Mechanical Methods to Increase Loom Production

This article is a brief survey of the various mechanical means used in recent years to increase the capacity of the loom. The use of diagrams makes comparison very easy

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The aim of the loom builder, superintendent, boss weaver, and loom fixer, is to increase production in the weave room. Modern competitive conditions force a weaving mill to produce the largest amount of the best possible cloth in the shortest time. The solution of the problem has been attempted in many different ways. This article gives a brief survey of certain mechanical means to the above mentioned end.

One of the first steps was to weave several cloths side by side in the same loom. Between each cloth, center "selvages" were woven. A knife, fastened to the breast beam, cut apart these two or more "selvages." In this way, a complete utilization of loom width was obtained, but the trouble with this procedure was that the selvages were poor. Many times they had to be woven with a leno attachment. To overcome this, center picking motions, such as shown in figure No. 1, were devised. By means of such an arrangement, the selvages improved, but the picking devices took so much room that the advantages were offset by the disadvantages.

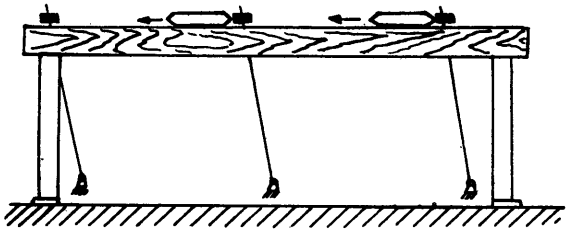

Fig. 1

Then an attempt was made to weave two and three cloths directly over each other. Such an arrangement is shown by Figure No. 1a. From a common warp beam, one set of yarns is brought up over one whip roll, and the other set over another whip roll. Every heddle in the common harness has two heddle eyes, one for the upper warp, and one for the lower warp. Two breast beams, two sand rolls, and two press rolls are required. This method of weaving has the great disadvantage that the upper cloth hides the lower cloth, and hence any imperfections pass unnoticed. In case of a yarn break, the weaving of both fabrics is stopped and reduces the production of both.

Another method was simply to increase the picks per minute. This failed many, many times.

Larger shuttles, permitting considerably larger quantities of yarn at one filling of the shuttle, were also used. The writer has seen looms with 29¼ inch shuttles running at a

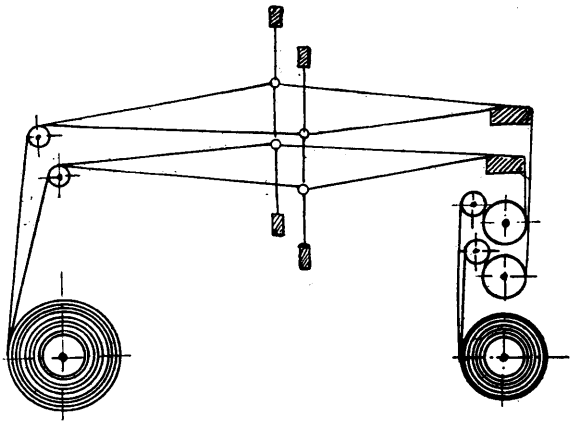

Fig. 1a

speed of 160 picks per minute for a considerably long period. The loom ran well and the stoppages were reduced to a minimum.

Later, the automatic loom appeared with a bobbin, or shuttle, changing mechanism.

At about the same time, an attempt was made to put a whole day's supply of filling yarn on one large single-end cone or bobbin at the side of the loom. The yarn was introduced into the shed by guides, leaders, or reacher arms.

There are three types of looms constructed on this principle, although in actual application they vary somewhat. In one loom, a shuttle with sinkable pins is employed. They catch the filling yarn on one side and pull it through to the other side in the form of a loop. On entering the farther box, the pins disap-

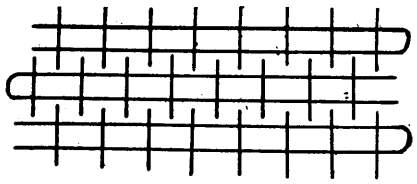

Fig. 2

pear in the frame of the shuttle and a hook holds the loop long enough to allow the shed to change. The same is repeated from the other side of the fabric. The construction of the fabric is shown by Figure No. 2.

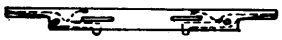

Fig. 3

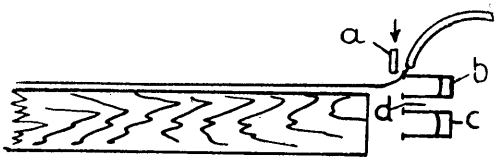

Fig. 4

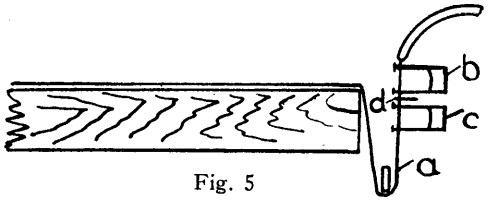

Fig. 5

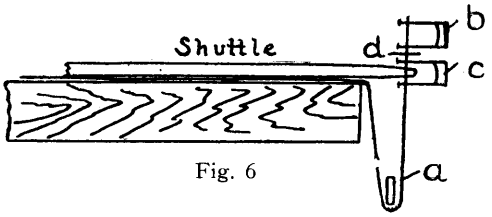

Fig. 6

An improvement on this construction was made by using a nipper shuttle. A nipper, or nip shuttle, is one provided with two beaks, nips, or gripper tongs, shown in Figures No. 3 to No. 6. One nipper grips the filling yarn and lays it into the shed. Then a lever "a," which pulls off more yarn, is lowered. In this way, the yarn is placed into clamps "b" and "c." (Figure No. 5.) On the second pick, the same occurs on the other side of the fabric. The yarn clamps are then raised at the right (Figure No. 6) and a knife "d" cuts the yarn.

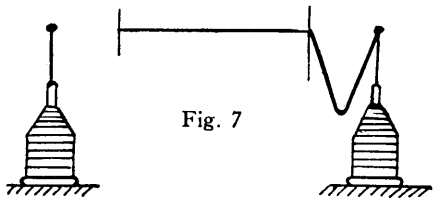

Fig. 7

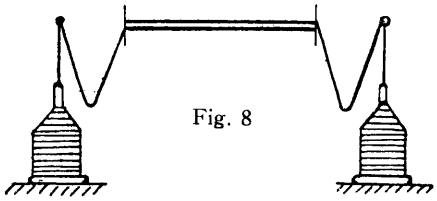

Fig. 8

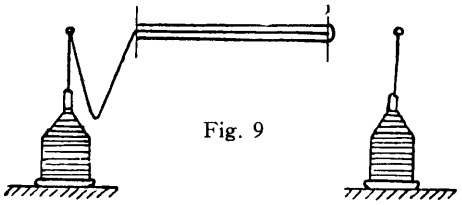

Fig. 9

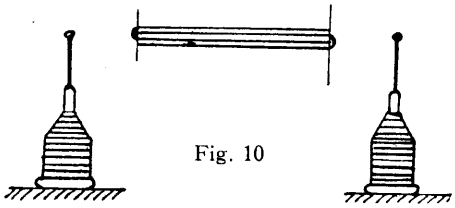

Fig. 10

and the nip shuttle again lays the loop into the shed. In this way, the cloth shown in Figures No. 7 to No. 10 is woven.

By means of a special arrangement, four to five colors could be used as filling. The above mentioned method, however, gave trouble as uniform and firm selvages could not be made.

A third system embodies similar ideas. This experiment is different as compared to earlier ones, as the power picking motion and shuttle are omitted entirely. The idea of a shuttleless loom, of course, is not new by any means.

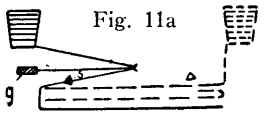
Fig. 11a

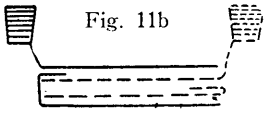
Fig. 11b

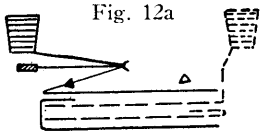
Fig. 12a

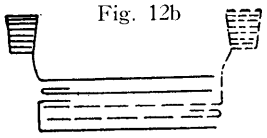
Fig. 12b

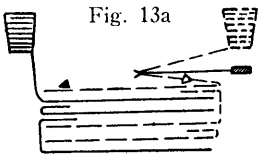
Fig. 13a

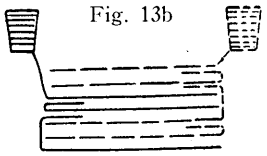
Fig. 13b

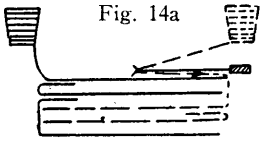
Fig. 14a

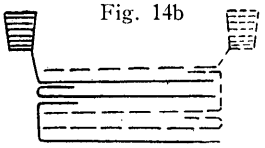
Fig. 14b

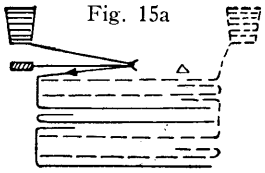
Fig. 15a

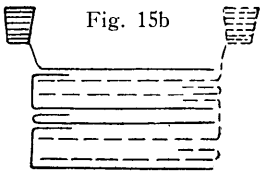
Fig. 15b

The ordinary shuttle and picking mechanism always gives trouble. Filling has to be rewound and on account of lack of space, can only be used in small quantities in the shuttle. Often, yarn slips off, giving trouble. The picking and the boxing of the shuttle consumes a lot of power, and there is considerable wear and tear on the parts involved. So far,

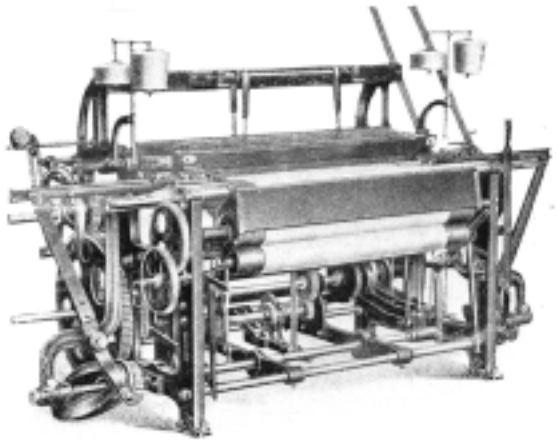
Fig. 16

it has been impossible to overcome these obstacles by better or more suitable construction of the loom.

The latter system has been the first attempt which has produced a satisfactory selvage without a shuttle. The machine is simpler in some respects, and more easily operated than some common looms, since the picking mechanism is omitted. The filling yarn is handled in a similar way to that in a haircloth loom. The levers are operated by cams, and the loom can make approximately 170 "picks" per minute. The levers are provided with a pair of clamps, which take the filling yarn halfway across the shed, and a second pair of clamps picks up the yarn in the center and takes it to the other side.

The yarn is at first handled as a loop and brought to the center of the lay. As soon as the second clamp has the yarn, it is cut on one side by scissors reaching into the edge of the cloth. This is done so that the right clamp will take the other half of the pick to the other end of the selvage. See Figures No. 11 "a" and "b," No. 12 "a" and "b." The clamp is denoted by "g" and the shears are designated by "s." Thereafter, the insertion of the filling takes place twice from the other side, Figures No. 13 and No. 14, "a" and "b." In Figures No. 15 "a" and "b," the repeat posi-

tion is again reached. The warp ends are omitted in the drawing for the sake of clarity.

From the preceding, it is quite evident that the inserted filling yarn extends over the edge of the cloth. It is then turned in and woven into the goods.

The filling is supplied from large cones. This is a sufficient quantity generally to keep the machine supplied for one whole day. Tension devices insure that the yarn is woven in the cloth with uniform tension.

The loom is shown by Figure No. 16.

The loom is provided with a four color change. The selection of the proper color of filling is done automatically by a pattern device. Several looms of this kind can be operated by one weaver. Any combination or pattern can be woven in this way, because the loom works like a box loom. The filling can also be handled pick and pick.

A special attachment for a basket weave permits the weaving of two picks at one time, and also prevents a rolling of the two yarns in the same shed. In case of breakage of one of the two yarns, the loom is stopped automatically and instantly.

On wide goods, the yarn "reachers" are built like a telescope to prevent vibration. These looms are not any wider overall than the ordinary loom.

The omission of the picking motion assures much quieter operation. The height of the shed can be smaller. Very weak filling yarns can be used because the yarn is not stretched or strained.

Another system which is a combination of the above and the power pick motion, was recently brought out. The first machine operated with a double yarn shed, and a power-driven pick motion. Since there is a limitation on the number of picks per minute, the clamp and reacher system was used for the front shed.

The main advantage of this method is a considerable increase in speed, since two picks are introduced in the time that an ordinary loom introduces one. As the principle is more or less known, only the most important movements are explained.

Figures No. 17 and No. 18 show two picks, S_1 and S_2, inserted into the two sheds formed by sort of half-heddles L_1 and L_2, which are beaten-up to the fell by a comb K. The reacher G brings the second pick S_2 forward to the former position of S_1. The comb K takes the place of the reed. The dents of the comb are open at the top, so that the rear pick can be brought to the fell. In addition, they are smooth and rounded off at the top, permitting ease of entry and withdrawal from the sheet of warp yarns.

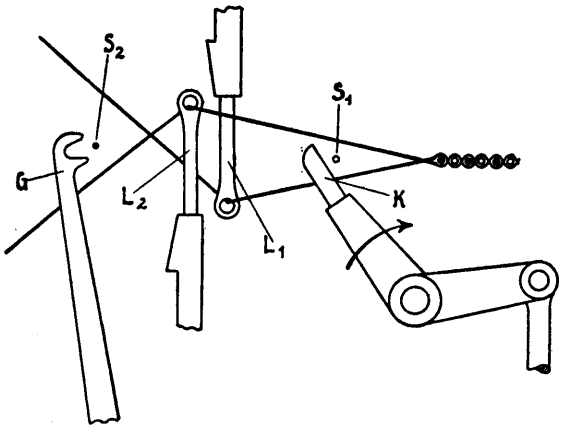

Fig. 17

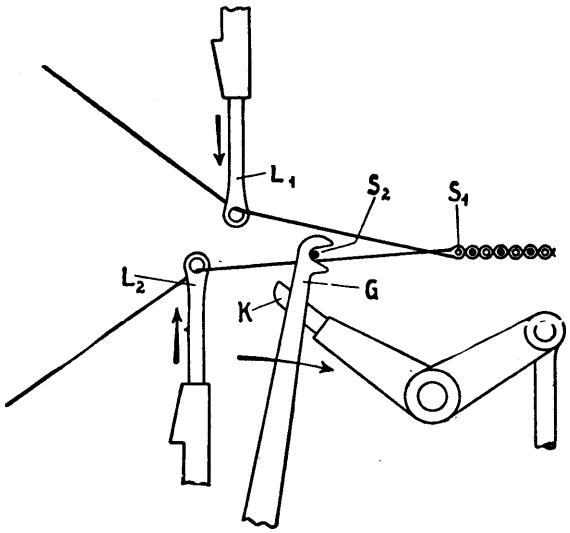

Fig. 18

As the comb is made out of light material and travels only short distances, it can be operated at considerable speed without setting up any serious vibrations. While the ordinary lay beats up once, the comb can operate twice, even three times. Instead of harnesses and heddles in the ordinary loom, half-heddles are employed. They are actuated by cams.