ITEMS FROM LETTERS.

1. Erwin Wyss sent the following note on the history of MATADOR, the wooden system mentioned briefly in OSN 3/44, which he obtained from a fellow member of AMS, Norwin Rietsch: "In 1900 Johann Korbuly (Vienna 1860-1919) invented MATADOR as a toy for his 3 sons. He started production of it at Pfaffstätten in Lower Austria, and he opened MATADOR-Haus (1070 Vienna, Mariahilferstrasse 62) where his products were marketed and sold. In 1978 the company was sold to Kurt Falk, former editor of the 'Kronenzeitung', and today editor of 'Täglich Alles'. After that MATADOR-Haus was modernised with considerable investment, but as with many similar systems, sales fell and production stopped some time ago. There may also have been legal troubles with LEGO. Considerable stocks of parts were available and are still sold in so called 'Schüttelkasten' (Shuttle-sets) for a price of öS 590 [about £35 -Ed]. These sets contain a bit of everything, worth about öS 1000. Should sales increase, which regretably I personally doubt, production could be started again."

2. From Keith Cameron in answer to a query about FISCHERTECHNIK: "fischertechnik (small f) is a most engaging medium. The aim of its manufacturer is to promote it to build prototypes for commercial systems such as production lines and other complex machinery, and large showrooms are set up for this purpose. Its many hi-tech parts include computer interfaces, are what attracted me. (It does have have many parts suitable for small-scale toys). When assembled correctly, it is reasonably rigid within the accepted limits. Rigid light alloy long parts are available. One can build a 4-axis robot in f/t in a couple of hours. I doubt that the same could be said of Meccano! I have a small/medium amount of f/t and I admire its ingenuity and the high quality of the parts, far surpassing most systems. However, its owners can make far more money out of commercial customers and the educational establishment, so tend to neglect hobbyists. This is understandable but irritating."

3. From Don Redmond, " • The new MW 16 DP Worm is of identical pitch to the 'old' (Mysto and early Gilbert) Erector, and the early coarse-pitch Erector Worms fit perfectly with the Meccano GRB and Large-Tooth Quadrants - and when found may be a lot cheaper! • The toyshop firm in Ottawa and Toronto which carried BRAL is out of business and I've not learned of any other Canadian BRAL stockist, though I haven't pursued the matter."

In a later letter he noted the many anomalies in a STRUCTOMODE manual. Many of the models are MECCANO inspired and so double railway buffers are shown whereas North American practice is a single, central stop. Two models appear to show slotted holes rather than the normal round ones, in the flanges of the 11x5 hole Flanged Plate; in a few others the illustration looks more like a Flat Plate with 11 hole A/Gs bolted to it, even though neither part was included in any of the sets. An unusual part is the 3/4" loose Pulley as well as those of ½" and 1" dia, though the latter was not in the sets.

Don also sent details of a Canadian plastic system called THE GROWING ENGINEER/LE JEUNE INGENIEUR which contains parts made in Hong Kong. They are multicoloured and look somewhat like PLASTIC MECCANO, but the Axles are 12.7mm dia with holes of 13mm; Bolts are 12mm o/d. There were 4 Sets available and the Instruction Sheet shows 71 models that can be made from the different sets. Gears and Braced Girders can be seen but are not included in the #1 Set that Don found. Details from Frank Beadle if anyone would like them, he keeps track of all plastic/wood systems. Don also mentioned a LINCOLN (best known for LINCOLN LOGS, a wooden set) plastic set he had seen, which much resembled Plastic MECCANO in the design of the parts and even the colours.

4. José Moreno sent an amplification of the STOKYS address given in 7/167: Grossmate 7, CH-6014 Littau-Luzern. Tel. 041 574159. Fax. 041 868554. He also sent some literature on PROTO and PIC (Precision & Industrial Components). The PROTO Parts List shows a few differences compared to the details in MCS and I hope to include them in a later issue. PIC is a new name to me and José sent the index from their catalogue, addresses of their agents worldwide, and the Contents List of some of the Kits of Parts that are (were?) available. The company is American and the catalogue of over 400 pages lists a myriad of small mechanical items, bearings, cams, gears, differentials, etc, etc, etc. The 9 Kits, 3 each for shaft diameters of 1/8", 3/16", and 1/4", contain gears, couplings, brackets, mounting boards, and the like, with 657 parts in the largest one. My feeling is that this little lot probably falls outside the OS field but if anyone would like to investigate and perhaps write it up, I will be glad to send them the details I have. The UK agent is The Barden Corp, Western Road, Bracknell. Tel.0344 24511.

5. On TECC Brian Rowe wrote: "I have since bought a No.6 Set and it is a comprehensive one with no less than four trays packed with parts - including Braced Girders which are not in any of the Spares Packs. The gears though do not always mesh properly but reaming out the holes to get rid of the paint sometimes helps. I understand that the smaller TECC Sets 1-4 (made by the CONSTRUCTION people) are no longer available."

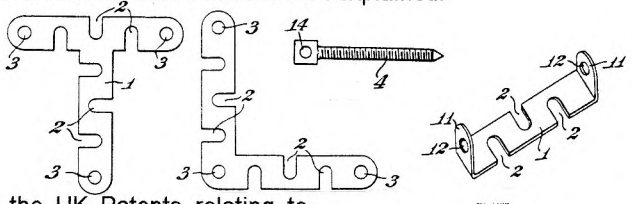
6. MECCANO's first serious competitor was almost certainly STABIL made in Berlin by Walther & Co. Tobias Haffter wrote that a lady, Emma Walther filed a patent application in 1904. In a 1924 manual,

ITEMS FROM LETTERS

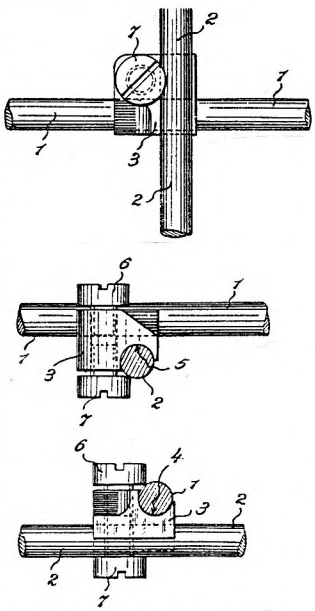
1. On TEMSI (see 11/292) René Mikkers wrote that: • The 15t Pinion isn't available because it would cost too much to produce. • The slight error in the hole spacing of the longer parts has certainly existed for at least the last 10 years. • The extra crosswise holes in the flexible plates is caused by the tooling used. • The Wheelbarrow Set was introduced some years ago and was a relatively expensive outfit.

2. On the KNIRPS aircraft (11/273), Peter Page said 'It's the first time I've seen a model of the revolving wing machine that impressed me in prewar boys' comics.' He also noted that Model & Prototype Systems Ltd. [who made, and perhaps still make, PROTO, one of the industrial 'Meccano' systems] is for sale.

3. David Hobson kindly sent copies of various patents. For the ULOX patent referred to in 10/254, he pointed out that since its application date was May 8, 1929, sets wouldn't have been on sale before then. The 4 parts below are shown in the Patent but as far as is known they were never marketed. The threaded rod with the square eye on the end, essentially similar to the Loop Spindle shown in 10/253, was intended to allow two screwed rods to be joined at right angles, but no specific applications are mentioned. I had hoped that the Patent might give uses for the four small holes in the Disc, but it only refers to them as housing a crank pin (Lever, see 10/252), and why the latter needed to be of a substandard diameter isn't explained.

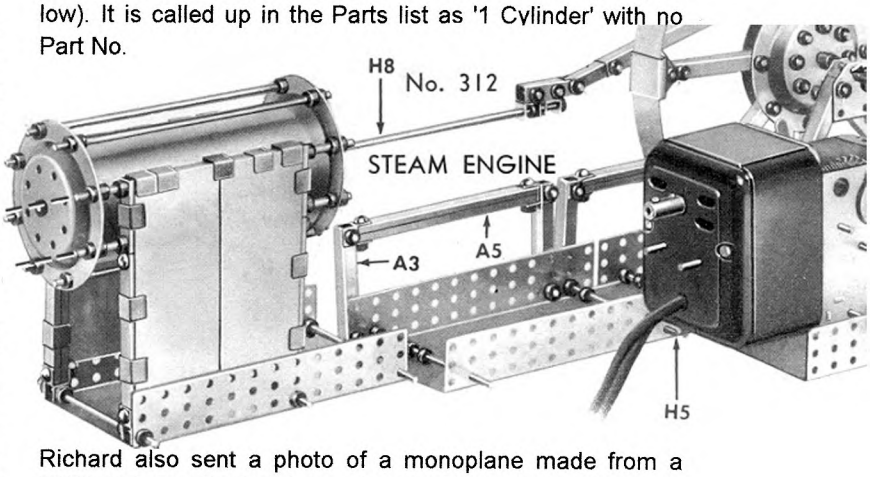


On the UK Patents relating to BOB, it turns out that the Joint (clamp) shown in 500629 (1939), mentioned in 9/233, is not exactly the type that is found in BOB sets. These are hexagonal in shape (as shown in 4/75) and are described in a later UK Patent, 622212 of February 1946, which is in the name of a Patent Agent, A.A.Thornton, who seems to have been the assignee of Charles Baumgartner. It was probably he who licensed the Patent to Ridingbery & Co. David added that according to 'British Tin Toys' the Feeder Road address for 'Ridingbery Metal Toys Ltd.' dates from 1948; before that they were at Bath Buildings, Bristol. It is said that Chad Valley took over the Company in 1949, and that no doubt was the end of BOB, even if it had lasted that long. The square shaped Joint from the earlier Patent is shown above. According to 6/121 Swiss BOB was marketed at the beginning of WW2, so it is possible that the earlier version was used at first. There is no Convention Date on 622211 and It isn't known if there was a Swiss patent for the hexagonal Joint.



Finally David noted that the two patent numbers quoted for BOYCOY (11/276) were in fact application numbers, and patents for them were never granted. This may have been because complete specifications were never submitted but, perhaps more likely, the invention was found not to be new, MOBILO for example had been patented in 1918.

4. In reply to my request for information on the LIONEL Cylinder part (11/271), Richard Symonds sent some details. It's red and rolled from .015" sheet with a butt joint, and is 4½" long and about 2.1" in diameter. There aren't any holes in it. He also sent a copy of a page from a #343 manual showing the Cylinder used in a Steam Engine (below). It is called up in the Parts list as '1 Cylinder' with no Part No.



Richard also sent a photo of a monoplane made from a DUX 104 Outfit, that he took at a Toy Show. All details agree with those in 11/287 except that the rear upper fuselage (and the logo on the nose) are blue. The painted control surfaces are red.

And on the NORELCO ME1200 Mechanical Engineer Set, he sent details and photos, and with them, and the MCS entry, I was able to make a good comparison with my own PHILIPS ME1200 Outfit. Apart from the change of name (everywhere except on one piece of cardboard packing which has PHILIPS on it in both cases), they appear to be identical (parts, manual, packaging), apart from the left end panel of the lid, which shows different models, and there's also some chat about the scope of the set on the NORELCO one.

5. Werner Sticht sent outline details of a universal coding system for parts which he uses to keep track of his parts from half a dozen different systems, and which could be extended as far as is necessary for any particular purpose. One or two examples from the many he provides are: A50 for a 50mm Axle, AT50 for a 50mm Threaded Rod, W36X for a Disc without Boss.

He also sent initial proposals for a Relational Database for MCS which could include full details of the systems entered, including outfits and parts, and would allow searches to be made in terms of any chosen single or combination of parameters.

Each of these topics is on a single A4 side and I can send copies to those interested.

6. In 11/272 Walther & Co. were said to have closed in 1968, but Don Blakeborough has pointed out that they were still in business in 1970, and sent a 1969 leaflet and a 1970 price list as evidence. On checking I found a note in MJ 28/821 that a letter sent to Walther's Berlin address in April of 1972 had been returned marked 'Firm closed down'.

7. Don Redmond wonders how to tell nickel MECCANO A/Gs from AMERICAN MODEL BUILDER ones, and adds that although AMB Sector and Flanged Plates have slotted holes longer than those in the MECCANO parts, this is not true for the A/Gs. Equally difficult is identifing the differences between the many parts that AMB, CASTLE BUILDER, MODELIT and STERLING TOY BUILDER have in common.

PROTO This was the British 'professional' system which was introduced in the late 1950s or early 1960s by Weyco (Sales) Ltd, the then UK agent for FAC (see 18/508), and at that time it was called the WEYCO CONSTRUCTION SYSTEM (see 19/526). It was a no-frills system and essentially consisted of structural parts, ball bearings, and a range of gears. The structures were made from slotted A/Gs rather than the FAC Beams, and/or 4mm Rods, as in FAC but joined by Hubs, Rod Sockets, and just 2 of the many FAC Clamping Plates. It was like FAC in having holes at 14mm pitch, M3 thread, Mod .7 Gears, and 4 & 6mm Shafts. It lacked FAC's plates & circular parts but actually included a wider range of Spur Gears.

FIG.1

Shortly after its launch the company changed its name to Model & Prototype Systems Ltd. and the system became PROTO. Thereafter additional parts were added over the years, and after the company had changed hands at least once it ceased trading in 2005. Many of the parts are still available though, from S.P. (Stephen) Birch (the company's last MD), 105 Horse St., Bristol, BS37 6DF, Tel: 01454 883300.

This article is based on 1) an early set which is nearly complete except for some of the Rods & Shafts, and includes a manual and various leaflets; and 2) items of literature which show the progress of the system. My thanks to Stephen for his help in tracing the history of the company.

c.1965 at Dames Road

The Early Set The leaflets with the set included a Parts Price List dated Nov. 1964. The company's address was the same as Weyco's, 18 Dames Road, London, E.7.

The **Set** was advertised as having 'approximately 1330 parts and was referred to as the Proto Constructional System (PN: P.C.S.). The only other outfit at the time was the Proto Structural Kit (P.S.S.), packed, like the P.C.S., in a wooden box, but a Leaflet with the Set marked 'Advance Publicity' gave details of a Proto Construction System Major Kit (P.C.S.M.) with approximately 3360 parts, including a few not in the Constructional Kit, notably a Gearbox and a Geared Motor.

The **box** measures 15¼*23⅜*3¼", is of light wood, nicely varnished. Its hinged lid carries the 2*2½" silver label in Fig.1. Inside wooden partitions form 43 compartments of varying size for the parts, including one the full length of the box, and 10 for the N&B etc on a tray which can be lifted out. There is 1" clear above the partitioning and so room for a tray, but there is ample space for all the parts without one.

The **parts** are listed below with comments where appropriate, and the quantities in the Structural; Construction; & Major sets in curly brackets. As explained later the quantities in red & blue are those for these parts in similar sets in 1969, and the 1990s, though the smallest in the last period is an all-round outfits and so not comparable to the earlier Structural sets. In some cases I've preferred to call the parts by my own MECCANO-style names with where necessary, the M&PS name in brackets. The parts illustrated in Fig.2 are starred and can be identified by the initials of their M&P name (a way of denoting the parts used in M&PS literature). Unless otherwise stated the parts are steel, the toothed parts with a polished finish and other parts chemically blackened. The bosses of the toothed parts have 2 tappings & a pilot hole, equispaced, as in FAC. Apart from the Collar the other parts are single-tapped. With the few exceptions noted, the parts are accurately made and well finished.

• **Rods**, 24,38,52,66,89,94,108,136,556mm long, 4.0mm Ø with a light grey finish, possibly cadmium. {12 of each in each set. My set had only the 136 & 556mm sizes.} {10 of each in each set.} {as left}

• **A/G*** (Miniature Slotted Angle), 558.8mm long with 20 slots. The length given on the drawing is correct but the slots are actually 3.2mm wide & 17.3 mm long, with 11.1 mm between them (all dimensions approximate). The metal is 1.3mm thick. {36; 12; 36} {20; 10; 20} {10; 20; 20}

• **Fishplate*** (Fishplate Connector). Similar to the FAC part. A pair are used to join A/Gs end-to-end. Also 2 parallel Rods with a 3mm gap between them can be clamped at any angle to an A/G, effectively one Rod if the other is just the length of the Fishplate. {12; 12; 24} {10; 10; 30} {10; 10; 20}

• **Hub*** (Circular Universal Coupler). Brass (later aluminium alloy) with 5 tappings for Rod Connectors, and can be fast or loose on a Rod through the centre hole. It can be used as a bearing as well as its main role in Rod structures. {24; 32; 64} {20; 20; 40} {4; 4; 8}

• **Rod Socket*** (Threaded Sleeve). Used to attach Rods to Hubs, A/G, etc. {24; 32; 64} {20; 30; 40} {new design: 10; 20; 20}

• **J-Clamp*** (Universal Rod Coupler). A Zinc diecasting mainly intended to allow mock-ups to be made quickly, and to allow Rods to be added to existing structures without any dismantling. The manual says that Allen Grub Screws must be used in this part. A number of those in the Set had the slightly larger diameter Bolts instead and broke in two as they were removed. {12; 24; 48} {10; 10; 30} {not listed}

• **Rod Clamp*** (Rod Coupler) Better than the similar FAC part because it is flat on one side. A most useful part which holds a 4mm Rod very firmly. {12; 25; 48} {10; 20; 40} {10; 10; 10}

• **Threaded Sleeves, 5 & 12mm**. Brass, 4mm o.d. {0/0; 0/0; 12/12} {20/20; 20/20; 20/20} {10/10; 10/10; 20/20} Mainly for use with the Screwed Rod but none of the latter were included in the first Major Kit, nor in the final sets.

• **Fork Piece* & Tongued Piece*** (Elbow Connector, Female & Male) One of the holes in the Fork is tapped and the Tongued Piece is free to pivot on a through Bolt. These parts are mainly used as a pair to join 2 Rods at any angle up to a little more than 90°, but fully tightening the through Bolt doesn't lock the Elbow. The Fork Piece is also used to connect a Rod to a Rack Strip. {8/8; 8/8; 16/16} {10/10; 10/10; 10/10} {redesigned as Elbow Piece, see later: 5/5; 5/5; 5/5}

• **Shaft, 4 & 6mm** Silver steel, 556mm long, to be cut as required. Users are warned to avoid fully tightening Grubs on it before final assembly to avoid raised burr. {0/0; 2/2; 2/2} {0/0; 1/1; 2/2} {1/1; 1/1; 2/2}

• **Tubular Shaft**, 4/6mm Ø silver steel. {0; 0; 1} {as left} {not listed}

• **Pillar Bearing*, 4 & 6mm** (Plain Bearing or Connector, 4 & 6mm). Brass. The body of the actual part is 9mm Ø and the unthreaded shank is 4mm Ø and 6mm long. There is another version not shown, 36mm long o/a, with the threaded shank 18 rather than 6mm long. The 4mm part is also used to hold Rods, and the axial tapping allows Rods or Shafts to be locked in position. {0/0; 8/8; 16/16} {10/0; 10/10; 10/10} {as left}

• **Ball Race** 19.0mm Ø, 6.0mm wide, 6mm bore. No 4mm version was available. {0; 8; 16} {0; 8; 12} {4; 4; 8}

• **Ball Race Housing*** A zinc diecasting. The tapped holes in the back face (at 14mm pitch) can be used to attach the part directly onto an A/G, for instance, or to remove the Ball Race by alternately tightening Bolts in them. {0; 8; 16} {0; 8; 12} {4; 4; 8}

• **Ball Race Housing Holder*** Mainly intended to attach the Housing to a pair of parallel Rods, but can also clamp Rods to a suitable part. {12; 24; 48} {10; 20; 40} {16; 16; 16}

• **Pulleys 4 & 6mm bore**, brass, parallel sides, single tapped through the rounded groove, 16mm Ø, 5mm wide. {0/0; 0/0; 4/4} {0/0; 4/4; 4/4} {4/4; 4/4; 4/4}

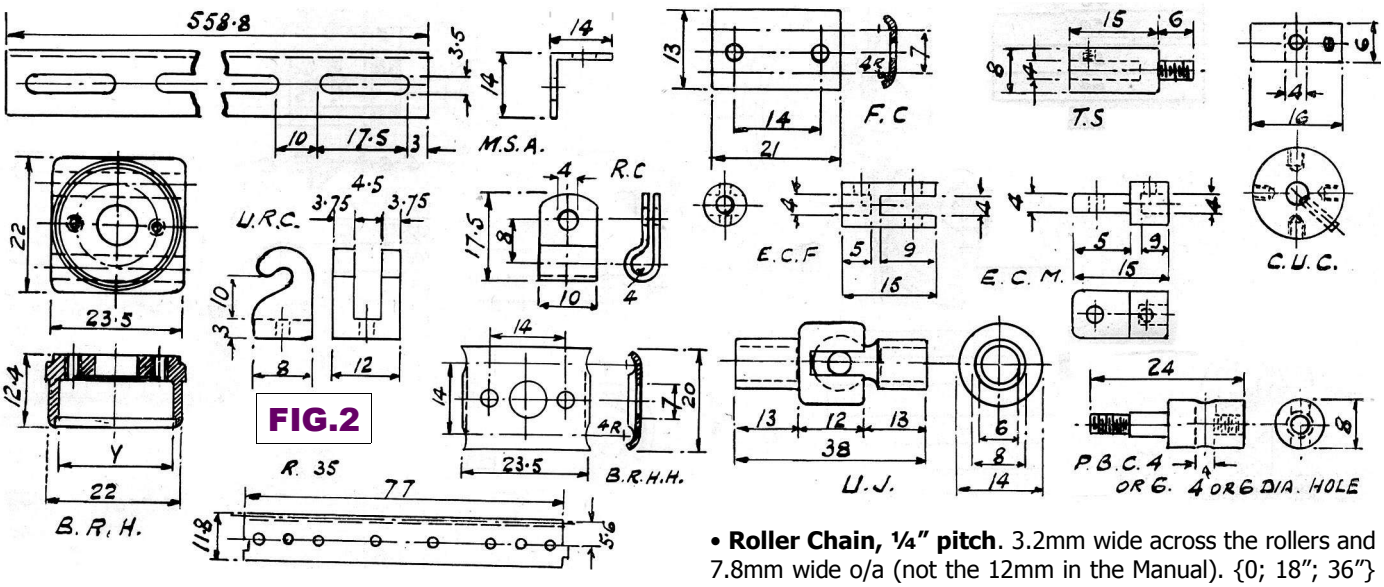


FIG.2

• **Pulley Cord**, rubber 4mm Ø. Join with Bostik 1261 (later Loctite 406 or Super Glue 4) on oblique cut. {0; 0; 24"} {5mm Ø: 0; 0; 1m} {as left}
• **Sleeve** Brass, 4.0mm bore, 6.0mm o.d., 8mm long (not the 9mm shown). Used in a Ball Race bore to adapt it for use with a 4mm Shaft. {0; 6; 6} {Now nylon. 0; 8; 8} {8; 8; 8}
• **Collars, 4 & 6mm bore**. 11mm Ø & 5mm wide, diametrically double-tapped. {0/0; 12/12; 12/12} {10/0; 10/10; 10/10} {as left}
• **Universal Joint*** Light grey nylon with 6mm bores of a slight 'D' section, and the Shafts have to be filed to fit into them. The action (through 25°) is very stiff and later a second, freer type was also listed. {0; 2; 2} {as left} {2; 2; 2}
• **Spur Gears** with 15,16,20,24,30,32,40,48,50,56,60,64,70, 72,80,90,96,100,105* teeth, and from 10.5 to 72.5mm pcd. The 15 & 16t have a 4mm bore, the rest 6mm. All have a tooth width of 3mm. Bosses vary from 8.9 to (for most) 14mm Ø. The 32t has a light grey finish like the Rods. The 56-89t parts have 6 face holes at 28mm pcd; the larger Gears have an outer ring of 12 holes, staggered symmetrically in relation to the 6h ring, and at 54mm pcd. These pcd's allow all pairs of holes to be at 14mm pitch, but does not allow a part to be bolted on at two points along a radius (as one might with a MECCANO Face Plate for example). {none; 4 of 15-32t, 2 of 40-80t, 1 of 90-105t in both sets} {as left except only 1x 80t} {Sets supplied with parts with one of two selections of sizes: • 4; 4; 4 of (15 or 16t), (30 or 32t). • 0; 4; 4 of (20 or 24t). • 2; 2; 2 of (40t), (48 or 50t), (56 or 60 or 64t). • 1; 1; 1 of (70 or 72t), (90 or 96t). • 0; 1; 1 of (80t), (100 or 105t)}
• **Rack*** The teeth are 4mm wide. The end locators are a nice touch but one of the 2 Racks in the Set had them (and the holes) machined with the part, its teeth already cut, mounted wrong side up. {0; 2; 2} {as left} {1; 1; 1}
• **Rack**, 12" long. Has only 4 holes along its length, at 98mm pitch. {0; 0; 1} {as left} {as left}
• **Bevel Gears, 18 & 20+60t**. Mod .8, all with 6mm bores. Said to be brass but the 18 & 20t are steel. The 60t was also available with 6 face holes as #B.G.60A. {0, 0/0; 2, 1/1; 2, 1/1} {as left} {2, 0/0; 2, 1/1; 2, 1/1}
• **Worm** 2-start, 15.3mm o.d., 19mm o/a with 5mm long, 11mm Ø boss. {0; 1; 2} {as left} {1; 1; 1}
• **Worm Wheel** Tufnol, 40t, 30mm o.d., 5.3mm wide, with 14mm Ø steel boss. {0; 1; 2} {as left} {1; 1; 1}
• **Sprockets, 11 & 22t**. 25 & 47mm o.d with 2.7mm thick discs. {0/0; 2/2; 4/4} {0/0; 2/2; 2/2} {as left}

• **Roller Chain, ¼" pitch**. 3.2mm wide across the rollers and 7.8mm wide o/a (not the 12mm in the Manual). {0; 18"; 36"} {0; 30cm; 30cm} {as left} Also a Connecting Link, Inner Link, Outer Link, & Clip Fastener. {0,0,0,0; 2,2,2,5; 2,2,2,5} {as left} {0,0,0,0; 2,0,0,0; 2,0,0,0} • **7mm pitch Ladder Chain** to run on the Gears, although not listed, was said in the Manual to be available.
• **Fixings**. All nickelled except as noted. **Bolts**, 6,9,15,24mm u/h, cheeseheaded, 4.8mm Ø for the 6mm, 5½mm for the others. {100/100/100/50; 200/100/100/50; 400/200/200/100} {100/100/50/0; 200/100/100/50; 300/200/200/100} {100/100/0/0; 200/200/50/50; 200;200;100;100} **Nut**, machined, 2.4mm thick, 6.3mm A/F (at some later point 5.4mm, the M3 standard). {350; 200; 900} {300;400;800} {200; 200; 400} **Washers**: 3mm, 7.8mm Ø, dull grey finish; 4mm, 9.5mm Ø; 6mm, 12.7mm Ø. {350/0/0; 200/50/50; 900/50/50} {300/0/0; 200/50/50; 800/50/50} {100/50/50; 200/50/50; as left} **Grub Screws**: Allen recessed, 3.2 & 5.2mm long. {50/50; 50/50; 96/96} {20/20; 40/20; 60/40} {20/10; 30/10; 40/20}
• **Multi-ratio Gearbox** (Fig.3). 2½*1⅞*2", with brass sideplates and 48 DP gears The input & output shafts are 6mm and the output gear is to be slid along its shaft and locked to mesh with 1 of 4 gears giving ratios of 1:1, 2:1, 4:1, or 8:1. {0; 0; 1} {as left} {as left}
• **Geared Motor** (Fig.4). 240v shaded-pole, 128rpm, 20in.oz torque. 2½*4⅝*2" wide plus the 6mm Ø output shaft on each side of its open gearbox. {0; 0; 1} {Similar but with enclosed gearbox, see later. 0; 0; 1} {Different type, see later. 0; 0; 1}
• **Tools**: • **Spanner**, single-ended. {0; 1; 1} {1; 1; 1} {as left} • **Nut Runner**. {1; 1; 1} {as left} {as left} • **Allen Key**. {2; 2; 4} {4; 4; 4} {as left} • **Junior Hacksaw**, and **Blades**. {0/0; 0/0; 1/12} {0/0; 0/0; 1/10} {as left} • **Chain Pin Extractor**. {0;0;1} {as left} {not listed} Only the Allen Key has been seen.

The **Manual** (Fig.5) has 20 quarto art paper pages, plus covers. After p20 are the stubs of 8 neatly cut out pages which were added after the other pages (they are held by a single extra staple). pp1-2 has the Introduction with mention of the

FIG.3

FIG.4

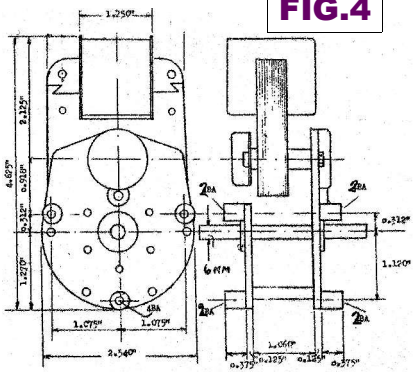


FIG.5

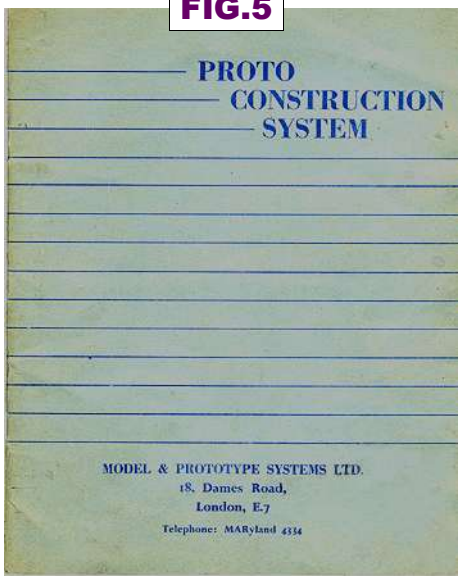


FIG.6

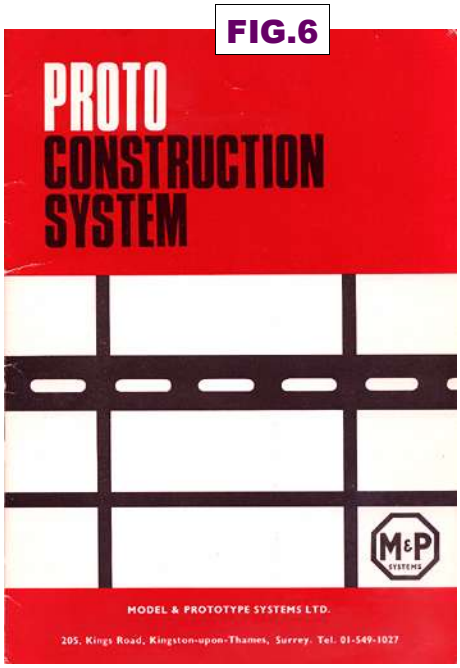
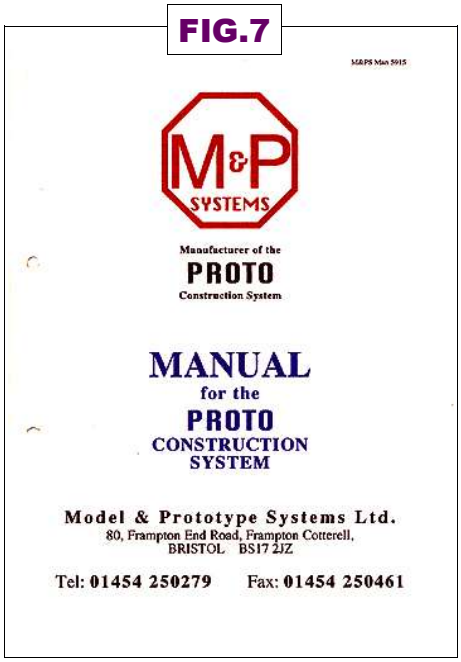


FIG.7



Structural & Construction kits, and their contents are listed on pp4-5. p3 has notes on the use of many of the parts, with references to 14 photos of partial structures on pp6-14. One of them is from the WEYCO publicity material. pp15-19 has engineering drawings of most of the parts. p20 is blank.

New Parts May, 1965 As well as the Motor, Hacksaw, Blades, Chain Pin Extractor & 12" Rack already mentioned: • A **Gear Checker**. • A **Spring Washer**. These parts will be described in the next section.

M&PS at Kingston Upon Thames c.1970

This section is based on documents from 1969, and others undated but a little later because they show additional parts. Those which show prices are from before Feb. 1971 because they use the pre-decimal £sd units, and all but one are probably before 1974 because none include a postcode (by then all areas had one). A publicity leaflet with a postcode talks of the system having been proven for over 20 years but gives no details of sets or parts.

A price list dated March 1969 gives the address as 205 King's Road, Kingston-upon-Thames, and a letter in Sept. 1969 also gives the registered office as 52 King William Street, London, E.C.4, and the directors as B.P. & M.A. Hegarty, and H.W.Moore. It says that a completely revised manual will soon be available. A leaflet attached to this letter gives a few details of 9 Demonstration Kits (PDK.1-9) for fairly simple models showing the use of gears, sprockets, universals, and a 'Simple 2-speed and reverse gear'.

The 1969 Price List lists the same sets as before (except that the PN for the Major is now P.M.C.S.) and a photo from about the time shows the Major in a wooden box, the same length as the early set but deeper and not as wide. It has partitioning in the base for the long & deep parts, and 2 partitioned trays with 24 bays in each for the smaller items.

The contents of the sets given in the Price List is markedly different from before with many new parts but fewer of most of the earlier ones, mainly the structural pieces. For the earlier parts the contents are those given in red for the 1965 sets. The new parts with quantities, also in red, are listed below with details from a manual. The latter is probably the one in the 1969 letter and has one additional part compared with the Price List. The blue quantities are, as explained earlier, those for later sets. The starred parts are illustrated in Fig.8. From the Manual: most of the steel parts are zinc or cadmium plated, with a few nickelled and many of the toothed parts phosphated. None have the previous black finish.

• **Plate**, **Slotted**. A 558.5mm length of the blank for the A/G before bending, 26.5mm wide. {5; 5; 5} {5; 5; 10}

• **Corner Gusset***. {10; 10; 10} {as left}

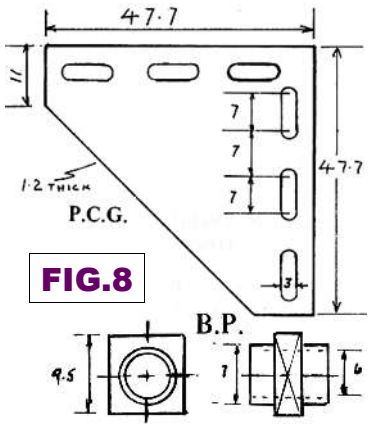
• **Screwed Rod**, 156mm long, nickelled steel. {10; 10; 10} {brass, but not included in sets}

• **Pulley Belt** for 4 or 6mm Pulleys at 45/105mm centres. Neoprene, 3mm Ø. {0/0; 2/2; 2/2} {2/0; 2/2; 2/2}

• **Circlips 4 & 6mm**. Used, I think, as axle stops. {0/0; 0/0; 10/10} {as left}

• **Bearing, Plain***. Brass, 6mm bore, to be held between 2 Ball Race Bearing Holders {0; 8; 8} {8; 8; 8}

FIG.8



• **Universal Joint** Acetal with brass inserts, and single-tapped bores. 30° working range and said to have a much freer action than the original version. {0; 2; 2} {as left}

• **Gear Checker** A 308mm long rack with plastic scale to show the number of teeth on Spur Gears. {0; 0; 1} {not listed}

• **Wire Chain**. 7.25mm pitch ladder chain (not presumably the earlier 7mm). {0; 1m; 1m} {0; 0; 0}

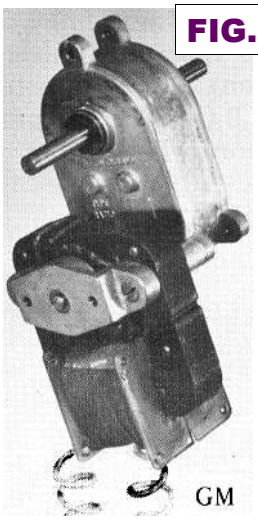
• **Sprockets for Wire Chain**, **9 & 18t**. 20.75 & 41.5cm pcd. Generally similar to the Sprockets for Roller Chain but brass. {0/0; 2/2; 2/2} {0/0; 0/0; 0/0}

• **Disc Hub**. A Bush Wheel with a 46mm disc & standard boss, the disc pierced with a ring of 6 holes on a 28mm pcd, 2 of which, diametrically opposite, are 4mm Ø. {0; 2; 2} {0; 0; 1}

• **Spring Washer**. No details given. {0; 100; 100} {as left}

• **Geared Motor** (right). Similar to the earlier type but with enclosed gearbox, and: 124 rpm, 2Lb-in torque, 144*61* 60mm wide (plus shaft). {0; 0; 1} { 0; 0; 0 of this style, see later.}

FIG.9



• **Geared Motor, Reversible**. As above but with a motor on both sides of the gearbox driving a common shaft. {0; 0; 0} {not listed}

• **Screwdriver**, 6". {1; 1; 1} {as left, 4" or 6"}

Bulletin No.4 This leaflet lists 4 new parts which were being introduced on a trial basis, and 14 which were specials only available while stocks last. They are listed below with the new parts first, and Fig.10 shows

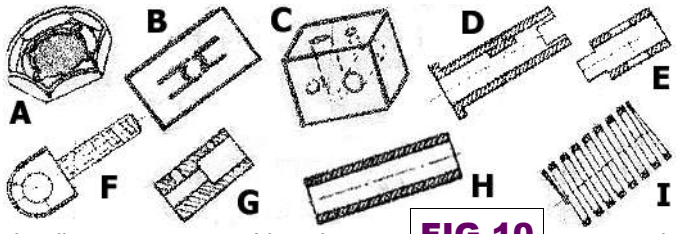


FIG.10

the illustrations given (though some are not altogether helpful).

- **6mm Shaft Connector** – not illustrated but will be described later.
- **Nut, Locking**, cadmium plated. Not included in the Later List below but eventually adopted. (A in Fig.10)
- **Plate, Ratchet**, blacked steel with versions for 4 & 6mm Rods. These two parts were not in later lists. (B)
- **Block, Connector**, brass. (C)
- **4mm Shaft Connector** – not illustrated.
- **Dog sliding**. (D?E)
- **Dog fixed**. (D?E)
- **Dog Shaft,** 4mm Ø x 556mm long. Not illustrated.
- **Eye, Screw,** 4mm eye with 12mm x M3. (F)
- **Reducer, Shaft**, 6/4mm. (G)
- **Sleeve**, 4 x 6 x 5,12,20,41,61mm long. (H)
- **Spring, compression**, 15 x 7.8 x 9.8. (I)
- **Spring, tension**, 278 x 4. Not illustrated.

The Manual It has 20 A4 pages plus covers but the pagination is 2-19 with the first & second pages unnumbered. The front cover (Fig.6) has the company's name & address in the bottom panel. The other covers are blank except for 'Printed By: CREATIVE OFFSET LTD., Tel: 01-549-0111' on C4.

FIG.11

The first page lists the contents and has the logo left by the company's details. The second page is blank. p2 has an introduction; p3 a few details under SPECIFICATION, followed by a list of the 3 sets which it says, are all in varnished wooden boxes. The parts are listed on pp4-11 with descriptions & drawings. p12 is headed APPLICATION and gives some advice on using the parts, with photos of mechanisms, structures etc on pp14-19. p13 shows 5 of the Demonstration Models and says sets of parts are available for them.

Only one new part is listed, the Coupling for 6mm Shafts mentioned above, and described below.

Later Material This consists of photocopies probably taken from a leaflet and an updated brochure or manual. In the former the sets are now called PROTO Major Construction Unit (PCU 1), Standard (PCU 2), & Basic (PCU3), but nothing is said of their contents except that all have parts intended to make both structures and mechanisms.

The other pages are like the Illustrated Parts in the manuals, and the parts are as before except for the new, modified, or deleted ones below.

- **A/G** Now 560mm long with different slots, see 'SA' in Fig.12. (The Slotted Plate is still based on the old pattern A/G).
- **Spacer** Brass 4/6mm Ø, 1mm wide.
- **Coupling** for 6mm Shafts. A brass tube 6/9.5mm Ø & 19.7mm long with a single tapping near each end.
- **4.0mm Roller Chain** and a **Connecting Link**.
- **Sprockets for 4mm Chain**. Brass with 12 & 24 teeth (15.25 & 30.50mm pcd) in the same style as the other Sprockets. 6mm bore.
- **Bolts** They now have a pan head.
- **Tubular Shaft & Reversing Motor** No longer listed.

M&PS near Bristol in the late 1990s

The company changed hands in the mid-1990s: the new directors were S.P. & E.J.Birch, and the new address was 80 Frampton End Road, Frampton Cotterell, Bristol BS17 2JZ. The two documents to hand are a Catalogue No.53, probably from 1995 or 1996 and a Manual, undated but before 1998, and possibly before the Catalogue. The sets and parts in them are very largely the same and any significant differences will be mentioned in what follows. A number of additional parts are listed compared with the 1969 range but it is understood that most, if not all, of these were added later in the Kingston era.

The sets listed are the Proto Standard Construction Kit (PCK 1 with over 2000 parts), the Medium Kit (PCK 2 with over 900 parts), the Basic Kit (PCK 3, over 70 [sic] parts), and the Project Kit (PCK 7). Each has parts for both structures and mechanisms; the PCK 7 is said to be ideal for student projects. The Catalogue also mentions specialised kits for education and training for: Mechanisms & Power Drive; a Two Speed Gear Box; and a Structural Kit. Kits PCK 1-3 have wooden boxes and the one for SCK 1, 607*223*166mm, matches the 3-layer Major box mentioned earlier. PCK 7 is in a plastic box with 15 removable compartments.

The contents of PCK 1-3 are listed in the Catalogue and the totals of the parts in the sets mostly don't agree with those in the Manual. For Sets 1-3 I made them 407, 349, & 295 plus 1460, 1140, & 630 NBW. The Manual has only the contents for the set in which it was included, PCK 1 in this case, with contents as in the Catalogue.

Comparing PCK 1 with the Kingston Major outfit, it has significantly fewer NBW and about three-quarters the number of the other parts, with noticeably fewer Spur Gears and the parts for use with the Rods. The new and redesigned parts though would add to the system's versatility and ease of use. And in making the comparison the PCK 1 cost about 6 times the Major but the cost of living had risen by 8 or 9 times between 1969 and 1996.

The new and modified parts (including those in the Kingston 'Later Material' list) are given below with the quantities of the new parts in blue brackets. Starred items are shown in Fig.12. The quantities of the earlier and modified parts were given previously in blue brackets.

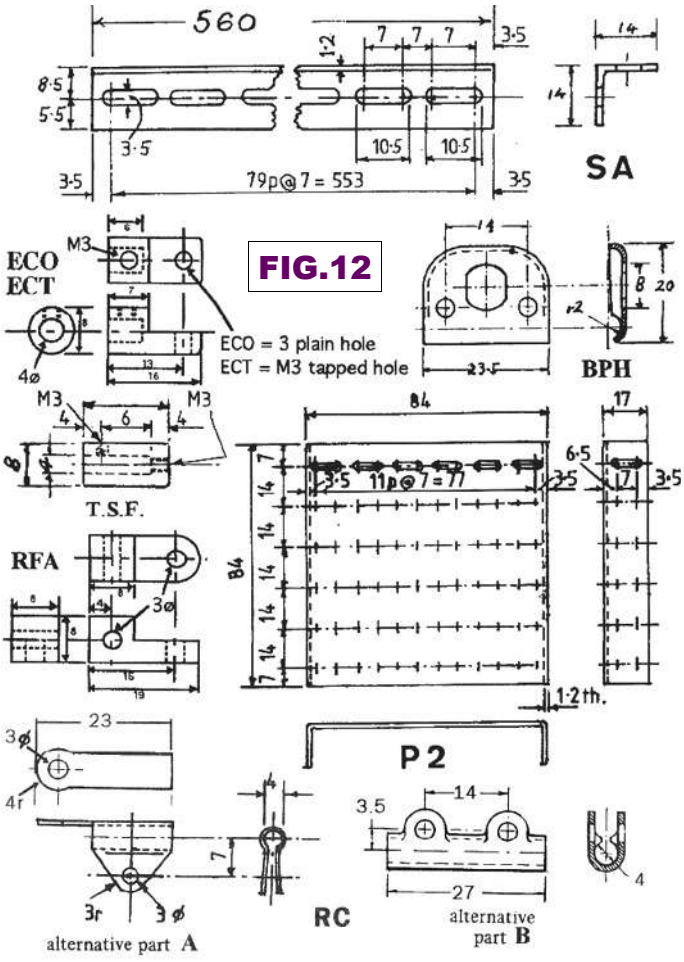


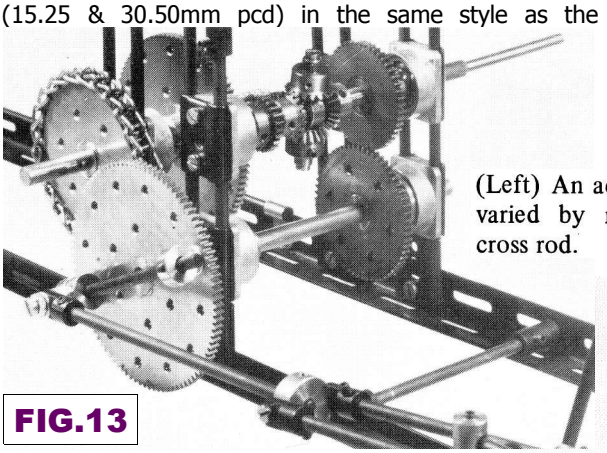
FIG.12

• **A/G*** Now 560mm long with different slots.
• **Plate, Slotted**. Now has the same slot pattern as the A/G.
• **Plate, Flanged*** 84*84*17mm with rows of the standard slots across the face and flanges. {2; 2; 2}
• **Elbow Piece***. A pair of these (ECO/T), one with a plain & one with a tapped hole, replaced the Fork & Tongued Pieces.
• **Rod Socket*** (Threaded Sleeve, TSF). Brass. New design.
• **Spacer** Brass 4/6mm Ø, 1mm wide. {0; 20; 20}
• **Shafts** Now stainless as well as silver steel.
• **Coupling for 6mm Shafts**. A brass tube 6/9.5mm Ø & 19.7mm long with a single tapping near each end. {2; 2; 2}
• **Tube, Brass**. 4/6mm Ø, 560mm long. {0; 1; 1}
• **Helical Gears**, 14 & 21t, 14.4 & 16.4 [sic] pcd, steel, 6mm bore. {1/1; 1/1; 1/1}
• **Sleeve** , brass, 4/6mm Ø, 12mm long. {0; 4; 4}
• **Split Bush**, brass, 4/6mm, 12mm long. {4; 4; 8}
• **Bolts** Now with a pan or hex socket head, and zinced or blackened respectively.
• **Geared Motor**, 12v D.C., 60rpm, 125mNm torque. Cylindrical, 34/39mm Ø, with a 39mm square mounting flange. 66mm long, plus the 4mm shaft. {0; 0; 1}

New Parts not in the PCK 1-3 Kits:
• **Rod Clamps*** 2 alternative designs.
• **Flat Connector***, RFA, brass
• **Holder for Plain Bearing***. BPH. For use in pairs when only one Rod is available. {0; 0; 1}
• **Sprockets for 4mm Chain**. Brass with 12 & 24 teeth (15.25 & 30.50mm pcd) in the same style as the other Sprockets. 6mm bore.
• **4.0mm Roller Chain** and a **Connecting Link**.
• **Geared Motor**. Similar to the Kingston model but 125mm long. Not listed in the Catalogue.
• **Geared Motor**, synchronous, 240v, 20rpm, 50mNm torque. 'Crouzet' type, 48*66*32mm long o/a plus the 4mm Shaft. Not listed in the Catalogue.
• **Timing Pulleys**, 10,15,30,45,60,75t. 5mm pitch, pcd from 15.1 to 118.5mm. Bores 5 to 10mm, with 2 sizes of **Split Bushes** to allow use of the larger bore ones with 6mm Shafts.
• **Timing Belts**, 33-200 teeth, 165 to 1000mm long.
• **Oldham Couplings**, brass with Acetal Disc. 12.7 & 25.4 Ø, each with 4 or 6mm bores tapped 2x M3, M4 respectively, at 90°. 15.9 & 28.4 long o/a. The 12.7mm was also available with 5mm & ¼" bores, and the 25.4mm with ⅜".

The Manual It has 20 punched looseleaf A4 sheets, many single-sided, including a title page (Fig.7), held inside a red plastic cover with a clear front. After the title page the pages are numbered 1-22, followed by 3 appendices. p1 lists the contents, pp2-3 has an intro including mention of the kits, and p4 has some hints on the use of the parts. The Illustrated Parts are on pp5-13 with the usual style of presentation, and pp14-22 has photos showing constructional details, with some new ones since the Kingston version. Then the appendices: 1) the quantities and layout of the parts in the PCK 1's box, 2) a table showing lengths of the 6.35mm Chain for various combinations of Sprockets & centre distances, and 3) centre distances for various combinations of Spur Gears.

The Illustrations that follow, Figs.13-17, are taken from the manuals described earlier. Notes about them are given in the 3 boxes amongst them.



(Left) An adjustable crank. The throw is varied by relocating the pivot on the cross rod.

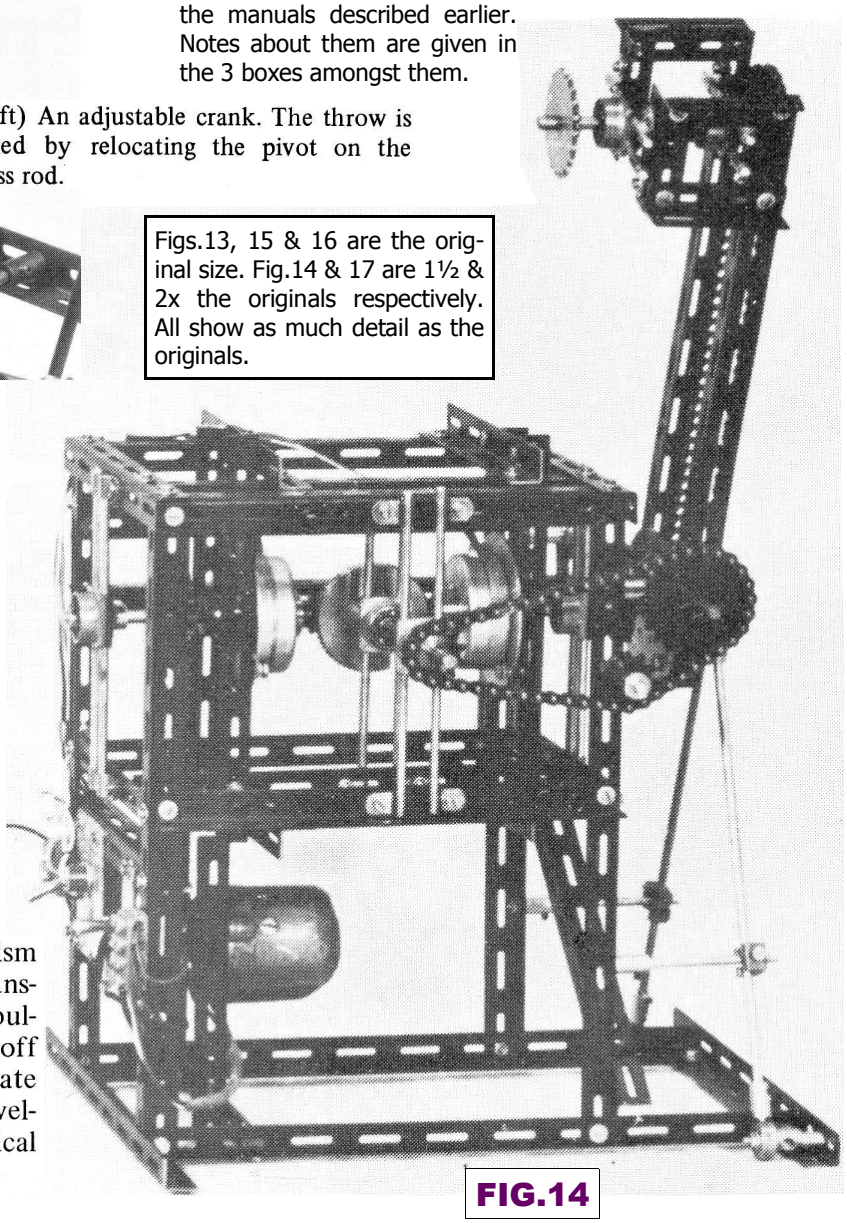
FIG.13

Figs.13, 15 & 16 are the original size. Fig.14 & 17 are 1½ & 2x the originals respectively. All show as much detail as the originals.

The photos in the three manuals described here comprise a number which were meant to show the use of the parts; some showing the demonstration models made from the various kits of parts produced by the company; and a few finished models or mechanisms.

The earliest manual had only those relating to the use of the parts, some of which were carried forward into the later editions. Fig.13 is one example, though most were about frameworks, bearings, & gearing. The last manual had 2 larger, clearer photos which were not in the earlier ones.

Only 5 finished models/mechanisms were included, and the same photos were used in both the later manuals. 3 are shown here in Figs.14,16,17. cont. in panel on next page



A simulated shoulder and elbow mechanism to investigate methods of power transference. A motor drives through the shoulder to the elbow joint. Power is taken off this drive by magnetic clutches to rotate the upper arm about the shoulder. Developed at the Department of Mechanical Engineering, Queen Mary College.

FIG.14

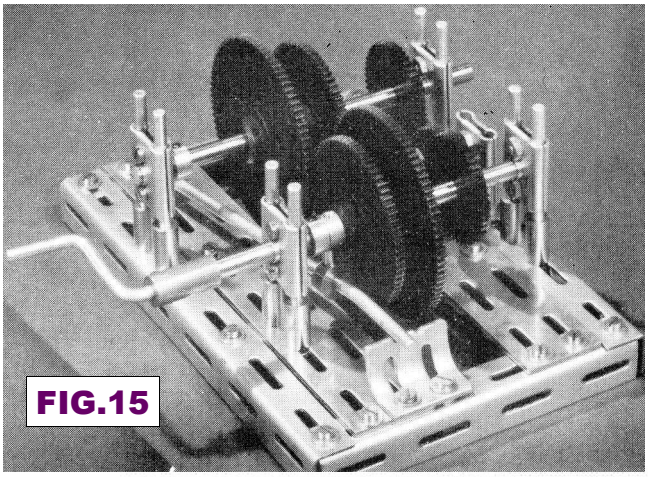


FIG.15

2-SPEED AND REVERSE GEAR

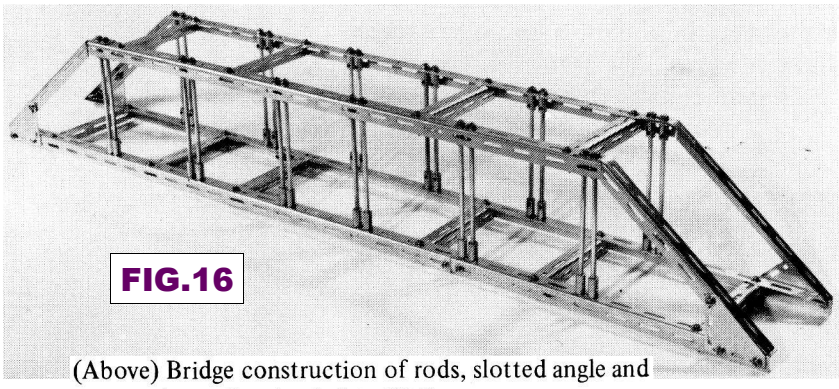


FIG.16

(Above) Bridge construction of rods, slotted angle and corner plates. Test loaded to 80 Kg.

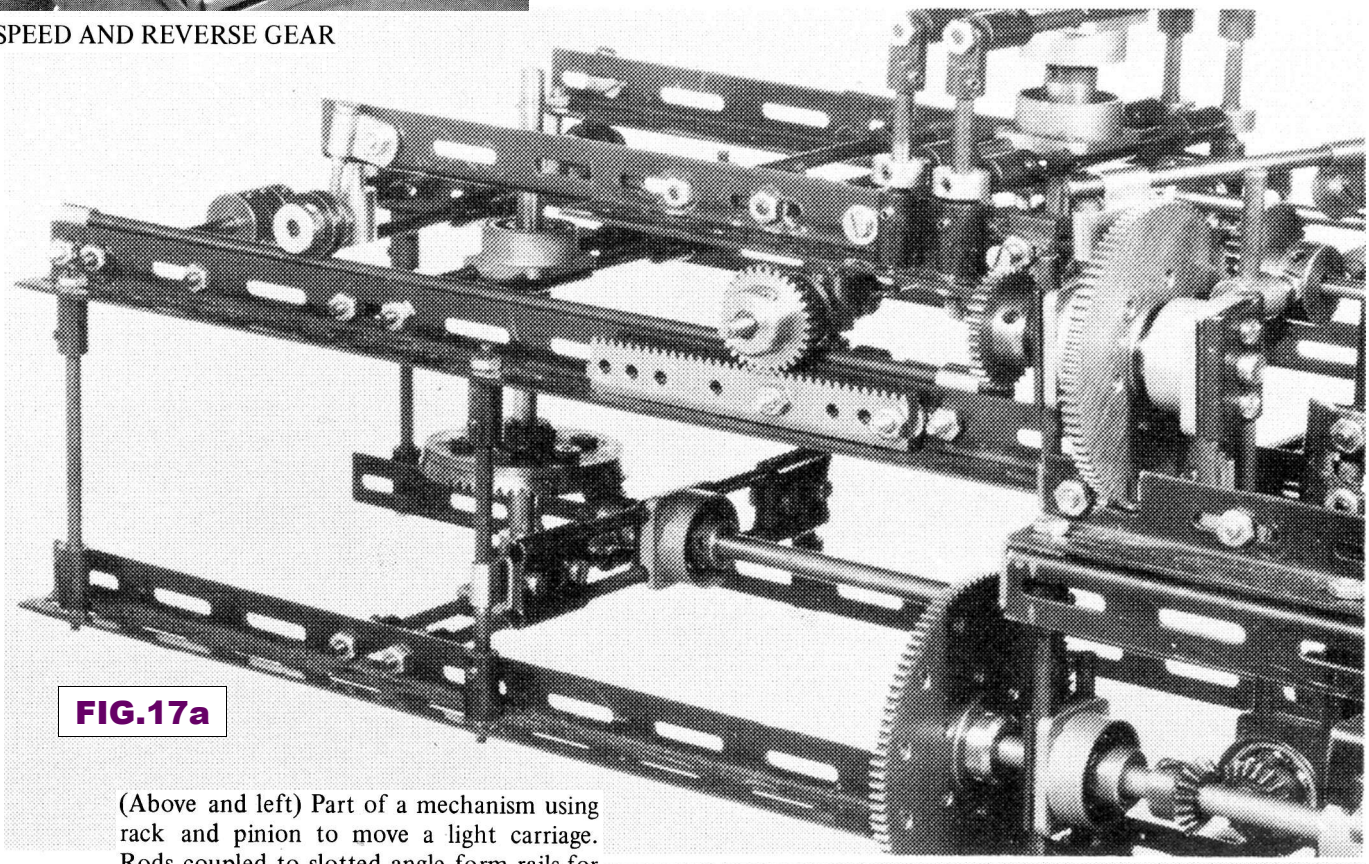


FIG.17a

(Above and left) Part of a mechanism using rack and pinion to move a light carriage. Rods coupled to slotted angle form rails for the pulley wheels.

One of the others was a simple Walking Machine designed by Professor M.W. Thring of Queen Mary College (University of London) and demonstrated on the B.B.C. television programme 'Tomorrow's World' '. Shades of Frank Hornby sending a set to Professor Hele-Shaw perhaps. Likewise the fifth model, a Travelling Crane, said to be one of a number designed and constructed by students at the School of Engineering Science, University of Warwick, as a cost-design project. Unfortunately the photos are too poor to see any details of interest.

Fig.15 is one of the 5 demo models which were included in both the later manuals.

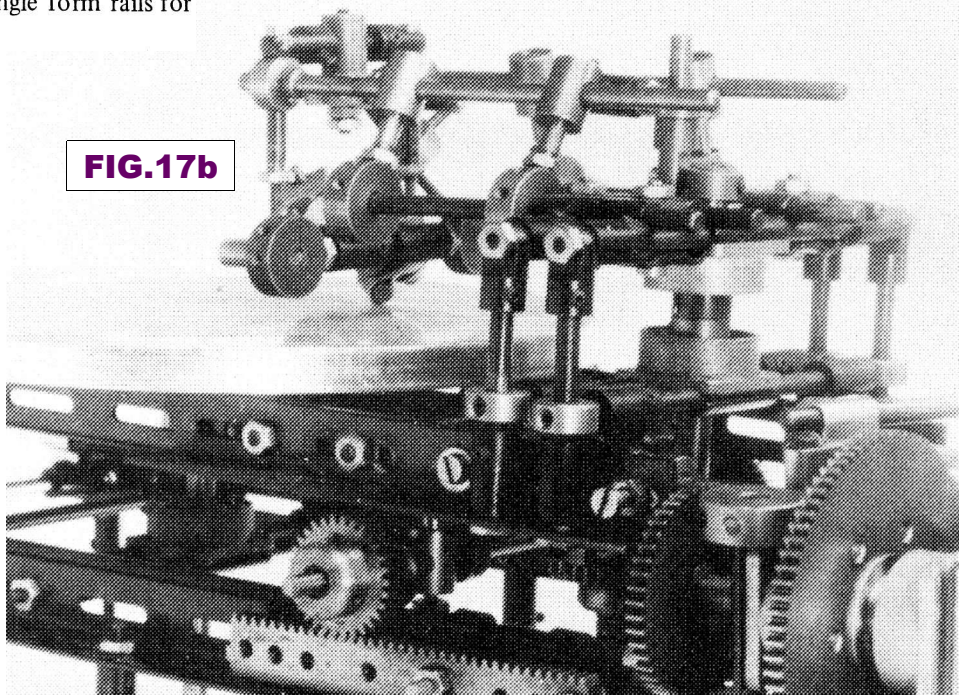


FIG.17b