The New Meccano Loom

Build this Fine Model and Weave Real Neckties!

THE art of spinning and weaving is of great antiquity. Even at the time when Britain was covered with forest and its inhabitants were uncivilised and clothed in skins, the people of Eastern nations were wearing woven clothes.

Up to the year 1785 all weaving was done on hand-looms and indeed many of these machines are still in use in parts of Scotland and Ireland, and also in France. In the early days nearly every farmhouse in Lancashire was an independent little factory and hand-looms were to be found in most of the cottages and houses in the towns and villages. The weaver himself generally bought the raw cotton. This was picked by his children, spun into thread by his wife or his elder girls and then woven at the loom by his sons, whilst he carried it to the merchants to sell.

The earliest improvements in the hand-loom were those made in connection with that part known as the shuttle. To understand exactly the functions of the shuttle we must remember that a woven fabric is composed of two elements, the "warp" or longitudinal threads, and the "weft," or cross-threads. If you examine your handkerchief or a tablecloth, you will see exactly what is meant by this. Notice how a woven fabric differs from one of another texture, such as a stocking, jumper, or crochet pattern.

The interweaving of the warp by the weft, called the "picking motion," is effected by passing a thread from the shuttle between some of the threads of the warp. The shuttle moves from one side of the loom to the other, and each time it passes between the threads of the warp, it leaves behind a thread of weft.

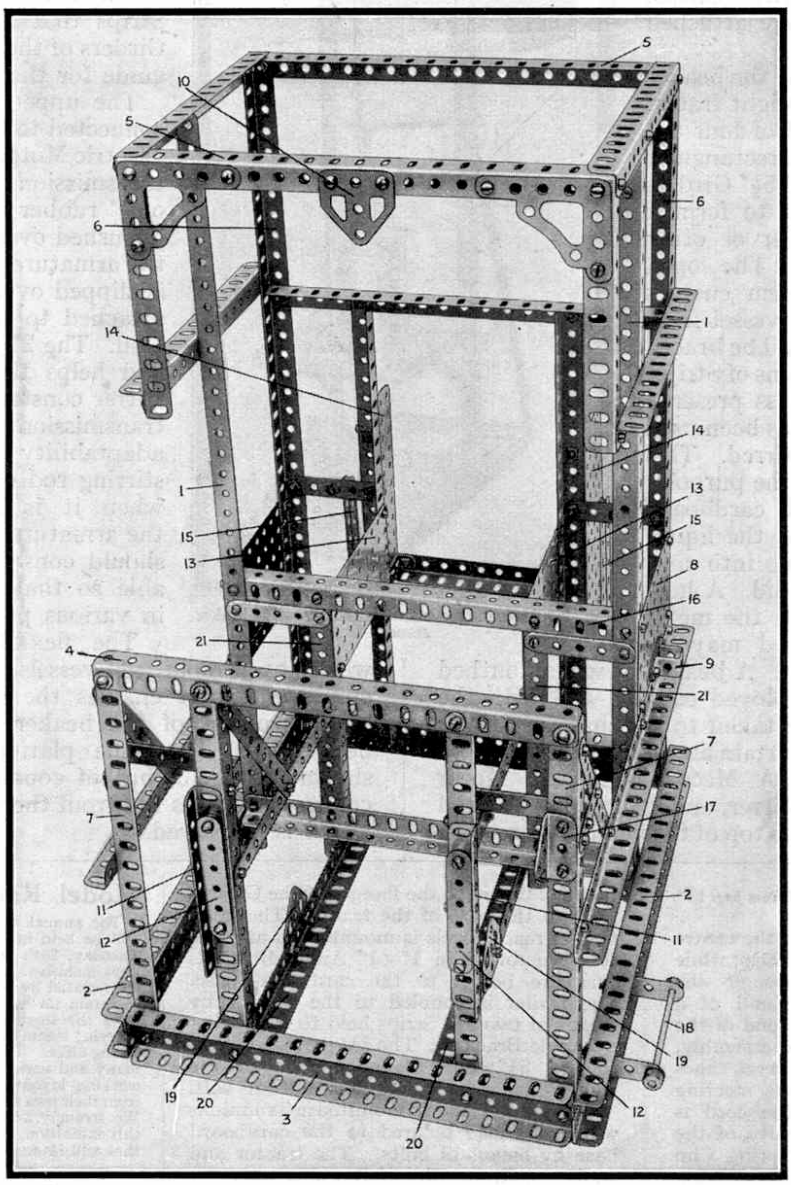

Fig. 1. The Loom framework, showing bearings and supports, etc., for the mechanism.

There are three distinct operations necessary to enable the shuttle to accomplish this movement. The first is the opening of the warp, when some of the threads are raised for the second operation of "picking." The third operation, which is called "beating up" the weft, consists of pressing the weft into position by the reed.

Up to the early part of the 18th century, the shuttle had to be "thrown" backward and forward by hand. This was accomplished by two persons, who stood one on each side of the loom. As the shuttle was heavy, throwing it was very hard work, as well as being a very laborious and slow process. In 1750, however, John Kay, of Bolton, invented the "flying" shuttle. This consisted of a "picking stick" that drove the shuttle and saved the weavers from throwing it with their hands.

In 1785 Edmund Cartwright, an English clergyman, invented the power-loom, which enabled cloth of more uniform texture to be produced at a lower cost and in greater quantities.

Strange though it may seem, yet it is a fact that the power-loom was only slowly taken up. It was first used in Glasgow about the end of the 18th century, but about a century ago it was rapidly adopted, especially after it was made so that the cloth was taken up mechanically, instead of having to be continually pulled forward by the weaver.

The Meccano Loom is designed exactly on the lines of the large power looms used in the cotton industry in Lancashire, and is capable of weaving excellent cloth.

The construction of the Meccano model is commenced

by building up the main framework, which is shown in detail in Fig. 1. Four 18½" Angle Girders 1 and 6 are secured in a vertical position at one end of the base Girders 2, and two 9½" Girders 7 are bolted in position at their other ends, as indicated in the illustration. A 9½" Angle Girder 4 bridges the tops of the Girders 7, and two further 9½" Angle Girders bolted to it carry 4½" Angle Girders 11. The remainder of the framework may be successfully completed by studying carefully the illustrations.

The next step in the construction of the model is the assembling of the gearing, which is shown in Fig. 2. To make matters quite clear it must be mentioned that the gearing, as shown in the foreground, is duplicated, with the exception of the operating handle, at the other side of the model.

The operating handle which consists of a Circular Plate with a 3" Rod attached to its face by a Double Arm Crank, is secured to a Rod carrying a ¾" Pinion that meshes with two 50-teeth Gears 62 and 63 (Fig. 2) fixed on separate Rods that run from side to side of the Loom. The first Rod has secured to it a cam 52 and the second Rod carries a Worm 56. Two cams are required, one at each end of the Rod, and they should be built up as shown in Fig. 3 and then secured rigidly to the Rod by duplicate set-screws in the bosses of the Bush Wheels, to prevent their rotation on the Rod.

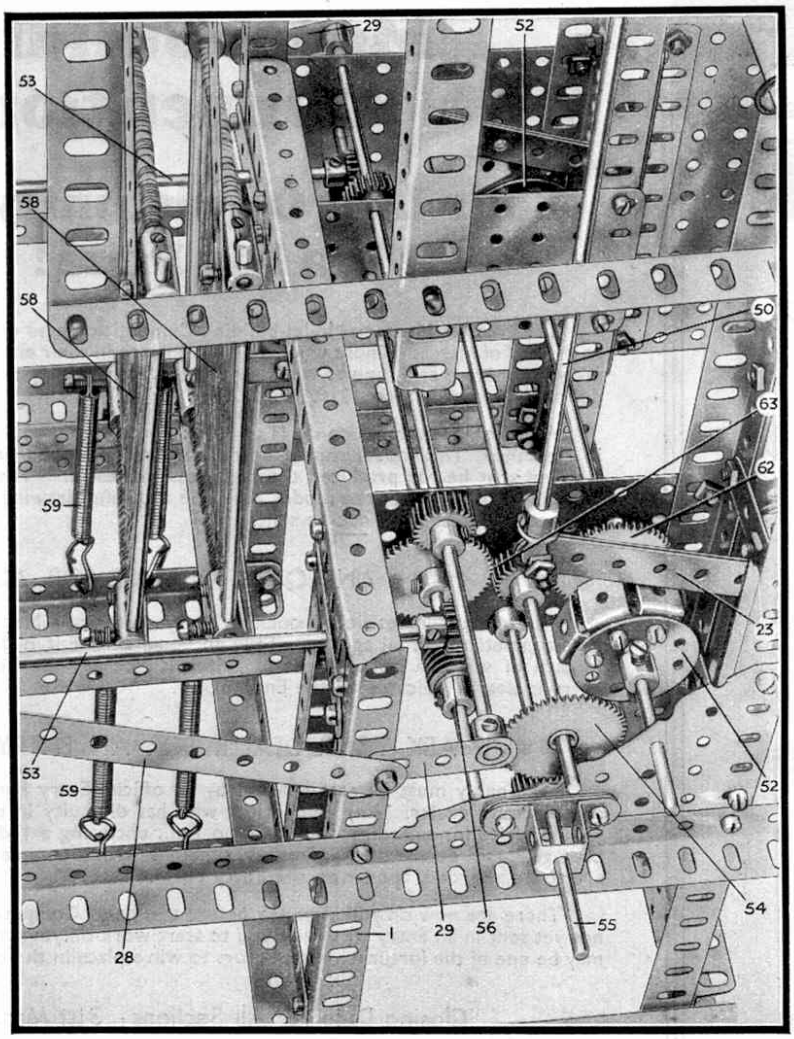

Fig. 2. A close-up view of the "Picking Motion" mechanism.

The Shuttle is thrown from side to side of the slay by means of mechanism known as the "picking motion."

The 5½" Strips 23 (Fig. 2) that ride on the cams are mounted on Pivot Bolts bolted to the 5½"×2½" Flat Plates seen in Fig. 4, and they slide between guides formed from vertically disposed 3½" Strips.

The free end of each Strip is connected by an End Bearing and a lock-nutted bolt to an 11½" Axle Rod 50 (Fig. 2), the upper end of which is attached in a similar manner to a built-up crank 1½" long that consists of two ordinary Cranks bolted together in such a manner that their bosses are at opposite ends. The composite crank is secured by double grub-screws to a Rod 22 (Fig. 4) in the upper part of the loom, which carries also a Crank 36. A Spring 37 attached to the Crank serves the purpose of maintaining the Strips 23 in intimate contact with the cam.

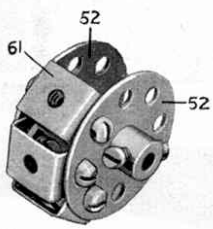

Fig. 3. Cam for operation of the Picking Sticks.

A Coupling is secured on the end of each of the Rods 22, a Pivot Bolt being passed through its end transverse bore and inserted in the tapped bore of a Coupling on the upper extremity of a Rod forming a "picking-stick." The bottom end of the picking-stick is later to be attached to a length of Spring Cord 25. The cams 52 are secured on their Rod in such a manner that the three Double Brackets forming the working face of one cam are diametrically opposite those of the other cam, so that the picking-sticks work alternately, and throw the Shuttle first to one end of the slay and then to the other.

The arrangem nt of the "take-up" motion that draws the wov n cloth through the loom is indicated in Fig. 2. On the Rod of the 50-teeth Gear 63 is secured a Worm 56 that meshes with a ½" Pinion on a Rod 53. This Rod is duplicated on the far side of the model, and the ends of both Rods terminate in ½" Bevel Wheels that are in mesh with 1½" Bevels on the Rod of the upper take-up roller (Sand Roller, part No. 106a). Owing to the gearing employed, a slow "take-up" is imparted to the Sand Roller, and the woven material, after passing beneath it, is wound on to a lower roller (Wood Roller, part No. 106). The lower roller is rotated by frictional contact with the Sand Roller, and both Rollers are kept together by means of a spring tension device. The lower ends of two Tension Springs are hooked on to the frame of the model, and their upper ends are fitted with short lengths of Sprocket Chain which, after passing over 1" guide Sprockets above the Rollers, are attached to the lower Roller spindle by Hooks. The spindle of the lower Roller slides in a pair of guides 12 so that it is free to move vertically (Fig. 1).

In the Meccano Loom there are two heald frames, but there may be many more in actual looms. As in actual practice, the healds are assembled vertically. The healds serve to lift and depress alternate threads of the warp, so that the shuttle may be passed between the threads.

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

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."

The construction of the heald frames will be described later.

When the heald frames descend after forming the "shed," the threads of the warp naturally fall slack, unless special mechanism is provided to remedy the matter. Slacking of the warp would, of course, prevent satisfactory work being turned out by the model, and in order to compensate for any sag of the threads, a particularly ingenious device known as a "warp tensioner" is incorporated in the model. This mechanism and its arrangement may be seen in the rear view of the model (Fig. 4), and a study of this illustration in conjunction with the following description will make the matter quite clear. It consists of a Rod journalled in the Plates 14 and carrying two Bush Wheels, to one of which a $2\frac{1}{2}$" Strip 33 is bolted. Two Cranks are bolted to the Bush Wheels as indicated in the illustration, and a Rod is secured in the bosses of the Cranks. The warp threads from the "beam" (a Wood Roller with a Face Plate 24 at each end) are first passed over the fixed Rod, then round the movable Rod, and again over the fixed Rod, to the Healds. The necessary tension is supplied by means of a Spring 34 attached to the Strip 33 as shown in Fig. 4.

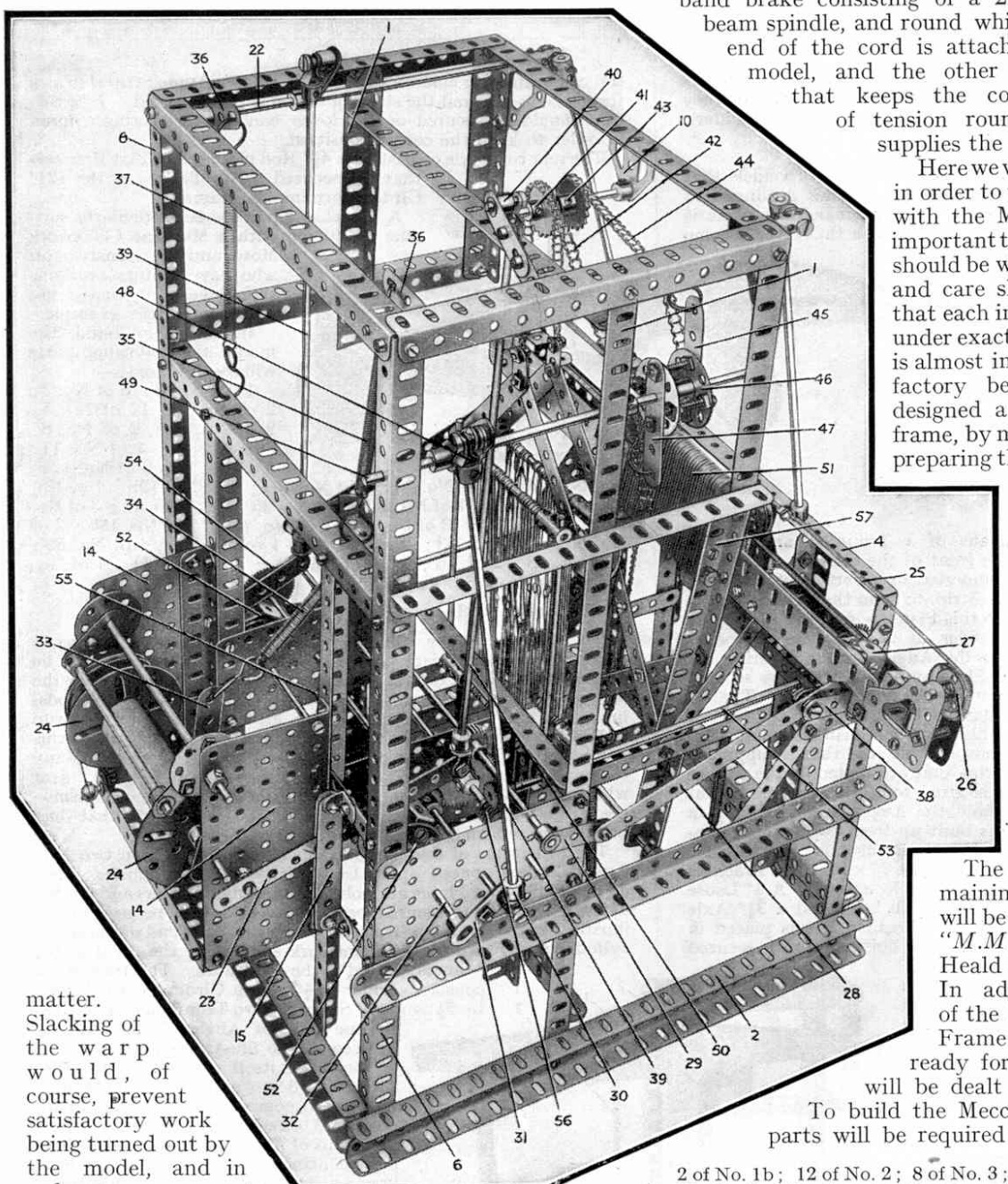

Fig. 4. View of the Loom mechanism from the rear.

Here we would like to mention that in order to turn out really good work with the Meccano Loom, it is most important that the threads of the warp should be wound evenly on the beam, and care should be taken to ensure that each individual thread is laid on under exactly the same tension. As it is almost impossible to wind a satisfactory beam by hand, we have designed a special type of beaming frame, by means of which the work of preparing the beam is quite easily and efficiently carried out. Another important point that will greatly assist the amateur weaver in producing good work on the Loom is the choice of the right kind of material for the threads. Our experience with the Meccano model Loom has shown that No. 8 "Star Sylko" is the most suitable for the warp threads and No. 40 for the weft.

The construction of the remaining portions of the Loom will be described in next month's "*M.M.*" These include the Heald Frames and the Slay. In addition the construction of the Meccano model Beaming Frame for preparing the Beam ready for insertion in the Loom, will be dealt with.

To build the Meccano Loom the following parts will be required:—

2 of No. 1b; 12 of No. 2; 8 of No. 3; 2 of No. 4; 42 of No. 5; 4 of No. 6; 2 of No. 6a; 4 of No. 7a; 10 of No. 8; 17 of No. 8a; 8 of No. 8b; 5 of No. 9; 2 of No. 9a; 2 of No. 9d; 4 of No. 10; 8 of No. 11; 6 of No. 12; 2 of No. 12b; 6 of No. 13; 7 of No. 13a; 6 of No. 14; 5 of No. 15; 6 of No. 16; 3 of No. 16a; 1 of No. 16b; 4 of No. 18b; 1 of No. 20a; 4 of No. 22a; 9 of No. 24; 5 of No. 25; 4 of No. 26; 5 of No. 27; 1 of No. 27a; 2 of No. 30a; 2 of No. 30c; 2 of No. 32; 202 of No. 37; 28 of No. 37a; 102 of No. 38; 10 of No. 43; 3 of No. 45; 2 of No. 46; 1 of No. 47; 4 of No. 53a; 14 of No. 57; 30" of No. 58; 24 of No. 59; 13 of No. 62; 1 of No. 62b; 13 of No. 63; 2 of No. 64; 2 of No. 70; 8 of No. 82; 28" of No. 94; 4 of No. 96; 60 of No. 101; 2 of No. 102; 4 of No. 103c; 1 of No. 104; 2 of No. 106; 1 of No. 106a; 6 of No. 108; 2 of No. 109; 2 of No. 111; 2 of No. 111a; 12 of No. 111c; 1 of No. 126; 3 of No. 126a; 2 of No. 133; 1 of No. 136; 1 of No. 146; 6 of No. 147b; 2 of No. 155; 6 of No. 166.