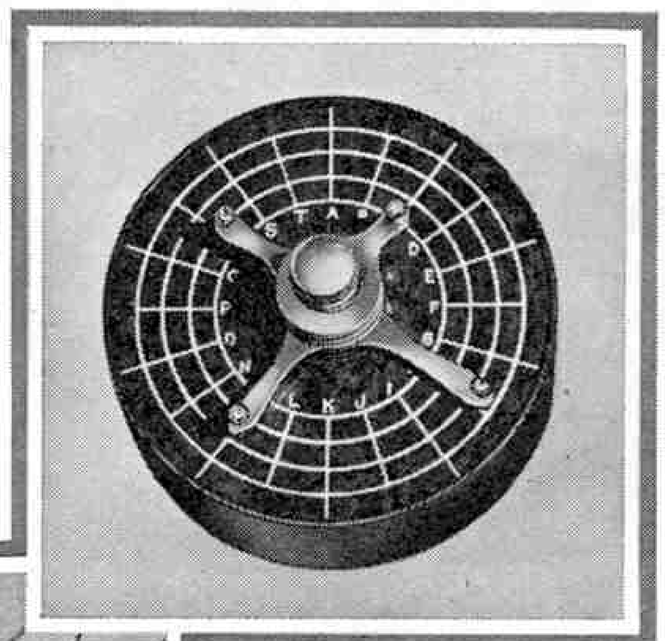
I suppose that the inference to be drawn from events of this kind is that we are all inventors. We differ greatly in inventive powers, of course, and only master minds can produce the striking inventions that create new industries. Others can find scope for invention in improvements in detail that gradually bring the various sections of a new industry to perfection, however, and many have had ideas for useful devices of some kind, but have not had the inclination or incentive to follow them up, or have abondoned their efforts for some other reason.

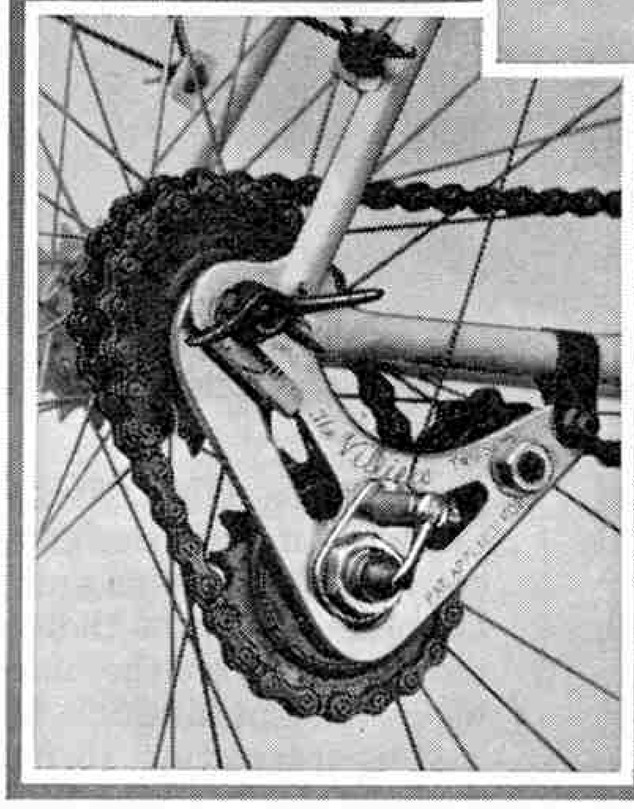
The Spread of Invention

The story of the development of the motor car and the aeroplane is a good example of the spread of invention. The internal combustion engine was the key to motoring and flying, and as soon as this was brought to a reasonable state of efficiency, other inventions followed in a stream that still continues. A visit to the recent British Industries Fair illustrated this, and also showed how inventions in one branch of industry meet demands in other fields. For instance, spray painting has been largely developed to meet the demands of motor car body manufacturers. To-day it is employed in countless other industries where formerly brushing or dipping was the rule, and the range of spray guns and spray painting outfits of all kinds to be seen at the Fair showed how ingeniously these have been adapted to special purposes.

The use of the spray gun is not confined to paint work, for B.E.N. Patents Ltd. have applied it in a high-pressure car-washing plant, in which water is pumped under a pressure of more than 350 lb. per sq. in. against the surfaces to be cleaned. The spray is easily controlled by simply rotating the handle of the gun, and the pumps included in the plant deliver three gallons of water per minute through each sprayer connected with it.

This car washing plant is intended chiefly for use as garage equipment, and the B.E.N. hydraulic jack illustrated in action on the opposite page is another example of a device introduced for saving time and labour in handling motor cars. This jack is of low construction to enable it to be slipped readily under the axles of modern cars, even when the wheels at both ends are entirely deflated, and with any load up to 2¼ tons the axles can be raised to a height of 19¼ in. in a very short time. An interesting feature is that the jack has a large swivel cap and is mounted on ball-bearing swivel castor wheels. Thus the handle can be swung round out of the way, giving ready access to the wheels or any other part of a car that needs attention.





Above is the code switch for motor cars described in this article. Photograph by courtesy of Messrs. Coleman and Lenney. On the left is the Villiers two-speed gear for bicycles. Photograph by courtesy of the Villiers Engineering Company Ltd.

Simple Two-Speed Gear for Bicycles

Another ingenious device shown at the Fair was the remarkably simple Villiers two-speed gear for bicycles. In this there are two gear wheels on the rear hub instead of one. The chain passes round the wheel that gives the lower direct gear, and when top gear is engaged the drive is taken to the second wheel through intermediate gear wheels mounted on a countershaft supported by a bracket. The chains of this ingenious mechanism are always in mesh with their respective toothed wheels and gear can be changed easily at all speeds. The cost of the device is low and it can readily be fitted to an ordinary bicycle.

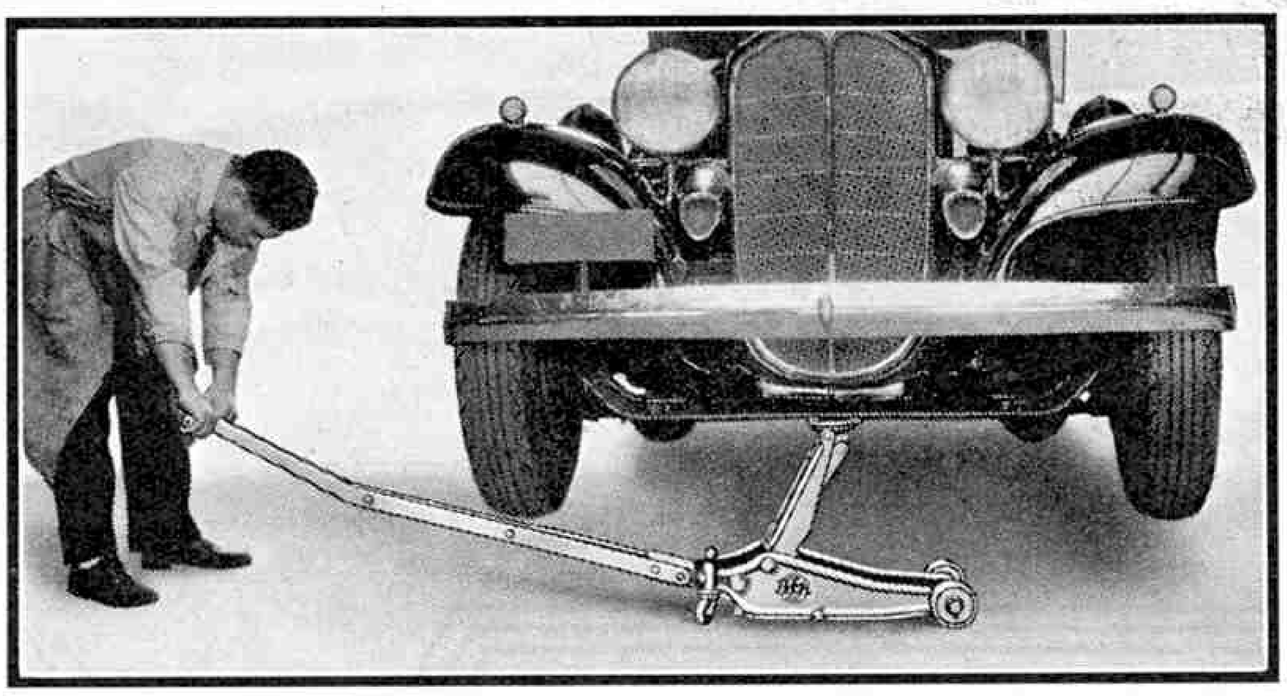
Foiling the Motor Car Thief

Among the many excellent devices for motorists that have recently come to my notice is a code switch designed to prevent the theft of a car, or its use by unauthorised persons. The upper illustration on this page shows the appearance of the switch, on which are four arms of different lengths, their ends rotating over circles on which the letters of the alphabet are marked. Each of the arms must be set on the correct letter of a code combination before the engine can be switched on, and the only result of an attempt to start the engine with any other setting is to blow the horn loudly. A separate four-letter code is provided for each switch, and of course is the secret of the car owner.

The device is intended for mounting on the dashboard of the car, and four of its five connecting wires lead to the engine switch, the ignition system and the horn. The fifth is intended for use with a separate switch to produce a blast on the horn when the bonnet of the car or a door is opened by any unauthorised person, and may be left disconnected if desired. A turn of a knob throws the code

switch out of adjustment, and the efforts by a car thief to avoid the betraying horn signal by cutting the wires will be a failure, for more time than he usually has at his disposal would then be required to select the right leads to enable him to rewire the ignition circuit.

An interesting little gadget that would be found useful by many motorists is a flashlamp bulb mounted so that it can be fitted on the finger, when its beams can readily be thrown upon a nut or the head of a screw. This is known as the "Fingalite" inspection lamp. As the illustration on this page shows, it consists of a clip of springy brass, shaped to fit the finger, in which a flashlamp bulb is mounted, and the necessary current is supplied by a battery in a case that can be carried in the pocket. In this position the light can be used for inspection purposes in many positions, while leaving the hands free for adjustments or work with a screwdriver or spanner. It is particularly useful for driving screws in dark corners, where the position of the slot in the head cannot be seen. Motorists will find it valuable when they are called upon to carry out roadside repairs at night, and an adaptor to plug in the lighting system of a car can be supplied with it.



The B.E.N. hydraulic jack. This rapidly lifts a car axle to a height of 19¼ in. above the ground and the handle can be turned round out of the way. Photograph by courtesy of B.E.N. Patents Ltd.

Electricity in the Ideal Home

Those of my readers who were fortunate enough to visit this year's Ideal Homes Exhibition must have realised the steady advance that has been made in the applications of electricity in the home, for the display seems to have been more electrical than those of previous years. The appliances on view included cookers, hot plates, carving tables and other devices for keeping food hot electrically, together with handsome lighting equipment in immense variety, and lamps for reproducing sunlight in the home. One interesting feature was the manner in which several electrical devices were combined. For instance, coal and electric fires were to be seen in combination with electric clocks. Greatly improved controls and switches also were shown, and it seems to me that in the ideal electrical home of the future the lighting equipment, water heaters, radiators, air conditioning and ventilation plant and other electrical devices will be designed to work together automatically to maintain agreeable and healthy conditions.

The extent to which electricity is used for cleaning purposes was well illustrated by the immense variety of remarkable gadgets incorporated in the now popular vacuum cleaner. One of these appliances shown included a floor polisher and dry scrubber and had no dust bag to empty; other were provided with headlights for use in guiding them in dark corners and to ensure thorough cleaning; in one case an indicator was attached to show when the dust bag needed emptying; and several cleaners had attachments for shampooing carpets, and for spraying with disinfectant gases.

Electric refrigerators also seemed to promise increased efficiency and popularity. They were of varied sizes, to suit small and large houses, and were to be seen built into kitchen cabinets, table-top vegetable bins, and stainless steel sinks. One model had doors that were opened by the operation of a foot pedal in order to make it easy to handle the food kept in it, and a curiosity that seems to have great possibilities was a combination of a small refrigerator with an electric cooker.

Meals by Pneumatic Tube

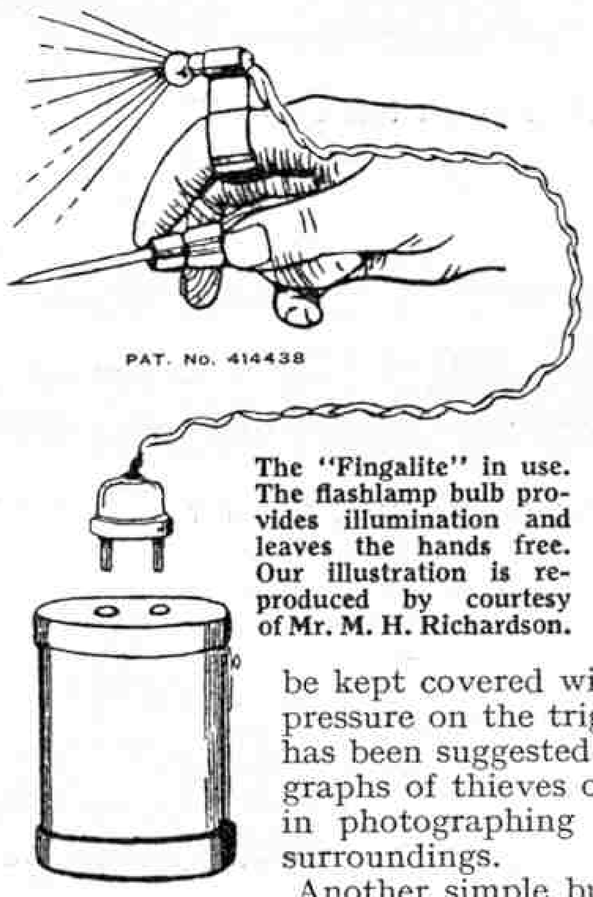
While some inventors are hard at work lightening the burden of household work, others are trying to abolish the need for work of any kind in the home. All previous efforts in this direction seem to have been surpassed by a German invention that will make the kitchen unnecessary, but yet will permit meals to be served in the home while still hot and freshly cooked. A central kitchen communicating with the home by means of a pneumatic tube is the secret of this device. The first installation of its kind has been constructed in Berlin and is said to be completely successful.

All those who subscribe to the scheme receive daily an immense bill of fare from which to select the dishes required. Orders are given by telephone, and at the appointed time the courses selected are placed in special thermos bottles that are wrapped in corrugated containers and blown through the tubes to their destinations. The kitchen in which the food is prepared is planned on an enormous scale and equipped with pneumatic tubes extending to every flat within a large area surrounding it, and a complete service can be given within 15 minutes of receiving instructions.

Television from Gramophone Records

I am sure that all my readers are following keenly the development of television, and will be interested to learn that pictures can now be stored on gramophone records for reproduction through the medium of an electrical pick-up on the screen of a television set. The records are of the standard 10-in. type, and although the first pictures recorded in this manner were "stills," it seems to be only a matter of development before actual moving pictures can be "played" from gramophone records.

The new system is called "gramovision" and seems to be a development of phonovision, one of the novelties introduced a few years ago by Mr. J. L. Baird, the British television inventor. The results obtained from Mr. Baird's tests were not very satisfactory, for it was found impossible to reproduce the high frequencies necessary to give pictures showing sufficient detail. Mr. L. Plew, the inventor of gramovision, appears to have been successful in reproducing these high frequencies, and his records give excellent results. A synchronising signal is included, and the picture can be kept steady in its frame by means of the usual automatic mechanism or simple hand gear. The records should be useful to television experimenters, whose opportunities for tests of their sets at present are limited to the brief periods when television programmes are broadcast. It is said that in Great Britain alone there are already nearly 30,000 experimenters of this kind, and with the growing interest in television there is little doubt that this number will be increased.



The "Fingalite" in use. The flashlamp bulb provides illumination and leaves the hands free. Our illustration is reproduced by courtesy of Mr. M. H. Richardson.

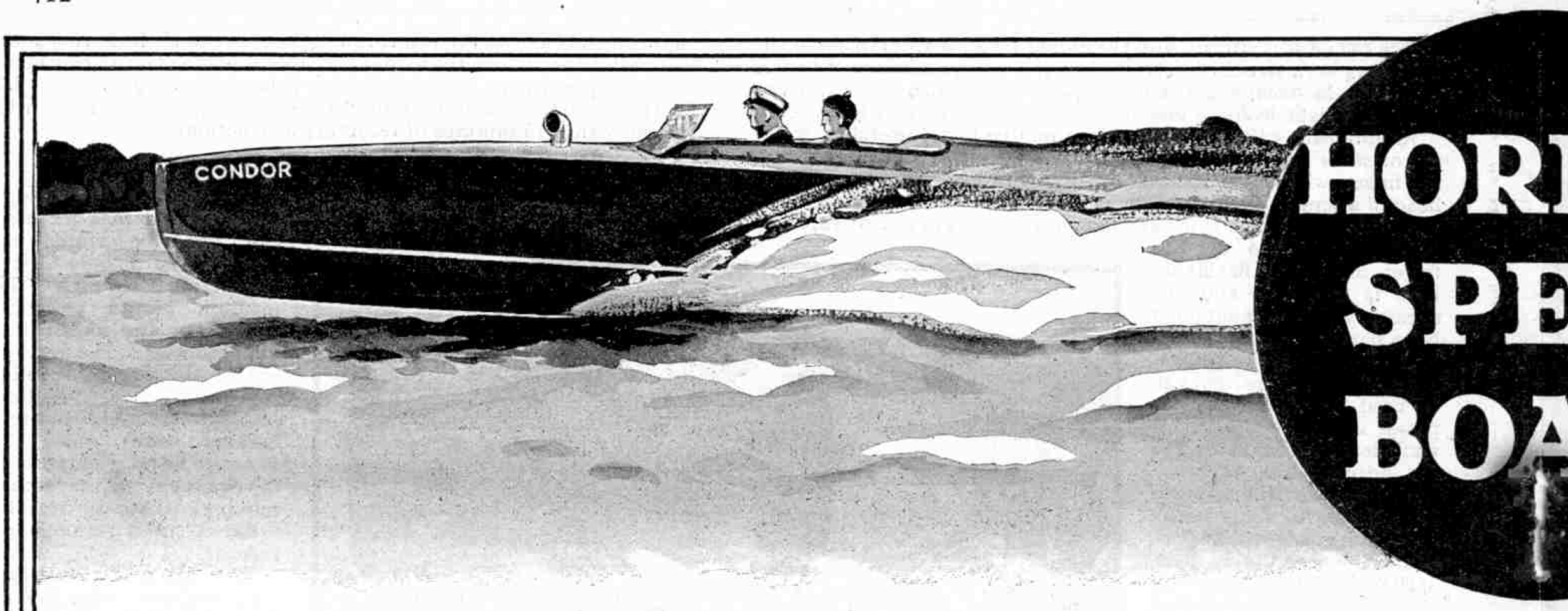
World's Smallest Radio Outfit

Recently I have received details of several small inventions of unusual interest. One of these is a radio set that is claimed by its Italian inventor to be the smallest in the world. It is a crystal set little larger than a badge to be worn in the buttonhole, and weighs 24 gr., or slightly under an oz. For reception a tiny portable aerial is plugged into it, and the user himself acts as earth wire when he holds the set to his ear. With this outfit radio programmes can be enjoyed while walking, and without the discomfort and unsightliness that follow the use of earphones.

A second invention of this type looks like a revolver, but really is a cinematograph camera. A target to which it is pointed can be kept covered without difficulty, whether still or moving, and pressure on the trigger sets the camera in motion. One use that has been suggested for this interesting device is in taking photographs of thieves or criminals, but it may prove of equal value in photographing animals or birds in movement in natural surroundings.

Another simple but effective invention is a lamp for use when road repairs are being carried out at night. Those of my readers who have travelled by road at night know that the ordinary red lamp gives no indication which side of a road under repair remains open to traffic, and this often gives rise to uncertainty and may lead to accidents. The new lamp, the product of a Blackpool inventor, has twin red and green lights, which serve as signals to oncoming traffic; and in addition there is a green illuminated arrow that points to the side of the road that is open for use.

I see that inventors are still trying to harness the Sun, and in a Sun motor devised by the General Electric Company of New York sufficient current to drive a tiny motor of less than half a millionth h.p. has been obtained from a battery of four photo-electric cells. The motor whirls round at about 400 r.p.m. when driven by direct sunlight, and turns rapidly when the cells are acted upon by light from a cloudy sky.



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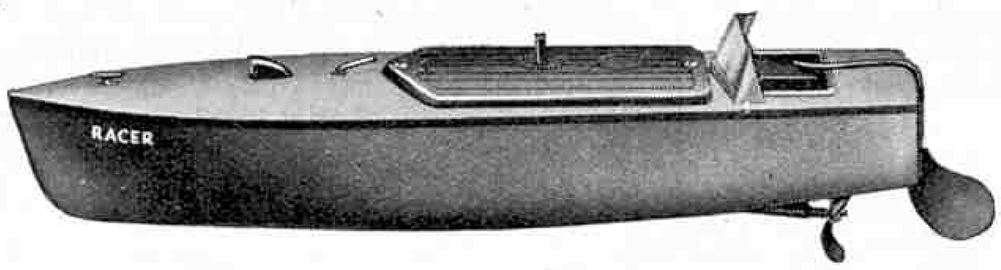
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This novel boat suitable for yo The deck realistically model of

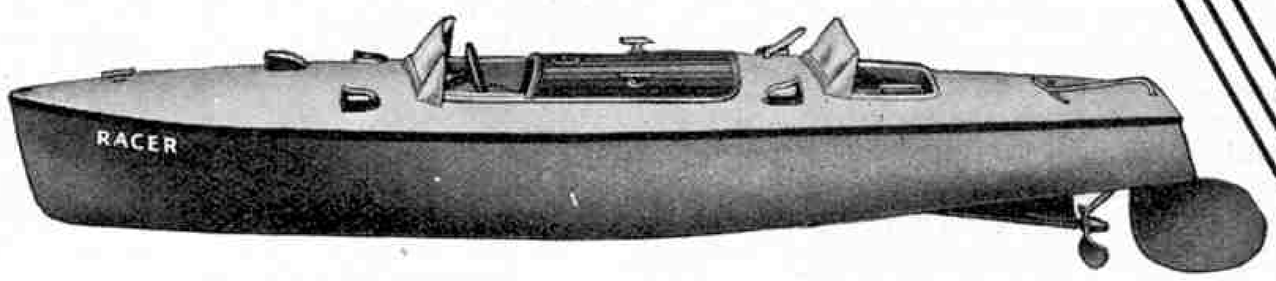
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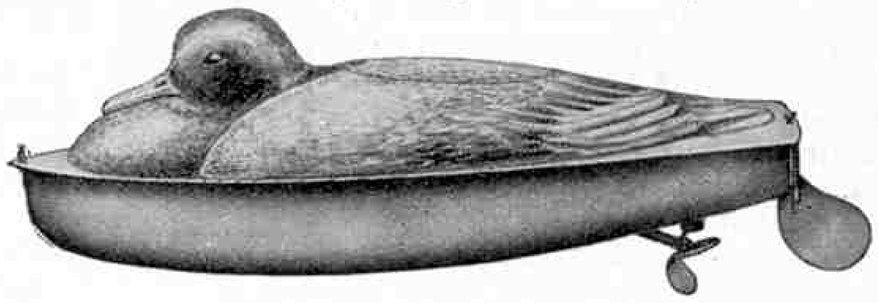
HORNBY RACING BOAT No. 1 "RACER I." Price **4/6**
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Travels over 200 ft. at high speed on one winding. Finished in Blue and Cream. Dimensions: Length 12½ in. Beam 3 in.



HORNBY RACING BOAT No. 3 "RACER III." Price **14/6**
Travels over 300 ft. at high speed on one winding. Finished in Red and Cream. Dimensions: Length 16½ in. Beam 3½ in.



HORNBY WATER TOY (DUCK). Price **2/6**
Travels over 100 ft. on one winding. Finished in appropriate colours. Dimensions: Length 9¼ in. Beam 3 in

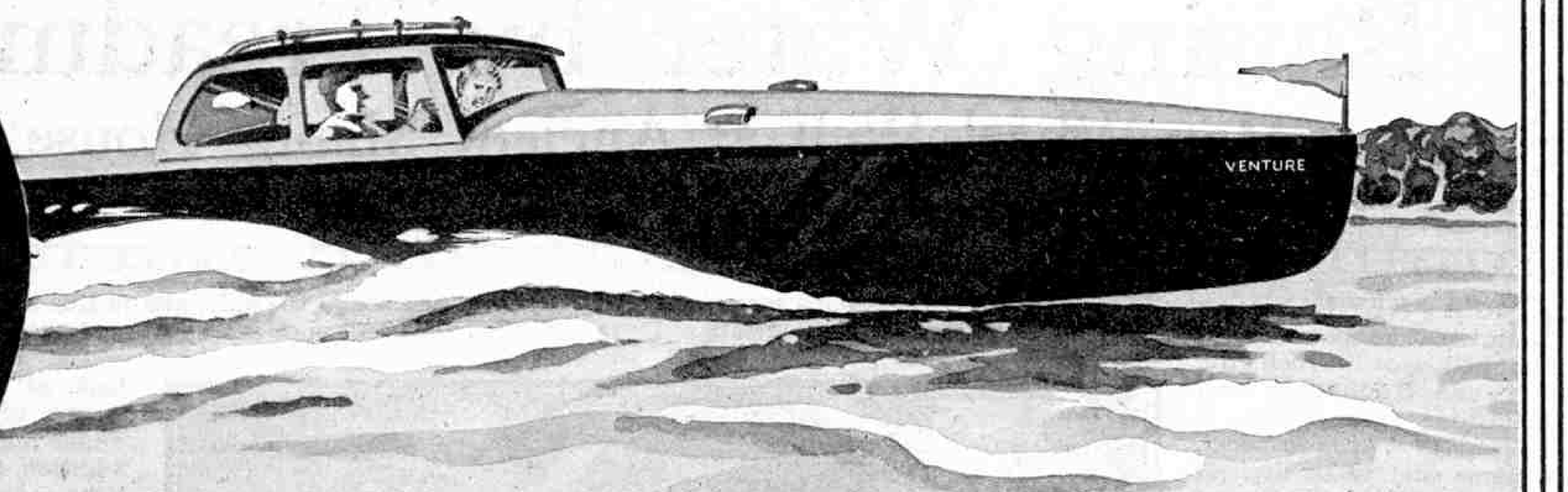


Join the Hornby Speed Boat Club

Every owner of a Hornby Speed Boat or Hornby Racing Boat should join the Hornby Speed Boat Club. This may be done by purchasing a special badge (illustrated here) from any Meccano dealer, or direct from Meccano Ltd., Binns Road, Liverpool 13. Prices: United Kingdom, **6**d., New Zealand **10**d., South Africa, **9**d., Canada, **20** cents.

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ful lines and beautiful finish are the outstanding
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the propeller and the unique methods
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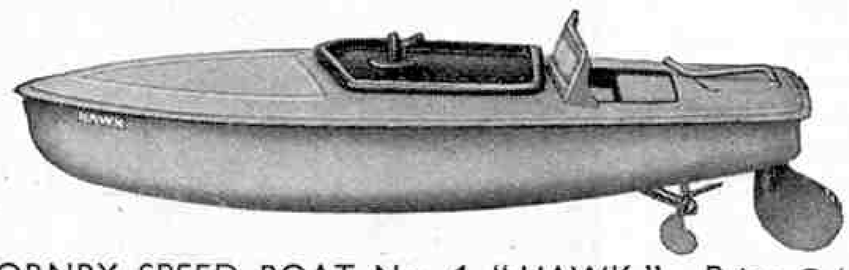
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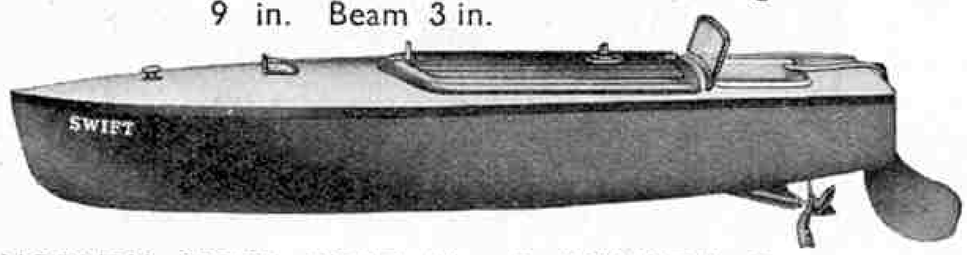
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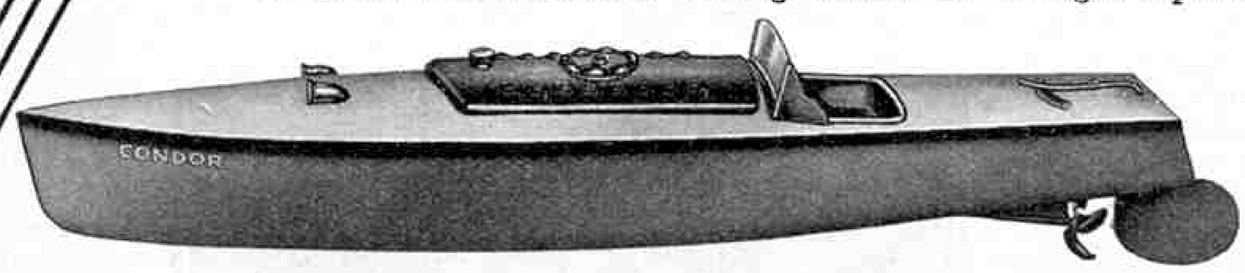
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HORNBY SPEED BOAT No. 1 "HAWK." Price **2/11**
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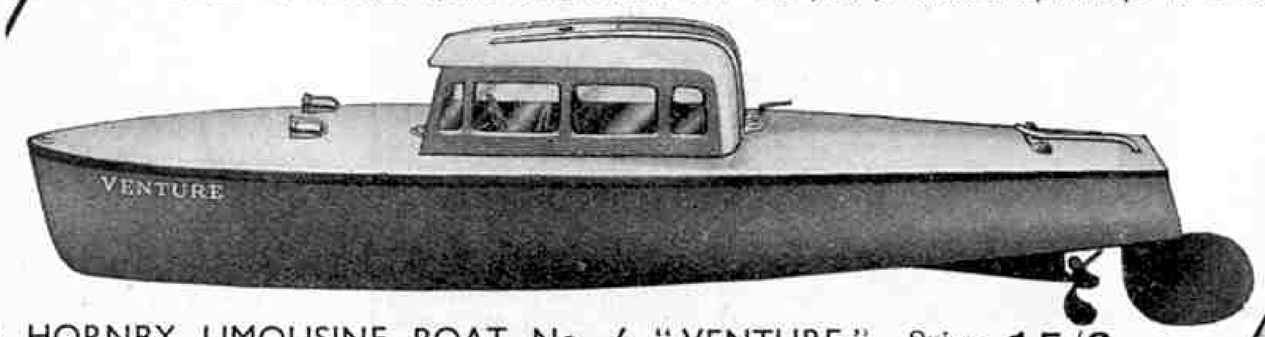
HORNBY SPEED BOAT No. 2 "SWIFT." Price **7/6**
Travels over 300 ft. on one winding. Dimensions: Length 12½ in. Beam 3 in.



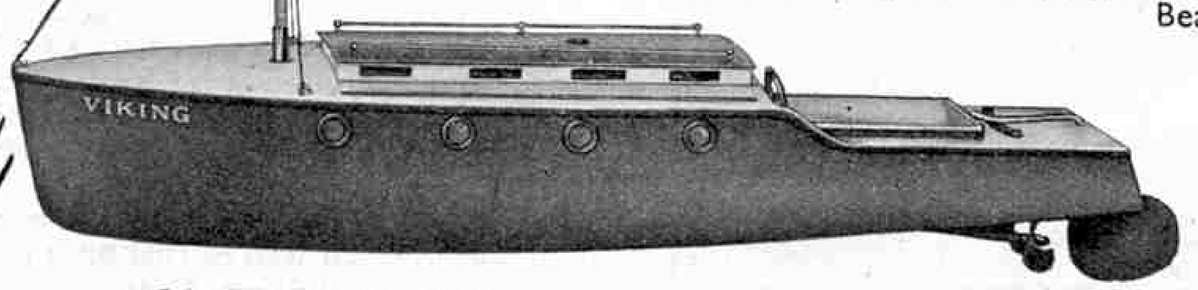
HORNBY SPEED BOAT No. 3 "CONDOR." Price **12/6**
Travels over 500 ft. on one winding. Dimensions: Length 16½ in. Beam 3½ in.

PENNANTS

Pennants for Hornby Speed Boats Nos. 3 and 4 may be purchased separately. Price **2d.** each.



HORNBY LIMOUSINE BOAT No. 4 "VENTURE." Price **15/6**
Travels over 500 ft. on one winding. Dimensions: Length 16½ in. Beam 3½ in.



HORNBY CABIN CRUISER No. 5 "VIKING." Price **16/6**
Travels over 500 ft. on one winding. Dimensions: Length 16½ in Beam 3½ in.



Binns Road, Liverpool 13

Raising Water by Treadmill

Man-Wheel Well at Ancient Manor House

By W. H. Evernden

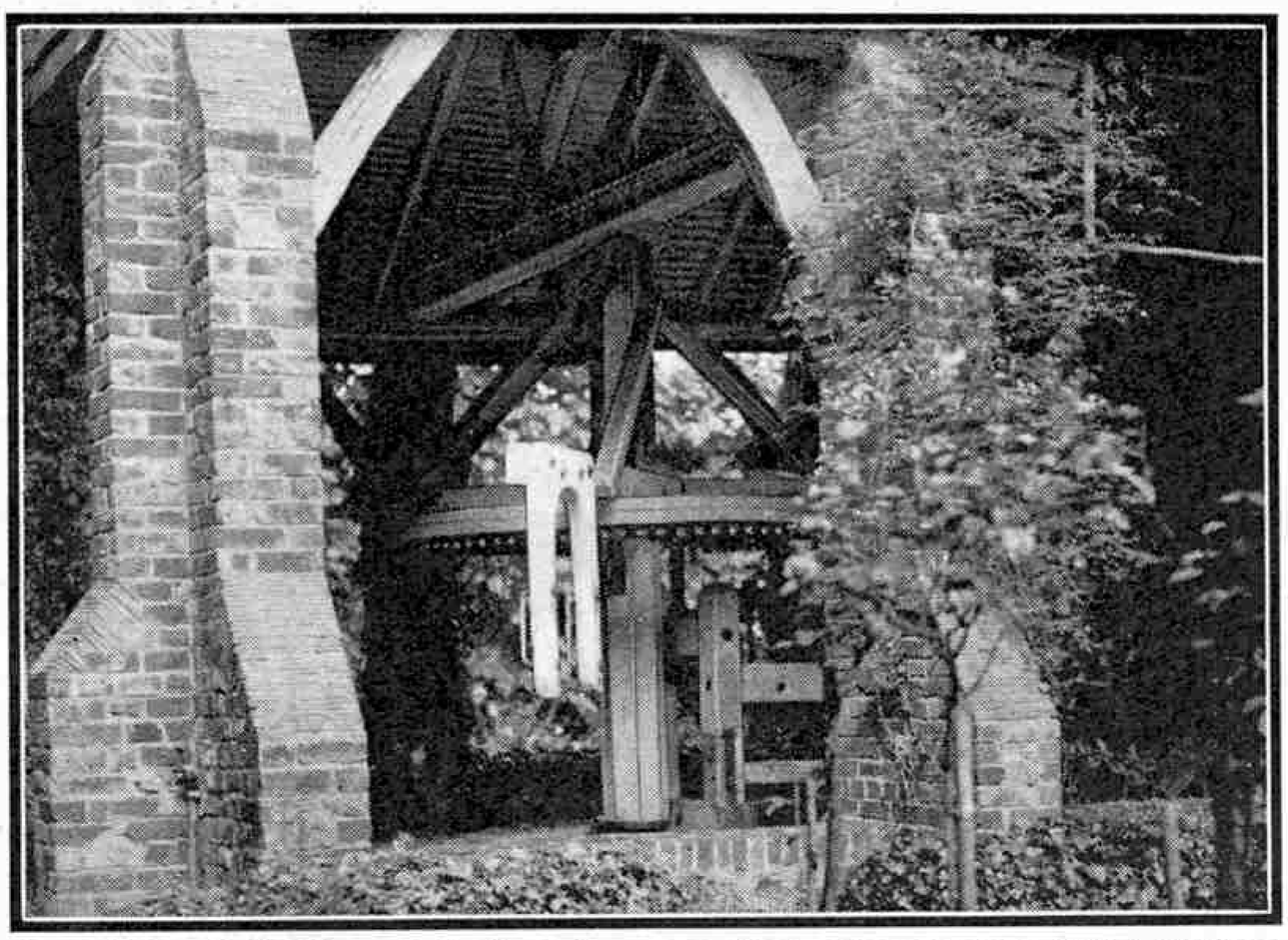
GREAT KEWLAND is an old manor house possessing a special interest in that it is situated in the historic area lying beneath the shadow of Bluebell Hill, between Rochester and Maidstone. The area is known as "Greywethers," a name said to be derived from the large grey Sarsen stones, somewhat resembling "wether" sheep, once so freely scattered there. Our prehistoric ancestors built these familiar Sarsen stones into their crude temples, altars and circles, among them the famous dolmen Kits Coty House, and a neighbouring group of neolithic remains known as "The Fallen Stones."

The house is less than a mile from Burham, just beyond where the ancient Pilgrim's Way, the oldest trackway in England, joins the Burham Road. It is said to have been the home of the ancient kings of Kent, and it is also believed that Henry VIII used it for a hunting box in the days when deer and wild boar roamed in the surrounding forests. It has a circular cellar, and strange dark basement rooms with heavy timber beams that carry the floor overhead. These speak of antiquity and strength, and readily lend themselves to suggestions of secret passages. It has been supposed that passages of this kind lead to an unused Roman well near the building, or connect this with a monastic house, known as "The Friars," at Aylesford. Other impossible directions for underground passages have been suggested, but all have been proved to be myths.

Kewland has its legend, however. At certain seasons, on dark and stormy nights, a phantom coach is driven up to the old house. The postilion dismounts and throws down the steps, when a veiled lady alights and the horses gallop away with the coach into the darkness. The veiled lady is perhaps the ghost of the beheaded Anne Boleyn, who often stayed in the neighbouring Allington Castle, visiting the old trysting place of Kewland.

Kewland is now a quaint old tumble-down farmhouse standing on the verge of an immense chalkpit that has completely ruined its once ancient and historic surroundings. It is well worth a visit, however, and upon the oak lintel of the entrance porch is carved the inscription "T.M.R. 1529." The interpretation of this is unknown, but it is testimony to the antiquity of the house.

To most visitors the chief attraction is the huge wooden man-wheel, installed ages ago for drawing water from the deep well beneath it. From the axle of this wheel hangs the well rope, carrying a large bucket; and to raise this full of water one steps inside the wheel and walks forward as if to climb the curved rim. No progress is made, however, the wheel revolving instead. This causes the rope to be wound round the axle, and in this manner the bucket is raised, filled with cool pure water from a depth of 200 ft.

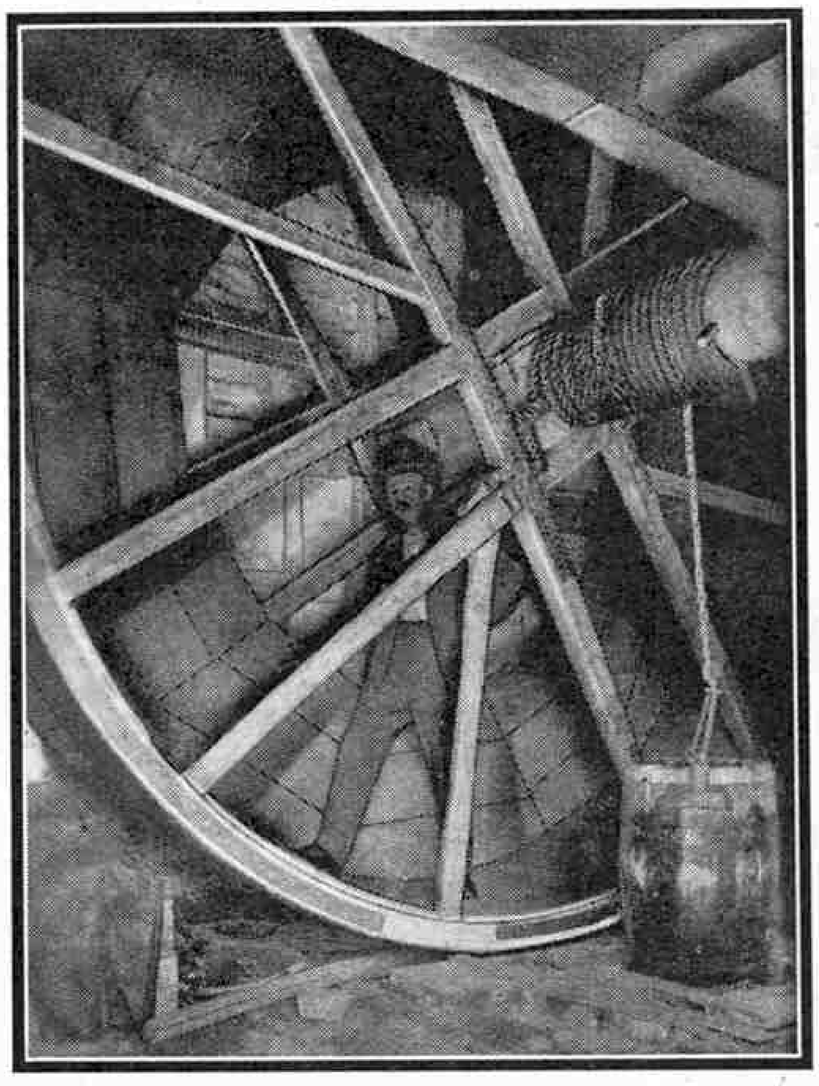


An ancient well at Chilham Castle, Kent. The pumps drawing the water were worked by horses harnessed to yokes on opposite sides of a horizontal wheel.

The writer essayed the task of raising water by means of the wheel, but found this very arduous. In addition, the blinking of the light caused by the passing of the spokes of the wheel produced a strange giddiness, and the writer's sympathy went out to the man whose thankless task it was, in days gone by, to draw water for the occupants of Kewland by labour on this treadmill.

It has been rumoured that the bottom of the well is so large that a team of horses could be turned round there. The writer found the man who cleaned out the well some years ago and learned from him that no such chamber exists. Examination revealed that the well simply "went down to a point," to use the workman's own words, and no passage or tunnel was discovered.

The old well wheel is now rarely used, if at all, as the public water supply serves the premises. Visitors are welcome, however, and those who contribute to the box attached to one of the beams will be glad to know that their donations will eventually reach the ancient Leper Hospital of St. Bartholomew, Rochester.



Hard labour on the man-wheel at Kewland. The bucket seen on the right is raised from a deep well by the treadmill action of the wheel.

There are other man-wheels of this kind at Carisbrooke Castle and at Beauworth in Hampshire. The latter is in daily use, and a distance of a quarter of a mile must be walked on its great wheel in order to draw up the supply of water required for the house in which it is installed. Still another wheel is to be found at Godmersham. This is 18 ft. in diameter and at one time was worked by a donkey. It was made between 1600 and 1650, and even to-day is beautifully balanced, a slight push being sufficient to set it in motion.

Many ancient wells are still preserved from which water was drawn by methods that seem quaint to modern eyes. A good example is a well at Lower Hardres, near Canterbury, where a horse does the work by walking round and round in a circle, pulling after it a cross piece that is attached to a central post. The post rotates and a rope is wound round a great bobbin on top of it as it does so, thus pulling a bucket full of water from the well, which is about 150 ft. in depth.

Horse wells were once fairly common, and a splendid old well of this kind is still to be seen at Chilham Castle. It was worked by two horses, which were harnessed to elaborate yokes set opposite each other on the wheel that actuates the pump. This well is situated in a part of the old Norman castle and is probably the original well. The present brick building over it is of much later date, however, for it is Tudor work of the 16th century.

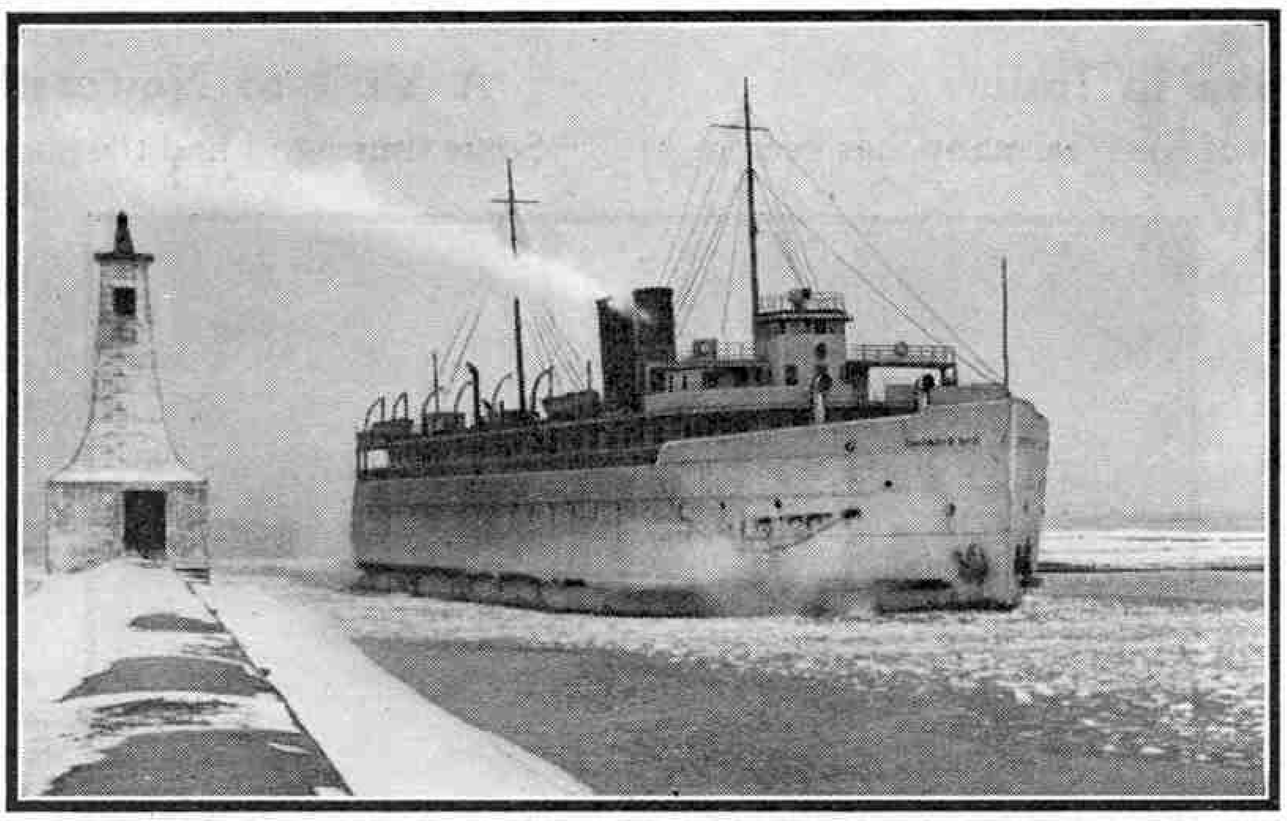
Crossing Lake Ontario in a Winter Storm

An Interesting Train Ferry

By J. Allan Cash

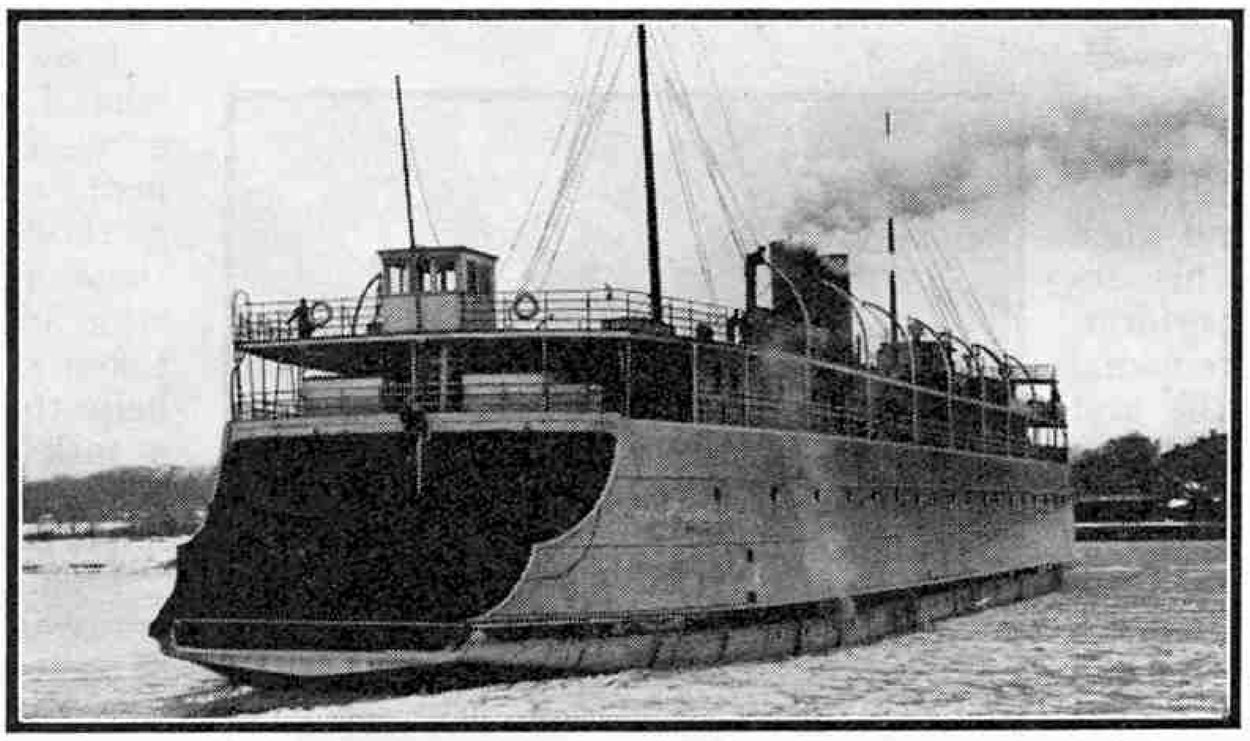
A LARGE train ferry operated by the Canadian National Railway plies regularly across Lake Ontario, more than 1,000 miles from the sea. Cobourg, Ontario and Rochester, in the State of New York, are the ports between which it is maintained, and there are two boats, but it is only in the busiest times that both are in use at the same time. The run across the Lake is about 80 miles in length, and the steamers make each trip in about five hours. Lake Ontario is so large that land is out of sight during a considerable part of the journey. Its waters can be very rough at times, and although the vessels are larger than many ocean-going steamers, they are often rolled and buffetted in great style by the waves.

The boats were built expressly for the purpose of carrying railway wagons, or freight cars to use the Canadian term, across Lake Ontario, thus avoiding hundreds of miles of railway hauling round its ends. They carry from 26 to 30 wagons at a time, each wagon weighing from 20 to 40 tons and containing from 40 to 60 tons of freight. The total weight carried often exceeds 2,000 tons. A certain amount of general freight is taken across the Lake in this manner, but most of the railway wagons ferried over to the United States from Canada contain pulp wood for the making of paper, while a considerable amount of coal is carried in the opposite direction. Coal is found in Canada on the Atlantic coast and in the Rockies, but central Ontario is a long way from these sources of supply and it is cheaper to bring this mineral by train ferry from the United States than to haul it thousands of miles by rail.



The train ferry between Cobourg, Ontario, and Rochester, New York, entering Cobourg harbour after her voyage of 80 miles across Lake Ontario.

The back of the train ferry is open, as the lower illustration on this page shows, and easy access is given to the deck, on which there are four sets of rails. On entering the harbour, the boat turns round and backs into a special dock in which it fits closely; a strong gangway is lowered, and the four sets of rails it carries are quickly coupled to those on the boat. Then an engine backs a short string of light flat wagons on to the steamer, and one of the lines of wagons on the deck is coupled on and hauled out. The flat wagons are used in order to avoid bringing the heavy engine on the gangway.



Stern view of the Cobourg-Rochester train ferry, showing the entrance to the train deck.

The operation is repeated until the train deck has been cleared, and then the wagons waiting to be taken back across the Lake are backed on to the vessel. The work is carried out expeditiously and congestion on the rails converging at the dockside is avoided. The train ferry can be unloaded, filled up with wagons and headed out of the harbour again in two hours.

In winter the boats sail as and when required, according to the amount of railway business offered. Very few passengers are carried then, but in the summer the voyage across the Lake is a favourite trip, and the steamers are crowded with passengers at week-ends and holidays.

The train ferry runs throughout the winter, sailings being delayed only in the most severe weather; and the vessel on service frequently is coated with ice from stem to stern when she reaches harbour after a rough voyage in "zero" weather. The steamers are fitted with very strong stems and really are ice breakers. Lake Ontario itself does not freeze over completely even in the coldest weather, but the vessels often have to plough through ice 12 in. or 15 in. thick in the harbours, and frequently run through large ice fields in the open lake. They are almost the only ships running regularly on the Lake throughout the year, and fog horns and lighthouses are kept in operation all winter as aids to their navigation.

A severe storm sprang up when one of these steamers sailed from Rochester late in the afternoon of a very cold day during a recent winter, and soon the ship was being sprayed continually from stem to stern with water that froze as it fell, tightly sealing doors and windows and making it impossible to see where the vessel was going. Late that night, people on the waterfront at Toronto saw a "ghost ship" out in the lake. She was ablaze with lights and was tossing violently in the raging seas. They were completely mystified, for no steamers sail anywhere near Toronto in the winter time; and they scarcely suspected that the vessel was the Cobourg train ferry, for she was then nearly 100 miles off her course.

Next day the vessel managed to reach Cobourg, and presented such a sight that news-reel cameras were rushed down to get photographs, and every newspaper contained long and thrilling stories of that wild night's sailing, when she was lost for many hours. The windows on the bridge were covered with ice 12 in. thick, and the captain had found it necessary to break one of them from the inside in order to see where he was going. There was so much ice on the rest of the vessel that her crew were compelled to spend three days chipping it off before she could be brought into service again. The upper illustration on this page shows the train ferry entering the harbour at Cobourg in wintry conditions, but of course these are very mild indeed in comparison with the blizzard that drove the vessel so many miles off her usual track from Rochester.

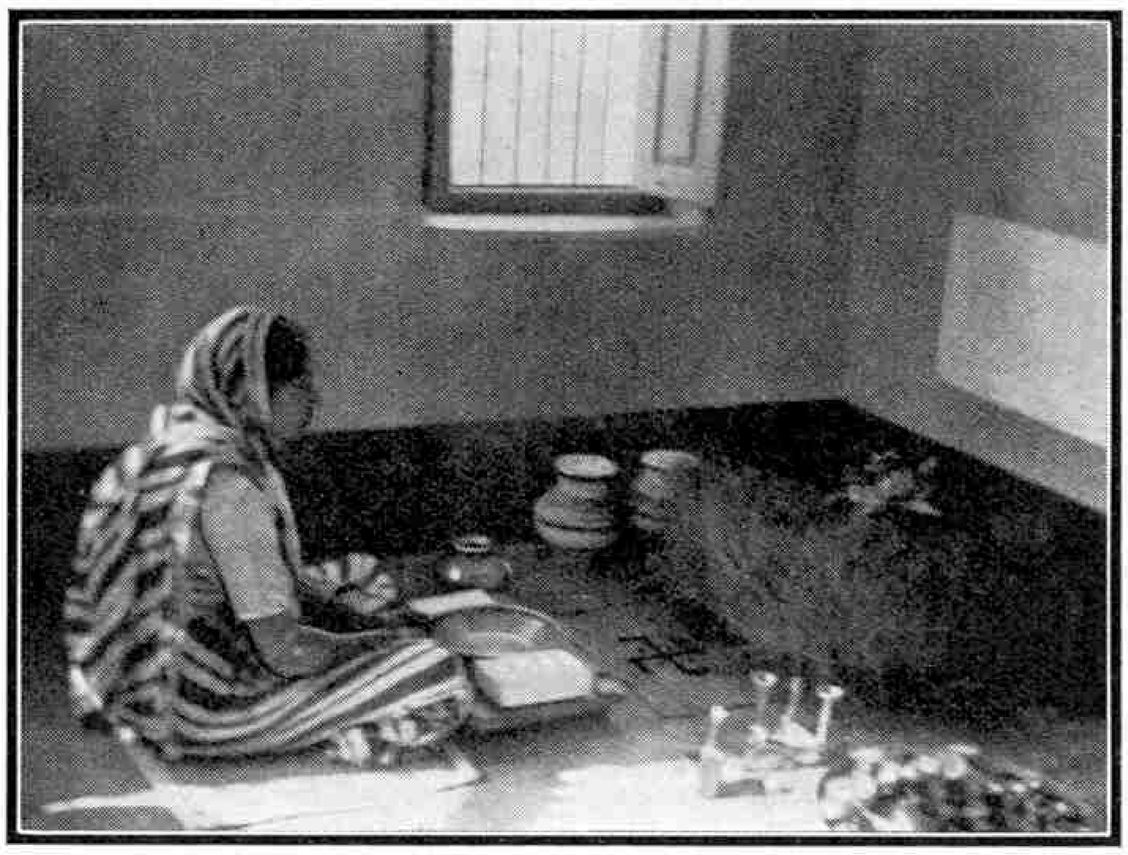
It is not always stormy on Lake Ontario, however. Many a voyage is made when the water is so smooth that the wheels of the railway wagons on board need not be locked to the rails, and in the summer time, especially in the midst of a heat wave, the trip is delightful.



These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for these pages are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

The Swastika in India

The swastika, the symbol of Nazi Germany, has been in everyday use in India for centuries, and there are few auspicious occasions on which it cannot be seen. There each quadrant has a dot in it, a feature that is omitted in the German symbol, and in this form it is in evidence in Hindu temples, where it can be seen, made with ground rice and coloured powders, on the altars. It is associated particularly with Ganesh, the elephant god of learning and intellect, and there seems little doubt that it was introduced into India about 2,000 years ago.

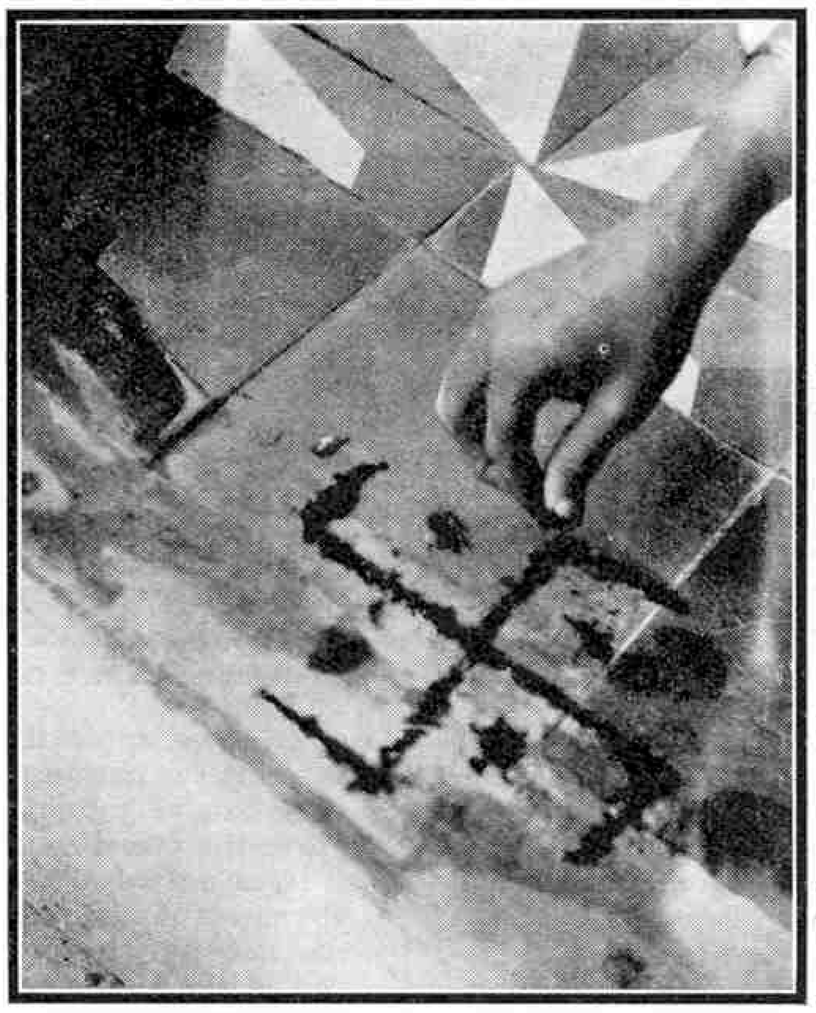


A Hindu housewife invoking a goddess, a ceremony in which the swastika is used. The photographs on this page are by M. P. Gandhi, Karachi.

Hindus mark their doors with the swastika in order to ensure the well-being and happiness of their households. On important holidays the fronts of houses are decorated with designs in which it predominates and those who can afford to do so adorn their houses with it daily, drawing it in red powder every morning. On any religious occasion, such as a marriage, the swastika is prominent in front of the altar on which the deity is seated; and when a Hindu merchant closes his accounts for the year, a task performed with solemn religious ceremonial at the Hindu New Year, the first page of his new books is marked with it in saffron or red, the most auspicious of colours.

The Hindus believe that a child is endowed with senses on the sixth day after birth. This is an occasion for elaborate ceremony, in which a swastika formed in rice is a prominent feature. The symbol is used extensively in connection with marriage customs, and among the presents received by the bride from her parents there is invariably a coconut embroidered with white glass beads, on which a red swastika is marked.

M. P. Gandhi (Karachi).



A swastika before the door of a Hindu house.

A Visit to Newcastle Police Station

Some time ago I had the good fortune to make a tour of the modern and highly efficient Police Headquarters in Pilgrim Street, Newcastle. The large general office of the station is fitted with long mahogany counters and looks more like the interior of a bank than that of a traditional police station. This is in keeping with the belief of the Chief Constable that the Police Force should not present a forbidding aspect to the public, in whose interests it is conducted.

Newcastle's traffic problems are studied in one department, and there I saw a graph that showed the hours between noon and 5 p.m. to be most prolific of accidents. A map on which pins marked the positions of street accidents showed that these occur chiefly on the main roads near the outskirts of the city.

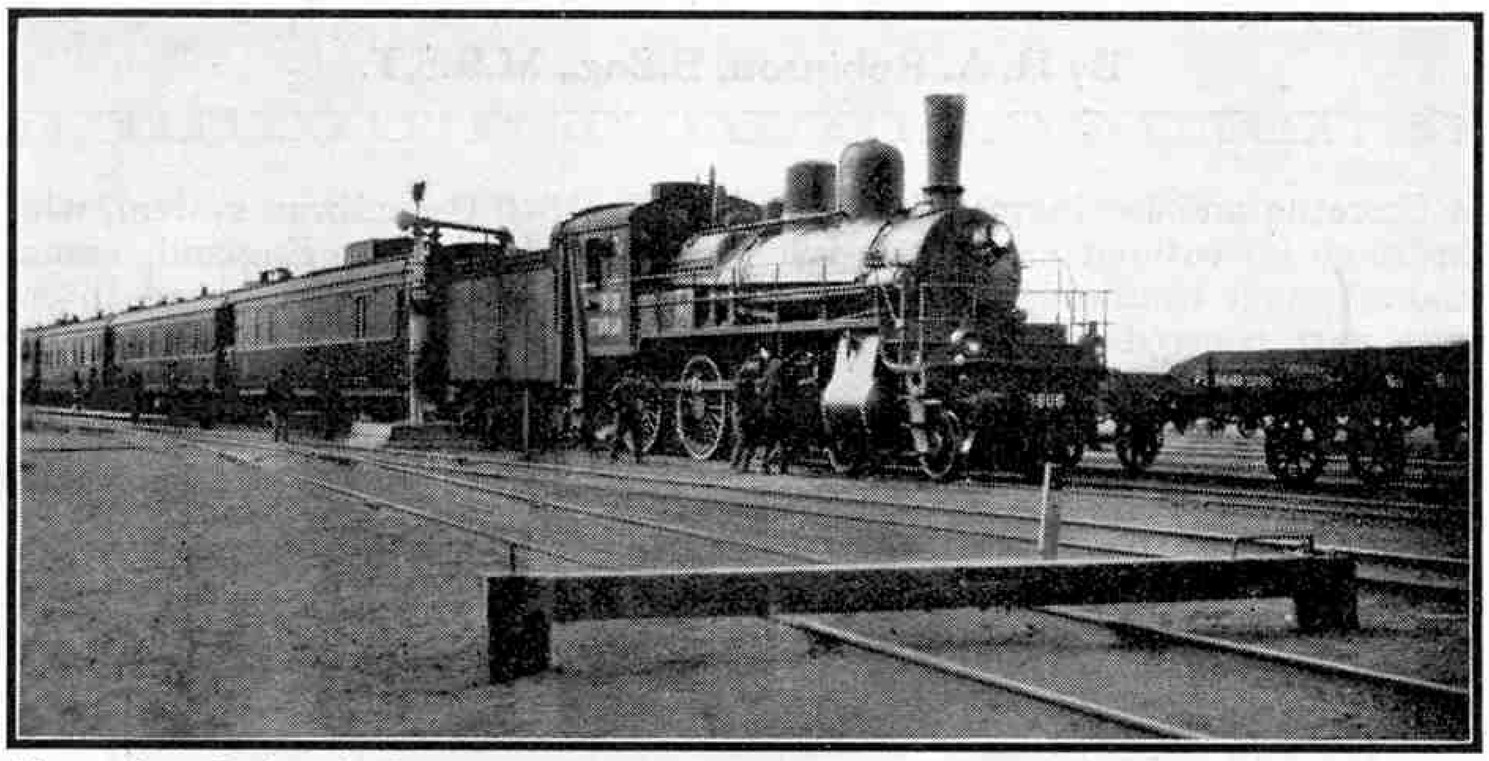
I was particularly interested in what I saw of the methods used in crime detection. Card indexes are kept of the characteristics and methods of known criminals, for these people rarely change their style; and a collection of photographs taken in a studio in the basement helps the police to identify criminals, a task in which fingerprints, also taken in this studio, play an important part.

Finally I saw many interesting curios in the police class room. One of these was a mouldy apple on which were teeth marks that had led to the conviction of a thief. Another exhibit was a rubber heel of well-known make. A print left by this heel at the scene of the crime seemed a useless clue until it was realised that the heel making it had been cut down a little to fit a particular shoe, and a conviction resulted also in this case.

F. W. Oliver (Sunderland).

Scenes on a Manchoukuo Railway

While in Manchoukuo a short time ago I was greatly interested in the Chinese Eastern Railway. This was built by the Russians, but has been transferred to Manchoukuo management and is now called the North Manchuria Railway. It is 1,080 miles long, and its headquarters are at Harbin, from which run main lines westward to the Siberian frontier at Manchouli, eastward to the Russian Maritime Provinces, and southward to Hsinking, the terminus of the South Manchuria Railway, respectively. Its trains connect with the famous Trans-Siberian expresses to and from Russia, a change of trains being made at the frontier, although the gauge is 5 ft., the same as that of the Siberian railways.



A locomotive and train on the North Manchuria Railway, formerly known as the Chinese Eastern Railway. Photograph by H. R. Hondelink, Kobe, Japan.

The line is single track throughout, and there are several important bridges and four long tunnels, which pass under mountain ranges just inside the eastern and western borders of Manchoukuo. Points are hand operated and signalling is rather primitive, only semaphore home signals operated by levers on the station platforms being employed. All stations are Russian in style, but I noticed one with a Chinese appearance, and learned that it was built not long ago and designed in this manner to please the local population. Soldiers were to be seen on the low platform of this station when I visited it, their presence being necessary in order to give protection against bandits.

There are four classes on this railway, but the coaches of the 4th class are really closed wagons, with wooden benches and a few small windows in the side panels. The second- and third-class carriages are equipped with bunks for use at night, and in the first-class coaches there are berths that fold back against the walls during the day.

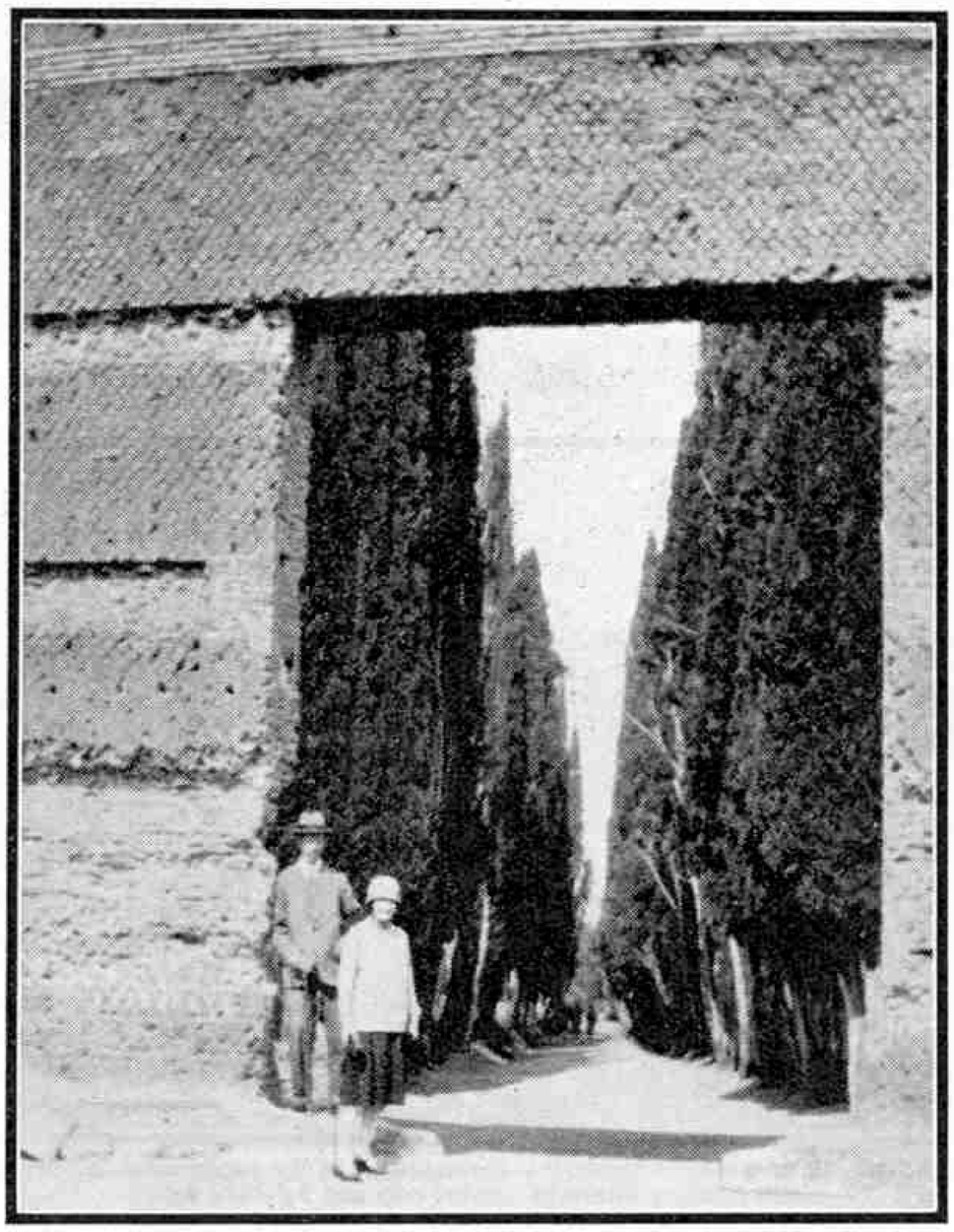
Harbin owes its existence to the railway, and as this was built by the Russians it is not surprising to find that the town has a European appearance and a large Russian population. Nearly all the business life of the town centres round the railway and its extensive workshops, and the railway management have provided many schools, hospitals, theatres and picture houses, libraries and other buildings.

H. R. HONDELINK (Kobe, Japan).

Hadrian's Villa

One warm Spring day we went by steam tramcar from Rome to visit Hadrian's Villa. It was a pleasant drive across country rich in pasturage and cattle, and over which ruins were scattered.

The Emperor Hadrian began to build his famous villa about 125 A.D. and retired to it as soon as it was finished. It was a magnificent structure, with a circumference of about eight miles; and the scale on which it was planned and built is suggested by the accompanying photograph of a doorway on the Pecile, or Painted Portico. Hadrian had lived for several years in Athens, his favourite city, and had seen the Pecile there and decided to copy it. The Pecile at Athens had frescoes and friezes, and traces of similar ornaments are still visible on that of Hadrian.



Doorway on the Pecile of Hadrian's Villa, the ruins of which can be seen near Rome. Photograph by R. C. Hoare, London, W.2.

Although the ruins are described as those of a villa, the name is very misleading, for they are incredibly large and more nearly resemble those of a small luxurious town with hospitals, baths, theatres, libraries and a gymnasium. All the doorways are as large or larger than the one illustrated, which conveys a good idea of the lavish scale on which building was carried out.

R. C. HOARE (London, W.2).

To Belgium by Schooner

The three-masted motor schooner *"Henford"* was lying off Greenwich when I joined her and we proceeded seaward as soon as supplies came aboard.

Next morning I awoke to find that we were in the midst of a large fishing fleet off the Belgian coast, and to starboard I could see the tall hotels of the health resorts on the shore. We passed Flushing, with its huge cranes looming high in the sky, and on reaching Terneuzen passed through lock gates into the Ghent Canal. Our inland voyage then took us under many white painted bridges, their piers protected by lines of piles. Some of them were swing bridges and others had lift spans, and as we went by each one a bag on the end of a pole was pushed forward for a contribution, and a note was made of the name of the vessel. Soon we were in Ghent, where next day we took aboard our cargo of cement.

J. VARVILLE (London, S.E.10).

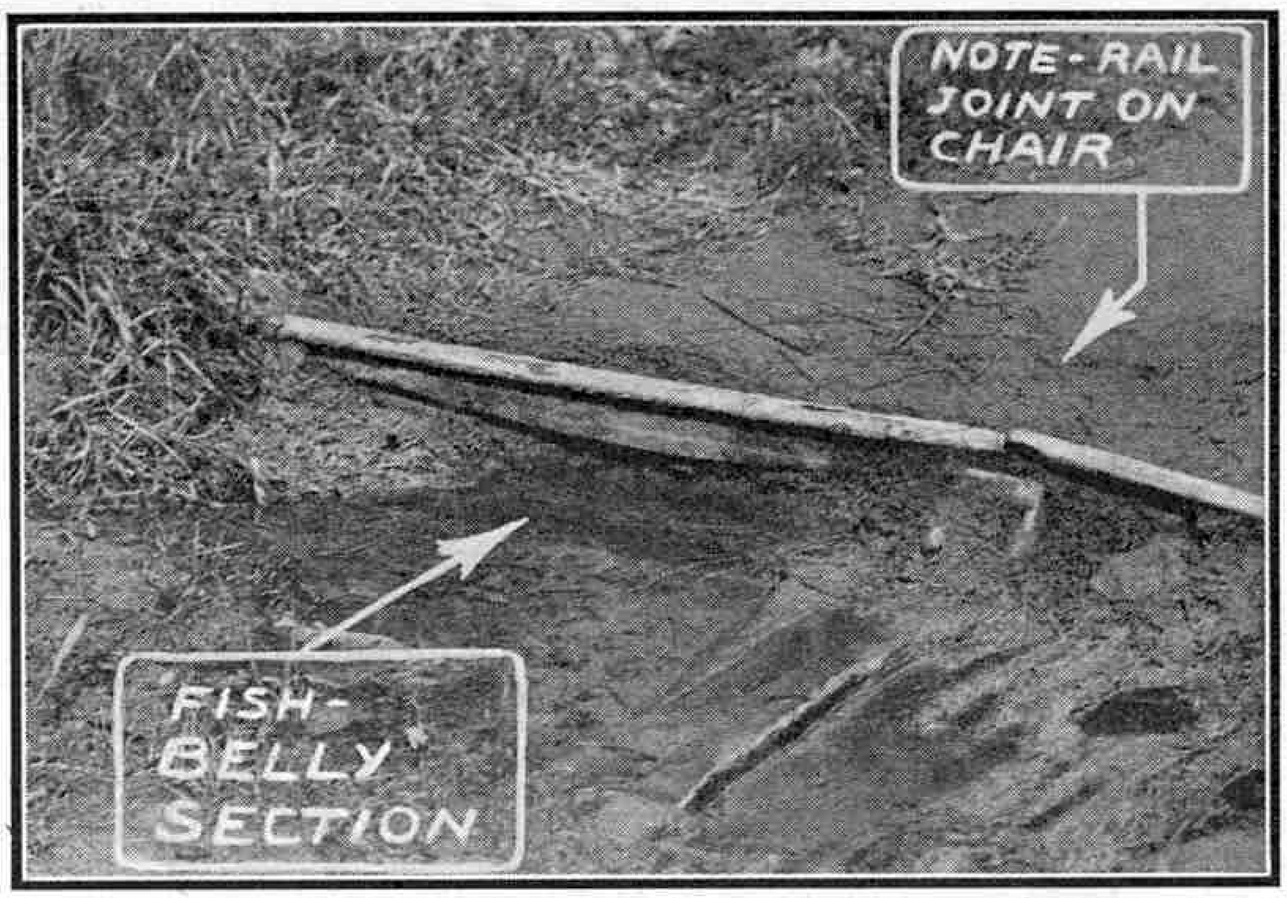
An Old Cheshire Tramway

Interesting Link With Stephenson

By H. A. Robinson, B.Eng., M.R.S.T.

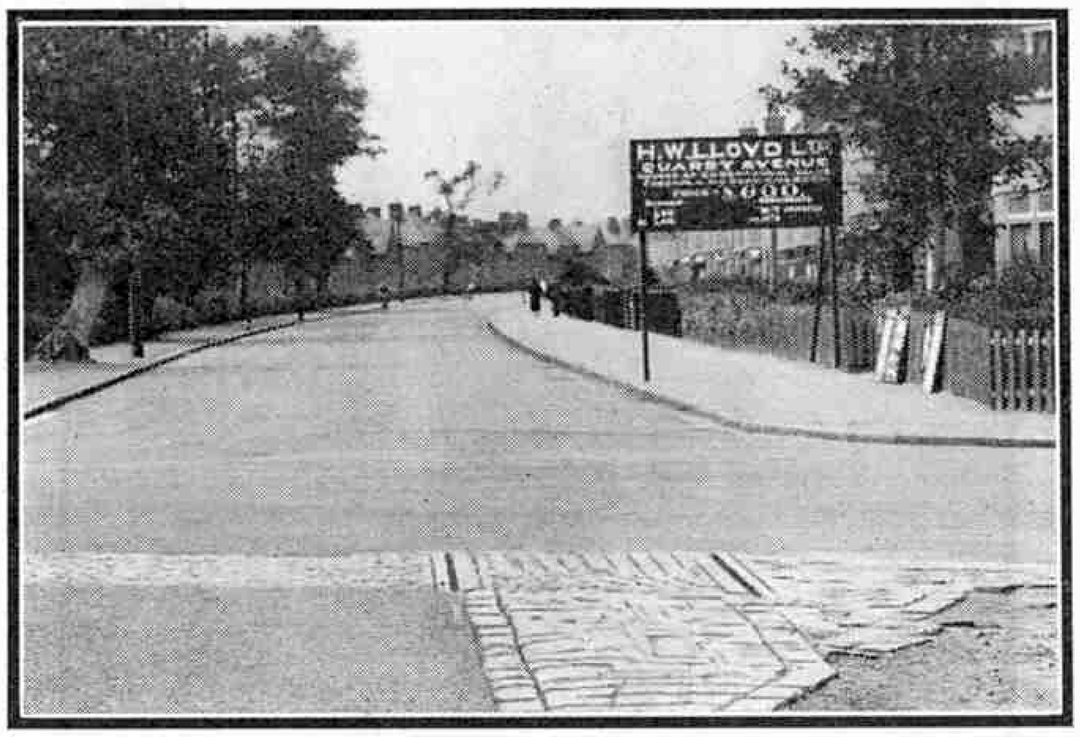
THE rambler in the Storeton and Bebington districts of Cheshire can hardly go far without coming across the relics of an old standard gauge tramway, fast rusting away and for the most part covered with grass and bushes, the growth of years. These relics, unlike most old track, which is generally not very inspiring, claim attention as forming a distinct link with the days when Stephenson and Hackworth were household names.

The tramway was closed down some 30 years ago, but prior to this it served the purpose of conveying the product of Storeton Quarry, known as Keuper Sandstone, to an isolated wharf on the Bromborough Pool, a tidal creek that flows into the River Mersey. There it was loaded on to barges and taken to Liverpool and Birkenhead docks. Much of Birkenhead and a number of buildings in Liverpool are built of this local stone.



A photograph of the old tramway rails referred to in this article, showing the special section and the method of arranging the rail joints.

It is the actual rails of the tramway that engage our attention, however, as they are of the "fish-bellied" type that dates back to the thirties and forties of last century. They are set on stone sleepers that run independently under each rail, but occasional use has been made of cross ties. The rail joints are arranged to come directly over chairs, thus doing away with the necessity of fishplates — a practice very common in early track. The term "fish-bellied" comes from the fact that rails of this type are cast in a series of inverted arches between the points of support, the widest section of the arch coming where the effect of the passing load would be most felt. Quite sound engineering as far as it goes.



Part of the old tramway in modern surroundings. In the foreground are two rails still in place although almost enclosed by stone sets.

Stone has been quarried from the Storeton Ridge for a very long period, but exactly how it was removed in the early days is not clear. At the opening of the last century, however, it was being conveyed along a three-mile road by ordinary carts to the nearest point on the River Mersey.

In 1840 the railway system, which was fast spreading its tentacles over England, came to Birkenhead, and incidentally in doing so had to cross the stone road at right angles, the crossing being effected by a short bridge. This line, known as the Chester and Birkenhead Railway, was engineered by Stephenson, and was taken over by the L.N.W.R. and G.W.R. in 1860. It is now jointly operated by the L.M.S.R. and G.W.R.

A comparatively short time after its opening in 1840 an extensive relaying of track took place, presumably to cope with heavier traffic, and a large stock of part-worn "fish-bellied" rails was put up for sale. A batch of these was bought by the then lessee of the quarry, who proceeded to lay them down in his stone road, following the same route taken by the carts, except for a little straightening and grading here and there. On this track were run four-wheeled trucks, some without raised sides and some cauldron-shaped. As the line was laid upon a more or less descending grade throughout, it was possible for the loaded trucks to make use of gravity on their downward journey. Each truck or train of trucks had horses in attendance to assist over the flatter sections and also to bring back the returning empties.

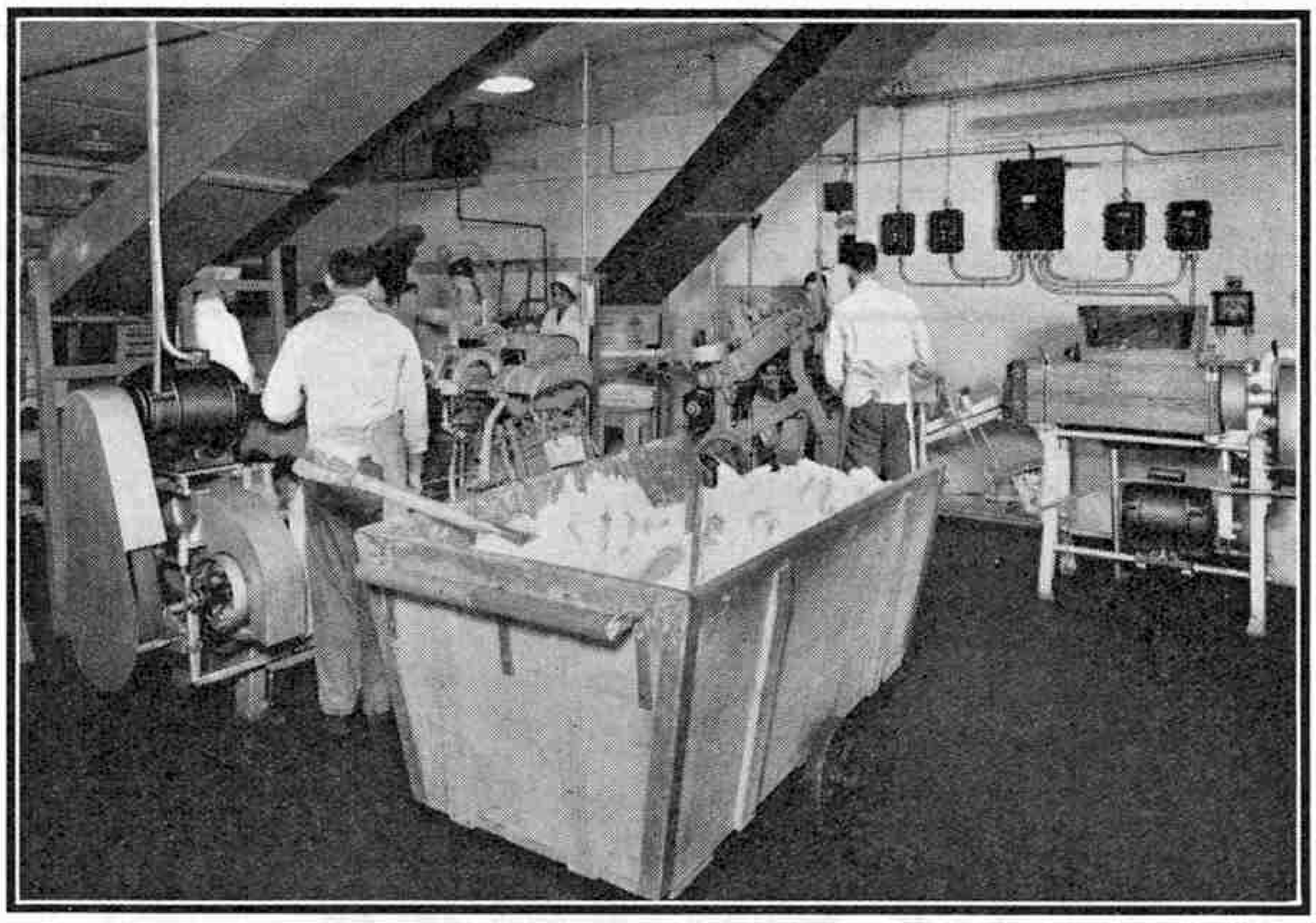
The tramway operated until in the course of time Port Sunlight, the famous village and works of Lever Bros. Ltd., began to grow around the lower end of the track. In 1905 Lever Bros. Ltd. became owners of the tramway and closed it down. The part of the track that ran through the village was taken up, but much of that nearer the quarry remained until quite recently when it has fallen victim to the estate builder. As one looks at the few remaining sections it is strange to think that these are the actual rails over which ran the first trains into Birkenhead nearly a century ago, although of course not in their present position, rails originally laid to the plans of Stephenson.

Margarine Factory Equipment

Interesting Electrical Installation

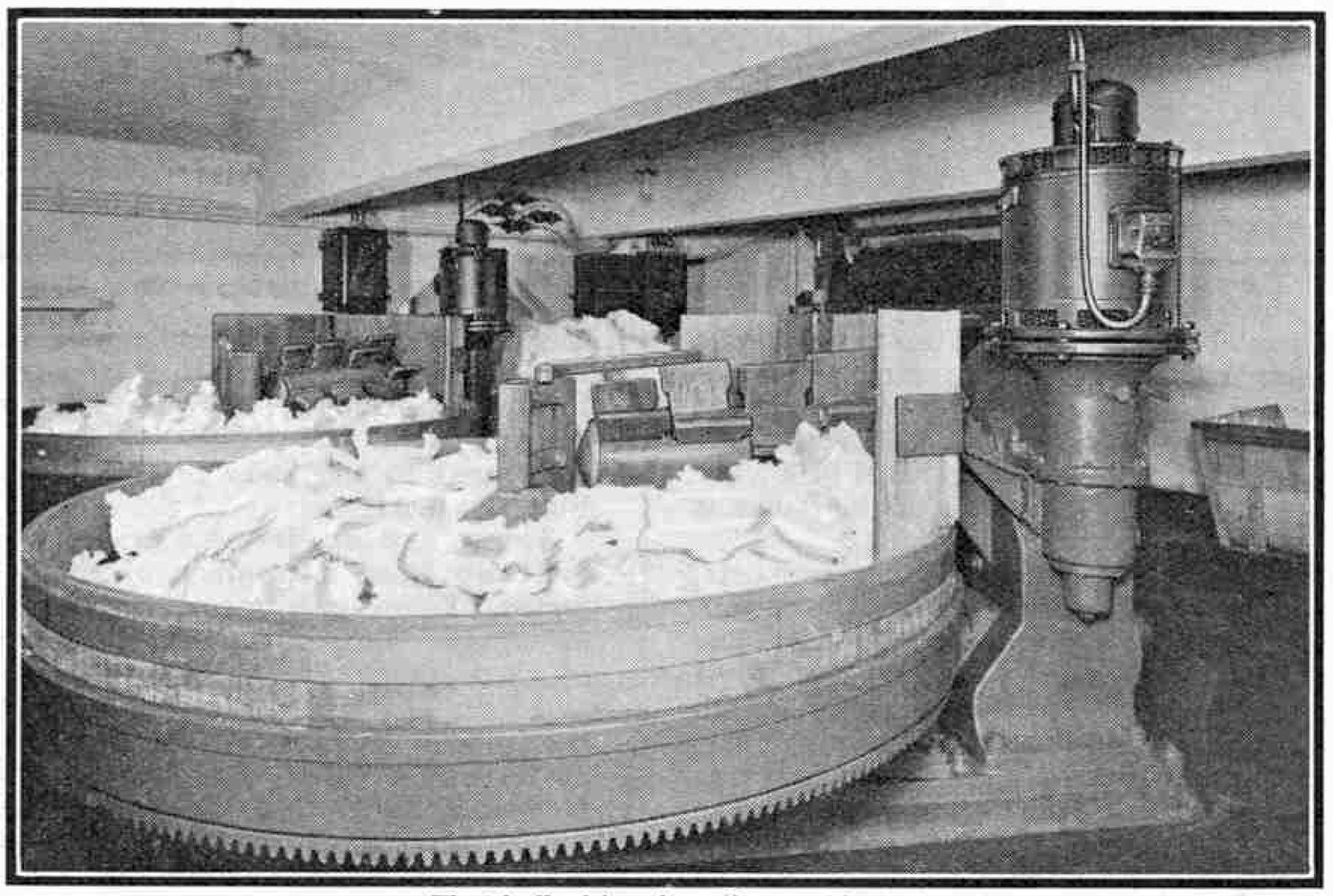
AS a result of England's departure from the gold standard, and other fiscal changes, a modern margarine factory has recently been built at Mitcham in Surrey, by Benninga's British Margarine and Produce Co. Ltd., whose chairman comes of a family that has been engaged for more than 60 years in the margarine business in Holland.

The Mitcham factory is designed on the lines of Dutch butter factories and creameries, and consists mainly of a single storey building laid out on the "straight-through" principle. A 3-phase, 400-volt, 50-cycle A.C. supply is obtained from the County of London Electric Supply Co. Ltd., and the whole of the machinery is electrically driven, a total of some 30 Witton motors and control gear, ranging up to 40 h.p., having been supplied by the General Electric Co. Ltd., London. The incoming power supply is led to a line contact circuit breaker from which it is divided into five sections for various parts of the factory. Raw materials, such as vegetable oils, are received at one end of the building in wooden barrels and galvanised iron drums, and are first melted down in steam-jacketed tanks. They then pass by gravity to two vertical spindle temporating churns or agitators, each geared to a 1-h.p. squirrel cage motor mounted with its direct-to-line starter on a cross-bar above the tank. The fat is next mixed with milk in jacketed emulsion churns, driven through line shafting by a 40-h.p. 950 r.p.m. protected type motor fitted with totally enclosing slipring cover, and the mixture is poured into a cooling drum, which is connected to an ammonia compressor. This drum is driven through vee-ropes by a 12½-h.p., 955-r.p.m. drip-proof motor of the slipring type, with wall mounted contactor starter, arranged for remote control from push buttons mounted on the platform above the drum.



Automatic packing machinery at a Margarine factory. The illustrations to this article are reproduced by courtesy of The General Electric Co. Ltd.

From the cooling drum the margarine falls in flakes into wooden trucks, where it is allowed to stand for a definite time. It is then raised by a lift to a triple-roller machine, which ensures a product of perfectly smooth texture. This machine first passes the margarine through a pair of wooden rollers and then through two pairs of granite rollers, each pair running at a different speed; it then removes any excessive moisture by forcing the margarine through a tube by means of a rotating worm. The rollers and the worm are driven by a 34-h.p. 950-r.p.m. slipring motor of the protected type. The necessary salt is added on kneading tables, in which the margarine is placed on a circulator rotating table, and the salt is mixed in by wooden vanes mounted on a revolving shaft. Two kneading machines are installed, each being driven through gearing by a 13½-h.p. 720-r.p.m. vertical spindle slipring motor, designed specially for incorporation in the machine. Two further mixing machines, with 12½-h.p. slipring motors running at 950 and 1,440 r.p.m. respectively, are also installed. (*Continued on page 440*)



Electrically-driven kneading machines.

Trolley Bus in Meccano

A British Industries Fair Exhibit

SINCE the War increasing attention has been paid to trolley buses, that is vehicles which derive their motive power from electric current collected from overhead wires, but do not run on a fixed rail track. As compared with the tramcar, the trolley bus scores by reason of its flexibility, which is almost equal to that of the petrol bus. It is capable of a deviation of about 15 ft. to either side from the centre of its trolley wires, and thus is able to load and unload its passengers at the kerb instead of in the middle of the road. In many respects it is a more comfortable vehicle than either the tramcar or the petrol bus.

The photograph on this page shows a fine model trolley bus built by Meccano Ltd., to the order of the Whitecross Co. Ltd., of Warrington, the well-known makers of overhead trolley wire for trams and buses. The model formed a notable feature of the Whitecross Company's display at the Heavy Section of the British Industries Fair at Birmingham in May last, where it attracted widespread attention and admiration. The current supply available for running the model was alternating current at 230 volts. It was not considered desirable to use this high-voltage current for the overhead wire supply, and therefore it was transformed down to 20 volts. On the other hand, it was found advisable to use a high-voltage motor for driving the bus, and therefore the 20-volt supply from the overhead wires was re-transformed before reaching this motor. The transformers employed were Meccano products.



A fine trolley bus in Meccano. It runs in a most realistic manner on current taken from overhead wires.

The model is not controlled in any way either for speed or steering, as such control is not necessary in the case of a demonstration model of this type. The bus runs round a circular track 9 ft. in diameter, with standards supporting the two overhead wires. A short distance from the outer edge of the track is fitted a continuous flange $\frac{1}{4}$ in. in height, against which runs the outside front wheel of the bus. The bus is set to travel in a very slightly larger circle than the track, and by means of the flange is prevented from deviating from its course.

The Electric Motor, which is mounted in two spring supports, carries a $\frac{1}{2}''$ Pinion on its armature shaft, and this drives the cardan shaft through a $1\frac{1}{2}''$ Contrate and a 3 : 1 spur gear reduction. The cardan shaft drives the rear axle through one $\frac{1}{2}''$ and one $1\frac{1}{2}''$ Bevel Gear, the large Gear being connected directly to a slip clutch mechanism. The outside pair of rear wheels are driven through this clutch, which slips when any undue strain is placed on the transmission. The inside pair of driving wheels are free to rotate on the axle, a Collar being used to retain them in place. Semi-elliptic springs are fitted to both front and rear axles.

The lower saloon floor of the model is built up from Strip Plates and Angle Girders of suitable sizes, the slope down over the rear axle being reproduced by bending the Plates slightly. The platform at the rear is secured to the lower deck by means of $1\frac{1}{2}'' \times 3''$ Flat Plates. This floor, which is not finally secured in place until the body work is completed, forms a base on which the remainder of the model is built. The sides, front and rear of the lower deck consist of Strip Plates edged with Strips and Curved Strips.

The driver's compartment is isolated by means of two $5\frac{1}{2}''$ Strip Plates, and a doorway leading into the lower compartment at the rear is formed by using two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates and $5\frac{1}{2}''$ and $2\frac{1}{2}''$ Strips. The seats have been cleverly represented by making use of the motor car seats found in Meccano Motor Car Outfit No. 2. Each of these seats is secured to the floor by means of two $1\frac{1}{2}''$ Angle Girders. The two seats nearest the door have their backs to the windows, while the remaining eight seats are arranged in a double row with a central gangway. The driver's seat is made by halving a motor car seat and supporting it on two $1'' \times \frac{1}{2}''$ Angle Brackets. The driver's cab contains, in addition to a seat, a dummy steering wheel, brake handle and master controller.

The upper deck to the model is supported on a series of Strips forming the window frames. Two of these frames, on each side, are made double thickness in order to represent the trolley-platform supports of the actual bus.

The floor of the upper deck is built, with slight modifications, in a similar manner to that of the lower deck, the most notable difference being the cut-away section for accommodating the stairs. Seating is of the central gangway type, the side on to which the stairs open having six seats. These are placed fairly close together, while the seats on the opposite side, seven in number, are spaced well apart. By this means, in actual practice the balance of the bus is not disturbed.

At this point the stairs were built-up and fitted. The shape and small size of these necessitated the use of sheet metal for their construction, as a set of stairs of this nature built in Meccano were not sufficiently neat and in keeping with the remainder of the model. The complete roof is secured to the body of the model by means of a number of Flat Brackets.

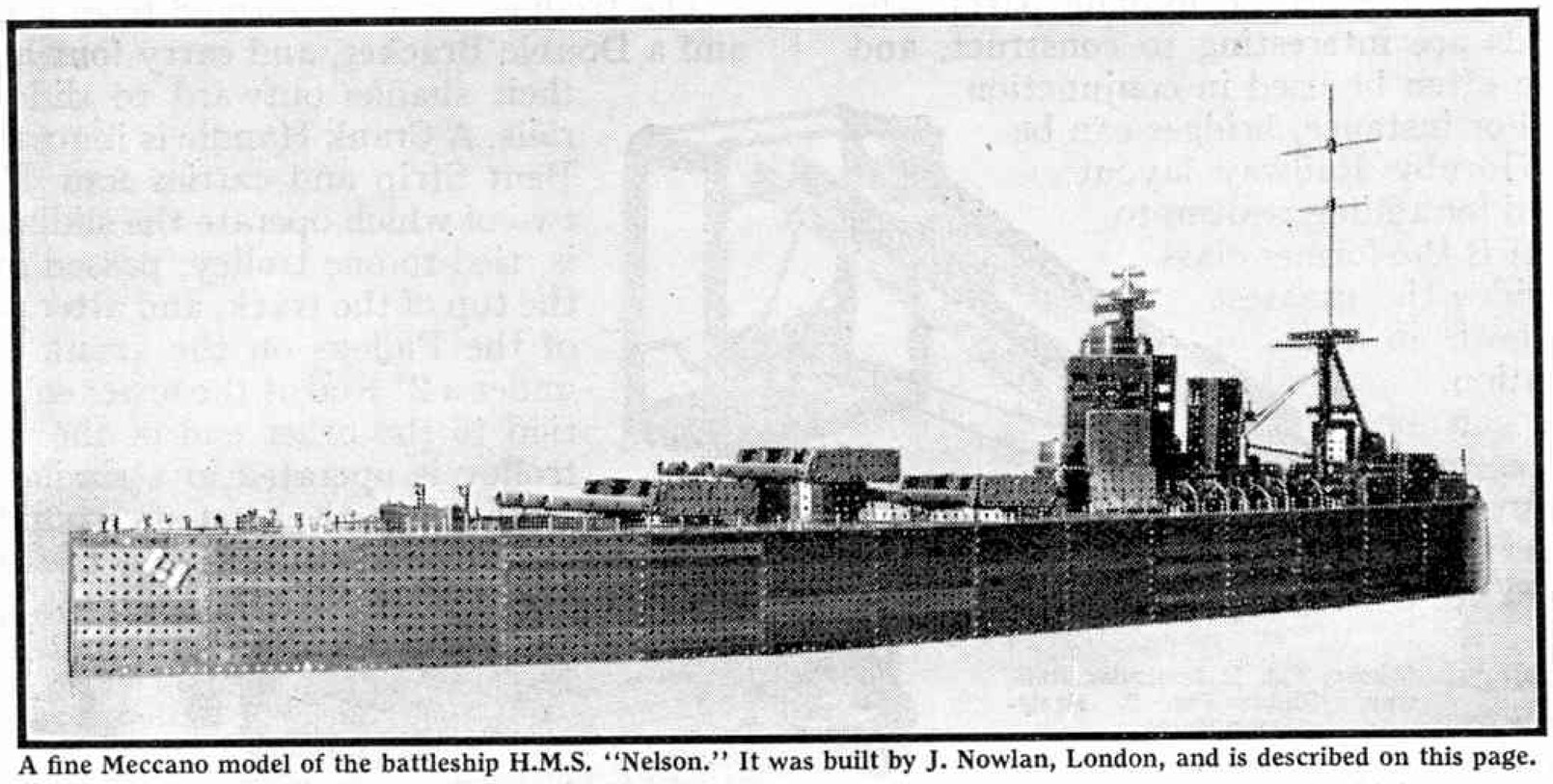
The trolley arm frame consists essentially of two curved girders built up from a number of short Angle Girders and Curved Strips. These two members are connected together by four $7\frac{1}{2}''$ Angle Girders supporting the trolley pivot frames. Each of these pivot frames is constructed from $1\frac{1}{2}''$ Angle Girders, and one complete frame is insulated from the remainder of the model. A short Rod carried in each pivot frame has at its upper end a Coupling that is fitted in its longitudinal bore with a $2''$ Rod. It carries also at each side a $2\frac{1}{2}''$ large radius Curved Strip, these two Strips being fitted at their outer ends with a Coupling supporting one of the trolley arms. The inner end of each Curved Strip is fitted with a strong spring, the opposite end of which is secured to the $2''$ Rod already mentioned. These springs always tend to keep the trolley arm in a raised position. The trolleys consist of $\frac{1}{2}''$ Pulleys each of which is mounted in a frame built up from sheet metal.

H.M.S. "*Nelson*" Built in Meccano

An Outstanding Prize Model

ON this page we illustrate a fine Meccano model of H.M.S. "*Nelson*," built by Mr. J. Nowlan of London, and we think that readers will be interested in the following details of its construction.

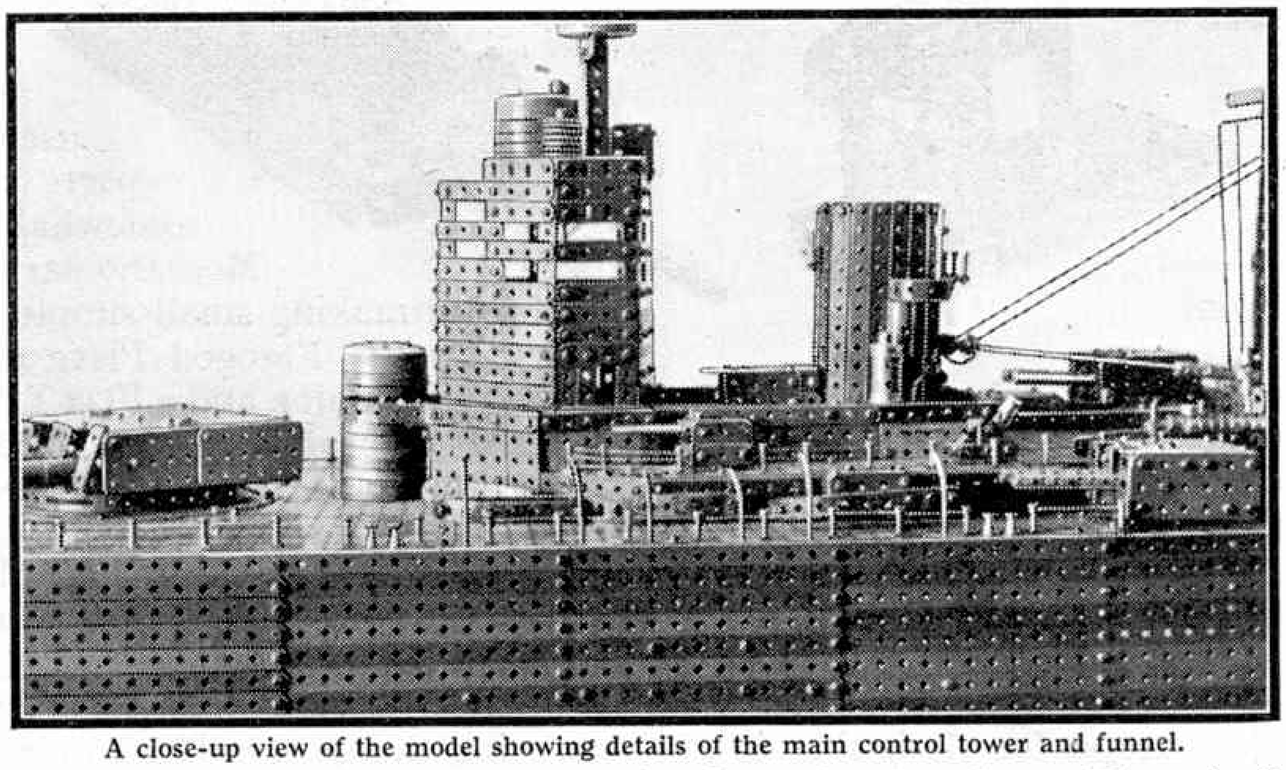
The model is 7 ft. 11 in. long and 1 ft. 4½ in. wide, and as the actual vessel is 710 ft. in length, with a beam of 106 ft., the model is built approximately to scale. The main portions of the hull are built on a framework of 24½" and 12½" Angle Girders, and the curved mouldings of the bow and stern are formed with bent 7½" Strips.



A fine Meccano model of the battleship H.M.S. "Nelson." It was built by J. Nowlan, London, and is described on this page.

The base of the main control tower is made as follows. A 5½" Angle Girder is bolted across the deck and at its ends carries converging 3" Angle Girders extended by two 3½" Angle Girders, the free ends of which are spanned by a 1½" Angle Girder. To the framework so formed are bolted 2½" × 2½" Flat Plates, held together at their upper edges by means of a second similar frame. The walls of the tower consist of 5½" Angle Girders and Strips of various lengths, a ledge ½" wide being left all round. The main control tower is topped by three smaller direction control towers and a conning-tower fitted with range finders.

The superstructure on which the funnel is mounted is the same height as the base of the tower and is constructed in a similar manner. The funnel itself is composed of 5½" Strips, and is provided with steam pipes and whistles made from Crank Handles, Collars and Threaded Pins. On each side of the funnel are high angle gun mountings made from Sleeve Pieces and ¾" Flanged Wheels.



A close-up view of the model showing details of the main control tower and funnel.

A second deck, which commences aft of the main control tower, is built over the main deck. Flat Girders are used for the sides, and the deck is filled in with Flat Plates bolted to Angle Girder supports.

On both sides of the tripod mast, which consists of Angle Girders mounted on a box-like structure of Flat Plates, are three sets of twin 6" gun turrets; and in rear of the tripod are a range finder and two high angle guns. The turrets for the 6" guns are made from 3" × 1½" and 2½" × 2½" Flat Plates, and the gun barrels are represented by Couplings fixed on Rods. The mountings of the high angle guns are 1½" Strips, with Flat Brackets bolted perpendicularly to them at their centres to form T pieces. Two of these joined together by Double Brackets provide the base for each gun, and the barrels are short Rods held in Couplings fixed between the Flat Brackets by means of two ⅜" Bolts. These Bolts are held in place by Set Screws.

The constructional details of the for'ard triple gun turrets are shown in the illustrations, but the operating mechanism requires description. Each gun barrel is pivoted on a Rod inside the turret and is free to move vertically, but normally it is held in the horizontal position by means of Springs. A length of wire connected at one end to a bolt on the supporting Rod is attached also to a Threaded Boss on a Screwed Rod, which is rotated from a vertical shaft through bevel gearing.

The vertical shaft forms the pivot for the turret and passes through a 3½" Gear Wheel bolted to its underside. At its lower end the Rod is provided with a ⅞" Bevel Gear that meshes with a similar gear on a sliding Rod, which is driven by a shaft that runs the whole length of the model and can be rotated by means of a hand wheel at the stern. A second Bevel Gear on the sliding Rod can be engaged with a Bevel on a second vertical shaft, which carries also a ½" Pinion that drives the 3½" Gear Wheel on the turret. By sliding the Rod into the appropriate position and then turning the hand wheel, the guns can be elevated, lowered or swivelled.

New Meccano Models

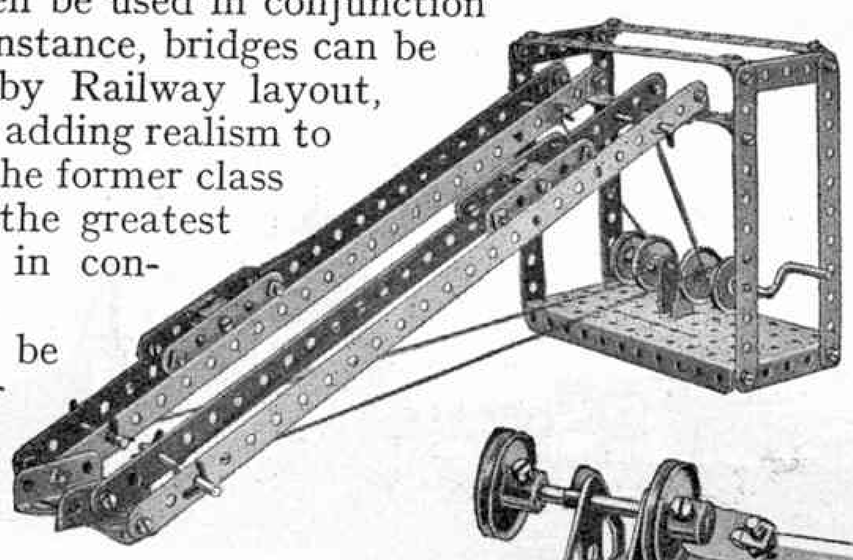
A Selection of Interesting Working Models

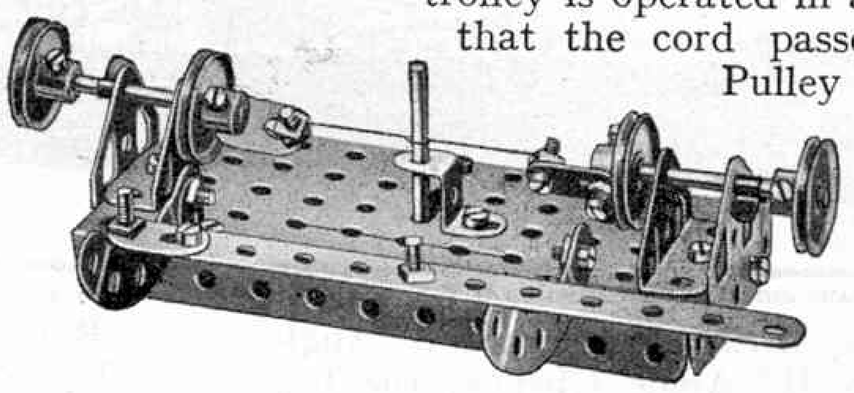
THE adaptability of Meccano parts makes it possible to use them for practically any form of structure, and the keen model-builder will not confine his activities to any particular type of model. Broadly speaking, models may be divided into two main groups—working models that carry out some operation or have some form of mechanical movement, and "still" subjects such as ships and bridges, etc., in which there are no moving parts. The latter class of models are interesting to construct, and when built they can often be used in conjunction with other models. For instance, bridges can be incorporated in a Hornby Railway layout, and ships can be used for adding realism to a model dockyard. It is the former class of model that provides the greatest interest, however, both in construction and operation.

Working models can be built to a prototype, or they may be designed by the builder to serve some definite purpose. In building, say, a model crane, the Meccano boy may follow either of the two distinct courses. He may search for a suitable prototype for his model by looking through books or periodicals, or he may visit some local works or dockyard in order to find a suitable subject. On the other hand he may decide to build a model entirely to his own ideas, designing the structure himself in order to obtain the best possible use from the parts at his disposal.

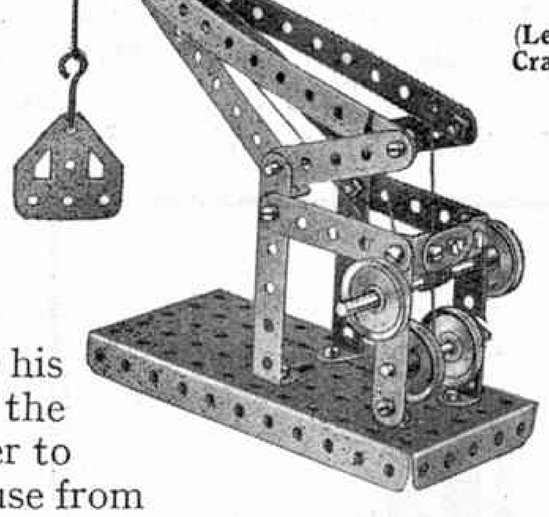
It is the boy who designs his own models who gets the greatest pleasure from the Meccano hobby. The inventive boy thinks of some idea for obtaining a certain result and after a little thought he develops his idea by building a Meccano model. Models that carry out the actual work of making something are particularly fascinating, and two examples of this type are shown in Figs. 2 and 4. The simple nature of these models shows that the constructor with even a small Outfit has scope for designing interesting models.

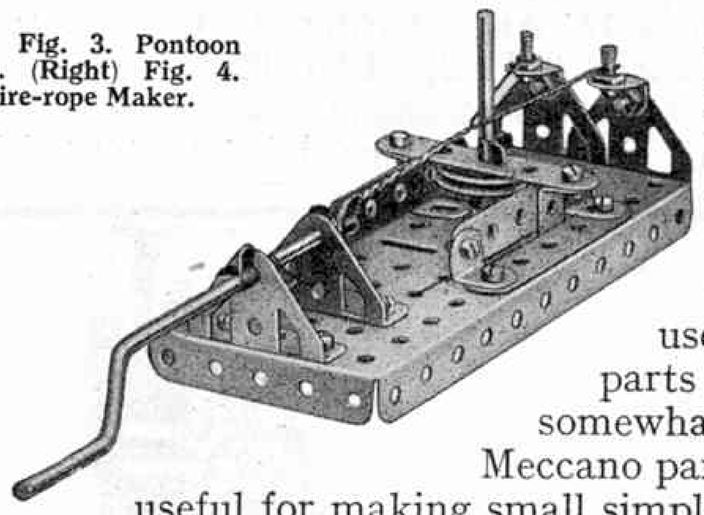
All the models shown this month are capable of carrying out some operation or movement. The four on this page are examples of the possibilities of very small Outfits, and the other two are a little more advanced. Those who have a Meccano Motor will find the models much more interesting when they operate under their own power, carrying out the various operations in a similar manner to the real thing.





(Above) Fig. 1. Funicular Railway. (Right) Fig. 2. Heald-making Machine.





(Left) Fig. 3. Pontoon Crane. (Right) Fig. 4. Wire-rope Maker.

Funicular Railway

This is a type of working model that can be built equally well to a definite prototype or entirely to the constructor's own design. The model illustrated in Fig. 1 is not intended to represent any particular structure, but is a simple reproduction of a typical funicular railway.

The trolleys are each formed from a pair of $2\frac{1}{2}$" Strips and a Double Bracket, and carry four bolts secured with their shanks outward to slide on the inclined rails. A Crank Handle is journalled in a Cranked Bent Strip and carries four 1" Pulley Wheels, two of which operate the sliding trolleys. A cord is tied to one trolley, passed over a $1\frac{1}{2}$" Rod at the top of the track, and after passing round one of the Pulleys on the Crank Handle is passed under a 2" Rod at the lower end of the track, and tied to the other end of the trolley. The other trolley is operated in a similar manner, except that the cord passes round the respective Pulley in the reverse direction.

Parts required for Funicular Railway: 4 of No. 1; 7 of No. 2; 1 of No. 3; 6 of No. 5; 2 of No. 11; 8 of No. 12; 2 of No. 17; 2 of No. 18a; 1 of No. 19s; 4 of No. 22; 8 of No. 35; 36 of No. 37; 6 of No. 37a; 4 of No. 38; 1 of No. 40; 1 of No. 44; 1 of No. 48; 1 of No. 52; 6 of No. 111c; 2 of No. 125; 2 of No. 126.

Heald-Making Machine

This model produces small healds that can be used in a Meccano loom. The parts made by the model are somewhat smaller than the standard Meccano parts, and will be found quite useful for making small simple models of looms.

A $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate is used for the base, and carries a Trunnion and a Flat Trunnion at each end. These parts form bearings for 2" Rods, each carrying two 1" Pulleys and a Spring Clip. The inner Pulleys are fixed with their bosses inward, and a Flat Bracket is secured to the boss of each by means of a bolt carrying a nut. A $\frac{3}{8}$" Bolt is carried in each Flat Bracket.

At the front of the Flanged Plate two Curved Strips are supported on Angle Brackets and serve as a rack for carrying the gauge. The gauge is used for obtaining the correct length of wire for each heald, and consists of one $5\frac{1}{2}$" Strip extended by a Flat Bracket as shown, and carrying two $\frac{3}{8}$" Bolts. A loop of wire is passed round these two Bolts and the ends are twisted together. The loop is then fitted over the vertical Rod in the centre of the base Plate, and the ends are passed round the $\frac{3}{8}$" Bolts on the Flat Brackets.

To make a heald, the outer 1" Pulleys are rotated simultaneously in opposite directions. As the length of the

loop decreases owing to the twisting of the wire, the Spring Clips allow the Rods to slide inward, but maintain a constant tension on the heald.

Parts required for Heald-making Machine: 1 of No. 2; 1 of No. 5; 3 of No. 10; 2 of No. 12; 1 of No. 16; 2 of No. 17; 4 of No. 22; 2 of No. 35; 14 of No. 37; 6 of No. 37a; 1 of No. 52; 2 of No. 90a; 4 of No. 111c; 1 of No. 125; 2 of No. 126; 2 of No. 126a.

Pontoon Crane

The model shown in Fig. 3 represents a type of floating crane that is used in dock and harbour work. Although only small, the model is capable of carrying out two operations, hoisting and luffing.

The jib is pivotally attached to the base by locknutted bolts, and two cords are attached at the rear of the jib and passed round a 2" Axle Rod carrying two 1" Pulleys. The hoisting cord passes over a $\frac{3}{8}$" Bolt at the head of the jib, and is tied at one end to the hook and at the other end to a $3\frac{1}{2}$" Rod fitted with two 1" Pulleys.

Parts required for Pontoon Crane: 4 of No. 2; 6 of No. 5; 4 of No. 10; 4 of No. 12; 1 of No. 16; 1 of No. 17; 4 of No. 22; 19 of No. 37; 3 of No. 37a; 1 of No. 40; 2 of No. 48a; 1 of No. 52; 1 of No. 57; 1 of No. 111c; 1 of No. 126a.

Wire-Rope Maker

Another interesting model that produces a finished article appears in Fig. 4. In this case the work turned out by the machine is not of much practical use, but the model is interesting to construct and operate. It will twist two strands of wire together to make wire-rope or twin flex.

The two lengths of wire to be twisted together are attached to the $\frac{3}{8}$" Bolts at the end of the base, and also to the Crank Handle at the other end. One wire is placed on each side of the vertical Rod that is mounted on a slide, and the Rod is pushed up close to the Crank Handle. As the handle is turned the wire is twisted. The vertical Rod ensures that the twisting is done evenly, and slides along to the other end of its travel as the twisting progresses. The Crank Handle slides in its bearings as the wires twist together.

Parts required for Wire-rope Maker: 7 of No. 5; 6 of No. 12; 1 of No. 17; 1 of No. 19s; 1 of No. 22; 4 of No. 35; 15 of No. 37; 6 of No. 37a; 1 of No. 52; 6 of No. 111c; 2 of No. 125; 2 of No. 126; 2 of No. 126a.

Ship Coaler

Interesting results are obtainable from the model ship coaler illustrated in Fig. 5. It is capable of carrying out three distinct movements—raising and lowering of the grab, traversing of the grab, and traversing of the trolley. In the prototype of this model the grab is lowered into a barge, picks up a load of coal, and is then raised. The trolley carrying the grab moves inward toward the tower, and the contents of the grab are dropped into another trolley that travels along a runway and tips the coal into the ship's bunker.

Three handles are arranged in the base of the model to operate the different movements. For the traversing of the grab a cord is wound round the Crank Handle, and both ends pass over a $3\frac{1}{2}$" Axle Rod at the inner end of the upper track. One end of the cord is tied to the grab trolley, and the other end is passed round a Rod at the outer end of the track before being tied to the opposite end of the grab trolley. The trolley consists of two $2\frac{1}{2}$" Strips spaced apart by two pairs of Angle Brackets and carrying 2" Axle Rods.

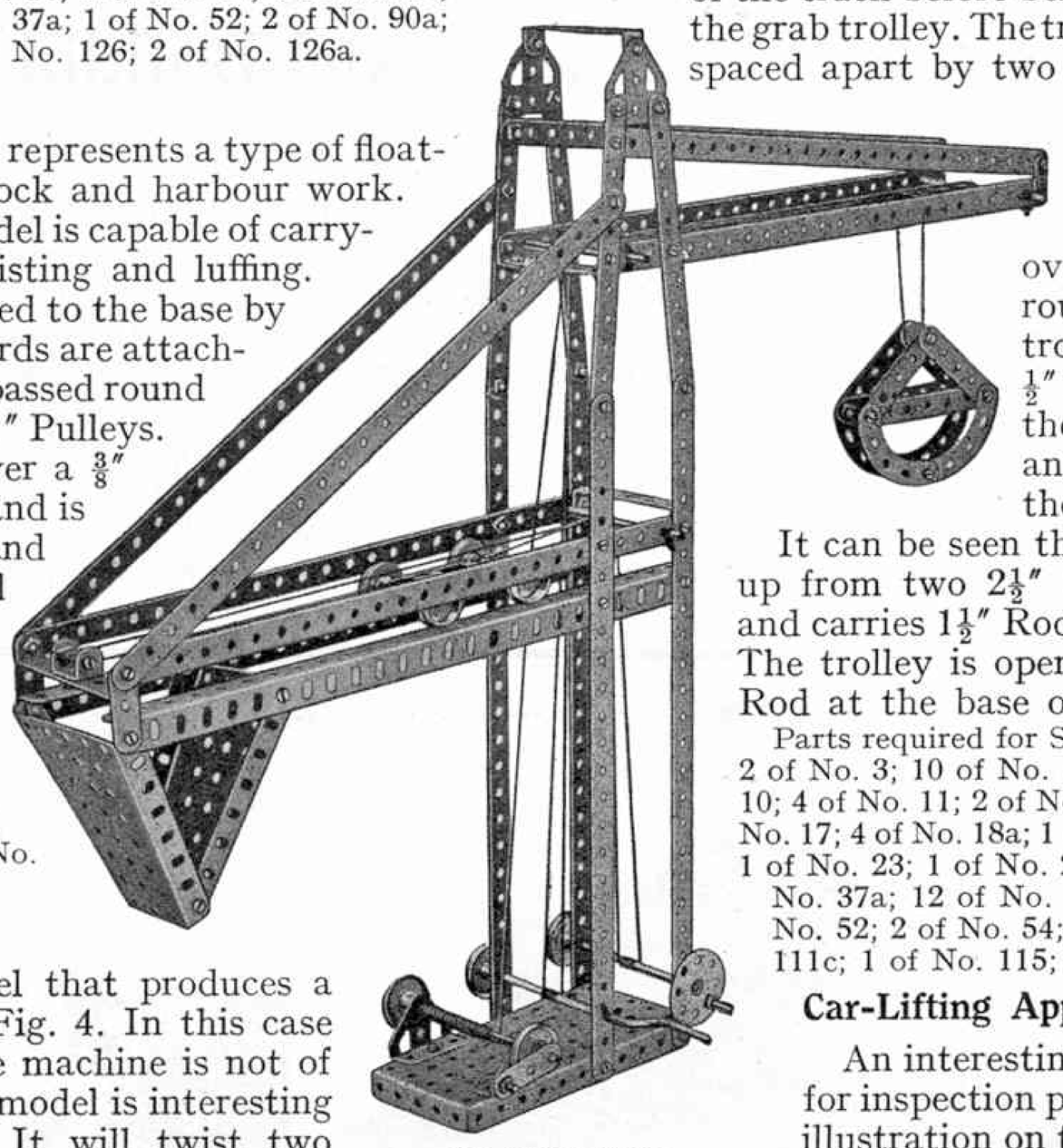


Fig. 5. Ship Coaler.

The grab hoisting cord is tied to the $3\frac{1}{2}$" Rod carrying a Crank, and after passing over the upper $3\frac{1}{2}$" Rod is passed round the 2" Rod of the grab trolley. It is then led round the $\frac{1}{2}$" loose Pulley on the grab, over the second 2" Rod in the trolley, and tied to the outer end of the track.

It can be seen that the second trolley is made up from two $2\frac{1}{2}$" Strips and Double Brackets, and carries $1\frac{1}{2}$" Rods fitted with Flanged Wheels. The trolley is operated from the remaining $3\frac{1}{2}$" Rod at the base of the tower.

Parts required for Ship Coaler: 10 of No. 1; 4 of No. 2; 2 of No. 3; 10 of No. 5; 2 of No. 6a; 4 of No. 8; 2 of No. 10; 4 of No. 11; 2 of No. 12; 1 of No. 15a; 4 of No. 16; 2 of No. 17; 4 of No. 18a; 1 of No. 19s; 4 of No. 20b; 4 of No. 22; 1 of No. 23; 1 of No. 24; 14 of No. 35; 60 of No. 37; 4 of No. 37a; 12 of No. 38; 1 of No. 40; 3 of No. 48a; 1 of No. 52; 2 of No. 54; 1 of No. 62; 4 of No. 90a; 2 of No. 111c; 1 of No. 115; 2 of No. 126; 2 of No. 126a.

Car-Lifting Apparatus

An interesting device for lifting motor cars for inspection purposes is shown in the second illustration on this page. The car is driven up the two sloping ramps, the lower ends of which are then raised so that the ramps take up a horizontal position, and the underneath of the car can be inspected without difficulty. It is a good plan to make a Meccano model car or lorry for use with this model.

At one end of the base inclined $5\frac{1}{2}$" Strips are attached to vertical $2\frac{1}{2}$" Strips, and $2\frac{1}{2}$" Curved Strips are fixed as shown. An $11\frac{1}{2}$" Rod carries two $\frac{3}{4}$" Flanged Wheels that travel on these inclined Strips and the Rod supports the lower end of each ramp. As the Rod moves up the Strips the ramps are raised to the horizontal position.

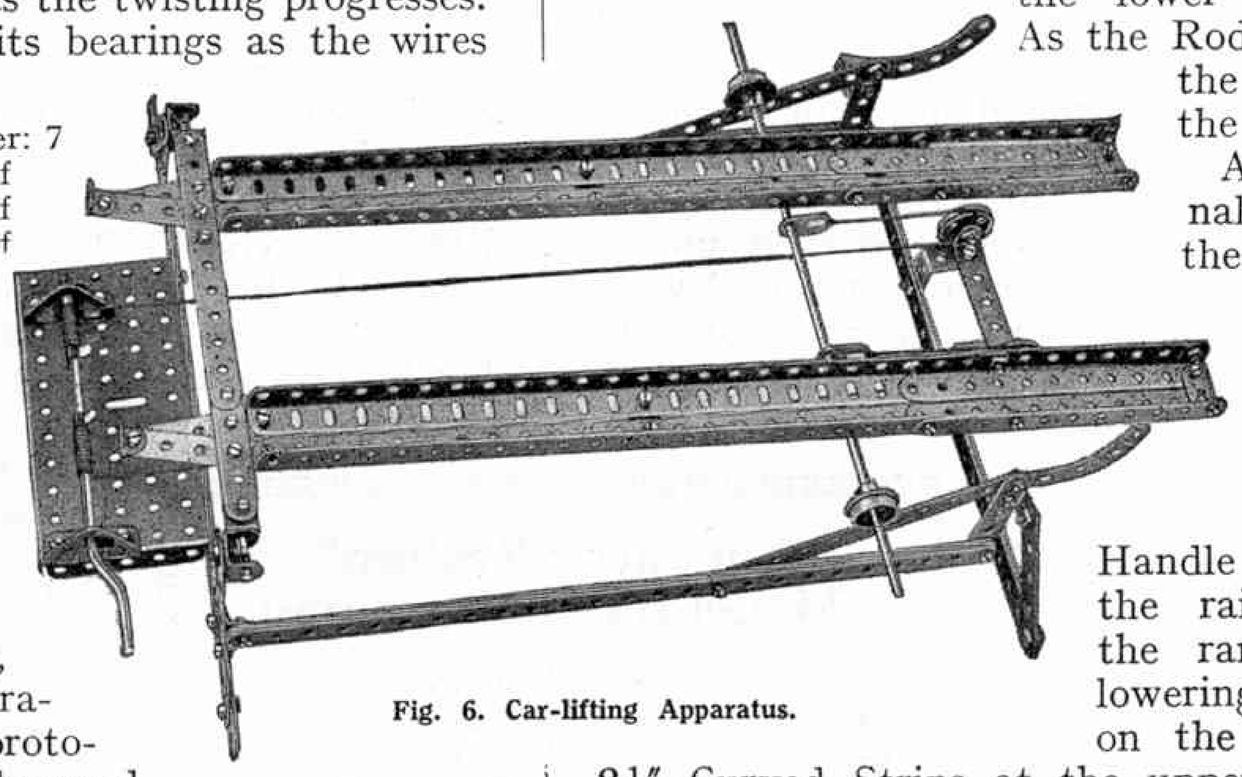


Fig. 6. Car-lifting Apparatus.

A Crank Handle journalled in Trunnions on the Flanged Plate carries two lengths of cord that pass round 1" loose Pulleys and are tied to Flat Brackets on the $11\frac{1}{2}$" Rod. Thus the Crank Handle is made to operate the raising or lowering of the ramps, by hoisting or lowering the $11\frac{1}{2}$" Axle Rod on the inclined Strips. The $2\frac{1}{2}$" Curved Strips at the upper ends of the sloping $5\frac{1}{2}$" Strips form stops for the $\frac{3}{4}$" Flanged Wheels on the Rod.

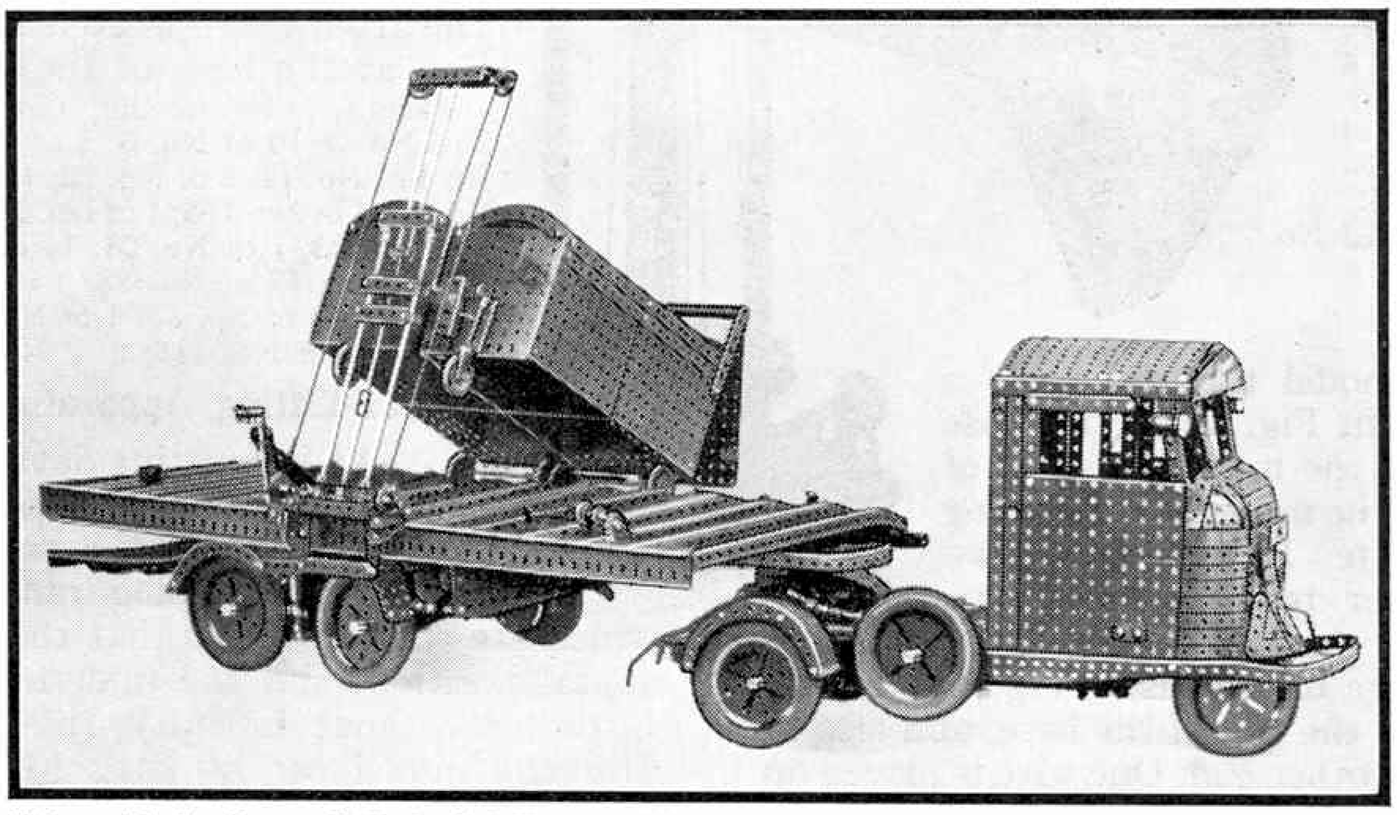
Parts required for Car-lifting Apparatus: 10 of No. 1; 14 of No. 2; 12 of No. 5; 2 of No 6a; 4 of No. 8; 6 of No. 10; 4 of No. 11; 10 of No. 12; 2 of No. 12a; 1 of No. 13; 2 of No. 18a; 1 of No. 19; 2 of No. 20b; 2 of No. 22a; 8 of No. 35; 60 of No. 37; 6 of No. 37a; 2 of No. 38; 1 of No. 40; 1 of No. 48a; 1 of No. 52; 2 of No. 90a; 6 of No. 111c; 2 of No. 126.

Summer "Realism" Contest

Outdoor Meccano Model-Building

In this month's competition competitors are asked to submit photographs showing Meccano models incorporated in realistic outdoor settings. The fine prizes of Hornby and Meccano goods listed in the panel at the foot of this page are offered for the most interesting photographs received, and successful competitors will be allowed to select any goods they like to the value of their prize from current Meccano and Hornby price lists.

Entry forms are not required and there are no fees to pay. Entries may consist of scenes incorporating Meccano model cranes, ships, motor cars, aeroplanes, or any other suitable subject, and a clear photograph, together with a brief explanation of any constructional or mechanical features not easily seen from the illustration, is all that is required. The photograph need not be the competitor's own work, but it is essential that the model and its setting should be his own unaided work. Drawings are not eligible for this Contest.



This model of a Scammell Mechanical Horse and bin carrier possesses many details of interest to Meccano users. It was built by R. Lawford, Watford, Herts., and is a splendid example of neat construction.

It should be noted that models need not be specially built for this contest. Any suitable Meccano model that is available may be entered, provided that it has not won a prize in a previous Meccano Competition, and that it is incorporated in realistic outdoor surroundings. For example, a Meccano bridge may be photographed set up over a miniature chasm in the garden; or an aeroplane model can be shown landing in an aerodrome. Another good subject would be a model church or a cottage surrounded with miniature trees and bushes, and set up near a small-scale roadway. A little thought will soon provide plenty of good schemes that could be arranged and photographed with little difficulty.

Entries in the Contest will be divided into three Sections—A, for readers over 14 living in the British Isles; B, for readers under 14 living in the British Isles; and C, for readers of all ages living Overseas.

The competitor's name, address, and age must be written clearly on the back of each photograph sent in, together with the letter A, B or C indicating the Section for which the entry is eligible. Envelopes containing entries should be addressed "Summer Realism Competition," Meccano Ltd., Binns Road, Liverpool 13. It should be noted that all prize-winning photographs become the property of Meccano Ltd., but unsuccessful entries will be returned to the senders after the close of the Contest, provided that a stamped addressed envelope is enclosed with the entry for that purpose.

Competitors may submit more than one entry if they wish, but in this event all entries must be sent in the same envelope. No competitor will be awarded more than one prize or share of a prize, and if more than one model is submitted they will be considered jointly. Models that appear in any of the Meccano publications should not be used in preparing entries for this Contest.

We wish to remind intending competitors that photographs need not be large. The main points to be noted are that the model and its surroundings should be clearly defined and sharp in focus, and that the background should not tend to confuse the details of the model. Good photographs can be obtained with even a small box-form camera.

September 30th, 1935, is the last day on which entries will be received in the Home Sections (A and B). Overseas readers must forward their entries to reach Liverpool on or before 30th November, 1935. Entries received after the above dates will be disqualified. Intending competitors in either Sections have plenty of time in which to prepare their entries, but it is advisable to set to work immediately so that, if necessary, alterations or revisions can be made to a model before taking the final photographs. It will be noticed that five clear months are allowed in the Overseas Section, and we hope that this concession will result in a record number of Overseas entries of outstanding merit, and that Meccano boys all over the world will submit at least one photograph.

Competitors should note that prize-winning entries cannot be illustrated unless clear and sharply-focussed black and white photographs are sent.

Summer "Realism" Model-Building Contest

The Prizes

The prizes in Sections A and C are as follows:

First Prize: Meccano or Hornby Goods value £3-3s.
Second Prize: Meccano or Hornby Goods value £2-2s.
Third Prize: Meccano or Hornby Goods value £1-1s.
Five Prizes of Meccano or Hornby Goods value 5/–.
Certificates of Merit.

In Section B the prizes are:

First Prize: Meccano or Hornby Goods value £2-2s.
Second Prize: Meccano or Hornby Goods value £1-1s.
Third Prize: Meccano or Hornby Goods value 10/6.
Five Prizes of Meccano or Hornby Goods value 5/–.
Certificates of Merit.

Model-Building Competition Results

By Frank Hornby

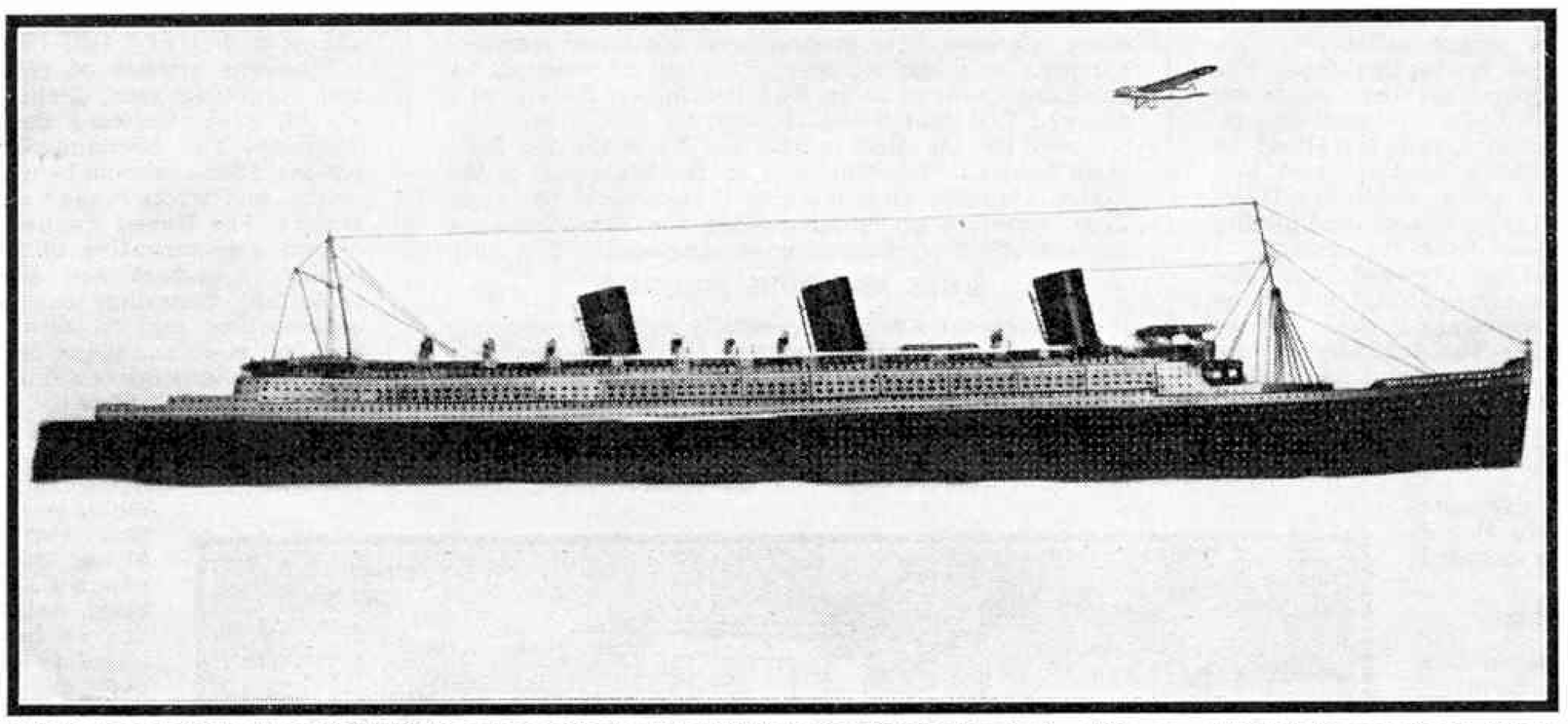
"Merchant Ship" Contest (Overseas)

The principal prizewinners in the Overseas Section of the "Merchant Ship" Model-Building Contest are as follows:

1ST, Meccano or Hornby Goods value £3-3s.: P. Giese, Buenos Aires. 2ND, Goods value £2-2s.: R. Myburgh, Capetown. 3RD, Goods value £1-1s.: D. Brilliant, Montreal. 4TH, Goods value 15/–: M. de Wilde, Antwerp.

Goods value 5/–: J. Diehl, Buenos Aires; F. Elliott, Melbourne; R. Latimer, Rangoon; J. Kennedy, Fredericton, Canada; R. Marcel, Paris.

Goods value 2/6: W. Jackson, Gatooma, S. Rhodesia; R. Jones, Johannesburg; J. Escary, Buenos Aires; P. Blight, Killora, N.S.W.; W. Henry, Toronto; J. Westley, Kingston, Canada; J. Young, Wilsonville, Canada; G. Emmerson, Greymouth, New Zealand.



A fine model of the Cunard White Star liner "Queen Mary" that won First Prize in the "Merchant Ship" Contest for P. Giese, Buenos Aires. Some details of the model are given in this page.

First Prize was awarded for the model of the Cunard White Star liner *"Queen Mary"* illustrated in this page. The model was designed from illustrations of the vessel as she will appear when completed, and is built to scale, the length and beam being 7 ft. and 10 in. respectively.

The hull is simply a sturdy framework of Angle Girders and Strips covered by $5\frac{1}{2}'' \times 3\frac{1}{2}''$ and $3'' \times 1\frac{1}{2}''$ Flat Plates, but the superstructure is excellently designed and contains a considerable amount of detail. Windmill Sails are used for the cabin and stateroom portholes and they give the model a neat and finished appearance.

The lifeboats are mounted on davits made from bent wire, and $\frac{3}{4}''$ Flanged Wheels fixed on Screwed Rods provide realistic ventilator cowls. The funnels are boilers compressed until oval in cross-section and then covered with thin cardboard, painted in the appropriate colours.

R. Myburgh was awarded Second Prize for a realistic model tugboat. Several of the parts employed in the construction of the model have been used in a very skilful manner, two good examples of this being seen in the funnel and the navigation lights. The funnel is a Boiler compressed to form a long thin tube about 1 in. in diameter, and held in this position by means of bolts projecting outward. Handrail Couplings fixed on the ends of the bolts support a Rod to represent the steam pipe, and navigation light shields are made with Dredger Buckets secured to the bridge by Bucket Clips. Nuts and bolts fixed inside each Dredger Bucket by means of Clips, and coloured appropriately, represent lamps. The insides of the Buckets also are coloured.

Third Prize was won by a model trawler that is simply constructed and very neat, two points to which the judges always pay great attention. The hull is made from Strips, the funnel of cardboard, and the bridge of Plates and Strips. Rubber Tyres are used for lifebelts, and a heap of Sprocket Chain skilfully arranged on the deck forms a realistic trawl.

A model of the *"Prince Baudouin,"* which is in service between Ostende and Douves, won Fourth Prize. It is well built, but too complicated in construction, and many non-Meccano parts are used. Small discs of paper gummed to the hull in the required positions are used with good effect to represent portholes.

"Limited Parts" Contest (Home Section)

In building models for entry in this contest competitors were restricted to the use of 15 Meccano parts only. They were allowed to choose any parts they liked, provided that the specified number was not exceeded.

The ingenuity displayed by competitors in using the limited quantity of parts to the utmost advantage was really remarkable, and I am sure they must have had a great deal of fun in experimenting with different ideas before they constructed their final models. The full list of prizewinners and awards in the contest is as follows:

Section A (home competitors of all ages).

1ST, Meccano or Hornby Goods value £2-2s.: P. Hands, Hillingdon, Middlesex. 2ND, Goods value £1-1s.: K. Edensor, Beeston, Notts. 3RD, Goods value 10/6: J. Toms, Ringwood, Hants.

Meccano or Hornby Goods value 5/–: T. Green, Mapperley, Notts.; B. Jean, Plymouth; L. Jones, Southampton; S. Thomason, Bromsgrove, Worc.; J. Tottle, Taunton.

Meccano or Hornby Goods value 2/6: R. Ball, Northampton; D. Broadbent, Shrewsbury; H. Davies, Swansea; V. Gibson, Lydney, Glos.; D. Head, Beckenham; C. Kemp, Guildford; A. Tankins, Bristol 7; R. Symons, Plymouth.

It is rather curious to find two models of cinematograph apparatus among the principal prizewinners in this contest. These models are a cine projector and a cine camera, and they won First and Second Prizes for P. Hands and K. Edensor respectively. The body of the projector is a Channel Bearing and the focussing unit a Coupling fixed on the end of a $2\frac{1}{2}''$ Screwed Rod. Two $\frac{1}{2}''$ Pulleys represent the feed and take-up reels for the film. The camera is somewhat similar in design, but in this case the body is a Girder Bracket. A Coupling represents the lens housing, and 1" fast Pulleys the feed and take-up reels.

"Year's Best Model" Voting Contest

The massed votes of competitors in this contest resulted in the following six models being chosen as the best illustrated in the *"M.M."* during 1934. (1) L.M.S. Articulated Locomotive, by J. Nowlan, London, S.E.14 (March *"M.M."*). (2) S.S. *"Olympic,"* by C. A. Jurgensen, Buenos Aires, Argentine (Sept. *"M.M."*). (3) Scammell Mechanical Horse, by R. Lawford, Watford, Herts. (July *"M.M."*). (4) Cenotaph, by D. Holloway, Squirrels Heath, Essex (May *"M.M."*). (5) Pit Head Gear, by J. Willems, Antwerp, Belgium (April *"M.M."*). (6) Traction Engine, by J. E. Matthews, Fillongley, Nr. Coventry (July *"M.M."*).

No competitor selected every one of these models and placed them in the correct order as listed above, and therefore the prizes were allotted in order of merit to the competitors whose entries were most nearly correct. The principal awards are as follows, and the prizewinners have already been notified:

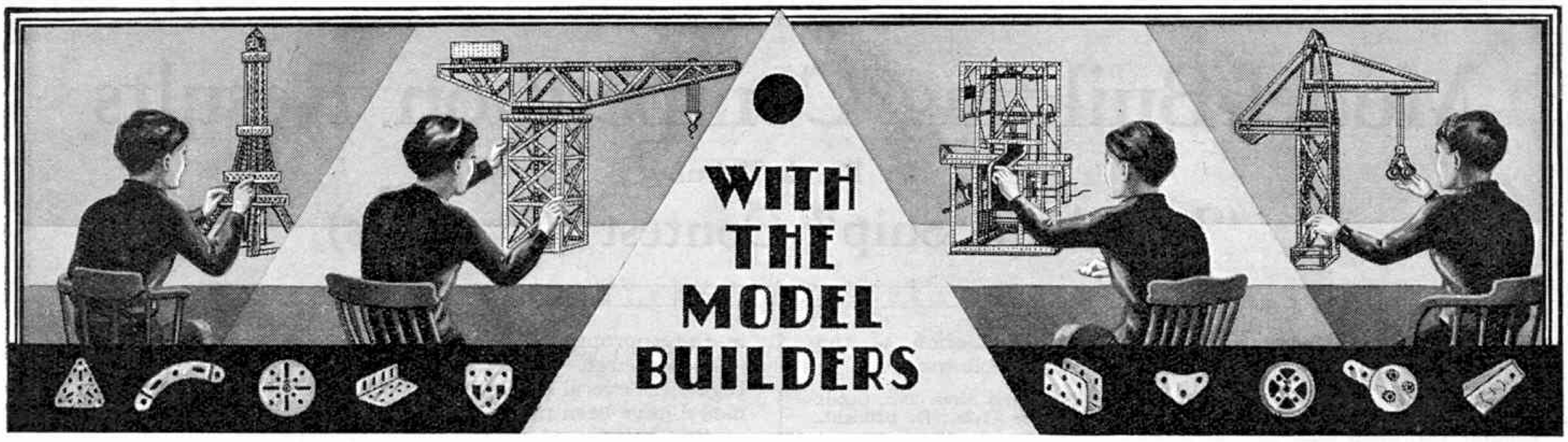
FIRST PRIZE, Meccano or Hornby Goods value £2-2s.: A. Littlewood, Mansfield, Notts. SECOND PRIZE, Goods value £1-1s.: T. Steer, Hayes, Kent. THIRD PRIZE, Goods value 10/6: R. Nicholas, Portsmouth. FOURTH PRIZE, Goods value 5/–: K. Costain, Bolton.

Prizes of Goods value 2/6: S. du Toit, Boshof, S. Africa; N. Adkins, Hatfield, Pretoria, S. Africa; S. Smith, Enfield Highway, Middx.; D. White, Christchurch, N.Z.; R. Horsey, Bexley, Kent; J. Marsh, Yeovil, Somerset.

The prizewinners in the "Sharp Eyes" Competition, which was announced in the Editorial page of the December 1934 issue of the *"M.M.,"* are as follows:

G. Smith, London, W.7; W. F. Bladergroen, Amsterdam, Holland.

Copies of the book *"Engineering for Boys"* by Ellison Hawks have been sent to each of the above competitors.



GARAGE FOR DINKY TOY CARS

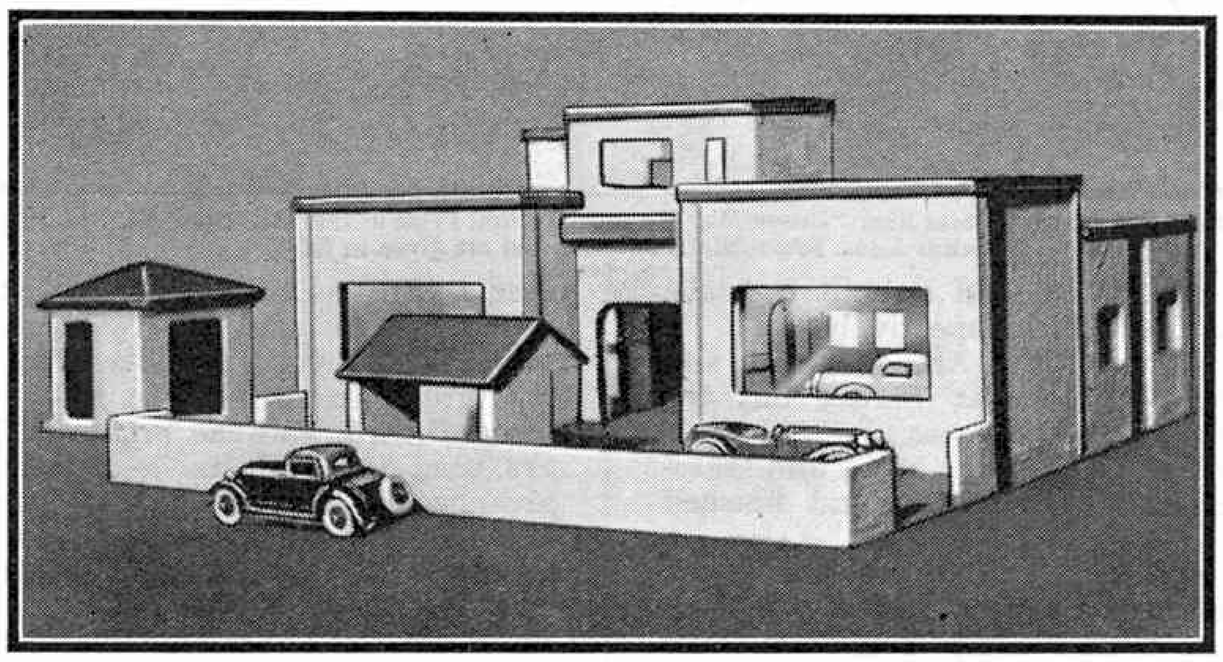
Owners of Meccano Dinky Toy motor vehicles will be interested in a miniature garage suitable for accommodating a fleet of these fascinating toys. The garage illustrated on this page has been made by Mr. H. Lloyd of Leeds, and is built to a scale of $\frac{1}{4}$ in. to 1 ft. In addition to accommodation for about 16 Dinky Toy vehicles, the building contains two well appointed showrooms and an office, the latter being situated in the central towerlike portion of the building and approached by a staircase from the garage.

The model is constructed of plywood, and the exterior is finished with a rough material known as "Cementilk," the walls resembling Portland stone and the roofs red sandstone. The interiors of the showrooms are finished in aluminium paint panelled in green. The entire building is illuminated by four pocket lamp bulbs, supplied with current from a transformer housed in a "sub station," which can be seen on the left of the illustration.

Dinky Toy enthusiasts should note that a Petrol Filling Station, Petrol Pumps and Oil Bins are now included in the Dinky Toy range.

CAR STEERING GEAR

Even on small model motor cars some representation of Ackermann steering gear should be fitted if a realistic result is required. A simple steering gear suitable for models built with the smaller Outfits can be made by mounting the front wheels on short Rods forming stub axles and carried in Double Brackets. Each Double Bracket is fitted with a $\frac{3}{8}$" Bolt that is secured by a nut and passed through the rigid front axle. These Bolts form the pivots for the stub axles, and each is fitted with a $1\frac{1}{2}$" Strip fixed by two nuts. The two $1\frac{1}{2}$" Strips are connected together by short Strips that are also pivoted to a Crank operating the steering gear. The Crank can be controlled through any convenient gearing from the steering wheel, and a Worm and Pinion will be found suitable in most cases, or a Contrate and Pinion can be used instead.



An imposing garage for Meccano Dinky Toy vehicles. It was built by Mr. H. Lloyd of Leeds to a scale of $\frac{1}{4}$ in. to 1 ft., and will accommodate 16 miniature cars.

AUTOMATIC STOP FOR LIFTS

A model warehouse or similar structure that is fitted with elevators is improved considerably if the elevators are made to operate up and down. An even greater improvement is effected by arranging the elevator cages to stop at each floor, and it is possible to achieve this result with quite a simple arrangement. Two lift shafts are used, and the two cages are attached at the ends of a single length of cord. The cord passes over a guide pulley at the top of each shaft and is then led under a 3" Pulley that supplies the drive.

The weight of the cages on the operating cord ensures a good grip between the cord and the driving Pulley, so that as the Pulley rotates one cage is hoisted and the other lowered. The driving Pulley should be driven through an automatic reversing gear such as Standard Mechanism No. 63, so that the cages are made to move up and down their respective shafts.

The automatic stopping device consists of a long vertical Rod that is arranged midway between both shafts. If one set of stops is to be used for both shafts, the shafts should be $2\frac{1}{2}$" apart; for other spacing of the shafts two sets of stops will be found necessary. The vertical Rod carries 1" Pulleys arranged with bosses uppermost, and fitted with small Fork Pieces that are free to pivot about bolts inserted into opposite bores of the Pulleys. The Pulleys are arranged immediately below each floor level so that the descending cage, on reaching the floor, strikes a bolt in the boss of the small Fork Piece. The driving Pulley continues to rotate, but as the weight of the descending cage is supported by the bolt, both cages remain stationary. The vertical Rod is made to rotate slowly so that the bolt eventually moves away from the cage, which then resumes its downward journey.

To avoid the possibility of the cage being obstructed on its upward journey, the small Fork Piece is pivoted, and if struck underneath is free to rise and thus let the cage pass unimpeded.

It is advisable to fit some form of adjusting device to allow for the stretch of the suspension cord, so that when one cage is at ground level the other registers correctly with the top floor. This can be achieved by attaching the cord to an End Bearing on the end of a Screwed Rod that passes through the top of the cage. Support for the Rod is afforded by a Double Bent Strip bolted to the cage, and on the lower end of the Rod a Threaded Boss is screwed to support the cage. Thus, screwing up or unscrewing the Threaded Boss has the effect of shortening or lengthening the cord.

SHIPS AS MODEL SUBJECTS

Although ships are not generally as interesting as a working model when completed, they are exceedingly fascinating to construct, and provide a wide choice of subjects for modelling. There are so many different types of ship that the model-builder is likely to find himself undecided where to begin, but most boys show particular interest in certain types, and will naturally reproduce the one with which they are most familiar.

Sailing vessels alone provide almost unlimited subjects for models. The prototypes range from small dinghies and racing yachts to square-rigged vessels, and there is such great diversity of types of rigging that the constructor will find sailing ship models most interesting. The rigging should be reproduced in as much detail as the size of the model will allow, as the final appearance of the model is largely dependent on this part of the construction. The appearance of the model can be changed entirely by fitting sails. Fairly stiff paper is generally preferable for this purpose, as it can be curved to give a more realistic appearance than woven material.

Coastal craft provide prototypes for a totally different type of model and here again the subject matter is extremely varied. It includes such interesting vessels as tugs, trawlers, tramp steamers, ferry boats, etc., which are all excellent subjects for modelling, particularly where the range of parts is comparatively small, as they do not incorporate so much detail work as the larger vessels. Passengers and cargo liners, oil tankers, etc., open up yet another field for constructional work, of special interest to boys with large outfits.

Finally there are naval vessels, which differ greatly from the ships already mentioned, and provide a wide range of prototypes for models. The fittings on naval ships are totally different from those found on merchantmen, the decks being particularly "clean" and the most noticeable features the guns.

DETAIL WORK AND FITTINGS

The possessors of larger Outfits are obviously able to incorporate more detail work in their finished models than are those with a very limited selection of parts. In order to obtain the best possible results from any selection of parts, it is advisable to choose the subject with due regard to the parts that are available. Sailing ships possess the great advantage that exceedingly realistic results can be obtained from only a small number of parts, the realism of the model being largely dependent upon the manner in which the rigging is carried out. Such models can be built with almost any sized Outfit to give very good results.

Standard articles of equipment such as lifeboats and launching gear, lifebelts, derricks and winches, are of straightforward design and should not give difficulty. The Meccano Ships' Funnels (Parts Nos. 138 and 138a-z) should be used if of suitable size for the model, and larger funnels can be made from Strips or Boilers. The Raked Funnels are available in different colours representative of 26 different shipping companies. Anchors and searchlights should not be forgotten, according to the type of vessel under construction, and on certain types of ships a novel addition is an aeroplane launching platform. For this all that is necessary is a small platform and a miniature aeroplane, as complete details of a launching catapult could not be incorporated in such a small model. A Meccano Dinky Toy Aeroplane could be used.

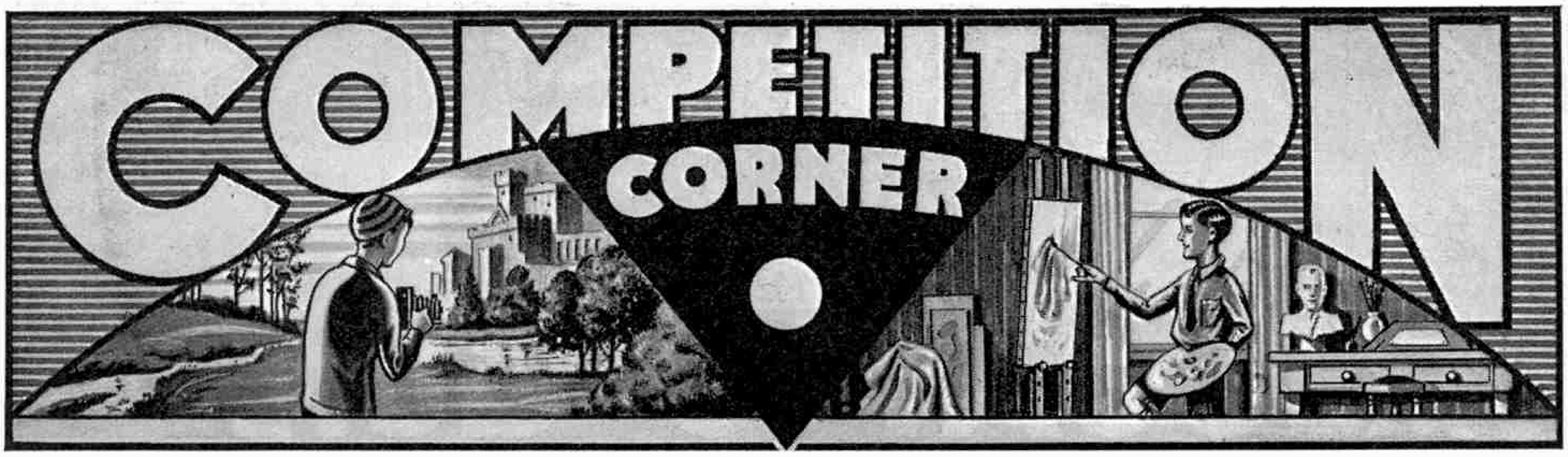
Whatever the type of ship the constructor decides to build, he must decide whether it is to be a water-line model or a reproduction of the complete vessel. The former requires fewer parts and is easier to build, but there is more interest to be derived from the construction of the complete ship. If the complete hull is built up, a rudder should be fitted, and this can be linked up through suitable steering gear to the wheel on the bridge. On a fairly large model power-operated steering gear can be incorporated.

SPRINGING FOR MECCANO MOTOR CARS.—The proposal that the Nos. 1 and 2 Motor Cars should be fitted with springs for the front and rear axles is interesting, and models incorporating this improvement would conform more closely to their prototypes. Such additions would add considerably to the cost of the Motor Cars, however, and for such small models they would not make any perceptible difference to the performance. The only advantage would be that of greater realism, and consequently the alteration would not be popular owing to the greatly increased cost. (*Reply to M. Downard, Germiston, Transvaal.*)

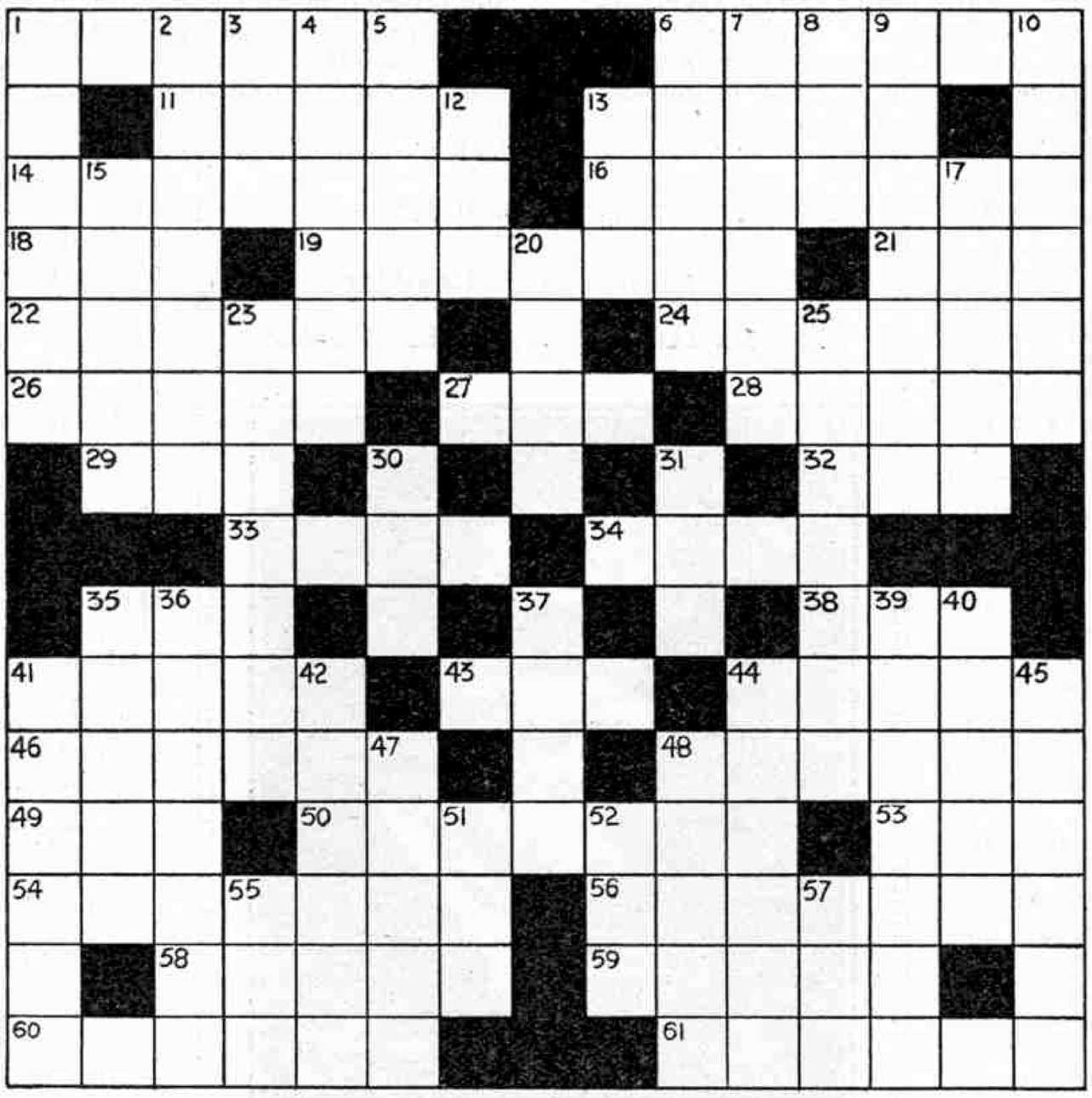
LOCKING DEVICE FOR BOLTS.—This interesting idea is for a bolt of standard Meccano diameter and thread, but having a smaller diameter at the end of its shank so that a nut to correspond can be screwed on and locked against the shoulder provided by the bolt shank. This part would be useful as a pivot, but there seems to be little justification for its manufacture as its uses are already covered by existing bolts fitted with locknuts. The use of two nuts tightly locked together enables a bolt of any length to be used as a pivot, and consequently this method of construction has more applications than the proposed new part. (*Reply to J. L. Cole, Rhyl.*)

MOTOR CAR WHEELS.—Suggestions for wire-spoked wheels for use on motor car models have already received our attention. The chief objection to the inclusion of these wheels in the Meccano system is the comparatively high cost of production. Many modern cars are fitted with disc wheels, and the present designs of 3" and 2" Pulley Wheels make good representations of this type of wheel. Constructors requiring even greater realism can fit discs of thin cardboard to the wheels, and enamel the cardboard to provide a better finish. (*Reply to F. T. Thomas, Liverpool.*)

FLANGED WHEEL ALTERATION.—To perforate the tread of the $1\frac{1}{8}$" Flanged Wheels would certainly increase their adaptability. It would enable them to be used for the ends of cylinders built up from Strips, for hubs of wheels and other similar applications. The perforations would considerably impair the smooth running of the Wheels on rails however and as this is their essential purpose it is unlikely that the alteration would be popular. Careful thought will be given to this idea. (*Reply to R. Wilson, Coventry.*)



JULY CROSSWORD PUZZLE



CLUES ACROSS

1. Desires
6. Saves
11. Chop finely
13. Keen look
14. Smash
16. Bird
18. Heated
19. Opponents
21. Evening
22. Whole
24. Heavy
26. Actions
27. Insect
28. Idler
29. Uninteresting
32. Animal
33. A halting walk
34. Secret injury
35. Everything
38. Congealed water
41. Threshing implement
43. Cutting tool
44. Stores
46. Cavalryman
48. Governing body
49. Part of circle
50. Liquid measure
53. A number
54. Copy
56. Invaders
58. Observed
59. A sea duck
60. Marked
61. Optical glass

CLUES DOWN

1. Cleansed
2. Superficial
3. Strike
4. Penetrates
5. Place
6. Hard metal
7. Gone
8. Skill
9. Screen
10. Greek goddess
12. Before
13. Wooden snow shoe
15. Sharpened
17. Equals
20. Excavation
23. Pastoral
25. Native of Arabia
30. An electrical measure
31. A pig's enclosure
35. Scare
36. Cutting open
37. Post
39. Bowl shaped mouths
40. Go in
41. Gifts of discernment
42. Envoy
44. Close
45. Faculties
47. Valued
48. Creeps slowly
51. Conducted
52. Raw metal
55. Weight
57. A retreat

This month's crossword puzzle will be found to follow the lines of the previous ones we have set on this page, all of which have proved remarkably successful. Every effort has been made to provide a fair and interesting puzzle. The clues are all perfectly straightforward, and every word used can be found in Chambers' or any other standard dictionary. The rules that govern the solution of crossword puzzles are by now so well known that it is unnecessary to give any further explanation of the requirements of the competition.

The prizes will consist of Meccano or Hornby Train goods (to be chosen by the winners from the current catalogues) to the value of 21/–, 15/–, 10/6 and 5/– respectively, to be awarded to the senders of the four neatest or most novelly-prepared correct solutions, in order of merit. The prizes will be duplicated for the Overseas section, which is open to all readers living outside Great Britain, Ireland, and the Channel Islands.

Entries should be addressed "July Crossword Puzzle, Meccano Magazine, Binns Road, Liverpool 13," and must be sent to reach this office not later than 31st July. Overseas closing date 31st October.

Competitors should not mutilate their magazines by cutting out the crossword illustration. Instead they should make a copy of the square on the same scale, or larger, and use that in submitting their entries for the Contest.

July Photo Contest

As announced in the April *"M.M.,"* until September next we shall offer prizes for the best and most interesting photographs submitted each month. The photographs may be of any subject, and may be made with any make of camera, plate, film or paper. Each photograph must bear on its back the reader's name, age and address, and a title, and the exposure must have been made by the competitor.

The entries each month will be divided into two sections, A for those aged 16 and over, B for those under 16; and prizes of Meccano Products or Photographic Materials, to be chosen by the winners, to the value of 21/– and 10/6 will be awarded in each section. A separate set of prizes, to be awarded in similar conditions, will be reserved for Overseas entries.

Entries sent this month must be addressed "July Photo Contest," Meccano Magazine, Binns Road, Liverpool 13," and must arrive not later than 31st July. Overseas closing date, 31st October.

COMPETITION RESULTS

HOME

May Advertisement Contest.—1. D. Morley Davies (Maesteg); 2. J. Mitchell (Edinburgh); 3. R. Howitt (Kirby Muxloe); Jt. 4. L. Jones (Southampton) and J. R. Stevens (Lytham St. Annes).

May Photo Contest.—First Prizes: Section A, V. L. Breeze (Lewes); Section B, F. H. Smyth (Exeter). Second Prizes: Section A, Wm. J. Aitken (Edinburgh); Section B, J. M. Barry (London, S.W.2).

OVERSEAS

February Drawing Contest.—First Prizes: Section A, J. Villa Pagés (Barcelona); Section B, M. Conly (Dunedin, N.Z.). Second Prizes: Section A, H. V. Mountfort (Ohakune, N.Z.) ; Section B, E. Scott (Calgary, Canada).



Round the World with the Guild

It is pleasant to keep in mind the fact that it is always summer at some place in the world of Meccano clubs. While members of clubs in Great Britain were engaged in winter pursuits, their comrades in the southern hemisphere were enjoying outdoor sports and rambles. "Hikes" seem to form a more prominent feature of club life in South Africa, Australia and New Zealand than in Great Britain. They are productive of an immense amount of fun, and have done much to promote the prosperity of the many well-established clubs in those countries.

The success of Australian clubs has always seemed to me a remarkable testimony to the value of Meccano in bringing boys together to enjoy the best of life. There the population is far more widely scattered than in Great Britain, but this has not prevented the spirit of the Guild from having been kept alive in a most vigorous manner, not only in clubs established in the chief centres, but also among the lone members who are unable to join in club life. This is the case also in New Zealand, the home of the Correspondence Schools M.C., which must be the most remarkable Meccano club in the world. This club holds no meetings in the ordinary sense, but that is no deterrent to keen competition in Model-building Competitions.

Equally satisfactory progress has been made in South Africa, especially in the more populous centres. South African Guild members realise to the full how Meccano fosters friendship and manliness, and enjoy themselves in all phases of club life all the more for their praiseworthy efforts on behalf of charitable objects. An interesting development of recent months has been the establishment of a club for coloured boys in Pietermaritzburg. This is proceeding on excellent lines, and its success helps to demonstrate that Meccano and the principles of the Meccano Guild appeal to boys of all races and creeds.

One of the brightest features of Guild progress is the advance made during the past 12 months by Canadian Meccano clubs. The winter sessions that have recently concluded have amply fulfilled the promise previously shown by these clubs, and to-day excellent organisations in Toronto and other centres are among the liveliest and most successful organisations of their kind in the world.

Nearer home, the Guild continues to make good progress in France, where many old-established clubs are in existence, and similar clubs have been established in Holland, Switzerland, Italy, Norway and other European countries. A splendid feature of all these clubs, and one that could be copied with advantage in existing clubs in other countries, is the thoroughness with which they enter into every pursuit. A keen lookout is kept for subjects for model-building, and the success achieved in this search is reflected in the results of Model-building Contests announced in the "*M.M.*," and also in the enjoyment members derive from club meetings at which their schemes are discussed and their models exhibited.

Meccano Club Leaders

No. 81. Mr. R. W. V. Selby Wright



Mr. R. W. V. Selby Wright, M.A., has been Honorary Leader of the St. Giles' Cathedral (Edinburgh) M.C. since 1931. The club is now associated with St. Giles' Cathedral Boys' Club, of which Mr. Selby Wright was the founder eight years ago, and splendid work is carried on by the members in the workshops and other rooms of the extensive club premises.

Club Meetings in Summer

Every report that I receive at this time of the year shows that full advantage is being taken of the long evenings of the outdoor season, and I am very pleased to see that outdoor pursuits of all kinds are being carefully planned. A distinct purpose is essential, even in a ramble, which is of little value in developing club spirit if it degenerates into a mere walk. If such an excursion is not directed to any feature of special importance, the aim should be to reach a convenient open space where games of some kind can be enjoyed, or treasure hunts or tracking competitions organised that will stimulate interest among those taking part. Great fun can be obtained also from flag signalling and similar occupations.

To a certain extent outdoor events are dependent on the weather. This, unfortunately, is not always favourable, but, wet or fine, every member should make a point of turning up at the appointed meeting place, when any changes made necessary can be put into effect. It is better to meet fellow enthusiasts, and to accompany them to the club room for indoor games, than to stay away in the belief that nothing of interest can be done; and Leaders will do well to impress on members that all meetings arranged will be held, even if the original scheme has to be abandoned.

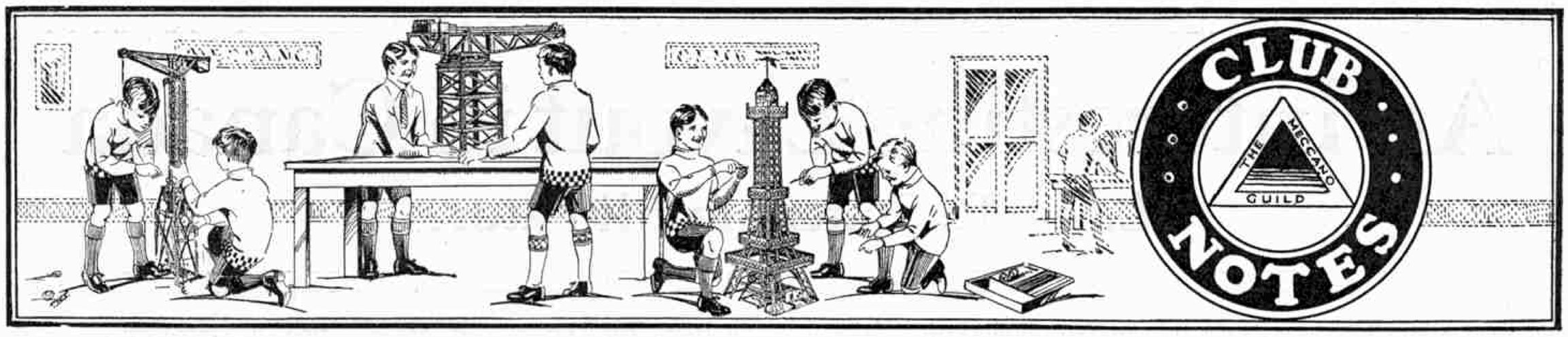
Dinky Toy Motor Racing

Miniature motor car racing is a simple but exciting game that could be introduced with advantage into the outdoor programme of most clubs. The cars employed are the racing cars, sports cars and other models of the Dinky Toy range, and all that is required to give these a suitable opportunity of showing their paces is a sloping track of some kind. In most cases it will not be difficult to find a suitable natural slope at places visited by clubs on their summer rambles. This should have a gradient on which the miniature cars can run freely without getting out of control, and the competing vehicles are started by placing them in line and releasing them. It is a simple matter to work out handicaps and allow suitable starts and this is followed by realistic overtaking and passing.

A simple wood track can readily be devised if no natural slope is available, and this has the advantage that its gradient can be varied. Such a track can be fitted up in a club room, so that the sport can be carried on during winter evenings as well as in summer. The races will give rise to an immense amount of fun, wherever they may take place. Much of the excitement may come from collisions and crashes, and it should be the aim of the competitors to direct their cars in such a manner that trouble of this kind is avoided.

Proposed Clubs

ALNWICK—E. Johnson, 24, Narrowgate, Alnwick.
BRADFORD—Mr. J. W. Whitworth, 1268, Leeds Road, Thornbury.
CHELMSFORD—Mr. D. G. Radford, 1, Dora Terrace, Baddow Road.
STOKE-ON-TRENT—E. Harple, 13, Maud Street, Fenton.



Middlesbrough M.C.—Special interest is taken in such events as Hat Night, when members speak for two minutes on subjects drawn from a hat, and Mock Trials. A typical Middlesbrough feature is "Ghost Night," when a ghost story is read in semi-darkness, while chains are rattled and "spectres" appear in the room. The Annual Exhibition included the usual excellent collection of models, and a Hornby Train layout that was a great improvement on previous efforts. The greatest attraction was a model of the Middlesbrough Transporter Bridge, loaned by Mr. H. G. Lord. A radio-gramophone provided music throughout the evening. Members Nights, Games Nights, a Sing-Song Night and entertainments given by various sections of the club have added to the enjoyment of membership. The Swimming Section is enjoying a successful season. Club roll: 45. *Secretary:* L. Shepherd, 29, High Street, North Ormesby, Middlesbrough.

Wednesbury and District M.C.—The club celebrated its first birthday with an interesting Exhibition, at which prizes of Meccano parts were given to members showing skill in model-building and to others who had done good work on behalf of the club. A large club model of the Eiffel Tower has been built. Lectures have been given on "*British Airways*," and on "*Beauty Spots of the Midlands*," slides for which were kindly loaned by the Midland Red Omnibus Company. Other interesting events have included a meeting at which short stories were read, a debate on "*Co-operation v. Private Trading*," and a visit to the Aerodrome at Castle Bromwich, Birmingham, where several R.A.F. machines were inspected. Good use is being made of the local press in attracting recruits. Club roll: 12. *Secretary:* A. L. Morgan, 17, Cobden Street, Fallings Heath, Wednesbury.

Mary Swanwick School (Chesterfield) M.C.—A splendid session's work ended with an enjoyable holiday. More than 20 members and friends stayed a week at Tenby, in charge of Mr. Lancaster, Vice-President, and Mr. T. E. John, Leader, visiting the lighthouse on Caldy Island, Pembroke and Manorbier Castles, Pembroke Dock, Haverfordwest, and other places of interest. Club roll: 18. *Secretary:* F. Adams, 213, Church Street, Old Whittington, Chesterfield.

Corner House (Corsham) M.C.—Members have enjoyed splendid times during the past session. Outstanding events have included a Party given by Mr. F. Dyke, President, at which enjoyable games were played and excellent refreshments served. Hornby Train meetings have alternated with Model-building evenings, at which an imposing array of lorries, workshops, ships and aeroplanes have been constructed. Electric light has been installed in the club room, and a permanent railway track has been laid down on trestles fixed to the walls. Club roll: 10. Leader: G. Dyke, Corner House, Church Street, Corsham, Wilts.

Whitgift School M.C.—Special meetings were devoted to the construction of models for the 6th Annual Exhibition, held in conjunction with the associated H.R.C. Branch. This was remarkably successful, and the attendance was so large that a Lantern Lecture on "*Britain's Largest Railway*," by Mr. Ewen, had to be repeated next day. Visits have been paid to the Motor Engineering Works of Hubert Dees Ltd., and Willesden Locomotive Sheds. The term ended with a special meeting at which prizes awarded in Model-building Contests were presented. Club roll: 38. *Secretary:* J. A. Watson, 23, Addiscombe Avenue. Croydon.

Tynecastle School (Edinburgh) M.C.—Models built by members during the session were displayed at the Annual Exhibition, along with others on loan from Meccano Ltd. This event aroused great interest in the school and the large number of visitors present were particularly attracted by a well designed layout constructed and operated by members of the Hornby Train Section of the club. Club roll: 35. *Secretary:* R. A. Forsyth, 41, Caledonian Crescent, Edinburgh.

Whitgift Middle School M.C.—Hornby Railway meetings and Model-building Competitions are held alternately. Models of special interest entered in contests included a lathe, punching machine, Fordson tractor and an A.E.C. chassis. Speed and endurance tests figured prominently in the programme of the Hornby Railway Section, and there was keen competition for the prizes awarded. Visits have been paid to the M.G. and Lagonda Motor Car Works. Club roll: 32. *Secretary:* D. Macdonald, 23, Woodvale Avenue, South Norwood, London, S.E.25.

Hele's School (Exeter) M.C.—A special effort to organise an Exhibition was so successful that this is now to be an annual event. This year it was followed by a special Social Evening to wind up the season's indoor work, and members of the club are now engaged in cricket and other summer games. Club roll: 15. *Secretary:* J. A. Drake, 94, Alphington Road, Exeter.

Regent Street Central School M.C.—Lantern Lectures continue to form an important part of club proceedings, and recent subjects have been "*Cities in Flanders*" and "*Ipswich*," the lecturers being Mr. J. Whitworth and Mr. H. Chaplin, Leader, respectively. Mr. Chaplin also gave a special lecture on School Camps, the slides showing the lecturer and boys taking part in camp life engaged in cooking, paddling and playing on the sands, and visiting places of interest. Table Tennis continues to attract members and the club representatives were successful in a special match against the rest of the school. Club roll: 120. *Secretary:* T. Wild, 1, Orchard Street, Heywood.

Gate House School (Ingatestone) M.C.—Increasing interest is being shown in Meccano Model-building, and originality and ingenuity is being shown in the design of models, an outstanding production being an automatic loading device incorporating grabs fitted to a travelling belt. Members also are taking interest in the Model-building Contests announced in the "*M.M.*," and excellent progress is being made in all directions. *Secretary:* F. Melville, The Gate House, Ingatestone, Essex.

Hornsea M.C.—The cricket season is now in full swing and members meet for practice and games on several nights each week. Great interest continues to be displayed in Cinematograph Shows and in experimental work in Electricity, Radio and other scientific subjects. A recent addition to the games played in the club is Mah Jong. An interesting Debate was held on the School Age, the majority being in favour of raising the age for leaving. Another new pursuit is Astronomy, and the Leader kindly allows members to make use of his 2-in. telescope. *Secretary:* L. Chapman, "Cleveleys," Hull Road, Hornsea.

John Culson Senior Boys' School (Coventry) M.C.—Mr. Garstone has kindly undertaken Leadership in succession to Mr. Jex. Competition Nights are held regularly and there is keen competition for marks. A Lecture on "*The Royal Scot*" was given by a member. Copies of "*Nuts and Bolts*," the club magazine, are to be exhibited on the School's Open Day. Club roll: 16. *Secretary:* T. Chappell, 8, Troughton Crescent, Radford, Coventry.

CANADA

Peterborough (Ontario) M.C.—Mr. J. Wray has kindly taken over the duties of Leader and under his guidance excellent progress is being made. Success attended a recruiting scheme in which a prize was awarded to the member bringing in most recruits, and the result of increased membership is seen in the greater number and variety of models brought to meetings for criticism and judgment. Special interest was taken in preparations for the club's Exhibition. Games have been introduced into the meetings and an innovation is the provision of notebooks in which members make drawings of attractive mechanisms and other subjects for model-building. The club magazine continues to make good progress. Club roll: 10. *Secretary:* K. Brown, 763, George Street, Peterborough, Ontario, Canada.

HOLLAND

Maastricht M.C.—Membership continues to be satisfactory and efforts are now being made to improve the appearance of the club room and make it more comfortable. Model-building Contests are held fortnightly and other meetings have included Lectures on model-building topics, famous locomotives and miniature railway working. The club recently celebrated its 5th birthday by a trip to the International World Fair at Brussels. Club roll: 9. *Secretary:* P. Bosch, Rechstraat, 61 Maastricht, Holland.

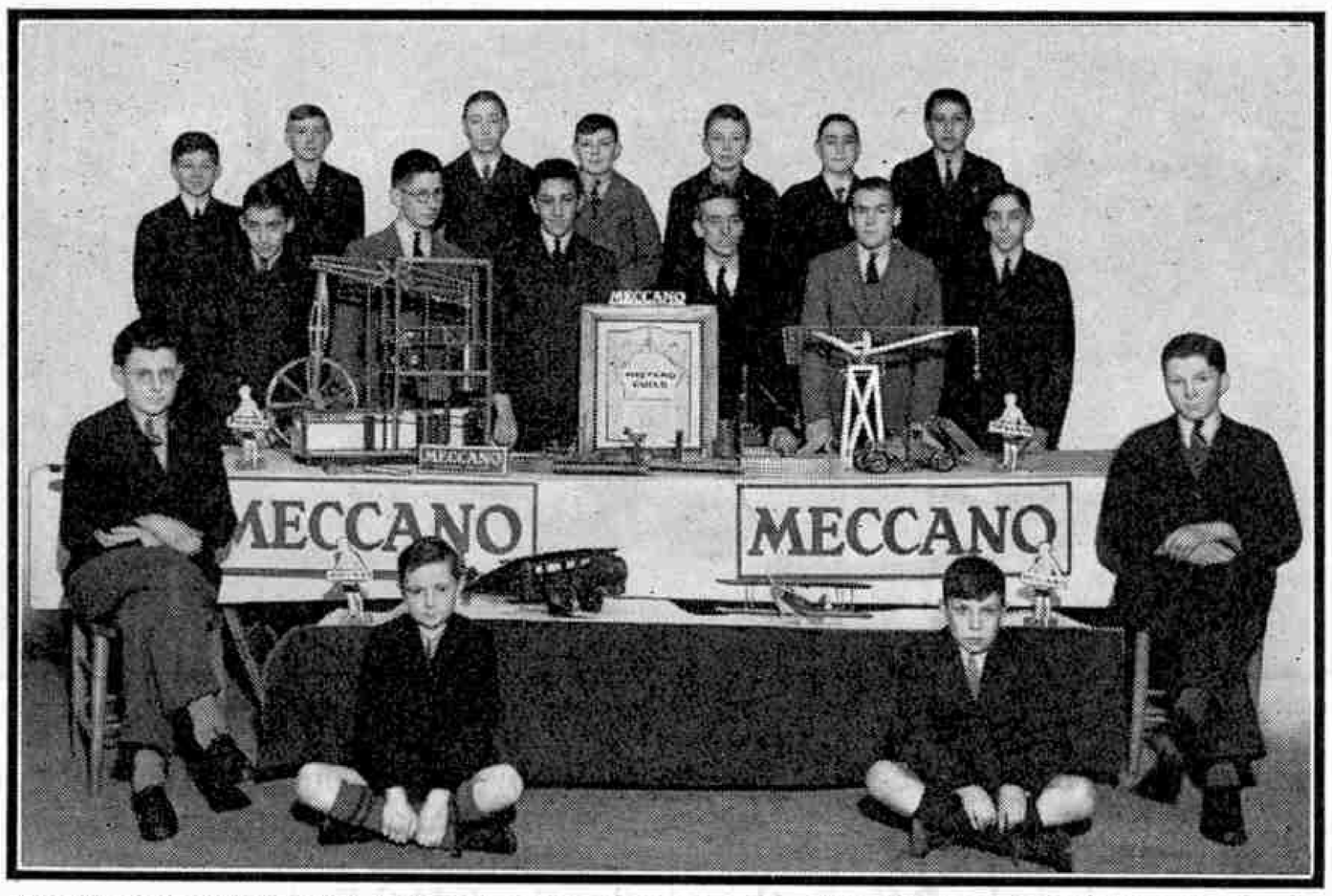
ITALY

Milan M.C.—A cinematograph projector has been purchased and films of adventure and of scientific interest are shown regularly at club meetings. Members are greatly interested in cinematography and an excellent lecture on "*The Invention of the Cinematograph*," given by Mr. C. Vigo, President, was greatly enjoyed. The programme for the summer sessions includes Rambles, Tennis Tournaments, Football Matches and visits to works. Club roll: 14. *Secretary:* E. Vigo, Corso Genova 19, Milan, Italy.

SOUTH AFRICA

Berea M.C.—Enjoyable evenings have been spent in indoor programmes of the usual kind, including Table Tennis Tournaments and a Draughts Championship, and in open air pursuits such as Treasure Hunts. A Girls' Section has been formed and this has resulted in increased activity and a rise in membership. The two sections provide programmes in turn and separate meetings also are held to enable all members to take part in activities that are specially suitable for them. *Secretary:* L. Michelow, 74, Hillbrow Street, Berea, Johannesburg, S. Africa.

Pioneer M.C.—Special attention is being given to improving the standard of model-building and members are encouraged to bring to the meetings models built at home for criticism by the Leader and other officials. The Pietermaritzburg Water Works and other places of special interest have been the objectives in country rambles, some of which have been devoted to the collection of plants that afterwards have been pressed and mounted. Members continue to enjoy drill with the Boys' Brigade and are keen and enthusiastic in all club activities, especially since the arrival of the Affiliation Certificate, which was presented to the Leader by the representative of Mr. A. E. Harris, Meccano agent in South Africa. Club roll: 11. *Secretary:* A. H. Alley, 461, Burger Street, Pietermaritzburg, Natal, S. Africa.



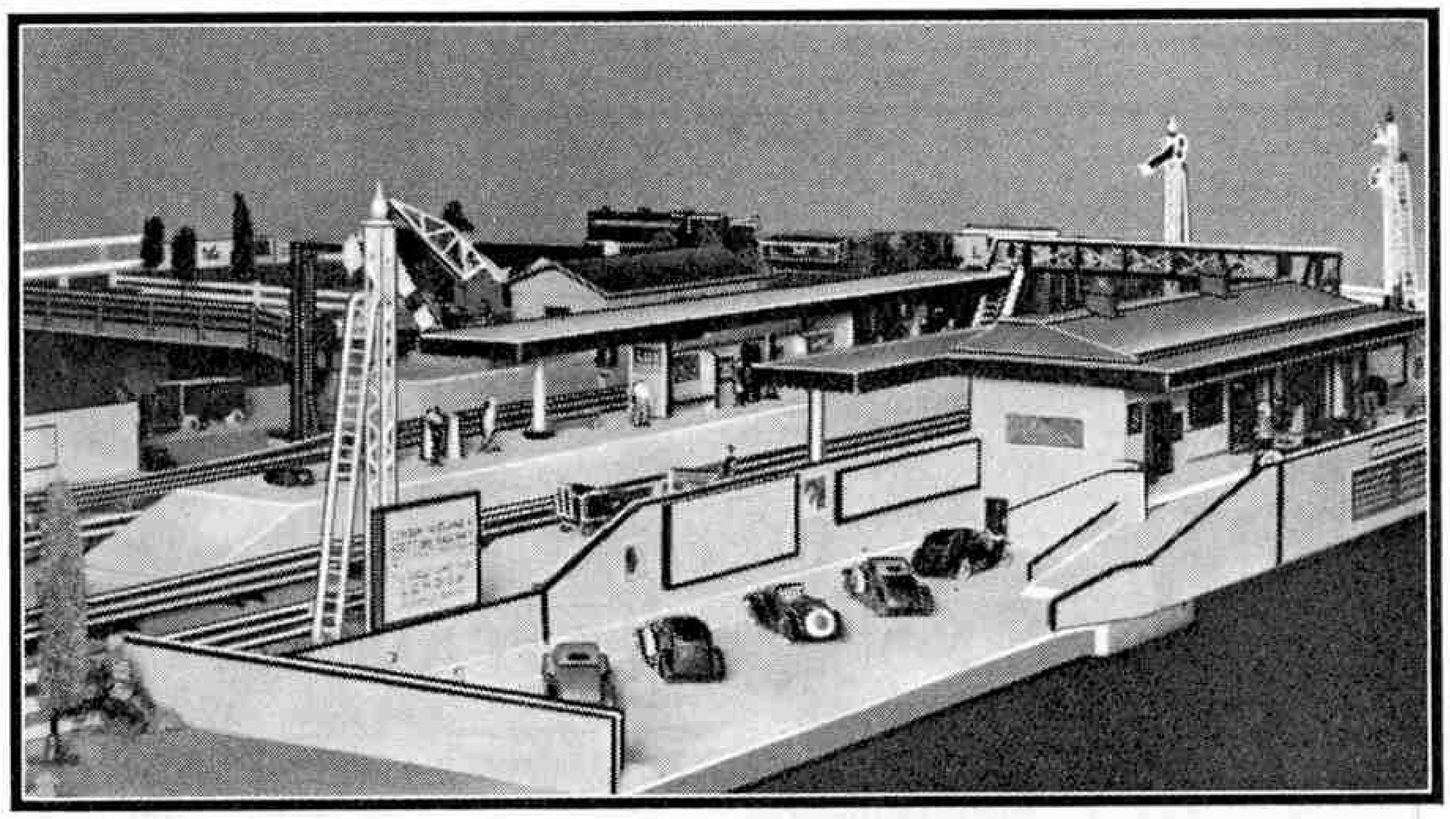
Members of the Old Charlton M.C. with models displayed at the club's 4th Annual Exhibition. Mr. Crosby, Leader, and W. Jaques, secretary, are immediately behind the Affiliation Certificate. The club was affiliated in November 1931, and the high regard its work has earned for it was shown when more than 300 visitors attended the recent Exhibition, which was opened by the Mayor of Greenwich in an appreciative speech.

An Interesting Layout in Canada

L.M.S.R. System in Miniature

IT is a remarkable tribute to the popularity of British railways that considerable interest is taken in them Overseas. We frequently receive details of layouts that are arranged to represent the practice of one or other of the British groups, although they are situated many thousands of miles away from their prototypes. An instance of this is found in the layout shown in the illustrations on this and the next page. This system represents a portion of the L.M.S.R., and has been laid out and equipped by Mr. H. G. Ogden of Victoria, B.C., for his son. Both are keen Hornby and real railway enthusiasts, and they have incorporated in their layout numerous features observed during a visit to this country last year.

The layout itself occupies a space of 12 ft. by 7 ft. 6 in., conforms in shape to the popular oval plan, and is laid throughout of Hornby Double Track. The general formation of the line is simple, but there are several points making various connections to sidings and loops that enable operations to be carried out in a realistic manner. The line is carried on a raised trestle foundation supporting the complete system. There is an open space measuring 5 ft. by 3 ft. in the centre of the layout that permits of the convenient operation of the system from inside.



An interesting view of the main station on the layout of R. Ogden of Victoria, B.C. A notable feature is the careful attention to detail, as shown in the road arrangement outside the station.

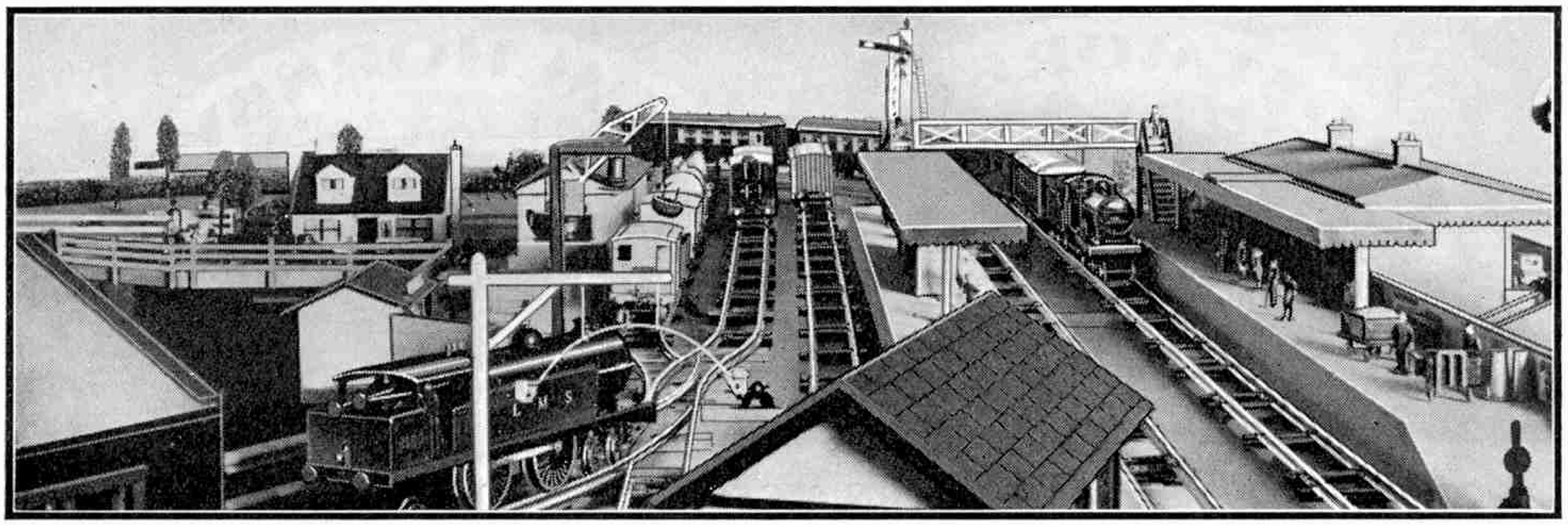
The permanent way is fenced off on both sides, and fields and roads fill in all parts not used for railway lines. This gives a most realistic lineside effect that is very different from the bareness so often displayed, even on large layouts with numerous details and accessories. A prominent feature near the station is the inn where the local Hunt, composed of miniature figures, is accustomed to meet. The Hunt is complete with horsemen and hounds and a fox, and the inn itself is appropriately termed "The Fox and Hounds." A modern touch that is in striking contrast to the old-fashioned air given by the homely inn is lent by a miniature aeroplane that is about to take off in an adjacent field.

The whole portion of the baseboard over which the rails have been screwed down has been treated with stucco powder so that no bare wood is visible anywhere on the system. This gives a rough surface and is coloured light brown, giving quite a realistic impression of a gravel-ballasted track. The colouring of the bare woodwork of the baseboard is an important point in securing realism, for the sudden appearance of a stretch of bare wood takes away much of the effect of a layout as a whole.

The numerous accessories in use on this system are a feature of its equipment. Prominent among them is the station, which is made up to have a double platform length of 5 ft. 4 in., allowing a tender locomotive and a 4-coach train to be accommodated alongside. The station platforms are fully provided with miniature fittings such as seats and automatic machines. Good use is made also of the vehicles included in the range of Meccano Dinky Toys, such as the Station Staff, Passengers, Pullman Car, Hotel and Engineering Staff. The various items of passengers' luggage and the milk cans included in the sets of Railway Accessories are placed in likely spots, the effect being to give an air of extreme liveliness and bustle that is most realistic. Miniature Posters of the Hornby Series are used to decorate the station and premises generally, and these are supplemented in an appropriate manner by various notices and announcements cut from real publications issued by the L.M.S.R. It is not generally realised how useful and effective these can be, provided that they are carefully selected and that the announcements used are not so big as to be out of proportion to the other posters and details.

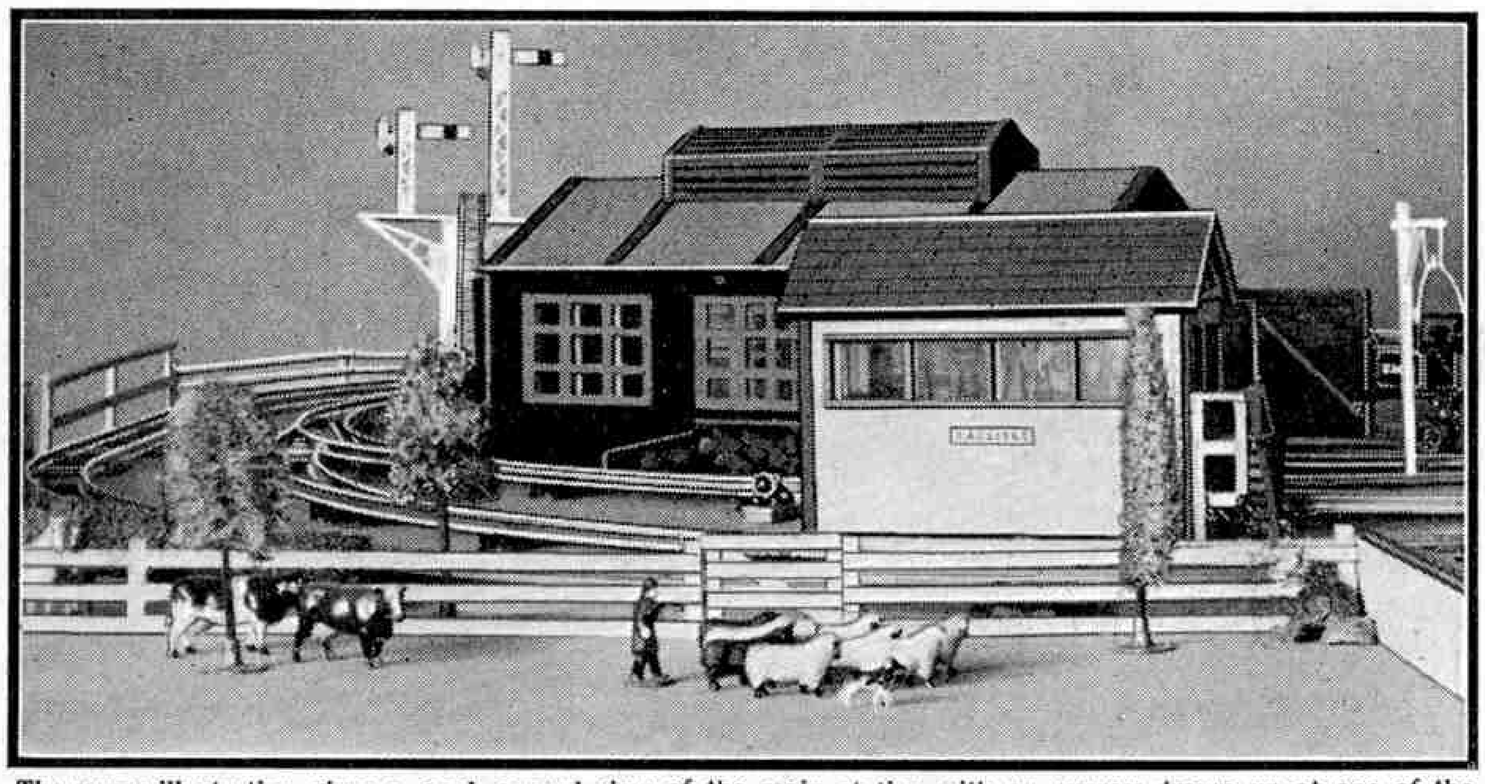
The road traffic arrangements in connection with the station are equally complete. This again is a point frequently overlooked by miniature railway owners, but it is most important if realistic effects are to be obtained. Various schemes can be developed in a very interesting and effective manner. Constant attention is being given in actual practice to improving the road approaches to many stations, not only in efficiency but also in their general appearance. As can be seen from the photograph on this page the station approach in this case is effectively carried out, and the premises are complete with such facilities as a telephone call box and motor car park. The latter feature gives a good chance of using many of the Dinky Toy Motor Cars in a useful and effective manner.

Similar completeness of equipment characterises the signal cabin at one end of the station. This has been provided with glass windows, and is fitted up inside with a dummy lever frame, and the telegraph



and telephone instruments found in real cabins. Even the signalman on duty has not been overlooked, yet another instance of the thoroughness with which the details of this railway have been carried out. Most miniature signal cabins appear to be untenanted!

For the accommodation of freight traffic there is a goods depot consisting of the usual loading platform or "bank" and a goods shed building. This is efficiently served by a Hornby Platform Crane. There is also a loading gauge in the yard to ensure that all loads come within the specified limits. It is interesting that this gauge was constructed at home, and its design is based on an illustration of an actual gauge that appeared some time ago in the "*M.M.*" The gauge bar has hinged ends, and a small bell in the centre that gives audible warnings of any load of excessive dimensions. The yard is completed by a coal order office, and brisk traffic is conducted both into and out of the yard. In order to provide the finishing touch to the effectiveness of the various accessories, each building throughout the whole of the system is lighted by miniature electric bulbs.



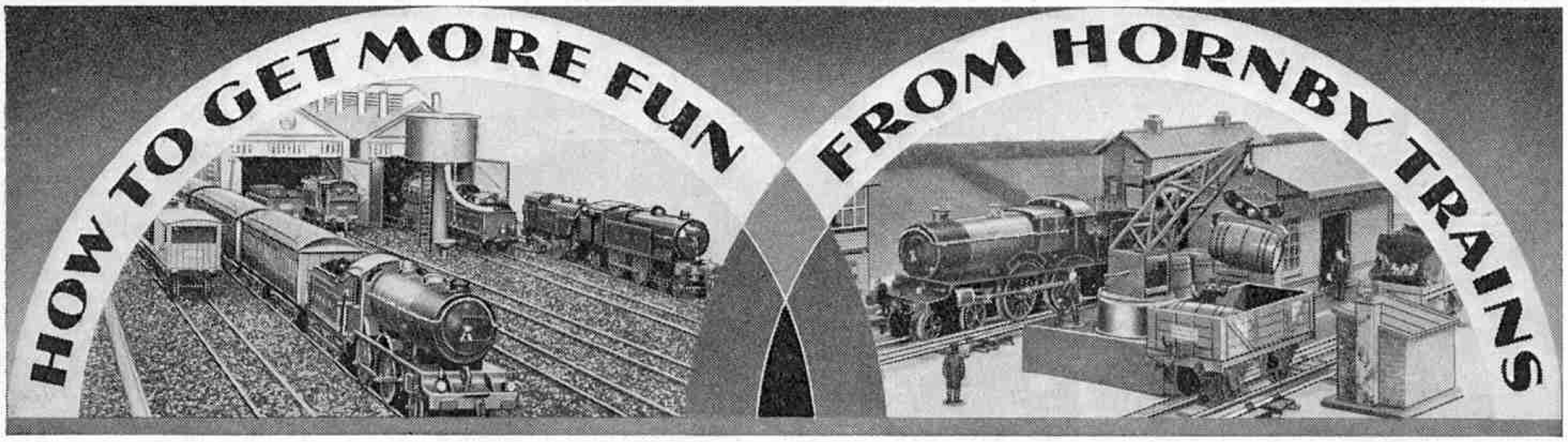
The upper illustration gives a good general view of the main station with an express drawn up at one of the platforms. In the lower photograph the home-built engine shed and signal cabin are effective lineside accessories.

The trains that maintain the services on the railway include the components of the No. 2 Special Pullman Set L.M.S.R. and the No. 2 Mixed Goods Set. These have formed only the basis of later developments, for the Pullman stock is supplemented by two No. 2 Saloon Coaches in L.M.S.R. colours, representing appropriately the modern vestibuled stock so popular on that line. Numerous and varied vehicles for freight traffic are in use, in addition to those first obtained in the Goods Train Set mentioned. These include such special types as Milk Tank Wagons, and there is also a Breakdown Van and Crane in case of emergencies.

The Hornby Locomotives in service on the layout no doubt remind their owners of the characteristic features of British locomotives. The largest in use is a Hornby No. 2 Special tender engine representing the efficient Standard Compound class of the L.M.S.R. that are found practically all over that system. For dealing with goods traffic there is a No. 2 Special Tank Locomotive, which is also used for local passenger trains. The latest addition to the locomotive stock is a No. 1 Special Tank, introduced specially for shunting work and local goods services. Thus the various duties called for by the traffic operated on this railway are efficiently carried out by an appropriate type of locomotive, thus adding to the realism.

An interesting point in connection with the engines themselves is that each has its own crew. These miniature drivers and firemen are permanently attached to a wooden block of suitable shape for fitting in to the cab. The block is made detachable in case it should be necessary to remove the enginemen while the locomotives are undergoing attention in the "repair shop." Each locomotive also is provided with a dummy fuel supply in the tender or bunker as the case may be. There is also a realistic stock of coal near the engine shed itself from which the locomotives are supposed to replenish their supplies. The "coal" is deceptive, in that it is not coal at all, but is actually small granite chips secured by glue to suitable wooden blocks and then enamelled black. This method is adopted in order to avoid the possibility of breakage and the consequent annoying dust that is formed when real coal is used.

It will be realised, therefore, that a considerable amount of time and trouble has been taken in order to arrange the setting and details of the line in an appropriate manner. To the onlooker, especially, the difference is very apparent between a system where careful attention has been given to the general "finish," and one where no attempt has been made to work out a realistic scheme for the situation of the accessories and lineside features that add so greatly to the fun of operations.

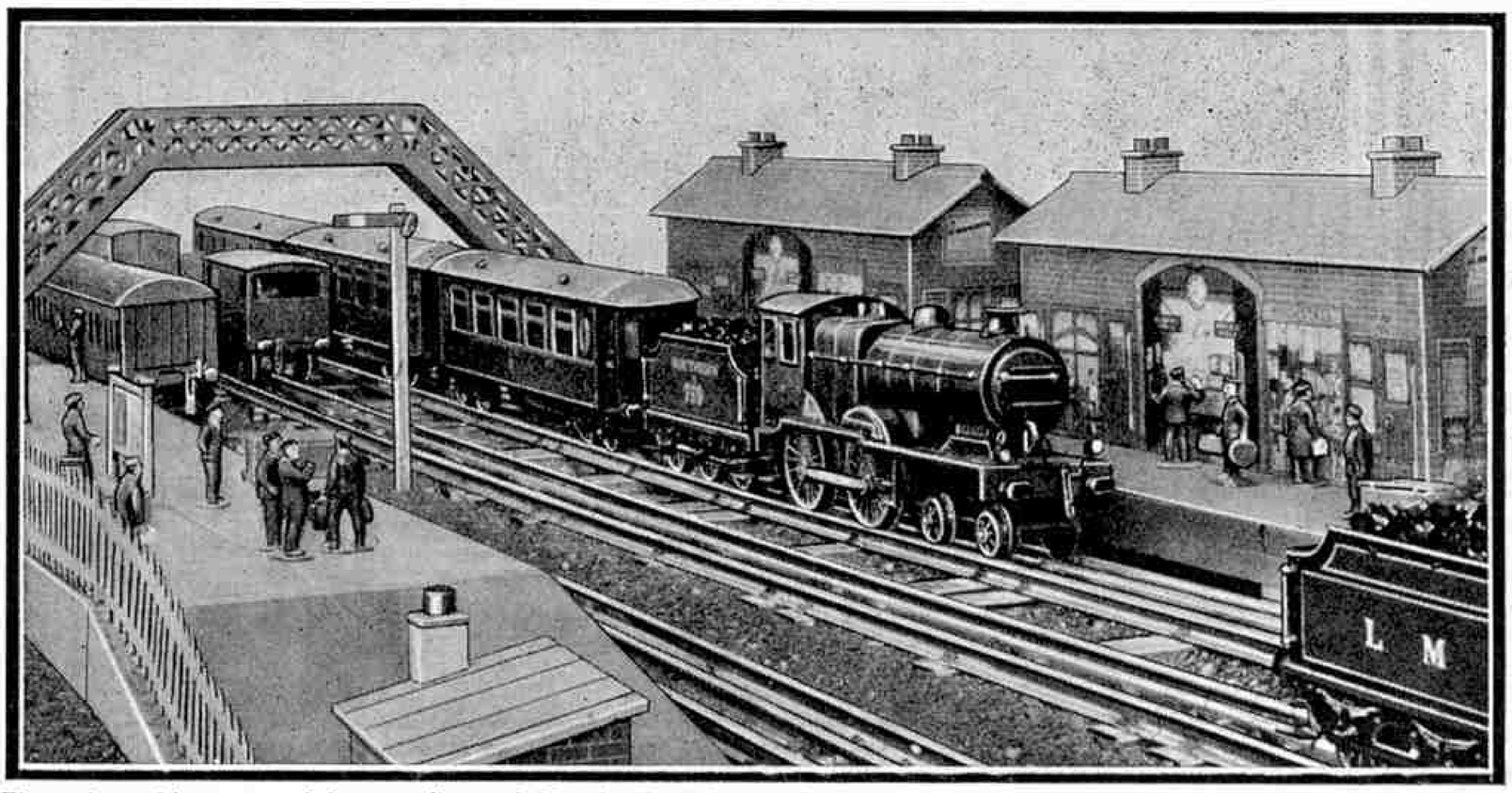


S.R. (EASTERN SECTION) SERVICES

THE Southern Railway is particularly associated with holiday traffic, and at this time of the year it will be appropriate to consider the various characteristics of that line with a view to their reproduction on Hornby layouts where Southern stock is in use. Many readers probably will travel over the S.R. during this or next month and no doubt will be keen to follow up its practice. In this article it is intended to restrict ourselves to the Eastern Section of the S.R. This Section is an extremely complicated system over which a very heavy and intensive service of trains is operated, especially during the summer months. There are numerous features that lend themselves particularly well to reproduction with the components of the Hornby Series.

The important Continental Boat Train services between Victoria and Dover run on the Eastern Section. The best-known train, *"The Golden Arrow Limited,"* is normally an all-Pullman service, so that where Hornby Pullman Coaches are available there will be no difficulty in making up a representative train. The engines invariably employed on these exacting duties are the famous "Lord Nelson" class, the first of which, No. 850, is represented in the Hornby Series by the well-known No. 3 Locomotive in S.R. colours, bearing the name *"Lord Nelson."*

An interesting feature of these trains is that special accommodation is provided for registered baggage. This is carried in luggage boxes or containers, which are conveyed on flat trucks attached to the train, and thus are readily transferred from train to ship and vice-versa at Dover and at Calais. These luggage boxes can easily be modelled in cardboard or wood, and if appropriately loaded on a Hornby S.R. Flat Truck they will form an effective and realistic part of a miniature Boat Train. The boxes do not require to include any great detail in order to give sufficient effect, and suitable small boxes or cartons are usually to be found at home. For instance, three ordinary matchboxes stuck together face to face, and then painted, will do quite well for each container. The finished containers should be loaded across the wagon and will then look quite realistic. They may be secured in position by Meccano Cord crossed over them and through the rings attached to the sides of the wagons. Those keen on detail may attach to the boxes suitable slings also made of Meccano Cord, with a small ring connecting them for hoisting purposes.



Through working on a miniature railway. A Hornby No. 2 Special S.R. "L1" class Locomotive with a train of L.M.S.R. No. 2 Saloon Coaches, a similar arrangement to the "Sunny South Express."

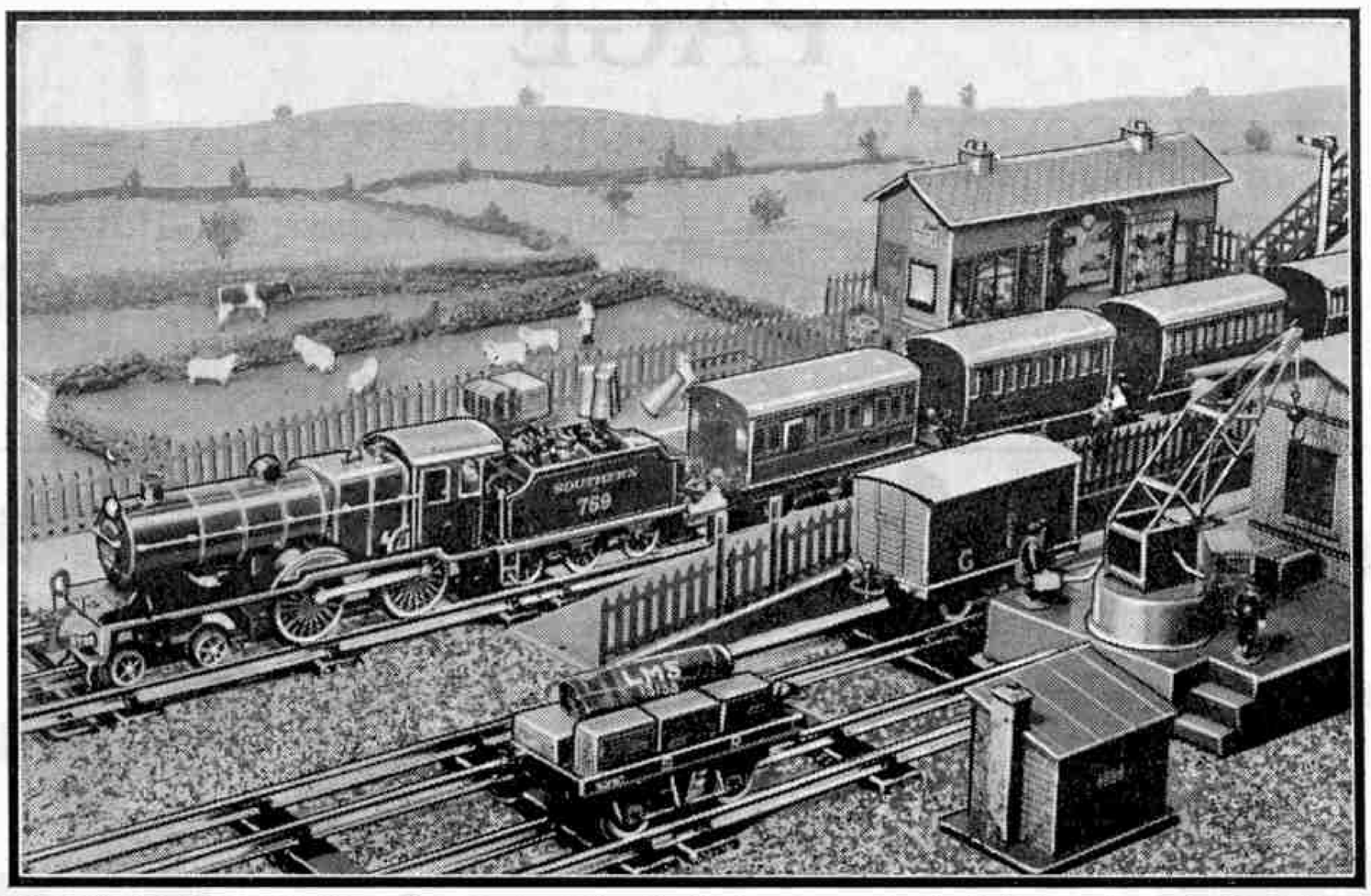
A notable series of trains is operated between Charing Cross and Folkestone. Particularly smart running is made by them, for they are very tightly timed; and Pullman cars form an important part of the formation of the trains. Of the various Southern Railway engines of the Hornby Series, the No. 2 Special tender Locomotive is the most suitable for the operation of a miniature "Folkestone Flyer." It represents the inside-cylinder 4–4–0s of the "L1" class that were introduced primarily for these duties.

An intensive service of trains is run on the Kent Coast lines, once the property of the former London, Chatham and Dover Railway. At the height of the summer season, train after train is despatched for the various resorts on the Kentish Coast. A particularly fine train on this service is the *"Thanet Pullman Ltd."*, which runs every Sunday during the year from Victoria to Margate, Broadstairs and Ramsgate. The formation of this train with Hornby components will be quite easy for its exclusive composition is indicated by its title.

Until fairly recently, weight restrictions prevented the use of 4–6–0 locomotives on this section, so that some hard tasks were set for the 4–4–0 engines necessarily employed. Now, however, the restrictions have been

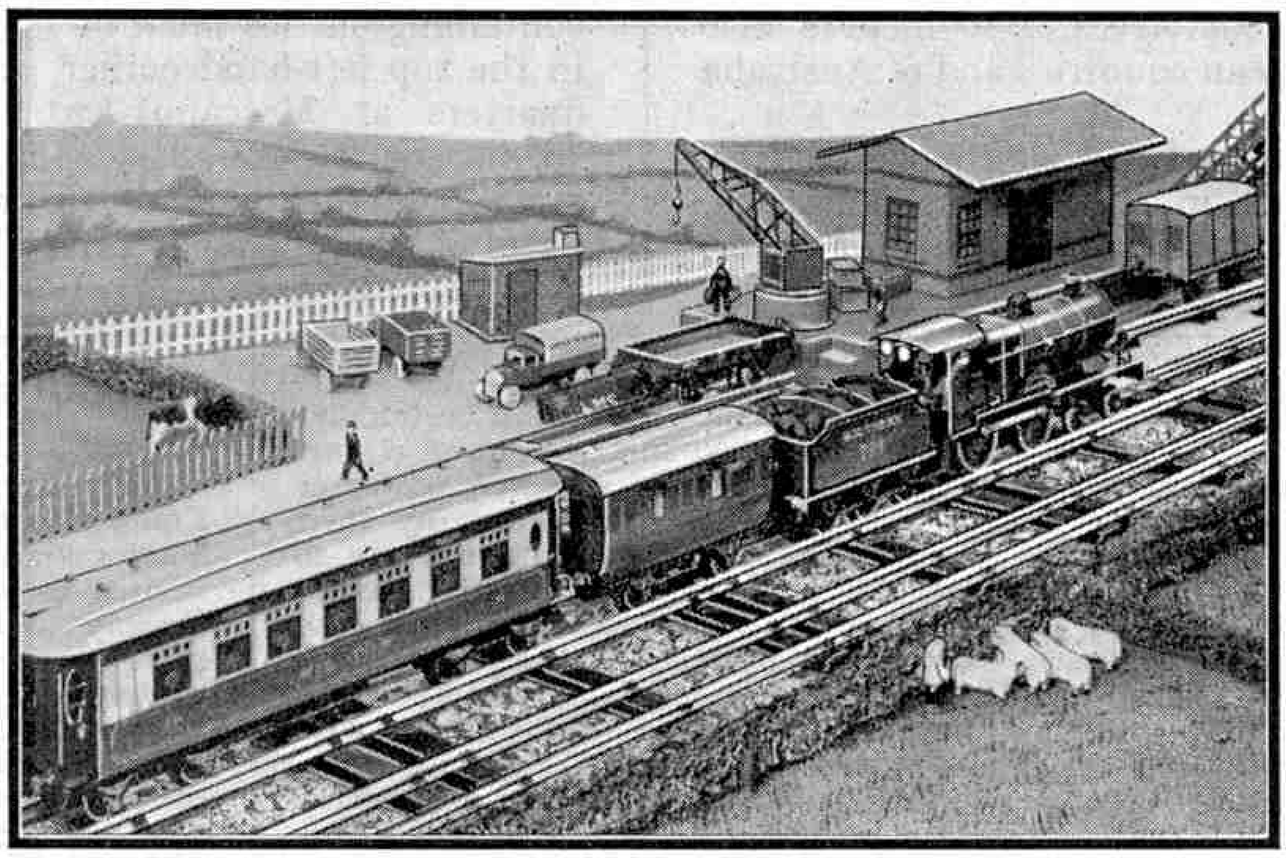
removed and heavier classes of engines can be admitted; so that the Hornby No. 3C Locomotive can be used for these Coast trains as well as for the more famous Boat Trains. Although a Hornby "Lord Nelson" is the obvious selection for the harder duties of this kind, other engines may be used for second portions, relief trains, or in an emergency on the chief trains. The 4–4–0 type of locomotive so long associated with Kent Coast trains can be well represented by the Hornby No. 2 Special "L1" class engine.

For handling the exceptional crowds that will be attracted by the special facilities offered as part of the summer programme on a Hornby railway, suburban stock may be pressed into use during the time of heavy traffic. In this connection it would be distinctly interesting to use a "set train" of No. 1 Coaches. The running qualities of these vehicles would naturally be improved by the fitting of Mansell wheels, though with suitable lubrication the standard pressed-steel type is quite satisfactory.



An excursion train passing through a country station. Traffic is so heavy that the train is made up of a "suburban set" of Hornby No. 1 Coaches, as suggested in this article.

Some interesting services are worked by the S.R. in connection with other railways. The famous *"Sunny South Express"* of the L.M.S.R. is probably the best known, and is certainly a good example of joint operation. This L.M.S.R. train from Liverpool, Manchester and Birmingham is handed over to an S.R. locomotive at Willesden Junction on the L.M.S.R. main line, and the train then proceeds over the West London and West London Extension lines. The portion for Brighton and Eastbourne passes on to the Central Section of the S.R. Through coaches for the Eastern Section for Margate and Ramsgate are also run, and these follow the Brighton and Eastbourne vehicles from Willesden in charge of an Eastern Section S.R. engine. For the return journey similar arrangements apply, but in the reverse order. Another joint working with another group involving the Eastern Section of the Southern Railway is the through service from the G.W.R. connecting Birkenhead and places on the G.W.R. North main line, with Deal, Dover and the Kent Coast generally. The transfer from the G.W. to the S.R. and vice-versa is made at Reading. This is a curious outpost for the "Eastern Section," but as it is reached by means of the former S.E. and C.R. line from Redhill, it ranks as Eastern Section from the operating point of view.



A special express passing a local goods yard. The use of the No. 1 Guard's Van in conjunction with Pullman stock is interesting and represents the use together of similar vehicles in actual practice.

A feature that is characteristic of S.R. trains during the daytime is the use of route-indicating discs displayed at the front of the locomotive. The S.R. prefer to indicate the route of the train by means of these discs rather than to show the class of the train by lamps as do the other companies. The great complexity of the Southern system and the variety of routes available account for this divergence from normal practice elsewhere and discs have been used for many years.

For attachment to Hornby Locomotives, discs can easily be made by drawing small circles on thin white card and carefully cutting them out. They should be made 11/32 in. in diameter, and should have small loops of paper attached behind them to allow them to be mounted on the brackets fitted to Hornby Locomotives. Readers who do not live on the S.R., and therefore are unable to observe the codes for the various routes and services, will no doubt be interested in the following details.

Boat Trains from Victoria to Dover, following the normal route via Orpington, carry one disc over each buffer. Trains on the Folkestone route from Charing Cross carry one disc over the left-hand buffer and one in front of the chimney. Those for Ramsgate from Victoria via Herne Hill carry a similar indication, except that the lower disc appears over the right-hand buffer. Trains from the "West London" Line, such as the Eastern Section portion of the *"Sunny South Express,"* also are indicated by the display of one disc in front of the chimney and one over the right-hand buffer. Those proceeding from the Eastern Section generally to the West London line are distinguished by the now rare display of three discs. One is placed in front of the chimney, and the other two are fixed on the right-hand and centre brackets respectively, above the buffer beam of the engine.

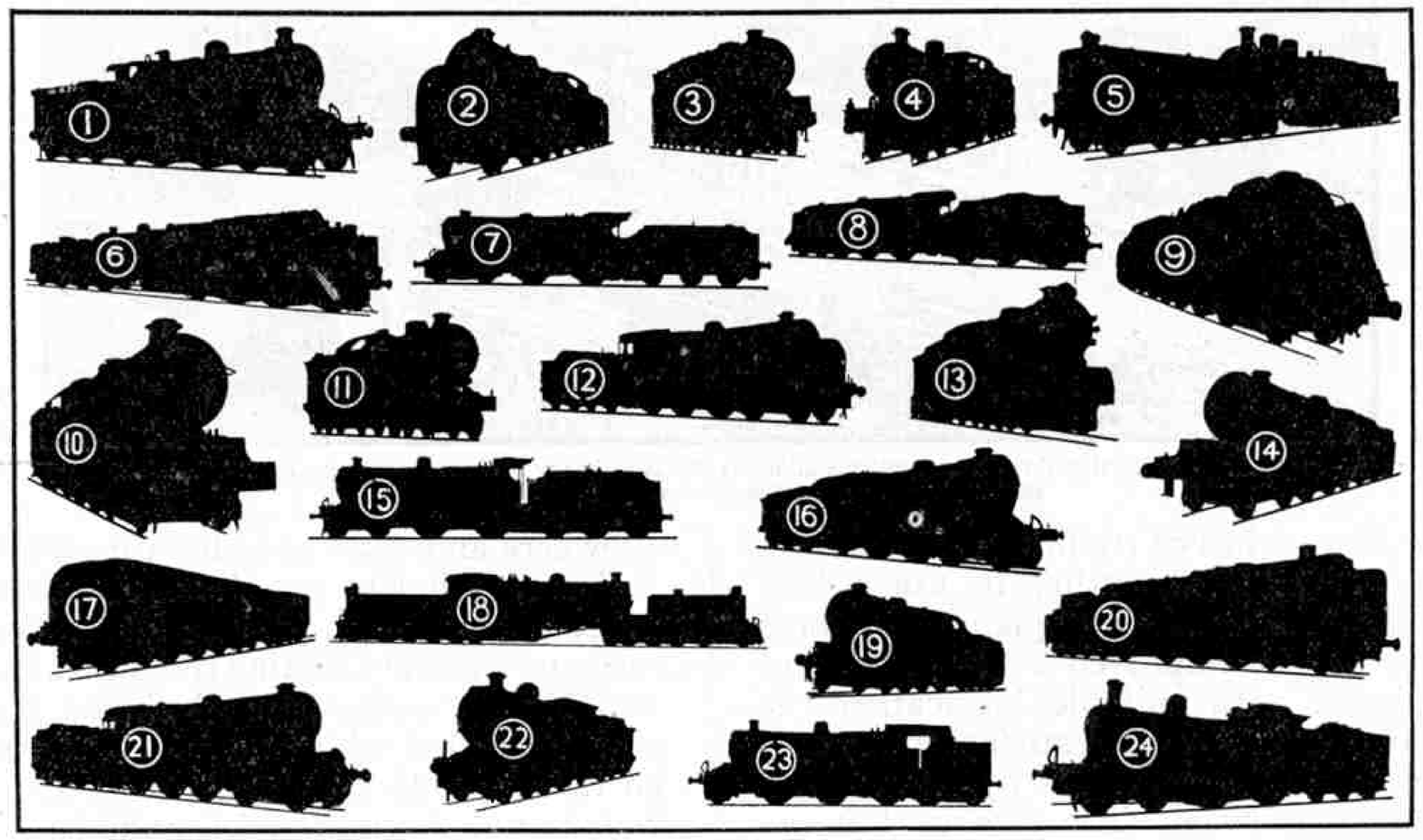
Join the Hornby Railway Company and become eligible for the competitions announced on this page.

H.R.C. COMPETITION PAGE

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

LOCOMOTIVE SILHOUETTES CONTEST

This month we introduce a new contest which, we believe, will prove of exceptional interest to readers. It provides them with a good opportunity of making use of their knowledge of locomotives and their wheel arrangements, and although some of the items are fairly easy, others are likely to need a little thinking out.



The accompanying illustration shows 24 small pictures each representing a locomotive in silhouette form. Competitors are required to decide the identity of each one, and to state its class, its wheel arrangement, and the railway company owning it. The silhouettes are not all of British locomotives, but include also locomotives of three European countries and of Australia and South Africa.

When a competitor has identified all the silhouettes, or at any rate as many of them as he is able to manage, he should make a neat list of them on a sheet of paper, together with the details asked for above, and add his name, full address and H.R.C. membership number.

The contest will be divided as usual into two Sections, Home and Overseas. Prizes of Hornby Train goods (or Meccano products if preferred) to the value of 21/–, 15/–, 10/6 and 5/– respectively will be awarded to the four best entries submitted in each Section. In the event of a tie for any prize neatness will be taken into consideration when the final decision is made. In addition a number of consolation prizes will be given to those members whose entries are not among the winners of the major prizes, but deserve some reward.

Envelopes containing entries must be marked *"H.R.C. Silhouettes"* in the top left-hand corner, and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st July. Overseas competitors must post their entries to arrive not later than 31st October, as entries received after that date cannot be accepted.

"My Favourite Railway Poster"

At this time of the year, with the holiday season close at hand, special efforts are made by the railway companies to draw attention to the attractions of the various districts and resorts served by them, and to point out the advantages of travelling by a particular route. A most effective method of catching a public eye is by means of posters, and good use is made of these by all the railway companies. From the public hoardings or from the billboards at railway stations and on railway premises we are invited to *"Travel L.M.S."* and we are further assured that this is *"The Best Way."* The L.N.E.R. feature the attractions of the *"Luxury Cruise on Wheels"* afforded by the famous *"Northern Belle."* Devon and Cornwall and the West generally are naturally the special province of the G.W.R., while "Sunny South Sam" invites us to go *"South For Sunshine"* on behalf of the S.R. All four groups make a special feature of the attractions of a holiday spent in one of the camping coaches that are proving such a success.

Members of the H.R.C. will be familiar with the posters and will have a particular preference for a certain poster or type of poster, issued perhaps by their favourite group. It will be interesting to know which are the most popular posters and therefore we announce a contest with the subject *"My Favourite Railway Poster."* Competitors are required to state which railway poster appeals to them most, and also to state which other three posters they consider to stand next in order of merit; and in each case to give brief reasons for their choice. The senders of the four best sets of answers will be awarded Hornby Train or Meccano products to the value of 21/–, 15/–, 10/6 and 5/– respectively. In addition consolation prizes will be awarded.

The Contest will be divided into two Sections, Home and Overseas. Envelopes containing entries must be marked *"H.R.C. Poster"* in the top left-hand corner and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st July. The closing date for the Overseas Section is 31st October.

Railway Photographic Contest

This month we announce the next Contest of the summer series of Railway Photographic Contests. Competitors are invited to submit photographs of typical railway scenes. There are no restrictions with regard to the subject chosen, and competitors may send as many prints as they desire, but no competitor can win more than one prize in one Contest. Prizes of Hornby Train material (or Meccano products if preferred) to the value of 21/–, 15/–, 10/6 and 5/– respectively will be awarded to the senders of the four best railway photographs received in each Section, Home and Overseas.

Envelopes containing entries must be marked *"H.R.C. July Photographic Contest"* in the top left-hand corner and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st July. Overseas closing date, 31st October. Each entry must bear the competitor's H.R.C. number in addition to his name and address.



Branch News

COTTESMORE CENTRAL SCHOOL.—The permanent track is double and is 200 ft. in length. The layout includes two stations, engine sheds, goods sidings with coal offices, and signal boxes. Two evenings a week are devoted to operations and other meetings have included a Cinematograph Night, when two members kindly brought their projectors to the club room. An enjoyable visit has been paid to Liverpool, where a large party of members made a tour of the Meccano Factory and afterwards were entertained to tea by Meccano Ltd. Secretary: Mr. J. S. Butler, Cottesmore School, Lenton, Nottingham.

HARLESDEN METHODIST.—This Branch has been reorganised and has held many excellent meetings. A useful non-continuous layout, with two loops and two terminal stations has provided enjoyable track working in which all members have taken part. A Shunting Contest was won by a new member who shunted a seven-truck train in 15 moves in two minutes. Secretary: G. P. Summers, 11, Radcliffe Avenue, Harlesden, London, N.W.10.

MAIDSTONE.—Track work is being steadily carried on and continues to give enjoyment to members. Other events have included the Annual Dinner, followed by entertainments and games, and an Exhibition of members' work, when models of aeroplanes were shown along with miniature boilers, engines and model railway material. Mr. H. R. Pratt Boorman, M.A., President, kindly showed films taken during a visit to the United States, and members enjoyed the pictures of the Chicago World Fair and of American locomotives included in them. Mr. Boorman also exhibited a film illustrating his visit to Switzerland, and a film of scenes in Devon and Cornwall were shown by Mr. P. A. Russell. The Short Aeroplane Works at Rochester have been visited. Secretary: W. Hills, The Orchard, Lord Romney Hill, Maidstone.

WOODFORD.—Membership is increasing satisfactorily and greater interest is being taken in track working, and in Shunting Competitions and other contests of ability in railway working. The 6th Birthday of the Branch was celebrated by an enjoyable Party. The Library has been reorganised, and a catalogue prepared. Secretary: J. H. Skelt, 27, Woodside Road, Woodford Wells, Essex.

BROOKFIELD (WIGTON).—The track is continually being extended and the layout improved in order to give more efficient working. Special interest is taken in operations at terminal stations. So many new members have joined that a Junior Section has been formed. The additional stock made available by successful recruiting has improved working, and additional lineside accessories have been introduced. Miniature lamp standards have been installed to light the track and excellent use is made of Dinky Toys. Secretary: N. Lowe, Friends' School, Wigton, Cumberland.



A happy group of members of the Chipping Campden Branch, No. 279, in pleasant surroundings. Chairman, Mr. W. J. Bright; secretary, R. H. Field. In our photograph the secretary is at the right of the third row. The Branch was incorporated in October 1934, and possesses an excellent track with scenery built by members.

FIRST SHEFFIELD.—Additions to the layout include new sidings, two engine sheds and loop lines. Operations at track meetings are now very fascinating, the proceedings at each meeting beginning with a service of railway trains occupying half an hour and continuing with the running of a series of crack Pullman expresses and goods traffic, the round of services occupying an hour and a half. Working is carried out to timetable and reports of accidents and delays are called for. During school holidays members visited stations on the L.N.E.R. main line to study fast passenger working and to take photographs. *"The Flying Scotsman," "The West Riding Pullman,"* and other famous expresses, hauled chiefly by L.N.E.R. "Pacifics," were seen on these visits. Secretary: W. B. Hutchinson, 35, Linden Avenue, Sheffield, 8.

CHIPPING CAMPDEN.—Membership is steadily increasing and recent recruits have contributed a Hornby *"Flying Scotsman"* and other valuable locomotives to the resources available for Branch meetings. Meetings are now being held weekly. An excellent track with sidings has been laid down and special attention is being given to the completion of the signalling system. Electric lighting is being fitted to the signal cabins and other lineside buildings. Secretary: R. H. Field, The Grammar School, Campden.

AUSTRALIA

MELBOURNE.—Demonstrations have been given of the running of Hornby Metropolitan and other locomotives. Trains were fitted with electric lighting and Dinky Toys added to the attractiveness of the layout. An interesting feature of the track on which this demonstration was carried out is a 6 ft. model of the Sydney Harbour Bridge, approached by a long gradient from the main track. An Underground Railway section has been formed, chiefly to provide a track on which members can practise coupling operations and train formation. The Leader gave an address on a recent visit to Sydney, where he met the officials of the Sydney M.C. and the Paramatta Branch. Secretary: L. Ison, 8, Hayes Street, Northcote, N.16, Victoria, Australia.

Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation and any boys who are interested and desirous of linking up with this unique organisation should communicate with the promoters, whose names and addresses are given below. All owners of Hornby Trains or accessories are eligible for membership and the various secretaries will be pleased to extend a warm welcome to all who apply.

BOURNEMOUTH—J. Gibbings, 12, Northbourne Avenue.

LONDON—G. G. Davies, 40, Wightman Road, Harringay, N.4.

LONDON—S. Price, 79, Markmanor Avenue, Walthamstow, E.17.

WAINFLEET ST. MARY—E. Jackson, Paradise Farm.

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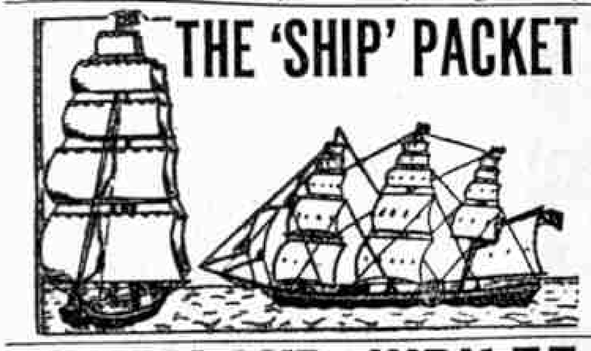
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Stamp Gossip

and Notes on New Issues



Jubilee Stamps

Continuing our series of Jubilee Stamp reproductions, we give this month specimens from South-West Africa (by courtesy of the High Commissioner for South Africa), and from Britain's own issue.

The South-West African design shown is used for each of the four stamps comprising the set, the values being 1d., 2d., 3d. and 6d. It is interesting to observe that the design of the King's Head is identical with that used in Britain's issue. This set will be on issue for two months only.



Britain's issue has been criticised freely in some quarters, but to most of us this set of stamps is definitely pleasing. There is nothing spectacular in the design, but it has a cleanliness and simplicity that makes it outstanding. Incidentally, it is the first G.B. design to be produced specially for reproduction in photogravure, and the colour treatment is delightful.

The only difference in the designs for the four values, ½d. (green), 1d. (red), 1½d. (sepia) and 2½d. (blue), is in the symbolical designs, where laurel wreaths, oak and olive branches are interchanged in the right hand panel of the different stamps, and in the borders flanking the King's Head. In the 2½d. stamp this border is composed of flower buds, presumably lotus buds.

United States Reprints

The Postmaster-General of the United States has given instructions for 22 recent U.S. commemorative stamp issues to be reprinted and reissued imperforate and ungummed. Only two millions of each stamp are to be issued.



This unusual step has been taken to placate U.S. stamp collectors who have taken strong exception to the practice of the P.M.G. in issuing "souvenir" sheets of new issues to a limited number of stamp-collecting friends. The Postmaster-General had not contemplated the possibility that the souvenir sheets might find their way on to the market, and the reissue is designed to prevent a repetition of a recent incident in which, it is alleged, a "souvenir" sheet of the 1934 3c. "Mothers' Day" commemorative was sold to a dealer at a price reported to be in the neighbourhood of $20,000!

There will be no further issue of souvenir sheets.

"Photographing" Stamps

Those of our readers who make a point of "writing up" their stamp collections have no doubt often felt that a simple photograph of a particular stamp would be very helpful in drawing attention to some special feature of the stamp. Few of our readers possess the special photographic equipment necessary to produce perfect stamp prints, but all of them can produce prints in a simple way described in a recent issue of *"Stamp Collecting."*

The only apparatus necessary for success is a small printing frame, a developing dish, a packet of glossy gaslight paper, and the necessary developing chemicals and a little benzine. The stamp itself is the negative. The stamp to be reproduced must first be cleansed of all mounts or adhering paper, then dipped in benzine, so that temporarily it is rendered semi-transparent.

After the surface of the stamp has been wiped to remove the surplus benzine, the stamp is placed in the printing frame with its printed side in contact with the sensitised surface of the printed paper. With paper of average thickness, G.B. stamps for example, an exposure of 12 secs. at two feet from a 100 watt lamp is sufficient. The resulting print, after development, gives a reversed negative image of the stamp. When the print is dry, the second stage of the process is carried out. In this the negative print and a fresh sheet of printing paper are placed face to face in the printing frame, and an exposure of from 35 to 60 seconds is given. The resulting print will give a perfect reproduction of the stamp.



The process is not suitable for use with stamps printed in photogravure, because benzine, even when care is exercised, tends to have a disastrous effect on fugitive printing inks such as are used in the photogravure process.

A Boom in Stamps

That business is improving is a happy fact, and in recent months stamp collecting at least has enjoyed a mild boom. Most of our dealer-advertisers can report increased and increasing sales. Stanley Gibbons Ltd., in fact, are proudly pointing to a hundred per cent. increase for the first quarter of this year.

There is little doubt, however, that the increase is due largely to the much wider interest that is being shown in the hobby. Air mails, photogravure stamps and Jubilee issues have all played a part which, in addition to being good for the stamp dealers, is good for the hobby.

Finnish Folklore Commemoratives

Finland has often been criticised for its penchant for unnecessary stamps, but the interest of its latest issue commemorating the first centennial anniversary of the publication of the *Kalevala*, a collection of Finnish folklore poems, frees it from all possibility of criticism. There are three stamps in the set, 1¼ marks. 2m. and 2½m., and of these the 2m., illustrated here, has a most interesting story to tell.



Väinämöinen, god of the ancient Finns, had captured from Louhi, the goddess of Lapland, the *Sampo*, a vessel having the magical power of bringing prosperity to its possessors. Väinämöinen fled with the *Sampo* in a small galley, and was pursued by Louhi in her fighting galley. She was shipwrecked, but transformed herself into a bird, half-eagle, half-hawk, took on her back and wings her swordsmen, javelin-throwers and archers, and overtaking the Finnish ship swooped down on its mast. She snatched the *Sampo* but the Finnish god struck at her with the tiller oar, causing her to drop the *Sampo*, which was smashed to pieces and ruined. Louhi saved one small part, and the remaining fragments were gathered by Väinämöinen and on his return home were planted in the ground, thus ensuring for ever some degree of wealth to Finland.

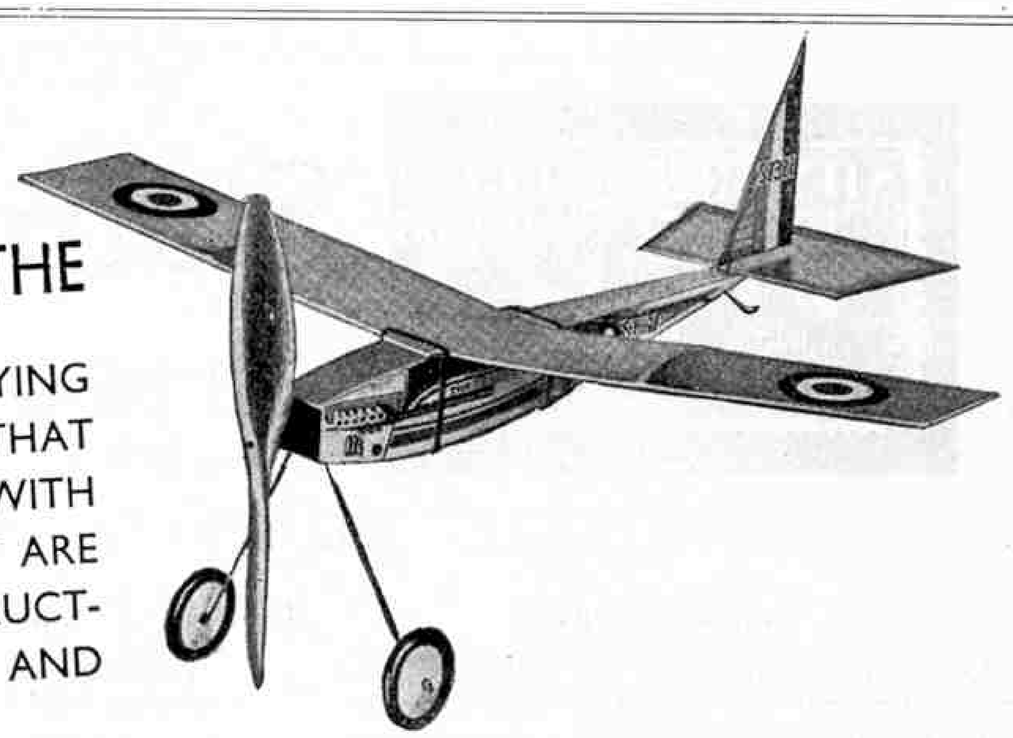
The stamp shows all the features of the story, Louhi perched on the mast of the galley with her javelin-throwers and archers on her wings, while Väinämöinen is striking at her with the tiller oar.

Philippine Pictorials

This month we illustrate two of the striking pictorial stamps issued by the Philippine Islands. The full set comprises 14 stamps with designs as follows: 2c., Dr. J. Rizal; 4c., a native woman with caraboa and rice-stalks; 6c., Filipino girl; 8c. (illustrated), pearl fishing; 10c., Fort Santiago; 12c., salt springs; 16c. (illustrated), Magellan's Landing; 20c., J. de la Cruz; 26c., Rice Terraces; 30c., Blood compact; 1p., Barasoian Church; 2p., Battle of Manila Bay; 4p., Montalban Gorge; 5p., George Washington on White Charger.

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

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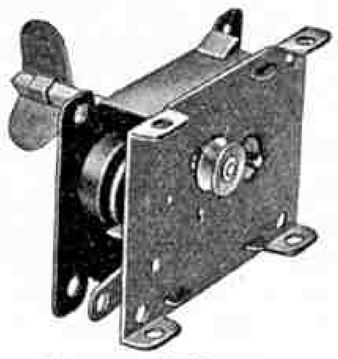
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A fine motor specially designed to drive models made with the new X Series parts. It is non-reversing. Price **2/6**

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This is a reversing motor of super quality. Price **10/-**

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A fine non-reversing motor, having greater power than the 6-volt motors ... ... Price **16/6**

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This is similar to the E20A Motor, but has reversing motion ... ... Price **18/6**

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No. T6 is available for all standard supply voltages, from 100 to 250 inclusive at frequencies of 50 cycles and upwards. Price **17/6**

No. T6a is also available for all standard supply voltages from 100 to 250 inclusive, at all standard frequencies. If required No. T6a Transformer can be wound for frequencies lower than 50 cycles ... ... Price **22/6**

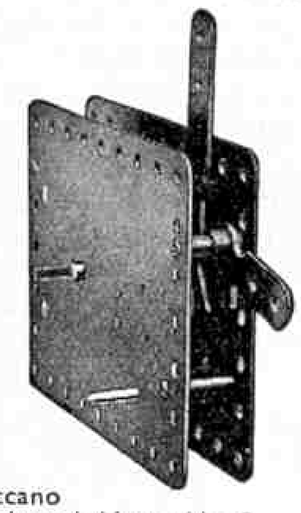
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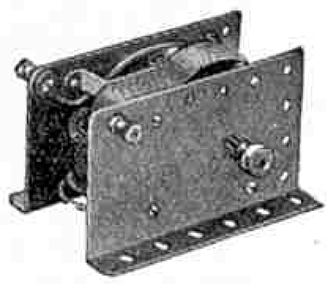
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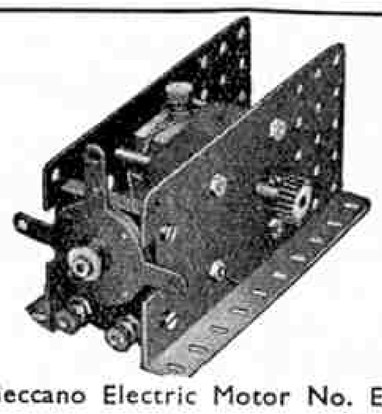
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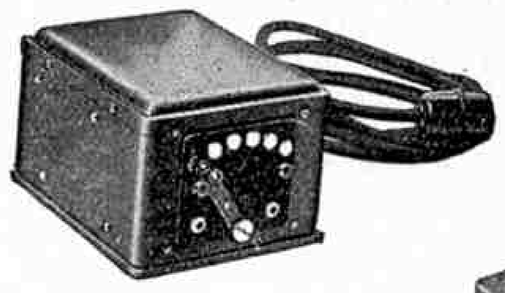
Meccano Clockwork Motor No. 2



Meccano Electric Motor No. E1



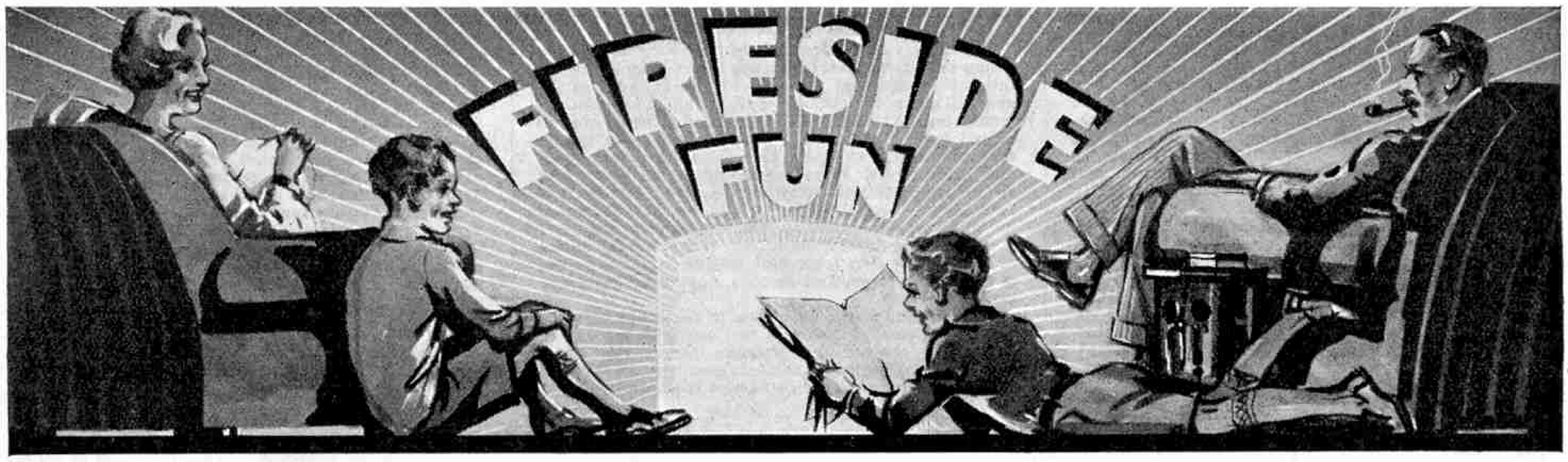
Meccano Electric Motor No. E6



Transformer No. T20



Meccano Steam Engine



NASAL EVIDENCE

Johnny (to chemist): "Please, sir, I want some soap with a very strong smell."

Chemist: "What's the idea, sonny?"

Johnny: "Well, I want mother to know when I've washed my face, so that she won't make me do it all over again!"

* * * *

"Well dad," said Jimmy, the scout, taking his chair at the breakfast table, "I've done my good turn for the day."

"What!" exclaimed his father, "You've been very quick about it. What did you do?"

"It was easy," exclaimed the boy. "I saw old Mr. Brown going for the seven-twenty train, and he was afraid he would miss it, so I let our dog loose and Mr. Brown got to the station in time."

* * * *

Mother: "You must not make all that noise on the stairs—go up again and come down quietly." Betty went up and came down without making a sound.

Mother: "Yes, that is the way a little lady should come down the stairs."

Betty: "Yes, I slid down the bannisters this time."

* * * *

Physician: "What did you operate on Brown for?"

Surgeon: "Three hundred pounds."

Physician: "Yes, I know. But what did the man have?"

Surgeon: "Three hundred pounds."

* * * *

Diner: "What is this leathery stuff?"

Waiter: "Fillet of sole, sir."

Diner: "Well, take it back, and see if you can find me a nice piece of the upper."

* * * *

Hobson: "How do you like radio crooners?"

Jobson: "Dead."

* * * *

Nurse was bringing little Jane home from a party and took her hand as they crossed the road.

"Gracious," she cried, "how sticky your hands are."

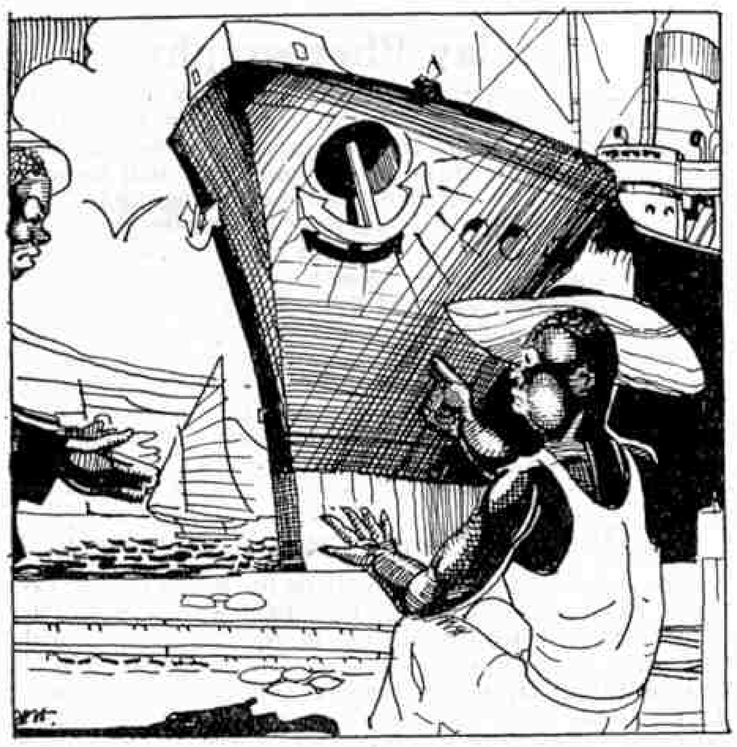
"So would yours be," replied Jane, "if you had two jelly trifles and a chocolate eclair in your pocket. Haven't you ever been to a party, nurse?"

* * * *

Diner (tired of waiting): "Waitress, please find out if your colleague from whom I ordered a steak some time ago is still employed here."

* * * *

WORTH WAITING FOR!



Rastus sat gazing at the mighty anchor that hung at the bows of the liner. He was still gazing when his friend Pete passed for a second time after half an hour.

"What yo' doin' there, Rastus?" asked Pete.

"Ah's waitin' to see de man dat uses dat pick," he replied.

SECRET WRITING

"But, darling, you're using the pen without any ink."

"Yes, mummy, this letter is very confidential."

* * * *

Teacher: "Do people eat whale meat?"

Jimmy: "Yes, teacher."

Teacher: "What is done with the bones?"

Jimmy: "They put them on the side of the plate."

* * * *

Motor Car Salesman: "Are you interested in any particular make of car, sir?"

Pedestrian: "No, I just came in here to enjoy being among a few that I didn't have to jump away from."

* * * *

BE PREPARED!



Patient: "When should I take these pills?"

Doctor: "About an hour before you feel the pain coming on."

* * * *

First theatre-goer: "You have been sitting on my hat. It is ruined."

Second theatre-goer: "I am sorry, but it might have been worse."

"How could it have been worse?"

"I might have been sitting on my own hat."

* * * *

Sergeant: "Did you shave to-day?"

Private: "Yes, sir."

Sergeant: "It was a bad one, if you did."

Private: "I had to shave with a candle."

Sergeant: "I see. Try the effect of a razor in future."

* * * *

Flips: "There are two sides to every question."

Flops: "There are two sides to a sheet of flypaper, but it makes a big difference to the fly which side he chooses."

* * * *

Parker: "What do you think of these cigars? I got them from an airplane pilot."

Hodge: "What does he use them for—sky-writing?"

* * * *

Willie, age nine, came sniffling into the presence of his father. "What's the matter with you?" demanded the parent. Willie stifled a sob. "I've just had a terrible scene with your wife," he replied.

* * * *

Bunce: "Haven't seen you for ages, old man."

Bounce: "I've been in bed for three months."

Bunce: "Sorry to hear that. Flu, I suppose?"

Bounce: "Yes; and crashed!"

* * * *

The soap-box orator was speaking. "It doesn't take me long to make up my mind," he said.

"Of course not," shouted the heckler, "you've such a small stock of material."

THEN HE KNEW

The conjuror's turn had not been going at all well, but he stuck to his task. "Now," he said, "if any lady or gentleman in the audience will oblige me with an egg, I will proceed to perform a really remarkable trick."

There was silence for a moment, and then came a voice from the back of the hall:

"If anybody 'ere 'ad an egg, you'd 'ave 'ad it long ago!"

* * * *

"You must admit that I have plenty of horse sense."

"Well, it certainly isn't human intelligence."

* * * *

"So your boy is going to be a short story teller, is he?"

"I should imagine so; every time he writes it is to say how short he is."

* * * *

Old Man (wandering round book shop): "Let me see, 'Last Days of Pompei'—what did he die of?"

Bookseller: "Some sort of eruption I believe."

* * * *

Teacher: "You are very dirty, Johnny! What would you say if I came to school in that condition?"

Johnny: "Please sir, I'd be too polite to mention it!"

* * * *

Mother: "Now remember, Bertie, there is a ghost in the cupboard where I keep the cake."

Bertie: "Yes you've told me that before, but it's funny you never blame the ghost when there's any cake missing!"

* * * *

First Hiker: "Didn't we leave two chops for this morning's breakfast?"

Second Hiker: "Yes, of course."

First Hiker: "Well, the dog has got away with yours."

* * * *

Mr. Newrich was dining at a fashionable restaurant, and to the manager's horror, he tied his serviette round his neck. A waiter was immediately told to try to make the diner understand that such a thing was not done, but was urged to carry out his task tactfully. He approached the man with an innocent look, and said brightly: "Shave or haircut, sir?"

* * * *

Teacher: "Now Charlie, tell me two minerals that are found in England beside coal and iron?"

Charlie: "Ginger beer and lemonade!"

* * * *

NO AMBITION



"Ye're no goin', Tam?" asked the young fisherman anxiously.

"Aye," replied Tam, "I'm awa' hame. Ma worm's no tryin'."

"Indian Midland" Railway (*Cont. from p. 405*)

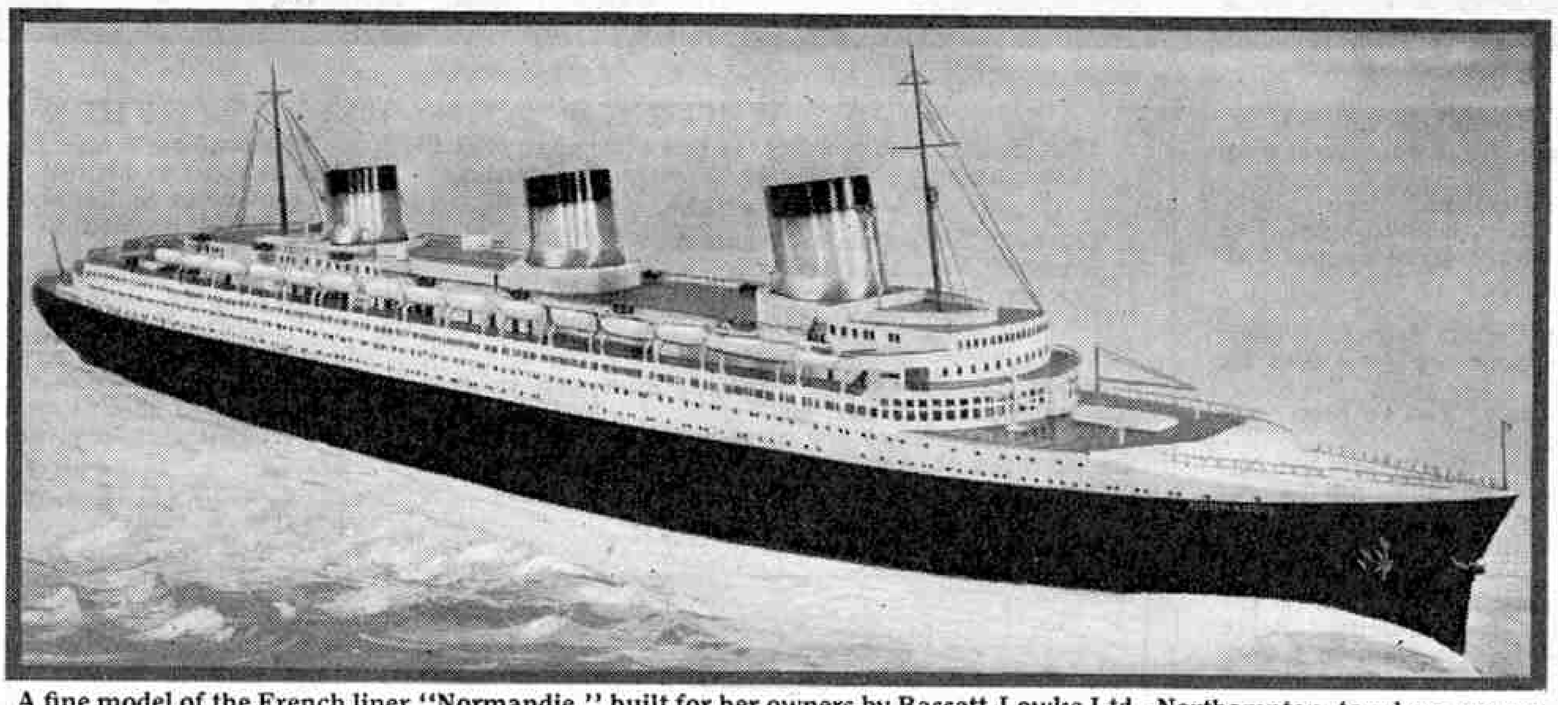
Oil cups for the slide bars, bogie and leading coupled wheel axle-boxes are employed, while a forced-feed system attends to the valves and trailing coupled wheel boxes. The engine carries all the touches of realism peculiar to its prototype No. 1102, whose class is associated especially with the picturesque "Midland" route of the L.M.S.R. on which it originated. The engine burns freely low-grade Central Provinces coals and steams well when so fired. These fuels incidentally facilitate lighting up.

The rolling stock, while not exactly ornate, serves its purpose, and includes four-wheeled wagons of L.M.S.R., G.W.R. and L.N.E.R. ownership. They are fitted with buffers, and screw couplings. The goods brake van, however, conforms to Indian Railway Standard design, and is similarly equipped. It has in addition a wheel-operated hand brake, and a full complement of electric side lamps, oil tail lamp and tail board. "Safety First" and "First Aid" equipment also are included.

Each car has a tare weight of 1¼ cwt., and the brake van of 2¼ cwt. The locomotive weighs 14 cwt., giving a gross load, including the weight of the engine, of almost 2 tons when the train is loaded to capacity with adults. Over the 1 in 100 grades the coal consumption with this load has worked out at about 5 lb. per mile.

A motor trolley is available for the Chief Engineer's inspections. This trolley is equipped with an "Austro-wheel" tow-cycle ½ h.p. petrol engine, which also generates power for the headlight.

Visitors to Jhansi, or from overseas to India for that matter, are enjoined on no account to miss seeing this railway; and the owner extends a personal invitation to all who can spare the time that is required to go over the layout.



A fine model of the French liner "Normandie," built for her owners by Bassett-Lowke Ltd., Northampton, to whom we are indebted for our illustration. The model is 10 ft. 4 in. in length, and its hull was hollowed out by hand to accommodate the internal lighting that illuminates its 1,500 portholes. A special article describing the great liner appears on page 392.

Footplate Runs on L.N.E.R. (*Cont. from p. 401*)

the crossing was most impressive, and then at last, after a careful negotiation of the junctions at Dalmeny, the driver was able to let the engine really go. And go "*Windsor Lad*" did to such effect as to accelerate from 40 to 69 m.p.h. in two miles! On full regulator and 20 per cent. cut-off we kept well above 60 m.p.h. right into the suburbs of Edinburgh, but as we passed Haymarket engine sheds the final slowing up began, and a moment later we entered the tunnel. We emerged into the heart of Edinburgh with the spire of the Scott monument rising above the Princes Street gardens on our left; high above us on the right, crowning the great rock that rises sheer from the railway and forms a natural cutting, was Edinburgh Castle. We ran cautiously through the short Mound tunnel, and so into Waverley station, 59¼ miles from Dundee, in 85 minutes 43 seconds. Thus, in spite of two extra slacks, we were less than a minute late, and our net time of 80½ minutes showed a gain of 4½ minutes on schedule.

It was a fine demonstration of "Super Pacific" ability, and illustrates too the extraordinary difficulties encountered in the working of heavy trains over this route. Seven regular service slacks, of which four are to 25 m.p.h. or less, coupled with the awkward grades that follow them, transform the apparently easy timing of 85 minutes into a booking that demands a first-class locomotive effort. Under these circumstances, to make a net gain of 4½ minutes was clearly an excellent piece of work.

"*Windsor Lad*" was now relieved by another "Pacific," but I did not travel beyond Edinburgh on this trip. Onward to London the train is timed at the usual moderate speed of night expresses, and its haulage demands quite a modest locomotive effort compared with that I had just witnessed.

Margarine Factory (*Continued from page 419*)

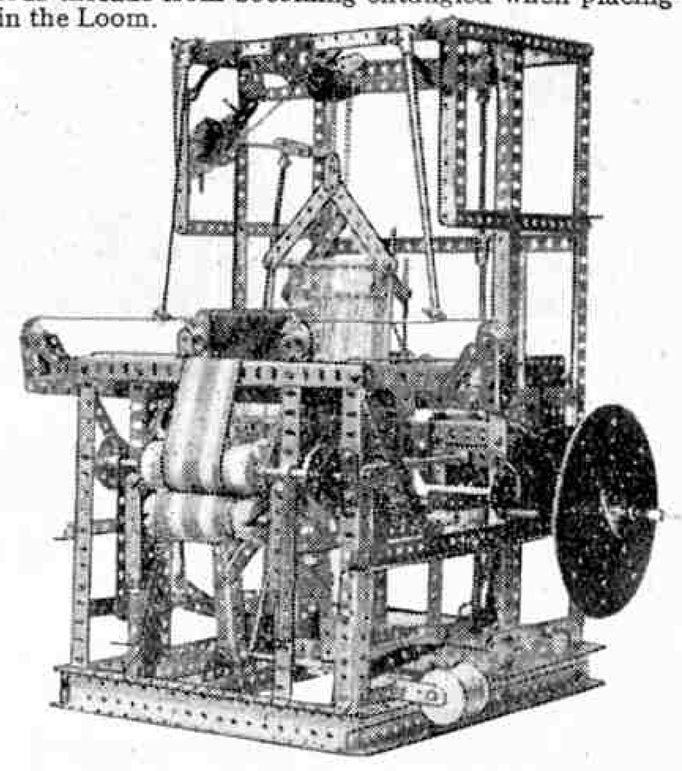
After kneading, the margarine is placed in a large refrigerated storeroom with special ventilating equipment so that it can be withdrawn in bulk for packing as required. High speed machinery cuts, forms, packs and weighs 60 packets or rolls per minute, one machine being adjustable to enable different sizes of packages to be produced for special purposes. Four totally enclosed squirrel cage motors of 1½, 2½, 3 and 3½ h.p. respectively, drive the packing machinery and are controlled by direct-to-line contactor starters.

In addition to the machinery mentioned, several pumps are employed for various purposes, such as conveying emulsion, fat, milk, and ice water, and for circulating cooling water. These are driven by squirrel cage motors from 1 to 6 h.p., those for the milk pumps being totally enclosed. Automatic contactor starters controlled by push buttons are installed for all the motors described, and allow maximum convenience and accessibility to be combined with safe operation by unskilled labour.

A Successful Meccano Loom

The Loom rightly is considered one of the most interesting and attractive of Meccano Super Models, and its intricate design and the need for careful adjustment give full scope for the exercise of the skill of experienced model builders. Different degrees of tension are required for the various movements, and exact timing also is necessary to ensure that these movements shall operate correctly. When the timing has been arranged to the complete satisfaction of the model-builder it is necessary to secure the gears, etc., on their shafts, in order to avoid risk of slip, and the various means of accomplishing this that have been brought to the notice of "*M.M.*" readers from time to time include the use of twin grub screws, flats on rods, duplicated gears and other devices.

Winding the warps evenly on to the beam presents another interesting problem to those who set out to build and operate the Meccano Loom. The usual method of accomplishing this is to comb out the threads, and by careful manœuvring to pass them under a Rod resting in the groove cut in the Wood Roller forming the beam. In actual weaving this operation is carried out by expert beam makers, who have a lifetime of experience in winding warps on to beams. It is not surprising therefore that Meccano model-builders handling a beam for the first time should experience a little difficulty in filling it, and in preventing the various threads from becoming entangled when placing it in the Loom.



A well constructed Loom built by boys of the Highfield Senior School, Liverpool. Interesting features of the model are described in an article in this column.

The usual advice given by expert weavers to beginners is "practice makes perfect," but a Meccano model often is built for only a short period, and this advice then cannot be followed. It was with this point in mind that Mr. Fearon, a master in Highfield Senior School, Liverpool, decided to assist a number of his pupils to construct the Meccano Loom and to embody in the model his own ideas for making it simpler and more efficient. The result of these efforts is the Loom illustrated on this page, with which excellent work has been carried out. When the model was completed it was inspected by one of our staff of expert model-builders, who at once noted the simple but effective means employed to overcome the difficulties usually associated with the Loom.

The first of these improvements is the duplicating of all gears subjected to heavy strain in order to prevent them from slipping on their shafts. Double grub screws are also used. The points where the picking sticks are pivotally secured to their shafts have been strengthened, and the springs operating these are now made to operate direct on the cam tappet arms. The mechanism controlling the return movement of the heald frames also is modified slightly, and the new arrangement is similar to that incorporated in the original Meccano Loom.

When winding the beam, difficulty was experienced in securing all the threads on to the Wood Roller so that they were distributed evenly. This trouble was eventually overcome by gumming all the threads together, with two short lengths of surgical sticking plaster, where they emerged from the reed of the Beaming Frame. From this point winding the beam proved to be a comparatively simple matter, and as it was carried out in relays by pairs of boys, the work of winding on sufficient length of threads for producing about 40 yards of material was accomplished in a very short time.

Useful Books for Scouts

One of the greatest pleasures that the Scout can experience is to camp out in the open, for it is then that he learns to think things out and to act for himself. A camp is not merely an opportunity for an enjoyable adventure, however, and a certain amount of careful organisation and preparation is necessary in order to ensure its success. "*Week-end Camps and Hikes*," by C. H. Young (Brown, Son and Ferguson Ltd., 1/6 net) will lighten the burden of Patrol Leaders who adopt this type of open-air life, and also will serve to introduce the novice to the responsibilities and joys of camp life.

As the title indicates, the author has in mind the small camp for a single patrol, or even for two or three Scouts. His book is intended chiefly for those who start off in small numbers for a week end camp or hike, either on foot, with or without a trek cart, or on bicycles, and deals fully with the selection of equipment, the choice of sites and the layout of camps. Special attention is given to camp routine, and also to cooking, on which success largely depends.

Woodcraft and nature study rightly are regarded as important in the training of a Scout, and camp life offers particularly good opportunities for those who wish to pass the tests for their Naturalist's Badge, or to give reign to their deep interest in nature generally. A complete record of observations is essential, however, and this can best be kept with the aid of a properly drawn-up note book, such as the "*Woodcraft Note Book*," (Brown, Son and Ferguson Ltd., 6d. net). In form this is a nature diary with sections in which birds and other creatures seen may be noted, and records kept of trees, wild flowers, ferns and grasses.

Another useful book for Scouts issued by the same publishers is "*The Gateway to All the Scout Tests*," 6d. net. This has been compiled by a District Commissioner, and is divided into sections intended respectively for the tenderfoot, and for those who wish to secure second and first class badges. Each of the tests that a Scout must pass in order to achieve these aims is dealt with separately, and practical suggestions are made as to the best means of preparing for them.

Holiday Photography

A holiday without a camera would be incomplete for many readers of the "*M.M.*," and any hints that will enable them to use their cameras to the best advantage during the holiday season naturally will be welcomed. A booklet entitled "*Holiday Photography*" has just been issued for this purpose by Burroughs Wellcome and Co. In it the amateur photographer is conducted on an imaginary motor tour during which a roll of film is exposed on eight different types of subjects, and the reasons for the differing exposures are carefully explained. Development and printing also are explained with appropriate detail. The booklet is attractively produced and illustrated, and copies can be obtained free by "*M.M.*" readers on application to Burroughs Wellcome and Co., Snow Hill Buildings, London, E.C.1.

A Motor Car Racing Record

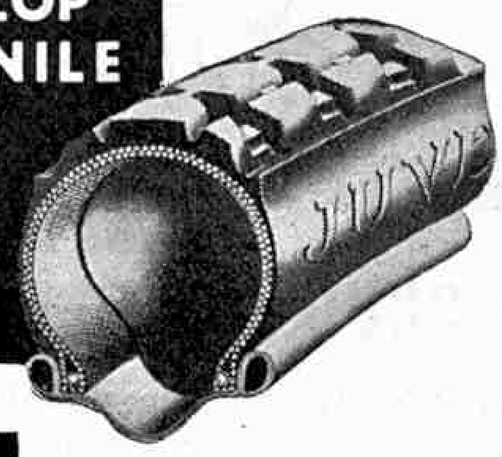
The year 1934 was a record one for the M.G. Car Co. Ltd., the well-known firm that has done so much to uphold British prestige in the motor car racing world. In order to commemorate the achievements of M.G. cars and their drivers during that year in hill climbs and in races on road and track at home and abroad, a pictorial record of outstanding successes has been produced in the form of a booklet under the title of "*Supremacy*." This is well illustrated by means of photographs reproduced in colour by a new process, and readers of the "*M.M.*" can obtain copies free on application to the Publicity Department, The M.G. Car Co. Ltd., Abingdon-on-Thames.

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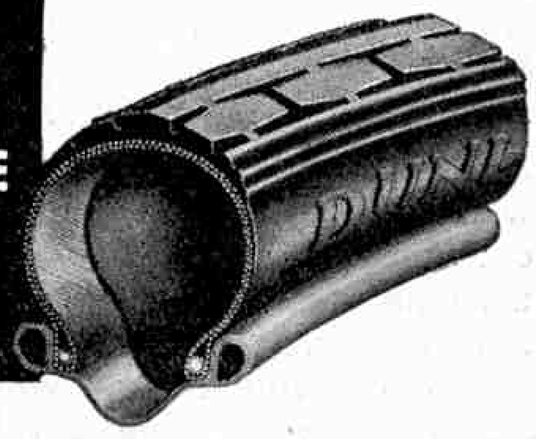
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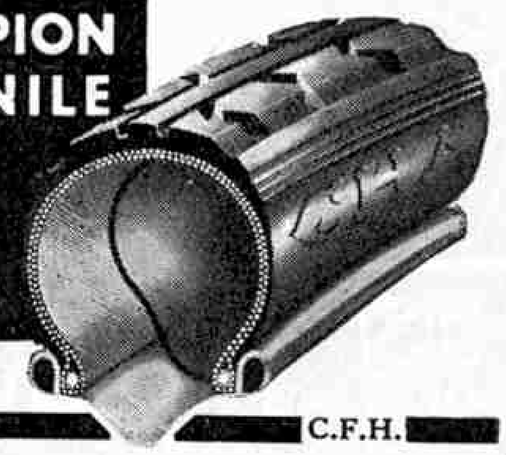
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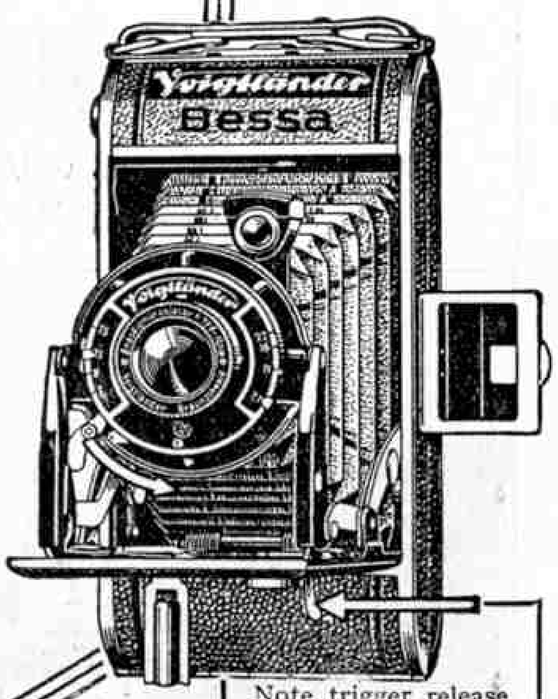
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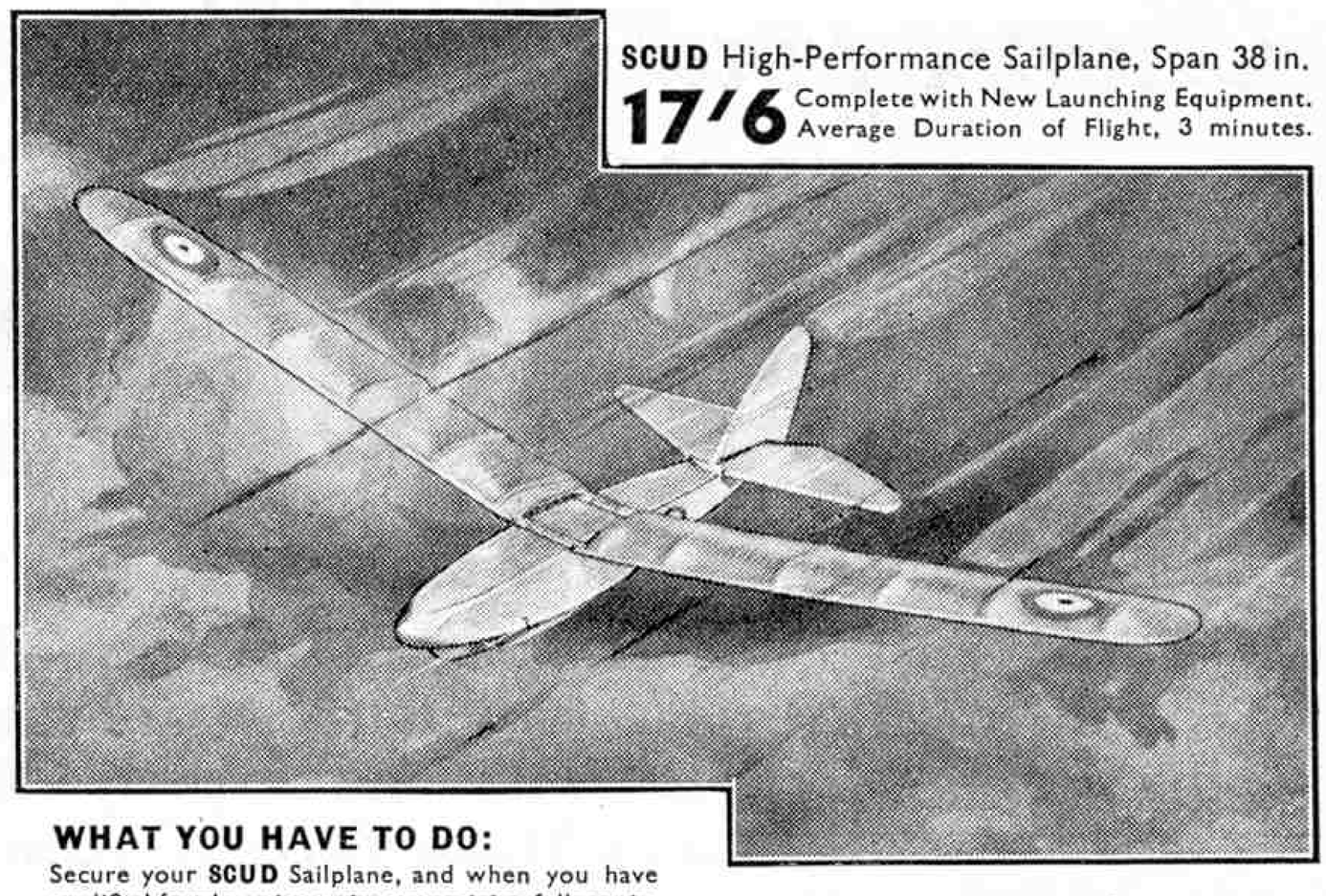
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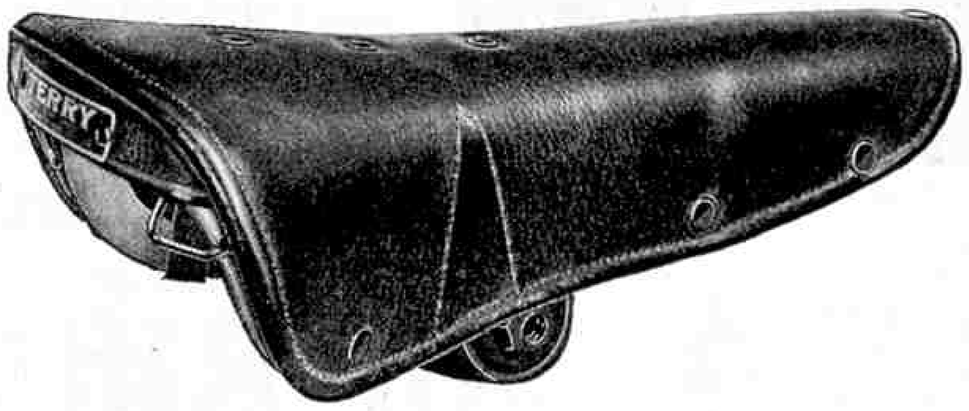
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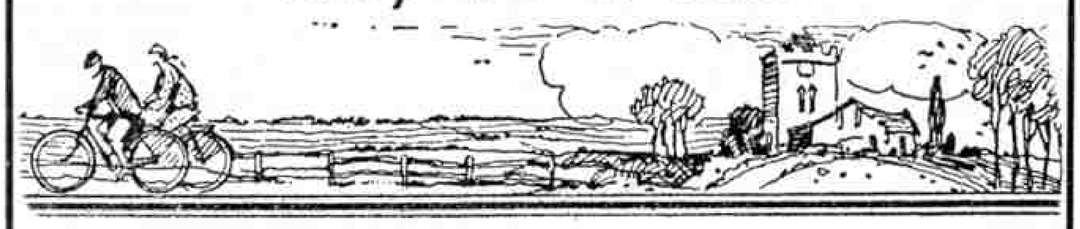


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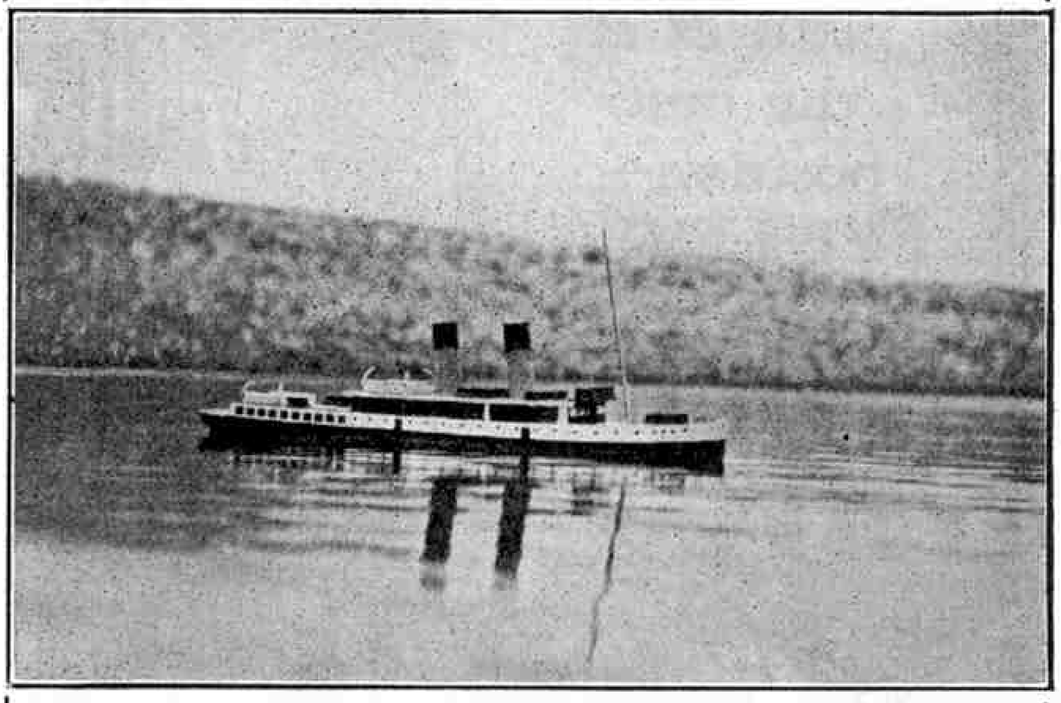
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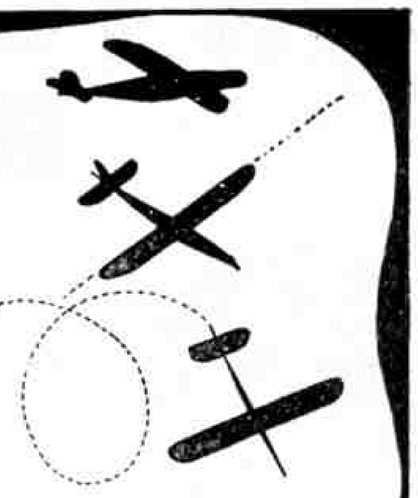
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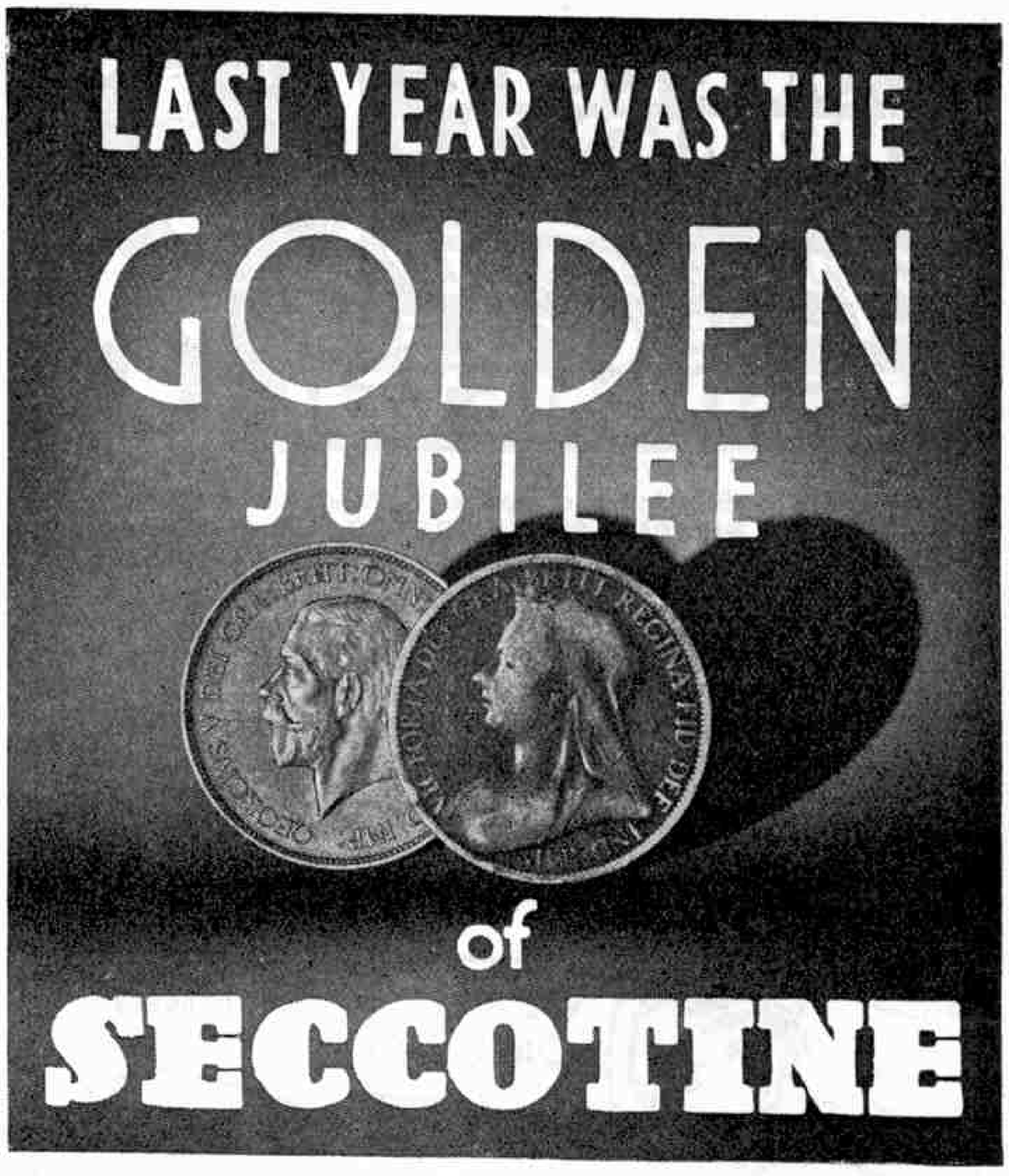
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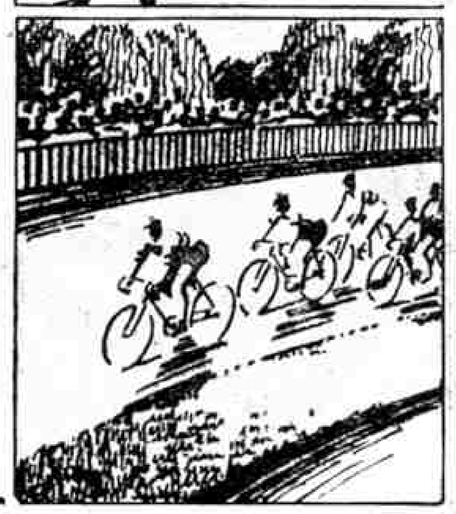


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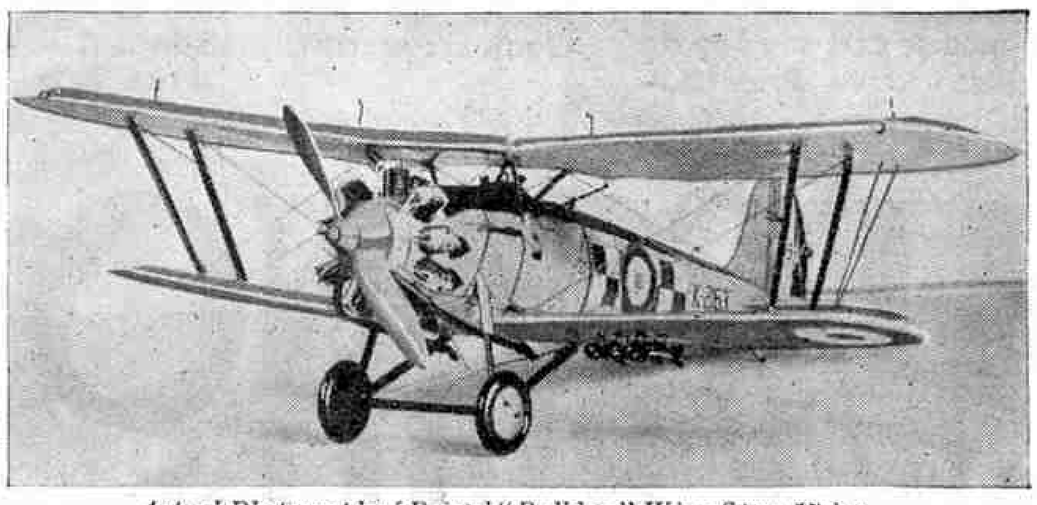
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The booklet is obtainable (Price 3d.) from any Meccano dealer, or (Price 4d.) post free, direct from

MECCANO LIMITED
Binns Road, Liverpool 13

"KEELBILD" SCALE FLYING MODEL CONSTRUCTION SETS

are not "Cheap," they are good, but they are cheap because they are so good.

No other Models fly so well, or are so strong. The "Keelbild" System and the well-known "Model Shop" quality of materials ensure success, every time.



Don't be misled by distances. Duration is the only reliable criterion, and you can depend on your "Keelbild" Model to give 45 sec. flights with ease.

Mod. HAWKER "SUPER FURY" 22" span (illus.) 10/6
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Postage U.K., 9d. per set. Abroad, 2/6 per set.

PLEASE LOOK OUT FOR SPECIAL ANNOUNCEMENT NEXT MONTH.

THE MODEL SHOP, 3, College Road, Barras Bridge, Newcastle-upon-Tyne, 2.

Illustrated Catalogue—2d. Post Free.



A Fascinating Pastime for Boys and Girls

The new Meccano Dinky Builder Outfits are ideal for all young boys and girls who are interested in model-building. The parts, tastefully enamelled in jade green and salmon pink, are fitted together in the most simple manner without the use of any nuts and bolts, giving results that are attractive and of exceptional interest. Two Outfits are available: No. 1 for general construction, including wheel toys, and No. 2 for making groups of miniature furniture. A brightly coloured Instruction Folder, that shows how extremely interesting and ingenious are the models that can be built, is included with each Outfit.

Your dealer will be pleased to show you these fine new Meccano Dinky Builder Outfits.

No. 1 Dinky Builder Outfit

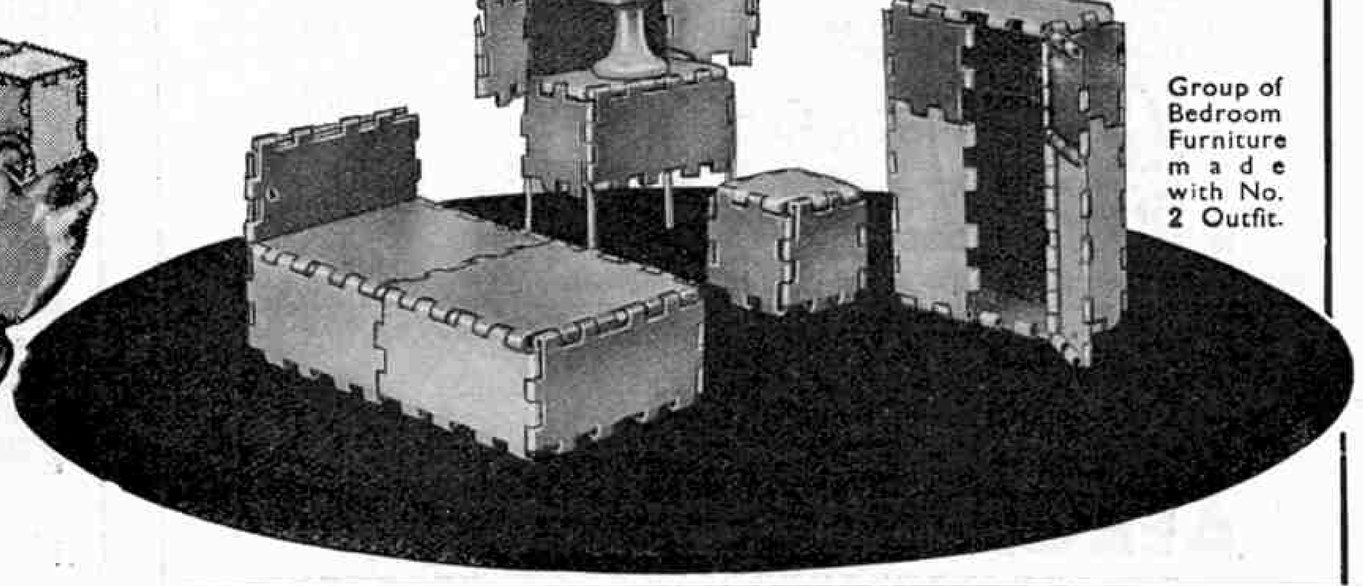
This Outfit contains a good selection of parts with which a large number of models can be made. It includes two trees on die-cast stands that lend the correct atmosphere to models of farm buildings, churches, etc. A further attraction is the wheels, finished in blue with white tyres, for constructing miniature wheel toys. The beautifully coloured instruction leaflet included in the Outfit illustrates a total of 44 models that any boy or girl can build. Price **5/-**

No. 2 Dinky Builder Outfit

The No. 2 Dinky Builder Outfit contains a wide selection of parts primarily intended for the construction of realistic groups of miniature modern furniture. The small table lamp and shade that are included add greatly to the realism of these groups, particularly as the lamp can be lighted from an ordinary flash lamp battery. The coloured instruction leaflet gives examples of 7 furniture groups, but to an enthusiastic model builder the possibilities of the Outfit are practically inexhaustible. Price **7/6**

MECCANO DINKY BUILDER

Manufactured by Meccano Limited, Binns Road, Liverpool 13



Group of Bedroom Furniture made with No. 2 Outfit.



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can now be obtained.
CIVIL, 208 letters ... ... Price **1**/–
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OUR LATEST MODELS–
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B.E.2.c. ... ... } **2/6** each

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SKYBIRD LEAGUE

MAKE MODEL AEROPLANE CONSTRUCTION EASY

This fascinating hobby has captured the imagination of air-minded men everywhere. No other model aeroplanes can compare with these beautifully made, easily constructed machines.
The components are wood, metal and celluloid, precision made—true to scale (1/72)—and perfectly finished. Start your collection to-day!
Write for list of Models and **Accessories.**

Join THE SKYBIRD LEAGUE, the League of Aeroplane Modellers—read "THE SKYBIRD," the only British Magazine for the Air-Minded. From any SKYBIRD AGENT OR BOOKSELLER price 6d., or direct from address below, post free 7d.

SHIPSERIES

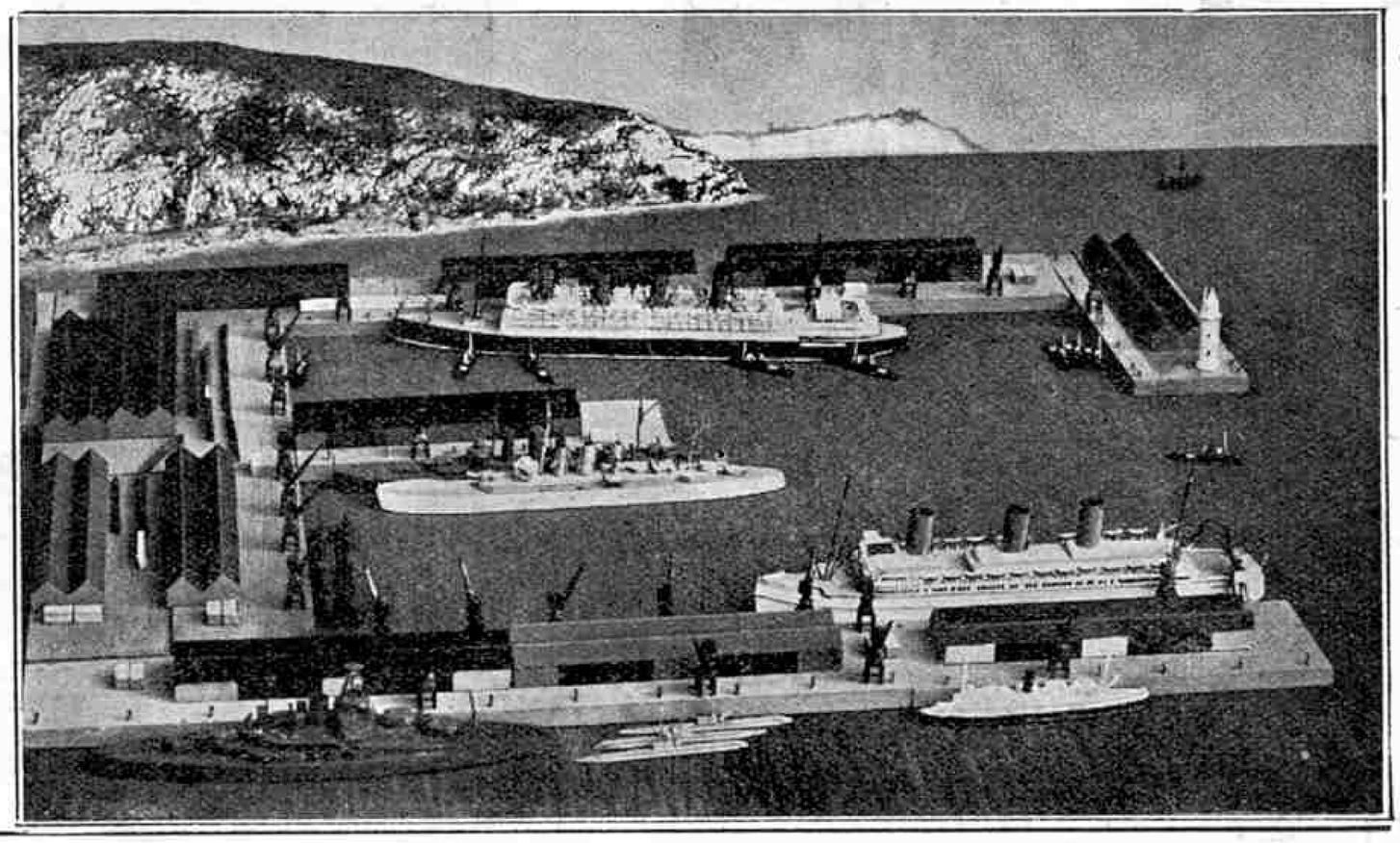
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Constructive Waterline Models of Famous Ships.
Scale 100 feet equals 1 inch.

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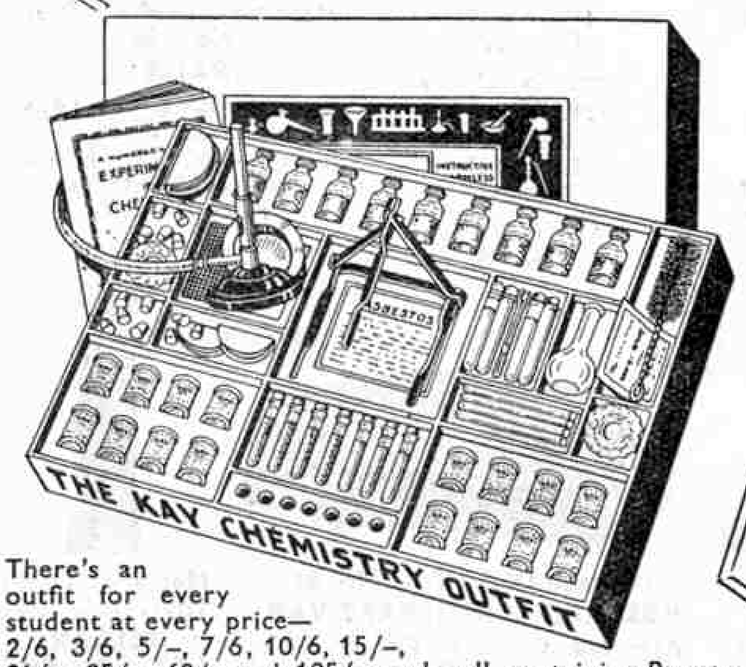
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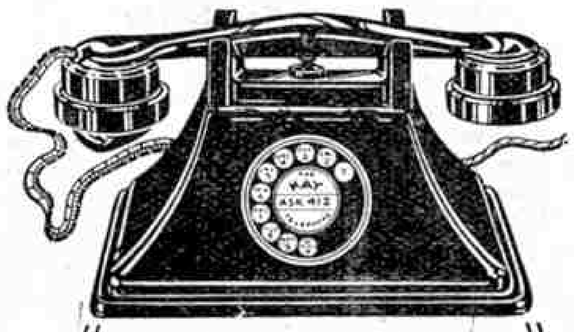
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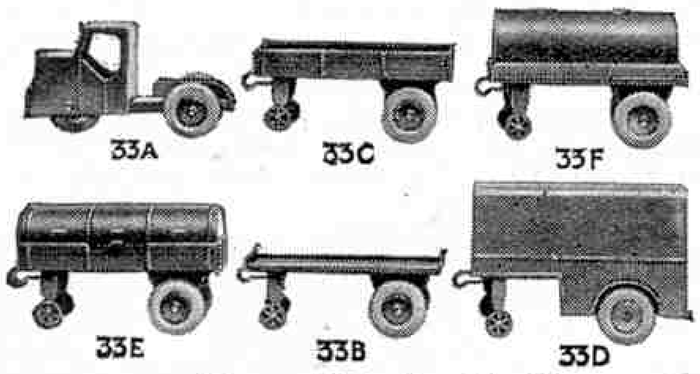
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A fascinating collecting hobby

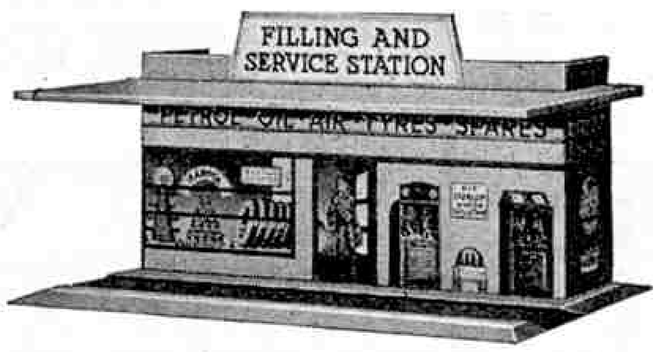


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Fitted with rubber tyres

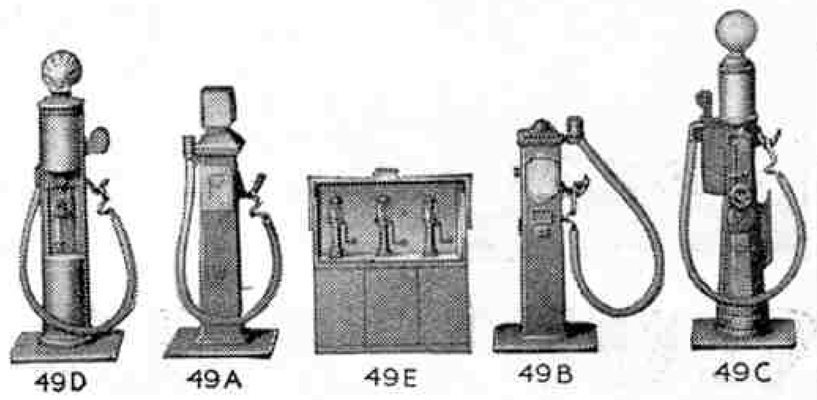
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150 Varieties



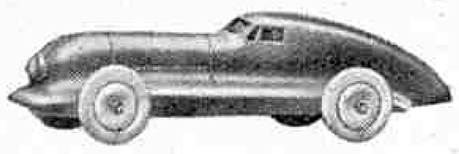
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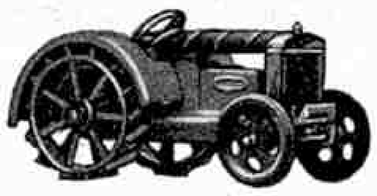
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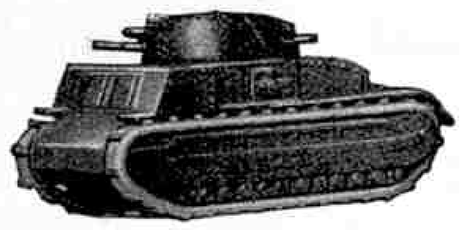
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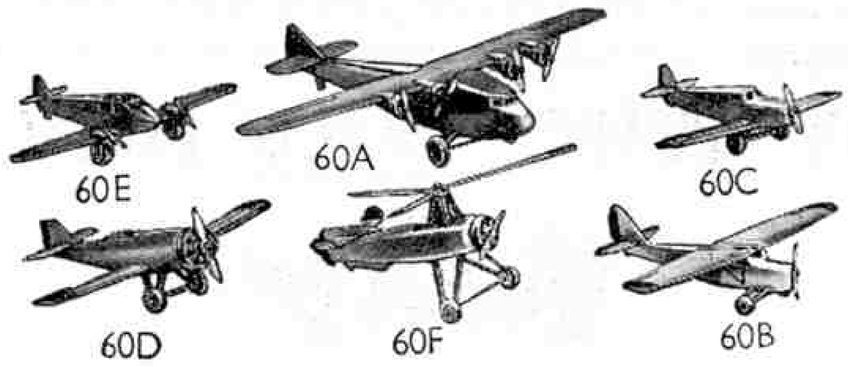
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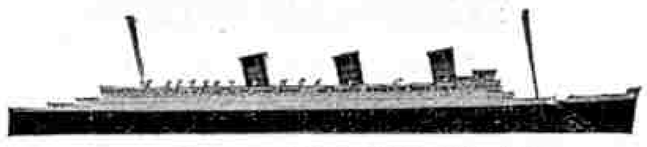
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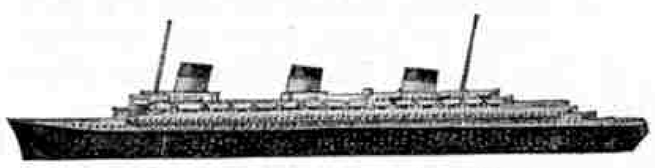
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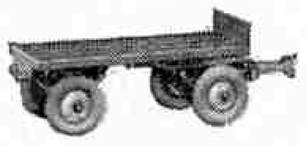


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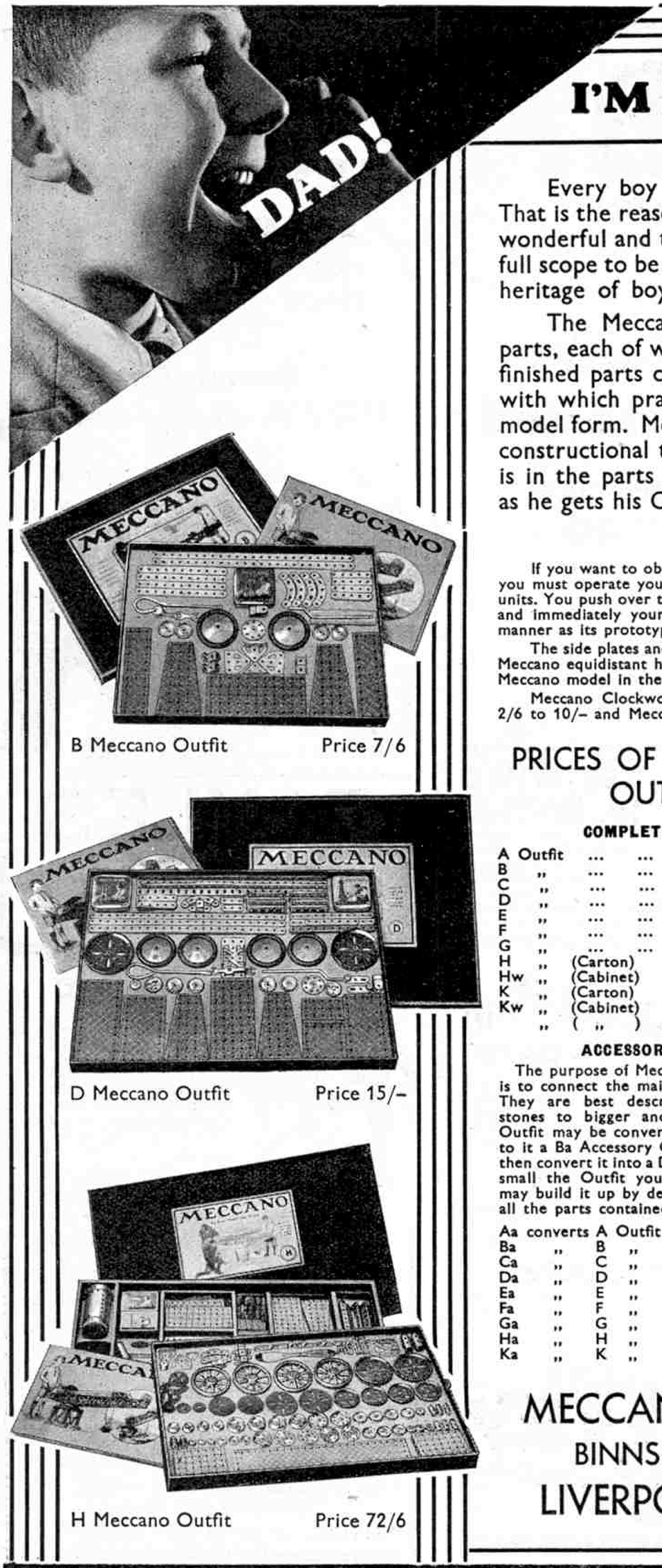


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B Meccano Outfit Price 7/6

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Every boy is happiest when he is inventing, creating and building. That is the reason for the everlasting popularity of Meccano. It is the most wonderful and the most fascinating hobby in the world, because it enables full scope to be given to all the inclinations and desires that are the natural heritage of boys.

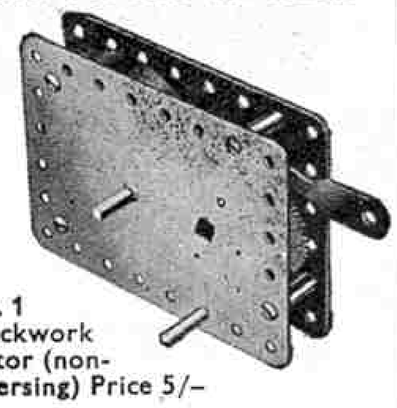
The Meccano system is composed of approximately 300 different parts, each of which serves a definite mechanical purpose. These perfectly finished parts combine to form a complete miniature engineering system with which practically any mechanical movement may be reproduced in model form. More can be accomplished with Meccano than with any other constructional toy, for no other system has such possibilities. The genius is in the parts and the youngest boy can begin to build Models as soon as he gets his Outfit home.

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If you want to obtain the fullest enjoyment from the Meccano hobby you must operate your models by means of one of the Meccano power units. You push over the control lever of the clockwork or electric motor and immediately your model commences to work in exactly the same manner as its prototype in real life.

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No. 1 Clockwork Motor (non-reversing) Price 5/-

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C	,,	...	...	...	...	,,	10/-
D	,,	...	...	...	...	,,	15/-
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ACCESSORY OUTFITS

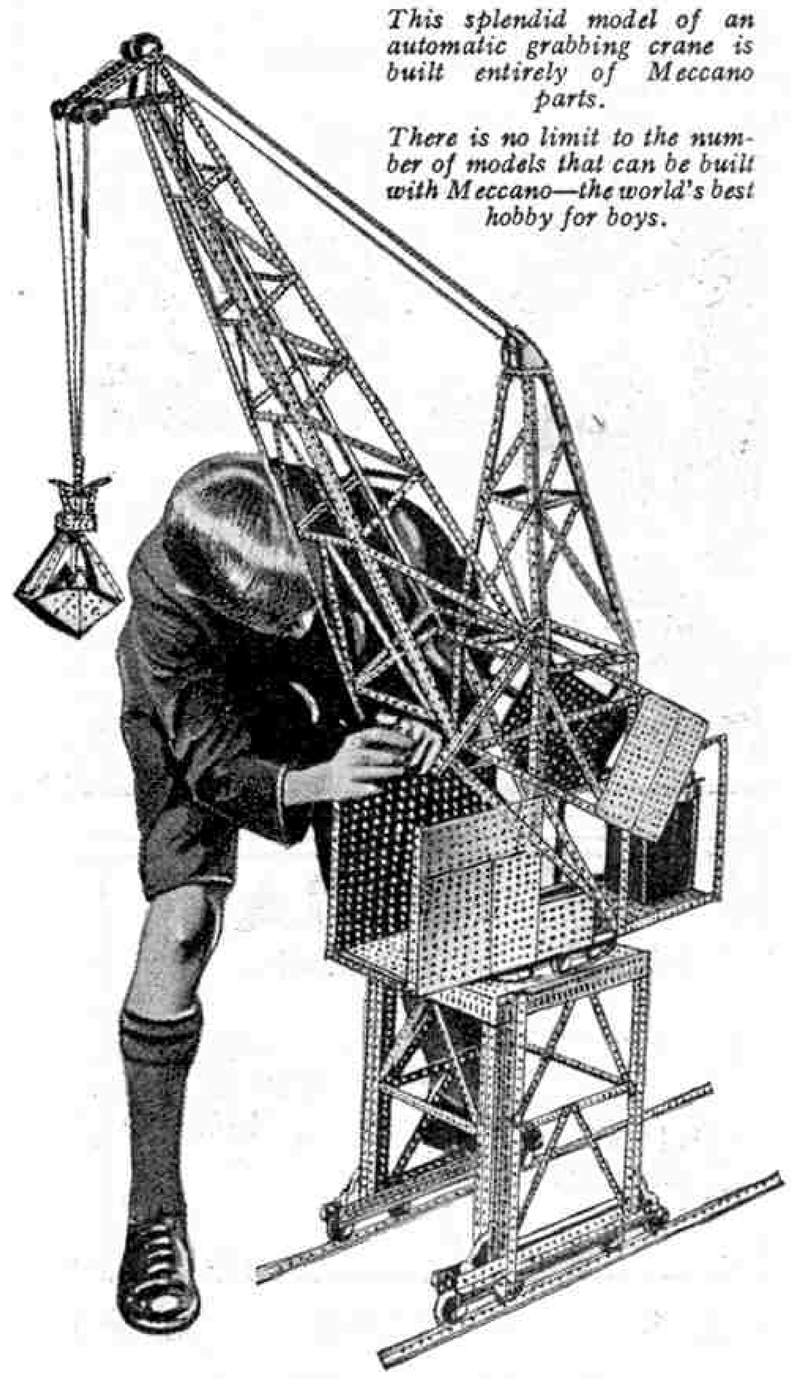
The purpose of Meccano Accessory Outfits is to connect the main Outfits from A to L. They are best described as the stepping stones to bigger and better models. A B Outfit may be converted into a C by adding to it a Ba Accessory Outfit, and a Ca would then convert it into a D. Thus, no matter how small the Outfit you commence with, you may build it up by degrees until you possess all the parts contained in the largest Outfit.

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Ca	,,	C	,,	,,	D	...	,,	5/6
Da	,,	D	,,	,,	E	...	,,	5/6
Ea	,,	E	,,	,,	F	...	,,	11/-
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Ha	,,	H	,,	,,	K	...	,,	60/-
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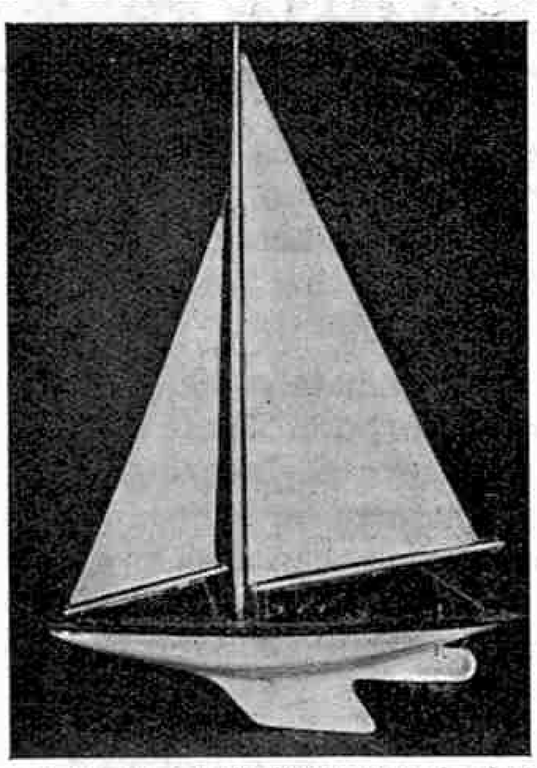
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There is no limit to the number of models that can be built with Meccano—the world's best hobby for boys.



MECCANO

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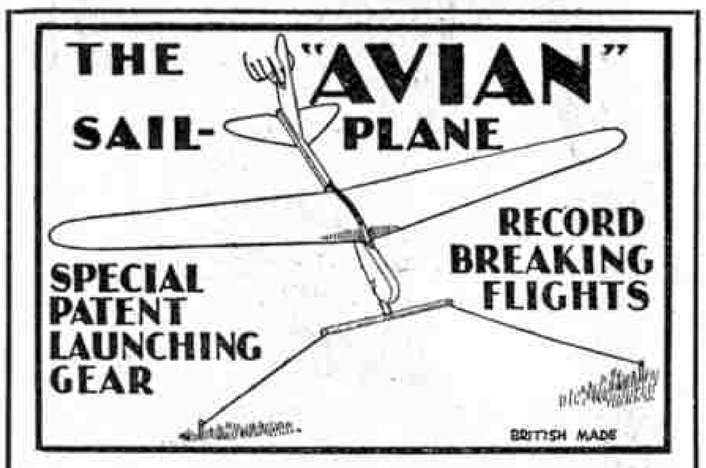


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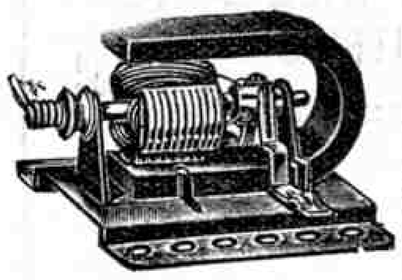
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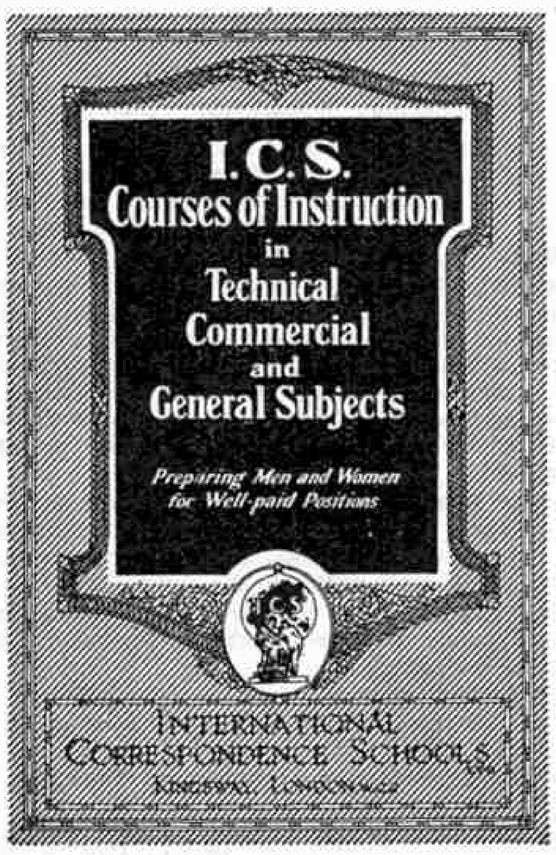
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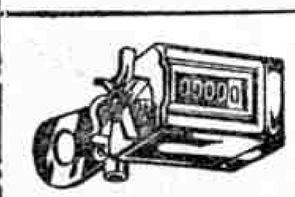
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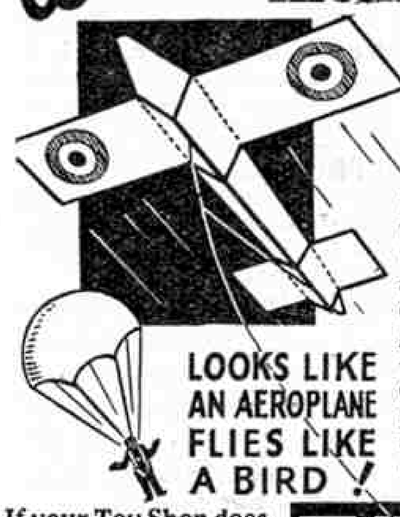
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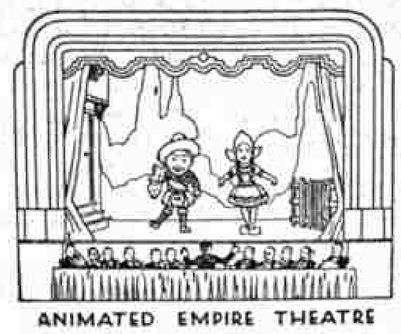


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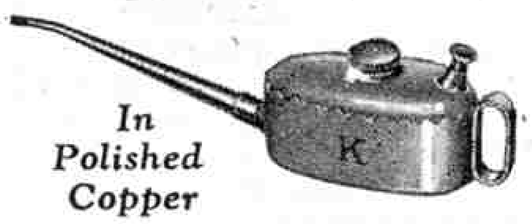
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Meccano Ltd., Binns Road, Liverpool 13.

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Stamp Advertisements (Continued from page 436)

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Meccano Ltd., Binns Road, Liverpool 13.

MECCANO MAGAZINE

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

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

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

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

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

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

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

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

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

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

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Readers Overseas and in foreign countries may order the "*Meccano Magazine*" from regular Meccano dealers or direct from this office. The price and subscription rates are as above, except in the cases of Australia, where the price is 1/2 per copy (postage extra), and the subscription rates 8/– for six months and 16/– for 12 months (post free); Canada, where the price is 10c. per copy, and the subscription rates 65c. for six months, and $1.25 for 12 months (post paid).

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

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

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NEW ZEALAND: Models Limited, Third Floor, Paykel's Buildings, 9, Anzac Avenue (P.O. Box 129), Auckland, C.1.
SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), 142, Market Street, Johannesburg.
INDIA: Karachi: Daryanamal and Bros., Elphinstone Street, Bombay; Bombay Sports Depot, Dhobi Talao. Calcutta: Bombay Sports Depot, 2, Lindsay Street.

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

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Model of a Standard Light Biplane built with No. 1 Aeroplane Outfit.



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Binns Road
LIVERPOOL 13



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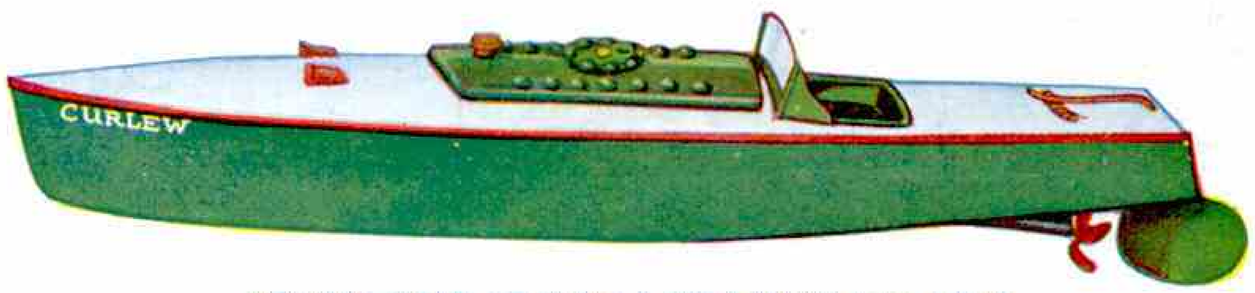
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HORNBY SPEED BOAT No. 1. "HAWK." Price **2/11**
Travels over 100 ft. on one winding. Dimensions: Length 9¼ in. Beam 3 in.



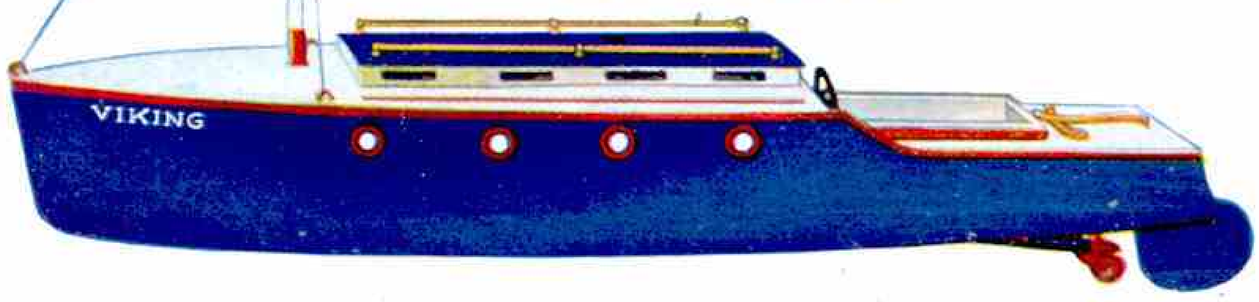
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HORNBY SPEED BOAT CLUB

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