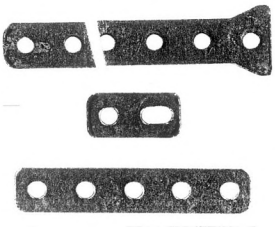
ITEMS FROM LETTERS

1. Roger Baker confirmed that the Patent date on his **U.S. ©1913 MECCANO Manual** is 16TH JANUARY 1906 (see 13/346).

2. From Don Redmond. Referring to **MEK-STRUCT** (OSN 14/392), there is another series of 9 sets (bubble packed on card), each making a model smaller than the 3201-8 outfits. All are vehicles except #32301, a Mini Plane, and 32302, a Mini Helicopter. All have 5-digit numbers and names prefixed with Mini: 323903, Fire Engine; -4, Fork Lift; 5, Racer; 6, Buggy; 7,Loader; 8, Off-roader; 9, Car. The Fire Engine has 89 parts, in the standard colours rather than the red used for the Emergency Vehicles (3213-5).

• On **HANDY CRAFT**, it's not clear in the MCS illustrations that the 15h Strip has both ends splayed, whereas the 11h, as can be seen, is so shaped at only one end. All the Strips and the Fishplate have corners of very small radius (about 3mm), and this gives the DAS a decidedly odd appearance. The 3*3h triangular 'Trunnion' is similar to the VOGUE one but again has small radius corners. [Don kindly sent a Fishplate and 2 Strips, a 5h and an 11h. They are nickel plated, 12.1mm wide, and their holes are 4.4mm Ø, against 4.2mm given in MCS.]



3. On **CONSTRUCTION TRUCK** (14/373), Richard Symonds passed on some more details that he'd had from Don Blakeborough. The Flanged Plate in Don's set had a normal centre hole and not the enlarged one shown in OSN 14, the Axles are 80mm overall with 10mm of thread at each end, and the length and width of the Triangular Plate are both 35mm. The latter is red like the Flanged Plate, and the other parts are blue, except the black Spanner and nickel Screwdriver. The 5mm Ø RH Bolts are 5mm u/h, and the hex Nuts are 6mm A/F.

Richard also sent a photo of what appears to be a **BILD-A-SET** manual cover. The wording on it is in English, including 'Made in U.S.A.'. And there's what may be a copyright date but I can't read it. The models shown are much like those in MCS with holes that look as if they might be at least an inch apart. It is stated that no tools are needed, and there's a sentence in small print that I think reads '170 pieces complete with wooden pegs and dowels'. The latter can be seen in the models and it's possible that all the parts are wooden and the pegs and dowels are a push fit in them.

Another item was the March issue of another U.S. advertising paper called ***Toy Trader***, rather similar to *Toy Shop* mentioned in 13/360. The main difference is that it doesn't contain any classified ads, all were from dealers, and I didn't, in a quick run through, spot any for OS in its 108 pages.

4. Points from David Hobson. • The London Toy Co., 0181 864 2186, say that they stock **STEEL TEC** sets, but have no lists. • ***Eisenzeit*** (ISBN 3-921590-39-6), the book reviewed in 14/377, can be obtained from the UK European Book Shop, German Dept., tel: 0171 7345259. It costs about £37 plus UK postage, and delivery takes about 3 weeks. [Richard Symonds obtained a copy from Canada by writing directly to the bookstore mentioned in EZ - W. Tümmels Buchdruckerie und Verlag GmbH, Gundelfinger Straße 20, 90451 Nürnberg. Tel: (0911) 64197-0, Fax: (0911) 6419750. The total cost was around £34 including £4 postage and tax. That would have been by surface mail I expect. Richard added "Sure is a winner of a book".]

• When starting to restore some (Belgian) **TECNIC** parts, the paint on a proportion of them was in a particularly poor state and it was found that they had been stamped from sheet zinc instead of the usual mild steel. The Nuts too were solid zinc, 10mm square by 2½mm thick.

5. On **TRIX**, Peter Page asks what surface treatment was given to UK parts, and wonders if it could have been cyanide case hardening, which he adds, was a very cheap mass production method.

6. Some notes from Jeannot Buteux. • CONSTRUCTORAMA (CO') have discovered the following **'new' systems**: MÉCAMOTEUR, MULTIMÉCOS, INGÉNIO [2], BYG OG LES, CONSTRUCTA, STRUCTEX, KOSTRUKTØR, MÉTALLO [1], MÉTALLO [2], INGÉNIOR, NAVIGO, DEN LILLE ELEKTROINGENIØR, LEONARDO, SCHUMANN, MATADOR-ELEKTRO, PRIMEX, TEKNO-ELEKTRO, METALLO-MOTOR, METALLO-BILER, ACQUAVIVA, APENES, TECNICAVIA, LE MÉCANO, MÉCANAUTO, MASSTER KOWIES (Polish), CONSTRUCTOR (Russian, 4 different types), MAL'YCH (Russia), ARTIMÉTAL, MULTI-CONSTRUCTIONS, CONSTRUITOUT, FALCO [2] (alias ASSEMBLO - this sounds like the FALCO mentioned in 5/83 but if so what is FALCO [1]?), FALCO ELET (alias the 1933 German ELECTRIC), MEC-AÉRO.

• Of these 3 seem of particular interest, although as yet the only information on them comes from documents - manuals, brochures, etc. **STRUCTEX** is Belgian and has about 112 different parts including a Ball Bearing and 11 A/Gs. The parts are apparently aluminium, like STOKYS. **LEONARDO** (Italian, 1947) is generally like MECCANO but with some individual parts. Again there is a good range of pieces, and the 'Epsilon' Set contains 1691 parts plus 1333 N/B. Another good size system is **MULTIMÉCOS**, c1950, and the parts include Curved Rods and many pieces with tapped holes.

• The existence of **MULTIMOTORE** has also been confirmed. It was an Italian version of MULTIMOTEUR (see 12/304 & 13/360), made under license by G.E.M.M.A. around 1947. It is likely that only 12 Outfits were available, from 3 of the 'groupes'. • Also confirmation that **EFEL** (the version made by Gédé, see 5/91) was produced with coloured parts: red A/Gs, green Strips, and blue Triangles.

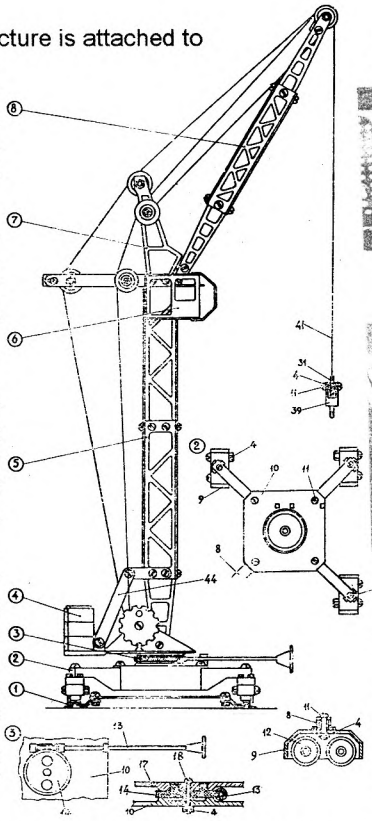
• Some years ago CO' discovered a 1921 **ERECTOR** Manual in Dutch.

• On **WENEBRIK** (13/334), Jeannot wrote that he used to have a French Set No.5 with a Manual in French which was different to the British version.

• In answer to Don Redmond (OSN 13/337), the name **ÉCÉPÉ** corresponds to the pronunciation in French of the initials E.C.P., which stand for the École Centrale de Paris, the school for engineers at which Gustave Eiffel was a student in 1852/53. Another thing, a large steel Plate, 19*28h with 2 flanges, and painted black, formed the bottom of ÉCÉPÉ boxes.

• CO' have a **TECHMASTER #50 Set** and extra/different details from those in 13/391 are: • The con-

slewing, and the super-structure is attached to the base by a long central Bolt. The sides of the jib and vertical pillar are probably spaced by other Braced Girders, joined by DAS and Double Brackets. Winding Drums are provided for both the luffing and hoisting cords, and the winding handles are attached to outer cheeks that look like sprockets. Each Drum seems to be pushed outward by a Spring on its axle, no doubt to engage a lock of some sort. In all 44 different parts can be seen. There's no definite indication of size but I think it says that the working radius is from .3 to .8m, (and that 1.5kg can be lifted at .7m). If so the jib might be some 2ft long and the vertical Braced Girders about 3" wide.

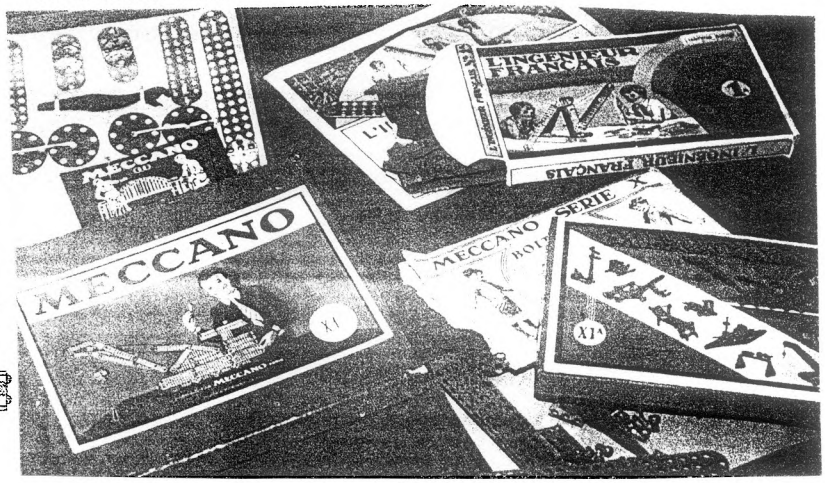


LEONARDO This postwar Italian system was mentioned in 15/426 and a leaflet showing the largest of the 5 sets provides a few more details. The outfits were designated Alpha, Beta, Gamma, Delta, and Epsilon, and the latter is shown in a large wooden box with handles at the ends. The top opens with fitted trays inside and other trays slide into one of the ends. Not many parts can be seen clearly but they include 6-spoke Wheels with bosses; an 11*5h Flanged Plate with the old MECCANO-style saw slots; a Disc of about 5½" Ø with holes on 16 equispaced radii; a larger Flanged Disc or Ring of perhaps 7½" o.d; 3" Ø M19b Pulleys and similar sized MÄRKLIN-pattern ones; and a Flanged Ring of about the same size.

Two quite nice looking Cranes are shown but the illustrations are too small to see any details. LEONARDO was made by a company called GEMMA of Via Borgazzi 4, Monza.

L'INGÉNIEUR FRANÇAIS The two sets, the linking set, and the parts in this system (LIF), are the same as those for BRITISH MODEL BUILDER (BMB), and MECCANO X (MCX), both British and French, and they all came on the market in late 1932. There were differences in the colours of the parts but I haven't reliable information on that, and the packaging varied too.

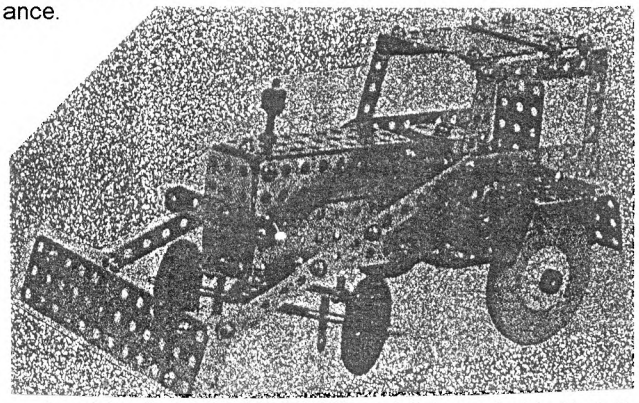
Each had two separate Model Leaflets, one for Set 1 and one for Set 2. The cover of the 4 page 1932 LIF Model Leaflet is shown opposite, and the BMB one of that year is identical, apart from the language, and some small details. The models are exactly the same with the same Model Nos., prefixed by B1 or B2 for Set 1 and Set 2 models. The French MCX Leaflets of the period are probably similar but the Leaflet with an X1A conversion set which dates from 1943, has a different cover. The 1932 UK MCX Leaflets are again very similar but on the cover the Derrick is replaced by an Excavator, and the models have an X preface instead of B. It is almost certain that the models in both the UK and French 1932 MCX Leaflets are the same, and identical to the LIC/BMB ones.



Jeannot sent a photo (above) of 3 French sets. The first, on the left, is a 1932 'X' and the label on the lid has a boy and a large Railway Breakdown Crane. The set number is X1S but I don't know what the small S signifies - I wondered if it meant supplémentaire, indicating a conversion set, but the contents correspond to an X1, and a French lists of the period shows an X1A conversion outfit. The second, top right, is a LIF 1A set of the same year, with what looks like a brightly coloured box and the Derrick on the front. The third is the 1943 X1A, and if it isn't clear the label has MECCANO along the top, with the Breakdown Crane and a (different) boy under it, above the wide diagonal stripe with 8 'X' models on it. The Leaflet with the unusual cover is under the box.

I don't have any positive end dates for any of the four but it's been said that MCX wasn't sold in the UK after 1936, or from another source, 1938; and I've never heard of MCX being available in France after WW2.

MALY KONSTRUKTOR This was (is?) a Polish system known from around 1985. There seems to have been only one set, and it was quite straight forward with Strips, A/Gs, and Flat Perforated Plates as the main parts. The illustrations I have of 2 models on what may be the cover of a manual are not very clear, but some of the parts may be visible in the one below. Generally they are probably simple mechanically but perhaps a little above average in appearance.



A set is shown in EZ (Pl.80) and it is probable that the holes are about 4mm at 10mm pitch. Several of the parts such as a slotted Curved Strip and a 50mm Disc, look just like CONSTRUCTION, but the A/Gs have the normal MECCANO arrangement of holes and slots in the flanges, and the corners of the Plates are rounded. The Perforated Plates that can be seen are 3h wide and 6,9 & 12h long. There's also a 6*6h Plate with holes only around the edges, and perhaps a similar one but up to 12h long. All the metal parts appear bright, and are probably plated. In plastic are 4 black Wheels which scale at about 60mm Ø, 4 yellow Wheels of about half that size, and some red parts including possibly some 2*2h Corner Brackets. The larger Wheels

Bottom, the Fuselage Side Panels, the lower Stub Wings, the lower Under Tailplane, the Engine Nacelles (3 diagonally in each top corner of the box) and the Propellers.

Parts in the box that can't be seen in the model are the silver rectangular 'box' with convex sides between the Wings; the round part midway up the right side, sitting on top of the red Cabin; the Radial Engines on either side of the Stub Wings; and the 8 black cone shaped parts along the top – possibly nacelles for a radial engine, or more likely, half nacelles. If so, they are perhaps a little too small to match the Radial Engines already mentioned. These 'extra' parts, particularly the Engines and the black 'Cones', are presumably used in the other Flying Boats, and the 1933 manual says that several large aircraft can be made by combining the 109 parts with those in the 106 and 108.

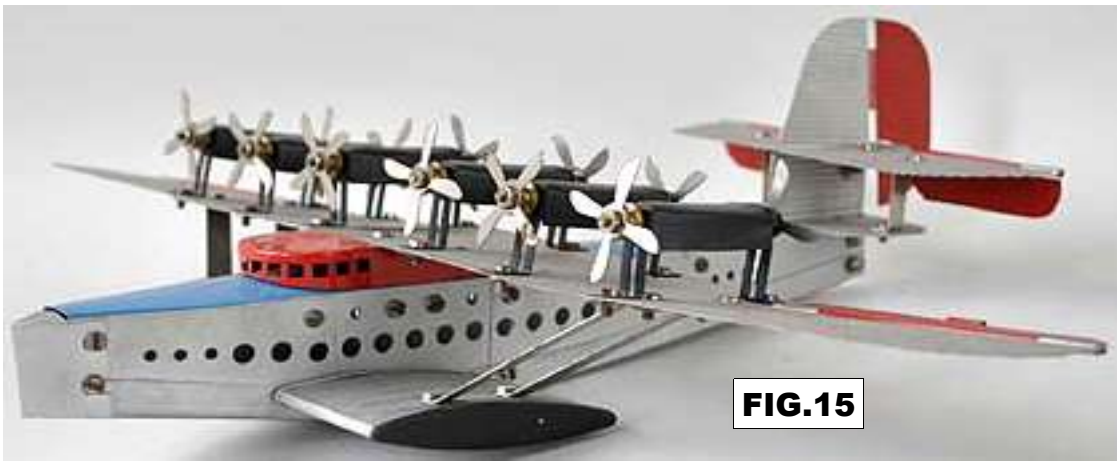


FIG.15

To my mind the model is rather impressive and is obviously the Do.X. It looks the part although it's not exactly to scale: in particular the wings outside the engines need to be longer, as does the fuselage behind the wing, and the chord of the Fin and Tailplane are oversize. That last though is true of most DUX models, and I wonder what prototype the designer of DUX Aero had in mind when sizing the various basic parts.

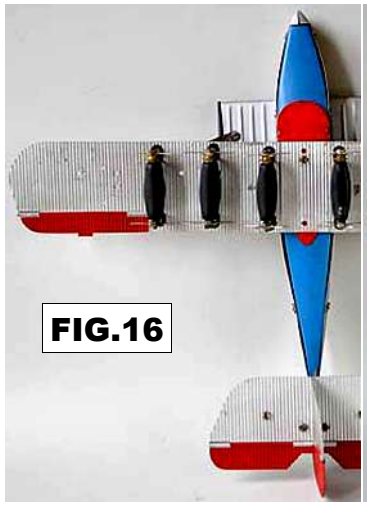


FIG.16

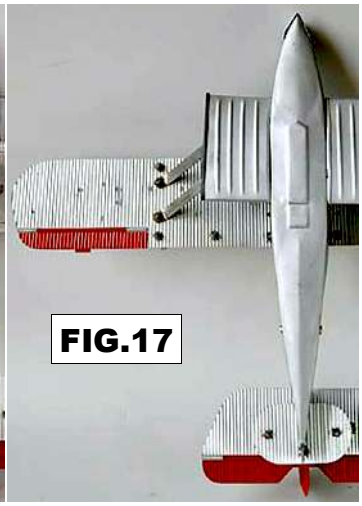


FIG.17

DUX AERO: S4 **OSN 42/1272**

Snippets. LEONARDO A note about a Leaflet advertising the 5 LEONARDO sets, Alpha to Epsilon, of this large Italian system appeared in 16/446. Since then the only additional material seen is 2 Ebay items, one a set in a wooden box and the other a Motor.

The Set was said to contain over 3000 parts, including 2 each of 220v & low voltage Motors, though it wasn't clear if some or all of these were part of the Set or extras. The manual with the Set was a '1946 edition'. The 3 Ebay photos, all very blurry, were the general view right; one of the 4 trays; and one of the manual page bottom right. Points of interest include:

- The Set matches the Epsilon described in OSN 16 fairly exactly. Of the 4 trays, the 2 which fit into the side of the box look to be full length; the 2 in the top are shorter, by about 20%.
- All the parts appear to be unpainted, and are perhaps nickelled. The parts in one of the longer trays seem to include extra long parts, possibly 49h A/Gs. Otherwise all that can be seen at all clearly are the 6-Spoke Wheels, some double Braced Girders, probably 25h long, and what might be a black cylindrical Motor sitting on the top of the lower of the 2 top trays.
- The parts that can be seen on the manual page include a Digger Bucket top left (& on re-examination one can also be seen in the Epsilon set in the Leaflet); a Dredger Bucket bottom left; 3 Pulley Blocks bottom centre; a 6-Spoke Sprocket Wheel top right; & a Triangular Girder Frame alongside it.

The Motor, right, looks conventional except that it has 3 pins on its connection panel. I wondered if, with suitable internal wiring, this would allow forward & reverse with the voltage applied across different pairs of pins, but I don't see how it could work. Another photo showed that the output shaft extends out from each sideplate.

LEONARDO: S1 **OSN 42/1272**

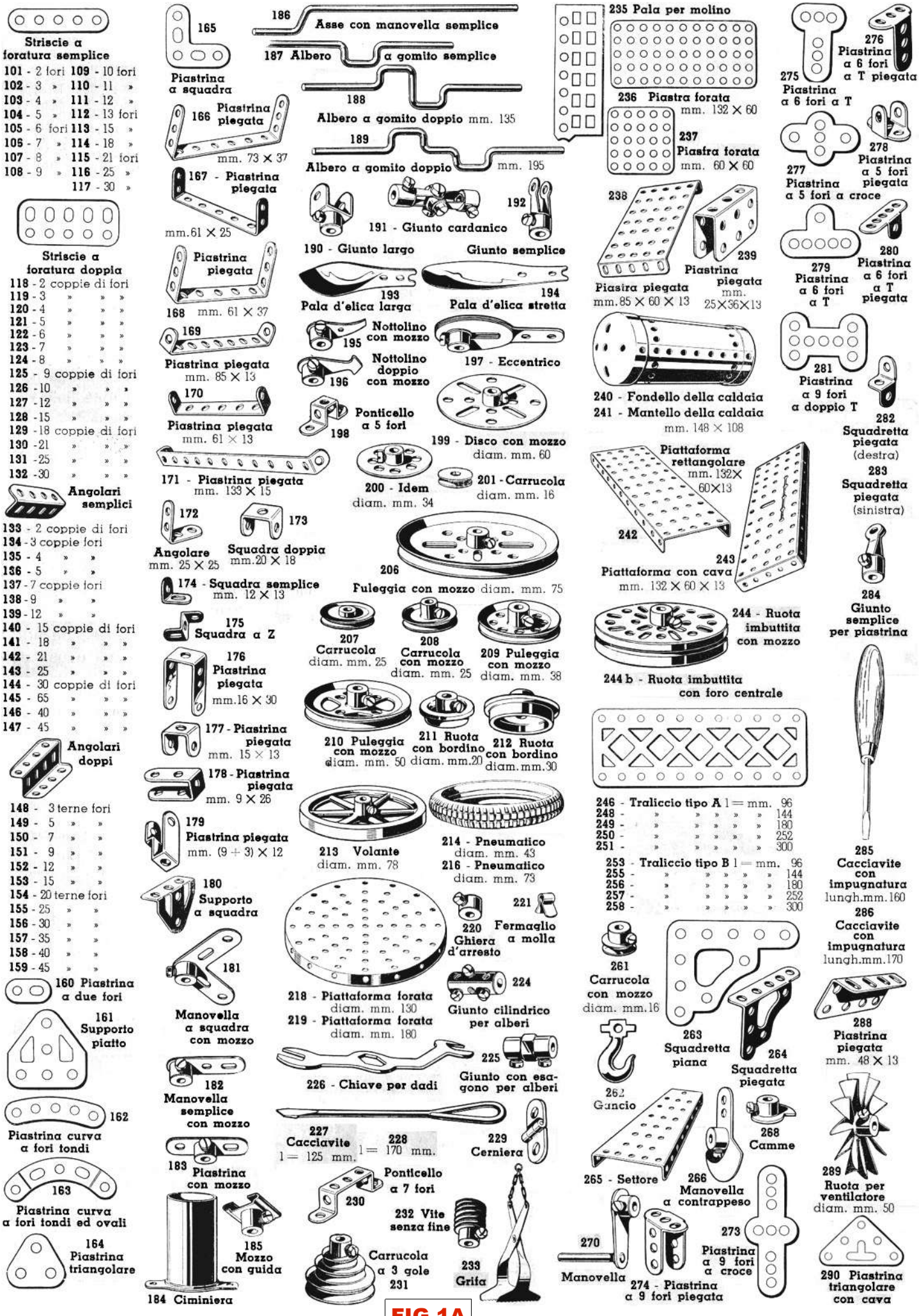

Striscie a foratura semplice
101 - 2 fori 109 - 10 fori
102 - 3 » 110 - 11 »
103 - 4 » 111 - 12 »
104 - 5 » 112 - 13 fori
105 - 6 fori 113 - 15 »
106 - 7 » 114 - 18 »
107 - 8 » 115 - 21 fori
108 - 9 » 116 - 25 »
117 - 30 »
Striscie a foratura doppia
118 - 2 coppie di fori
119 - 3 » » »
120 - 4 » » »
121 - 5 » » »
122 - 6 » » »
123 - 7 » » »
124 - 8 » » »
125 - 9 coppie di fori
126 - 10 » » »
127 - 12 » » »
128 - 15 » » »
129 - 18 coppie di fori
130 - 21 » » »
131 - 25 » » »
132 - 30 » » »
Angolari semplici
133 - 2 coppie di fori
134 - 3 coppie fori
135 - 4 » »
136 - 5 » »
137 - 7 coppie fori
138 - 9 » »
139 - 12 » »
140 - 15 coppie di fori
141 - 18 » » »
142 - 21 » » »
143 - 25 » » »
144 - 30 coppie di fori
145 - 65 » » »
146 - 40 » » »
147 - 45 » » »
Angolari doppi
148 - 3 terne fori
149 - 5 » »
150 - 7 » »
151 - 9 » »
152 - 12 » »
153 - 15 » »
154 - 20 terne fori
155 - 25 » »
156 - 30 » »
157 - 35 » »
158 - 40 » »
159 - 45 » »
160 Piastrina a due fori
161 Supporto piatto
162 Piastrina curva a fori tondi
163 Piastrina curva a fori tondi ed ovali
164 Piastrina triangolare
165 Piastrina a squadra
166 Piastrina piegata mm. 73 × 37
167 - Piastrina piegata mm. 61 × 25
Piastrina piegata 168 mm. 61 × 37
169 Piastrina piegata mm. 85 × 13
170 Piastrina piegata mm. 61 × 13
171 - Piastrina piegata mm. 133 × 15
172 Angolare mm. 25 × 25
173 Squadra doppia mm. 20 × 18
174 - Squadra semplice mm. 12 × 13
175 Squadra a Z
176 Piastrina piegata mm. 16 × 30
177 - Piastrina piegata mm. 15 × 13
178 - Piastrina piegata mm. 9 × 26
179 Piastrina piegata mm. (9 + 3) × 12
180 Supporto a squadra
181 Manovella a squadra con mozzo
182 Manovella semplice con mozzo
183 Piastrina con mozzo
184 Ciminiera
185 Mozzo con guida
186 Asse con manovella semplice
187 Albero a gomito semplice
188 Albero a gomito doppio mm. 135
189 Albero a gomito doppio mm. 195
190 - Giunto largo
191 - Giunto cardanico
192 Giunto semplice
193 Pala d'elica larga
194 Pala d'elica stretta
195 Nottolino con mozzo
196 Nottolino doppio con mozzo
197 - Eccentrico
198 Ponticello a 5 fori
199 - Disco con mozzo diam. mm. 60
200 - Idem diam. mm. 34
201 - Carrucola diam. mm. 16
206 Puleggia con mozzo diam. mm. 75
207 Carrucola diam. mm. 25
208 Carrucola con mozzo diam. mm. 25
209 Puleggia con mozzo diam. mm. 38
210 Puleggia con mozzo diam. mm. 50
211 Ruota con bordino diam. mm. 20
212 Ruota con bordino diam. mm. 30
213 Volante diam. mm. 78
214 - Pneumatico diam. mm. 43
216 - Pneumatico diam. mm. 73
218 - Piattaforma forata diam. mm. 130
219 - Piattaforma forata diam. mm. 180
220 Ghiera d'arresto
221 Fermaglio a molla
224 Giunto cilindrico per alberi
225 Giunto con esagono per alberi
226 - Chiave per dadi
227 Cacciavite l = 125 mm.
228 l = 170 mm.
229 Cerniera
230 Ponticello a 7 fori
231 Carrucola a 3 gole
232 Vite senza fine
233 Grifa
235 Pala per molino
236 Piastra forata mm. 132 × 60
237 Piastra forata mm. 60 × 60
238 Piastra piegata mm. 85 × 60 × 13
239 Piastrina piegata mm. 25 × 36 × 13
240 - Fondello della caldaia
241 - Mantello della caldaia mm. 148 × 108
242 Piattaforma rettangolare mm. 132 × 60 × 13
243 Piattaforma con cava mm. 132 × 60 × 13
244 - Ruota imbuttita con mozzo
244 b - Ruota imbuttita con foro centrale
246 - Traliccio tipo A l = mm. 96
248 - » » » » » 144
249 - » » » » » 180
250 - » » » » » 252
251 - » » » » » 300
253 - Traliccio tipo B l = mm. 96
255 - » » » » » 144
256 - » » » » » 180
257 - » » » » » 252
258 - » » » » » 300
261 Carrucola con mozzo diam. mm. 16
262 Gancio
263 Squadretta piana
264 Squadretta piegata
265 - Settore
266 Manovella a contrappeso
268 Camme
270 Manovella
273 Piastrina a 9 fori a croce
274 - Piastrina a 9 fori piegata
275 Piastrina a 6 fori a T
276 Piastrina a 6 fori a T piegata
277 Piastrina a 5 fori a croce
278 Piastrina a 5 fori piegata
279 Piastrina a 6 fori a T
280 Piastrina a 6 fori a T piegata
281 Piastrina a 9 fori a doppio T
282 Squadretta piegata (destra)
283 Squadretta piegata (sinistra)
284 Giunto semplice per piastrina
285 Cacciavite con impugnatura lungh. mm. 160
286 Cacciavite con impugnatura lungh. mm. 170
288 Piastrina piegata mm. 48 × 13
289 Ruota per ventilatore diam. mm. 50
290 Piastrina triangolare con cava

FIG.1A

FIG.1B

LEONARDO by Jacques Pitrat

'Costruzioni Leonardo' was made in Italy just after WW2 by Giocattoli Elettro Meccanici Minuterie Affini (G.E.M.M.A.), via G. Borgazzi, 4, Monza. The logo of the firm, above, is the letter 'G' inscribed in a pentagon. The manual with the set to hand was printed in 1946. Little has been known of LEONARDO until now: there is a short entry based on a leaflet in MCS, brief mentions in OSN 15/426 & 16/446, plus, in 42/1272, a picture of the largest set, & one of a motor sold on eBay. This account is based on a lightly used Gamma set, its manual, & some model sheets with it.

The system comprised five sets: Alpha, Beta, Gamma, Delta, & Epsilon. There were no connecting sets but the manual mentions the possibility of buying supplementary parts, so one could upgrade one's set. Nowhere is the price of the sets or of the separate parts indicated.

FIG.2

One could roughly define the 5 sets as large 1929 MECCANO sets completed with some MÄRKLIN parts. But though most of the parts look like MECCANO or MÄRKLIN they are not compatible with them because their hole pitch is only 12.0mm.

The PARTS The Illustrated Parts in the manual is shown, in condensed form, in Figs.1A & 1B. In the original the lengths of parts 101-159 were given but all are simply the number of holes multiplied by 12mm. Many of the actual parts can be seen in the photos of the set below. There are so many parts that I cannot describe all of them, so I will only highlight some characteristics of the system.

The diameter of the holes is 4.3mm, and as already noted, the pitch is 12.0 mm. The thread is M4 and the bosses are double-tapped. Bolts are cheeseheaded, & the Nuts are hexagonal: one type is 2.0mm thick, the other 3.3mm. Axles are 4.0mm diameter. The Gears are about Mod .65, virtually the MECCANO value. The pitch of the Sprocket Chain is about 5mm, a

FIG.3

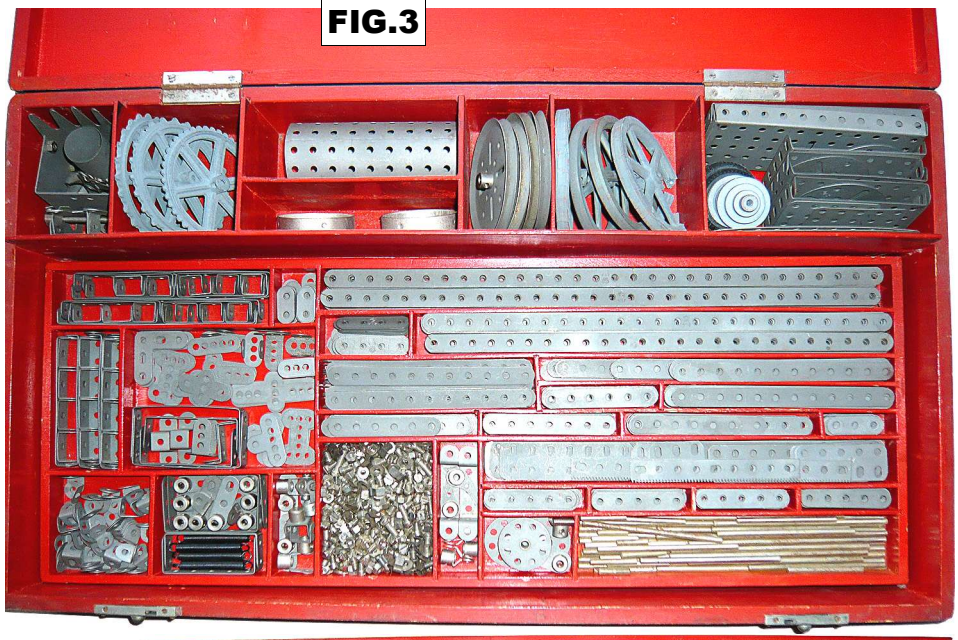


FIG.4

little greater than the MECCANO value.

According to the manual the Strips, Girders, & Plates are 'acciaio inossidabile' (printed in bold), stainless steel, but treated to have a grey appearance – to make the models look more realistic perhaps. Some other parts such as the Bush Wheel, the 3" Pulley, the Face Plate, the Cranks, the Bearings; the Forks, the Cam, etc. are also steel but with a brass boss. The Couplings, Collars, & the Worm are brass. All the parts are very well made, and look like new, without rust, screw marks, or tarnish. A few parts are stamped with the 'G' logo & the PN. It is difficult to understand why some parts are stamped and others are not. For instance the 8h Braced Girder with closed ends is stamped while the 8h Braced Girder with open ends isn't.

The makers probably also wanted to have brass Pulleys, Pinions, Bevels, & Wheels: the Crane on the manual cover has brass Wheels & Pulleys. But as copper was scarce at the time, they were obliged to find a substitute and these parts were cast using what is probably a lead alloy. Antimony was often added to lead to increase its hardness. All these parts are marked with the 'G' logo & their PN, and the quality of these marks is excellent, as good as printed characters. So it is possible that the alloy includes tin, as in type alloys; tin is harder and tougher than lead, and it promotes the fluidity of the molten metal. The appearance of these parts is excellent, the teeth of the Pinions & Bevels are as good as those in MECCANO, cut from brass. However this alloy has two severe drawbacks. Firstly, if it is hard, it is fragile. In my set, one Artillery Wheel and one Pinion are broken. Secondly, just as there is a well known zinc pest, there is also a lead pest due to impurities in the alloy. Some parts are still immaculate, but many have serious damage. They have white patches which indicate a change in the composition of the alloy, or they have marks & cracks; in the worst cases, they have begun to disintegrate. It would be impossible now to use most of these parts in a working model, they would not bear the stress. The solution chosen by Meccano France at the same time was much better: the normally brass Pinions, Bevels, Gears, Worm, & Ratchet Wheel were made of an aluminium alloy, and are still in a perfect condition.

Though most of the parts look like MECCANO, this does not mean that they are in the sets in the same number as in the corresponding MECCANO outfits: there is no compatibility of the models. Moreover, the number of holes is not always the same: LEONARDO favours even numbers. For instance, there are 8, 10, 12, 18, & 30 hole Strips & Flat Girders; 12, 18, 30, & 40 hole Angle Girders, and 8 & 12 hole Braced Girders.

To maintain the symmetry of the ends of the Braced Girders with an even number of holes they have a curious opening in the centre, as right.

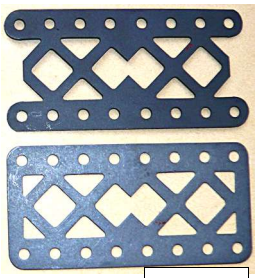


FIG.5

Conversely, many parts with an odd number of holes are not represented in the LEONARDO system: there are plenty of 11h Strips, but no 11h Flat, Angle, or Braced Girders (although a non-existent 11h long part was used to illustrate the Braced Girders in the manual!).

If we list all the number of holes that are represented for at least for one kind of Strip or Girder, we have the following sequence: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 18, 20, 21, 25, 30, 35, 40, 45.

In some cases, the parts are slightly different to the equivalent MECCANO part, for instance, the Corner Angle Bracket has no oval hole. It also happens that some parts are very different, such as the Eccentric, where the LEONARDO solution is better since it is not limited to only three values for the stroke.

One oddity of the LEONARDO system is that it has two versions of a few MECCANO parts. Thus one Propeller Blade is the large 1909 form, the other the more realistic 1927 shape. One 11*5h Flanged Plate has no end flanges, the other has them and also the slot & slit for the Saw. One Pawl is the 1921 two-headed type with boss, the other the modern form. The wider 1914 Double Bracket coexists with the narrower 1917 one. And all the Braced Girders exist with closed & open ends (and each set has exactly the same number of of each type).

Some Meccano parts have not been reproduced; among those missing are the Electrical parts, the Loom parts, the Train parts, the Screwed Rods, the large circular parts, and naturally all the parts that appeared after 1928. However, many rare parts such as the Ship's Funnel, the Octagonal Coupling, the Hinge, the Dredger Bucket, the Fan, the Cone Pulley, and the Digger Bucket, are present. Moreover, LEONARDO sets include six MECCANO parts that were never in the MECCANO sets: the three Pulley Blocks, the Crane Grab, the Girder Frame, & the Right Flanged Bracket (the Left one was not included in LEONARDO).

Beside MECCANO parts, LEONARDO also has many reproductions from MÄRKLIN. They include (with the pre-WW2 MÄRKLIN/LEONARDO PNs): 7h Double Bent Strip (45a/230), Handle (62/270), Worm Housing (65/335), Wheel (67/244), Crankshaft, Double (99a/189), various Brackets (114-118/274-281, plus 273 which had no MÄRKLIN equivalent), Crank with Counterweight (122/166), Cam (123/268). Unlike the MECCANO parts, many of these did not exist in 1929.

LEONARDO also has three families of original parts. First, the Z-Girders with 12 sizes (#148-159) from 3 to 45 holes. A singularity in this sequence is that there are neither 18 nor 21h parts, but 20h ones, the only part 20 holes in length. Few of these parts are in the sets: none in the Alpha and up to 6 of each in the Epsilon. As can be seen right the part is unusual in the position of its slotted holes.

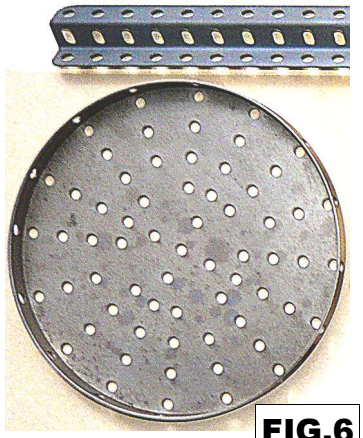


FIG.6

Two sizes of Flanged Discs exist in this system. They are different from the MECCANO & MÄRKLIN parts with only round holes and no other piercing of the face. The 130mm above has its face holes in a slightly different pattern to those shown in the Illustrated Parts.

As in MECCANO & MÄRKLIN, LEONARDO includes a Dredger Bucket (#307) and it is shown right with its associated parts (plus a 3h Z-Girder to give scale). Instead of being fastened to a Sprocket Chain, it has a rectangular link with a hook spot welded to its underside, and this can be clipped into a chain made from similar Links, pitch approximately 9mm. As these Links are larger than those of the Sprocket Chain a special Wheel (#345) with suitably spaced teeth is provided.

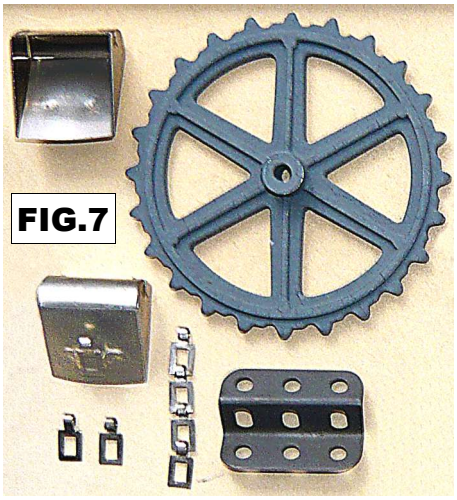


FIG.7

Finally, 29 parts appear in the contents of the sets with a number but without a description. They are probably parts that the authors of the system wanted to include in the sets, but were never realized because of lack of time or of manufacturing capacity. As the parts are numbered in a logical

PN/Set	α	β	γ	δ	ε
101	12	14	16	20	24
102	9	16	18	20	34
103	12	18	24	30	36
104	15	40	70	90	100
105	6	12	20	32	40
106	6	12	18	24	30
107	4	8	12	16	20
108	2	6	8	12	16
109	2	4	6	8	12
110	10	20	40	60	80
111	6	12	20	30	40
112	2	2	2	4	4
113	2	2	4	4	4
114	—	2	4	6	8
115	—	—	2	4	6
116	10	20	30	36	40
117	10	20	30	36	40
118	—	—	—	4	4
119	—	—	2	4	4
120	—	—	1	2	3
121	—	2	2	2	2
122	—	—	—	2	2
123	—	1	2	3	3
124	—	1	2	3	3
125	—	—	1	2	2
126	—	—	—	1	1
127	—	1	2	4	6
128	—	1	1	2	2
129	—	—	1	2	2
130	—	1	2	3	3
131	—	—	1	2	2
132	—	—	—	2	2
133	—	—	1	2	2
134	1	2	2	4	4
135	—	1	2	2	2
136	1	2	4	6	6
137	1	2	4	6	6
138	—	—	1	2	3
139	2	6	12	18	24
140	1	2	2	4	4
141	—	2	4	6	8
142	—	—	2	4	6
143	4	6	12	16	20
144	2	4	6	8	10
145	—	—	2	4	4
146	1	2	4	6	6
147	—	1	2	4	6
148	—	1	1	2	2
149	—	1	1	2	4
150	—	—	1	2	2
151	—	—	1	2	4
152	—	1	2	4	6
153	—	1	1	2	2
154	—	1	1	2	4
155	—	—	—	2	2
156	—	1	1	—	4
157	—	—	—	2	2
158	—	1	1	—	4
159	—	—	—	2	2
160	8	10	12	16	24
161	2	4	6	6	6
162	2	4	4	12	16
163	2	3	4	6	8
164	2	4	6	8	10
165	2	2	4	6	6
166	1	1	2	2	2
167	2	2	4	4	4
168	1	1	2	2	2
169	6	6	8	10	12
170	8	8	8	12	18
171	2	4	4	6	6
172	4	6	8	10	12
173	8	12	16	18	20
174	20	40	60	80	96
175	8	12	16	18	20
176	1	2	3	4	4
177	8	12	16	18	20
178	1	2	3	4	4
179	—	1	2	2	3
180	2	4	4	6	6
181	1	1	2	2	2
182	2	4	6	8	12
183	2	2	2	4	4
184	—	—	1	1	1
185	—	—	1	2	2
186	1	1	2	3	3
187	1	1	1	1	2
188	—	—	1	1	1
189	—	—	—	1	1
190	1	2	2	3	3
191	—	1	1	2	2
192	2	2	2	4	4
193	—	—	2	2	2
194	2	2	2	4	4
195	1	1	2	2	2
196	—	—	1	2	2
197	1	1	2	2	3
198	1	2	2	3	4
199	1	2	3	4	4
200	1	2	3	4	4
201	2	4	6	8	10
202	—	—	—	—	—
203	—	—	—	—	—
204	—	—	—	—	—
205	—	—	—	—	—
206	4	4	4	4	4
207	4	4	6	8	10
208	1	2	4	4	6
209	2	2	4	6	8
210	4	4	4	4	4
211	4	4	8	10	12
212	4	4	4	8	10
213	—	4	4	4	4
214	—	4	4	4	4
215	—	—	—	—	—
216	—	—	—	4	4
217	—	—	—	—	—
218	—	—	1	1	1
219	—	—	—	1	1
220	10	20	30	40	50
221	15	20	25	30	35
222	—	—	—	—	—
223	—	—	—	—	—
224	4	6	8	12	15
225	1	2	2	3	4
226	1	1	2	2	2
227	1	1	1	1	1
228	—	—	1	1	1
229	1	2	2	4	4
230	1	1	2	4	4
231	—	1	2	3	4
232	1	2	2	2	2
233	—	—	1	1	1
234	—	—	—	—	—
235	—	—	4	4	4
236	1	2	4	4	6
237	—	1	2	4	4
238	3	5	5	8	10
239	1	1	1	1	2
240	2	2	2	2	2
241	1	1	1	1	1
242	2	2	4	6	6
243	1	1	2	3	3
244	—	—	—	3	3
244 b	—	—	—	1	1
245	—	—	—	—	—
246	—	—	1	2	3
247	—	—	—	—	—
248	1	3	6	8	10
249	1	1	1	2	2
250	1	1	1	2	2
251	2	4	6	8	10
252	—	—	—	—	—
253	—	—	1	2	3
254	—	—	—	—	—
255	1	3	6	8	10
256	1	1	1	2	2
257	1	1	1	2	2
258	2	4	6	8	10
259	—	—	—	—	—
260	—	—	—	—	—
261	3	3	3	4	5
262	1	1	1	2	2
263	2	2	4	6	8
264	—	—	2	4	6
265	2	2	3	4	4
266	—	1	1	2	2
267	—	—	—	—	—
268	—	—	1	1	1
269	—	—	—	—	—
270	1	1	1	2	2
271	—	—	—	—	—
272	—	—	—	—	—
273	2	2	3	4	4
274	—	1	2	2	2
275	2	3	4	6	6
276	—	2	2	3	3
277	2	3	4	6	6
278	—	2	2	3	3
279	2	3	4	6	6
280	—	2	2	3	3
281	2	3	4	6	6
282	2	4	6	8	10
283	2	4	6	8	10
284	1	1	2	2	2
285	1	1	1	1	1
286	—	—	—	1	1
287	—	—	—	—	—
288	2	2	2	4	6
289	—	—	—	1	1
290	—	1	2	6	8
291	—	1	2	4	4
292	—	—	—	—	—
293	—	—	—	—	—
294	—	1	1	1	1
295	—	—	—	—	—
296	—	—	—	—	—
297	1	1	2	2	2
298	1	1	1	2	2
299	—	—	1	2	2
300	—	—	—	1	2
301	1	1	2	2	2
302	—	—	1	2	2
303	—	—	—	1	2
304	1	1	2	3	3
305	1	1	2	3	3
306	—	—	—	—	—
307	—	—	4	8	12
308	—	—	—	—	—
309	—	—	32	64	96
310	2	2	2	2	2
311	—	1	1	2	2
312	—	—	1	1	2
313	—	—	—	—	—
314	—	—	1	2	4
315	—	—	1	2	4
316	2	3	4	6	8
317	2	3	4	6	8
318	2	3	4	6	8
319	3	4	6	8	10
320	2	2	3	4	5
321	—	—	1	2	2
322	2	4	6	8	10
323	2	3	4	6	6
324	1	2	4	5	6
325	4	6	8	10	12
326	4	6	8	10	12
327	—	1	2	3	4
328	—	—	—	—	—
329	—	—	—	—	—
330	—	—	2	4	4
331	—	—	2	2	4
332	—	—	2	2	4
333	—	—	2	2	4
334	—	—	2	2	4
335	1	2	2	2	2
336	1	1	1	1	2
337	60	75	100	180	300
338	30	40	70	120	200
339	10	15	20	30	48
340	5	7	10	15	24
341	3	4	6	8	12
341 b	5	7	10	12	15
342/343	108	141	206	353	584
344	20	30	40	80	150
345	—	—	2	2	4
346	—	2	2	4	6
347	—	2	2	4	6
348	2	3	4	6	12
349	1	2	2	3	5
350	—	2	2	2	2
351	—	—	2	2	2
352	—	—	—	2	2
TOTALE	613	962	1486	2250	3024

FIG.8

order, it is possible to have an idea on the nature of some of these parts. For example, 215 & 217: Tyres for 1½" & 3" Pulleys, while parts 247, 254, 252, & 259 were probably 10 & 30h Braced Girders. In some cases it is more difficult to guess: 328 & 329 could be very long Axle Rods, while 267, 269, 271, & 272 could be other MÄRKLIN parts. One of these unknown parts was no doubt a Circular Saw given the Flanged Plate #244 (one model is an adaptation of the MECCANO 4.36 Swing Saw where the Saw had to be replaced by a Face Plate).

As mentioned in OSN, the Electric Motor uses a 20V alternating current. It is not included in the sets.

The SETS The present Gamma outfit is in the sturdy, 583*323*88mm, wooden box below. The main label is

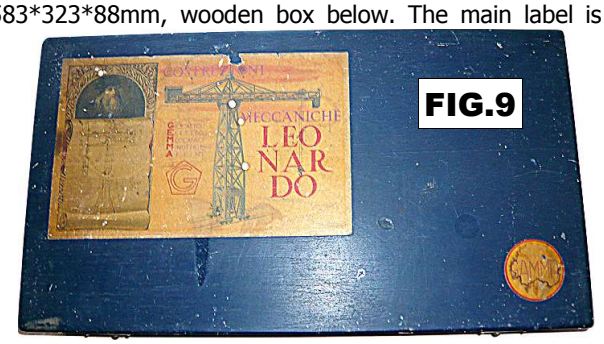


FIG.9

identical to the manual cover shown in Fig.10, while the small round label has GAMMA printed on it. Inside are several compartments, one of them housing three removable trays, see Figs.3 & 4. The box & trays are very well made, with many compartments; those for Strips & Girders are exactly the length & width of the parts in question.

The larger sets are also in wooden boxes, the Delta with four trays, and the Epsilon with five.

The set contents are given left. The sets are progressive but unusually the number of types of part in the Delta & Epsilon are exactly the same (as shown parts 154 & 156 are not included in the Delta, but this is surely a typo since they are included in the Gamma outfit. Usually the largest set of a system has many new parts, for instance 1929 Meccano set #7 includes 57 parts that do not exist in set #6. A possible explanation is that initially the makers wanted to include all the numbered but not named parts in Epsilon, but they later thought that few expensive Epsilon sets would be sold. So it was not reasonable to manufacture only very few of each of these parts; they preferred to see whether these sets sold well before increasing their contents.

The MANUAL It is written in Italian, with 16 pages, 308*193mm, plus covers, and the front is shown in Fig.10 overleaf. Two pages present the system, followed by four for the Illustrated Parts. Then, eight pages describe 41 simple standard mechanisms; they are similar to mechanisms given in MECCANO manuals, but 14 of them also use a few MÄRKLIN parts. The contents of the sets are in the three last pages, through C3. The manual does not contain any models other than the Crane on the cover: a supermodel which cannot be built even with Set Epsilon – for instance it needs 28 Small Flanged Wheels.

The model sheets are in a case, and are cardboard, 300*180mm, printed on both sides. One or two models are on each side, except that one model occupies both sides. The sheets are numbered, the highest number in my set being 23; I have only 12 of them. The models are also numbered, the highest number in my set being 48. Many models are missing, my set includes 27 models for Alpha, but only 1 for Beta, 3 for Gamma, 1 for Delta, and none for Epsilon. Each model is described by a drawing, the number of necessary parts, and almost always a text

FIG.10

one from Set 6 (Scales, 6.39). The adaptations are well made, the model is sometimes presented from a clearer point of view, and the LEONARDO parts are shown truly when they differ from the MECCANO pattern. For example, two 11h Braced Girders are used in the MECCANO 'Try-Your-Strength Machine' (2.50). As they do not exist in the LEONARDO sets, they are replaced by 12h Braced Girders; moreover, as Alpha has only one with closed ends and one with open ends, the drawing shows one of each type, with their characteristic centre opening. See Fig.12. All in all, the Alpha models are satisfactory, although they are not very original, and larger and more intricate models could be built with this set. A more complicated Alpha model is shown below.

I have only one sheet which include models for sets Gamma & Delta. All four are Bridges and they are disappointing as, if we do not include the Nuts, Bolts, & Washers, they use only between 11 & 15 different types of part. This is rather few for sets with 200 different kinds of part, and one cannot say that the potential of these sets was well used. The 3 Gamma models represent one side of a Bridge, and the parts are given for building this side. Naturally one

explaining how to build it. Contrary to the standard mechanisms of the manual, MÄRKLIN parts are rarely used in the models: in only three in fact.

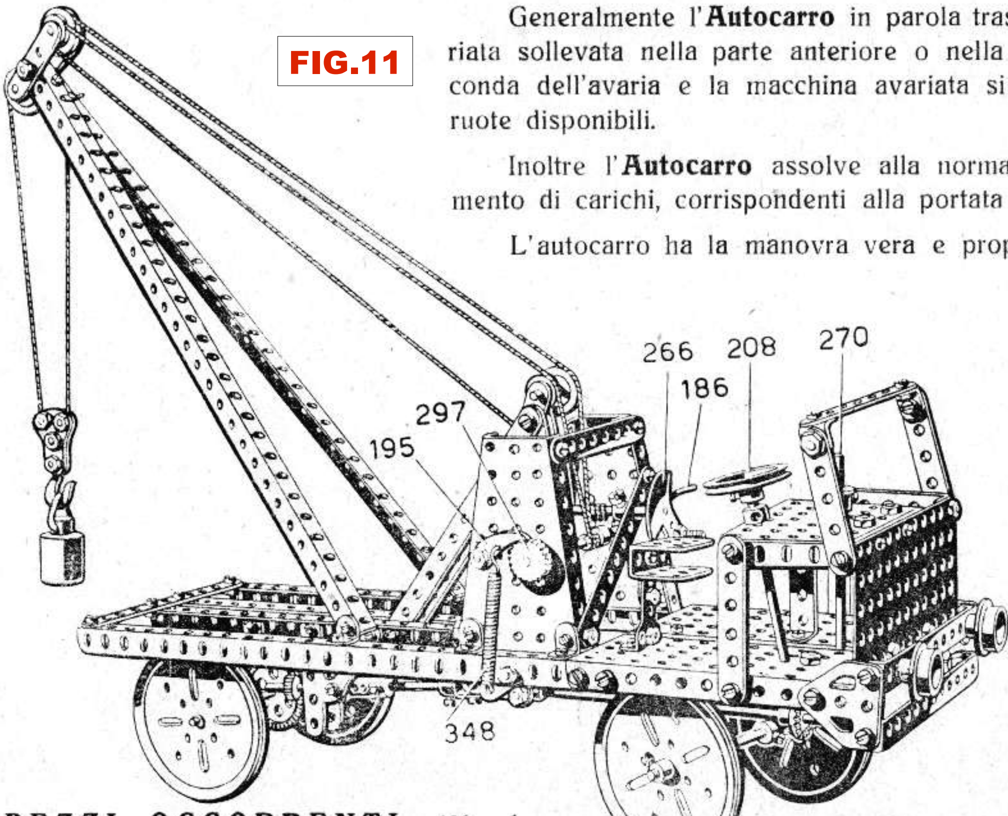
Most Alpha models are adapted from models in the 1929 or older MECCANO manuals for Sets 2, 3, 4, and there is even

Costruzione realizzabile con le Scatole: **Alfa - Beta - Gamma - Delta - Epsilon**

Mod. N. 11 - AUTOCARRO CON GRU

È un **Autocarro** particolarmente usato per i servizi di soccorso stradali e precisamente per ricuperare e rimorchiare auto od autocarri che abbiano subito avarie per incidenti stradali e non siano più in grado nè di proseguire con mezzi propri, nè di essere rimorchiati da altre macchine.

FIG.11



Generalmente l'**Autocarro** in parola trasporta la macchina avariata sollevata nella parte anteriore o nella parte posteriore a seconda dell'avaria e la macchina avariata si vale delle uniche due ruote disponibili.

Inoltre l'**Autocarro** assolve alla normale funzione di sollevamento di carichi, corrispondenti alla portata della gru.

L'autocarro ha la manovra vera e propria di guida, e le manovre inerenti al funzionamento della gru.

La prima è realizzata in maniera alquanto originale ed è meglio visibile nell'altra figura.

Il volano è rappresentato da una **puleggia con mozzo** 208 sul quale è imperniato lo sterzo che all'estremità inferiore è collegato con un **disco** 200 (vedi altra figura).

PEZZI OCCORRENTI (vedi retro)

Voce	Numero Pezzi																
101	5	109	2	164	2	186	1	211	2	242	2	297	1	322	1	342	108
102	4	110	2	166	1	192	2	220	10	262	1	298	1	323	1	343	13
103	2	111	2	168	1	195	1	221	8	263	2	301	1	324	1	344	1
104	8	134	1	170	1	200	1	224	2	265	2	304	1	326	1	348	1
105	2	136	1	171	2	201	2	236	1	266	1	305	1	337	125	Corda Metri 2.5	
107	2	143	4	174	10	206	4	238	1	270	1	317	2	338	10		
		144	2	177	6	207	2	239	1	275	2	318	1	340	2		
		161	2	178	1	208	1					320	1	341	2		
						209	1										

would want to build both sides but unfortunately the Gamma does not contain enough parts for that. The Delta Bridge is shown in Fig.13. I cannot really judge the models of the large sets with so few examples, I can only hope that I was unlucky in having only this particular sheet.

LEONARDO v. 1929 MECCANO etc The MECCANO part with the highest PN similar to a LEONARDO part is the Digger Bucket, #169; and as it is also the part with the highest PN in the 1929 MECCANO sets (except the electrical parts), it will be interesting to compare them with LEONARDO sets.

LEONARDO sets are very large. Georges Spinnler, then Professor of Mechanical Engineering at the Ecole Polytechnique Fédérale de Lausanne in Switzerland, devised a method for measuring the 'Potential' of construction sets assembled using Nuts & Bolts. He suggested N*Z/1000 where Z is the number of different types of part, and N the total number of parts (the 1000 is just to give a handy result). One never takes into account the Tools, Set Screws, Nuts, Washers, manuals, & instruction leaflets. The Potential for the 1929 MECCANO Sets 4-7 are 41, 64, 160, & 464, while the Potential for Sets Alpha, Beta, Gamma, Delta, & Epsilon are 61, 125, 248, 391, & 493. Thus the Potential of the smallest set Alpha is almost the Potential of the MECCANO No.5, while Gamma is much higher than the No.6, and Epsilon higher than the No.7. Other manufacturers have made sets with a high Potential, but lower than Epsilon; for instance the value for the FAC X2 is 382, while the ERECTOR set with the highest Potential is the 1931 No.10 set, the Climax of Erector Glory, but it only rates 437. (Automat has very large sets, but their Potential is difficult to evaluate because it is not clear whether one has to take account of some, none, or all of their many very small parts: spacers, rollers, links, & circlips). Before WW2, the set with the highest Potential was the Meccano's 'L' outfit with 490, so LEONARDO matched this record (which was also almost equalled by C.I.G.E.A., another Italian system, with 481 for its Set H). It was only surpassed in 1962 with the 512 of the MECCANO No.10. But if only one of each of the LEONARDO 'unknown' parts (those numbered but not named or produced) had been included in the Epsilon outfit the Potential of the Set would have risen to at least 566, greater by far than any set ever made. In fairness though it should be added that Spinnler has pointed out that the Potential of the sets in some systems do not reflect the Potential of the system itself because many of the parts are not included in the sets. MÄRKLIN suffers thus, and especially STOKYS which includes only 94 of its 280 parts in its largest outfit.

Costruzione realizzabile con le Scatole:
Alfa - Beta - Gamma - Delta - Epsilon

Mod. N. 44
Misuratore di Forza

È un dispositivo che dà in modo relativo la misura della forza basandosi sul colpo che si impartisce su un disco predisposto allo scopo.

Il principio è semplice: per effetto del colpo dato al disco il movimento viene impresso ad una piccola carrucola che scorre verticalmente su due guide. L'altezza raggiunta da detta carrucola determina l'entità della forza.

Il dispositivo della leva è montato sul **settore** 265 di base, uguale a quello superiore indicato in figura.

Due **supporti a squadra** 180 sono montati su detto settore. Due **striscie** 110 abbinate all'altezza del terzo foro sono attraversate da un **alberino** 317 che è imperniato nei due supporti 180 suddetti con interposizione di 3 **ranelle** 344 per parte, e fissato con **due ghiere 220.** Le due striscie 110 sono unite all'estremità esterna con due **squadre** 174 e libere all'estremità interna, e sorreggono una **carrucola** 201 che scorre fra le due **striscie** 117 verticali senza poterne uscire, per effetto della scanalatura della carrucolina.

Il pulsante è composto da un **disco 200,** un **alberino 319** ed una **ghiera** 220 interna che poggia sulle due **squadrette** 174 della leva.

Colpendo il **disco** 200 il pulsante trasmette il colpo, mediante la leva interna, alla carrucola, imprimendole una certa velocità ascensionale; a seconda della forza del colpo la carrucola raggiungerà una data altezza.

PEZZI

Voce	Numero Pezzi
106	1
110	2
116	2
117	2
144	2
162	2
174	4
180	2
198	1
200	1
201	1
220	3
242	1
248	1
255	1
263	2
265	2
317	1
319	1
337	41
342	35
343	2
344	6

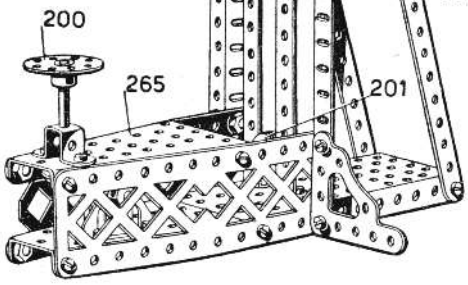


FIG.12

REMARKS It is very surprising that such large sets appeared in Italy just after WW2. Both the French & the Italian industry had been severely damaged by the war and at the time the highest set produced by Meccano France was the No.7 with an Potential of 42, less than the Alpha, the smallest LEONARDO outfit.

These huge LEONARDO sets have a very high potential with their large quantities of (mostly) well chosen parts. Most of the parts are not very original, they are essentially re-productions of MECCANO & MÄRKLIN. They were very well made, and still look as new; however, due to the scarcity of copper, the alloy chosen for casting many of the Wheels & Gears produced pieces which are fragile & subject to a pest destroying some of them.

It would be certainly possible to build very interesting models with the sets, but I am not sure that those devised by the maker fully use the system's potential.

On the whole, I admire the maker who succeeded in producing one of the largest metal construction system ever made at a time when many difficulties must have been hard to overcome. Unfortunately, it does not seem that LEONARDO was a commercial success: the sets are very rare.

Mod. N. 21 - Ponte Ferroviario
con arco a 2 cerniere a spinta eliminata

N. b. - Costruzione realizzabile solo con i modelli « DELTA » ed « EPSILON ».

PEZZI OCCORRENTI

Voce	Numero Pezzi
104	4
106	4
107	4
108	8
115	4
116	30
140	4
147	4
160	4
174	44
180	4
238	4
263	4
337	180
338	35
340	2
342	56
343	165
344	13
Corda	mt. 1.40

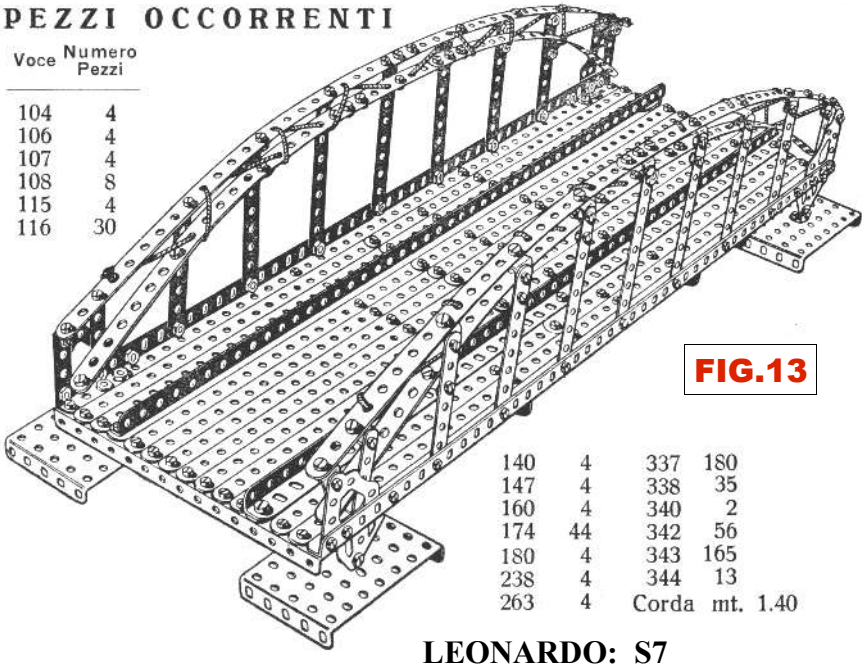


FIG.13