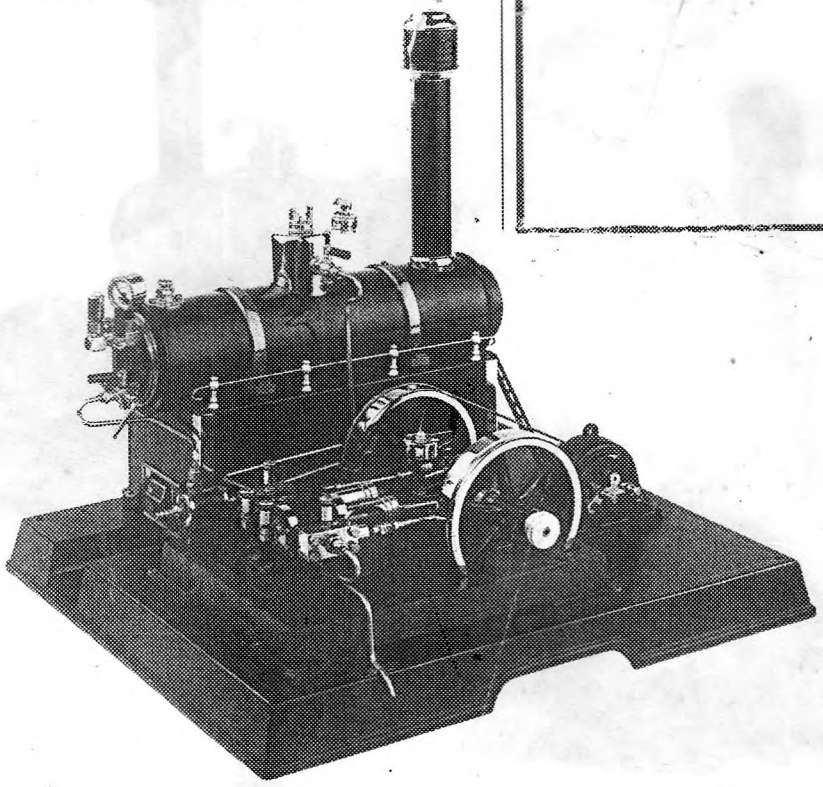
A MARKLIN CO[illegible]STEAM ENGINE.



Compound steam engine 4158/91 from 1919 with high and low pressure cylinders in combined cylinder housing. With centrifugal governor, lubrication reservoires, condensing water drain and feed pump.

Flue boiler of heavy brass with boiler pipes, brazed. Removable spirit vaporizing burner. Cord- and belt-drive and also dynamo are mounted on the same base.

My latest model completed a few days ago from a photograph (shown above) from a past issue of the "Marklin Magazine". This is a compound engine where steam from the larger main cylinder-is passed into the smaller cylinder on the offside of the engine unit. It is a large model with the baseplate being 24½" in length-and with a width of 21"overall. .
The colour contrasts are as follows:- Boiler in Yellow with Red ends,a Black and Nickel stack,Flywheels in Black with Silver rims. Cylinders are in Black with Nickel bands and the boiler firebox is also in black with Red surrounds.
The engine plinth is in Mid-Red/Green and the surface of the baseplate is in Red with Green surrounds. The mains motor is encased in Meccano replica 3½" circular girders and represents the actual Dynamo. Fitted with a well proportioned Governor and boiler feed pump while most piping has been carried out with Aluminium tubing bent to shape. The drive from the motor is by means of a flat elastic belt to the offside flywheel and the governor drive is a small Meccano rubber belt. Valve gear is made from small eccentrics from the built up crankshaft inside the two flywheels and the feed pump is also a small eccentric near the firebox end of the crankshaft.
The completed model has been designed for display purposes so all bearings are substantially constructed and all wheels and pinions have been fitted with double set and grub screws.
The following page gives different views and instructions are now being completed-obtainable direct from me. This German engine is similar in layout to the "Wilesco" model shown in this treatise on pages 71/72-but in a different colour scheme.

SHEET ONE. MARKLIN COMPOUND STEAM ENGINE.

This large working model has been copied from an actual engine of circa:1919-culled from a German language catalogue recently sent to me by a German steam enthusiast. It is a compound type with one cylinder larger than the other and is unusual from the common type of model steam engine. The model is shown driving a "Dynamo"-this being the motor encased in Meccano parts and with elastic flat belt drive onto one of the flywheels. Each wheel is identical being pairs of hub discs with rod spoke overlaps and plenty of brass wheel discs to give added weight.
The base of the model has a top plate size of 24½"in length by 21" wide and the cambered sides increase these dimensions and add about 1½"height to the baseplate. The totally enclosed boiler is 15½"in length by 5½"diameter and the firebox is 12½"long by 7½"width and 5½"height and with platforms on each side with access steps at the stack end. The engine motion baseplate is 12½"long by 9½"width with a height of 1½". There are two built up cranks with two slide valves and a boiler feed pump. A non-working governor is fitted between each cylinder and this operates by a Meccano rubber belt from the middle of the crankshaft.

My colour scheme is clear from the photographs-but you can devise your own contrasts for good overall effect. The stack is built from boiler sections with 3"pulleys forming the spark arrestor top. A weighted safety valve and steam dome-plus various gauges and cocks are all incorporated as in the original.

The main crankshaft requires careful construction with bush wheels forming the crank webs and robust bearing surfaces supplied by the bores of double-arm cranks. The boiler ends are covered by 4" circ plates and several 2½x1½"triangular plates to fill in exposed areas.Boiler bands are cut from pieces of old plastic plates but are NOT essential.

The motor used is a small induction type which has been enclosed in a casing made from 3½"circ girders and curved and formed strips-but any type of Meccano motor can be utilised for driving purposes. My model runs very free due to the careful use of straight rods and ample lubrication to all bearing surfaces.

The baseplate top is filled with flat plates of various sizes-but none are required under the firebox area. Access steps to the boiler platforms are made from strips with 1½x½"D/A strips as steps-the platforms are 1½"wide and fitted with handrails on each side of the boiler. The boiler plating can be built with a choice of metal or plastic flexible plates-but other plates are bolted INSIDE the boiler curvature to cover exposed holes.

Piping can be carried out in several ways-either with Meccano rods-or by Aluminium tube curved to shape. Lengths can be bought that fit into coupling bores and can be retained by grub screws where required. The model has similarities to the "Wilesco" twin cylinder engine as featured in my Meccano Treatise and is to the same scale with similar flywheels. The two cylinders require some dexterity in construction and you will find diagrams of salient points in the following instructions. Several cross girders are employed in the base-plate so that the various flat plates can be bolted without overlaps-mostly in a "U" section under the Red plates. The cambered sides are attached to the edges by obtuse brkts and you will note the use of Green-enamelled triangular plates at each corner-2½"x2" size. The model will be described in sections and we will commence with the boiler unit. I have used Zinc angle girders of MW 15½" size but you can make these with 12½" girders extended by 3" girders to give the compound length of 15½".

These girders are attached to the hub discs INSIDE their flanges -but see diagram in the first instance.

Following pages give details of constructions:------

THE BOILER UNIT.

There is a correction here-do not use two hub discs for the ends as you require access to the internals. One hub disc is situated at the stack end with a wheel discs at it's centre. A ball race flange or toothed discs is bolted at the centre with a threaded pin at the centre also. The pin holds a conical disc and a collar to represent the smokebox door. The other end of the boiler has a CIRCULAR GIRDER bolted over the ends of the 15½"angle girders. Four 1½"strips are bolted inside the circ gdr flange and radiate inwards towards the centre. Short bolts are attached to the inner ends of these strips and locked with nuts. This enables a 4" circ plate to be attached to the bolt shanks and retained with nuts. A face plate-boss inwards-is bolted to the centre of the circ plate and 2½x1½"triangular plates fill in the exposed gaps around the edge of the circ plate. Various gauges and cocks are fixed to this boiler end as per diagram. The boiler plating is mostly carried out with 5½x2½"flexible plates starting at the top girder length-and wrapped around. It does not matter if the bottom of the boiler is exposed as the firebox will cover this area. Use smaller plates INSIDE the boiler to cover as many exposed holes as possible. Note that the plating starts at the 2nd hole in from the boiler front(firedoor end) and continues along the top to the 2nd hole in from the stack end.

To get access inside the boiler-just remove the 4" circ plate and move the 1½"strips to one side-this enables your hand to get inside if required. The boiler is eventually attached to the firebox and will be described later. The top of the firebox has a "well" at each end to accommodate the boiler-again-see diagrams included. I have used BLACK parts edged with green girders for the firebox-but NOT essential. You build a rectangle 12½"long by 7½"wide with a height of 5½" but the ends are lower for the boiler cradle. See sketch where 4½x2½" and 3½"x2½"flex plates are used. The firebox door consists of a 2½x1½"flanged plate to which two 2" angle girders are bolted by their round holes. The slotted flanges down at the sides. A 1½"x1½"flat plate is bolted at the centre of the flanged plate and a grip is made from a ½"pulley with boss-bolted to the centre hole of the 1½"plate. Two hinges are attached to the top edge and these hinges are fixed to the firebox on a strip running the width of the box. The sides are extended upwards by two holes using 5½" by 1½"flex plates and 1½"angle girders are bolted to the top-these girders support the gangways each side of the boiler. The firebox hole is 3½"x2½" edged with this size of strips so that the door fits in the aperture. Triangular plates 2½x1½" are bolted each side to the vertical 5½x1½"flex plates-forming a cradle for the boiler.Repeat the other end of the boiler fire-box. The attachment feet are two 2½" angle girders bolted to the bottoms of the 4½x2½"flex plates each side of the door,by their round holes-the slotted holes allow for fixing to the baseplate.

The two gangways are identical-being 12½"long by 1½"wide and are made with flat and flex plates attached to the lugs of the 1½"a/girders at each end. The steps are attached to the under-sides of the platforms with 1½x½"D/A strips as are the step treads. The boiler is held in place in the cradle by four brkts made from 1"x½" a/brkts spaced with collars from the inner plat-form edges-the slotted holes of the brkts are lined up with any hole in the boiler side for fixing by a bolt through the plating.

Make sure the boiler lies level with the stack in a true vertical position. The boiler overhangs the firebox at each end as you can see in the photographs.

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MARKLIN ENGINE.

THE ENGINE MOTION BASEPLATE.

Built separately-this is 12½"long by 9½" wide and 1½"height. The long angle girders are used for the sides and are supported by 1½"A/gdrs at each corner with 1½"square plates behind.There are eight 1½"plates and with 1½"a/g's as feet(slotted holes flat on main baseplate). The ends of the base have flat girders bolted across with 1"corner brkts fixed to the 1½"plates. The long sides have a 9½"strip also with corner brkts to the 1½"plates and with feet made from 1½"a/g's. The top is filled in with four 5½"x3½"flat plates in the positions shown in the diagram-allowing 2½"spaces wide for the flywheels. A 9½"angle girder is bolted across the width 11 holes in from the flywheel end and the flat plates are bolted to cross girders under the base. The main outer c/shaft bearings are made from two 3½"A/g's with 2½x1½"flanged plates bolted to them in a vertical position. These plates are at the centres of the 3½"A/G's with their flanges outwards at each side of the baseplate. There is NO overlapping of the top flat plates-so arrange them to give the flat surface required. The flat plate between the flywheels has two 5½"angle girders bolted under it's length at each side-these are fixed to the end 9½"A/gdr and to the one running across the base 11 holes in from the end. A central c/shaft bearing is made with a channel bearing to which two 1½"x1½"flat plates are bolted on each side giving a 2" height.Two double arm cranks are bolted to these plates in the top holes with their bosses outwards.
The governor drive pulley is situated between the plates with a small rubber belt.I have used a Mamod brass pulley with a wider groove as the belt has to twist to give a vertical drive to the governor shaft(I have these pulleys which fit Meccano rods).

Each flywheel bearing has an 8-hole bushwheel bolted to it-in the top run of holes in the 2½x1½"flanged plates.The bush wheels are inside the bearings with their bosses inner but each holding bolt has a thin washer as a spacer because of the bush wheel pummels standing "proud". Attach these wheels so that their tapped holes are uppermost and can be used for lubrication.

Now line up the bearings with a long STRAIGHT rod and adjust as necessary. The two flywheels are easy to build-use two hub discs to each wheel and overlay spokes are made from some short rods held at their inner ends with rod and strip connectors

Layers of brass discs form the hubs with the spokes attached between alternate layers of discs. Also fit a bush wheel to each hub for fixing on the crankshaft. See diagram attached.

The flywheel bearings have a pair of 1½"D/A strips bolted at their sides-the top lugs bolted to the flanged plate slotted flanges and capped with a small pulley or collar to represent oil cups. These bearings MUST be vertical to the base and MUST be in line straight a cross the crankshaft length. We next come to the built-up cranks which are made from bush wheels:-
Each crank requires two bush wheels-8 or 6 hole. Attach a rod socket to one of the radial holes on the same side as the bush wheel boss.Repeat with another bush wheel. A short rod joins the bush wheels in the bosses of the rod sockets. The connecting rod has a rod socket fixed at the c/s end-this socket is screwed into the tapped boss of an 1" bush wheel and locked with a nut.Repeat for the other crank.The other tapped hole in the 1"bush wheels will accommodate a collar fitted with a grease cup(if you have these) but is NOT essential. The valve small eccentrics are insid the flywheels in the positions shown in the diagram. You can now place the cranks between the bearings and select suitable straigh rods with the cranks at ninety degrees to each other.Test for goo rotation and adjust as necessary. Two grub screws allow for bette adjustments but require patience. Test that bush wheels run true and replace if necessary.

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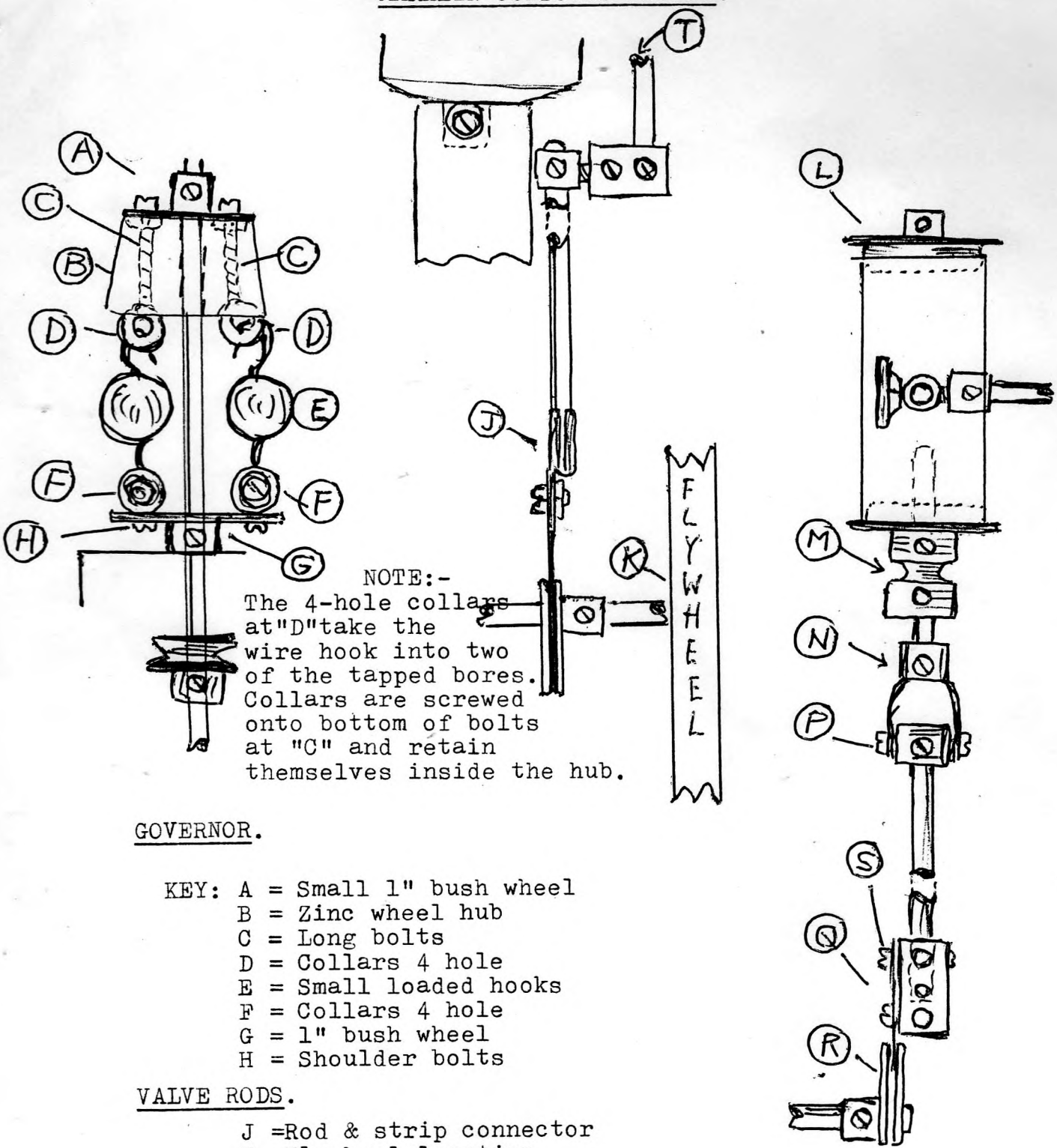
MARKLIN COMPOUND ENGINE.



NOTE:-
The 4-hole collars at "D" take the wire hook into two of the tapped bores. Collars are screwed onto bottom of bolts at "C" and retain themselves inside the hub.

GOVERNOR.

KEY: A = Small 1" bush wheel
B = Zinc wheel hub
C = Long bolts
D = Collars 4 hole
E = Small loaded hooks
F = Collars 4 hole
G = 1" bush wheel
H = Shoulder bolts

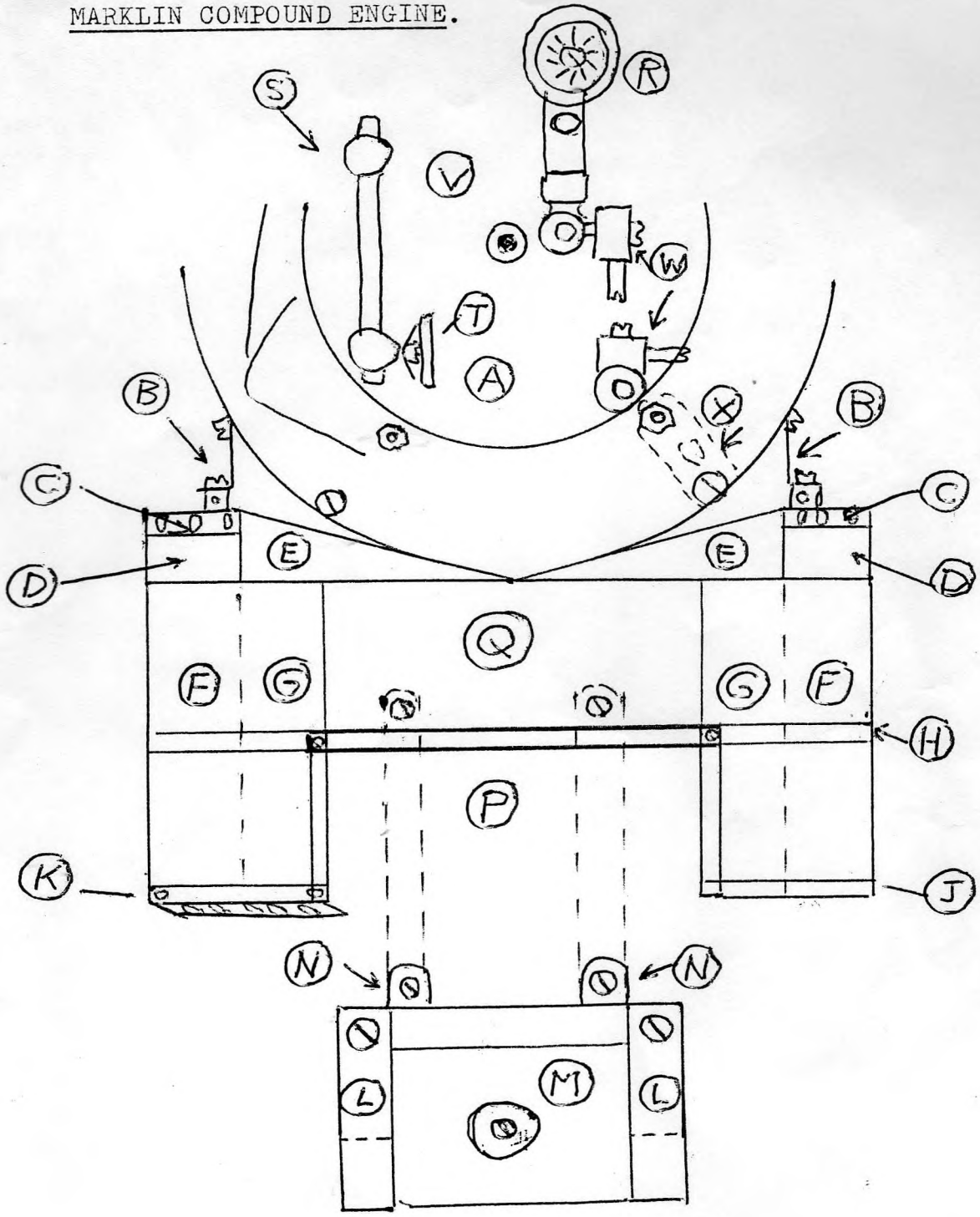
VALVE RODS.

J =Rod & strip connector
K =Flywheel location
T =Valve rod

FEED PUMP. L =Large flanged wheel-part inserted in cyl end
M =Socket coupling fixed to wheel boss
N =Swivel bearing
P =Collar 4 hole with shoulder bolts
Q =Coupling S =Shoulder bolts
R =Small eccentric outside main bearing

The vertical governor rod is six holes in from the crankshaft central between the Meccano cylinder housings. Use a Meccano rubber belt for governor drive-preferably from a Mamod pulley on the c/shaft middle bearing between double arm cranks.

MARKLIN COMPOUND ENGINE.



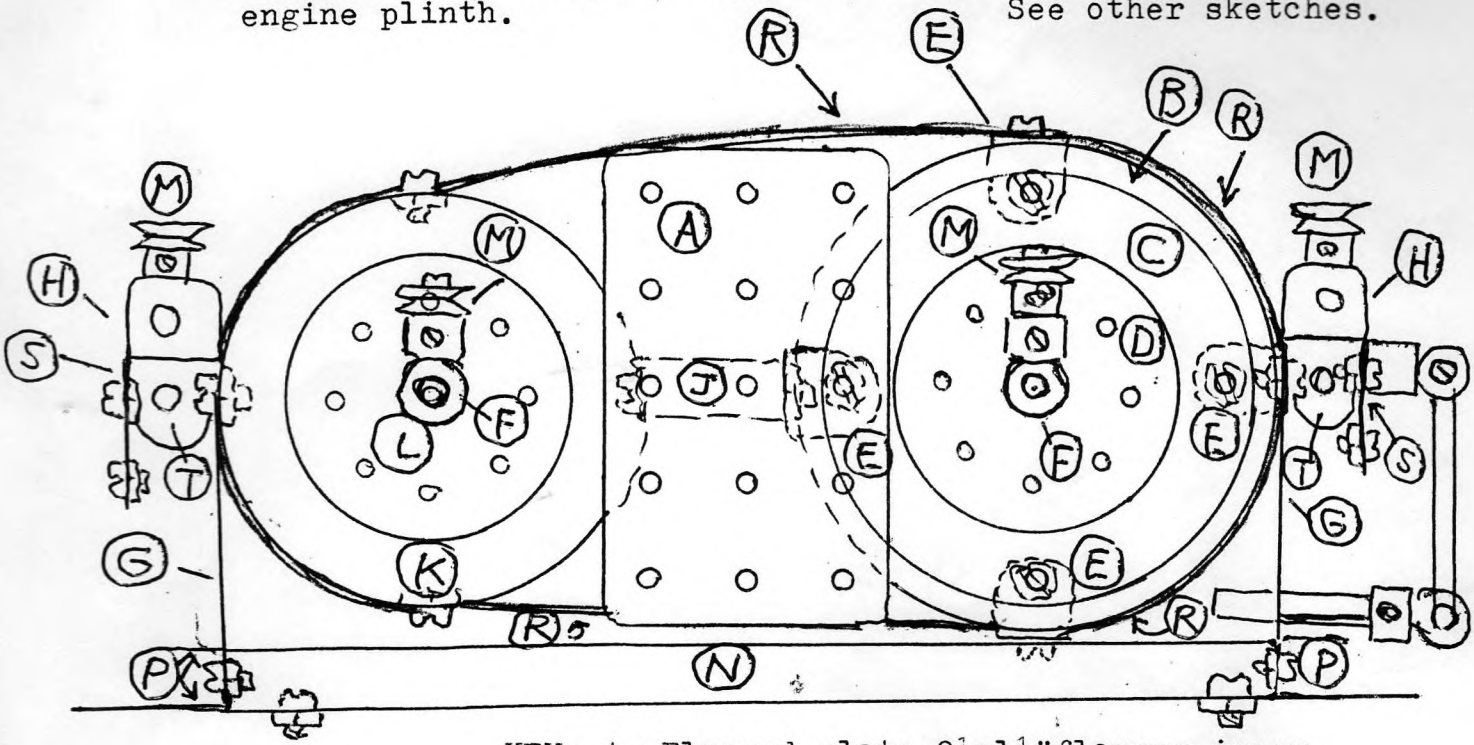
A = Boiler front-firebox end
B = Boiler support brkts
C = Platform girders 1½"
D = Tops of 5½x1½"flex plates
E = Triangular plates 2½x1½"
F = Flex plates behind 5½x1½"
G = Flex plates 4½x2½"
H = Strip 7½"long
J = Corner gdrs 5½"
K = Angle gdrs 2½"
L = Angle gdrs 2"
M = Flat plate 1½x1½"
N = Hinges(two)

P = Firebox door area
Q = Flex plate 3½x2½"
R = Pressure gauge
S = Water level gauge
T = Small handwheel
V = Face plate
W = Turn cocks
X = Front holding strips 1½" at four points

Repeat for other end of fire box-but fill in complete area with flat or flex plates to same dimensions.

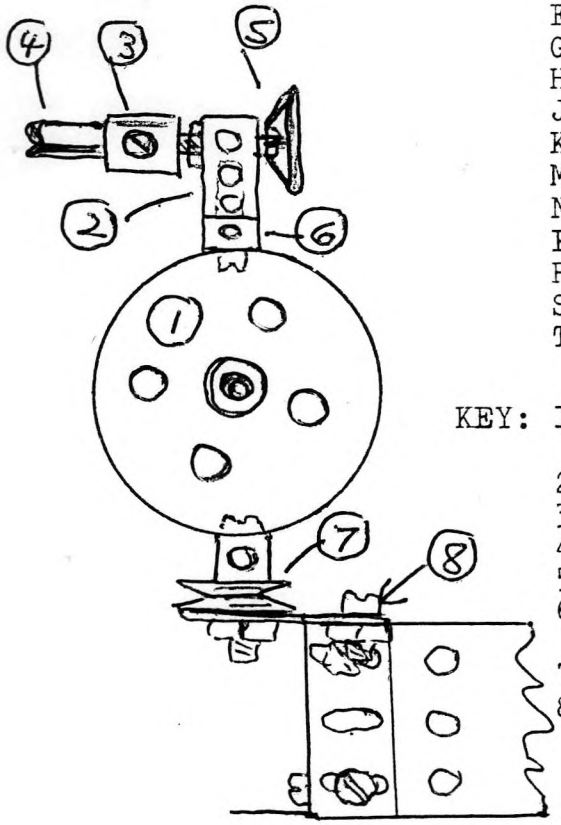
MARKLIN COMPOUND ENGINE. FULL SIZE FRONT CYLINDER LAYOUT.

Note that the two cylinders are 3½"wide and surrounded by flexible plates in the positions shown in diagram. The unit should be built separately-and then bolted in place on the engine plinth. See other sketches.



KEY: A =Flanged plate 2½x1½"flanges inner.
B =Face plate boss outermost.
C =Wheel flange-stood off on f/plate boss.
D =Bush wheel-boss outermost.
E =D/A strips(4) 3½x½"
F =H/rail coupling on bolt shank.
G =Sideplates 2"flat girders each end.
H =Chimney adaptors on valve chests.
J =Spacing couplings(2) one each end.
K =Boiler end. L =wheel disc.
M =Small brass pulleys or collars.
N =Angle gdr 5½" between cylinders on base.
P =Angle gdrs 5½"(2) "U"channel.
R =Flexible plates wrapped round
S =Valve channels 2½"A/g's "U"section.
T =Valve slides 1½x½"D/A strips

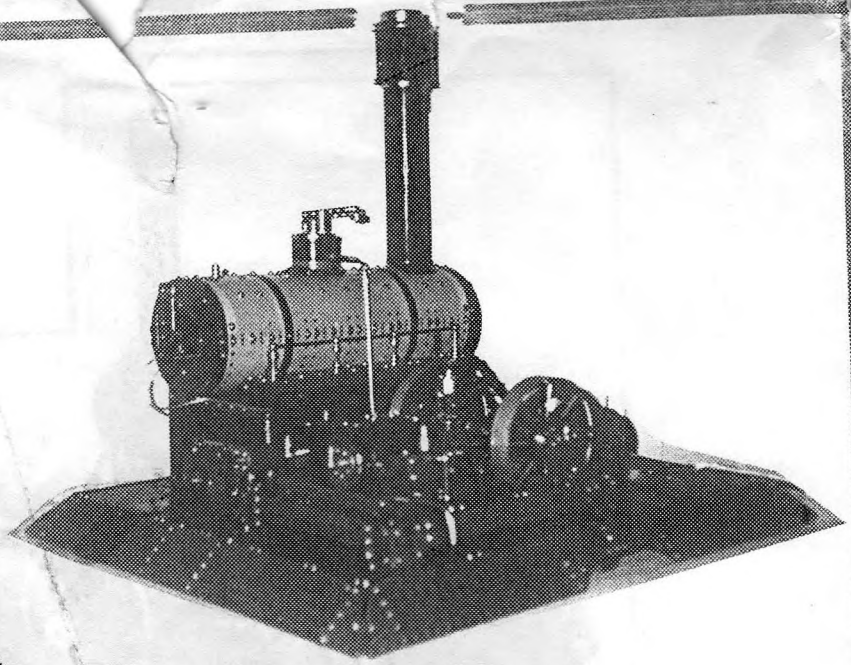
BOILER FEED PUMP.

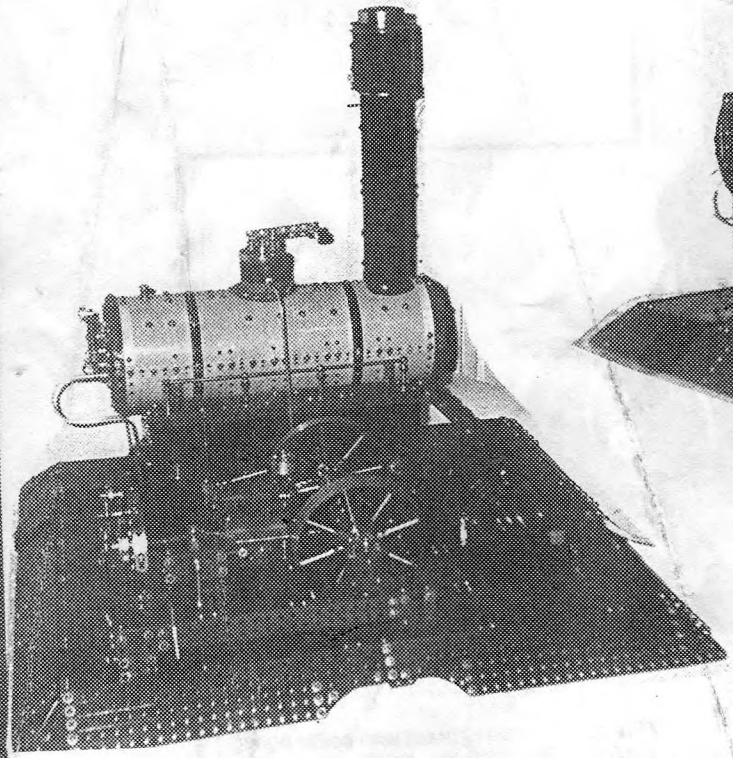


FRONT OF BOILER FEED PUMP.

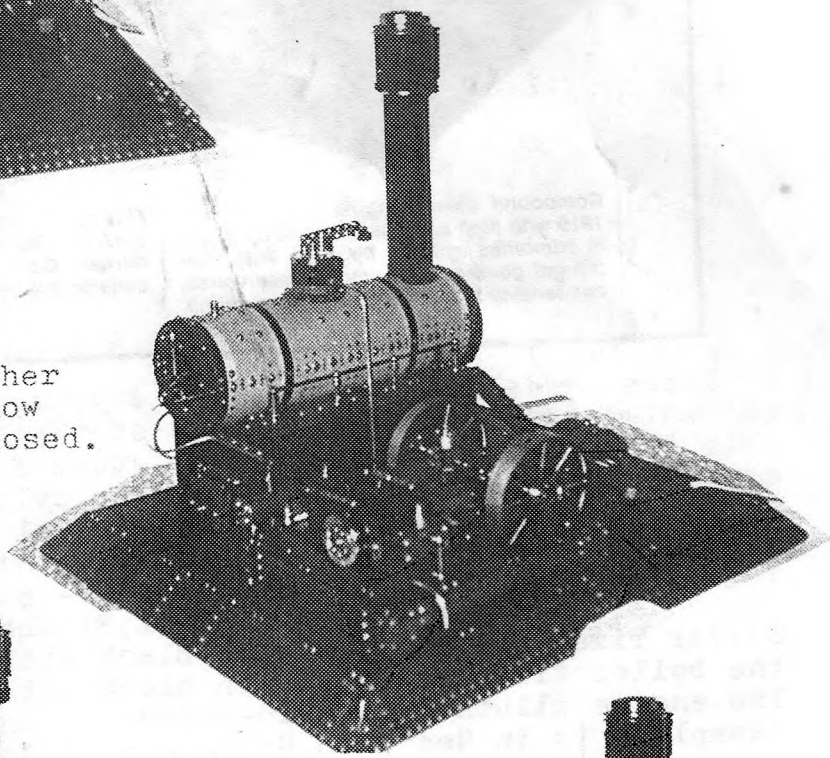
KEY: 1 =Large flanged wheel pressed in end of cylinder
2 =Coupling and collar.
3 =Rod socket.
4 =Pipe socket.
5 =Small hand wheel
6 =Screw rod adaptor in middle of cylinder top row of holes.
7 =Pulleys(2)with boss ½"dia
8 =Flat gdr 1½" attached to top plate side

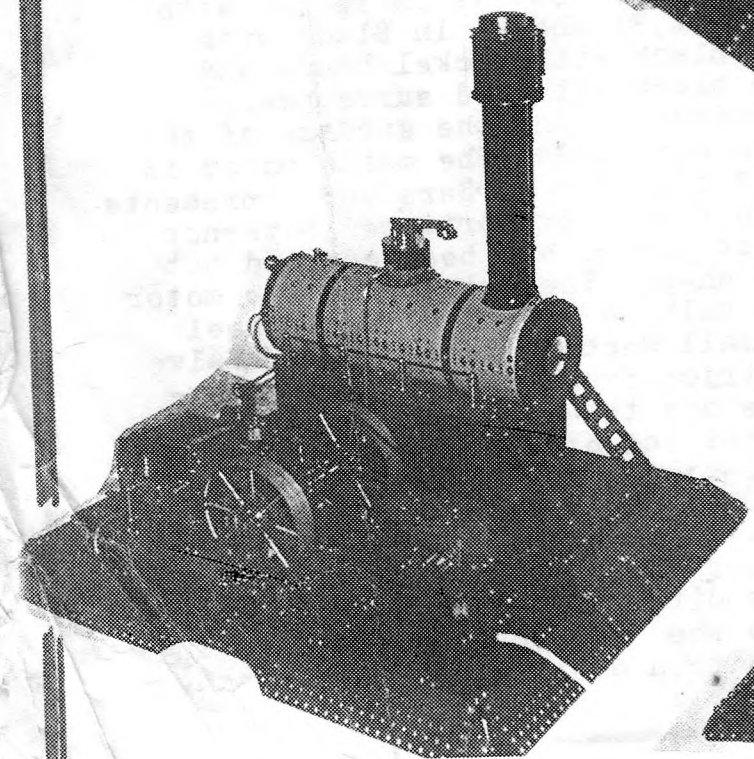
The cylinder wrap round plates are 2½" and 1½"wide overlapped and secured with 3½"strip overlays at joins.Formed strips can be bolted around the face plate side of each end of the cyl block-but not essential. The 2" flat girders as side supports can be replaced with a rectangle of 3½"and 2" strips for width and height. See further diagrams of front end of cylinders.

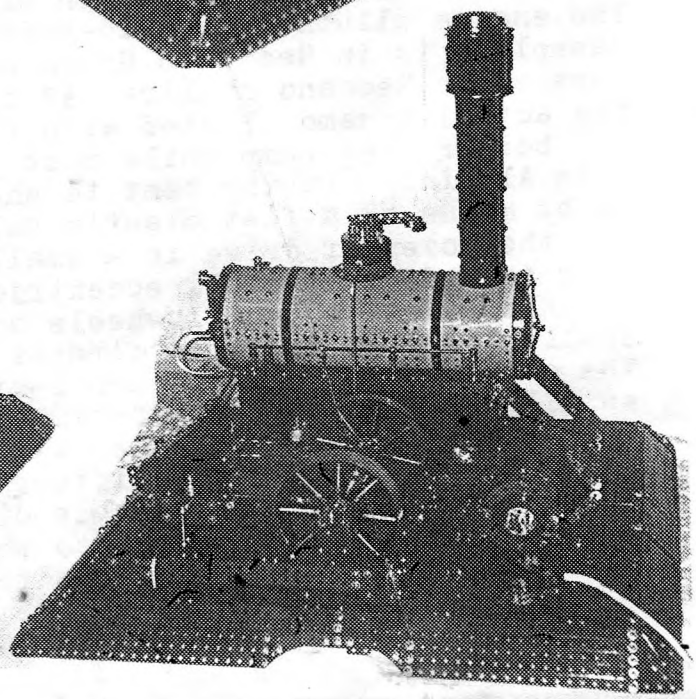




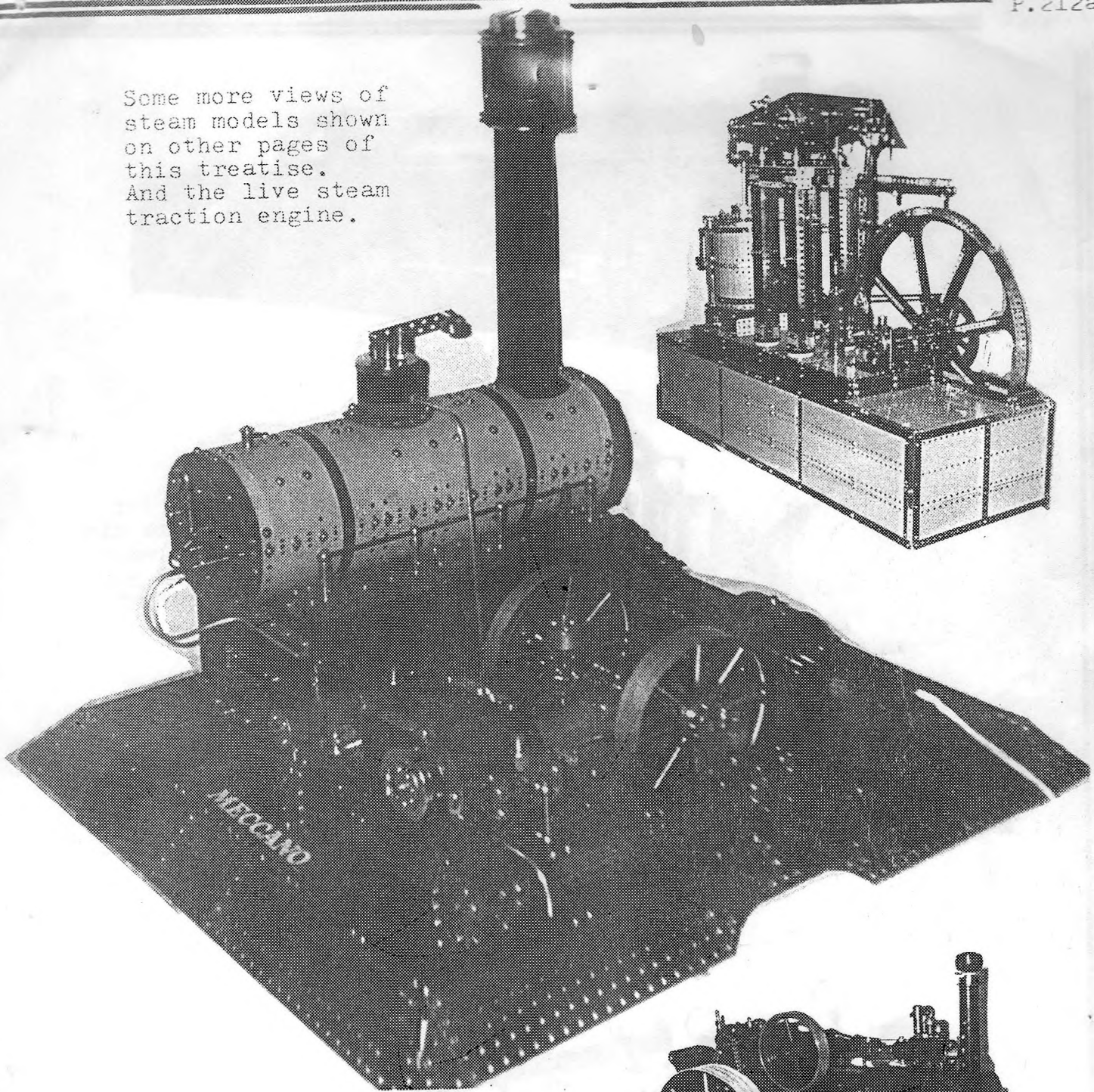
A larger print of this engine is shown on another page-instructions are now available-see list enclosed.

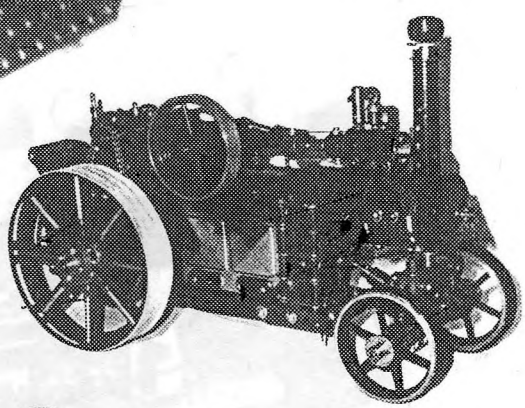


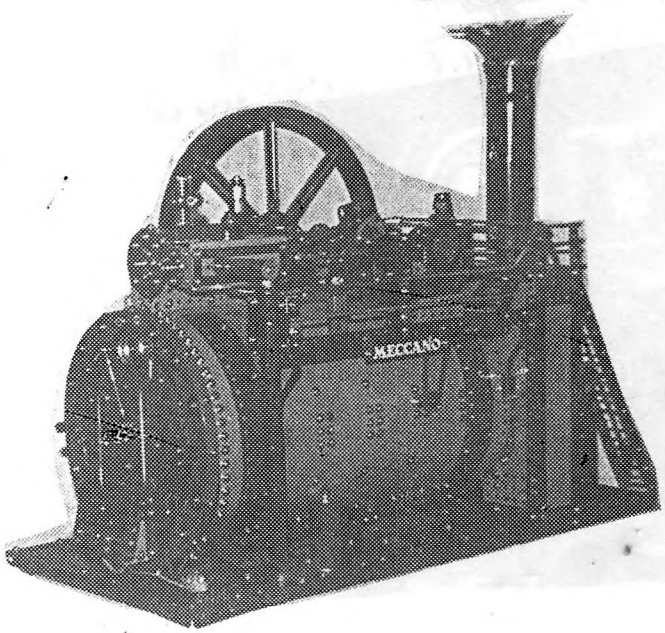


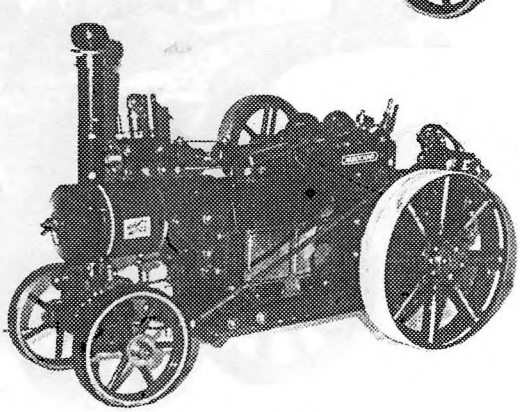


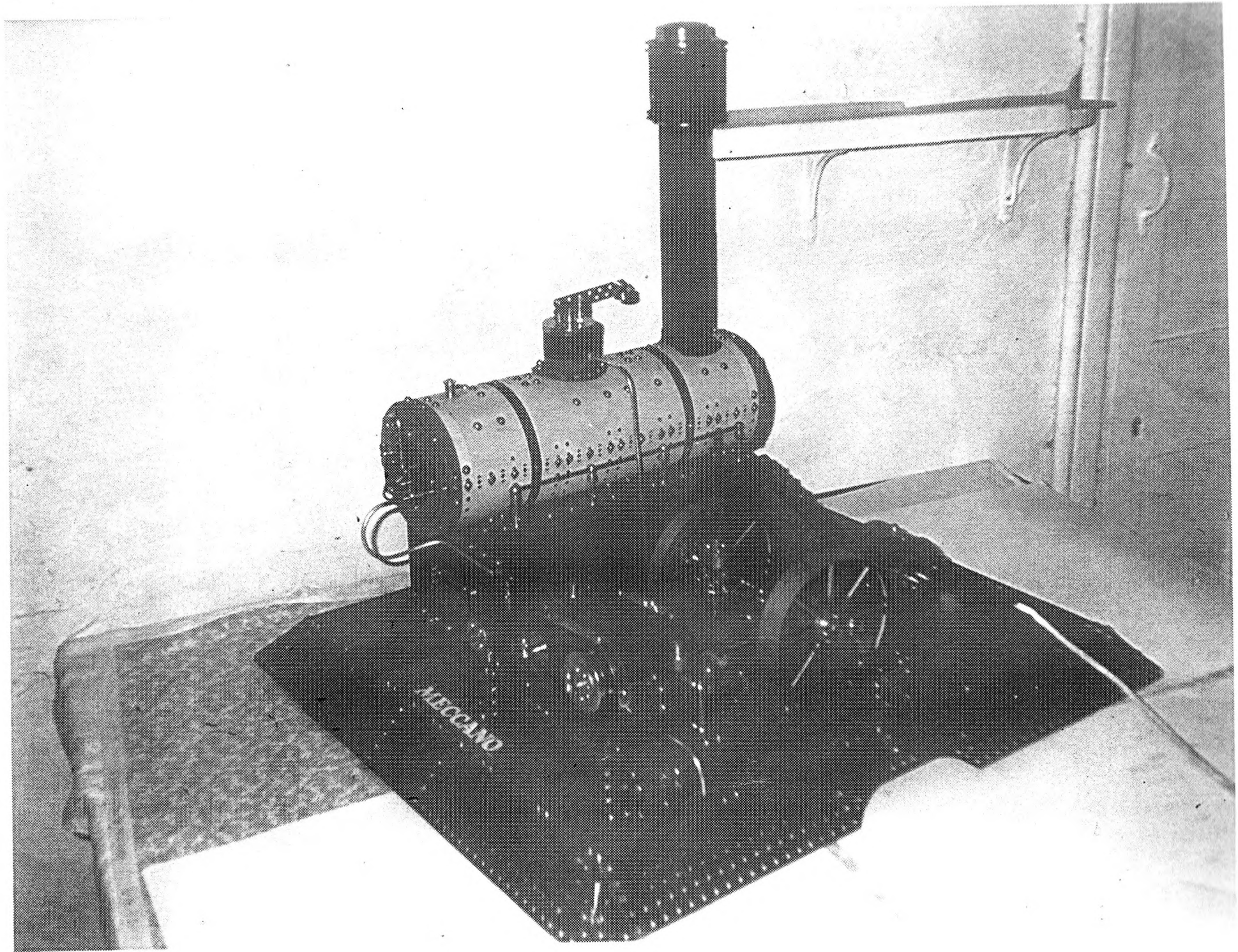
Some more views of steam models shown on other pages of this treatise. And the live steam traction engine.

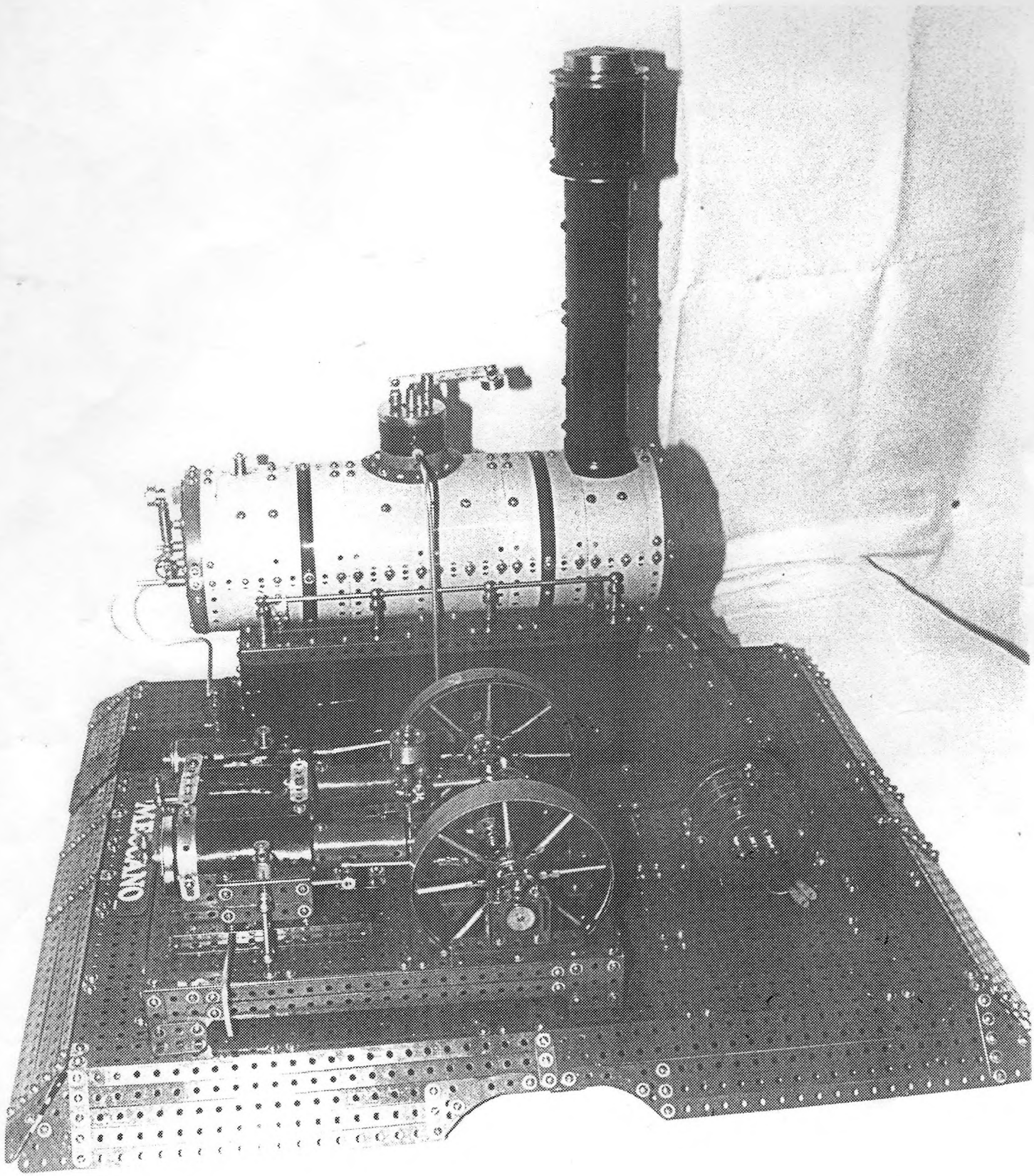









MECCANO


MECCANO