THE MECCANO LOOM

FOR REAL WEAVING

INSTRUCTIONS FOR BUILDING THIS REMARKABLE MODEL

No model could better illustrate the wonderful genius of the Meccano system than the Meccano Loom. In this model every technical operation in the process of weaving is perfectly carried out in miniature, exactly as in every-day practice in actual manufacture. The Loom is operated simply by the turning of a crank handle, which sets in motion the whole of the necessary operations.

THE main framework of the loom is made up as shown in Fig. B, both sides of the framework being similar in construction.

When the framework is built, proceed to insert the driving mechanism, Fig. C.

The main operating handle 1 on the rod 2 drives a ¾" pinion 3 meshing with a 50-toothed gear wheel 4 on the spindle of which is a ¾" pinion 5 meshing with 50-toothed gear wheels 6 and 7 driving them in opposite directions.

Picking Motion

On the rod 8 of the gear wheel 7 are fixed 2 1½" bush or pulley wheels 9 connected by 3 double angle brackets 10 forming a cam, Fig. D, upon which 2 5½" strips 11, placed together, pivoted at 12 ride, and are held in contact by the springs 13. The cams at each side of the loom are disposed oppositely, that is to say, the 3 double brackets 10 on one cam are on the top when the corresponding 3 double brackets on the other side are beneath. To the outer end of the strip 11 is bolted a 12½" angle girder 14 the top of which is connected to a crank 15 formed of two cranks butted together with a 2" strip between, secured on the rod 16. At the far end of this rod is another crank 17, to the outer end of which is connected a spring 18 which normally tends to hold the crank 15 down, and return it after it has been moved up by the cam. To the outer end of the rod 16, by means of 2 couplings 19, is attached the picking stick 20 formed by a 9½" rod, the lower end of which is connected to a cord 21 passing round 2 1" pulleys 22. This cord is connected to a double bent strip 23 which engages a shuttle and flicks it across the slay 24. As the cams 10 are oppositely disposed, the picking sticks at each side of the machine work in unison and throw the shuttle to and fro.

Take up Motion

This is shown in Fig. C. On the rod 63 of the gear wheel 6 are also mounted 2 worms 64 which engage and drive 57-toothed wheels 65 on rods 66. ½" pinions 67 (Fig. A) drive ¾" contrate wheels 68 on the vertical rods 69. It is to be noted that the contrate wheels 68 are reversed. Other ¾" contrate wheels 70 on the rods 69 engage and drive ½" pinions 71 on the sand roller 72. Owing to the gearing of the worm 64 and gear wheels 65 the necessary slow "take up" motion of the sand roller is imparted, and the woven material, after passing beneath the sand roller, passes over the rod 73 to the lower roller 74, on which the fabric is wound. The lower roller (74) is driven

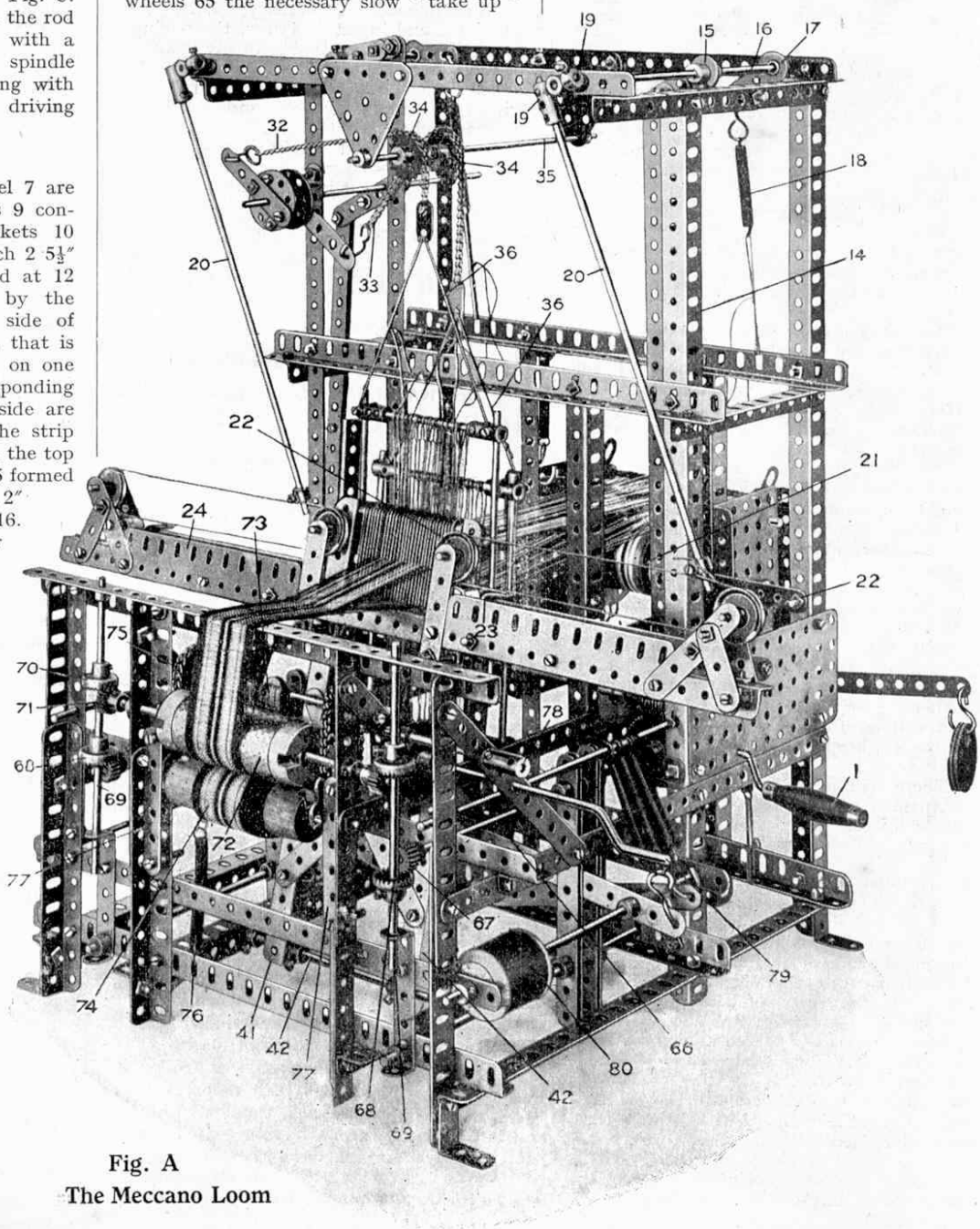

Fig. A
The Meccano Loom

The Meccano Loom—*(cont.)*

frictionally from the sand roller and is kept in frictional contact therewith by means of the chains 75 at either side, which are hooked on the rod of the roller 74 and are kept taut by springs 76 connected to the other end of the chains 75. The rod of the lower roller 74 is enabled to move away from the sand roller 72 so as to allow for the increasing diameter of the woven fabric thereon by causing the ends of its rod to engage between 2½″ strips 77 and the frame of the machine at each side.

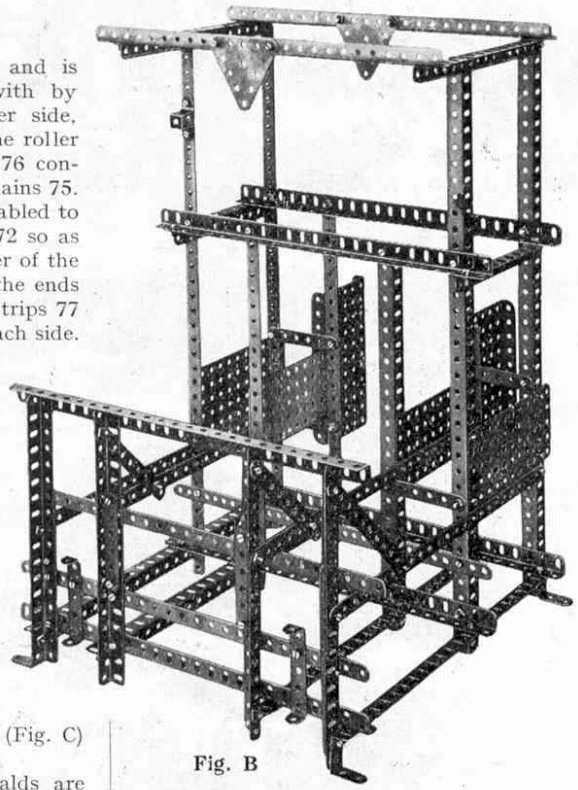

Fig. B

The Heald Frames

The construction of the heald frames will be clear from the detail given in Fig. E. The lower ends of the heald frames as shown in Fig. C are connected to 3½″ strips 37 coupled to 5½″ strips 38 controlled by the springs 39 which tend always to draw the heald frames down.

To adjust the healds correctly set them so that the eyes of both heald frame sets are level when the cranks 45 are vertical and the strips 47 (Fig. C) are horizontal.

As in actual practice, the healds are assembled vertically. In the Meccano Loom there are two frames, but there may be many more frames in actual looms. Whatever the number the frames are so arranged that when some are raised the others are pulled down. The healds thus serve to lift and depress the warp, so that the shuttle may be passed between the threads.

Purpose of the Healds

The healds consist of a number of wires, called "leaches," each having in its centre an eye, or "mail," which to a certain extent resembles the eye of a needle. The depression of the warp, referred to above, is made possible by passing the warp threads through these mails.

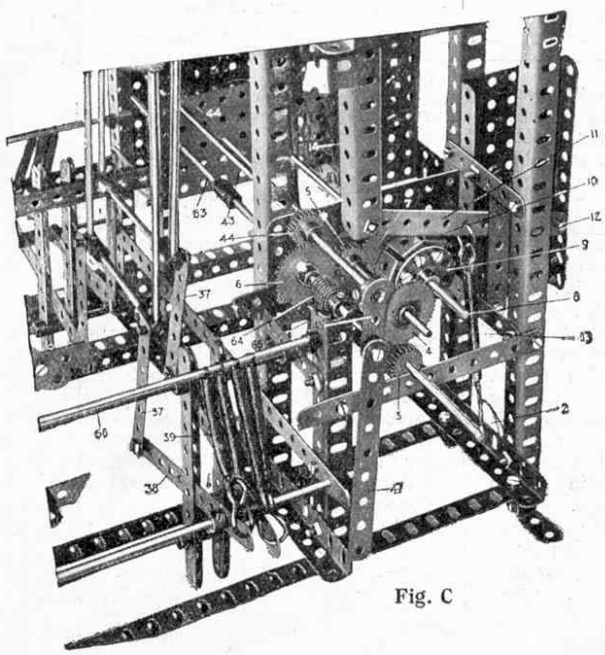

Fig. C

The warp is the thread that runs longitudinally, from the back to the front of the loom. The thread at right-angles to it is the "weft," which is introduced by the passing of the shuttle between the warp threads and pressed into position by the reed, both of which operations will be described in next month's "*M.M.*"

Pattern and Texture

It may here be remarked, perhaps, that the pattern depends upon the number of healds, the greater the number employed, the more complex is the resulting pattern. For the weaving of very complex figures the warp must be divided among a large number of healds.

When the Loom has been built, it is necessary to determine what pattern you will weave. Whether it be a tie or a hat-band that is your first effort, the choice of colours for the warp, and the colour of the weft will call into play your artistic qualities to no little extent, in addition to your manipulative abilities in the actual process of weaving.

In cases where specially intricate patterns are being worked, each individual warp thread may have its separate lifting apparatus. In such a case some automatic mechanism is necessary, in order that the pattern may be preserved when working at a high speed. Such a lifting mechanism is used in the "Dobby" loom, a model of which can also be successfully constructed by means of Meccano.

The pattern, which as we have seen depends on the number of healds employed, does not have any bearing on the texture of the woven fabrics. The closeness of the texture of any material depends upon the number of warp and weft threads to the inch. In actual manufacturing, fine cloth may have 125, or even more, threads to the inch both in warp and in weft.

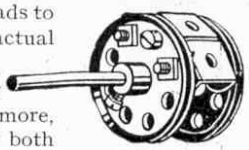

Fig. D

Thus in addition to the colour and the pattern, you will have to decide of what texture your fabric is to be.

Next month we shall continue these instructions for building the Meccano Loom by describing the Heald Motion, the construction of the Slay and the Reed, and of the warp thread Tension Mechanism. The article will conclude with some useful hints on preparing to weave, and full instructions will also be given in that issue for the construction of the Beaming Frame, a necessary model to those who build the Loom. We shall also give an illustration of some of the fabrics that have been woven on the Meccano Loom.

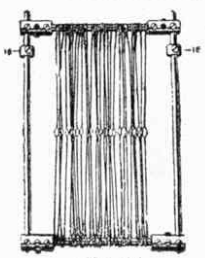

Fig. E

Parts Required

The following is a complete list of parts required for building the Loom, both those referred to in the above instalment and those that will be required to complete the model in accordance with the further instructions in next month's "*M.M.*"

6	of No.	1	3	of No.	27A
22	,, ,,	2	4	,, ,,	29
8	,, ,,	3	2	,, ,,	32
9	,, ,,	4	6	,, ,,	35
39	,, ,,	5	195	,, ,,	37
4	,, ,,	6	33	,, ,,	37A
4	,, ,,	6A	198	,, ,,	38
6	,, ,,	7A	15	,, ,,	43
17	,, ,,	8	2	,, ,,	44
3	,, ,,	8A	5	,, ,,	45
15	,, ,,	9	2	,, ,,	48A
2	,, ,,	10	2	,, ,,	52
8	,, ,,	11	17	,, ,,	57
4	,, ,,	12	55	,, ,,	59
4	,, ,,	12A	15	,, ,,	62
4	,, ,,	13	13	,, ,,	63
13	,, ,,	13A	4	,, ,,	67
10	,, ,,	14	4	,, ,,	70
1	,, ,,	15	2	,, ,,	76
1	,, ,,	15A	4	,, ,,	82
6	,, ,,	16	12	,, ,,	94
8	,, ,,	18A	4	,, ,,	96
2	,, ,,	19	42	,, ,,	101
2	,, ,,	20A	6	,, ,,	103
4	,, ,,	21	1	,, ,,	104
4	,, ,,	22	1	,, ,,	106
2	,, ,,	24	1	,, ,,	106A
5	,, ,,	25	2	,, ,,	109
5	,, ,,	26	7	,, ,,	111
5	,, ,,	27			

(To be continued)

THE MECCANO LOOM

FOR REAL WEAVING

INSTRUCTIONS FOR BUILDING THIS REMARKABLE MODEL

In this instalment we conclude the article on building the Meccano Loom, commenced in our July issue. This model illustrates the wonderful genius of the Meccano system, for every technical operation in the process of weaving is perfectly carried out, exactly as in actual manufacture. Hat-bands, ties and other similar fabrics may be woven with the Meccano Loom; and the skill and artistic abilities of the model-builder are expressed in the resulting patterns and combinations of colours.

(*Continued*).

Heald Motion

THIS is brought out in Fig. J. On the far end of the rod 8 is a crank 25 (two cranks butted together), the outer end of which is connected to 9½" and 5½" angle girders, overlapped 9 holes, forming a connection 26, the top of which is coupled to an extended crank 27 fixed to a rod 28. The element 27 is made up of a 2½" strip the end hole being on the rod 28, and with 2 cranks reversed and bolted through the strip.

On the other end of the rod 28 are secured 2 bush wheels 29, which are fastened together by ¾" bolts. A 2½" strip 30 and 3" strip 31 are bolted to the bush wheels, and hooks are connected to the outer ends of these 2 strips. The chains 32 and 33 are passed over 1" sprocket wheels 34 on the rod 35 and are connected to the heald frames 36.

Slay

The construction of the slay 40A is shown in Fig. I, the reed consisting of a number of 2½" strips (spaced with washers) 40, mounted on upper and lower rods and carried on the angle girders 41 pivoted on the rod 42. The slay is rocked to and fro from a rod 43, Fig. C*, which is driven from the gear wheel 6, a ¾" pinion 44 on the rod 43 meshing with the gear wheel 6.

On both ends of the rod 43 are fixed cranks 45 which are connected to the cranked bent strips 46, Fig. F, on the slay by means of 4½" strips 47. In Fig. B the near strip is shown hanging down disconnected.

The sides of the slay consist of 5½" flat girders 48, and the pulley wheels 49 round which the picking cords run are carried as shown in illustration, Fig. I.

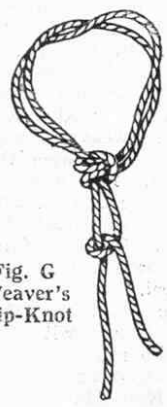

Fig. G Weaver's Slip-Knot

* Illustrated in the July "*M.M.*"

The shuttle moves along the "slay," which supports and guides it as it is jerked from one side of the loom to the other by means of the "picking stick," suspended from above. Attached to the slay is the "reed," which moves forward with the slay, after every crossing of the warp by the weft.

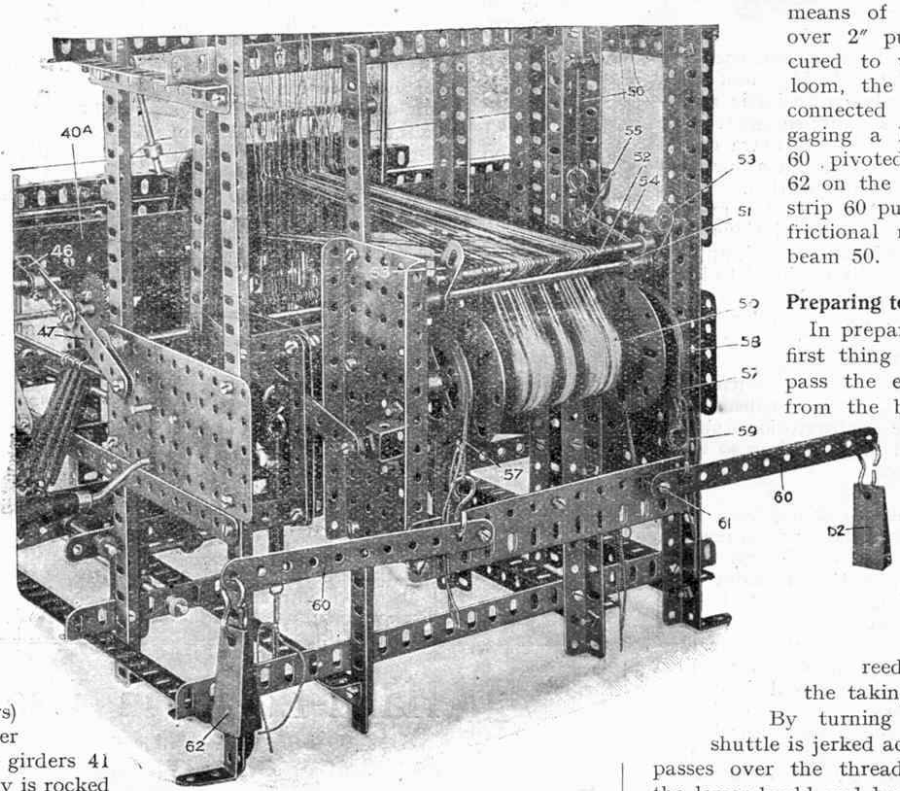

Fig. F

Warp Thread Tension Mechanism

In order to compensate for the slacking of the warp threads which develops when the shed is formed by the motion of the healds, the warps are passed from the beam 50, Fig. F, under the rod 51 and over another rod 52 and thence through the eyes of the healds to the reed.

The rod 52 is given a continuous rearward tensional movement as follows: it is carried on cranks 53 fixed on the lower rod 51; another crank 54 to which is connected a 2½" strip 55, the end hole being threaded on the rod 51, is connected on its outer hole by a hook coupled to a spring 56. The spring 56 therefore rocks the upper rod rearwardly, and takes up the slacking formed by the shedding action of the healds.

The beam 50 is braked by means of cords 57 passing over 2" pulleys 58 and secured to the frame of the loom, the other ends being connected to hooks 59, engaging a hole in the strip 60 pivoted at 61, weights 62 on the outer ends of the strip 60 putting the required frictional resistance on the beam 50.

Preparing to Weave

In preparing to weave, the first thing to be done is to pass the ends of the warp from the beam (situated at the back of the loom) through the mails of the healds and then through the reed. One or more threads are passed through each division of the reed, and attached to the taking-off roller.

By turning the crank, the shuttle is jerked across the loom and passes over the threads held down by the lower heald and beneath those raised by the upper heald, at the same time leaving in its wake a loose thread of weft. The slay then moves forward and brings up the reed, which drives before it this thread or "first pick" of the weft. By continuing to turn the handle, the same process is repeated, the shuttle being again jerked back and across the loom, this time from the other side. The reed again moves forward and presses up the second pick against the first. The taking-off roller in the meantime slowly rotates, and as the weaving proceeds it rolls around itself the woven fabric.

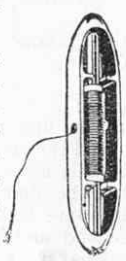

Fig. H Shuttle

A suitable material for use in this model is No. 8 Star

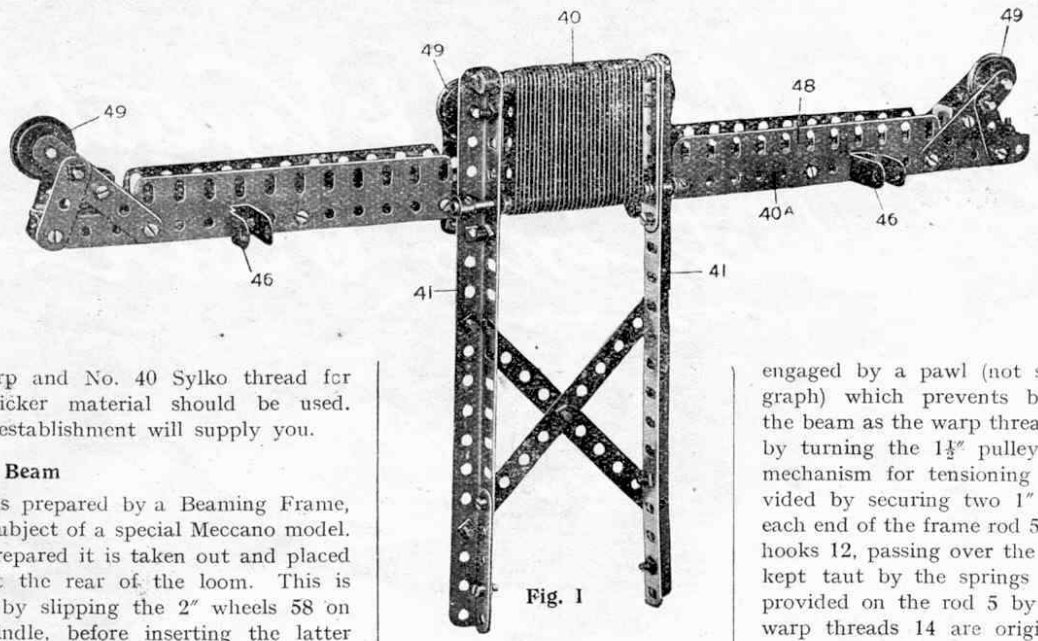

Fig. 1

Sylko for warp and No. 40 Sylko thread for weft. No thicker material should be used. Any drapery establishment will supply you.

Preparing the Beam

The beam is prepared by a Beaming Frame, which is the subject of a special Meccano model. After being prepared it is taken out and placed in position at the rear of the loom. This is accomplished by slipping the 2″ wheels 58 on the beam spindle, before inserting the latter in the holes of the side flanged plates. After doing this the pulley wheels are secured to the spindle at each end to hold the beam in position.

All the ends of the threads are drawn under rod 51 and over 52, long enough to permit each thread to be passed through the healds in the following manner: the first warp thread is passed through the eye of the first heald in the near frame, and thence through the first aperture of the reed; the next thread is passed between the first two healds in the near frame and through the eye of the far frame and thence through the next aperture of the reed. The warp threads may be threaded through the reed spaces in pairs. This process is continued until all the ends are threaded through the reed. They are then carried over the front angle girder, under the sand roller 72 over the rod 73 and on to the take-up roller 74, where they are gripped under a rod in the slot of the roller. This operation is more conveniently performed by two persons with the aid of a reed hook.

For winding the weft thread on the spindle forming the cop the spindle should be removed from the shuttle, and one end inserted in the coupling 78, and the thread from bobbin 80 wound around it by turning the crank handle 79.

Fig. G illustrates a weaver's slip-knot, which is used when adjustments or tension is necessary.

In one of our future issues we hope to illustrate some of several patterns obtainable with the Meccano Loom.

How to Build the Beaming Frame

The Beaming Frame is illustrated on page 102 of this issue, and may be built as follows:

The frame 1, upon which the warp threads are wound, is built up of 12½″ angle girders, 2 overlapped seven holes and bolted to a 5½″ girder and 5½″ strip crossed and connected to face plates 4 on the 11½″ rod 5. Inside the frame, two 5½″ angle girders are bolted nine holes from each end to form the inner bearings for the rods 5.

Another 5½″ girder is bolted crosswise to these in the centre to form a stay. The warp threads are first wound upon the frame 1, and pass through the holes in a 24½″ angle girder 6, and, converging together, pass between the 2½″ strips 7 forming the reed, and so on to the beam 8. On the far side of the beam rod is a ½″ pinion

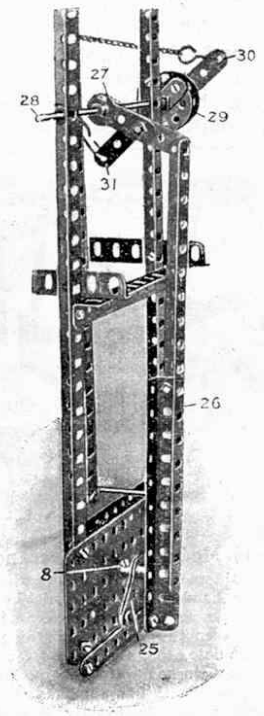

Fig. J

engaged by a pawl (not shown on the photograph) which prevents backward rotation of the beam as the warp threads are wound thereon by turning the 1½″ pulley wheels 9. A brake mechanism for tensioning the frame 2 is provided by securing two 1″ pulley wheels 10 at each end of the frame rod 5, cords 11, secured by hooks 12, passing over the pulleys 10 and being kept taut by the springs 12. A handle 13 is provided on the rod 5 by means of which the warp threads 14 are originally wound on the frame 2.

Parts Required for Building the Loom

6	of No.	1	3	of No.	27A
22	,, ,,	2	4	,, ,,	29
8	,, ,,	3	2	,, ,,	32
9	,, ,,	4	6	,, ,,	35
39	,, ,,	5	195	,, ,,	37
4	,, ,,	6	33	,, ,,	37A
4	,, ,,	6A	198	,, ,,	38
6	,, ,,	7A	15	,, ,,	43
17	,, ,,	8	2	,, ,,	44
3	,, ,,	8A	5	,, ,,	45
15	,, ,,	9	2	,, ,,	48A
2	,, ,,	10	2	,, ,,	52
8	,, ,,	11	17	,, ,,	57
4	,, ,,	12	55	,, ,,	59
4	,, ,,	12A	15	,, ,,	62
4	,, ,,	13	13	,, ,,	63
13	,, ,,	13A	4	,, ,,	67
10	,, ,,	14	4	,, ,,	70
1	,, ,,	15	2	,, ,,	76
1	,, ,,	15A	4	,, ,,	82
6	,, ,,	16	12	,, ,,	94
8	,, ,,	18A	4	,, ,,	96
2	,, ,,	19	42	,, ,,	101
2	,, ,,	20A	6	,, ,,	103
4	,, ,,	21	1	,, ,,	104
4	,, ,,	22	1	,, ,,	106
2	,, ,,	24	1	,, ,,	106A
5	,, ,,	25	2	,, ,,	109
5	,, ,,	26	7	,, ,,	111
5	,, ,,	27			

Parts Required for Beaming Frame

2	of No.	1	6	of No.	21
4	,, ,,	2	1	,, ,,	26
44	,, ,,	5	1	,, ,,	33
4	,, ,,	6	253	,, ,,	37
4	,, ,,	7	88	,, ,,	38
2	,, ,,	7A	4	,, ,,	43
12	,, ,,	8	8	,, ,,	57
10	,, ,,	9	10	,, ,,	59
8	,, ,,	12	1	,, ,,	63
2	,, ,,	13	1	,, ,,	103
3	,, ,,	14	4	,, ,,	109

(THE END)