

The New Meccano Loom

Completing the Mechanism and Beaming Frame

DETAILS for building the Loom framework and parts of the mechanism were published in the March issue of the "M.M.", and it now remains to describe the slay, Heald frames, and the special Beaming Frame.

The construction of the Heald frames should be quite clear from Fig. 9 (which shows one of the two frames removed from the Loom), and therefore we may pass on to their insertion into the Loom. Hooks on the ends of the Springs 59 (Fig. 9) depending from the lower extremity of the Heald frames, are attached to the Girders 20 (Fig. 1 in March "M.M."). The Flat Brackets 60 at the tops of the

frames are bolted to lengths of Sprocket Chain 42 and 44 (Fig. 4 in March "M.M.") respectively. These Chains pass over 1" Sprocket Wheels 41 and 43, and are attached finally by Hooks to 2½" Strips 45 and 47 that are affixed by ¾" Bolts and Nuts to two Bush Wheels secured rigidly to the Rod 49. The Rod carries an ordinary Crank, which is connected by a Rod 39 to a Crank 31 on one end of the camshaft. The attachment of the Rod 39 to the lower crank 31 is effected by means of a Swivel Bearing 30, and to the upper crank by an End Bearing 48.

The main features of the slay will be clear by referring to Fig. 7. The portion of the slay upon which the Shuttle slides is a girder of channel section, consisting of two 12½" and two 2½" Angle Girders butted together. The Shuttle is prevented from leaving the slay by 5½" Flat Girders, which are bolted to the sides of the channel

girder. Architraves at each end serve as bearings for the Rods of 1" loose Pulleys 26.

The Reed 51 consists of thirty-two 2½" Strips mounted on two Rods, each Strip being spaced apart the thickness of one Washer. The Reed is attached to the slay by passing the ends of the Rods carrying the 2½" Strips through the flanges of the 9½" Angle Girders 57. A

length of Spring Cord 25 (Fig. 4) passes round each pair of 1" Pulleys and its ends are fixed to the lugs of a Double Bent Strip 27, which slides freely on the bed of the slay. The lower ends of the picking-sticks will eventually be attached to the Spring Cord and in

this manner the Double Bent Strips are made to flick backward and forward, so that when the Shuttle is placed at one end of the slay, one of the engage the Shuttle site end of ing-stick then return

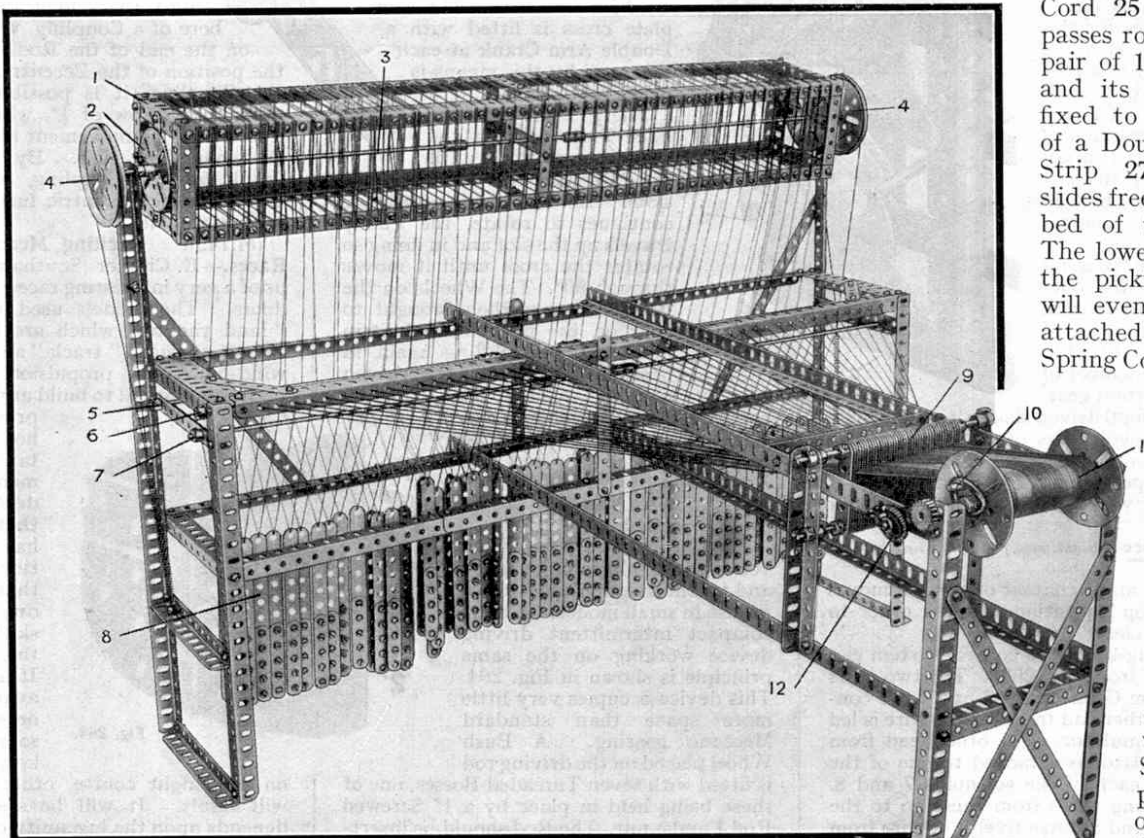


Fig. 5. View of the complete Beaming Frame, on which the Beam must be prepared before insertion in the Loom.

Double Bent Strips will with the pointed end of and throw it to the opposite slay. The other pick-and Double Bent Strip it.

The slay is mounted in place in the Loom by passing a Rod through the top holes of the Flat Trunnions 19 (Fig. 1, March "M.M.") and through the bottom holes in the Girders 57 of the slay. The slay is rocked about its pivot by means of two Cranks 29 (Fig. 4) secured on the ends of the Rod carrying the ¾" Pinions that mesh with the 50-teeth Gears 63 (Fig. 2, March "M.M."). Connection between the Cranks and the slay is formed by means of Strips 28, which are attached to the slay by means of the Single Bent Strips 38 (Fig. 4).

The picking action of the model may be greatly

improved by lining the bed of the slay with a narrow strip of tin. This improvement enables the Shuttle to slide with considerably greater freedom.

As explained in last month's "M.M." in order to turn out good work with the Loom, it is important that the threads of the warp should be wound on the beam evenly, and each individual thread must be laid on under exactly the same tension. For this purpose a beaming frame is employed. The Meccano model beaming frame is shown in Fig. 5.

The rotating frame 1 on which the various skeins of silk are wound, consists of four $2\frac{1}{2}$ " Angle Girders, bolts being inserted in the holes of each Girder throughout their length in order that the skeins may be kept separated from each other. A Face Plate 2, attached to each end of the frame, is secured to a Rod 3, which is journalled in the end holes of the vertical girders, and has brake drums in the shape of 3" Pulleys 4 fixed at each end. Cords are passed round the Pulleys under tension, which is supplied by Springs.

Each of the warp threads is led behind the Rod 5, through the top hole of each weight 8, and in front of the Rod 7. After leaving the Rod 7 the thread passes behind the Rod 6, and is taken through a hole in the front Girder as shown before it is inserted in the reed 9. This process is repeated with each warp thread in turn. All the warps are then fastened to the beam 11 by clamping them with a Rod 10 in the groove of the Wood Roller. This Rod is held in position by a $\frac{5}{8}$ " Rubber Ring, which is placed over each end of the Rod and the bosses of the Face Plates forming the end of the beam. A Pawl and Ratchet mechanism 12 is fitted to the beam spindle to prevent it from unwinding.

Each of the weights 8 is composed of a $5\frac{1}{2}$ " Strip to which three $2\frac{1}{2}$ " Strips are attached by five nuts and bolts. If the builder does not possess sufficient $2\frac{1}{2}$ " Strips, it will be necessary to construct some of the

weights with other Strips to an equivalent weight.

One or two precautions must be observed before attempting to remove the beam from the beaming frame for insertion in the Loom. If all the silk has not been wound off the frame 1, the threads must be cut. Prior to this, a Rod should be clamped over the threads on the beam in a similar manner to the Rod 10 (Fig. 5) in order to prevent the threads from becoming loose and deranged; and a pair of Strips should also be clamped above and below the warp, just in front of the reed. This is to prevent the warp threads from pulling out of the reed when the warp is severed. The beam may then be removed from the machine.

Care should be taken to replace the Rod holding in place the turns of warp on the beam, and it should be removed only when the warp is secure on the take-up rollers.

When the Loom has been completed, it becomes necessary to take into consideration the pattern to be woven. Whether it be a hat band or a tie that is to be the first effort, the choice of colours for the warp and the weft—particularly the former—will call upon the artistic ability of the user to no little extent, in addition to manipulative ability in the actual process

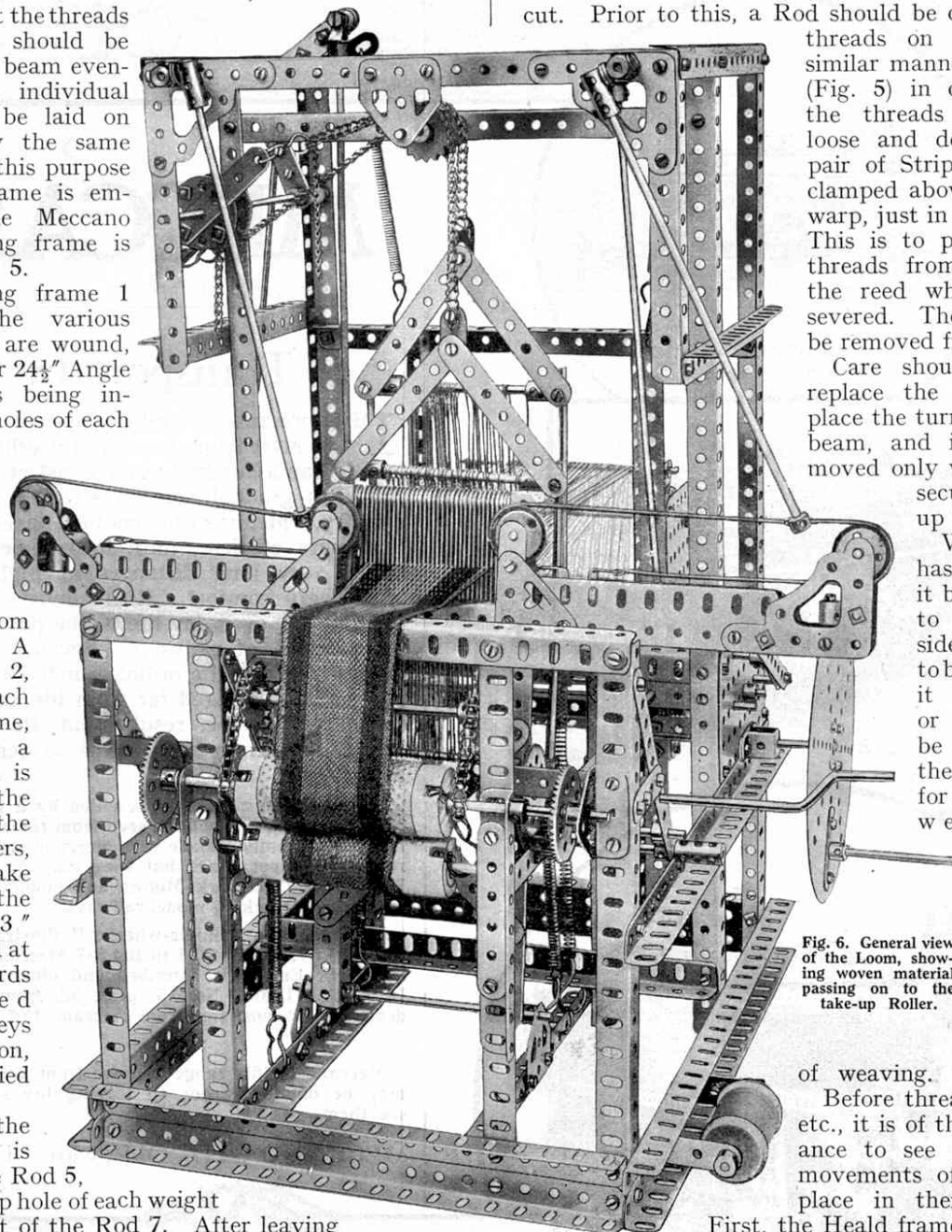


Fig. 6. General view of the Loom, showing woven material passing on to the take-up Roller.

of weaving.

Before threading the Healds, etc., it is of the utmost importance to see that the various movements of the model take place in their correct order.

First, the Heald frames should both be arranged so that the mails or eyes of the respective groups of healds coincide when the Crank 31 (Fig. 4, March "M.M.") is set vertically. Then, with one of the Heald frames raised and the other lowered to their greatest extent, the Cranks 29 should be turned so that the slay is as close as possible to the front Heald frame. The Cranks are then secured on the Rod. At the same time the picking motion must throw the Shuttle across the slay, and this cycle of operations must take place with unflinching regularity. Having made quite sure that everything is correctly adjusted attention may be paid to the actual threading of the Healds.

A single warp thread is passed through each mail of the Healds, the threads passing through the mails of the two Heald frames alternately. Care should be taken to

see that none of the threads cross. One or more threads may be passed through each division of the reed, and attached to the take-up Rollers. The Meccano Reed Hook will be found useful for passing the threads through the reed.

Sufficient warp thread should be unwound from the beam to allow the Healds to be easily threaded, and the ends of the threads then clamped to the lower take-off roller, an operation that is accomplished in a similar manner to that adopted with the beam.

The Meccano Shuttle is illustrated in Fig. 8, from which it can be seen that it consists mainly of two parts, a shell and a "cop" on which the weft thread is wound. The latter may be quite easily removed from the shell, and may be wound with thread on the winding machine that is incorporated in the Loom. The winding machine consists of a Crank Handle (seen projecting from the right-hand side of the model in Fig. 6), on which is a 57-teeth Gear Wheel in mesh with a $\frac{1}{2}$ " Pinion on a secondary Rod. This Rod has also secured to its outer end a Coupling in which the cop is held during the winding. The reel of thread is accommodated on a Rod 18 (Fig. 1, March "M.M.") which is carried in a $2\frac{1}{2} \times 1$ " Double Angle Strip bolted to the base Girders of the Frame. After winding, the loaded cop is inserted in its shell, the free end of the thread being passed through one of the holes in the side of the shell and allowed to trail freely alongside when the Shuttle is placed in the slay.

When the operating handle is turned, one of the Heald frames rises and the other falls simultaneously, thus "shedding" the warp. The slay moves up to the Heald frames, and as it pauses before commencing its return journey the Shuttle is thrown across the slay between the parted warp threads, leaving in its wake a trail of weft thread. On the return of the slay the reed drives before it loose thread left by the Shuttle, so forming what is termed the "first pick" of the weft. By continuing to turn the handle the process is repeated, but this time the Shuttle is thrown from the opposite end of the slay. The reed then presses the second pick into place against the first.

The taking-off rollers in the meantime revolve slowly and draw in the woven fabric as weaving proceeds.

Care should be taken to carefully adjust the Springs controlling the picking motion to ensure that the tension of both Springs is equal. Several experiments may be necessary before the Springs are in correct adjustment, but any trouble taken at this point will be amply repaid by the better quality of the woven cloth.

Another important point is the timing of the motion of the slay with that of the Shuttle. Here it may be mentioned that the Shuttle must shoot between the threads of the warp just at the moment when the latter are separated to their greatest extent, which coincides with the instant when the

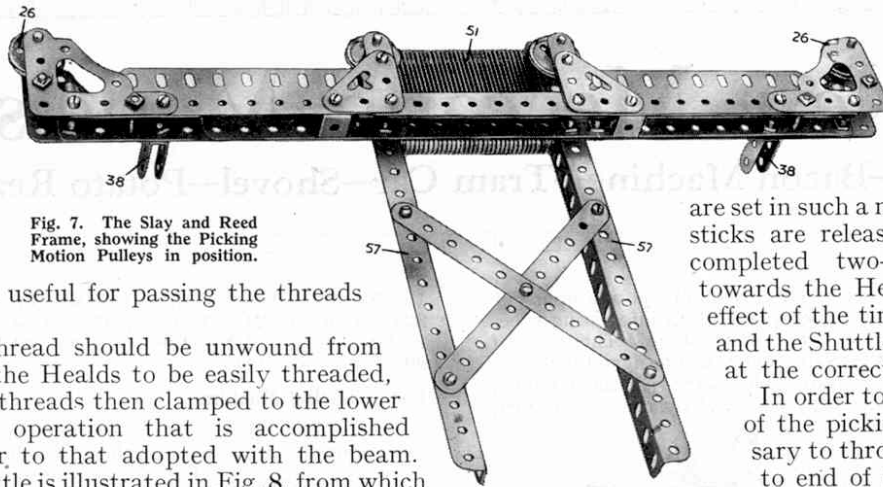


Fig. 7. The Slay and Reed Frame, showing the Picking Motion Pulleys in position.

slay is nearest to the Heald frame. This adjustment is best carried out by arranging matters so that the cams operating the picking-sticks are set in such a manner that the picking-sticks are released when the slay has completed two-thirds of its travel towards the Heald frames. Thus the effect of the time-lag is counteracted, and the Shuttle passes across the warp at the correct moment.

In order to obtain the sudden jerk of the picking-sticks that is necessary to throw the Shuttle from end to end of the slay, the operating

handle should be turned quickly at the point where the cam releases the picking-sticks.

We have not yet explained how the cop may be removed from the Shuttle. This is accomplished by extracting the grub-screw seen at the left-hand end of the Shuttle in Fig. 8. The cop will then move to the left under the action of the spring, and the right-hand end of the cop will drop clear of the Shuttle. It is advisable to mention that the purpose

of the spring is to prevent too free rotation of the cop, which would lead to uneven edges in the woven material. If the spring is too strong, on the other hand, the Shuttle will not travel completely across the slay, owing to the braking effect produced. The spring should press quite lightly on the end of the cop, and if it is judged to be too strong, a turn or two may be cut off.

It will be realised that considerable strain is placed upon some of the Gears and Rods of the mechanism, and in order to prevent the Gears slipping on their shafts, all set-screws must be secured very tightly. If any parts are still found to slip on their Rods, especially in connection with the picking motion mechanism, the set-screws should be duplicated, thereby doubling their powers of resistance.

Where considerable trouble is experienced from this cause, it is a good plan to file a small flat in the Axle Rods immediately beneath the set-screws, thus providing a better gripping surface.

Before concluding it should be mentioned that the bottom set of warp threads, which are depressed by the appropriate Heald frame during one cycle of operations, must lie closely on the floor of the slay, otherwise the Shuttle may foul them in its passage across the slay. The upper set of threads also should receive attention in order to ensure that the Shuttle has a clear path between the two sets of threads. The adjustments necessary to effect this may be carried out simply by varying the lengths of Sprocket Chain 42 and 44.

To build the Beaming Frame the following parts will be required:—4 of No. 1a; 62 of No. 2; 10 of No. 3; 2 of No. 4; 224 of No. 5; 12 of No. 7; 2 of No. 7a; 6 of No. 8; 15 of No. 9; 7 of No. 9b; 8 of No. 13; 2 of No. 14; 1 of No. 15; 3 of No. 16; 2 of No. 19b; 594 of No. 37; 6 of No. 37a; 90 of No. 38; 1 of No. 40; 3 of No. 43; 2 of No. 48b; 21 of No. 59; 8 of No. 63; 3 of No. 103; 2 of No. 109; 6 of No. 111c; 1 of No. 147a; 8 of No. 147b; 1 of No. 148.



Fig. 8. The Meccano Loom Shuttle.

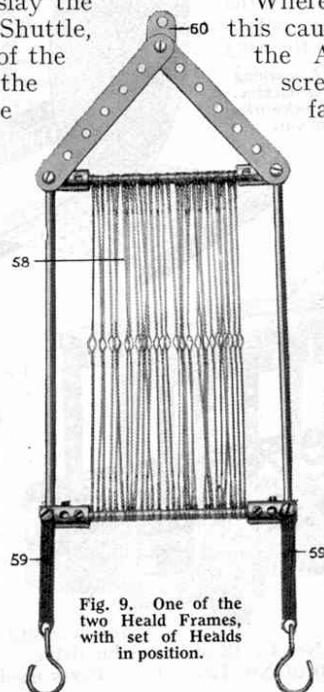


Fig. 9. One of the two Heald Frames, with set of Healds in position.