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real material with this Meccano hand loom

by **Spanner**

WORKING MODELS, as I have said before, are always more popular with constructors than those static reproductions which, while *looking* very impressive, do not actually do anything. For instance, far more cranes are built than, say, ships, simply because Meccano Cranes can simulate operations of the machines on which they are based, whereas ships cannot. But even the popular model group, itself, can be subdivided.

Two sections that spring to mind might well be termed 'Models simulating real-life operations' and 'Models producing a visible result'. A Counting Machine such as that described in these pages last month, is one example of the latter section and you can see that it does produce a definite result, although, in this case, it is only a mathematical figure. There can be no doubt, however, that the model Hand Loom featured here qualifies for Section Two as it produces an extremely obvious result—real cloth.

Owners of Outfit No. 8 will be able to build the Loom provided that they obtain a few extra parts. These additions are 24 Healds, No. 101, one End Bearing, No. 166, and 24 Washers, No. 38.

At this point, I think I should explain a few technical terms which crop up in the instructions. The 'warp' consists of the lengths of cotton which are wrapped around the warp beam roller, and which are threaded

through the Healds, etc. The 'weft' is the single length of cotton which is wrapped around the shuttle. The shuttle itself is the object that is passed backwards and forwards between the 'warp' and is built-up from a Rod, held loosely in two End Bearings that are bolted, as shown, to two Perforated Strips, bent to shape. It is best to saw out the metal between the two centre holes of one of the Strips so that the weft can be passed through the resulting elongated hole.

To make construction easier, I have set out the instructions in sections so that the different parts of the model can be recognised.

Framework

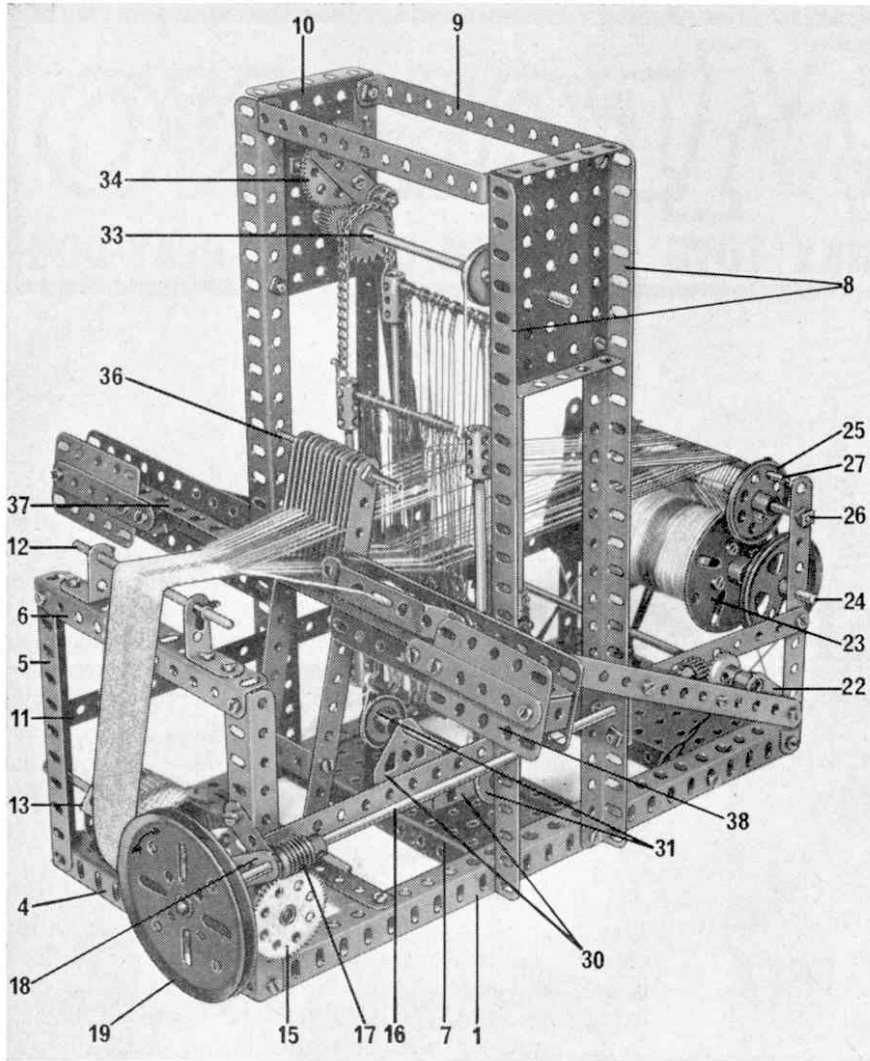
A $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 2 is bolted between two $12\frac{1}{2}''$ Angle Girders 1 with $5\frac{1}{2}''$ Strips 3 attached at the corners. At the front of the Loom a $5\frac{1}{2}''$ Angle Girder 4 is secured to the Angle Girders 1, at the same time fixing supporting $5\frac{1}{2}''$ Angle Girders 5 and 6 in place. In the centre of the Angle Girder 1, a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 7, at each corner of which four $12\frac{1}{2}''$ Angle Girders 8 are fixed, is bolted. The top of the Angle Girders 8 are connected together by two $5\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips 9 and two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates 10. Two $12\frac{1}{2}''$ Strips 11 are bolted to the Angle Girders 5 and 8 and to the Strip 3. A 4" Rod 12, held in place by Spring Clips, is journalled in two $1'' \times 1''$ Angle Brackets bolted to the Angle Girder 6.

Take-up Roller

Four $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips are bolted between two Bush Wheels 13 and secured to a $6\frac{1}{2}''$ Rod 14 which carries a 57 tooth Gear Wheel 15, spaced away from the frame by three Washers. An $11\frac{1}{2}''$ Rod 16, journalled in two $1\frac{1}{2}''$ Strips 18 and a $1\frac{1}{2}''$ Strip bolted to the Angle Girder 8, has a Worm Wheel 17 and a 3" Pulley Wheel 19 fixed on it. Worm Wheel 17 drives Gear Wheel 15. A $\frac{1}{2}''$ Pinion on Rod 16 drives a $\frac{3}{4}''$ Contrate Wheel on an 8" Rod 20 to which is secured a 1" Sprocket Wheel 21 and Cranks 22 at each end. Collars hold the Rod in position.

Warp Beam Roller

Four $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips are bolted between two Face Plates 23 that are, in turn, mounted on a $6\frac{1}{2}''$ Rod 24. This Rod supports two 2" Pulleys, serving as brake wheels, around which cord is placed, one end



The Hand Loom showing the woven material, the reed and the shuttle.

being anchored to the flange of the Plate 2, and the other tied to a small Driving Band which is looped over $\frac{1}{2}$ " Bolts fastened to the inside flange of the Plate 2.

Tensioning Device

Two $1\frac{1}{2}$ " Pulleys 25 are secured to a 6" Screwed Rod held at the ends by two nuts locked together. A $4\frac{1}{2}$ " Rod 27 is placed between the Pulleys and held by Spring Clips, as shown, after which a $3\frac{1}{2}$ " Strip 28, placed at right angles to the Rod 27, is bolted to one of the $1\frac{1}{2}$ " Pulley Wheels. A 6" Driving Band anchored to the Plate 2 is attached to $3\frac{1}{2}$ " Strip 28 by means of a Loaded Hook. A Double Bent Strip 29 is bolted over Angle Girder 8 and $12\frac{1}{2}$ " Strip 11, then two Trunnions 30 are fixed to the centre of the Plate 7, being spaced one and a half inches apart. A 4" Rod carrying two 1" Pulley Wheels 31, is journalled in the apex holes of these Trunnions.

Two similar heald frames are required, construction of which is quite straightforward. Twelve healds are placed on two $3\frac{1}{2}$ " Rods, being held in place, on the top Rod, by a Coupling at each end, and, on the bottom Rod by a Swivel Bearing at each end. This latter applies only to one of the heald frames, as couplings take the place

of the Swivel Bearing on the other. The Couplings and Swivel Bearings are connected by $4\frac{1}{2}$ " Rods.

One pair of Couplings are connected by 27 links of Sprocket Chain, fastened to the Couplings by Cord, as can be seen, while the other pair is connected by Cord only. Special care should be taken to ensure that the heald frames are level. The lower ends of the heald frames are connected by Cord pulled tightly around the Pulleys 31.

Heald Operating Mechanism

Two $1\frac{1}{2}$ " Strips spaced two holes apart, are bolted to a 2" Sprocket Wheel, two Washers on the shank of the bolts holding the Strips away from the Sprocket, and a Threaded Pin is secured in the V formed by the Strips. A compound 9" Strip 32, made up from two $5\frac{1}{2}$ " Strips, is placed on the Threaded Pin and held by a Collar. The 2" Sprocket Wheel is then mounted on a $1\frac{1}{2}$ " Rod, journalled in the Double Bent Strip 29, and is driven by Chain from the 1" Sprocket Wheel 21. A 2" Strip is bolted across a 57 tooth Gear Wheel 34, and this is connected to strip 32 by means of a Threaded Pin, being held in place by a Collar. Gear Wheel 34 is fixed on a $1\frac{1}{2}$ " Rod journalled in a Double Bent Strip 35, bolted to one of the Flanged Plates 10. A $\frac{1}{2}$ " Pinion on a $6\frac{1}{2}$ " Rod 33 engages with the Gear Wheel 34. Also

on Rod 33, a 1" Pulley and a 1" Sprocket Wheel are fixed. When the Threaded Pin on the 2" Sprocket Wheel is in the lowest position the back heald frame top should be 1" away from the Rod 33, and the Cranks 22 should be in their most rearward position.

The Slay and Reed

On two 3" Screwed Rods 36 a $5\frac{1}{2}$ " Strip, followed by two Washers and a $2\frac{1}{2}$ " Strip, is placed. A further $2\frac{1}{2}$ " Strip, then two Washers, are added, and this is repeated until eleven $2\frac{1}{2}$ " Strips are on the Rod, finishing with two Washers and a $5\frac{1}{2}$ " Strip. Nuts are tightened up against the $5\frac{1}{2}$ " Strips, which are then extended by $4\frac{1}{2}$ " Strips overlapped six holes with a $1\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip bolted between them. A $5\frac{1}{2}$ " Strip 40 is attached to the Angle Girders 1 having a $1\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip fixed in the centre of the Strip. The extended Strips of the slay pivot on a $3\frac{1}{2}$ " Rod journalled in the $1\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip. Collars are secured on the Rod to hold the extended Strips. The lower Screwed Rod has an Angle Bracket fastened next to the $5\frac{1}{2}$ " Strips to secure the built-up 'reed' to a $12\frac{1}{2}$ " Angle Girder 37. Two $5\frac{1}{2}$ " x $1\frac{1}{2}$ " Flexible Plates are bolted to the rear of the Angle Girder, the bolts also fixing Double

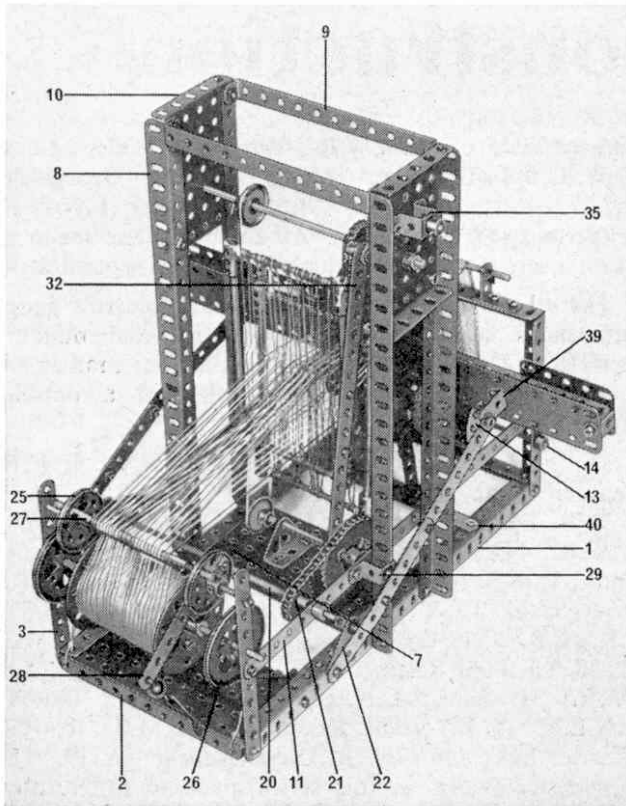
Brackets to its underside. A 3" Strip and a 2½"×"11½" Flexible Plate 38 are fixed to these Double Brackets. Two 1"×½" Angle Brackets 39 are bolted to the rear of the slay and are connected by a 13½" compound strip to the Cranks 22. When the reed is at the back centre, the heald frames are fully open.

The 'weft' thread may be wound on a Rod and pushed through the 'warp' threads, or the built-up shuttle may be flicked by a finger across the reed. Both produce good results.

Preparing to Weave

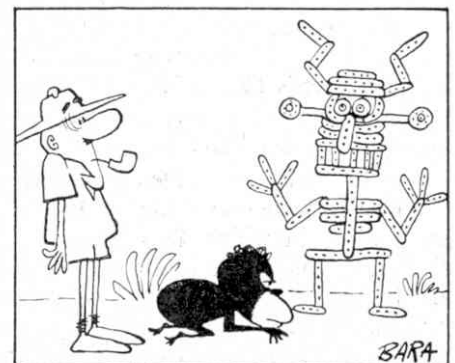
I recommend 'Lyscordet' Fine Knitting Cotton No. 5 for 'warp' and 'weft'. Take 24 lengths of cotton, two or three yards long and tie all the lengths together in one knot. Pass this knot between two of the Double Angle

Strips of the warp beam, and then push the beam axle through the threads in front of the knot, so as to anchor the cotton. Now commandeer a friend, and ask him to hold the threads in one hand and a coarse comb in the other hand. The comb should be held about 2 inches away from the beam. Next, place one thread in each of the comb teeth. With the brake off, carefully wind the threads on the beam, your friend holding the comb and keeping the threads tight until all but about one foot is wound on the beam. Now remove the comb. Making sure the heald frames are level, thread the first strand of cotton through the eye of the first heald on the front frame, then thread the second strand through the eye of the first heald on the back frame. After this, pass both threads through the first dent (hole) of the reed. Repeat this sequence until all the threads have been dealt with, then slide them between two of the Double Angle Strips of the take-up roller and tie them to Rod 14. Place the brake cords back in position. Wind some 'weft' thread on a Rod, or the Rod in the shuttle and turn the 3" Pulley 19 until the heald frames are fully open. Now pass the weft between the warp threads and turn the 3" Pulley clockwise again. The reed will then push the weft forward. When the reed reaches back centre, again pass the Rod or shuttle through the warp threads. This constitutes the actual weaving process. The longer you repeat the movements, the more woven material will be wound on the take-up roller.



The Loom viewed from its other side showing the warp beam roller and heald frames.

Parts required.—2 of No. 1; 9 of No. 2; 4 of No. 2a; 3 of No. 3; 2 of No. 4; 11 of No. 5; 1 of No. 6; 5 of No. 6a; 7 of No. 8; 4 of No. 9; 4 of No. 11; 2 of No. 12; 2 of No. 12a; 2 of No. 12b; 1 of No. 13; 1 of No. 13a; 3 of No. 14; 2 of No. 15; 3 of No. 15a; 2 of No. 15b; 5 of No. 16; 3 of No. 18a; 1 of No. 19b; 2 of No. 20a; 2 of No. 21; 3 of No. 22; 2 of No. 24; 2 of No. 26; 2 of No. 27a; 1 of No. 29; 1 of No. 32; 4 of No. 35; 110 of No. 37a; 93 of No. 37b; 65 of No. 38; 2 of No. 45; 2 of No. 48; 8 of No. 48a; 2 of No. 48d; 2 of No. 52; 2 of No. 53; 1 of No. 57c; 9 of No. 59; 2 of No. 62; 6 of No. 63; 1 of No. 79a; 2 of No. 80c; 1 of No. 94; 1 of No. 95; 2 of No. 96; 24 of No. 101; 2 of No. 109; 3 of No. 111a; 2 of No. 111c; 2 of No. 115; 2 of No. 126; 2 of No. 165; 2 of No. 166; 2 of No. 186; 1 of No. 186a; 2 of No. 188; 2 of No. 189.



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