MECCANO® Magazine

OCTOBER 1970

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MAP HOBBY MAGAZINE

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★ DINKY TOY NEWS ★
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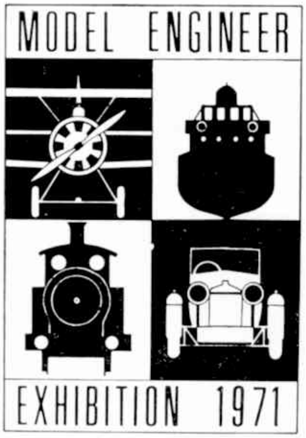
THE PRACTICAL BOY'S LEISURE TIME MAGAZINE



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Model Boats, Cars Aircraft, Locomotives Traction Engines Military Models Crafts

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★ CAR RACING CIRCUIT
★ MODEL STEAM PLOUGHING

29th DECEMBER 1970 TO 9th JANUARY 1971

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COMPETITORS

Your entries are now invited. Entry Forms on request. £300 in prizes . . . some 30 cups, trophies and other awards. Championship Cups for permanent retention. A win confers "Expert Status!"

ENTRY CLASSES

Examples of every form of modelmaking activity can be entered. Model engineering masterpieces such as locomotives, traction engines, aircraft, boats, cars . . . or simple plastic creations . . . there is a class for you. New classes this show will include Military Models (six classes) and Craft entries (Furniture, glass fibre, etc.).

SEE & BUY

Full model trade support with well stocked stands. Stands have been taken by Beatties of London, Model Hobby Consortium, Myfords Ltd., Graham Farish Group Sales Ltd., The Turntable, Kennions, Traction Engine Enterprises, Wall Models, Historex, Mainstream Productions Ltd., Faller, Plaistow Pictorial . . . with others to follow. . . .

SPECIAL ATTRACTIONS

Last year's popular pool with working space around will be there again—located in the centre of the main hall. Aircraft will again be showing their paces above the pool. Boats will be available for visitors to try. . . . The Society of Model & Experimental Engineers will be operating their famous passenger carrying model steam locomotives—some wonderful models at work under the direction as ever of Mr. Bill Carter. Other models under compressed air in action.

NEW! A demonstration of steam ploughing by model traction engines (Even better than when shown on TV!) The ECRA Championship car circuit (a little tight for room last year) moves into a larger hall. Longer track, more spectator space. Jock Thin and Dick Smith welcome you again. Other new attractions will include model soldiers, guns, dioramas. Display of woodwork and craft items. Demonstrations of various kinds. Small lecture theatre for film shows, model subject talks.

SOUVENIR GUIDE

Another CHRISTMAS EXTRA issue of *Model Engineer* will be coming out 2nd Friday in December with entries, trade stands, articles galore to assist the visitor and solace the stay-at-home.

PRIZE POOL ALLOCATION

Classes attracting six or more entries will enjoy prizes to value of 1st £5; 2nd £3; 3rd £1. With over 12 entries 1st £7; 2nd £4; 3rd £2; 4th £1. Classes under six will have 1st & 2nd only, or at discretion of the judges may be combined with other classes.

ENTRIES' CLOSING DATE

All entries must be made by October 19th, 1970.

TICKETS:

Pre-booking concessions. Parties (10 and under), Adult, 4/6; Child, 2/6d. (More than 10), Adult, 4/-; Child 2/-. Teachers i/c parties, free—one per 10 in party. Paybox Admission: Adult, 5/-; Child, 3/-.

Enquiries for Competition Entry Forms, Trade Stands to EXHIBITION MANAGER, M.A.P. Ltd. 13/35 BRIDGE STREET, HEMEL HEMPSTEAD, HERTS.

MECCANO® Magazine

OCTOBER 1970 VOLUME 55 NUMBER 10
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MAP **HOBBY MAGAZINE**

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FRONT COVER

Subject for this month's cover is the splendid new three-wheeled 'Bond Bug,' a speedy futuristic car which was loaned to the staff for a week during the middle of last month. More photos and gen in the centre of this issue. Oh ! and the pretty young lady just about to go for a run is Marion Jones, one of our favourite members of the staff.

NEXT MONTH

'Top features-a-plenty' sums up nicely the line up in store for readers in the November issue of Meccano Magazine.

Last month saw the conclusion of a true-life adventure series on a group of young students who crossed the Sahara Desert, and, in this issue a new contributor to our pages, M. Bull, tells readers all about this remarkable place in detail, backed by a selection of excellent photographs.

Still with the adventure theme in mind, a top line article by yet another new contributor, F. Wiggen, telling readers all about the Navy's only ice-patrol ship, the *Endurance*.

Other features in the issue include the regulars, Air News, Battle, Dinky Toy News, etc., plus, of course, the Meccano Construction features.

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CONTENTS

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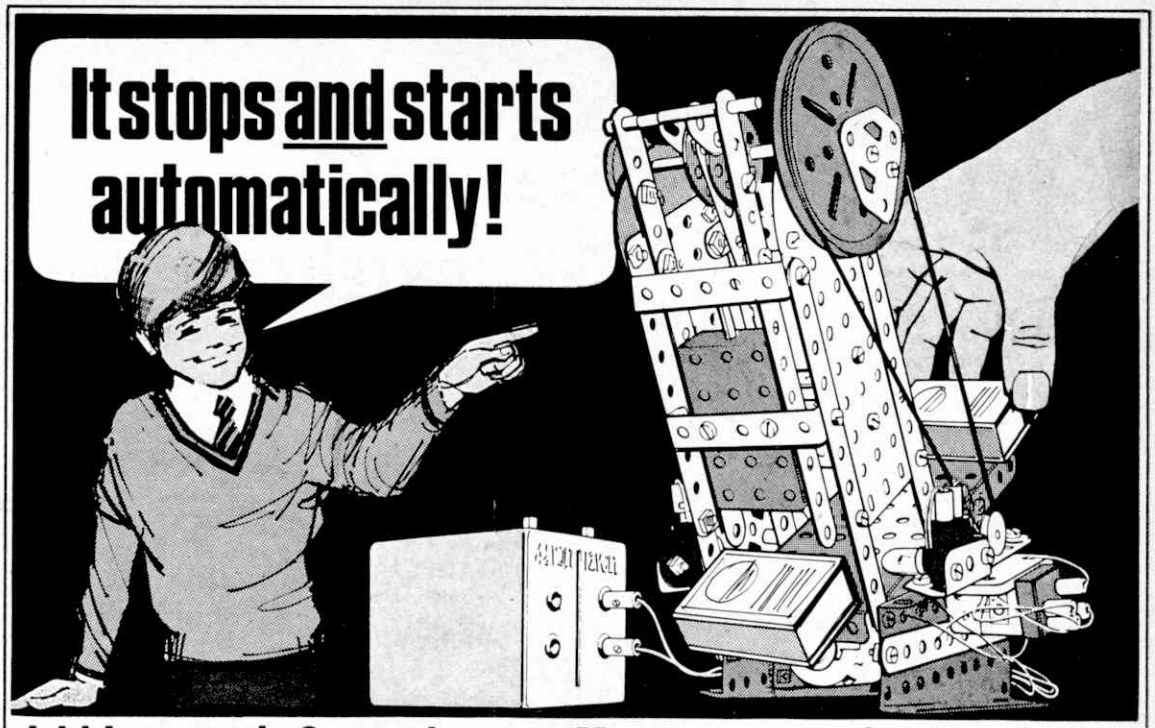
NEW MECCANO NEWS



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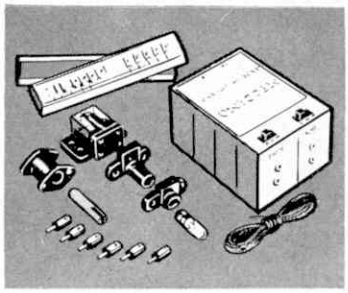
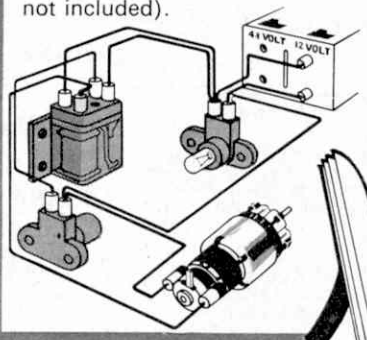
Add this exciting electronic accessory set to your existing sets and control your motorised models automatically.

With a photo-electric cell you can add a new 'computer-age' look and action to your model-making.



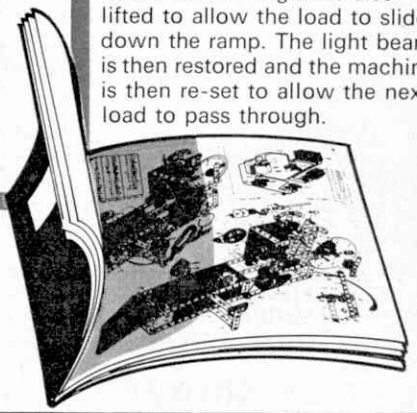
Electronic Control

This set includes a battery control box, an electronic eye that acts as an automatic switch, a relay, solenoid, bulb holder, plugs and wire. (motor not included).



See how Electronic Control works with the Automatic press

The load for pressing is slid down the ramp breaking a light beam as it arrives in position under the press tool. As the beam is broken the motor starts and the press tool descends upon the load, held in place by the metal retaining gate.
As the press tool is automatically raised the metal gate is also lifted to allow the load to slide down the ramp. The light beam is then restored and the machine is then re-set to allow the next load to pass through.



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We are happy to announce that our already well-known third party insurance for readers has now been increased to offer indemnity of £100,000! This magnificent insurance scheme, which covers modelling activities within Great Britain, Northern Ireland, Channel Islands and the Isle of Man, has been negotiated with a leading insurance company. It is sufficiently embracing to cover all forms of model activity. It is equally applicable to free flight models, control line models, radio control models, aircraft, boats, cars and locomotives.

All that is necessary for you to do to obtain the benefits of this magnificent cover is to complete the forms at the right of this announcement, sending part II to us together with your remittance of 5/-, which covers you for one year, and handing part I to your usual magazine supplier. Whether or not you already have an order in hand for the regular supply of your magazine, this form should still be handed in and your dealer will adjust his requirements according to whether you are a new customer or merely continuing your old arrangement.

This insurance is the prudent thing for every modeller to take out, but it is a sad fact that until now, although the governing bodies of the hobby have offered this cover to their members, something like 90 per cent. of the modellers in the U.K. have never taken up this opportunity and are operating 'without insurance protection'. By joining M.A.P. 'Modellers' Accident Protection' you come into the world's BIGGEST MODEL CLUB. For your initial subscription you obtain a lapel badge for identification and transfers to put on your model.

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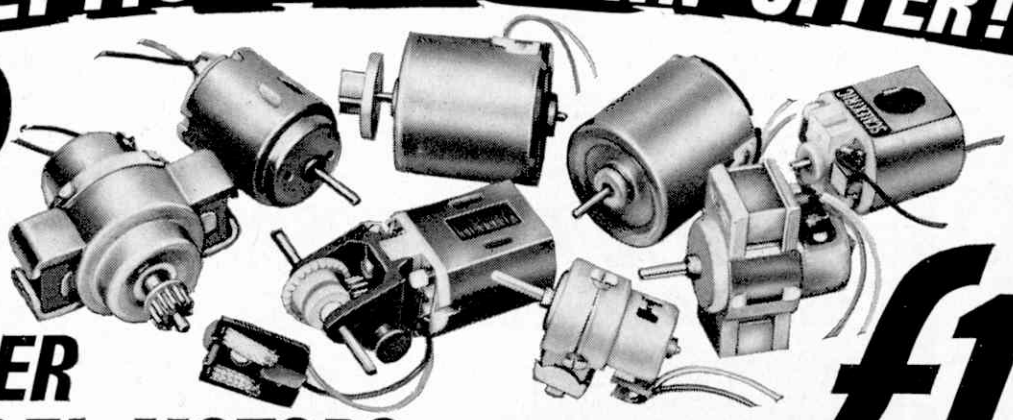

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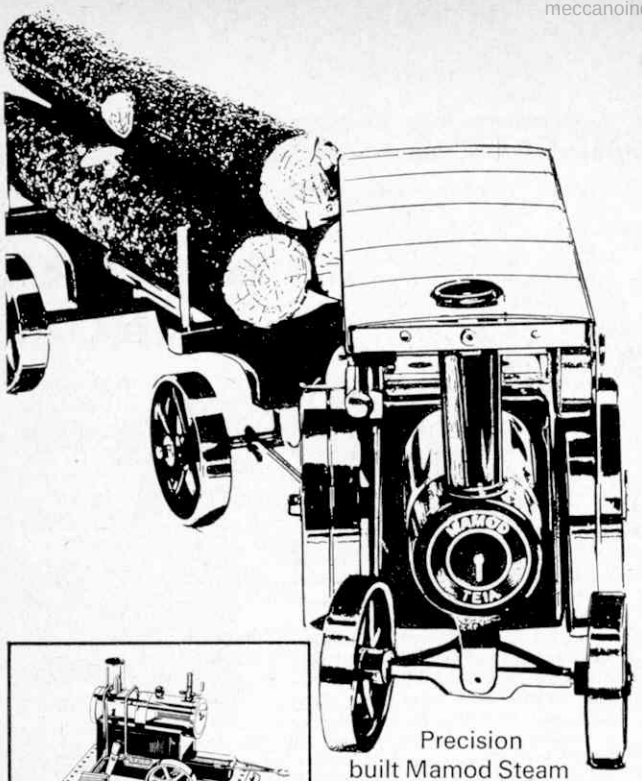

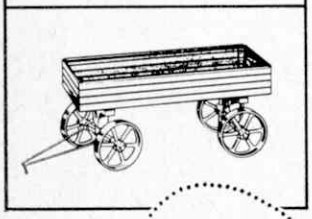

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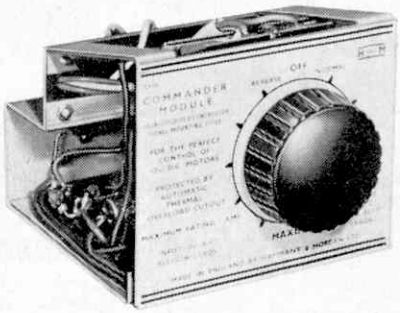

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Do-It-Yourself Exhibition

Practically minded readers living in the London area may be interested to hear that opening at Olympia on the 28th of August and running for 14 days is the annually held "Do-It-Yourself" Exhibition.

Over 200 exhibitors will be displaying their products and from past experience I can vouch that anyone who makes the necessary journey will find it well worth while.

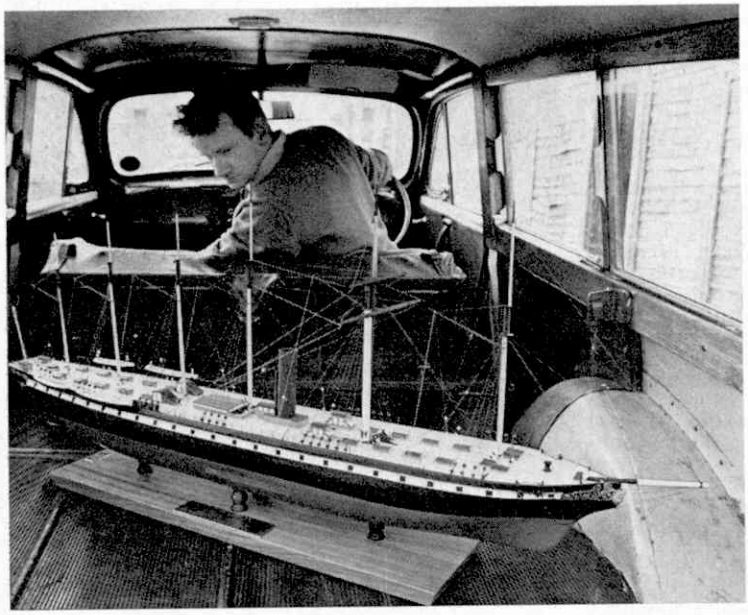
Award for Airfix

The well known kit producing firm of Airfix have been awarded the "Toy-of-the-Year" award by the Swedish Toy Retailers National Association. This award was won by Airfix in competition with the world's leading toy manufacturers and it is only the third occasion on which the award has been won by a British company. The award, a wooden horse in characteristic Swedish design will be presented to Airfix at a Celebration dinner in Stockholm on September the 26th.

A review of some of the latest kits from Airfix appear in this months "Have You Seen?" and you may be interested to learn that there are now almost 350 kits in the present range.

Built on a scale of eight feet to the inch, the model is approximately 3½ ft. long and 2 ft. 6 in. deep. The hull is constructed of spruce and the deck of plywood, with cotton thread for the rigging.

Norman has been interested in model-making since he was a boy and estimates that he has made about 700 models, although he says that none of them are on a par with his latest effort. The completed model (shown below) took Norman almost 300 hours to complete and I think readers will agree with me that he has produced an excellent representation of this famous vessel.



Norman Hill transporting his superb model of the SS *Great Britain* from his home in Weston-super-Mare to the Bristol Shipping firm of Charles Hill and Sons Ltd., who will be responsible for the restoration of the full-size vessel. *Photograph by courtesy of Graham A. Wiltshire.*

SS Great Britain

Recently returned to its birthplace, Bristol, is I. K. Brunel's ship the SS *Great Britain*. In 1843 she was at that time the largest ship in the world, the first screw driven ocean going vessel, the first large iron ship and the first also with water-tight bulk heads !

The *Great Britain* as many of you will know is now safely berthed in the dock in which it was built and is at present awaiting reconstruction. The Bristol shipping firm of Charles Hill and Sons Ltd. who will undertake the mammoth task of restoration, felt that a model would help them in the planning and carrying out of work and commissioned Norman Hill of Weston-super-Mare to build one.

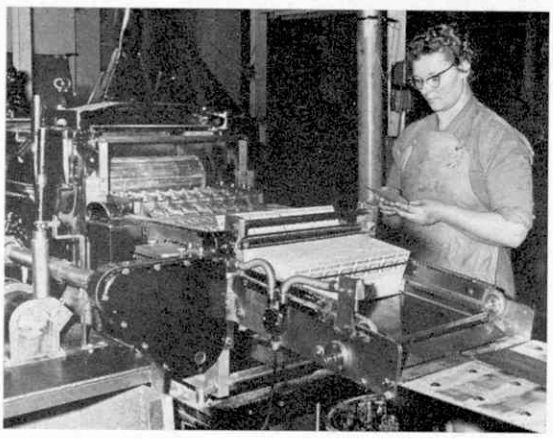
CAR OUTLINE COMPETITION

At the time of going to print (August 12th), I have received literally hundreds of entries for our new 'Car Outline' competition which started last month. The winning entries have been selected and 50 models of a Pontiac Parisienne (the correct answer to the competition) are now on their way. This month's outline appears, together with a list of last month's winners, on page 571, so why not have another go ? *Do* remember to put your correct address on your entry, despite reminders last month, two were received without this !

A HUNDRED YEARS OF MATCH MAKING

Edward G. Hodgkins visits the Gloucester factory of S. J. Moreland & Sons Ltd. to find out how matches are made

ENGLAND'S GLORY MATCHES, famous throughout the country, have their home in Gloucester where they are made exclusively by S. J. Moreland & Sons Limited. The story began during the Spring of 1867 when Samuel John Moreland opened his factory beside the Gloucester-Berkeley canal for the purpose of making " lucifers ". The site was carefully chosen to benefit from the thriving Gloucester timber trade, based on the canal, and to use the waterway for despatch of the finished products. By 1897, thirty years after opening his factory, S. J. Moreland employed 450 people and supplied matches to the North and West of England, to the industrial Midlands, to Northern Ireland, Australia, South Africa and Canada. A fleet of horse-drawn carts delivered matches to Birmingham and the Black Country, and continued to do so until motor vehicles took over in 1919. The company erected new factory buildings in the same year, within a hundred yards of their original site, and are still producing matches there today.



This rather complicated machine prints matchbox skillets.

Testing finished matchboxes in accordance with British Standards.

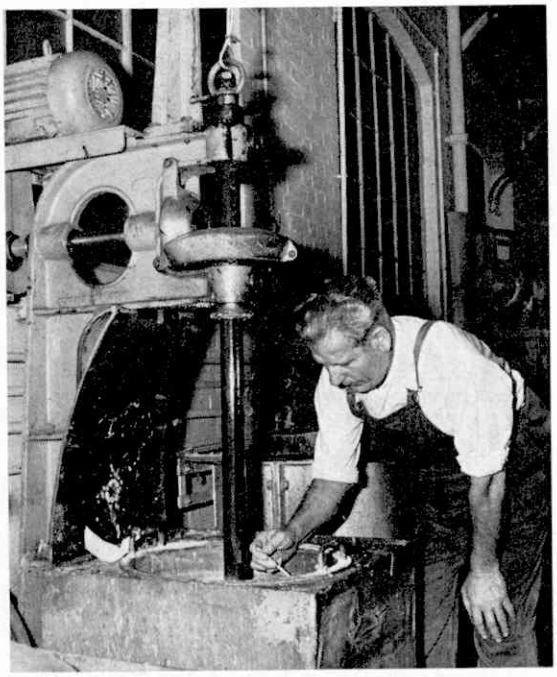
The Moreland family still control this thriving company. The present Managing Director is Samuel John Moreland, great grandson of the founder and bearing the same name. His brother, Robert, is the Works Director. In 1911, the company employed 640 people, but with the introduction of modern automatic machinery this has gradually fallen to the present workforce of around 350. There is a very happy atmosphere in the factory and many of the employees have been here for their whole working lives. Two men still at Moreland's have completed 50 years service, eleven have been with the company over 40 years and no fewer than thirty have reached 25 years.

Until recently, Moreland's used to manufacture their own match splints from Russian aspen, but now it has proved more economical to import ready-cut poplar splints from Canada. Therefore, instead of the giant machines peeling wood into long " snakes " of veneer before splitting it into match-sticks, all we see now are bundles of splints shaped like cheeses, one match stick in thickness. These are broken into the enormous conveyor system that then carries the sticks in a stream of air to the match machines. Chemical compounds are mixed in another department under very strict fire safety conditions, and the mixture is stirred and creamed to the consistency of liquid icing sugar. Then this too is fed, at a controlled temperature, into the match machines.

A third production line is required to feed the mighty match machines—the box manufacturing line. Rows of machines churn out inner boxes which are fed into huge hoppers. Other machines cut and print

the outer boxes, which are known as " skillets " while they are flat. These skillets are then folded and stuck by a bar machine that produces nearly 1,000 outer boxes a minute. These outer boxes are fed into other hoppers alongside the " inners ". Conveyors finally carry both halves of the boxes to the match machines.

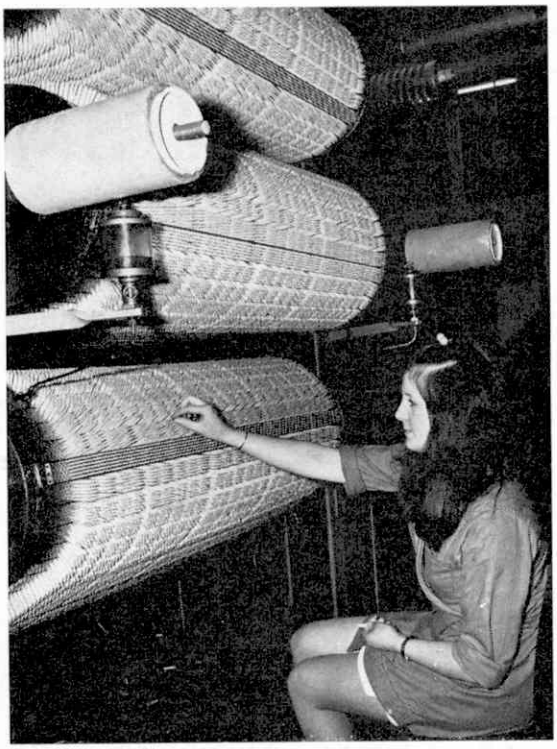
The four giant match machines stand side-by-side in a huge air-conditioned room. Each machine produces 13 million matches a day and consists of an endless conveyor belt, filled with holes, into which the individual match splints are pushed. These splints are then carried to a bath of paraffin wax where they are dipped to give us the bright little yellow flame we all know. Next the matches are dipped to exactly the correct depth in a bath of " composition " to produce the heads. This composition takes about an hour to dry, so the conveyor slowly moves backwards and forwards inside the machine until, an hour later, the finished matches are fed down the front of the machine to meet the boxes on their conveyor. Exactly the correct number of matches is automatically placed in each box, the " outer " is slipped on, and off we go again to the packing department on yet another conveyor.



Checking the temperature in one of the composition mixers.

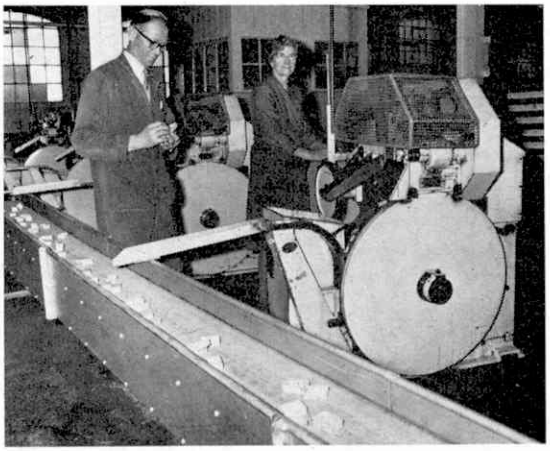
Here, the first machine packs the boxes into packets of a dozen. Another machine packs the dozens into gross packets which are loaded by hand into 8-gross boxes. This is the first time the matches have been handled manually since the " cheeses " of splints were broken into the first conveyor tray. A conveyor finally takes the cartons to the bonded store, where they are recorded and counted for payment of " Match Tax ".

Moreland's own green vans will now deliver the cartons to stores and warehouses throughout the country, or to the docks for export. In this way, this fascinating factory produces 50 million England's Glory " strike anywhere " matches and Moreland's



One of the four giant match machines. Here a girl is checking that all is well after the matches have been dipped in the composition that forms the head.

Special Safety matches each working day. Among the forty or more different brands produced by Moreland's in the last hundred years have been such matches as John Bull, Jack Tar, Hotspur and Light Brigade. Collectors of Match-Box labels can obtain a selection of these historic brands by sending a shilling postal order to S. J. Moreland & Sons Ltd., Bristol Road, Gloucester.



Machines making matchbox " inners."

AIRCRAFT ON STAMPS

by James A. Mackay

IN JUNE OF THIS YEAR I had the pleasure of visiting Australia and New Zealand, flying right round the world in the space of three weeks and making stops in all the major cities of both countries. In the course of twenty days I made 26 flights and can say that I have sampled almost every kind of aircraft in commercial use in Australasia today. The latest set of stamps from the territory of Papua and New Guinea therefore had some personal meaning for me, since it depicts the aeroplanes flown on the air routes between Australia and that country.

On my journeys from London to Perth in Western Australia, and from Fiji to London via Tahiti, Mexico, the Bahamas and Bermuda, I flew as a passenger on a Boeing 707 of Qantas, the Australian international airline. This giant pure-jet is a far cry from the Avro biplanes which the Queensland and Northern Territories Aerial Service—to give Qantas its proper name—first operated fifty years ago between Longreach, Cloncurry and Winton in northern Australia. The Boeing 707/338C capable of carrying 220 passengers, is now used by Qantas on all its overseas flights. Under the command of Captain D. Harden, the first Qantas 707 to land at Port Moresby on the resumption of this ariline's far-eastern service on September 14th 1967, was VH-EBS "Kalgoorlie". Since January of this year this route through Port Moresby to Manila, Hong Kong and Tokyo has been a twice weekly event. The 30c stamp of Papua's airmail series shows the 707 in the new Qantas livery, against a background of Hombrom's Peak, a well-known landmark near Jackson's Airport near Port Moresby.

In twelve days I criss-crossed Australia, from Perth to Brisbane, flying on aircraft operated by the two major domestic airlines, Trans-Australia Airlines and Ansett—Australia National Airlines. Both companies use similar aircraft over the same routes, the major difference being that TAA is a nationalised concern whereas Ansett (named after its founder, Sir Reginald Ansett) is run by private enterprise. Both companies use Boeing 727 T-jets on the Australian internal flights and also on the Papua-New Guinea routes. Perth to Adelaide is almost 2,000 miles as the crow flies, but in a Boeing 727 of ANA, cruising at 620 m.p.h. at an altitude of 40,000 feet one was left with the impression of making a short hop, without any conception of the actual distance involved. Both TAA and ANA introduced the Boeing 727 on their routes from Sydney to Port Moresby in May 1976. One of the four 5c stamps in the new airmail series shows this aeroplane, with the old TAA insignia on its tail unit, in flight over Mount Giluwe, the second highest mountain in the territory.

An extremely handy aircraft for shorter routes is the Dutch-built Fokker Friendship, a high-wing monoplane powered by two Rolls-Royce prop-jets which cruises at 300 m.p.h. In Friendships I made flights by TAA from Melbourne to Tasmania and by the National Airways Corporation of New Zealand from Auckland to New Plymouth. Both TAA and ANA introduced F27s on their route from North Queensland to the Solomon Islands via Port Moresby and Lae in March 1967. This aircraft not only speeded up the journey but provided air-conditioned, pressurised travel to passengers on these internal routes. One of the 5c stamps shows a Friendship with the distinctive red triangular insignia of ANA on its tail unit, with Manam Island Volcano in the background.

A popular turbo-prop airliner in Australia is the Lockheed Electra Mark II, in which I made flights by Air New Zealand. The Electra was used by Qantas on its far-eastern route from 1959 to 1961 and some years later TAA and ANA introduced it on their route from Sydney to Lae via Brisbane and Port Moresby, though now it has been partly superseded by the Boeing 727. One of the 5c stamps depicts an Electra in the old Ansett colours, flying over Mount Yule. Prior to 1965 both companies operated Douglas DC6B airliners on this route and one of these prop-jets, in the old livery of TAA is shown on a 5c stamp with Mount Wilhelm, the territory's highest mountain, in the background.

Probably the most famous aeroplane ever built, the Douglas DC-3 Dakota, is featured on the 25c stamp of the series. It seems almost incredible that this airliner was in production as long ago as 1934. Since then it has been operated by airlines all over the globe and performed almost every task that any aircraft has ever been called upon to undertake. During the Second World War Dakotas were flown between Australia and New Guinea by Qantas, ANA and the armed forces. Qantas used DC3s on its Papua-New Guinea routes until 1960, but during the past decade this popular aircraft has continued in use with both TAA and ANA and currently there are 20 of them in service on the territory's internal air routes.

The ubiquitous DC3 also appears on a 7 sene airmail stamp released by Western Samoa on July 27th. Polynesian Airlines (PAL) operate Dakotas on their flights from Samoa to Tahiti, the Ellice Islands and New Zealand. The remaining three stamps of Samoa's airmail set range from the historic flying boat "Frigate Bird III", in which Sir Gordon Taylor made his pioneer flights and which is still employed by the French airline UTA on flights from Tahiti, to the Britten Norman Islander currently used by Air Samoa on its inter-island flights.

Prototype Saab SK37 Viggen two-seat trainer.

AIR NEWS by John W. R. Taylor

First Tri-jet Airbus rolled out

Stage two of re-equipping the world's airlines with huge wide-bodied jet transport began on 23 July 1970, when the first McDonnell Douglas DC-10 made its debut before 1,000 VIP guests at its maker's Long Beach, California, factory. At a signal from Spiro T. Agnew, Vice President of the United States, the gleaming new aircraft was towed into position before the reviewing stand. By his side was Donald Douglas, honorary chairman of the company, who must have cast his mind back 35 years to the first flight of the DC-10's most famous predecessor, the old DC-3 Dakota.

Nearly 11,000 DC-3's were built, mostly for war-time service. The survivors still outnumber any other single type of aircraft on the world's airline routes, and at least one of them has well over 80,000 flying hours recorded in its log-book, equivalent to more than nine years non-stop in the air or 25 trips to the Moon and back.

The DC-10 has been born in an age when men go to the Moon. It uses a type of engine that had never even run on a test-bench, much less been fitted in an aeroplane, when the DC-3 went into production. It can carry up to 345 passengers in a cabin that is 8 ft. high and 18 ft. 9 in. wide—over 7 ft. wider than that of current "big jets" like the DC-8. With a reduced load of 270 passengers and their baggage, one version can fly 6,100 miles non-stop, and it will be able to cruise above 585 m.p.h. By comparison, the DC-3 was designed to carry 21 passengers 1,480 miles at 195 m.p.h., although later models managed to pack 36 seats into the cabin which now looks so small.

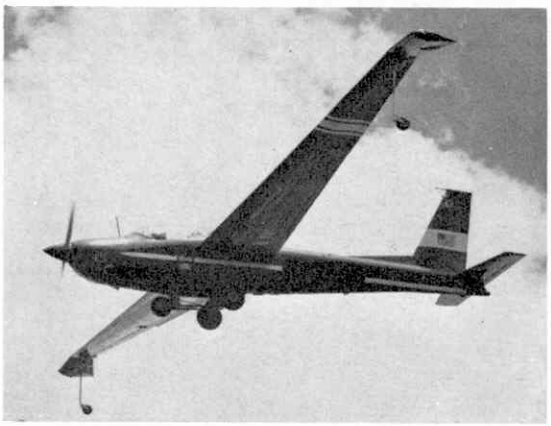
N10DC, the first DC-10, is a Series 10 version powered by three 40,000 lb. thrust General Electric CF6-6 turbofan engines, and is intended primarily for service on US domestic routes 300 to 3,600 miles long. The Series 20, with three 49,800 lb. thrust Pratt & Whitney JT9D-17 turbofans (basically similar to those in the four-engined Boeing 747 "jumbo jet"), has 50 per cent more fuel for international operations but is the same size as the Series 10, except for a 6 ft. increase in wing span. So is the Series 30, which differs from the 20 only in having 49,000 lb. thrust CF6-50A engines. Convertible passenger-cargo versions, able to carry up to 345 passengers or 70 tons of freight, are designated DC-10F.

In every respect, the DC-10 is quite an aeroplane. Even the Series 10 spans 155 ft. 4 in., is 181 ft. 5 in. long and 58 ft. 1 in. tall, with a take-off weight of 410,000 lb. The Series 30 will have a maximum loaded weight of 555,000 lb., which is exceeded only by the Lockheed C-5A Galaxy military freighter and the Boeing 747. Eight doors, most of them wide enough for two persons to pass through side-by-side, give access to the three-compartment passenger cabin. Six-abreast seats in the first class section are in three pairs, separated by 27 in. aisles. Even in the eight-abreast coach class sections, seats and aisles are wider than those in earlier jet-liners and no passenger is more than one seat away from an aisle. Nine-abreast seats are fitted in economy class layouts.

Closed overhead compartments, within easy reach of the passengers, hold personal effects and carry-on baggage. Galleys can be on the main deck or lower deck, as preferred by the airline. When ready for serving, meals can be whipped up from the lower deck by lift in the insulated serving carts that carry them to the passengers. If an upper-deck galley is installed, this frees the whole vast lower deck for containerised baggage and freight.

At the moment, firm orders for the DC-10 total 111,

SPACIOUS DC-10 INTERIOR—Feeling of room-like spaciousness is created by expanded dimensions of McDonnell Douglas DC-10's wide-bodied fuselage. Cabin interior is 18 ft. 9 in. wide at passenger seat level and approximately 8 ft. high.



The Bede BO-2 " Love One " is based on the Schweizer 232 all-metal sailplane. *Photograph courtesy of Howard Levy.*

with options on 119 more, from thirteen airlines. The biggest contracts have been placed by US operators like American Airlines, National, Northwest and United, which account for a total of 78 firm orders and 77 options; but already sizeable export orders have come from Alitalia, KLM, SAS, Swissair and others, despite competition from the Lockheed TriStar, of which the first prototype is nearing completion, the European A.300B and, possibly, the BAC Three-Eleven. Whether we like it or not, we are now in the age of the airbus.

Tandem-wing two-seater

Another interesting newcomer which put in a first appearance this Summer is the SK37 two-seat trainer version of the Swedish Air Force's new Saab-37 Viggen. First flown on 2 July, it can be distinguished easily from the earlier multi-purpose STOL combat versions by the second cockpit to the rear of the usual pilot's cabin. This additional seat is raised, to give the instructor a good view forward over the head of the pupil in front. It takes the place of some electronics and the forward fuselage fuel tank; but external tanks can be carried on the aircraft's stores pylons to give it a long range, and most of the single-seat Viggen's other combat equipment and weapon-carrying capability are retained.

All seven prototypes of the tandem delta-wing Viggen are now flying. The AJ37 all-weather attack version has almost completed its flight tests and is already in quantity production, with deliveries scheduled to begin next July. Current orders are for 140 AJ37's and 35 SK37's, all of which will be in service by 1974.

The Viggen spans 34 ft. 9¼ in., has a length of 53 ft. 5¾ in. and, in its attack version, weighs 16 tons at take-off with a normal load of air-to-surface missiles, bombs, rockets and/or fuel tanks on three under-fuselage and two underwing attachments. Two Swedish-built Pratt & Whitney JT8D-22 turbofan engines, each rated at 26,450 lb. thrust with reheat, enable it to fly at more than twice the speed of sound. Yet the unique tandem-wing layout, with flaps on the foreplanes, is so effective that the Viggen lands at only 137 m.p.h.

Chinook's big lift

Boeings big CH-47C Chinook helicopter has earned a high reputation as a military transport, able to carry up to 44 troops. Such normal load limitations can, however, be disregarded in an emergency, as a Chinook proved recently in South America.

Two CH-47C's were sent to Peru, from the US Army's New Cumberland, Pennsylvania depot, following the devastating earthquake which hit that country a few months ago. The first of the " choppers " reached Lima on 9 June. On the evening of its third day's operations, devoted mainly to emergency airlift of vital medical and food supplies, its crew spotted a group of fifty adults and a hundred children stranded in a small village 8,500 ft. up in the mountains.

Dusk was falling rapidly, but the pilot cleared a 14,000 ft. mountain ridge to make an instrument approach. He then loaded all 150 people on board the Chinook and flew them to safety. There could have been no more impressive demonstration of the CH-47C's ability to operate in the high, hot, thin atmosphere of the Andes mountains.

Many other US aircraft helped in relief operations, side-by-side with a fleet of 65 Russian aircraft, including four-jet I1-62's, turboprop An-12 freighters, and four of the huge new An-22's, of which one was unfortunately lost in the Atlantic. Material flown into Peru from the Soviet Union included 100 prefabricated houses, road building machinery, a field hospital with 200 beds and a medical staff of 70, and everything needed to set up three nursery schools.

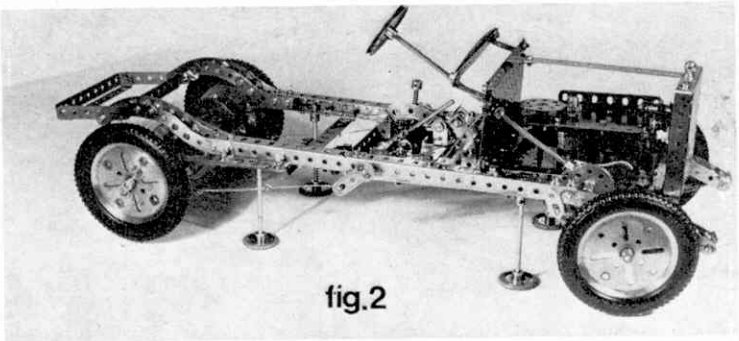
Jim Bede's remarkable records

Most world aviation records are pretty remarkable nowadays, with speeds around the 2,000 m.p.h. mark and the X-15A-2's height figures up in the realms of spacecraft and satellites. Nevertheless, the batch of records recently credited to US designer/pilot James R. Bede are in many respects the most incredible of all. They include a piston-engined closed-circuit distance record of 8,973.3 miles, beating the previous best by a B-29 bomber in 1947 and the first record in this class set up by a solo flyer since 1913.

Not since 1935 had anyone set up a world-class record in an aeroplane he designed, built and flew himself. Bede has been designing aeroplanes for many years, and his two/four-seat BD-4 lightplane is selling in huge numbers in plan and kit form for construction by amateurs. Back on 11 March 1967 he flew for the first time an aeroplane known as the BD-2 Love One and this is the machine used for his record flights. Its name stands for " *L*ow *O*rbit *V*ery *E*fficiently, number one " and indicates the object of building it, which is to make the first-ever round-the-world non-stop flight without aerial refuelling.

The basic airframe of the BD-2 is that of a Schweizer 2-32 all-metal sailplane, extensively modified. The wing has been sealed to form a huge fuel tank and, with other tanks in the fuselage, enables the aircraft to carry 470 gallons of petrol. This is believed to be sufficient to cruise 28,500 miles, and flying time for the round-the-world trip is estimated at between 150 and 170 hours. For most of the time, the autopilot will be in control, and a special warning system will alert Bede if it should go wrong, perhaps while he is asleep, causing a change of altitude. The Continental 10-360 engine is rated at 225 h.p. for take-off, but can be throttled back to give as little as 30 h.p. at 20,000 ft. in flight, for maximum fuel economy.

NASA has supplied a spacecraft type of liquid oxygen system for use by Bede at this altitude, and he will keep in constant touch by radio with the Collins " antenna farm " at Cedar Rapids, Ohio.



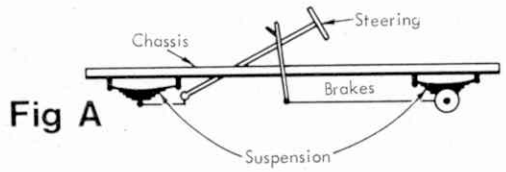
Reconstruction of original Meccano Motor Chassis which demonstrates basic car mechanics.

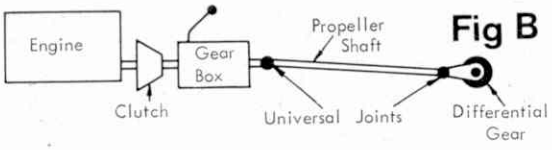
Meccano Constructors Guide

by B. N. Love

PART 10 – VEHICLE MECHANICS

ANY LAD OPENING his Meccano Outfit for the first time will be confronted with a range of parts so suggestive of vehicles that some form of car or lorry will be among the very first of his creations.



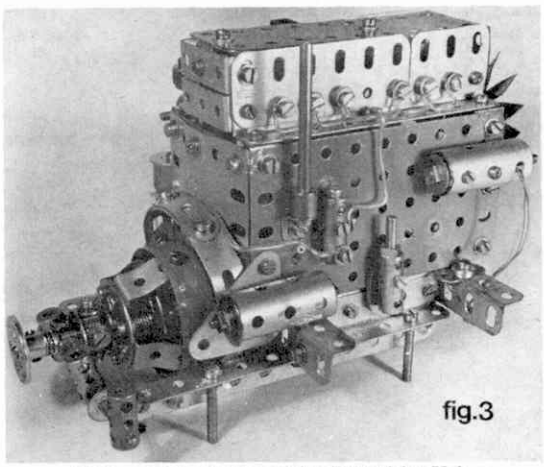


This fever seldom leaves the life-long enthusiast who knows how well the system is suited for demonstrating vehicle mechanics. If we consider two aspects of this topic we might put them in these categories :
(a) Chassis, steering, brakes and suspension,
and (b) Transmission from engine to road wheels.

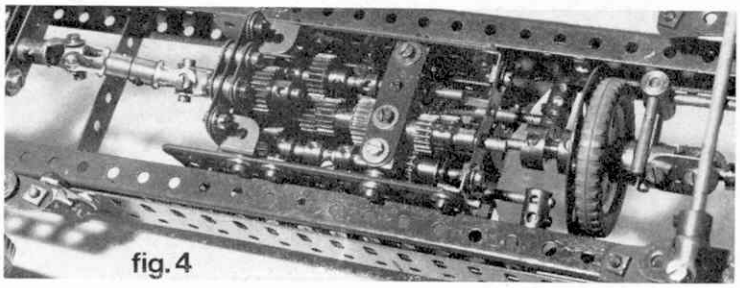
Although the bareness of the diagrams make them more akin to a 1916 Motor omnibus than a 1970 family saloon, the esentials have altered little in the past fifty years. In other words, we need basically, four wheels attached to a frame and a method of propelling the vehicle smoothly and a means for setting it in motion and bringing it to rest while being able to make it follow a non linear path. Considering the chassis before the transmission is literally putting the cart before the horse so we might consider the latter first. Thanks to the Powerdrive motor with its built-in gear box we can install an engine in a Meccano model in a comparatively small space and then proceed to give it realism by building detail around it. At one time the constructor was obliged to use a long sideplate motor which can be seen installed in the original Meccano Motor Chassis, a rebuild of which appears in Fig. 2. Despite the limitation in parts of the period from which this model originates, the basic movements of the motor mechanisms are all reproduced in this model.

Fig. 3 shows what can be done in the way of disguising the Powerdrive motor of modern manufacture by enclosing it in an engine ' block ' constructed of Plates, Strips and accessory parts to simulate a heavy duty deisel unit. Fuel lines are easily assembled from connecting wire covered in transparent plastic insulation while standard parts provide generator, breather, dipstick and well, starter motor and cooling fan. A clutch housing is provided by a Boiler End, four 1 in. × ½ in. Angle Brackets and an 8-hole disc to form the Bell moulding, while particular care has been taken in making the thrust race which is engaged by the clutch dogs to disengage the clutch plate. The two ¾ in. Washers sandwiching a ' spider ' Collar (Part No. 140Y) which carries four Washers on short Set Screws forms probably the smallest Meccano Roller Bearing. It is very efficient in action.

This particular clutch is somewhat unorthodox in that the Bell housing revolves as a whole, the clutch plate being a 1 in. Pulley with Motor Tyre fixed to the engine shaft. When the clutch pedal is depressed, the Bell housing moves forward bodily, the Boiler End component thus losing contact with the Motor Tyre carried inside it. The clutch shaft is fitted with a Small electrical Bush Wheel at its rear end to engage with a sliding coupling to the gearbox and its forward

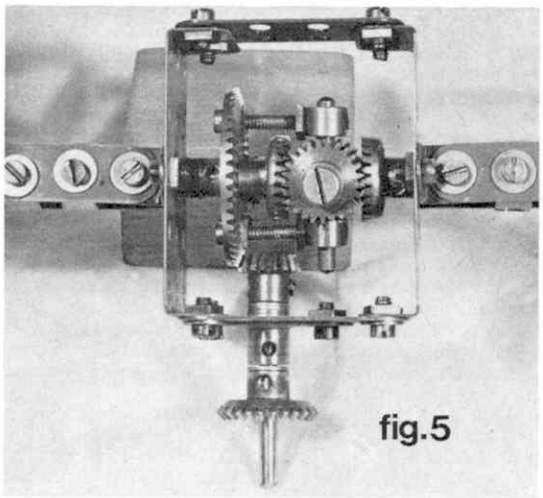


Built up engine block housing Powerdrive Unit.



Simple clutch unit on lorry chassis. Note all-Pinion gear-box and universal coupling at rear.

end carries the spring pressure 8-hole disc and Bush Wheel, a portion of this shaft being journalled in the clutch housing in alignment with the engine shaft. The inner 8-hole disc is spaced from its Bush Wheel by a lock-nut on each of the compression spring bolts and

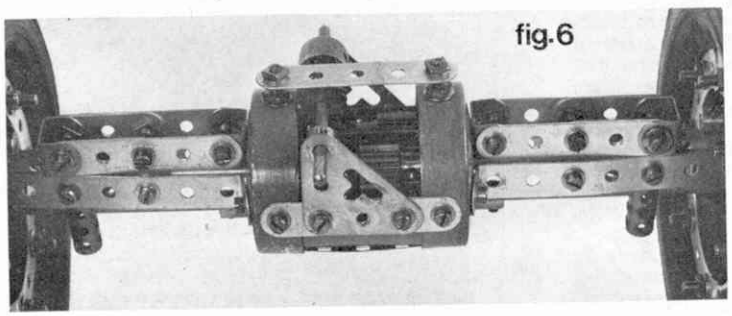


Simple differential gear employing Bevel, Contrate and Pinion Gears.

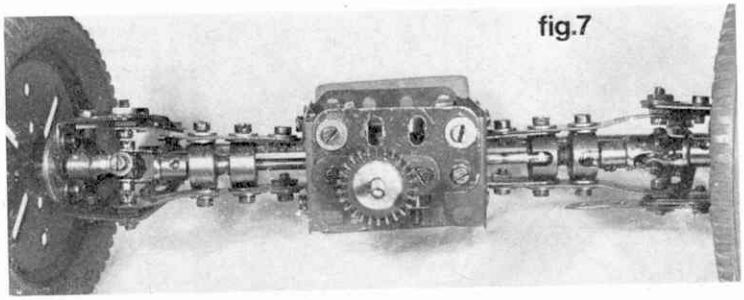
thus forms a free centre for the tip of the engine shaft to enter for alignment. A pressure pad of greased washers may be inserted between this inner disc and the boss of the 1 in. Pulley with Tyre for clutch idling with motor running.

A simpler but perfectly effective clutch unit is shown in Fig. 4. In this case, the clutch plate is a Faceplate connected to the gearbox shaft by a Socket Coupling and Collar. This provides a hollow bearing through the centre of the Faceplate boss so that the engine shaft can be journalled inside it. The clutch friction disc is a Motor Tyre on a 1½ in. Pulley journalled in a second Socket Coupling which is free to slide on the engine shaft. It is obliged to revolve with the engine shaft by the drive from a pair of Fishplates lock-nutted to the other end of the Socket Coupling as shown in the illustration. The slotted holes of the Fishplates slide on the shanks of Set Screws fixed tightly in a Collar on the engine shaft. A clutch fork is made from two 1½ in. Axle Rods in a Coupling attached to the clutch pedal by link rods. This fork will pull the 1½ in. Pulley with Tyre away from the Faceplate when the clutch pedal is pressed to disengage.

Fig. 4 also shows a compact gearbox based on a non-standard spacing employing ½ in. and ¾ in. Pinions. Twin lay-shafts are employed in this arrangement because of the limited selection of Pinion sizes. The central shaft is split at the centre in a common bearing and three forward speeds plus one reverse are available. Readers are referred to M.M. for April 1969, page 192, for a further explanation of a similar gearbox. The non standard spacing of ½ in. and ¾ in. Pinions in mesh is achieved by using Flat Girders in the construction of the gearbox casing, exploiting the slotted holes to obtain the critical spacing required. Notice that at the output of the gearbox, a universal joint is provided. Fig. 1 shows the normal positions for these joints which are required to make allowance for the difference in level between the rear axle of the vehicle and its gearbox. This difference in level is both a design feature and a consequence of axle movement when the vehicle is travelling. A universal joint is capable of making a junction between the ends of two shafts in such a way that rotation is maintained even when the shafts are at a small angle to one another—drive being available for an angle up to 45 deg. but with decreasing efficiency as the angle increases.



Heavy-duty rear axle unit with spur gear differential.

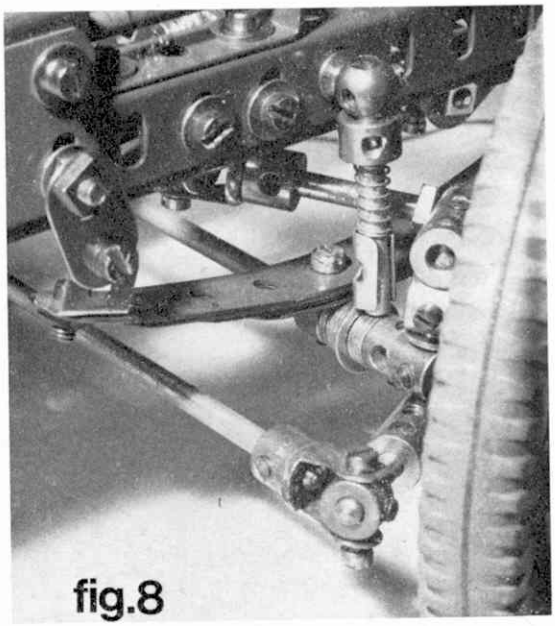


Demonstration front axle drive with flexible joints to road wheels. Note use of Socket Couplings as axle bearings.

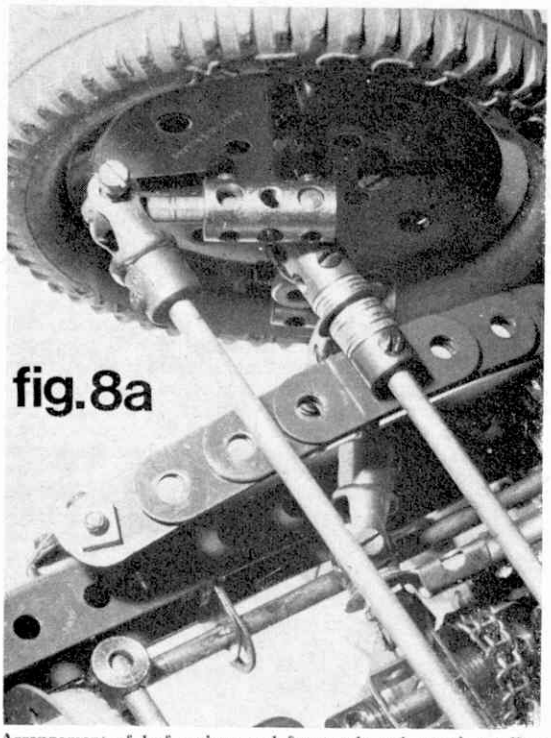
At this stage the transmission from the engine is still running in a line from front to rear and must be turned through 90 deg. if the rear axle is to turn. This could be achieved very simply by using a Pinion and Contrate gear to obtain the necessary right-angle drive as demonstrated in the early chapters of the Constructors' Guide and for very simple models this is a satisfactory way of doing the job. However, when a vehicle changes direction it tends to follow a curved path, as tyre marks in snow or mud will immediately show. This running over curved paths causes the rear wheels to run at different speeds depending on the sharpness of the turn and its direction left or right. Therefore, to permit the rear wheels to turn at different speeds, a differential drive is required and a simple form of this is shown in Fig. 5. Many such differentials have been illustrated in M.M. over its 50 years and more of publication and the gear illustrated in Fig. 5 is a neat combination of bevels, contrates and pinions. A Coupling forms the heart of the differential and receives the inner ends of the 'half-shafts' running to each road wheel, in either end of its lateral bore. The central transverse bore of the Coupling holds a $1\frac{1}{2}$ in. Axle Rod which in turn is bolted to the large Bevel Gear by $\frac{3}{4}$ in. Bolts lock-nutted on Collars as shown. The two 'planetary' 50-teeth Pinions are carried round in 'orbit' by the Pivot Bolts which tie them to the central tapped holes of the Coupling. The two 50-teeth Contrate Gears receive the drive from the Pinions and pass it on to their respective road wheels. If the vehicle is travelling in a straight line on a flat surface, both rear wheels will revolve at the same speed and the orbiting planet Pinions will be carried round by the large Bevel Gear, known as the 'crown' wheel, but the Pinions will not revolve on their Pivot Bolts. If, on turning a corner, one rear wheel is turning faster than the other, the planet Pinions will commence to turn on their bolts and in so doing will pass on a 'differential' motion to the two half-shafts comprising the rear axle. An appreciation of this is far more easily demonstrated by making up the mechanism than by attempting to describe its working in print.

An important feature in mounting differential gearboxes on rear axles is to ensure that they are rigidly attached to axle tubes which are in turn secured to the springs of the vehicle. Fig. 6 shows a rugged construction of a differential gear case suitable for a heavy duty model lorry. Boiler Ends provide strong journal plates for the axle tubes and half-shafts which run out from the differential. By a suitable selection of Double Angle Strips, Double Brackets, etc., the reinforced rear axle assembly shown will carry considerable torque and is designed to receive hub reduction gear at its extremities. Under these conditions, a model would be reaching a very advanced state. The actual differential shown is known as a spur differential because spur or Pinion gears are used. The principles do not change, however, long and short faced Pinions being employed to obtain the necessary meshing arrangements. In this particular instance, a Helical 'crown' wheel is employed to turn the differential carrier and this allows a top meshing Helical to pass the drive 'over the top' making it a simple matter to engage the drive to a second differential if twin rear axles are employed.

Fig. 7 shows a drive arrangement for a front axle where the road wheels are required to steer. Under prototype conditions a special flexible joint is required to pass on a steady drive to the front wheels at all angles of steering. The geometry of the simple universal joint shown in Fig. 7 falls short of this requirement, a special slot and ball joint being required. This can be partially simulated in the Meccano system by engaging a Handrail Coupling, fitted with a Keyway Bolt, in the open end of a Socket Coupling. This does not give a true ball joint through 360 deg. of drive however but the arrangement shown in the illustration is adequate for demonstration purposes. Note the use of Socket Couplings as rigid bearings in the axle tubes. Basic steering on non-driven front axles has been illustrated frequently in various Meccano articles and a further example is shown in Fig. 8. In



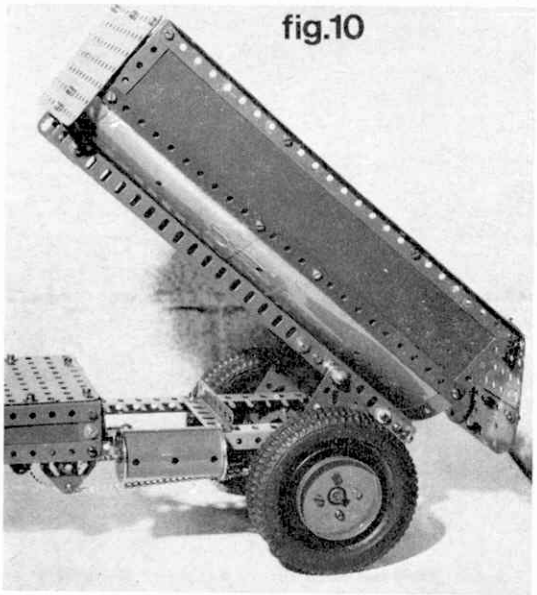
Steering gear fitted with simple coil spring shock absorber.



Arrangement of leaf springs and front axle rod securing collars to centre of springs.

this case an Axle Rod is used for the main axle beam which is secured to the leaf springs by Collars. Short Couplings at each end serve as Kingpin journals and the track rods which link one wheel hub to the other

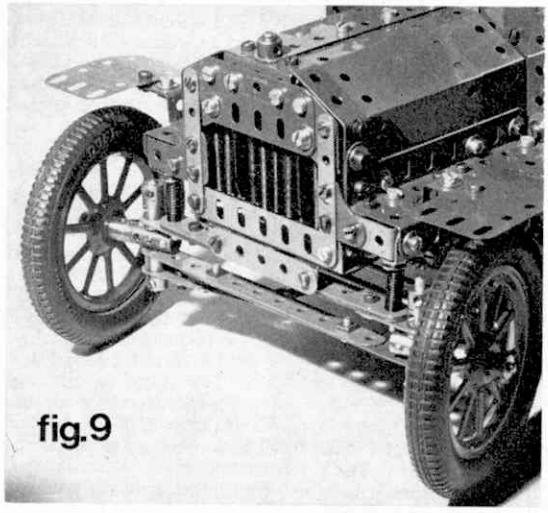
Tipping section of heavy lorry for earth moving. Note curved shape under bodywork.



are terminated in Swivel Bearings. An interesting feature in Fig. 8 is the provision of a coil spring shock absorber. A 1½ in. Axle Rod pivots in a Rod and Strip Connector on the main Axle and carries a Compression Spring held in place by a loose Collar. A handrail Support, lock-nutted to the chassis, allows the 1½ in. Axle Rod to ride up and down in its transverse bore to cushion the bumps from the main leaf springs.

A form of coil spring suspension is shown in Fig. 9 applied to a neat model of a veteran car. In this case the front axle beam is made of two or three thicknesses of Perforated Strips pivoted at the centre just below the bonnet. Cranks are bolted to each end of the beam to form journals for the Kingpins which are reinforced from below by a cross-strut made from further Perforated Strips. The chassis bearers on either side of the radiator are fitted with Long Threaded Pins pointing downwards, each fitted with two Compression Springs, the tips of the Pins penetrating the axle beam at which point the Compression Springs are trapped in place.

Vehicle features in general offer considerable scope to the Meccano modeller as the veteran car radiator details illustrate in Fig. 9. Coiled Tension Springs in this case give a very realistic appearance while the sharp bends in the Flexible Plates gives a really veteran look to the model.

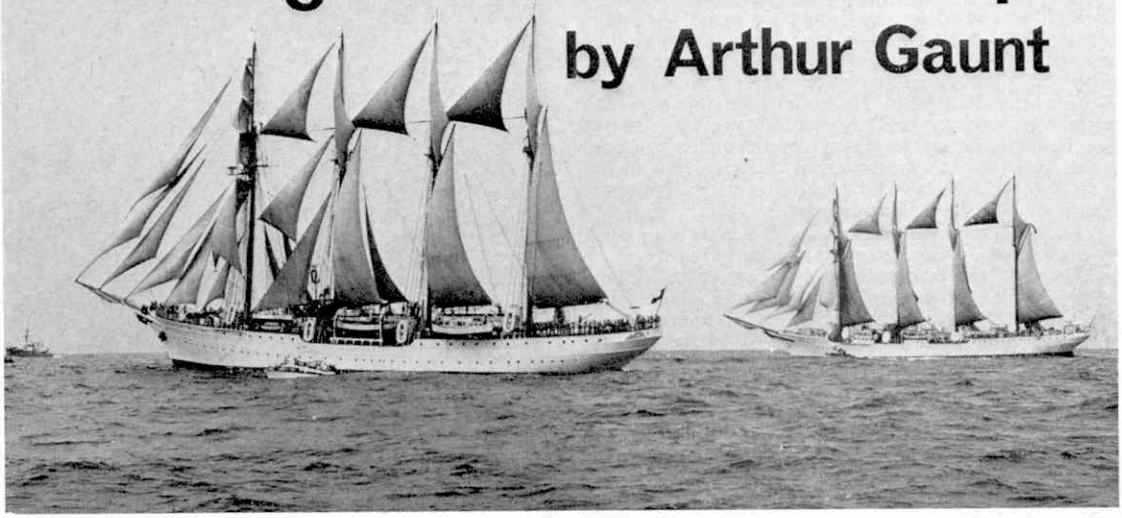


Simple front axle unit for veteran car employing central axle pivot and coil spring suspension.

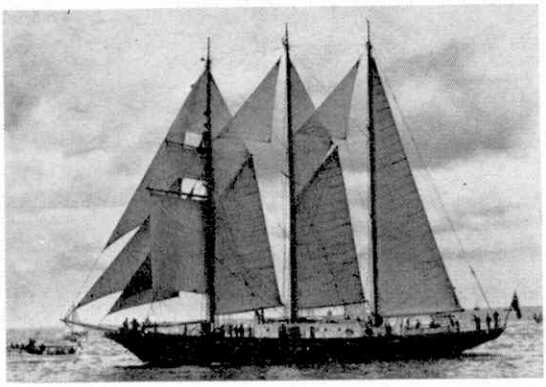
Commercial vehicles are always popular and with so much motorway construction in progress, the tipper is a common sight these days. Nothing spoils the appearance of such a model as a tipper section which is badly designed or full of holes and the example shown in Fig. 10, although quite simple, makes a neat job of tipping. This is largely due to the use of overlapping flexible plates to give a curved under-belly to the tip unit with a minimum number of protruding bolt shanks to prevent smooth discharge of spoil. A further feature is the gravity tail board, hinged from the top edge and neatly curved at its lower edge to conform to the tip-body contours. Twin rear wheels are fitted to the vehicle and nicely finished with Wheel Flanges. The tipping motion, which is controlled from the driver's seat is via the motor gearbox and Sprocket Chain.

Challenge of the TALL ships

by Arthur Gaunt



Big tall-masted sailing ships have not been entirely ousted from the seas by more modern vessels, and schooners from several countries will be converging on Plymouth at the end of July to take part in races to distant ports.



THE HEYDAYS OF OCEAN-GOING SAILING SHIPS was recalled on July 29, when a number of such craft set out from Plymouth to take part in this year's races organised by the Sail Training Association. That body had its beginnings in 1955, when a retired solicitor sought a means of bringing together young people from various countries, so that international understanding would be fostered or improved. The outcome was the promotion of races for square-rigged sail training ships. Although large clippers like the *Cutty Sark* (described in the recent May issue of the Meccano Magazine) are regarded by many people just as museum exhibits, full-rigged schooners and barques still plough the high seas.

Vessels of this type include a number used as train-

The training ship Sir Winston Churchill, launched in 1965. This three-mast schooner of 300 tons gained first place in a race from Falmouth to Skaw, in 1966.

ing ships, and the Sail Training Association was founded to give young people opportunities to go to sea in friendly competition with others (from their own country or from abroad), especially those who would normally be denied such seafaring experiences. The crews, who must be 15-25 years old, include Royal Navy cadets and Merchant Navy trainees. Also eligible are those who, whilst not being trained to become professional seamen, need experience of deep-water sailing as part of their schooling or character training. Any sailing vessel more than 30 ft. long on the waterline can take part in this thrilling contest, provided that at least half the crew are young people under training. A novelty is that all-female crews can take part in the races. *Crackerjack*, one of the entrants in the Plymouth-Tenerife race this year, was sailed by such a crew.

Who shall go on the ships is decided entirely by their owners. Most of the big square-riggers are owned by the Navy of their own country and carry naval cadets. In the case of private entries the owner of the ship selects his own crew, and the same circumstances apply to sailing club entries. The choice of crews for the Sail Training Association's own schooners is made in exactly the same way as for any other cruise—" first come, first served."

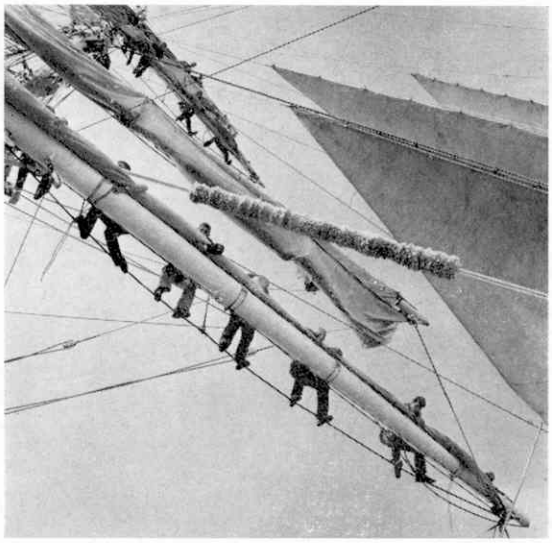
The first of these Tall Ship Races took place in 1956, when 20 square-riggers obeyed the starting signal off Torbay and set sail for Lisbon. Entrants included not only big sailing ships but smaller craft as well. Only seven of the competing vessels, in fact, exceeded 350 tons.

The race was so successful that the S.T.A. decided to promote similar events at two-year intervals. The pattern which has evolved consists of a major race, in which big ships may take part, every even-numbered year, and two short races in odd-numbered years, these short contests being held in the English Channel. " Feeder " races and Channel races are also organised in the " odd " years to meet requirements, and since 1965 an annual race has been held for sailing ships of not more than 350 tons, the route being from the Solent to Cherbourg. The event starts on the summer Bank Holiday, for it is the policy of the S.T.A. to run such short races on a Monday, enabling a completely raw crew to embark on a Friday night and have two whole days to work up. Another route used for short races in the English Channel is from Weymouth to Saint Malo, France. This route was followed in a race last year.

In August 1958 a long-distance event took the entrants from Brest to the Canary Islands, and in 1960 the route from Oslo to Ostend was used. Some big races have been from Brest to La Coruna, Spain. The longest race so far organised by the S.T.A., however, was held in 1964. The contestants set sail from Lisbon and crossed the Atlantic to Bermuda, a distance of 3,600 miles. The contest demonstrated that square-rigged sailing ships can sail to tight schedules, three of the entrants crossing the finishing line within a space of three hours.

Falmouth provided the setting for the start of a race to Skaw, Denmark, in 1966. The Cornish seaport is often considered to have the finest natural harbour in the country, and it has close ties with earlier races between " tall ships ", such as the clippers bringing wool, tea, and other cargoes to Britian from Australia and the Far East in the 19th century.

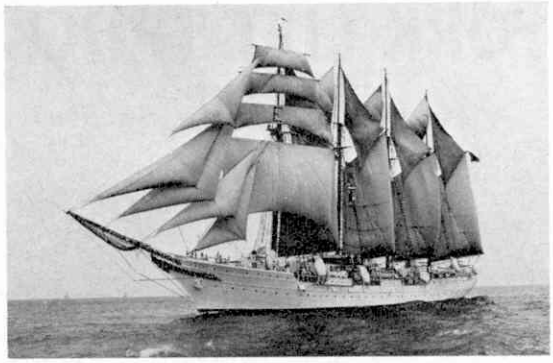
An important step in connection with the S.T.A. races was taken in 1961, when the possibility of building a large sail training ship for Britain was investigated and put before the Royal Navy. The sponsors



Sail drill aboard the Christian Radich, the winner of the Lisbon-Bermuda race in 1964 for vessels of her class.

of the idea pointed out that such a craft would enable Britain, the organisers of the present-day Tall Ship Races and historically the world's leading seafaring nation, to have her own entry. When the Admiralty turned down the suggestion, the big shipping companies were approached. They too declined to take up the proposal. Undaunted the Sail Training Association decided to organise an appeal for funds from the public to build a suitable ship, not primarily designed to win races, but to serve as a comfortable sea boat for sail training and able to keep to a schedule of cruises from early March to early December each year. The design and rig were endorsed in 1963, and she was launched at the beginning of 1965. At the same time permission was obtained to name her *Sir Winston Churchill*, as a tribute to the great statesman whose offices included the Lord Wardenship of the Cinque Ports from 1941 to 1965. The craft is a three-masted topsail schooner of 300 tons, with an overall length of 135 ft. and 100 ft. long on the waterline. She has a beam of 24½ ft. and a draft of 15½ ft. Her normal role is to take 39 young people on cruises lasting two weeks. Her successes in Sail Training

The Danmark, one of the entrants in the 1964 Sail Training Association race to Bermuda. She was built for seafaring trainees in 1933.



The Julian Sebastian de Elcano leaving Bermuda in 1964, after competing in a race from Lisbon to that pleasant spot.

Association Races include first place in her class when making her way from Falmouth to Skaw in 1966. Later that year she took the second place in her class when she raced from Skaw to Den Helder, in the Netherlands.

In August 1968 the *Sir Winston Churchill* reached only fourth place in a race from Gothenburg to Kristiansand, but she regained much of of her reputation as a formidable challenger in September by achieving third position in a Portsmouth-Cherbourg race. Tall ships seeking glory as racers have sometimes figured in unsought happenings. *Crackerjack*, an entrant in a Harwich-to-Kristiansand race in 1968, had to put into Terschelling, at the entrance to the Zuyder Zee, to undergo repairs. In 1958 the *Nicolette* had to retire after colliding with another ship, although she did manage to reach the finishing point at La Coruna eventually. Another red letter day in the history of the Tall Ship Races occurred in August, 1966, when five entrants had to give up, only one ship completing the course from Southsea to Cherbourg.

Sailing ships are an impressive sight from any angle, and here the schooner Sir Winston Churchill sets out to sea.

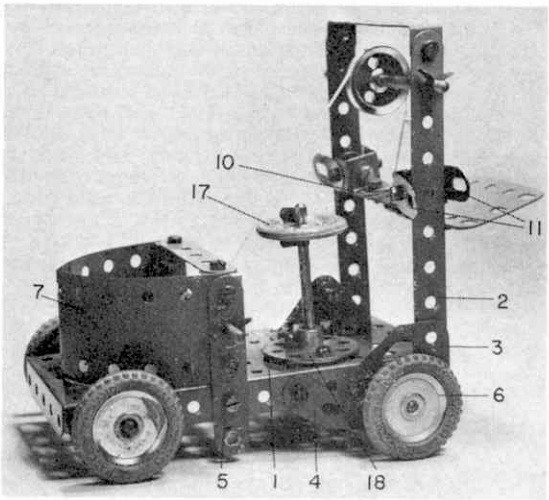
Last year no fewer than eight ships seeking racing honours, by making a fast run from Weymouth to St. Malo, had to retire, and only three sailed into the French port. The *Sir Winston Churchill* was among the craft which had to give up.

The competitors in Sail Training races are divided into two main classes. Class A consists of square riggers, barques, and other vessels of more than 500 tons. In fact there is no upper limit to the size of competitors in this category. Class B takes in all other sailing ships not less than 30 ft. in waterline length, and is normally divided into at least two divisions, depending upon the number of entries received. A system of time allowances, worked out from the sail plan and the line-plan of the hull, is used to give each vessel a rating. A rating certificate from the Royal Ocean Racing Club may be used in the same way. The rating arrangements give all entrants a fair chance of appearing in the prize list, whether they are converted old work-boats or modern yachts.

Two races were scheduled to start from Plymouth at about noon on July 29 this year. The main race, for big square-riggers and other large craft, will finish at Santa Cruz de Tenerife, 1,400 miles away. These entrants will follow a direct course, except that they will be required to pass between the island of Madeira and the neighbouring island of Porto Santo. Starting at the same place near Plymouth, there is to be a race open to all sail training ships except the square-rigged ones. This contest has been organised for vessels with crews who are unable to afford the time to take part in the race to Tenerife, and the finishing point will be at Coruna, in Spain. The starting-place for both these 1970 races was about a mile from Wembury Point, on the eastern side of the entrance to Plymouth Sound. August 31 is the date chosen for a race open to all sail training craft under 300 tons. The entrants will set out from Southsea and follow a 140-mile course to Cherbourg. For 1971 there are prospects of a Tall Ships Race in the Mediterranean. It will not be the first S.T.A. contest held in that area, however. One took place from Cannes to Naples ten years ago.

Looking a little further ahead to 1972, plans are being made for two big races in that year, one starting from the Aaland Islands in the Baltic and the other from the Solent. Both events are to finish at or near some port at the bottom end of the Kattegat. From that place there will be a cruise in company, and the grand finale will be a parade of all the competitors to Kiel, where the yachting events of the Olympic Games are being held. The S.T.A. programme will be timed for the ships to reach Kiel on Saturday, September 2.

This summer's races from Plymouth on July 29 were honoured by the presence of H.M.Y. *Britannia*. Prince Philip did in fact give the starting signal for the 1970 Sail Training Association competitive events, thus setting the royal seal on the Tall Ship contests.



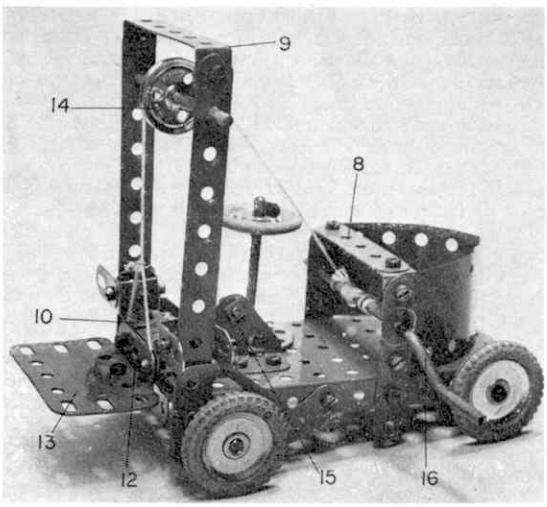
New Meccano Set No. 2 contains all the parts needed to build this simple working Fork Lift Truck model.

FORK LIFT TRUCK

A New No. 2 Set Model described by 'Spanner'

MECCANO MODELLERS, ever on the look-out for ideas, have always found a rich source of subjects in the machines of industry. In the modern mechanised world new machinery is constantly being designed to aid manufacturers with their production and much of this is ideal for reproduction in Meccano. Strangely enough, though, one of the most popular types of industrial machine with modellers is not new, but rather among the oldest pieces of mechanical handling equipment still in use—the fork lift truck.

Fork Lift Trucks of all shapes and sizes have been built in Meccano over the years, and it's easy to see why: the interesting movements of the machines can be easily reproduced, no matter how small and simple the model. Featured here, for example, is a really basic Fork Lift built from New Outfit No. 2, yet it is fitted with a fully working fork which makes it ideal for youngsters to build and operate.



Another view of the Fork Lift Truck as seen from the opposite side.

Construction presents no problems, the chassis consisting of a 5½ × 2½ in. Flanged Plate 1, to each side flange of which are bolted a 5½ in. Strip 2, a Flat Trunnion 3, a 2½ in. Stepped Curved Strip 4 and a 2½ in. Strip 5. Note that the Flat Trunnion is mounted on its side, its base overlaying the 5½ in. Strip 2, and that both this Strip and Strip 5 project a distance of one hole below the Flanged Plate. The forward end of Curved Strip 4 is bolted to the lower end of Strip 2. Journalled in the second holes of the Curved Strips at each side is a 3½ in. Rod held in place by 1 in. fixed Pulleys 6 fitted with Motor Tyres, similar Pulleys and Tyres securing a 3½ in. compound rod towards the rear end of the Flanged Plate. This compound rod consists of a 2 in. and 1½ in. Rod joined by a Rod Connector.

Now bolted between Strips 5 at each side is a 5½ × 1½ in. Flexible Plate 7, curved to shape, the upper securing Bolt in each case fixing an Angle Bracket in position. These Angle Brackets are connected by a 2½ in. Strip 8, while Strips 2 are connected at their upper ends by a 2½ × ½ in. Double Angle Strip 9.

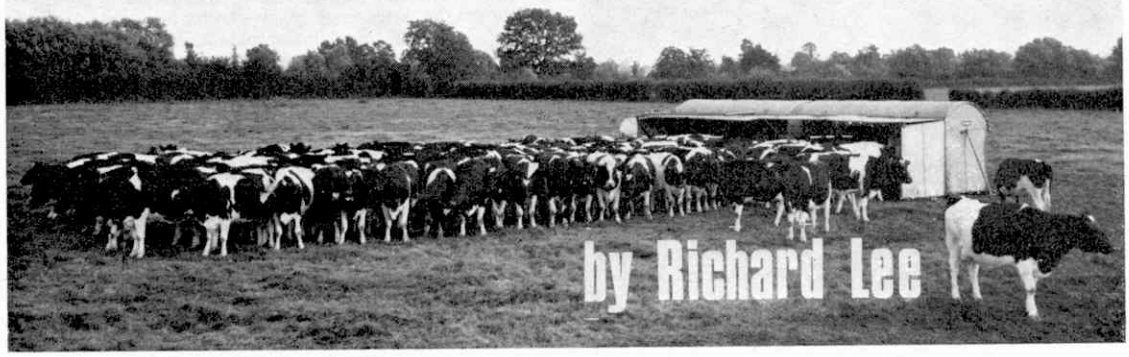
Strips 2, of course, serve as the runners for the lifting fork assembly which is built up from a second 2½ × ½ in. Double Angle Strip to which four Angle Brackets are bolted, arranged in pairs as shown to form two corners angle brackets 10. Bolted to the upper lug of each of these "corner angle brackets" is a Double Bracket, the lugs of which are extended by two Fishplates 11, these Fishplates projecting each side of nearby Strip 2. Bolted to the lower lugs of the corner angle brackets is a Trunnion 12, two 2½ × 1½ in. Plastic Plates 13, mounted one on top of the other, being secured to this Trunnion to serve as the lifting platform. The platform assembly is raised by two lengths of Cord trapped between the Flat Trunnion and corner angle brackets, these two lengths combining into a single length which is passed over a 1 in. loose Pulley 14 on a 3½ in. Rod held by Spring Clips in the second holes of Strips 2. From there, the Cord is brought down and around a ⅜ in. Bolt carrying a loose Washer and fixed by Nuts in the apex hole of a Trunnion 15 bolted to Flanged Plate 1, after which it is attached to a 3½ in. Crank Handle 16, held by Spring Clips in Strips 5.

Finally, an imitation steering wheel is supplied by a 1 in. loose Pulley 17, fitted with a Rubber Ring and also held by Spring Clips on a 2 in. Rod fixed in the boss of an 8-hole Bush Wheel 18 bolted to Flanged Plate 1 in the position shown.

PARTS REQUIRED

2—2	1—18a	31—37b	2—126a
3—5	1—19s	3—38	4—142c
4—10	4—22	2—48a	1—155
1—11	2—22a	1—52	1—189
8—12	1—24	2—90a	2—194
2—16	6—35	1—111c	1—213
2—17	35—37a	2—126	

Cows LIKE the Milking Machine



by Richard Lee

The old-time methods of milking cows are fast being replaced by newer and more hygienic techniques as science takes over in the milking sheds . . .

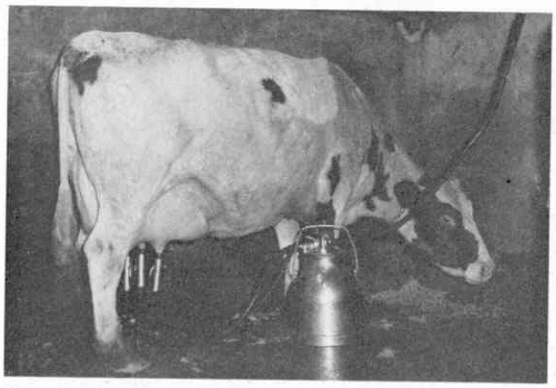
MACHINES ARE ALWAYS BEING BLAMED for the insensitive robot-manner that they work with. So it is a little odd to find a machine which owes its success almost entirely to what might be termed its 'personal touch'. This is the key feature of the milking machine.

Cows have been hand-milked from time immemorial. In many foreign countries it is still the practice to hand-milk a cow with her calf at her side. The cow gives her milk down readily thinking the calf is suckling her, but the farmer is, of course, filling his own bucket first before allowing the calf to have whatever is left. Dairy cows have been bred to yield far more milk than a single calf could ever drink and, in modern countries, are trained to let their milk down for a human operator. The secretion and delivery of milk in the cow's udder has been proved by scientists to be largely a physiological reaction which depends upon the cow being in the right frame of mind.

Before the last war there were very few farmers who had milking machines but the war brought an intensive drive to farming to grow more food—but fewer young people to 'lend a hand on the land'. Hand milking is a skilled job and very tiring to the novice. Even an expert cowman would jib at having to hand-milk more than fifteen cows twice a day. With a milking machine one man can manage a herd of thirty cows, however, or even many more with a modern parlour system.

All milking machines work on the same basic principles. They all run on vacuum power which is produced by a petrol engine or electric motor driving a vacuum pump. This is kept running the whole time that milking is in progress and is continually exhausting the air in the pipeline which runs through the cow-shed or milking parlour. By means of air taps the milking unit can be powered by the vacuum 'pressure' to draw the milk from the cow's udder to the milk holding vessel. The optimum vacuum for milking is 15 in. Hg (38cm) and a relief valve is incorporated in the pipeline to permit the ingress of air when this degree of vacuum is reached. A vacuum gauge is always mounted on the pipeline in a prominent position

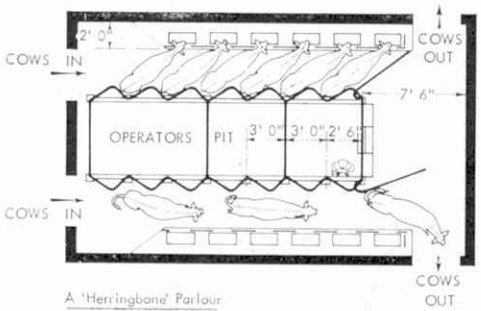
An Alfa-Lavae bucket unit—still popular on countless small farms today. The bucket holds four gallons of milk before exchanging for interchangeable empty spare bucket. *Photograph courtesy Alfa-Lavae.*



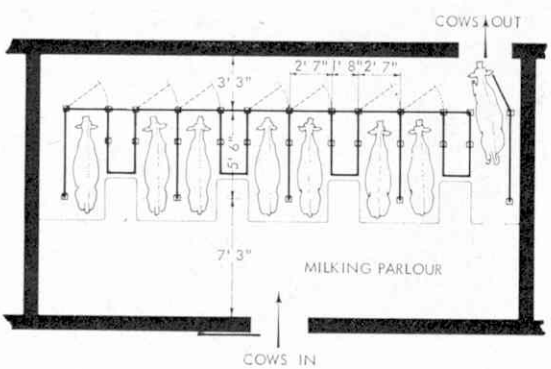
A modern cowshed and Alfa-Lavae milking installation. Milk from the milking clusters goes direct to the dairy via pipeline running alongside vacuum line over cows headrail. *Photograph courtesy Alfa-Lavae.*

to inform the herdsman of possible trouble. A small leak in the system, for instance, will allow too much air to enter for the vacuum to milk the cows properly. This would have to be found and sealed before he could proceed.

So much for the vacuum pipeline. The second part of the milking machine complex is the actual milking unit. The easiest to understand are the bucket-type units which constituted the first milking machines. These bucket units were designed to be portable so that the herdsman could milk the cows where they stood in the cowsheds—the vacuum pipe running the length of the shed over the cow's heads. The bucket unit consists of a closed metal bucket of about four gallons capacity. The lid is held in place by a snap-over handle by which the bucket can be carried. Rubber pipes connect the bucket unit to the vacuum line for power. As the vacuum is a power that is sucking all the time, the rubber pipes do not need any elaborate connections—they are just pushed over the nozzles to a tight fit and no air can enter the system.



A 'Herringbone' Parlour



An 'Abreast' Parlour

The really ingenious part of the milking machine is the cluster of teat cups which lead from the cow to the bucket. Although the teat cluster assembly is qiute heavy, when they are slipped over the cow's teats, the vacuum in the system ensures that they remain there without falling off. As the milk is drawn from the cow under the vacuum, it is transferred along the rubber milk pipe to the bucket where it drops, of course, to the bottom. If the bucket becomes overfull it would go up into the air line and would then proceed to ruin the vacuum pump. The pipeline system incorporates a special sanitary trap to catch any milk or water that might thus be accidentally drawn into the vacuum system.

The teat cluster does not milk by a simple vacuum action alone, however. The metal teat cups are fitted with an inner rubber lining into which a special gadget on the bucket unit lid regulates a vacuum 'on-off' effect. This is known as the pulsator and provides the cow with a regular squeezing motion to the teats as the teat-cup liners alternately stretch and relax. In this way the machine comes very close to simulating the actual feeling that a cow gets when she is feeding a live calf. Of course it is not *exactly* the same, and with young cows being introduced to the machine for the first time, the good herdsman will soothe a nervous animal by talking to her and handling her while she becomes accustomed to the sensation.

After a week or two most young cows will accept the machine and yield readily to this form of milking. It is the usual practice to wash the udder with warm water before attaching the teat cups, the warm wash serving to prevent foreign matter entering the milk, and also to prepare the cow emotionally for the milking routine. About a minute after washing down the udder can be seen to swell and tighten visibly as milk is being 'let-down' by the internal response of the cow. Usually the only time an adult cow becomes fractious with the milking machine and lashes out is when the udder is sore or chapped and the teat cups are giving pain. A good hot wash and plenty of udder ointment will restore this situation very quickly in most cases. If a cow kicks the cluster off the cowman must turn the air tap off that unit at once—or the vacuum will fall and cause all the other units on the other cows to fall off at the same time!

A herdsman milking in a cowshed with bucket units can usually manage about three units at once. He works to a strict time-and-motion sequence, washing and feeding cows ahead, removing units as cows finish, taking milk to the dairy for filtration and cooling, and fixing the machine to the next waiting cow—the units leap-frogging each other as they work down the line of cows. A unit will milk a cow out in about four-eight minutes. This depends on the quantity of milk the cow gives and whether she is a fast or slow milker. It is not good to leave a unit pumping away on a cow after she has finished milking.

If you have ever seen the circus act where a juggler keeps plates spinning on bamboo poles all over the ring, rushing from one to the other to keep them spinning as they appear to be on the point of falling off, you have a fair comparison to the art of milking cows under high speed techniques! According to the

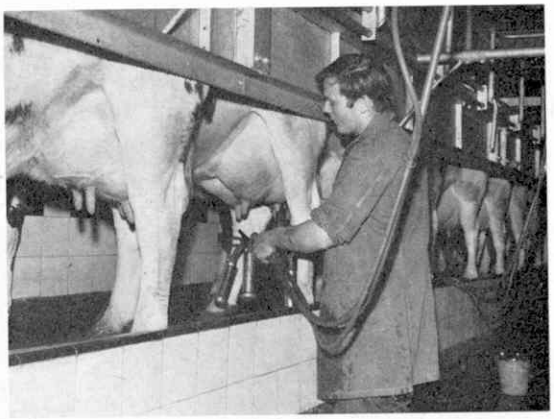
number of milking units, the operator has to prepare, wash and feed the same number of cows, remove and refix machines and get the milk off to the dairy in about six minutes. A good herdsman is a time and motion expert in his own right and goes through his operations sequence without a wasted move. In addition he copes with odd extra jobs that livestock inevitably bring with them. Whilst milking he may dose or 'drench' a cow with medicine, take a flnit from the hoof of a lame cow, apply udder cream to a sore cow and find a minute to console a nervous animal—all while attending to the milking routine!

On many farms the bucket unit milking machines has been superseded by parlour milking techniques. The basic difference is simply that the cows come to the machine in a parlour instead of the machine coming to the cow in the cowshed. Parlour lay-outs can handle more cows per man because the cowman has little or no walking to do. Most parlours accommodate a minimum of four cows at a time and some may hold as many as twelve cows for a batch milking. The milking clusters and vacuum pipelines are just the same, but the milk lines run via glass measuring receptacles to the dairy direct and save the job of carrying it away. In a parlour the cowman can have everything to hand, supplies of hot water for washing, cattle cake in hoppers for automatic feeding as the milking takes place. The cows are allowed to enter and leave the parlour by gates and doors which are operated by levers or remote-control systems. And it is much easier to swill a parlour down afterwards than to clean out a whole cowshed.

After milking the cows comes the washing-up. All milking machinery is designed to come to pieces very quickly so that it can be kept scrupulously clean. The rubber milk pipes are made of surgical rubber to stand up to boiling and steam cleaning sterilisation. The metal parts are either aluminium or stainless steel which can be cleaned and made germ free by immersion in caustic solutions. Some of the big parlours are fitted with re-circulatory cleaning systems which allow them to be cleaned without the usual dismantling after each milking.

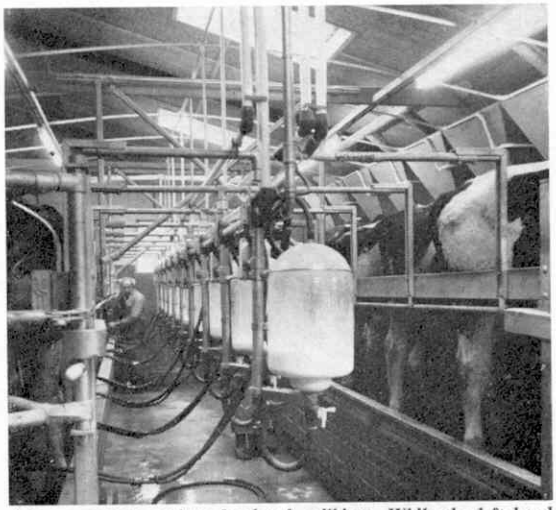
Milk has to be produced to strict standards of compositional quality and hygiene. Frequent samples are taken for bacteria analysis and tested for keeping quality. If the milk is not up to standard the farmer may lose his bonus cheques or even his producers licence. The herdsman has to be meticulous in his care of the milking machinery to keep it germ free at all times. The dairy equipment is designed to ensure that this can be done, although there are many different methods employed according to the facilities that suit the individual farm best. The milk may be cooled by running over a water cooled surface area—the cooling thus effected lowering much of the natural bacterial activity of milk, or ice-bank coolers may be used where water is in short supply. Sterilisation of equipment may be by detergent, chemical, steam or caustic solution. The milk may be put into churns for despatch or into refrigerated bulk-holders for tanker collection. Again some farmers also have a retail milk round and have a bottling plant for this purpose. The advent of waxed paper cartons for milk is another approach which is catching on very quickly.

There is a tremendous amount of technical 'jargon' in the dairy industry. Inventive people have designed modifications to the milking machine to such an extent that it takes an expert to understand what much of it is about. Parlours are made in many forms whereby cows stand in line 'abreast' or in 'tandem' or in 'herringbone' formation to be milked. The very latest idea is a rotating parlour which gives the cows a 'merry-go-round' ride while they are being milked. They all stem from the simple bucket units which are still in use and just as popular on small remote farms today. This simple contraption of a bucket and a few lengths of rubber pipe, a pulsator and a vacuum line, has been one of the modern miracles of farming—ranking equally with the farm tractor in taking the drudgery out of the 'cold-comfort' farms of yesteryear.



The operator prepares to attach the teat cups to cows in a *Gascoigne* herringbone parlour. A simple cut-off device prevents air from entering the system when the cups are hanging in a 'down' position.

None of this ingenuity would be of the slightest use if the machine did not have the co-operation of the cow in the first place. The cows look forward to their twice-daily milking times, where they will get a nice feed of cake and a soothing hot wash, to be relieved of their milk burden by a gleaming machine at their side which squeezes the milk gently away to the low, slow steady beat of the pulsator. The satisfied sighs of the machine echo the obvious contentment of the cows they tend.

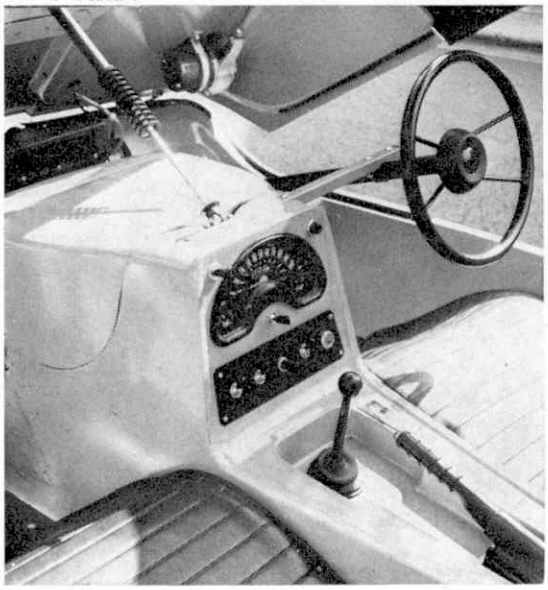


A large modern parlour for batch milking. While the left hand side row of cows are being milked, the right hand side will be washed. The units then swing over to milk them. Milk collecting in the glass vessels will be siphoned off to the dairy after recording the individual yields from each cow. A parlour of this size keeps two men busy, can you see the second man?

bond BUG

From the British firm of Bond comes a futuristic three-wheeler capable of speeds in excess of 75 m.p.h.

WE'VE JUST BORROWED FOR A WEEK what must surely be the most eye-catching futuristic three wheeler to ever be produced. It's called the "Bond Bug", rather an apt name we feel as with its long wedge shaped nose and bulging square headlights it looks very much like a fugitive from the insect world !



The small photograph (right) shows the familiar Reliant saloon on which the 'BUG' is based.

We first read about the "Bug" in a popular motoring magazine, and having shortly after seeing one in a local dealers showroom, decided that here was a car that would be of great interest to readers of *Meccano Magazine*.

The "Bug" is produced by Bond/Reliant for the 16 to 25 year olds and is available in three versions. The cheapest (the 700) costs £548, the middle one (700E) costs £580, and the most expensive (the 700ES) costs £629. The differences between the three mainly concern bodywork details although the 700ES has in addition a high compression engine. Our test Bug was the 700E version. As an incentive Bond offer a "package-deal" covering Insurance, Road Tax and a year's warranty (or 2,400 miles whichever comes first) on all models.

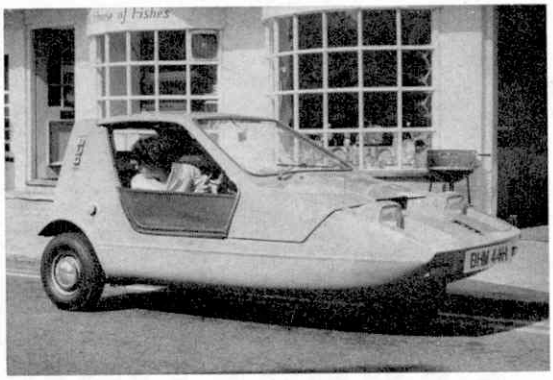
So what is a Bug ? Basically it is an all glass-fibre four cylinder, four stroke powered three wheeler with an engine unit and chassis almost identical to those found on its stablemate, the familiar Reliant Regal. Its body design is however completely different. Shaped like a slice of cheese laying on its side, perhaps its most unusual feature is its lack of doors. Access to this little two-seater is gained by hinging up the entire roof and windscreen section, hopping in and then by means of a couple of strategically placed handles inside, closing everything down into place once again.

There's plenty of room inside a Bug, the long, well padded seats are very comfortable and there is ample room for even a six footer inside. The steering wheel

Left : Futuristic lines are carried inside the "Bug". The tiny steering wheel and low seats add to its racy image.

Right: The most expensive of the new "Bugs", the 700 ES, and with the other two in the range incorporates many parts, found in the more familiar Reliant Regal saloon shown below.

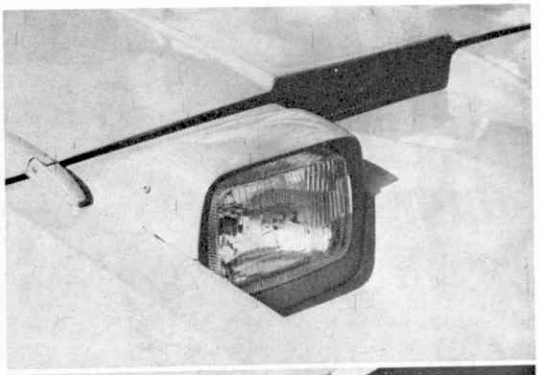
is very small and with just over two turns from lock-to-lock the Bug can be swung around corners with the minimum of fuss. The small engine (just 700 cc's) is mounted *inside* the car which although making for good weight distribution does tend to make the passenger compartment rather on the noisy side. The four speed gearbox is operated by a short gearstick, easy to use but rather on the "notchy" side. Performance is pretty spectacular by any standards. We took our Bug from London to Liverpool (to show "Spanner") and found cruising at 70 m.p.h. on the Motorway was no effort at all. Top speed would appear to be getting on for 80 and contrary to what the motoring press stated, we found that a trip of 5 or 6 hours was achieved quite comfortably and the only irritating point being the noise which prevented the passenger from having a short sleep !

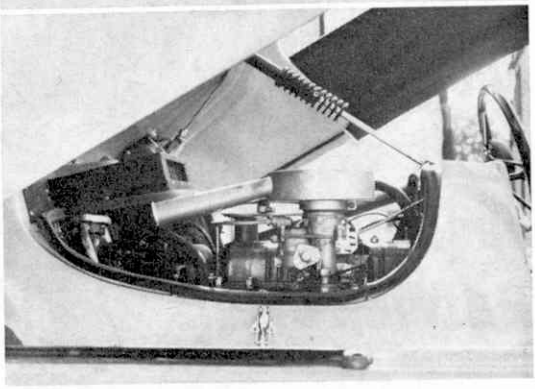


One of our local readers, Frank Canadas, gets to grip with the "Bug", and tries it out for town manoeuvring.

When the weather is agreeable, the sidescreens can be removed (as will be seen in the majority of our photographs) by simply undoing a small clip and removing them from their "gatepost" hinges. The boot situated at the rear of the car can quite easily accommodate them. With one window removed the interior is quite draught free and comfortable, although with both out at speeds over 40 m.p.h. a reasonable gale sweeps through the interior !

It is without a doubt a youngsters car; few Dads would put up with the noise and bumpy ride for long, and the rather unelegant means of getting in and out. We think it will be very popular among the under 25's, it certainly attracts a lot of attention from people of around that age, but at a price of £580 there can't be many lucky enough to afford it.

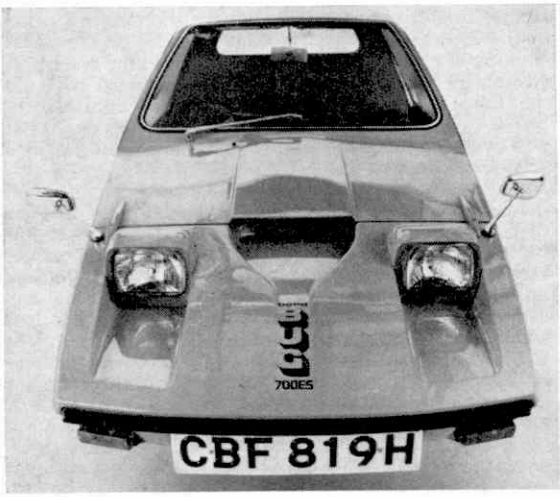




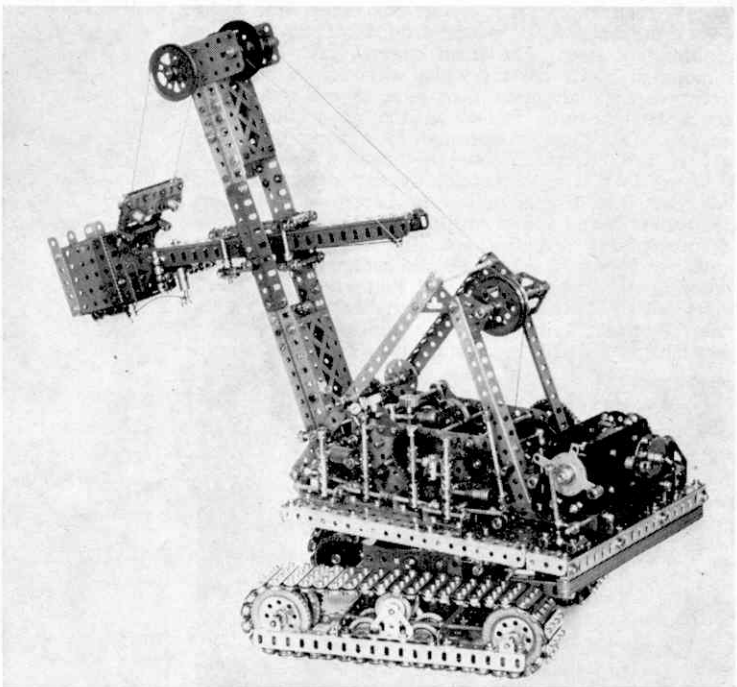
Upper : Powerful sealed beam units give a terrific beam of light well up to any full size car standards.

Lower : With the engine cover removed, limited access is given to the willing little 700 cc. engine unit.

Our thanks to Two-Strokes of Stanmore for the loan of the Bond Bug.

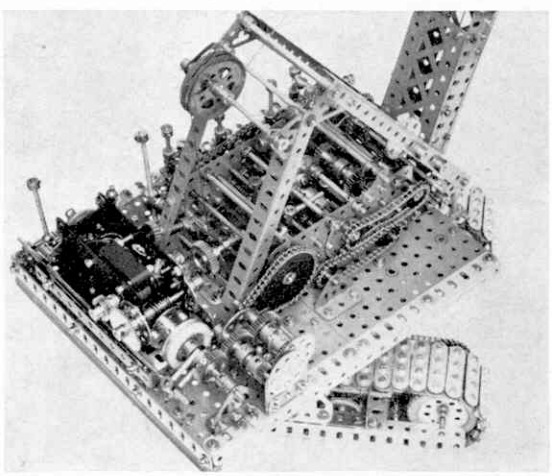


'Spanner' introduces a superb model of advanced construction designed, built and described by Patrick Lewis



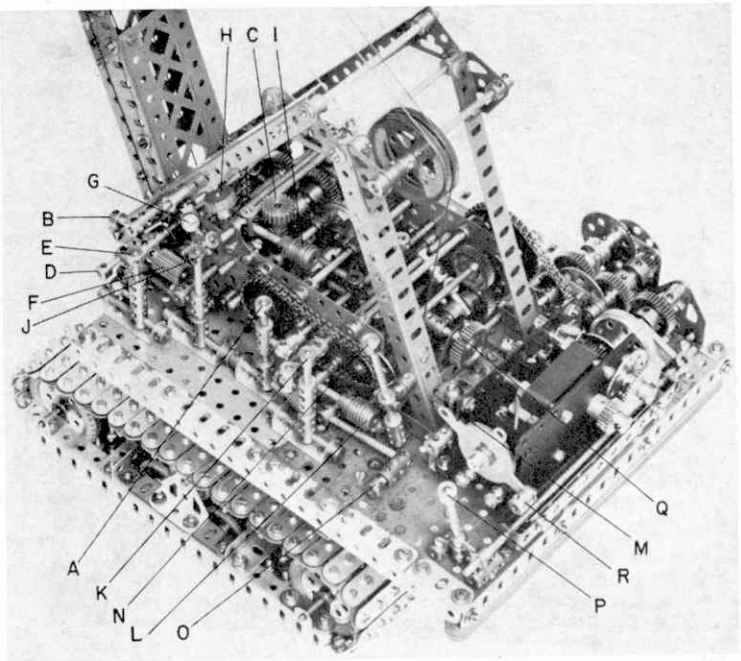
FACE SHOVEL EXCAVATOR

PAT LEWIS OF FORMBY, LANCASHIRE, has been employed as a model-builder at the Meccano Tri-ang factory in Liverpool for the past three years, now, but he has been a keen Meccano modeller for very much longer than that—ever since he was a young boy in Yorkshire, in fact. From time to time we have featured ideas from Pat in "Among the Model-builders", but on this occasion we are going much further and presenting a really excellent model he has built: a fully-working Face Shovel Excavator which qualifies as one of the most complicated pieces of Meccano engineering I have seen for a long time. Indeed, the complexity of the model prevents me from giving full step-by-step building instructions, but the accompanying photographs, coupled with Pat's following description, give a very good idea of just how outstanding the model undoubtedly is. Before getting to the description, however, and in order to show that working for the Company did not give Pat an unfair advantage, I should mention that he started to build the Excavator more than six years ago, finishing it before he joined Mecano. In other words, although Pat now works for the Company, his model qualifies as a private production!



A close-up view of the Excavator body showing the initial drive from the E15R Motor. Note the constant-mesh gearbox in the foreground which is similar to a unit featured in a recent "Among the Model-builders" article.

The machine (writes Pat) realistically performs all the motions of a real excavator, actuated by no less than 18 controls, all located on the left side of the superstructure and governing the clutch, gearbox, reversing clutches, slewing, travelling, steering, luffing, raising and lowering the bucket arm, retracting and extending the bucket arm and opening the bucket door which closes and locks automatically. Powered by an E15R Meccano Electric Motor mounted at the rear of the superstructure, the drive is transmitted by reduction gearing to a two speed constant-mesh gearbox via a clutch. A $\frac{3}{4}$ in. Sprocket Wheel on the output shaft drives the superstructure machinery that motivates the model. The entire gear complex is a constant mesh system.



This close-up view looking into the body of the machine clearly shows the large amount of operating machinery built into the model. All movements are controlled by the levers in the foreground.

Dog clutches are employed to engage drives independently to the drums, tracks and turntable. Two additional dog clutches are used in the reversing clutches operated by control lever A on the accompanying photograph. Two multi-jawed dog clutches in the undercarriage machinery control the direction one track rotates in relation to the other which enables the excavator to be steered whilst travelling. Socket Couplings are used as dog clutches to engage the drive to all the other motions. One cup of the Coupling is fixed over the boss of a gear by two Grub Screws but the gear, itself, is free on the shaft. In order to engage drive to the shaft the Coupling/gear unit is moved over by rod-operated selectors so that the open-ended socket slides over a Collar or wheel boss which is secured to the shaft by a Grub Screw. The protruding Grub Screw head engages with the waist of the Socket Coupling forming an effective dog clutch.

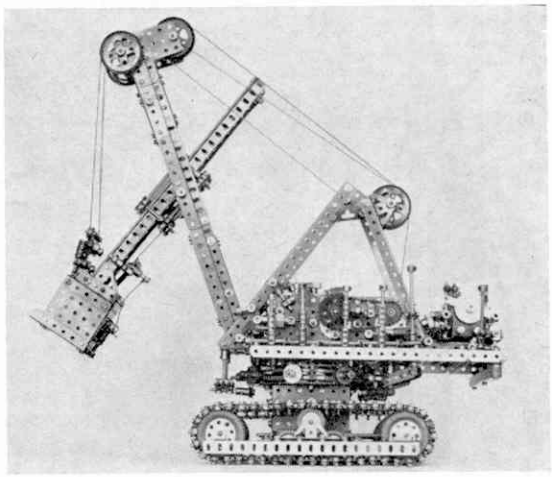
Simple yet powerful screw-operated friction brakes are used on the drum shafts together with ratchet brakes which prevent the drums from unwinding when the drive to them is first disengaged. To lower either the boom or the bucket arm the appropriate ratchet brake is disengaged and then the friction brake is eased off so that the drum is allowed to unwind slowly. The friction brake is re-applied to arrest the downward movement of the boom or the bucket arm whichever the case may be. When the brake has halted the drum, the Pawl is allowed to re-engage with the Ratchet Wheel on the drum shaft. Weighted levers control the engagement of the Pawls with the Ratchet Wheels.

Before engaging the dog clutch drive to any of the drum shafts the friction brake is released. The ratchet brake prevents the drum from unwinding pending engagement of the dog clutch. Unlike the crowding drum, the boom and bucket arm drums are driven one way only so that the Ratchet Wheels are allowed to revolve in that direction while the Pawls are engaged with them.

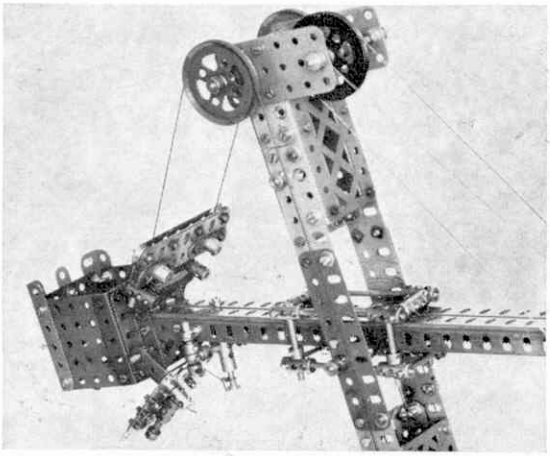
The superstructure platform is immensely strong and is stiffened further by the 6 in. turntable plate attached to, but spaced from the platform by numerous Threaded Bosses and Collars. The centre of the platform is unplated, to make room for the drives to the undercarriage machinery and turntable.

To ensure correct alignment of the bearings, eight fixed shafts connect the side plates of the machinery box. Three of these cross shafts incorporate Coupling bearings which locate the centre post, slewing pinion shaft and the drive shaft between them. Two more fixed shafts locate the centre bearing in which the shaft carrying the reversing clutches revolves. This shaft is chain driven from the layshaft which is in turn driven from the gearbox. The Sprocket on the other end of the reversing clutch shaft drives the bucket arm drum layshaft, the Chain beneath being driven indirectly from the nearer of the two 50-teeth Gear Wheels which rotate with 1 in. Bevel Gears on the fixed shaft below the reversing clutches shaft. This Chain drives the crowding drum layshaft. The reversing clutches have a neutral position on the shaft and either one can be engaged with the Collars on either side of the centre bearing.

The crowding drum shaft, operating the retraction and extension of the bucket arm, drives another drum shaft which controls the bucket door release catch. As both drums are equal in diameter and rotate at the same speed, the cord operating the bucket door release catch does not slacken when the bucket arm is extended. To open the bucket door, control B is turned clockwise. A friction brake acts on the bucket door trip-



A side elevation showing the turntable roller and movement control levers.



A close-up view of the bucket arm showing the heavy-duty nature of the constructional methods used.

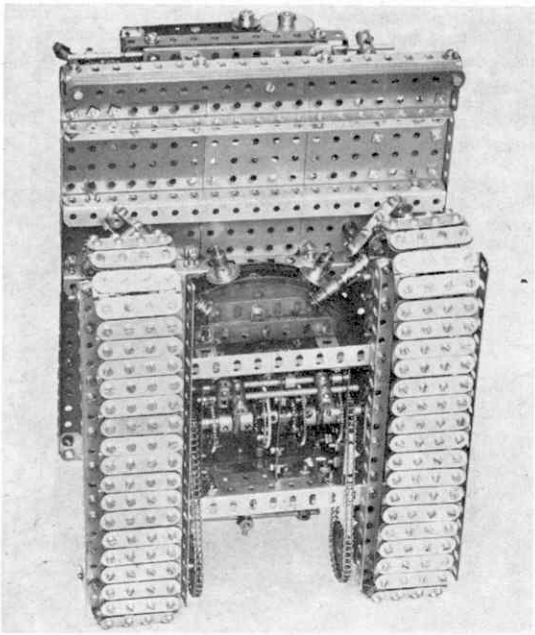
control shaft and, as this shaft and the crowding drum shaft are connected by Sprocket Chain, the brake also affects the crowding drum shaft. Similarly, a ratchet brake on the crowding drum shaft affects the bucket door drum shaft.

Built into the boom is the saddle block, pivoted amidships. A Rack Strip incorporated in the sliding dipper arm meshes with a ½ in. Pinion on the cross shaft on which the saddle block pivots. On each side of the Pinion is a ½ in. Pulley Wheel because, at present, the machine is fitted with a cord-operated crowd. It can, however, be adapted for Sprocket Chain drive from the crowd drum shaft. The cords pass under ½ in. Pulleys on the shaft serving as the boom pivot. One of the cords is reeved over and the other under the divided crowd drum so that, when the drive is engaged, one of the cords is wound in while the other unwinds. The bucket door trip-cord passes over a Pulley on the end of the saddle block cross shaft and under a ½ in. Pulley on the boom pivot shaft. As the distance between the saddle block cross shaft and the boom pivot shaft is constant, the boom can be raised or lowered without affecting the tension of any of these cords.

Three hook rollers effectively counteract digging stresses on the superstructure. A Gear Ring is fixed by Threaded Bosses to the lower turntable plate, the slewing pinion meshing with the outer teeth on this Gear Ring. Wheel Discs bolted to the centre of the turntable plates serve as bearings for the centre post on which a free-running ¾ in. Pinion is mounted, being held, with Washers, between the turntable plates. Meshing with this Pinion are two 50-teeth Gear Wheels, one of which is on the end of a shaft projecting through the top turntable plate, while the other is on the end of a shaft projecting through the bottom turntable plate. When the superstructure revolves on the turntable during slewing the Gear on the upper shaft can pass over the Gear on the lower shaft. Thus, when the upper shaft is driven, actuated by control C on photograph, the Gear on the end of the shaft turns the Pinion on the centre post, which in turn drives the other Gear on the lower shaft. A Pinion on the other end of this shaft, inside the undercarriage, shifts a Worm Gear on the rack and pinion principle. Selectors on the Worm shaft operate the steering clutches.

Carried in the track frames are the driving wheels, idler wheels and track rollers, the idler wheels running freely on fixed axles which can be moved back to take up any slack in the track. Although tyres on the driving wheels transmit a friction drive to the tracks, the grip is extremely powerful by virtue of the track design and double driving wheels. The track plates are spaced from the hinges by Nuts so that the plates do not rub on the hinge joints thereby causing considerable friction.

I hope the above details give some idea of the model, but in view of the complexity of the machine, I regret I am unable to enter into correspondence with readers on matters of construction.



In this underside view of the Excavator, the detailed construction of the track and the track-drive gearing are clearly shown.

CONTROL LEVER KEY

A. Reversing Clutches control.
B. Bucket door trip control.
C. Steering clutches control.
D. Track drive control.
E. Bucket arm crowd drum drive control.
F. Crowd drum ratchet brake.
G. Crowd drum friction brake.
H. Bucket arm friction brake.
I. Bucket arm ratchet brake.
J. Bucket arm drum drive control.
K. Boom drum drive control.
L. Boom drum ratchet brake.
M. Boom drum friction brake.
N. Initial drive gearbox control.
O. Slewing drive control.
P. Primary clutch control.
Q. Superstructure locking brake.
R. Motor switch.

AMONG THE MODEL BUILDERS

with 'Spanner'

Mr. Jack Farrington of Cwmcarn, Cross Keys, Monmouthshire, with the 6 ft. Blackpool Tower model which has obtained so much publicity for the Meccano hobby. Photograph reproduced by courtesy of the "South Wales Argus".

Block and Tackle

MAN, THROUGHOUT HISTORY, has spent a good deal of time and energy on designing machines which enable him to lift heavy loads easily, and man, as we know, has been more than successful in this direction. Today he has machines capable of lifting almost anything!

Strangely, though, one of the most common pieces of mechanical handling equipment in use today is not a fantastic modern giant, but rather is one of Man's earliest inventions—the good old Block and Tackle. It is a Block and Tackle which we feature here as the first of the month's readers' suggestions, but it is a Block and Tackle with a difference, as a glance at the accompanying diagram will show. It is based on Weston's Differential and, instead of using a system of Pulleys, it employs Gears and Sprockets, being controlled by an endless length of Sprocket Chain. Full credit for its design goes to Mr. D. R. Cowdrey of Aylesbury, Buckinghamshire.

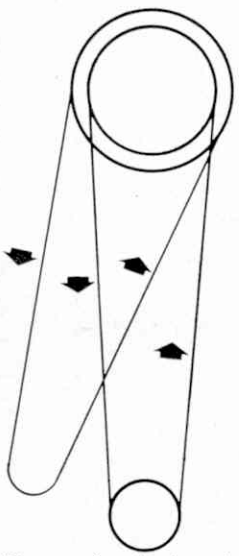


Diagram 2, showing the method of winding the endless connecting chain between the Sprockets in the Block and Tackle.

In the unit illustrated two side members, built up from suitable Angle Girders, are connected by four cross-members 1, 2, 3 and 4. Journalled in cross-members 1 and 2 is a Rod, on the inside end of which a $\frac{3}{4}$ in. Pinion 5 and a 3 in. Sprocket Wheel 6 are fixed. In mesh with the Pinion is a 50-teeth Gear Wheel 7 on the inside end of another Rod also journalled in cross-members 1 and 2. Mounted on this Rod betwen the cross-members is a $\frac{1}{2}$ in. Pinion 8 which meshes with a 133-teeth Gear Wheel 9 fixed on the end of a Rod journalled in cross-members 2 and 3. Fixed in the opposite end of this Rod is a 95-teeth Gear Wheel 10 which meshes with a $\frac{1}{2}$ in. Pinion 11 on yet another Rod, this one journalled in cross-members 3 and 4. A 1 in. Gear Wheel 12 on the outside end of this Rod engages with a second 1 in. Gear Wheel 13 on a similar Rod journalled in the same cross-members, this latter Rod also carrying a $\frac{1}{2}$ in. Pinion 14 between the cross-members. Pinion 14 engages with another $\frac{1}{2}$ in. Pinion 15 on a further Rod mounted in cross-members 3 and 4, a 57-teeth Gear Wheel 16 being fixed on the inside end of the Rod. This Gear meshes with a $\frac{1}{2}$ in. Pinion 17 fixed on a final Rod mounted in cross-members 3 and 4. A second 3 in. Sprocket Wheel 18 is fixed on the inside end of this Rod to lie close to, but not touching Sprocket Wheel 6.

In operation, the unit can be suspended either horizontally or vertically and the load to be lifted is attached to a simple sheaf carrying a third Sprocket Wheel. The diameter of this Sprocket does not effect the velocity ratio of the complete unit, therefore the sheaf size can be adjusted to suit the needs of the modeller. A useful example can be built up from two Flat Trunnions, between which a Loaded Hook and a $\frac{3}{4}$ in. or 1 in. Sprocket Wheel can be carried. The Sprocket would be mounted on a short Rod journalled

in the centre base holes of the Trunnions, while the Hook would be fixed between the Apex holes of the Trunnions in the usual way. A suitable length of Sprocket Chain—Mr. Cowdrey suggests 3 metres —is arranged round the three Sprockets as shown in diagram 2, the effort being applied to one side or other of the 'hoist' loop, depending on whether the load is to be raised or lowered.

The final word on the mechanism comes from Mr. Cowdrey, himself. "Although the mechanical advantage of the system," he writes, "is not outstanding, there are two other characteristics which recommend this device :

1. a high ratio,
2. the system does not run backwards of its own accord."

The high velocity ratio Mr. Cowdrey mentions, incidentally, is 30.

Non-standard Mesh

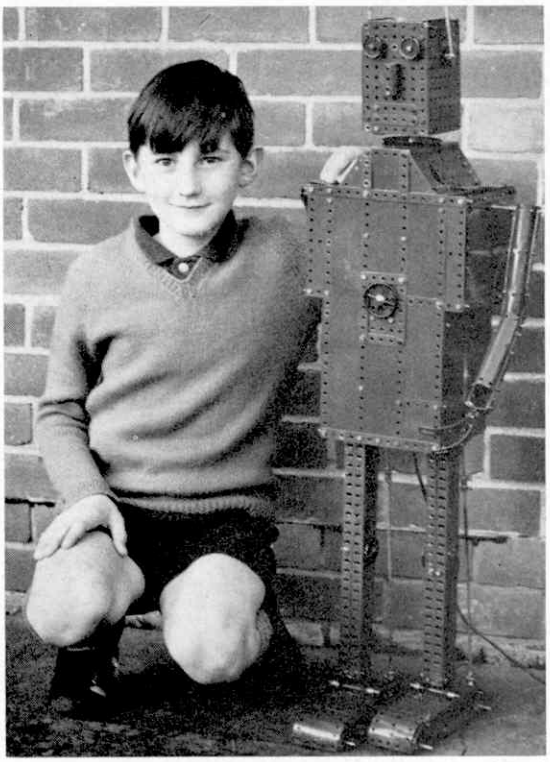
To move on to a completely different subject, Mr. P. Mercer of Ashford, Kent, wrote to me earlier in the year on a point which Meccano modellers have regularly come up against in the years since Meccano was invented. "Ordinarily," he says, "the meshing of Meccano Gears presents no problem if one keeps to the standard combinations—such as the ½ in. Pinion with the 1½ in. Gear Wheel—but, occasionally, a ratio is required which cannot be obtained by standard meshing of Meccano Gears. I choose as an example the ratio of 50 : 1. This can, of course, be obtained by the use of four standard gears, but a much neater way is to mesh a Worm with a 50-teeth Gear."

This, of course, is quite true, but, as Mr. Mercer points out, these two gears will not mesh when standard Meccano spacing is used. However, he has supplied details of a very easy way to overcome the problem—simply by mounting the Rod carrying the 50-teeth Gear 1 in two 2½ in. Stepped Curved Strips 2 bolted to the side or the Worm-Rod support Plates 3, as shown in the accompanying photograph. Using this method, the Worm and Gear will mesh perfectly.

Most older Modellers are already familiar with Mr. Mercer's idea, but I thought it well worth mentioning for the benefit of many younger enthusiasts who have only recently taken up the Meccano hobby. If any other old hands have more "standard methods" that younger readers may not have yet learned about, please don't hesitate to get in touch. They could be very helpful.

Of general interest

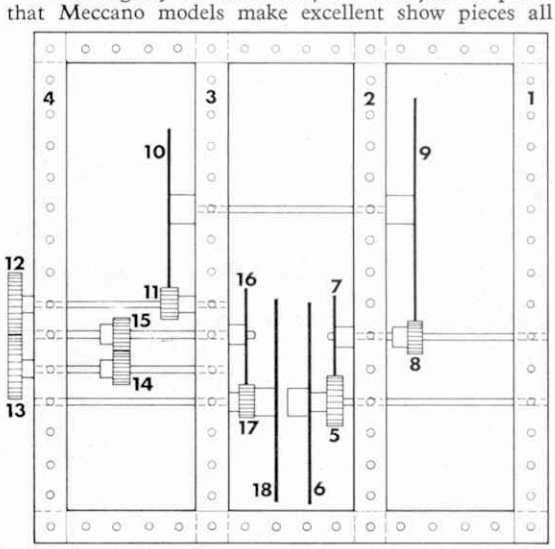
Turning away from mechanisms, now, readers of last month's M.M. may remember that we reproduced a photograph of a Robot built by a modeller in Chile, South America. Robots seem to be popular as, only a couple of days after I had finalised last month's feature, I received the photograph, reproduced here, showing 9-year-old Paul Davies of Llanishen, Cardiff, in company with a fairly large Robot he has built. Admittedly, the model is featured in one of Meccano's Instructions Leaflets, but Paul built it entirely on his own, without any help whatsoever, and considering his age, this is worthy of the highest praise. Well done, Paul ! An interesting point mentioned by Paul's father when he sent me the photograph, by the way, was that Paul unfortunately suffers with asthma, but since taking a really keen interest in Meccano his health has improved noticeably. I should like to say, in all sincerity, that we are genuinely pleased Meccano has helped, and I am sure that all readers will join with me in wishing Paul a speedy return to perfect health.



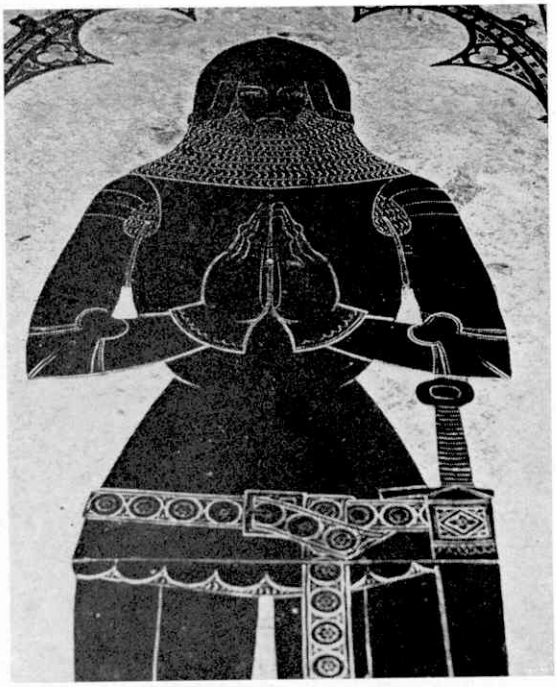
Nine-year-old Paul Davies of Llanishen, Cardiff, pictured with the Robot which he built entirely unaided. The Robot goes under the nickname of "Fred".

Australian Exhibition

On a slightly different subject—and just to prove that Meccano models make excellent show pieces all



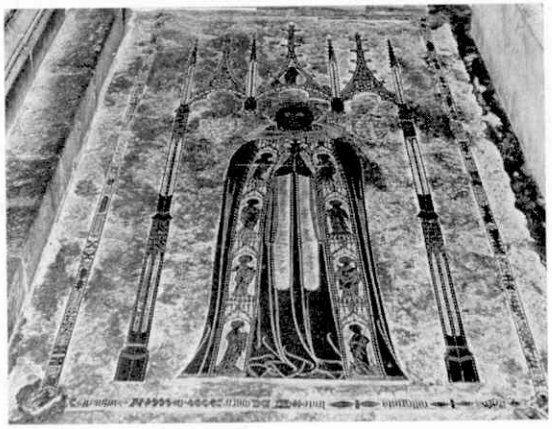
A Block and Tackle with a difference is this unit based on Weston's Differential principle and designed by Mr. D. R. Cowdrey of Aylesbury, Bucks. It has a velocity ratio of 30, but this can be increased to 42 by replacing gears 5, 7, 16 and 17 with, respectively, a ½ in. Pinion, a 57-teeth Gear, a 60-teeth Gear and a 7/16 in. Pinion.



PORTRAITS IN BRASS

Peter Wilkes describes the intrigue and history to be found in Memorial Brass Plates

TODAY MEMORIAL BRASSES, after laying neglected and forgotten for decades, have attained a popularity that their engravers could never have envisaged. The development of brass rubbing as a hobby is partly responsible for this, but brasses have also been discovered by commercial organisations, and facsimile representations grace book covers and Christmas cards, as well as making tasteful wall decorations for the home.



Engraved brass plates as memorials to the dead were introduced into England from the Low Countries towards the end of the 13th century. They immediately attained a great popularity, particularly in the Eastern parts of the country where trade with the Continental countries was thriving. These brass memorials were found to be more easily worked and more durable than the stone slabs then in use and were also capable of accepting finer engraving.

Although we use the term 'brass' in respect of these monuments, the material used was different, both in consistency and manufacture, to the brass we know today. Calemite brass was used for memorial brasses and this was obtained by heating copper and calemite ore together. The resultant molten metal was poured into stone moulds to give sheets of the shape and size required, but if a really thin sheet was required water driven hammers were used to hammer the metal from the mould until the required thickness was obtained. The designs used by the engraver were often the work of local artists that he commissioned, but sometimes existing drawings were copied. This could arise when a customer expressed a wish for a memorial similar to an existing one, or when an engraver, to increase his profit margin, decided to copy rather than incur the

expense of hiring an artist to prepare the design. Often the engraving was enriched by the use of inlaid enamels, and even today pieces of blue enamel can be seen on the shield of the brass to Sir John D'Abernon, at Stoke D'Abernon, Surrey.

This is the oldest of the English brasses. Dating from 1277, it shows the figure of a knight wearing chain mail, the armour of that age. This was made from interlocked, riveted iron rings, but it afforded only limited protection to the wearer. An arrow from a long bow could penetrate it and soon additional protection became necessary.

One of the fascinating aspects of memorial brasses is that they present a visual picture of the development both of armour and civilian wear. The story of armour is particularly well presented and can be followed from the days of chain mail, through the first attempts to reinforce it with additions of plate armour, to the grandeur of the Gothic style which represented the ultimate in the art of the armourer.

Many people have become endeared to these "portraits in brass" because they depict the ordinary people of the age and tell the story, as no other means can, of the life in the Middle Ages. Trades can be followed from the memorials to tradespeople who are usually depicted standing on a symbol of their business. At Northleach in Gloucestershire, the 1485 brass to an unknown wool merchant shows him standing on sheep and a woolpack, while at Cirencester, also in Gloucestershire, a vintner is shown with a wine cask at his feet. Shears at the feet of William Scors at Northleach leave no doubt as to his trade as a tailor and a fold of linen on a memorial at Lambourne, Essex, identified the trade as a clothier. An interesting brass at Ingoldmels, Lincolnshire, shows William Palmer, a cripple, with his crutch or, as the inscription says, "with ye stylt". This is the only brass in England that depicts a physical deformity.

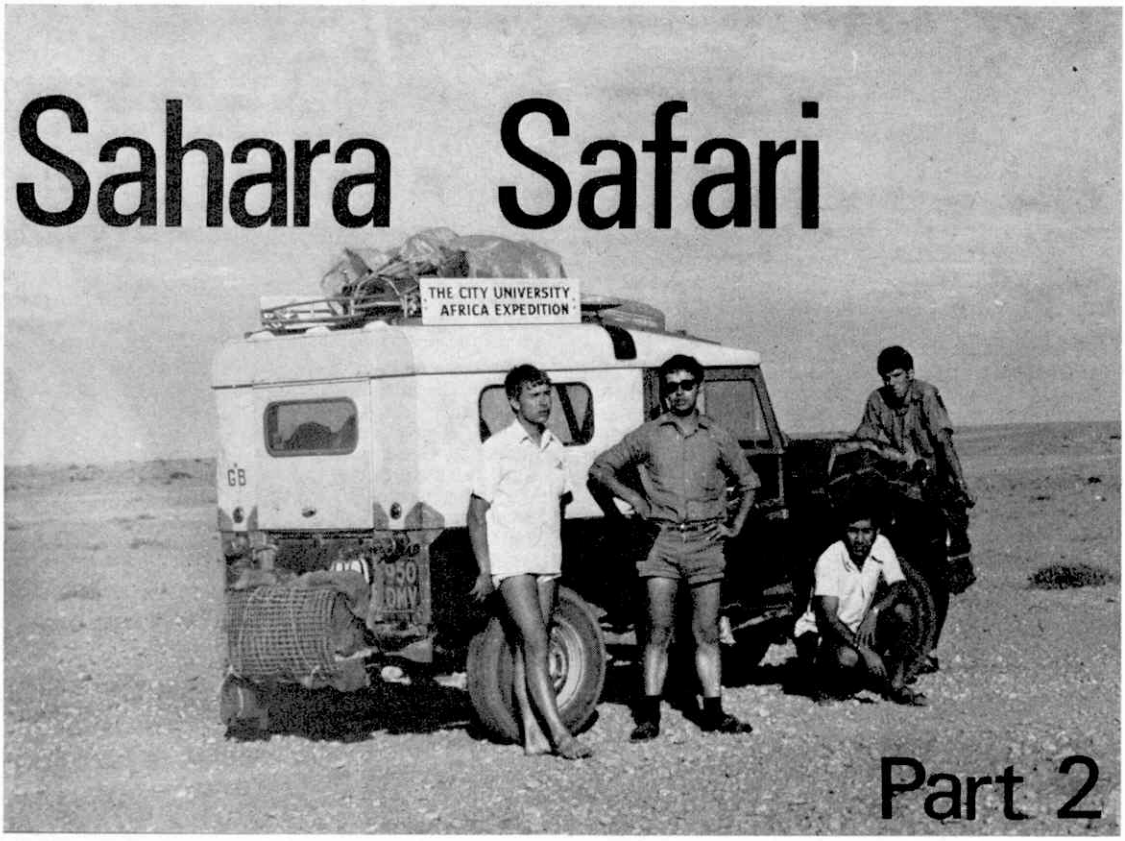
Often, from these memorials, customs that have fallen into disuse are remembered. In the church at Scrivelsby in Lincolnshire, is a brass depicting Sir Robert Dymoke, one of the family of that name who were the Hereditary King's Champions of England. It was they who entered the Great Hall at Westminster on the occasion of a coronation and, throwing down a gauntlet, challenged to combat anyone who disputed their monarch's right to his succession. Sir Robert Dymoke performed the ceremony at the coronations of Richard III in 1483, Henry VII in 1485 and Henry VIII in 1509.

Not all brasses represent people. During the 15th century gruesome memorials became fashionable and skeletons were shown wrapped in funeral shrouds. These were intended to illustrate the frailty of man and, combined with an inscription which reads, "as you see me so shall you be another day", succeeded in their purpose. After about 1640, "portraits in brass" began to lose their popularity and, as engraving declined, elaborate sculptured memorials took their place. Today however, about 4,000 memorial brasses exist in churches and cathedrals, providing interest to both historians and brass rubbers.

Brass rubbing is often considered to be a hobby of modern times but as long ago as 1775 three men, Sir John Cullum, the Rev. Cole and Craven Ord, visited churches to study these "portraits in brass" and obtain impressions of them. The system that they used was to ink the memorial using a roller and then, after the lines of the engraving had been cleared of surplus ink, press the paper in contact with the brass. This gave an impression that was reversed right to left. To add to their difficulties the only paper available was heavy and dense and obtainable only in pieces measuring about 2 ft. square. This meant that each complete impression was made up of a number of squares of paper which had to be carefully joined together.

Today the enthusiast has none of these problems to contend with. Strong but thin paper is available in sizes that will cover all but the largest brasses. The impression is obtained by rubbing the paper covered memorial with a specially prepared wax which gives a distinct black impression. The resulting rubbings are both tasteful and durable and a collection can be built up to illustrate one particular theme on life in the middle ages or individual rubbings can be mounted and hung providing a tasteful reminder of craftsmanship and artistry of the highest order.

Sahara Safari



Part 2

END OF THE ROAD

I CANNOT REALLY CONVEY the hopelessness of such a situation. I remember climbing to the top of a dune and seeing a few more tracks, all of which beckoned us on into more sand. All around us was sand, ever shifting and always quietly trying to stifle human life. Suddenly the sand was an enemy.

In the middle of all this there was an incident which became one of the more famous tales of the Africa Expedition. From the top of one of the dunes, Mo espied a young Bedouine on his camel, who was coming from the direction of Tarfaya. He ran up to him and said;

" Good afternoon, brother "

" Good afternoon brother," replied the boy.

" May peace envelope you," said Mo.

" May peace envelope you too "

" Do you know the sands around here?" enquired Mo, to which the boy nodded that he did.

" Then can you tell me the way to Tarfaya?"

" It is this way or this way or this way," said the boy, as he swept an arc of about 180°. This is not the kind of accuracy an engineer of Mo's calibre expects, so he asked;

" Brother, which is the best way?"

" Yesterday it was this way," he said indicating a certain direction, " But that was yesterday. Today, well, God has all the knowledge."

When Mo came back to the Landrover, I asked him which way we should go.

The City University Africa Expedition photographed in the Spanish Sahara. Left to right, Chris Wilson, Pat Reynolds, Mohammed Watfa and Nick Turnbull.

" God has all the knowledge," Mo replied, I didn't find this very funny at the time, and became convinced that being lost like this was already affecting our reasoning powers.

Having evaluated the young Bedouine's information, we decided to retrace our steps. We were only just in time, for the wind had already covered parts of our own tyre marks. Ten minutes later, retracing our own tracks would have been almost impossible. With a sense of relief we emerged from the dunes to see the rocky hills and the sea we had come over.

This experience had taught us how sand dunes should be negotiated; Follow the freshest tracks even if they appear to be going in exactly the opposite direction to where you want to go. So, with this new philosophy we set out again, and after about half an hour of fairly intensive driving, emerged on the other side of the sand dunes.

By the end of the day we had made about 100 miles. It was still very slow going, and we knew we couldn't do the complete desert crossing if it was all like this. But Tarfaya was some 45 miles away, and we were determined to get there. We did—the next day.

Tarfaya is a strange outpost. When the British built a fort just off the coast at the beginning of the nineteenth century, the Moroccons built Tarfaya as a fort against the British. But the British never annexed that part of Africa (understandably—after all what can you do with sand?). They just used Cape

The sands are always moving and in conditions like these the Expedition get lost.

Jubi as a handy half way stage to West Africa. Then when the Spanish annexed their bit of desert, Tarfaya became their northern most outpost, intended to stop the French in Morocco coming any nearer. When Morocco became independant, Tarfaya was given back to Morocco, and now is used as a southern outpost to discourage the Spanish coming further north. And so, isolated from Morocco by 150 miles of hostile rocky desert and isolated from the Spanish Sahara by the border, it is quite cut off. Life goes on there fairly independently of the outside world, with everything covered in a fine layer of sand being taken for granted. Cape Jubi fascinated me.

The Governor of the Provence of Tarfaya could not be found when we arrived, and it took us two hours to get our exit permits. When at last we did, it was near the end of the day, so we camped just outside the town.

The next day's drive took us across the border and on to Aaiun (Arabic for the " Wells "). Aaiun is a new concrete city which has been built in a large sand pit. It is the chief city of the Spanish Sahara, and many troops are based there. I was very amused to see several old German Junkers aircraft being used. They make a terrific noise when taking off—all three engines flat out—and stagger into the sand-saturated air above the city to disappear into the brown haze at just about tree-top height. Fortunately, there are no trees there!

To the south-east of Aaiun, the desert is flat and gravelly, and almost completely lifeless. As we went further inland it became very much hotter. In the middle of the day it was quite impossible to walk without sandles, and we could have fried an egg on Benji's bonnet. The hot air on the ground reflects the sky, and the desert looks like a mass of wonderful lakes—which disappear when you get there. The tiniest bush looks like a large tree, and mountains appear as " blobs ", hovering above the horizon, which only become attached to the ground when you get quite near. This part of the world is hostile. It is a place where direction is meaningless, and where the heat plays tricks with your sense of distance and size.

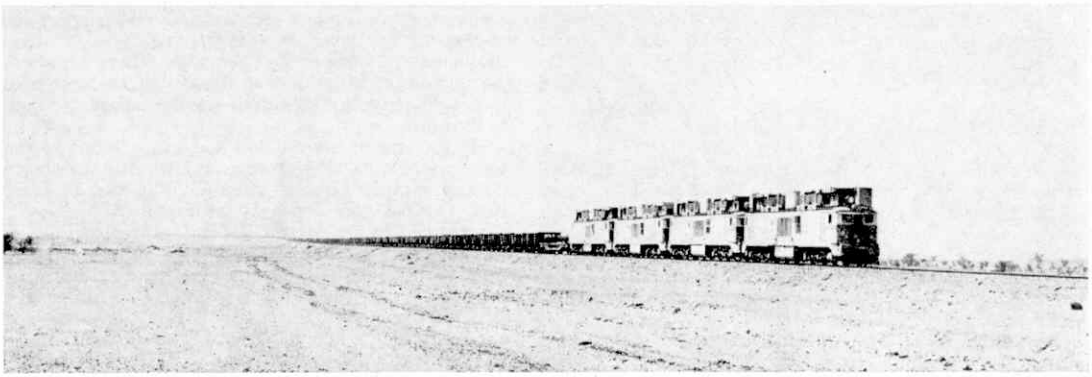
We made good progress that day, maintaining a steady forty m.p.h. for miles on end, and churning up a dust cloud that never settled till long after we were gone. Navigation was by compass, made comparatively easy by white markers spaced at about eight mile intervals. Towards the end of the day we approached the rocky hills of Guelta Zemmur, and had some difficulty navigating through the hills at night to the military outpost there. We slept the night in some prison cells while our passports were checked, and set off the next morning for Bir-Megrien, in Mauritania.

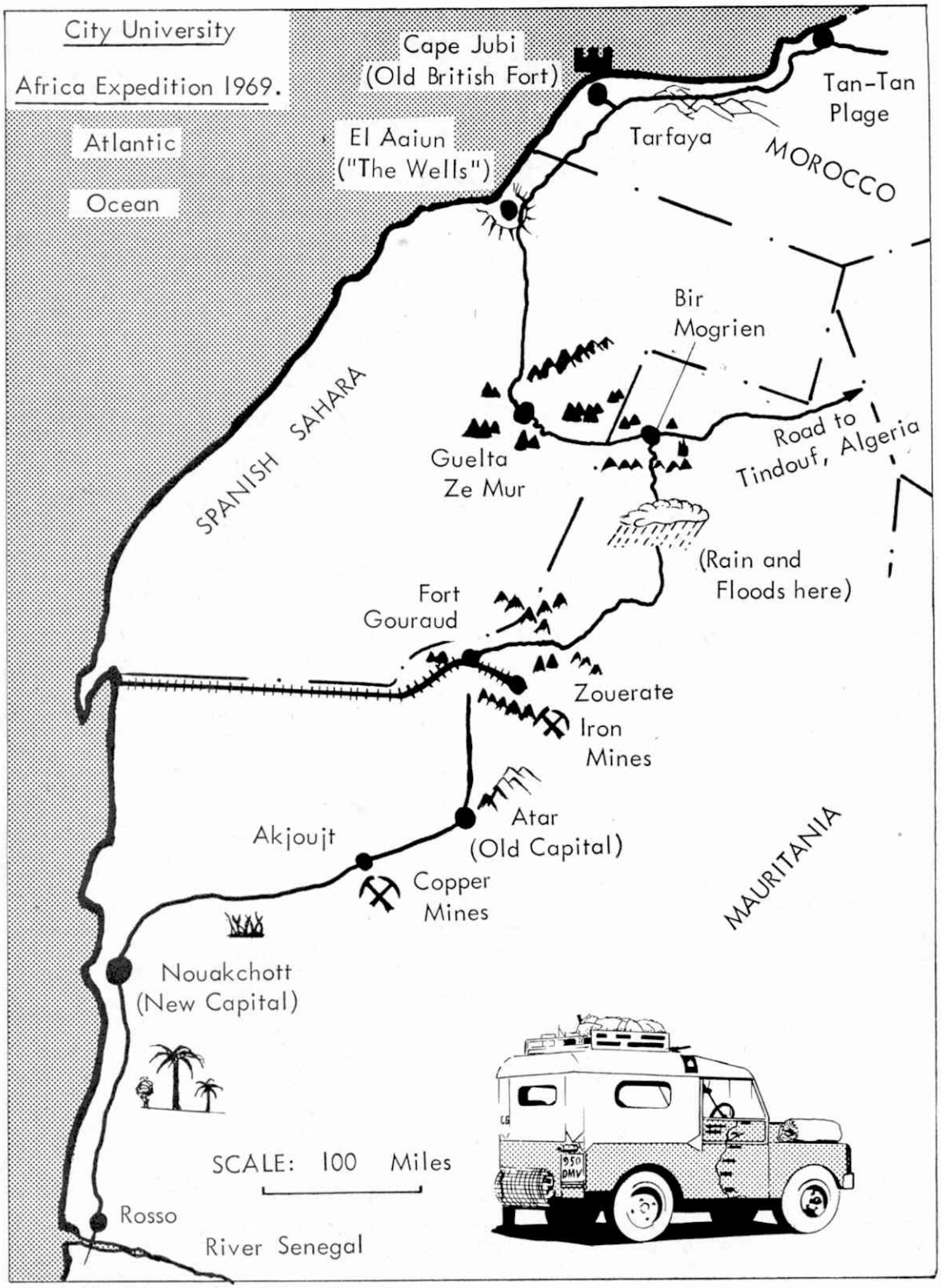
As we emerged from the winding, twisting road through the hills of Guelta Zemmur out into the open again, the desert took on a completely new form. I shall always remember that part as the " Purple Desert ". Great purple rocky pyramids 200 to 300 feet high, stuck up out of a dead flat plane of mauve sand, like rocky islands in a glass smooth sea. There was not a breath of wind, and the sky was so hazy the sun could hardly get through. Time was standing still here—the place being unchanged for millions of years—and the utter silence was unreal. It was as if we were on some distant lifeless planet. Only the occasional traveller disturbed the scene as he scuttled along in and out of the pyramids, which looked down in obvious disapproval.

Just as we were leaving the " Purple Desert " behind, I noticed a dark brown cloud on the horizon to our right. I watched it for a while, and saw it was travelling towards us at quite a speed. I told the others and it didn't take us long to agree what it was—a sand storm! According to our calculations, Bir Mogrien was only a few miles ahead. The race was on.

Benji made a valiant effort to win, and as we charged across the desert like madmen, we could see the edge of the brown cloud in front and to our right. There was already quite a cross wind, and then with virtually a blast we were enveloped in a shrieking gale, and everything went bright orange. The sand storm had won. We stopped Benji with his back end into the wind and a cloth stuck up the exhaust pipe (sand in the engine can ruin it), and sat it out. We were safe inside, although everything became covered in fine sand, and the air tasted horrible.

The train linking Zourate to the outside world. It is more than a mile long and takes eighteen hours to do the journey one way.





Continued on page 569

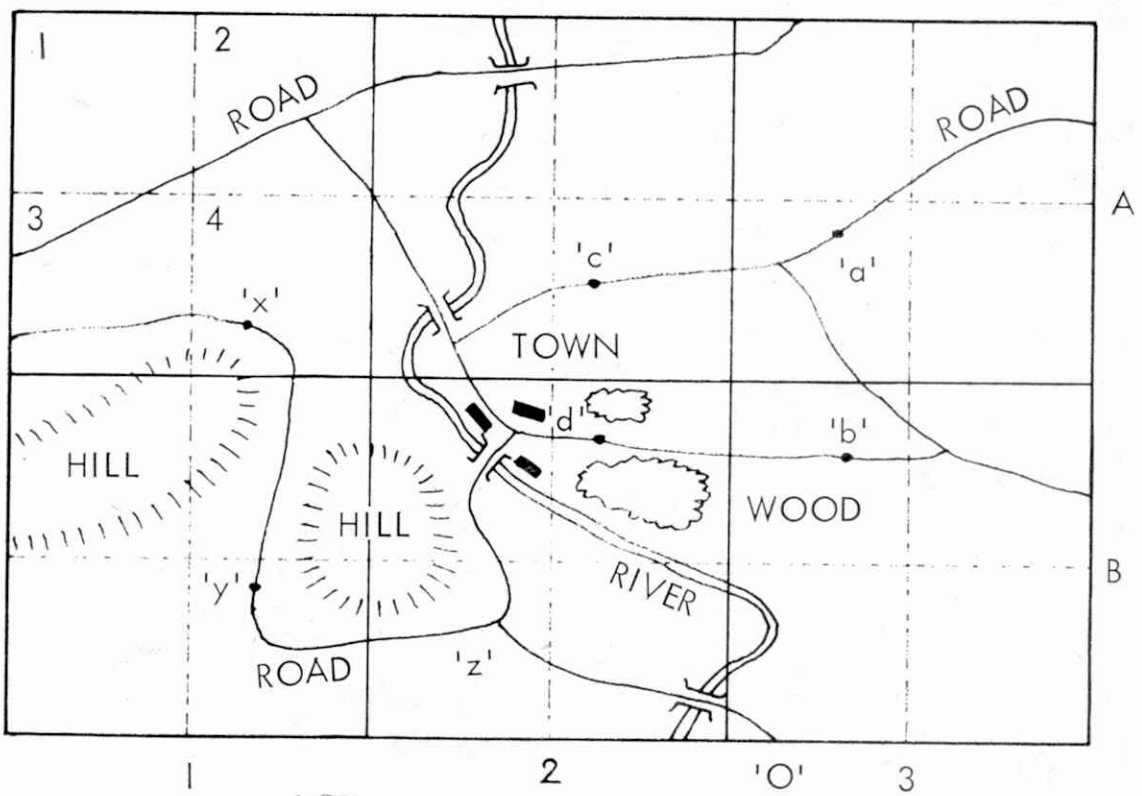
BATTLE

by Charles Grant

Part XXX—A beginning with maps

IT IS LOGICAL, I SUPPOSE, to proceed from terrain to topography, and it is with the use of maps in the wargame—or at least the elements of the 'art'—that I propose to deal now. So far, we have been concerned only with the action taking place on the wargame table, the purely tactical side of the business, and nothing has been said as to how the troops arrived there and, indeed, why they did so! The traditional set-piece engagement, in which the players array their troops on opposite sides of the table prior to setting about each other, has its limitations and sooner or later the time arrives when the player asks himself whether there should not be a little more to things than a straightforward coming to grips with what he sees opposite him. He realises that his overall view of the scene of operations (even allowing for the varying visibility factor) is neither a true nor a realistic one, and furthermore, it might occur to him that it would be a good thing were he able to divert a portion of his force on some wide flanking movement beyond the confines of the table and thereafter smite his opponent on flank or rear right lustily, with results devastating to the recipient of the operation.

All this is perfectly possible, as will be demonstrated, although inevitably some little preparation is required if one is to indulge in the strategical sort of wargame rather than the purely tactical one we have dealt with in the past. The first and obvious requirement, needless to say, is a map, or rather two identical maps, as it is much easier for each player to have his own, enabling him to mark out positions, movements and what not, without his opponent seeing his dispositions and penetrating his designs. It is possible to obtain commercially produced maps, some however being unsuitable in that they contain far too much detail for our purpose, or alternatively, too little, although if we are pushed, the latter is more preferable. It must be remembered that sooner or later a part of the map will have to be reproduced on the wargame table, and if a great deal of topographical detail has to be included the resulting clutter and confusion may well spoil the game. What we really want is simply something to



show the main terrain features—hills, rivers, woods and so on, and at the outset the less built-up area the better.

The problem, indeed, may be quickly solved by drawing up one's own map—not such a tremendous task as might be imagined—thus giving an opportunity to create some totally imaginary piece of countryside, but this is something we will take up a little later when discussing the broader aspects of the strategical type of game. In the meantime let's concentrate on the simple mechanics of operating what we call a 'map game'. It is quite an elementary business, really, and adds quite remarkably to the realism of the game and to one's enjoyment of it.

Let us start with a map then, and for the moment let us take the small section of one reproduced. Only the barest of essentials are shown, just enough to indicate how the process of moving troops is carried out. As will be seen, the map—admittedly a pretty barren piece of country—is 'gridded', the larger squares, those contained within the continuous lines, being easily identified by the grid references, for example, the top left square is A.1. Each of the large squares is divided again into four by the broken lines, they are numbered as shown in every case, and are again readily identifiable. The extreme top left small square will be referred to as A1.1, its neighbour on its right being A.1.2, the one directly below A.1.1 being A.1.3 and so on. The reason for the second grid will be apparent at once.

Now we shall consider the movements of two 'generals', whose troops are coming on to the map from opposite sides, one from the LEFT, the other from the RIGHT. As has been said previously, I find —certainly when fighting is taking place on the table— that simultaneous moving is desirable; on maps the reverse is the case, alternate moves by the players ensuring that no anomalous situations arise with people passing under each other's noses without realising that this is happening. Our first proposition therefore is that players move alternately. It will be found that, in the case of map moving, no undue advantage can accrue to any player by reason of his moving first or second—or at least very little can do so, and this sorts itself out as play proceeds.

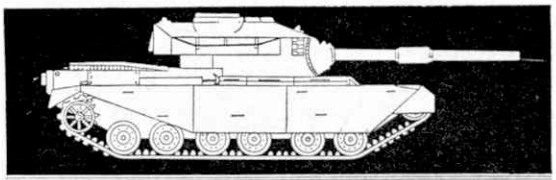
A quick word about the distance of the moves as made on the map. I don't have to point out, I'm sure, that—just as on the wargame table itself—different types of vehicles have different moves, as do men on foot of course. All, however, whatever distance they are moved on the map—and this is a matter of convenience relating to the scale of the said map—are in exactly the same proportion to each other as are the table moves. For instance, a vehicle whose table move is 12 in., that is, four times the infantryman's move of 3 in., will have, on the map, a move four times that of infantrymen dismounted. At the moment this does not greatly matter, for we shall take, for the purpose of demonstration, opposing forces of exactly the same type with accordingly the same move. Getting on with it, we assume that player LEFT has first move, and that he has a couple of armoured cars, their task being to 'recce' as far forward as possible until they contact the enemy, RIGHT. So, having quite arbitrarily given the cars a move—on the map—of 1½ in., we see that LEFT has moved his armoured cars along the southernmost of the two roads in A.1, and as each sub-square is one inch square, the vehicles at the end of the move are at position 'x', and LEFT announces to RIGHT that he is in Square A.1. The latter has a little information at his disposal now—such as he might get from aerial observation—and is aware that the enemy is in a certain area, but he is without detailed knowledge of his strength and intention. So off he goes, *his* two armoured cars entering the map separately, one on the north road (in A.3.2) and one on the southern one (B.3.2). Both make the appropriate move—1½ in.—and *they* end up in positions 'a' and 'b' respectively. RIGHT then announces to his opponent that he is in A.3 and B.3, thus 'foxing' LEFT pretty considerably.

Now it is the turn of LEFT again, and his cars race ahead, reaching, at the end of the second move, position 'y', ths being announced by LEFT as 'B.1'. Things are becoming a little clearer from RIGHT's point of view. Previously he was in a bit of a quandary, not being certain whether his enemy was on the north road, heading for the river crossing at A.2.1, or on the south road, with a different objective. So he sends his cars forward on their respective roads until they reach the end of their second move, positions 'c' and 'd' and announces to LEFT his presence in A.2 and B.2. (Generally we refer to these announcements as 'contacts', although contact is not necessarily always made —it's just a phrase). Things are hotting up somewhat and discovery is imminent, and probably a confrontation as well.

LEFT's armoured cars proceed from 'y' and at the end of the move they reach the junction, position 'z', in the large square B.2. Now, since, for the first time, opposing forces have entered the same large square, to wit B.2, the moving player has to particularise rather more. As RIGHT had already indicated his presence in the square in question, LEFT must be more explicit, and has to announce both square and sub-square, which is in fact, B.2.3. RIGHT shakes his head and replies 'No contact'. Now, both 'generals' have a fair idea of what is going on (although neither will have any idea of his enemy's strength). LEFT, having reached 'z', knows that RIGHT is in the northern part of B.2, for, had he come in from the south, by 'O', he would certainly have reached 'z' by the second move. RIGHT realises that *his* enemy must be in B.2.3, as he could not have got further in the time, but he cannot say what the enemy destination will be.

The crucial move is the third, LEFT dividing his force and sending one of his cars to the bridge at B.2.4 (to secure the crossing) and the other into the town at B.2.1 to await the enemy. In so doing he states his presence in the exact sub-squares—B.2.1 and B.2.4—RIGHT, as we already know, being in B.2.2. The ball is now in RIGHT's court, and forward go his cars, one from 'c' to secure the bridge in A.2.3, and the second—with some caution it must be said— from 'd' towards the town, his intention being that the second car should, if possible, pass through the town and head southwards into B.2.3. Given a free passage he would probably get as far as 'z'. He therefore announces 'A.2.3' and 'B.2.1'. Were there no reaction to the latter call, he would follow it up with B.2.3, but a sharp cry of 'contact!' brings him up with a jolt. (Naturally, one has to follow, in announcing positions, a logical sequence showing the progress of troops. If he had simply given the destination, B.2.3, there would have been no reply, as LEFT had already moved out of this sub-square, and the whole thing would have been rendered null and void).

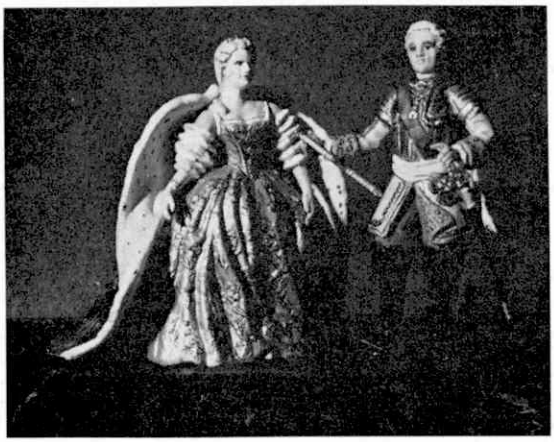
So we have finally arrived at a confrontation—the enemies are in presence—and in the next Part we shall see how each is discovered to the other and how this can be most realistically done.



MILITARIA

A REVIEW BY CHARLES GRANT

ONE OF THE MOST notable developments of recent years in the model soldier world is the emergence of the collector's type plastic figure, of which one finds surely the finest examples in the range produced by the French HISTOREX firm (British agent—L. Sangster, 3 Castle Hill, Dover, Kent). Up to the present the Napoleonic period has been the firm's prime concern, but they have now ventured—very happily, I may say—into an earlier time, with figures —the 54 mm. scale, of course—of Louis XV of France and his Queen, Marie Leczinska. The photo-



graph shows the very fine appearance of the new figures, but gives no idea at all of the really marvellous details of the moulding on the state robe of the queen, every bit of embroidery, every fleur-de-lys being minutely reproduced in relief. The two form a really magnificent pair, and for Napoleonic 'buffs', as Americans call them, there is the news that the next figures in this series are to be of Napoleon and the Empress Josephine in their coronation robes. This should make the collector's mouth water. One interesting thing is that the new types take much less effort to put together, whether this is new policy or not I wouldn't know, but certainly there are very few of the tiny bits one tends to lose track of on the work table. The real pleasure comes from painting in these two instances, and the price—28/- for the two, base included—is extremely reasonable; they are really worth it.

Exceedingly well detailed 20 mm. metal figures of the Marlburian period from LES HIGGINS MINIATURES.

BELLONA PUBLICATIONS LTD. (Badgers Mead, Hawthorn Hill, Bracknell, Berkshire) have produced a considerable number of most interesting and useful books of late, and I should especially like to mention one which I found excellent—this being "German Military Field Works of World War II" (of which the price is 18/-). To say that something is a 'must' nowadays is a bit of a cliché I think, but there is no other word that the wargamer—the World War II type—can use to describe this volume. It is basically an actual reprint of the official German manual of 1943, and although the captions to the illustrations—there are scores of them—are in German, there is a very full explanatory text in English. Every possible type of field fortifications is covered with true Germanic thoroughness, from the simple foxhole to the most complicated defence system, and as I say, the Wargamer whose period is World War II requires no other work of reference than this book to assist him in his table top battles. Very well recommended, indeed.

On a similar sort of theme is the magazine "Tankette", organ of the Miniature Armoured Fighting Vehicles Association (Secretary—G. Williams, 15 Berwick Avenue, Heaton Mersey, Stockport, Cheshire). This publication deals with every aspect of the study of armoured fighting vehicles of all kinds, their construction and their use in battle, and the journal is published bi-monthly at a subscription of 30/- per annum (35/- overseas). The copy I have deals with a wide range of topics—troop organisation, identification of units, drawings and technical details of tanks, etc., uniform details, reviews of books and so on. The actual production of the magazine merits some considerable praise, good paper, excellent printing and reproduction make it a pleasure to read. The editor has done an excellent job. I should think that for anyone—not just wargamers—interested in World War I and World War II, this is an extremely useful publication.

The Spring Supplement to ROSE MINIATURES catalogue (45 Sundorne Road, Charlton, London S.E.7) gives us some further splendid examples of the 54 mm. figures produced by Russell Gammage. This time they could hardly cover a wider historical spectrum, ranging from the most aggressive looking Amazons of mythological times, through impressive Persian 'Immortals' (the famous bodyguard of the Kings of Persia) up to Indian Army types of 1880-1914 and British infantrymen of World War II. Being, I confess, if it has not already been spotted, a bit of an 'ancient' enthusiast, I try not to be prejudiced in favour of the Immortals, but, as the photograph shows, they are really good figures, and the armament of bow and spear, plus the exotic looking robes, are shown in great detail. Even so, I have to admit that the Indian and Colonial troops show the Rose Miniature at its best—for clarity of detail, natural quality of position and simple detail of moulding they are first-rate. The pre-1914 British Empire has many devotees in the model soldier world and this series will gladden their hearts without a doubt. It is a great pleasure to me to see that Rose figures are now stocked by quite a number of better class hobby and similar type shops, and the price—it ranges from 23/- to 28/- depending on the figure—is far from being expensive.

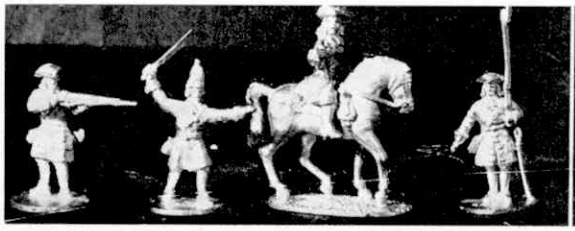
Going right down the scale—in size, that is—it was with undisguised delight that I viewed for the first time some of the 20 mm. metal figures produced by LES HIGGINS MINIATURES (78 Northampton Road, Wellingborough, Northants.) They really are accurate 20 mm. figures, not the 25 mm. which is common nowadays and in this size they are quite the best I have seen. The firm does two lines—20 mm. and 30 mm.—and it's the former I'd like to deal with for the moment. At present there are twenty or so different figures in this line, all of the 1700-1720 period—the " Marlborough " series—the age of Blenheim, Ramillies and so on, and the figures simply cannot be faulted in any way. I was quite honestly tremendously impressed by them. The detail of casting —not a vestige of ' flash ' anywhere—would do credit to figures many times their size. In mass, and painted only reasonably well, they would provide a wargame army to be proud of, and they could well stand on their own on the display shelf. Have a look at the mounted officer, for example—a real beauty, is he not ? And the grenadier about to heave his missile—another splendid figure and no mistake. Prices are normal for this size—the foot figure is 1/6 each, and a shilling each if more than 12 are purchased together. The separate horse comes at 1/6, so that cavalry, if a dozen or more are bought, are half a crown each, I suppose. For a period not too well known but worthy of much attention—wargame-wise, that is—Les Higgins Miniatures are the answer. I'm sorry if I sound overenthusiastic but they really did take my fancy. (I hope to have a note on the 30 mm. figures ere long).

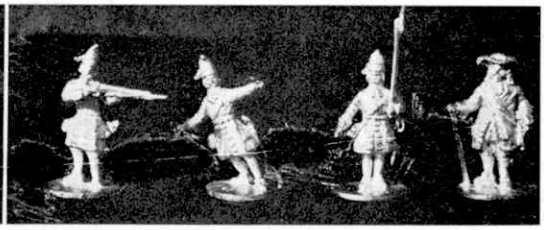
A very useful " Bibliography of Military and Naval History " has been produced by Tony Bath, Vice President and founder of the Society of Ancients (11 King Edward Avenue, Millbrook, Southampton). This provides a convenient reference to books covering all periods of military and naval history from the earliest times to the present day. It is in loose leaf form and doubtless could be added to—good value at 10/- post free.

A fine selection of Indian and British Colonial pre-1914 types, together with some splendid Persian ' Immortals ', all by ROSE MINIATURES.

Right : The Miniature Armoured Fighting Vehicles Association magazine, ' Tankette ' is full of good stuff to interest the modern period wargamer.
Left : A most useful publication from BELLONA—everything one could wish to know about German field works of World War II.

A selection of the new LES HIGGINS MINIATURES. Scale is 20 mm. and detailing is very impressive.





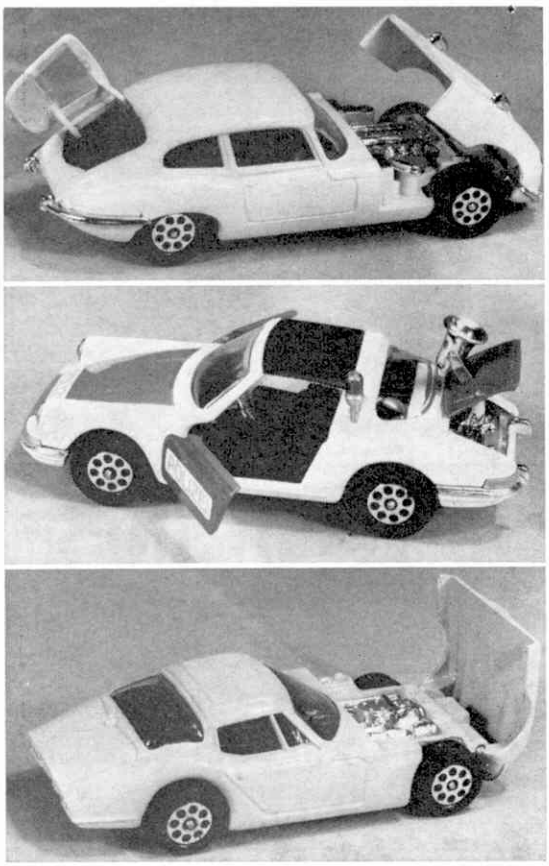
HAVE YOU SEEN ?

New Matchbox Cars

Straight in this month with the three latest releases from Corgi. Sports cars seem to be the " in " thing at the moment with die-cast manufacturers and this trio all fall into that category. It's our opinion that the finest of the three is the Porche Tonga 911S German Police car. Finished in contrasting red, white and black this model will certainly appeal to collectors. The two doors open to reveal a well detailed black interior complete with reclining seats. The boot (fitted outside with a loud hailer) also opens revealing the familiar " flat 4 " Porche-type engine.

Other features of note include Whizzwheels, jewelled headlamps, POLITZEI labels on bonnet and doors and finally a simulated flashing blue lamp on the offside window pillar. The Porche costs 9/6d.

Bottom : The new MATCHBOX Marcos.
Centre : Beautifully detailed Porche Police car, once again from MATCHBOX.
Top : ' E ' Type Jaguar from MATCHBOX.



The " E " type Jaguar which is the second Corgi model we look at is one of the most realistic " E " types we've seen in die-cast form. Our sample is finished in lemon colour, a colour which contrasts well with the black and chrome " Whizzwheels ".

The bonnet hinges forward to reveal a chromed engine unit, and the rear door opens to reveal a matt black interior. A complete exhaust system is fitted to the underside, rounding off a nice little model. Price of this one is 9/6d.

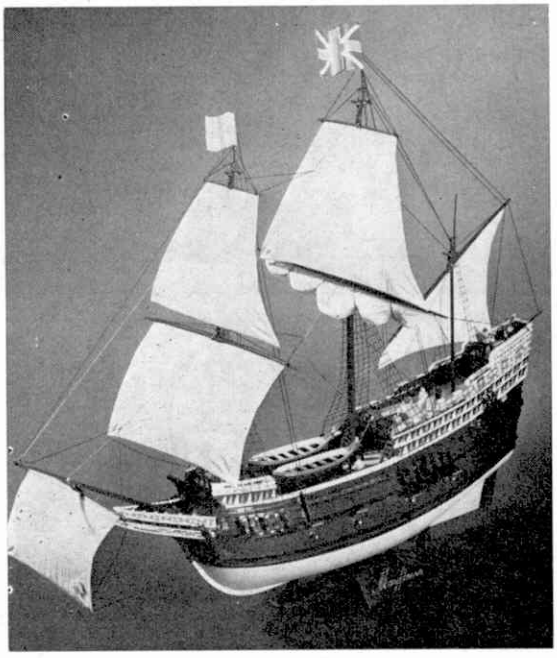
The final Corgi this month is a Marcos 3 litre. Finished in mustard yellow, the only working feature is the bonnet which lifts to reveal a chromed engine unit. Whizzwheels are fitted of course, but we were a little disappointed with this one. The paint finish was rather thick and the " Marcos " symbol on the bonnet too large and mounted off centre. Price is 6/11d.

Airfix

Recently received from Airfix are a whole batch of new plastic kits. Quite frankly with the tremendous rate at which kits are arriving here at the office we just can't build all of them up as we have done in the past, but instead have shown them to our chief kit builder who reported on them as follows :

A.M.S. Mayflower

This is of course a model of the vessel used by the Pilgrim Fathers in their voyage to America. The model is 15 in. long and well moulded in dark brown. A set of plastic cream coloured sails are provided as indeed is the rigging, etc. already moulded and only requiring gluing into place. At 21/6d. this kit would appear to be good value.



The latest *Airfix* kit is this 15 in. long model of the Mayflower the full sized version of which took the Pilgrim Fathers to America.

H.M.S. Leander

This model of a modern frigate measures only 7½ in. in length and for those bored with the conventional sized kits will provide an interesting change. There are only 70 parts and because of this would be a suitable starting point for the novice. Its price is a mere 2/11d.

Below: The Airfix H.M.S. Leander, outstanding value at 2/11d.

B.A.C. Jaguar from Airfix, a well-detailed model at a good price.

B.A.C. Jaguar

Aircraft are always popular with our readers and another new release from Airfix is a 1/72nd model of the B.A.C. Jaguar interceptor. Containing 80 parts moulded in grey with transparent cockpit, etc., and a comprehensive set of decals, at 6/- is undoubtable good value.

Toyota 2000 G.T.

This is a model of one of Japan's fastest sports cars and its body shape has been well produced by Airfix. The kit, costing 15/-, naturally contains a fair number of parts (well over 100 in fact) and so is not really a good model for the inexperienced model maker. The main parts are moulded in white, with clear windows and lights etc., and a reasonable amount of chromed " extras " are included.

S.R.N. 4 Hovercraft

The most impressive of the new releases is undoubtedly this one. In 1/144th scale this model is most unusual and appealing and is at present in the throes of construction. A full review will appear next month.

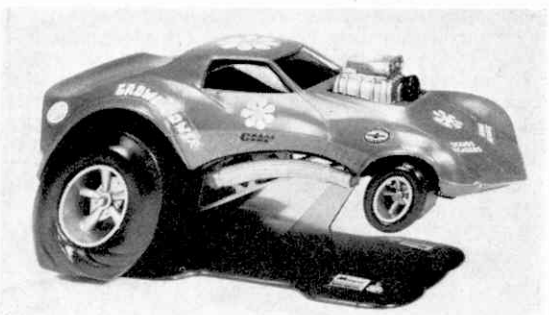
Monogram ' Fun ' Cars

Four " fun " car kits have just been released by Monogram, these are Ross Mustang, Screaming 'Vette, Dune Rat and Thunder Bug.

These are really caricature type models of famous cars. They snap together in about 5-10 minutes, no glue or paints are required. Moulded in about 4 different colours the models look quite attractive when assembled. A sheet of self adhesive emblems are included for these kits. Either nauseating or groovy according to your taste, prices are to be announced.

Airfix Handley-Page

The Handley Page Jetstream is one of the latest aircraft kits from Airfix moulded in over 60 parts in white polystyrene plastic, the model goes together very well. Full interior details such as stretchers, seats, cockpit consoles are provided and can all be seen through the crystal clear transparencies. Points to note are the finely detailed undercarriage and gloss decal sheet, which is very well printed. Fairly simple to assemble the kit is reasonably priced at a mere 6/-.



' Screaming ' Vette, one of the new crazy models from Monogram. All are ' snap-together ' kits needing no cement.

USS Constitution from Revell

From Revell comes a superb 22 in. model of one of America's most famous ships, the USS Constitution. Containing over 100 parts this kit builds up into an incredibly well detailed and authentic looking model.

It isn't a model that can be just glued together in one evening, it is in fact a model for the enthusiast, and relies on patience and a fair amount of skill to complete successfully. At a price of 42/- it represents excellent value for money.

SAHARA SAFARI

Continued from page 561

Two hours later the wind had subsided, and the air was comparatively clear. Benji started without hesitation, and willingly took us on to Bir Mogrien, not more than one and a half miles away, *They* never even saw the sand storm. An annoying and unnecessary delay over passports kept us for the rest of the afternoon, and we eventually set up camp just a few miles out of the settlement. That night we went to sleep with a determination to reach Fort Gourard the next day. If the desert was as flat as it had been the previous two days, this was a perfectly reasonable target.

But the next day was Pat's birthday. Although this in itself didn't result in the desert immediately becoming covered in sand dunes, boulders, crevaces and impossible mountain ranges, it did result in the desert filling up with water. Admittedly the desert had never filled up with water before, according to the local Bedouines, but this was no reason for it not fiilling up on Pat's twenty second birthday, which it did. We now regarded the sequence of events surrounding Pat's everyday life with a certain amount of suspicion. In Spain he had managed to locate the local motor-cycle Police midnight meeting place without any difficulty, and on his advice we spent the night there with a deep puddle on our left, a rubbish tip on our right, a 50,000 volt cable above us, whose pylon behind us attracted most of the lightning for miles around during the thunderstorm which happened to be raging around us at the time. We had not, however, learnt to predict the impossible on occasions like his birthday. Had we been a little wiser, we would have been expecting Martians for tea!

Seriously though, when the sky became decidedly overcast at about 10 a.m. we were surprised. When it started to rain we were absolutely astounded. Immediately we got out and filmed it. We filmed it on the windsrceen, on our hands, in the sand—everywhere it could be filmed, movie, stills, colour, black and white. We filmed intensively because we expected it to stop at any minute. But it didn't. We had already made sixty miles when the rain started, and an hour later things were still " looking good ", even if they were a bit wet. By 1 p.m. however, the desert was soggy, and Benji was finding it hard work. Already much of the land was underwater, up to a foot deep in places. A Bedouin came up to us at about that time, and from him we learnt that neither he, his father, grandfather, great grandfather etc. etc. had ever seen rains like this. (This same freak storm hit Algeria and Tunisia two days later, causing £6 million worth of damage and making world headlines).

' Benji ' the Landrover up to his axles in wet sand. The expedition party spent many hours trying to dig it out, but in the end were forced to wait for better conditions.

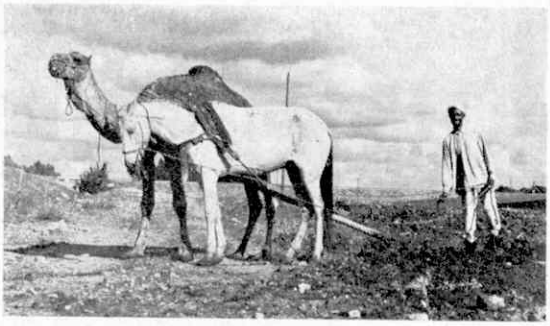
At about 2 p.m. Benji got badly stuck. An hour's digging and pushing enabled us to sink in again about half a mile further on, In our determination to keep going we used a lot of valuable petrol and drinking water. At 4 p.m. we accepted that the struggle was both futile and dangerous. It was a moment of truth for the expedition. The storm had got worse if anything, and now there was the added danger of lightning. The desert was flat to within about eight feet, the lower ground being underwater, the higher ground exposing Benji to lightning. The nearest help was more than 100 miles away. Understandably we were worried, but managed to celebrate Pat's birthday with a cake made from the finest mud we could find. Fortunately tiredness got the better of our anxiety, and we all managed to go to sleep early that night, despite some colourful speculation of how we might (or might not) wake up.

By morning the storm had completely gone, and when we awoke the sun was doing a nice bit of mopping up. After a welcome wash in one of the remaining puddles, followed by a leisurely breakfast, we set off again. The ground was still horribly soft, and we got stuck several times that day. The garden fencing we had brought along as sand mats proved most effective and by the end of the day we were fairly good at digging Benji out of the soft mud. At 11 p.m. that night the Expedition reached Zouerate—just. I remember well the philosophising which went on about the merits of civilisation in general, and the merits of beer at the Bar Texas, Zouerate, in particular. It tasted awfully good!

Zouerate is a " private " town owned by the " Miferma "Iron mining company. It has a considerable European population (perhaps two or three thousand) and is a complete community in itself. Here the wives and families of the mining engineers and staff live in very pleasant, spacious air conditioned bungalows. Everything has to be shipped into the town, even the water is brought in on the mile-long train that comes from the coast nearly five hundred miles away, The mine itself is situated in the rocky mountains above Zouerate, and the process consists essentially of cutting up the mountain and loading it onto the train. These particular mountains are made of iron ore. Although we only intended to spend a morning there to re-stock with supplies etc., we made a number of friends and ended up staying two days.

We set out much refreshed after the break, following the railway for nearly 100 miles. At first the desert was flat, but there was a fair amount of soft sand, and we only made slow progesss. That night was spent next to the railway—not the kind of thing I expected in the desert! During the following day's drive the desert began to change considerably as we steadily climbed up to the plateau of Atar, the old capital of Mauritania. The land was rocky and harsh, but not lifeless. Stunted trees and bushes grew among the boulders, and the local population consisted of lizards, chameleons and insects. Atar itself lost 140 houses as a result of the storm a few days before (it occurred to me that the town would cease to exist in about four or five years if such storms became a regular thing). It then occurred to me that few people would miss Atar if that did happen!

In Atar we had a very annoying episode with the Police. They kept us waiting for five hours, while



A typical farming scene in central Morocco. Horses and camels work happily side by side but unhappily it is a very hard life for them.

they " checked " our passports. At last, when evening came they released us and we all vowed not to check in or out of any other town in Mauritania. This led to an amusing situation on the way back five weeks later when we wished to re-enter Mauritania. According to our passports we were still between Atar and Akjoujt, and we had exceeded our allowed time in Mauritania by five weeks. So they couldn't let us into the country because we had apparently never left it, and they couldn't let us out because we had already been to Senegal and Sierra Leone. Various solutions were put forward by the Expedition, one theory being that the great Moslem country of Mauritania had annexed Senegal and Sierra Leone, which were not inside Mauritania, but this did not amuse the officials.

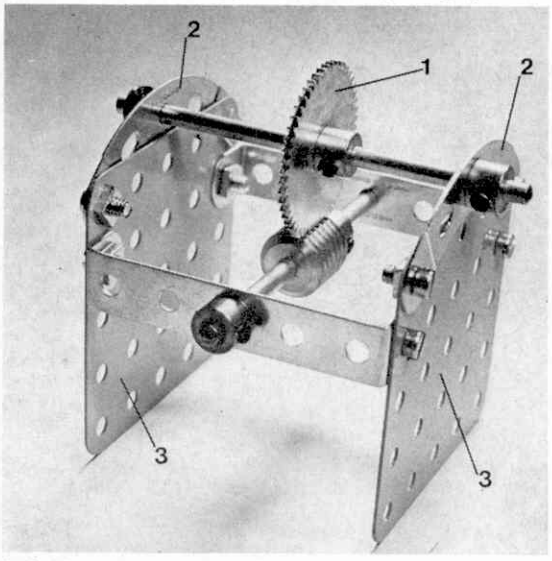
The road south west of Atar was well defined, and a day's driving took us beyond Akjoujt. Akjoujt is a sleepy little settlement which is just starting to wake up because a Canadian company is starting some copper mines there. In ten years time it could well be another Zouerate. It was just after Akjoujt that the desert terrain started to take on a more green, less sandy appearance, the first sign that we were coming out of the desert. This had the effect of provoking the comment, " I told you so " from someone, which related to the incident when the said person was navigating and there was at least one individual who was of the opinion that we were heading for Timbuktu!

The desert ended abruptly as we crossed over onto the tarmac roads of Nouakchott, capital of Mauritania. It was a great moment, and the entire Mauritanian Air Force (two Austers and two D.C. 3's) was parked outside its hangar—a sure sign that civilisation still existed! For nearly eighty miles north of Nouakchott we sped along a real, properly made road. Then a hundred miles or so of track brought us to Rosso, on the evening of Saturday, September 27th. On Sunday we crossed the river Senegal into West Africa, we'd made it!

AMONG THE MODEL BUILDERS

Continued from page 556

over the world—I was sent a photograph of part of the Meccano stand at the Royal Melbourne Show held in Melbourne, Australia, during October and November last year. Although the stand was organised by Mr. Oliver Waring, Meccano's " Man in Australia," most of the models appearing in the photograph were built by keen enthusiasts out there instead of by professional model-builders. Indeed, one of the models shown was of a Destroyer which was Colin Burnett's prize-winning model featured in greater detail in last February's issue of *Meccano Magazine*.



A simple way to mesh a Worm with a 50-teeth Gear, supplied by Mr. P. Mercer of Ashford, Kent.

I understand that Mr. Waring receives a great deal of help and co-operation from " private " modellers, and this is something for which both he and the Export people at Binns Road are deeply grateful. Unfortunately, the photograph in question did not reproduce very well and so we were unable to use it in the magazine.

Talking of size and complexity, one other photograph which I must include is that showing Mr. Jack Farrington of Cwmcarn, Cross Keys, Monmouthshire, with a giant-size Blackpool Tower he has built. I first saw Jack's Tower, " in the flesh," at this year's Model Engineer Exhibition in London and can report it to be a splendidly-detailed and accurate reproduction, the accuracy extending right down to the " arcade " built round its base. It stands some six feet high and uses well over 1,000 parts, including Nuts and Bolts, in its construction.

As a matter of interest, Mr. Farrington has netted a good deal of publicity for the hobby with his tower. It first appeared in the G.P.O. house journal, the " Courier ", then turned up in the " South Wales Argus ", followed by a showing on Harlech Television. Next came a write-up in the " South Wales Echo " and I understand that it has even been filmed by Welsh B.B.C. Television for showing in " Wales Today ", the latter no doubt having been screened by the time this Magazine goes to press. Congratulations on a first-rate model which has done a great deal of good for the hobby, Jack !

In closing, our thanks go to the " South Wales Argus " for permission to reproduce the accompanying photograph of Jack and Tower.

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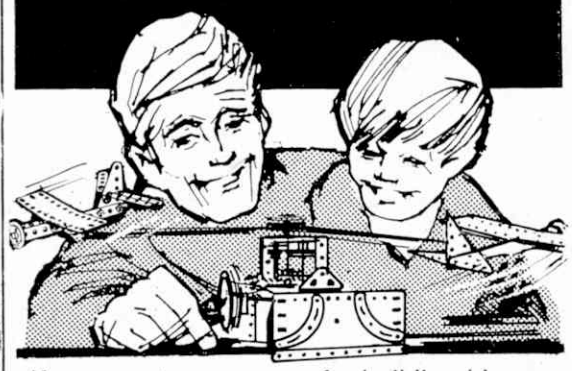

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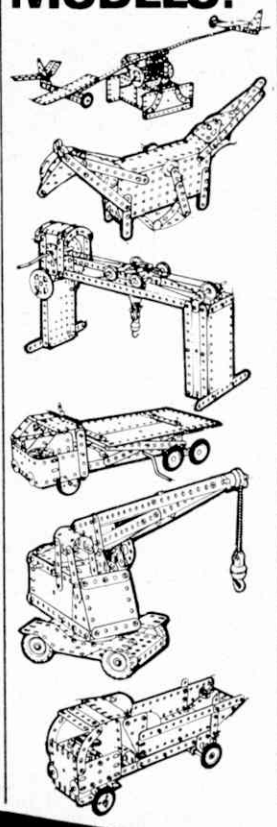

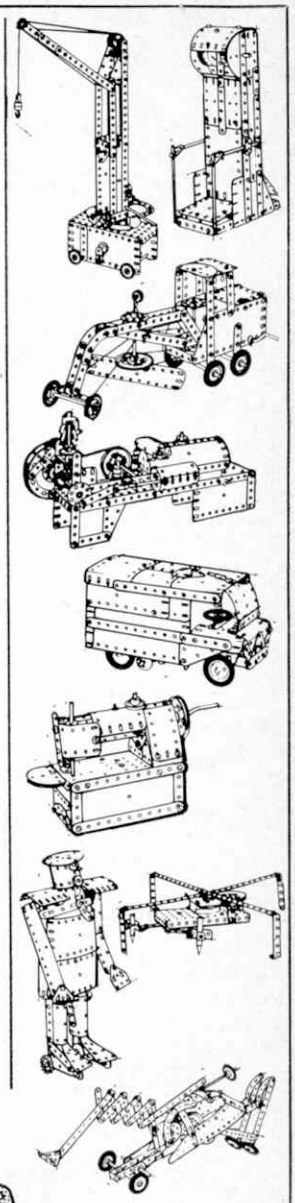

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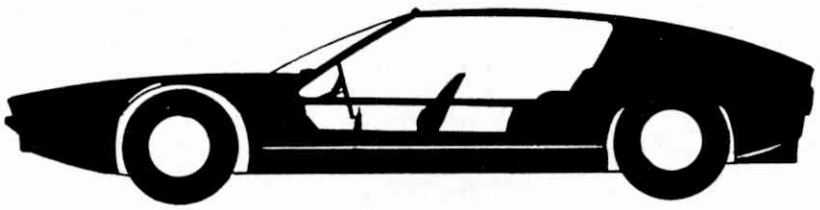

DINKY TOY WINNERS!

Below is a list of the winners who correctly identified last month's silhouette and were the first to send their entries to the *Meccano Magazine* Office. To those of you whose entries were wrong, or didn't perhaps get them off to us quickly enough, don't despair, but have another try this month. The last month's car was, of course, a Pontiac Parisienne.

Winners.

R. Levy, Manchester, N. Boot, Buntingford, P. Fisher, Cannock, K. Wood, Ilford, J. Wood, Ilford, A. Drake, Cambridge, S. Salmon, Winchester, R. Green, Isleworth, A. Garner, Manchester, J. Wells, Crewe, P. Morrey, Crewe, C. Parsons, Lincoln, R. de Tullio, Chelmsford, W. Pulman, Woking, A. Moore, Knaphill, K. Saunders, Southampton, G. Saunders, Southampton, P. Knight, Brentwood, C. Stokes, Hailsham, D. Sleightholm, Angmering on Sea, P. Beecroft, Sheffield, K. Marchant, Gravesend, H. Wilson, Ongar, N. Hodson, Pinner, S. Trott, Pinner, M. Styles, Shenfield, M. Bird, Birmingham, I. Yule, Bearsden, D. Cossells, Edinburgh, G. Dugan, Blackheath, M. Stamp, Reading, E. Sailley, Morden, P. Glynn, Birmingham, S. Rollinson, Havant, M. Holliday, Wallingford, A. Favell, Birmingham, I. Welds, London, J. Harrison, Battle, G. David, Hucknall, P. Yates, Liverpool, M. Kerr, Chelmsford, D. Nolan, Chandlers Ford, M. Hirst, Sandbach, R. Parkin, Hertford, B. Parkin, Hertford, A. Peacock, Hertford, J. Moore, Wychwood, S. Copeland, Uttoxeter, J. Stevens, Woking and S. Cartham of Bude.

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For Sale. Meccano No. 8+ red/green. Offers—Lonnon, 116 Pinewood Green, Iver Heath, Bucks. H

For Sale. Meccano Magazines from December 1957 to May 1962 complete. Good condition. —R. Palmer, 66 Bradbourne Road, Sevenoaks, Kent. H

Large Collection of Dinkys, many of them supertoys, mostly mint, boxed. Also Matchbox series, and Hornby "O" gauge trains all reasonable prices. S.A.E. for list to—P. Downey, 5 Swiftsden Way, Bromley, Kent. HI

Pre-war Meccano. Clockwork motor—gears, etc. Best offer secures.—Leonard Oliver, "Peneglos," 37 Trevingey Road, Redruth, Cornwall. H

Perfect Replica's P/N 119 Channel Segments $ (Aust.), 8.00 per set of 8 (Airmail $9.50). Each set makes an 11⅛ in. diameter circular channel girder. Two sets make an excellent *large* roller bearing similar to obsolete P/N 167, instructions supplied if required. Replica P/N 156 Pointer $0.75c each (Airmail $1.00).—W. R. Inglis, 219 Blackburn Road, South Blackburn, 3130, Victoria, Australia. HI

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Collector Disposing of surplus models. Dinky, Corgi, etc. Send for lists to—D. Hardman, 20 Linden Road, Tunnel Hill, Worcester. H

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Meccano Magazines, May 1949-April 1957. Complete v.g.c. Offers to—45 Tyersal Park, Bradford 4. H

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Meccano Magazine Sought for June, 1934 (Vol. XIX, No. 6). Write price and condition to—P. Naritomi, 901 Washington Blvd. Venice, California 90291, U.S.A. H

Collector Urgently Requires for surprisingly high prices, any unusual cast iron and tin toy childrens' money-boxes made before 1950. I particularly want a "Footballer" money box, a "Tommy," "Queen Victoria," "Wimbledon," "Grenadier," "Volunteer," "John Bull," Sentry (tin), Giant, Clown, "Hoop-la," "Robot" (aluminium), Musical Bank, etc., but will consider any kind of money-boxes, especially those with working parts and moving figures. Exchange also considered against old toys, pre-war Meccano, etc. All letters answered so please write if you can help.—Haley, 5 Flushouse, Holmbridge, Nr. Holmfirth, Huddersfield HD7 1QD. H/S

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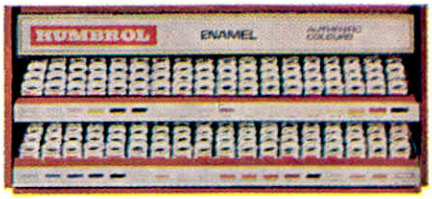

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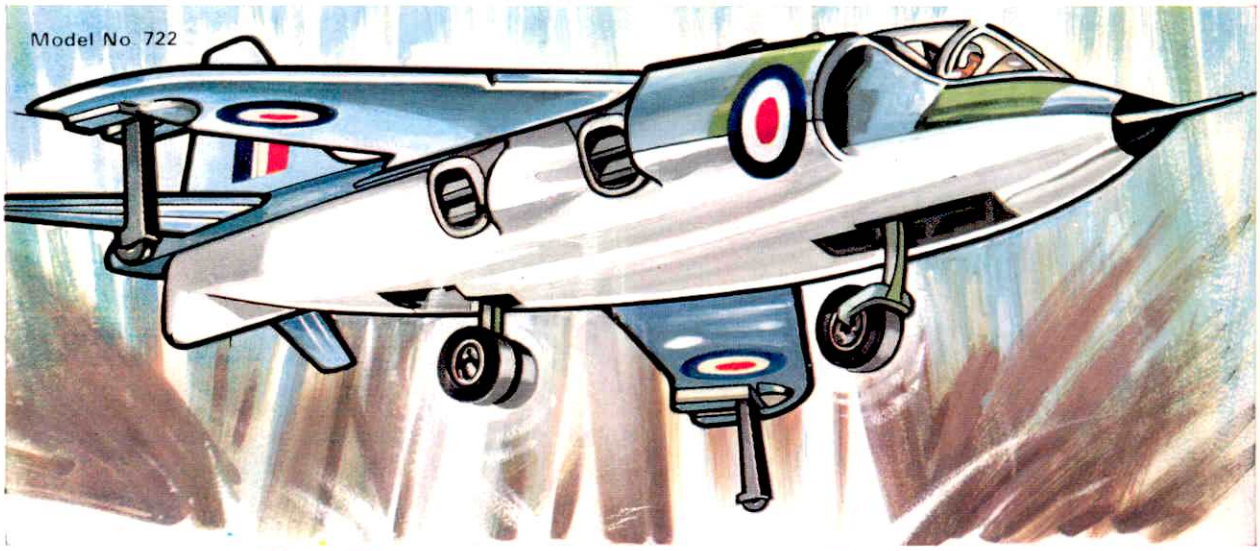

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HAWKER HARRIER JUMP JET

with swivelling jet exhausts

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- ★ Retractable wing tip stabilising wheels.
- ★ Moulded cockpit canopy and nose cone.

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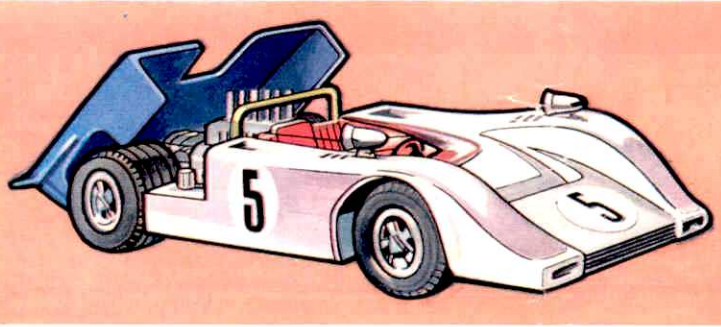

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