July 19, 1966 A. L. POWER 3,261,361

ATTACHMENT FOR NEEDLE LOOM

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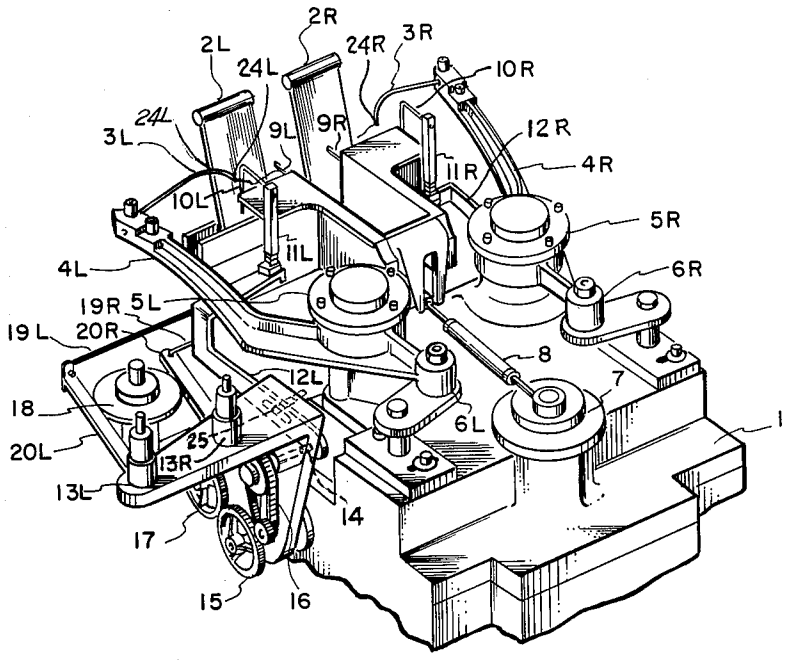


FIG. 1

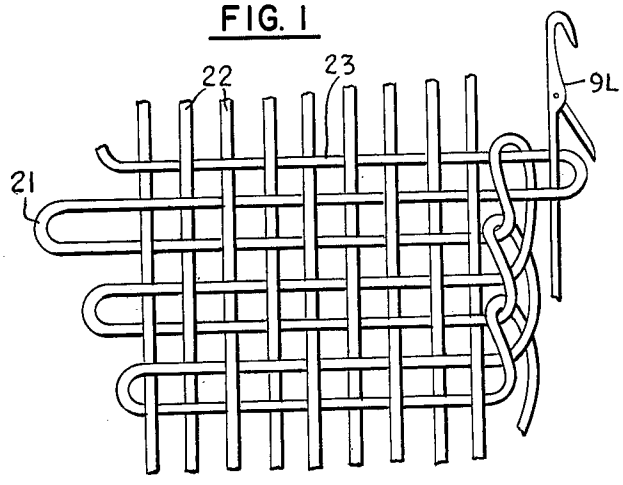


FIG. 2

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ATTACHMENT FOR NEEDLE LOOM

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This invention relates to an improved needle loom and more particularly to an improved loom which produces decorative designs on one edge of each web.

Ordinary needle looms which weave webs, usually pairs of webs, use edge wires on the side and so produce straight edges. There has been a demand for webs, particularly elastic webs, with decorative patterns such as scallops on one side. A new type of loom for performing this function is disclosed in the patent to Libby, 3,126,920, March 31, 1964. In this loom one of the edge wires for each web has been replaced by a finger which catches each loop of weft yarn projected through the shed by the loom needle. The finger is gradually moved in and out to produce a pattern of loops of various lengths such as, for example, a scallop pattern. The finger about which the loop is formed is moved up and down in synchronism with the weaving so that it holds the loop only until the needle has woven another complete pick and is then raised so that when the pick is beaten into the fell the loop is no longer caught by the finger. The gradual in an out position of the finger is effected by a cam and a separate cam and drive is required for each web. Thus on a loom which weaves two narrow webs, one cam and drive is required on one side and one on the other. The inner edges of the two webs are produced by edge wires of conventional design.

All of the drive mechanism including the two cams and double drive linkage are mounted above the web. While the Libby loom is capable of producing narrow webs with decorative edges it has three drawbacks, one being the fact referred to above that separate drives are required for each finger and the second is that the web is concealed by the drive mechanisms above it which is undesirable as the operator cannot see the web which has just been woven and therefore does not notice defective portions until a considerable length of web has been woven. The third is that the mechanism normally has to be built into the loom.

The present invention deals with an improvement on the Libby loom or rather on looms which operate on the principal of the Libby loom. All of the advantages obtained by the Libby loom are retained and the drawbacks are eliminated.

First of all the mechanism operating the finger, both in its up and down motion and in its gradual in and out motion, is below the web so that the operator can see the latter at all times and can spot rapidly any defect before any considerable amount of web has been woven.

The second big advantage of the present invention is that it is possible to have a single drive mechanism from a single cam which moves both fingers on the opposite outside edges of the two webs in opposite directions. The result of the design is therefore achieved with but little over half as many elements of mechanism. The double cams, double drives and the like are eliminated without eliminating their function.

The present invention also has another advantage in that it can be designed as an attachment to any needle loom and so is applicable to a wide number of different types of needle loom. The added flexibility is applicable to improve existing looms and which can be rapidly connected or disconnected if it is desired to weave runs of straight edged webbing between runs for scalloped webbings. This is of practical importance and constitutes an additional advantage of the present invention.

The invention will be described more particularly in conjunction with the drawings in which:

FIG. 1 is an isometric view of a portion of a standard two web needle loom in which the present invention has been incorporated, and

FIG. 2 is a plan view of the resulting fabric.

As the present invention can be formed as an attachment to an existing loom which does not change most of the elements of the loom, only a portion thereof is shown in FIG. 1 namely the portion to the right of the reeds which, as is conventional, beat the picks. Also since it would obscure some of the mechanism the web is not shown in FIG. 1 nor its conventional take-up roller.

The needle loom shown in FIG. 1 has a base **1** on which is mounted the reeds **2L** and **2R** their drive **7** and drive rod **8**. As many elements are repeated for the left-hand and right-hand webs, they will be given the same reference numeral but with a suffix L and R respectively.

Warp threads, which can be covered elastic threads, are separated by heddles in frames which are actuated by the conventional harnesses. As this portion of the loom is in no sense changed it does not appear in FIG. 1. The warp threads pass through the conventional reeds **2L** and **2R** and alternate sets are raised and lowered by the heddles in the normal manner. Weaving zones are thus produced for each web woven, in the case illustrated two zones are formed.

Two needles **3L** and **3R** carry the weft thread through the separated warp threads in the usual manner. These needles are reciprocated by arms **4L** and **4R** driven by drives **5L** and **5R** and pivot about pivots **6L** and **6R**. The main drive gears, which are underneath, are conventional and are therefore not shown as the attachment of the present invention connects on to the gears without changing their operation.

The two inner straight edges on the webs are effected by latched needles **9L** and **9R**. The outer edges, which in a normal loom are formed by means of edge wires, are changed by removing the wires and replacing them by two L-shaped pointed thread holding fingers **10L** and **10R** mounted in pillars **11L** and **11R**. These fingers are located adjacent the outer edges of the two weaving zones. The motion of the fingers is in two directions, first a small tilting motion which moves the ends up and down at the proper time to hold a loop of weft yarn around them and to let it go after the pick is completed. This motion is substantially similar to that of the corresponding elements in the Libby loom. A second motion moves the fingers **10L** and **10R** gradually in and out to produce the scallop pattern. It will be pointed out below that this is effected by a single cam which drives both fingers. First however the operation of the present invention will be described.

FIG. 1 shows the fingers **3L** and **3R** just before their extreme outer positions. As they continue to move out the reeds **2L** and **2R** are pulled forward to beat the last pick into the fell. The heddles move and as the webbing moves to the right the inner thread loops move off the latched ends of the hooks **9L** and **9R**. This is the conventional operation of this type of needle loom. Only a short piece of weft thread is shown at **24L** and **24R** in order to avoid obscuring the mechanism. However just before the needles move inwardly the fingers **10L** and **10R** are tilted slightly so that they catch the thread and hold it in a loop. The loops are shown at **21** in FIG. 2 which shows a webbing with warp threads **22** and weft thread **23**. As the needles move inwardly the loops **21** are held by the fingers **10L** and **10R** which remain in their depressed position. When the needles have made a complete movement inwardly they return, the weft threads

being caught by the needles 9L and 9R. This last operation is also the same as in a conventional needle loom. The thread is then pulled back and just before the reeds 2L and 2R are moved to beat in the pick the fingers 10L and 10R are tilted up so that as the web moves to the right the last loop is no longer held by the fingers 10L or 10R. As soon as the reeds have moved back the fingers 10L and 10R tilt down and the sequence just described is repeated for another pick.

The drive mechanism for the fingers 10L and 10R will now be described as this constitutes the novel portion of the present invention. A gear 15 is turned by a shaft which enters the bed 1 and is connected to the loom driving gears. There is also a chain which turns an eccentric 14 on a stub shaft. The pillars 11L and 11R are mounted in arms 12L and 12R, only a portion of the arm 12R being shown as it is obscured by the body of the loom. These arms are pivoted, the left hand pivot 25 being shown in phantom. The right hand pivot and other mechanism is, of course, obscured by the main body of the loom but it constitutes a mirror image of the mechanism shown at the left. The arm 12L is raised and lowered by the eccentric 14 and results in the ends of the fingers 10L and 10R moving up or down at the proper time to effect the sequence described above. This movement is quite small, typically about an eighth of an inch.

The gear 15 drives another gear 17 which in turn drives a cam 18 which turns on a shaft with a bevel gear on its end. This gear is not shown in FIG. 1 as it is concealed by the cam 18. The cam is provided with two followers 20L and 20R pivoted on pivots 13L and 13R, these followers drive the fingers 10L and 10R out or in depending on the cam profile. The connection is through rods 19L and 19R. As a result the single cam and follower mechanism and the gears which drive it operate to perform the same function that required two cams in the Libby loom. The pattern woven however, is exactly the same and therefore these additional elements are eliminated without eliminating their functions.

The pattern of scallops formed by the loops is determined by the profile of the cam 18. The cam of course turns quite slowly though in synchronism with the loom drive so that patterns of a number of loops are formed. If other designs are required for example, square, rectangular or the like, a different cam is mounted and this can be changed rapidly without disconnecting any of the mechanism of the loom drive. The rate at which the cam is turned is also changed by changing the gears driving the cam so that it is possible to change the length of each element of the pattern on the webbing edge.

It will be seen that the present invention with its smaller number of elements can be applied to any standard needle loom with great ease. It is only necessary to drill holes in the bed to support the mechanism of the present invention and to connect the shaft of the gear 15 to the main drive of the loom. Of course before weaving webs with patterns it is necessary to remove the two outer edge wires. When a run of straight edged webbing is desired the fingers 10L and 10R do not move in and out by disengaging the cam drive. No edge wires are needed and so their wearing effect on the reeds is eliminated and there is no risk of broken wires with resulting jamming of the loom.

The great flexibility of the invention is an important advantage. Frequently it is desirable to make fairly short runs of a few hundred yards of different webbing and

this can be done quickly with a change of design or even returned to straight edged webbing at the will of the operator. Of course where very long runs are desired of a single pattern the loom may operate for days without any change but the possibility of rapid changing gives it a desirable flexibility and it is obtained without any additional complication in the drive.

The drawings illustrate the incorporation of the improvements of the present invention in a typical commercial needle loom which differs somewhat in details from the reconstructed loom of the Libby patent. The drawings illustrate an attachment to a C and K loom but of course the invention can be applied to any other type of needle loom including one which has a needle drive corresponding to that of the Libby loom before it was reconstructed. Of course different looms will have different dimensions and the like and so the actual dimensions of the attachment will be changed to suit the particular loom to which it is being applied. The eccentric 14 and mounting of the fingers 10L and 10R permit adjustment for wear but as the elements of the present invention do not require any considerable power to operate, wear is slight and adjustment is normally required only at long periods.

I claim:

In a needle loom for weaving a plurality of webs including weaving zones for each web, reciprocating needles and reeds in predetermined synchronism, the improvement which comprises,

(a) a member on one side of each weaving zone, said member being capable of limited vertical movement and lateral movement and comprising an arm carrying a pointed thread engaging element positioned so that in its lower position of vertical movement it engages a weft thread as the needles move inwardly through the weaving zone to hold the thread in the form of a loop,

(b) means underneath the weaving zones of the loom driven in synchronism with the loom drive for raising the pointed thread engaging element as the needle approaches its outer most point and the reeds begin to move in to beat the weft up, whereby the weft thread loop held by the pointed member is beaten up with the pick, the means for vertical movement of the pointed member comprising eccentrics bearing on the arms carrying the pointed element and being driven to lower the elements to thread engaging position as the needles begin their inward travel, and

(c) means driven in synchronism with the loom drive but at a much slower rate than the drive means for the needles, said means comprising a single cam, dual cam followers and rods driven thereby beneath the web to move the pointed members gradually in and out, whereby a predetermined pattern of loop length is produced.

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