Sept. 8, 1964 L. FONTAINE 3,147,774

LOOM

Filed Aug. 1, 1961 8 Sheets-Sheet 1

Fig. 1

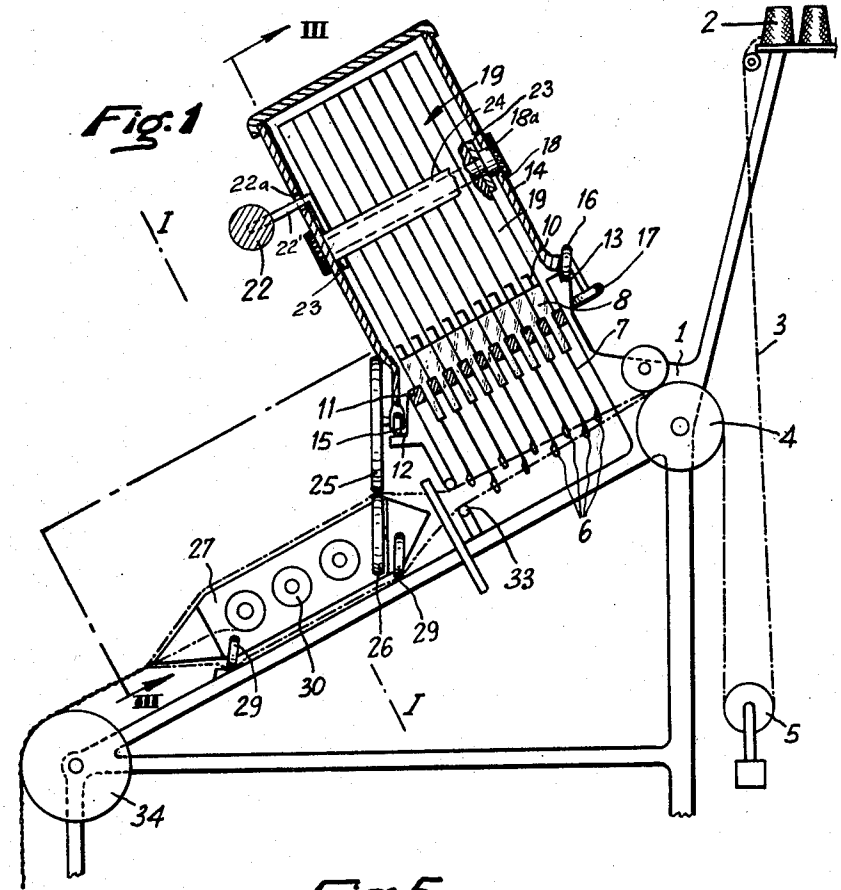


Fig. 4

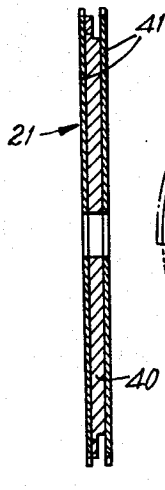
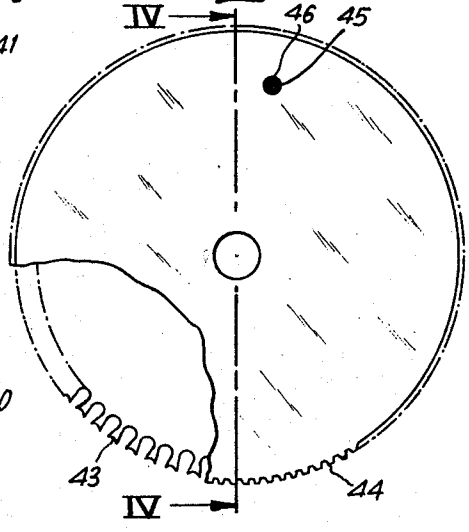


Fig. 5



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Sept. 8, 1964 L. FONTAINE 3,147,774

LOOM

Filed Aug. 1, 1961 8 Sheets-Sheet 2

Fig. 2

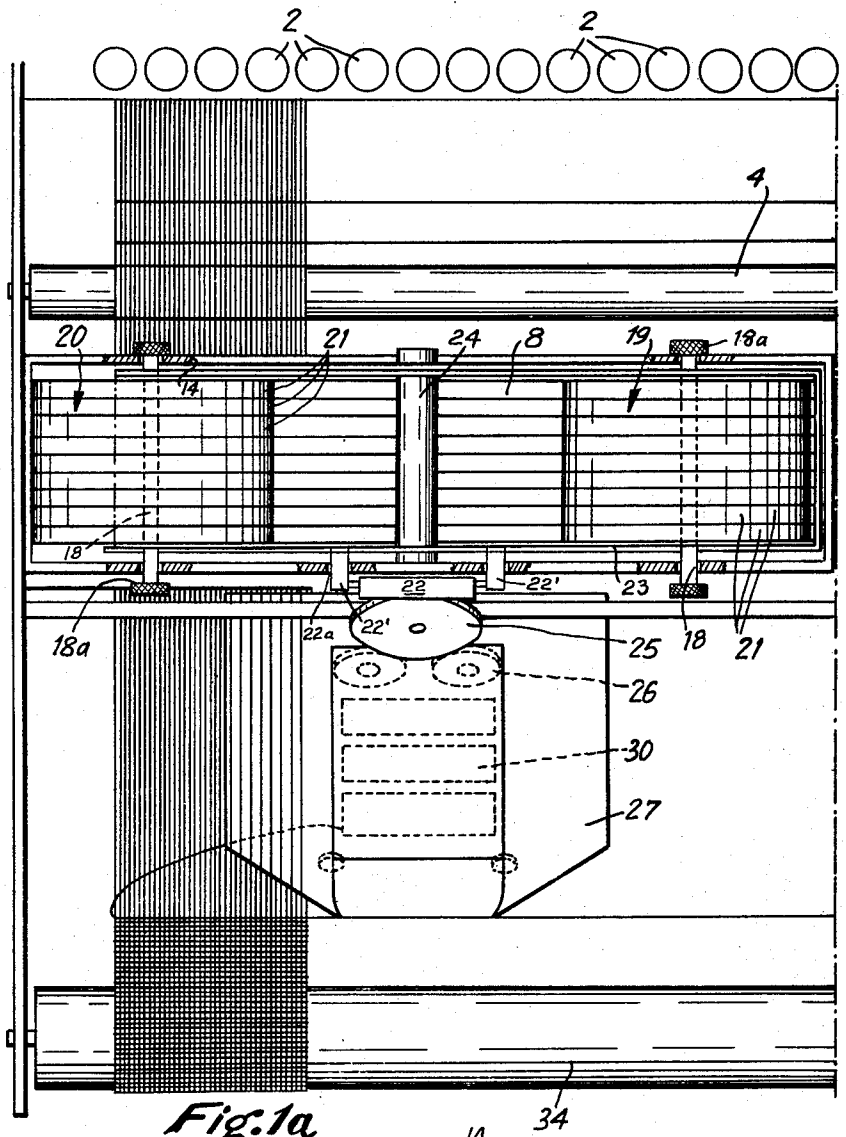
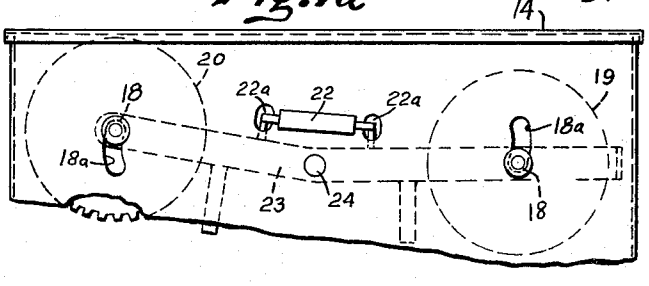


Fig. 1a



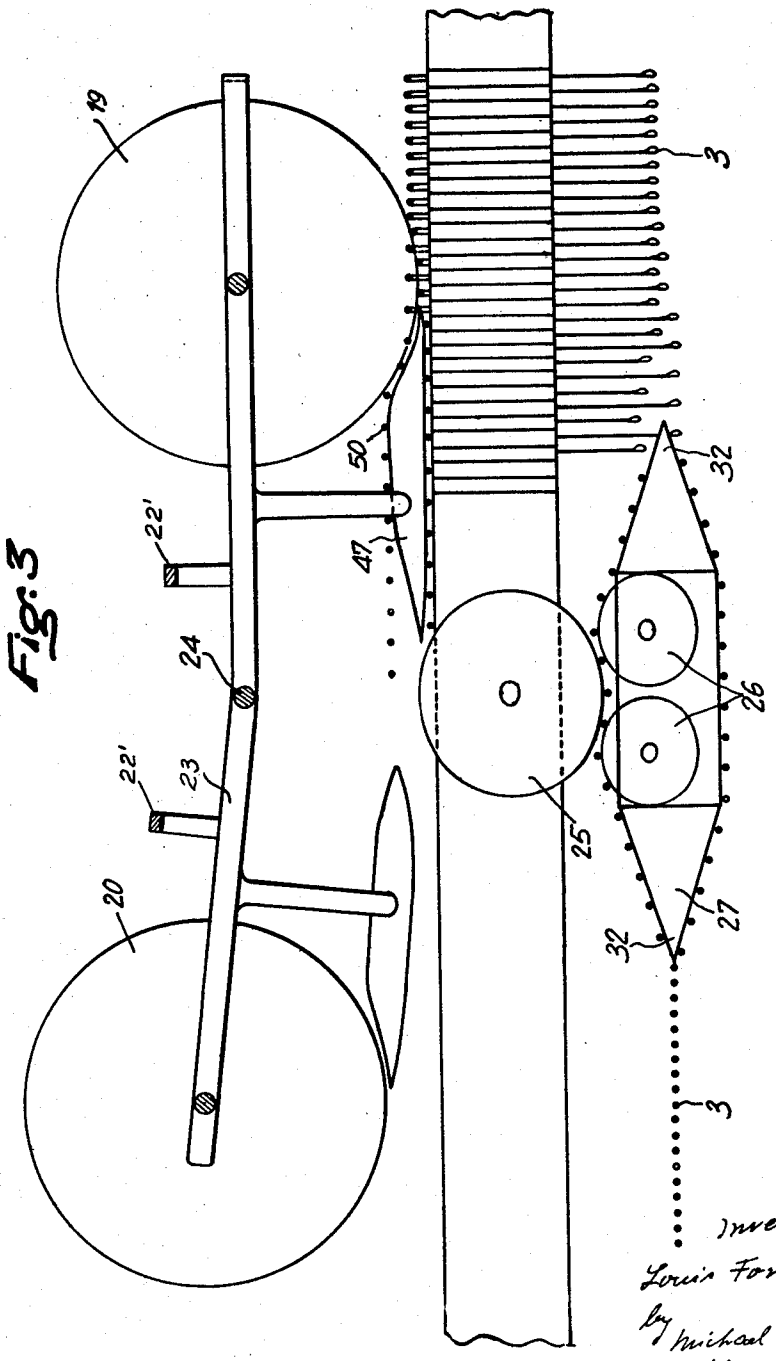
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Sept. 8, 1964 L. FONTAINE 3,147,774

LOOM

Filed Aug. 1, 1961 8 Sheets-Sheet 3

Fig. 3



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Sept. 8, 1964 L. FONTAINE 3,147,774

LOOM

Filed Aug. 1, 1961 8 Sheets-Sheet 4

Fig:16

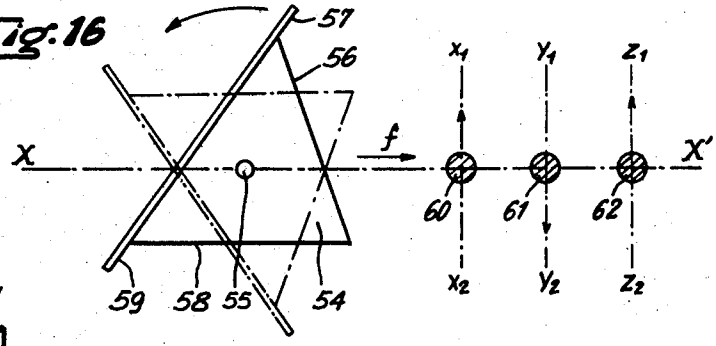


Fig:6

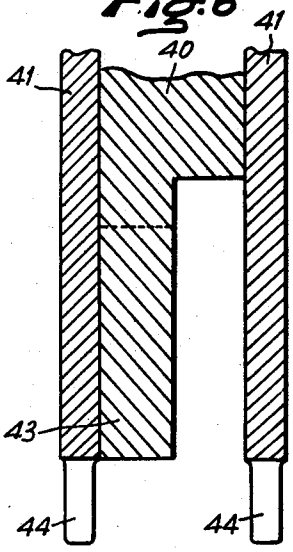


Fig:17

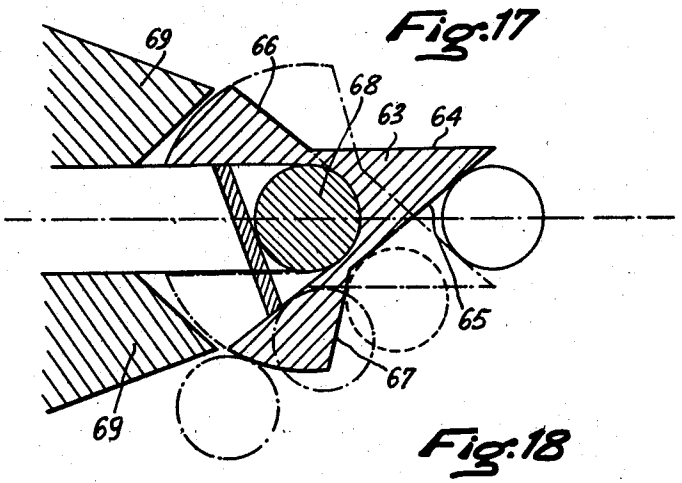


Fig:18

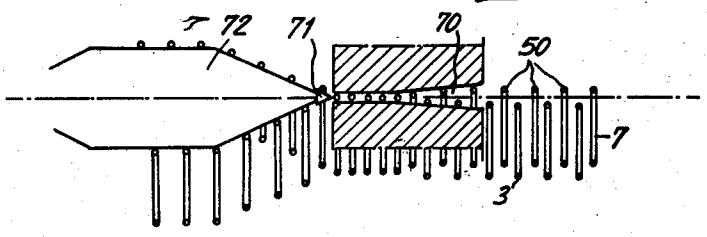
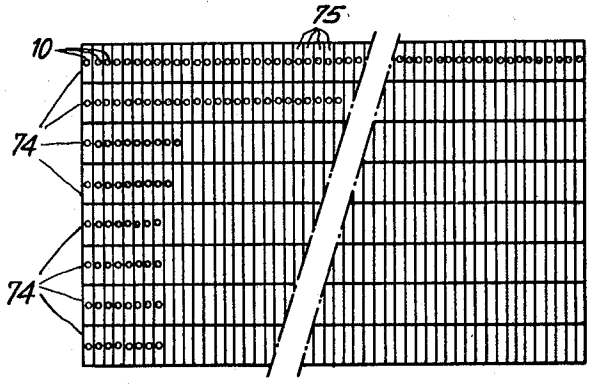


Fig:19



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Sept. 8, 1964 L. FONTAINE 3,147,774

LOOM

Filed Aug. 1, 1961 8 Sheets-Sheet 5

Fig: 7

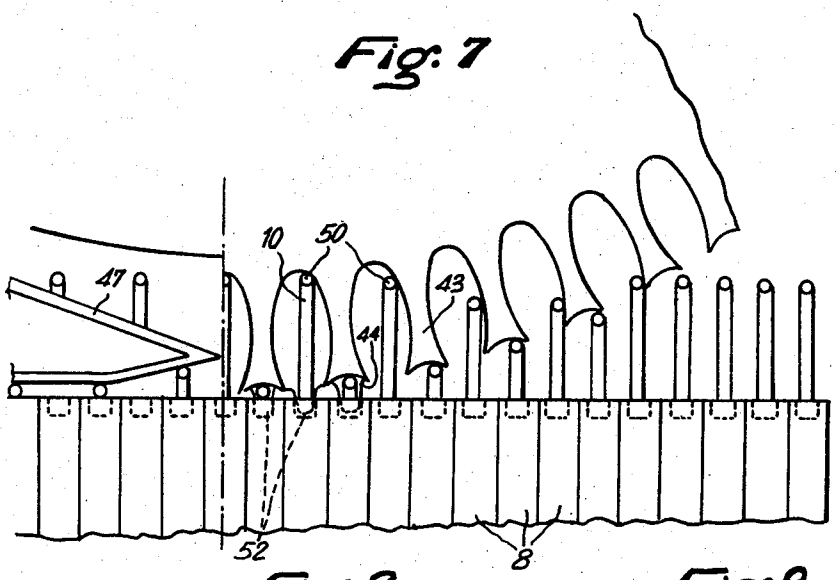


Fig: 8

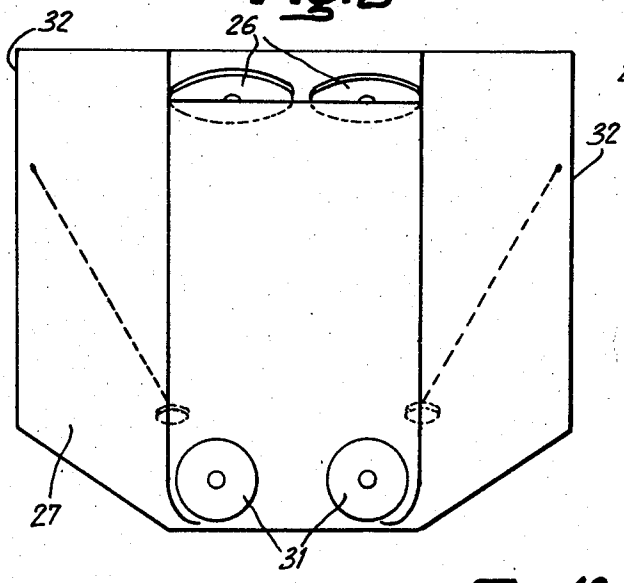


Fig: 9

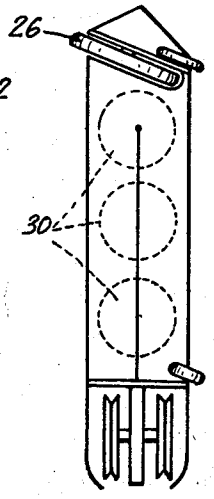
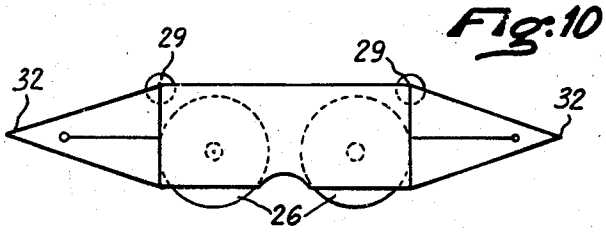


Fig: 10



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Sept. 8, 1964 L. FONTAINE 3,147,774

LOOM

Filed Aug. 1, 1961 8 Sheets-Sheet 6

Fig:11

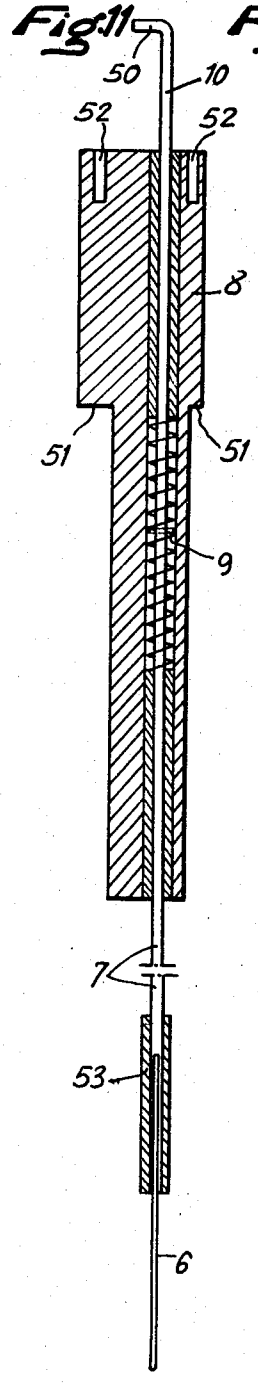


Fig:12

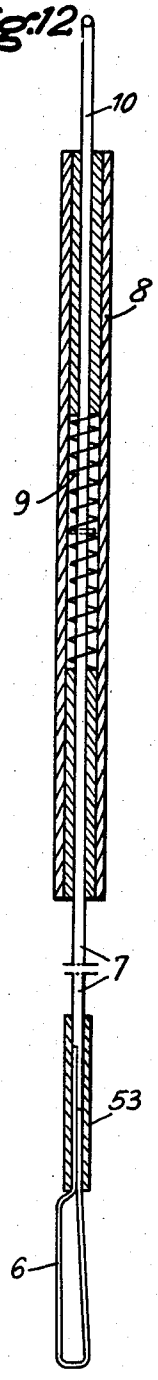


Fig:13

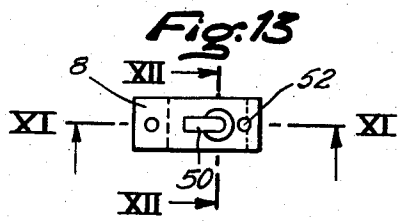


Fig:14

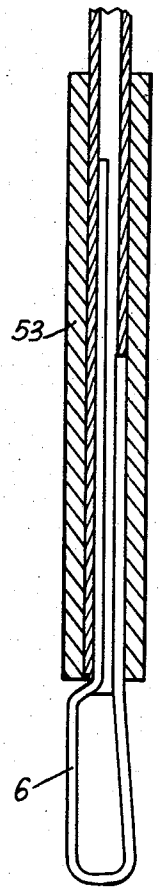
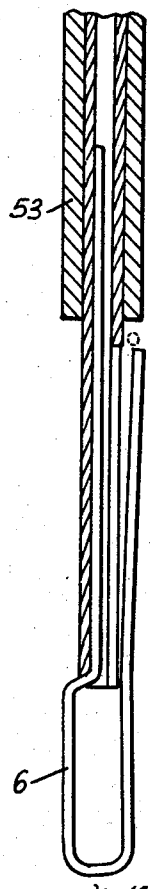


Fig:15



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Sept. 8, 1964 L. FONTAINE 3,147,774

LOOM

Filed Aug. 1, 1961 8 Sheets-Sheet 7

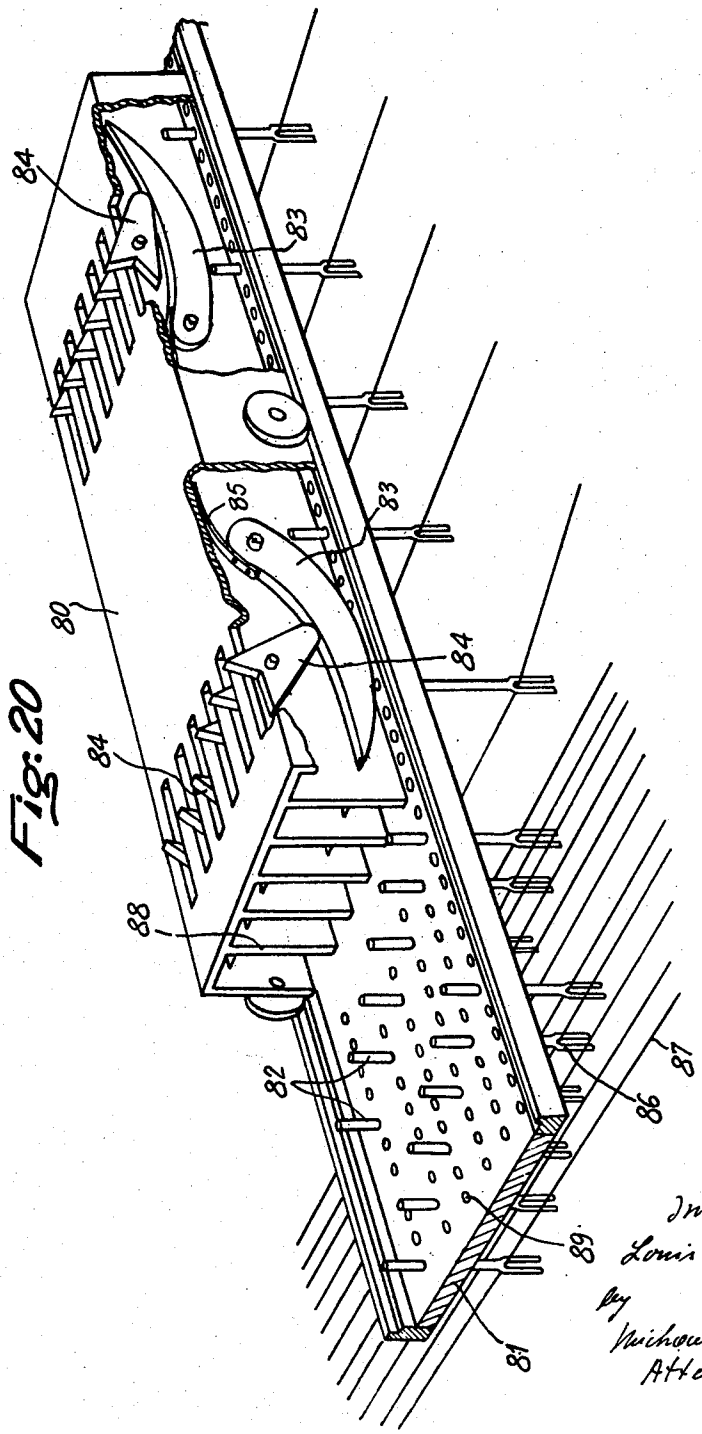


Fig. 20

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LOOM

Filed Aug. 1, 1961 8 Sheets-Sheet 8

Fig. 21

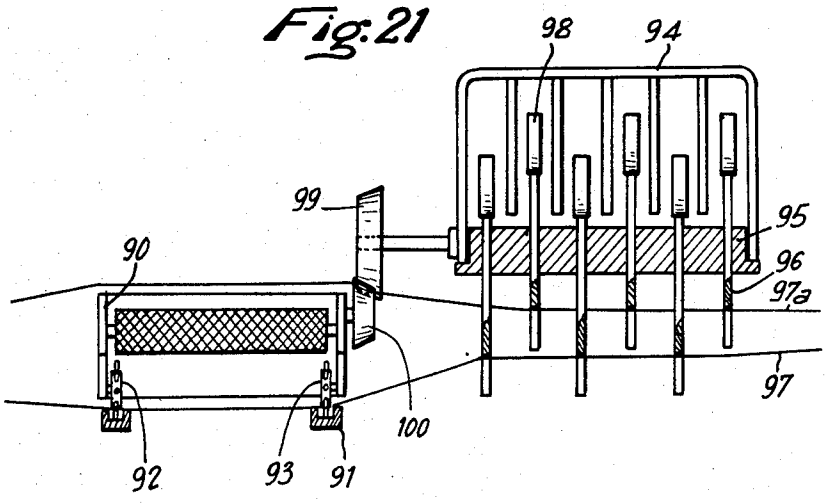
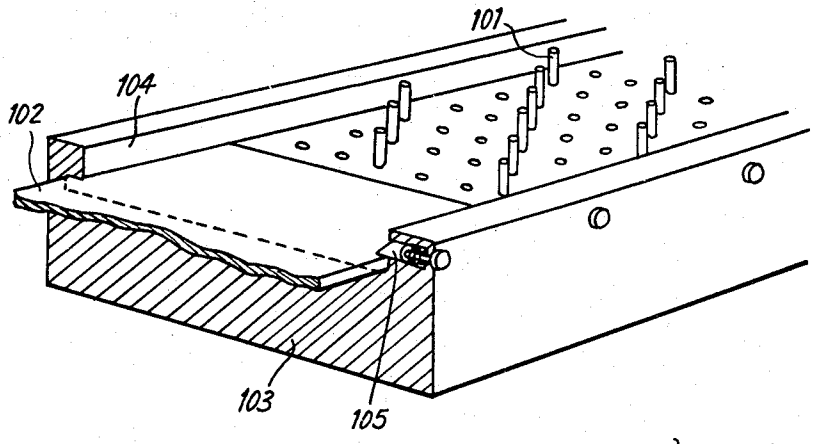


Fig. 22



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United States Patent Office 3,147,774 Patented Sept. 8, 1964

3,147,774

LOOM

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Filed Aug. 1, 1961, Ser. No. 128,459
Claims priority, application France Aug. 1, 1960
14 Claims. (Cl. 139—29)

Known looms include a warp, composed of warp threads which are disposed parallel, side by side, at regular intervals. The warp threads are separated into two sheets by means of a harness in such a manner that these two sheets form between them a dihedral angle into which one throws the shuttle supplying the woof yarn, which unwinds during the course of travel of the shuttle, thereby laying down the woof. When this woof is laid down, the harness functions again in such a manner that the warp threads are again interlaced and separated into two sheets, again forming between them a dihedral angle, into which one again throws the shuttle, which again lays down the woof. The composition of these sheets is modified at each passage of the shuttle; that is, the position of the warp threads forming each of these sheets is modified with regard to the path of movement of the shuttle, each warp thread being now on one side of this path, then on the other.

The loom according to the present invention includes a shuttle delivering the woof in the course of its to-and-fro traversal of the warp, and is characterized in that the warp is disposed in one plane and that the heddles of the warp are individually controlled by appropriate means whose movement is linked with the movement of the shuttle, said means selecting one by one the threads of the warp and displacing the same out of their original plane in order to permit passage of the shuttle in proportion as it progresses, the warp threads returning to their original position in the plane immediately after passage of the shuttle.

According to one feature of the invention, the heddles are connected at the stems projecting above a plane perpendicular to which they slide and are grouped in one or more rows parallel to the path of movement of the shuttle; and the means for selecting and separating the warp yarns are supported by a carriage movable over this plane, said carriage being linked in movement with the shuttle, and said means acting upon the ends of the stems.

According to another feature of the invention, these means comprise cams, or toothed discs, or oscillating selectors, which are in number at least equal to the rows of stems of the heddles. These means are moved along by the moving carriage, whose movement is linked to that of the shuttle, so that these means cause an individual displacement of the heddles and separation of the warp yarns, in succession as the shuttle progresses.

According to one embodiment of the invention, the warp can be separated into two sheets, either by spreading apart all of the heddles from their position of equilibrium, some being depressed and some being raised; or by spreading apart only a certain number of heddles from their position of equilibrium, the rest retaining their original position.

The linking between the carriage and the shuttle is realized by rollers, or toothed wheels, carried respectively by the shuttle and the carriage, between which pass at least one of the two sheets of the warp yarns which the carriage separates in order to permit the passage of the shuttle.

Another embodiment of the invention is described below, with accompanying drawings, by way of illustrative example.

FIGURE 1 is a partly sectioned side view of the loom according to the invention.

FIGURE 1*a* is a partial front view of the apparatus shown in FIG. 1.

FIGURE 2 is a partial top view of the apparatus of FIGURE 1.

FIGURE 3 is sectional view taken substantially along line III—III of FIG. 1 and viewed in the direction of the arrows.

FIGURE 4 is a sectional view of a toothed disc taken along line IV—IV of FIG. 5.

FIGURE 5 is an elevation view, partially broken away, of a face of a toothed disc.

FIGURE 6 is a partial view of FIGURE 4 and drawn to an enlarged scale.

FIGURE 7 shows on an expanded scale, the interaction between a disc and the spindles of the heddles.

FIGURE 8 is a plan view of a shuttle.

FIGURE 9 is a side view of a shuttle.

FIGURE 10 is a front view of a shuttle.

FIGURE 11 is a sectional view of the means for guiding a heddle taken along line XI—XI of FIG. 13.

FIGURE 12 is a sectional view of the means of FIGURE 11 taken along line XII—XII of FIG. 13.

FIGURE 13 is a top view of the means of FIGURE 11.

FIGURE 14 is a detail of FIGURE 12, drawn to an enlarged scale and showing a heald eyelet closed.

FIGURE 15 is a detail of FIGURE 12 drawn to an enlarged scale and showing a heald eyelet open.

FIGURE 16 illustrates the principle upon which the functioning of the oscillating thread selector is based.

FIGURE 17 shows one practicable embodiment of an oscillating thread selector.

FIGURE 18 is a detail view in elevation of an oscillating thread selector of the loom.

FIGURE 19 is a plan view showing a grid of oscillating thread selectors.

FIGURE 20 is a schematic perspective of another embodiment for individually controlling the warp yarns, according to the invention.

FIGURE 21 is a vertical sectional view taken parallel to the warp, showing the means for guiding the shuttle.

FIGURE 22 illustrates, with reference to FIGURE 20, a means for obtaining shaped material directly by weaving.

Referring now to FIGURES 1 and 2, it will be seen that the frame **1** of the loom of this invention supports spools **2** from which the warp yarns are unwound, which pass over cylinder **4**, the warp yarns **3** having been, beforehand, warped and placed under a constant tension by means of a counterweight **5**. The warp yarn can also be prepared by winding on the loom beam without spools.

After having passed over the loom beam **4**, the warp yarns pass through the heald eyelets **6**, at the ends of the heddles **7**. The heddles **7** pass through blocks **8**, in which they slide and the upper faces of blocks **8** are arranged in a plane. They are returned to their original position by elastic means—such as springs **9**, for example (FIGURES 11 and 12); or simply by the tension on the yarn—in such a manner that the ends **10** of the heddles **7** are made to project slightly, when at rest, beyond the plane of blocks **8**.

These blocks **8** are supported by parallel rails **11**, which are themselves supported by the frame **1**, and blocks **8** are arranged side by side so as to form rows parallel to the path of the shuttle but perpendicular to the warp.

In the embodiment shown, the loom comprises nine rows of blocks **8**, so as to permit use of a sufficient number of heddles **7**, in order to handle all of the warp yarns **3**. The blocks **8** have a thickness very much greater than the diameter of the warp yarn.

Two rails **12** and **13** are arranged on frame **1**, on

which the carriage 14 moves by means of rollers 15 and 16.

In the embodiment shown, the combination of heddles 7, blocks 8, rails 11 and carriage 14, are inclined for the comfort and ease of the operator; and a supporting roller 17 rests against the frame 1 so as to keep the carriage 14 on rails 12 and 13.

Rollers 19 and 20 are mounted within carriage 14. Each roller is composed of a number of toothed discs 21 mounted on a common shaft 18. There are, in either roller 19 or 20, as many discs 21 as there are rows of blocks 8.

The shafts 18 of rollers 19 and 20 are mounted on a rocker arm means 23 which is tiltable about shaft 24 supported by the frame of carriage 14. The rocker arm means 23 has a handle 22, of such a kind that, when the carriage 14 is moved by means of handle 22 from the left to the right (FIGURE 3), the arm means 23 is tilted so that the discs 21 of roller 19 contact the rows of blocks 8, while the roller 20 is out of contact with the plane of blocks 8; and when the carriage 14 is moved from right to left by means of handle 22, the arm means 23 is tilted in opposite direction so that the roller 19 is out of contact with the blocks and roller 20 is in contact with the blocks. To permit such tilting, the handle 22 extends with portions 22′ thereof through slots 22*a* in the front wall of the carriage 14, whereas shafts 18 extend through slots 18*a* through the carriage walls, as best shown in FIG. 1*a*.

In the instance where it is desired that one of the two rollers 19 or 20 contacts the blocks in both directions of movement of the carriage, the separator 47 can be provided with a means insuring that the desired roller will contact the blocks in both directions of movement.

In addition, the carriage 14 includes means insuring synchronous movement between it and the shuttle 27. In the embodiment shown, this means comprises a wheel 25 mounted between rollers 19 and 20 for rotation about an axle carried by the carriage 14 and coacting, as shown in FIGURE 3, with two rollers 26 mounted for rotation on shuttle 27.

The warp yarns 3, passing on each side of the shuttle 27, and in particular, a part of them which forms one of the sheets separated by the carriage passes between the wheel 25, and the rollers 26.

Since the wheel 25, is as free to move as the rollers 26, one can see that the wheel 25, guides the shuttle when the carriage 14 is moved, by exerting pressure on one or the other of rollers 26.

The shuttle 27 is provided, for example, with a running wheel 29 or other gliding means, which permit it to be moved and guided along frame 1, and includes also spindles 30 of weft yarn and means 31 known in the art for braking and adjusting the tension.

The amount of displacement of the warp yarn under the action of the carriage can be held small in relation to the thickest section of the shuttle 27 since the two extremities 32 of the shuttle each taper along two inclined planes so as to enter between the warp yarns only slightly separated and to increase the separation during movement of the shuttle so as to permit passage of the entire shuttle.

In the embodiment shown, each roller 19 or 20 is composed of nine discs 21, which are shown in detail in FIGURES 4, 5, 6, 7, and 8.

Referring to these figures, one sees that each disc 21 is composed of a central disc 40, on the two faces of which are mounted two plates 41. Central disc 40 has a row of dog-teeth 43, and the two plates 41 have teeth 44. Each disc 21 is provided with a keyway 45 into which may be introduced a key 46 for fixedly attaching all the discs of one group to one or the other of rollers 19 or 20.

Referring to FIGURES 11 to 15, one sees that each block 8 supports a heddle 7 by means of a spring 9 and

that the end 10 of each heddle, which projects beyond the top face of the block, is bent to form an arm 50. Each block has two shoulders 51, by means of which it is held on rails 11. Each block has, in addition, two guide holes 52, designed to receive the teeth 44 of the plates 41 of discs 21.

By way of simplification, one can forsee a variation. There are two plates 41, for each of the two groups of discs 40. Accordingly, the blocks 8 are or are not supplied with guide holes 52, which cooperate with teeth 44, carried by the plates, in order to assure perfect synchronization between the dog-teeth 43, and the ends 10, of the heddles 7.

FIGURE 7 shows part of a disc 21, from which one of the plates 41, has been removed, so as to reveal the central disc 40 and the dog-teeth 43. As the discs 21 progress over the surfaces of blocks 8, the teeth 4 penetrate into the guide holes 52, which stabilizes the discs 21, in their path of movement, during the course of which the dog-teeth 43 contact the arms 50 on the ends 10 of the heddles. By reason of the profile of the dog-teeth 43 on disc 40, certain heddles 7 are not depressed. Preferably, the dog-teeth 43 are incurved in order to insure that the apparatus will function well.

The movement of a disc 21 over a row of blocks 8, therefore, causes the separation of the warp yarn 3.

Since the thus produced separation of the warp yarn is insufficient to permit passage of an end 32 of the shuttle 21 between the warp yarn, each disc 21 is followed by a separator 47.

Each heddle 7, terminates in its lower part in means which permit the yarn to be introduced without the danger that the yarn escapes during the course of work: for example, a heald eyelet 6, may be provided, composed of an eye made of spring steel and having one branch in one piece with the heddle 7, and the other held against the heddle 7 by means of a sliding collar 53.

The manner in which the loom of the invention functions will now be explained.

The warp yarns 3, from the spindles 2, are warped and maintained under constant tension by means of counterweights 5, and then passed over cylinder 4.

The warp yarns 3 are then introduced into the heald eyelets 6 of the heddles (FIGURES 11–15), by raising the sliding collars 53, thereby opening the heald eyelets 6, and reclosing the heald eyelets by means of collars 53, after the warp yarns have been introduced. When each warp yarn 3 has been introduced into a heddle, the two groups of rollers 19 and 20, are assembled by the key 46, there being as many discs 21 as there are rows of blocks 8.

The rollers 19 and 20 are than placed on the carriage 14, which is given a to-and-fro motion by any appropriate means, such as handle 22, for example.

When the carriage 14 is moved from left to right (FIGURE 2), the rocker arm means 23 are tilted by the handle 22 to the position shown in FIG. 3 so that the roller 19 contacts the rows of blocks 8. Each disc 21 of the roller 19, guided by the teeth 44 and the holes 52, moves over the corresponding rows; and the dog-teeth 43, by pressing upon certain arms 50, cause the depression of the ends 10 of the heddles 7, and therefore, of the corresponding warp yarns. In the embodiment shown, the dog-teeth press upon every other one of the arms 50; consequently, every other one of the warp yarns is depressed.

The separators 47 increase the separation between the warp yarns by raising those heddles 7, which were not depressed by the dog-teeth 43, by grasping them under the arms 50.

The shuttle 27 pulled along by carriage 14 by means of wheel 25 and rollers 26, is introduced by one of its ends 32 between the yarns momentarily kept spread

apart by the separator 47, and lays down a weft thread as it progresses co-jointly with the carriage 14.

Immediately after passage of the roller 19, and the shuttle 27, those heddles raised by separator 47 and those heddles depressed by the dog-teeth 43, against the bias of springs 9, return to their original positions and the warp yarns return to their original positions which they occupied before passage of the carriage, that is, disposed parallel, side by side, in the same plane.

At the end of the path of the carriage 14, the weft newly laid down is tightened against the weft previously laid down by means, not shown, known in the art, such as a comb.

The carriage 14 is then moved in the opposite direction, that is, from right to left. During such movement the rocker arm means 23 will tilt to a position opposite to that shown in FIG. 3 so that the roller 19 is moved out of contact with the blocks, and roller 20 is placed in contact with the blocks. The same process is recommenced, with the difference that discs 21 of roller 20 do not press on the ends 10 of the same heddles 7 and that the warp yarns depressed by roller 20 are different from those depressed by roller 19, which causes the interlacing of the warp yarns, and so makes possible the operation of weaving.

In the embodiment shown and described, the weave, that is, the method of interweaving the warp and the weft, is a plain weave, the warp yarns being separated into even and odd pairs; but it is evident that the apparatus very easily and very quickly permits the obtaining of an infinity of weaves, which can be of any kind. In order to do this, it suffices to replace the internal discs 40 of discs 21 with discs 40 having the desired variation in dog-teeth 43.

In the embodiment described above, the heddles 7 have bars 50, which permit the separators 47 to raise those heddles which have not been depressed by the dog-teeth 43; all of the heddles, therefore, are moved from their position of equilibrium, certain ones being depressed and the others raised.

According to another embodiment, the separation of the warp yarns is obtained by an oscillating selector carried by the carriage 14, instead of by the rollers of discs 19 and 20.

FIGURE 16 illustrates the principle operating of an oscillating selector. A triangular member 54, revolvable about an axis 55 is displaced in the direction of arrow *f* along a line X—X', along which the arms 60, 61 or 62, circular in cross section, are arranged and respectively movable only along lines X_1—X_2, Y_1—Y_2, Z_1—Z_2, these lines being perpendicular to the line X—X' of displacement of the triangular body 54.

When the face 56 of body 54 comes into contact with arm 60, the latter is moved in the direction X_1, sliding along face 56 until it strikes abutment 57, causing body 54 to rotate about axis 55 so as to present face 58 to arm 61; when face 58 contacts arm 61, the latter is displaced in the direction Y_2, sliding along face 58 until it strikes abutment 59; and the same process is repeated with arm 62. The triangular body 54 is thus caused to perform an oscillatory movement, causing the arms 60, 61, and 62 to move up or down. By varying the position of axis 55 with respect to the center of gravity of the triangular body 54 and by modifying the included angle between faces 57 and 58, one can obtain all possible combinations of direction of movement and order of displacement of arms 60, 61, or 62.

Referring to FIGURE 17 one sees a practicable embodiment of the oscillating selector. This oscillating selector comprises a triangular shaped toe 63, each face 64 and 65 of which includes an abutment, 66 and 67, respectively, inclined to the plane of the respective face. This oscillating selector pivots about its axis 68 and oscillates between the two extreme positions, respectively shown in solid line and in dotted line.

Because the dimensions of the toe 63, must be very small so that it can rock between two arms 50 of heddle 7, the heddles are submitted to a very small displacement, which must be amplified by separator 69.

FIGURE 18 shows a practicable embodiment of an oscillating selector for a loom. Carriage 14 (not shown) supports a combination of elements comprising an aligning orifice 70, which accurately aligns all of the arms 50 in the same plane; an oscillating selector 71, which causes the separation of the heddles 7, by raising some of them by their arms 50, and lowering the rest; and a separator 72, which increases the separation between the arms 50, so that the ends 32 of the shuttle can be introduced between the warp yarns 3.

In the embodiment shown in FIGURES 17 and 18 the arms 50 of all of the heddles 7 are moved from their position of equilibrium, some being depressed and others raised.

According to another embodiment of the oscillating selector for a loom, shown in FIG .19, one can move only a certain number of heddles 7 from their position of equilibrium, the others retaining their original position.

In this embodiment, the arms 50 of the heddles 7 are eliminated; and the combination of oscillating selector 71 and separator 72 is rotated 90° with respect to the position it occupied in FIGURE 18; that is, the selector oscillates in a horizontal plane instead of in a vertical plane.

The combination of blocks 8 is replaced by a grid of which the heald eyelets are rectangular. This grid has as many rows 74 as there are rows of blocks (FIGURE 1), these rows being divided into small rectangles 75, from which extend the extremities of stems 10 of heddles 7 (FIGURE 19).

The size of rectangles 75 is such that the stems 10 can be displaced laterally, that is, perpendicularly to the movement of carriage 14, which carries as many selectors comprising the combination of elements 70, 71, 72, as there are rows 74.

In accordance with the progression of the carriage 14, the oscillating selector 71 laterally separates the stems 10 in one direction or in the other from their position of equilibrium. The separator 72 increases the separation of these stems 10; and a third inclined plane carried by carriage 14 on any appropriate place, depresses all of those stems found on the same side with respect to their position of equilibrium, thereby causing the separation of the warp yarns, between which the shuttle is introduced.

In this embodiment, the stems 10 can be connected to the grid by any appropriate elastic means or they can, just as well, rest on the warp yarns, which, stretched by counterweight 5, return to their position of equilibrium after passage of the shuttle.

In order that the warp yarns can submit to the different displacements at each passage of the shuttle, one can modify the selection of heddles 7, so as to have at one's disposed two selectors for each row 74, or each line of blocks 8: one selector for each direction of movement of the carriage, such that the other selector is chosen when the one has rotated 180°.

In order to change the weave, it is sufficient to change the construction of the selector, that is, the position of its axis, the length of faces 64 and 65, or the angle of toe 63.

With this loom one can even modify, as one desires, the arrangement of the warp during the course of weaving.

Since the blocks 8 only rest upon rails 11, one can interchange them at will; putting several warp yarns in the same heald eyelet and realizing thus with the warp all of the possible and imaginable combinations. One can even change the rectangle or the row of the stems 10 in the grid.

One can, by superimposing several warp yarns in the same heald eyelet, obtain a pleated weave; the combinations of this kind being nearly infinite, these examples

are given only for the purpose of illustration, and the loom of the present invention is in no way limited to them.

Referring to FIGURE 20, one sees that according to the invention one may also provide on a carriage 80; movable over plane 81, spanned by rows of heddles 82, one or more rows of raisable cams 83, equal in number to the rows of heddles (six rows being shown in the figure), in which the cams 83 are springs loaded by spring 85 and are kept lowered by cams 84. During passage of the carriage, those cams 83 which are lowered drive down the corresponding rows of heddles 82, thereby opening the way for passage of the shuttle (not shown in FIGURE 20, but shown in FIGURE 21), which is linked to the carriage.

After each passage of the carriage, the operator must raise or lower cams 83 acting on cams 84 so that on the next passage of the carriage the same heddles are not depressed. One can use a single set of cams 83 acting on the heddles in both directions of movement of the carriage; or, one can as shown, use two sets of cams, each set functioning alternatively as the carriage moves in one direction and then in the other.

The cams 83 and their controlling means can assume various kinds of embodiments, different from that shown. For example, each cam can have a simple controlling stem, upon which the operator directly presses. It is very important to note that each cam 83 can be raised or lowered by the operator at any point in the path of movement of the carriage, permitting a modification of the weave in the width of the warp.

In the embodiment of FIGURE 20, the blocks 8 of FIGURE 1 are simply eliminated and replaced by a plate or table 81, having perforations 89, in which one slips the stem 82, forked at their lower ends 86 in order to bestride the yarn 87, and thus constituting the heddles. The heddles are elastically biased to a position of rest by the tension on the warp yarns. According to the arrangement adopted in placing the stems in the perforations 89, one can change the kind of weave.

In the embodiment shown, the cams 83 are guided between partitions 88 carried by the carriage. It is the privilege of the man versed in the art to choose any equivalent solution. For example, the partitions 88 can be integral with the plate 81, or simply be eliminated.

The guiding of the shuttle in its path poses an important problem, since the carriage must accurately draw along the shuttle. In the embodiment of FIGURE 1, the guiding was obtained simply by the rolling of rollers 9 on a rail.

Referring to FIGURE 21, the guiding is obtained by moving the shuttle 90 on rails 91 by means of wheels 92 provided with small pressure points on pins 93 coacting with at least one lateral face of rails 93 (but with two faces in the case of a slot rail, as shown).

In FIGURE 21 one recognizes the other elements of the invention, that is, the carriage 94, movable over plate 95 carrying the stems 96, which form the heddles mounted by their lower forks on the warp yarns 97, and elastically biased upwardly by the tension on the warp yarns. The carriage acts on the heddles by means of the cams 98, and carrying along the shuttle 90, by means of wheels 99 cooperating with wheels 100, carried by the shuttle 90. The sheet 97*a* of the warp yarn passes between wheels 99 and 100 in the course of the progression of the carriage-shuttle assembly.

To the left of the figure is found the part already woven and to the right the supply of warp and the means for keeping it under tension, such being known and not shown, but conforming, for example, to that of FIGURE 1.

FIGURE 22 shows an extremely simple embodiment for shaping material directly by weaving, the means consisting simply of depressing all of the stems 101, under a part of the width of the work by means of one or more thin plates 102. The carriage passing over this plate can no longer act on any stem, and the corresponding width is not woven. Thus, by eliminating, before each passage of the carriage-shuttle assembly, a predetermined zone of the warp, one can obtain a weave conforming to no matter what the customer desires.

In the embodiment of FIGURE 22, the plate 102 is shown in combination with a perforated plate 103, carrying the heddles 101, as in FIGURE 20. This plate is held in place by a flange 104, on one side and by a spring loaded stop 105, on the other side. But the same arrangement can be adopted in combination with the arrangement of FIGURE 1 or that of FIGURE 17 to 19, the plate 102 being, in the embodiment of FIGURE 1, placed between the blocks 8 and the rollers 19 or 20. In the embodiment of FIGURES 17 to 19, the plate 102 is placed over a group of stems 10.

The loom described by way of example is a hand loom, intended for private use, in a manner similar to the sewing and knitting machines, the user being supplied with a number of sets of discs 21, permitting him to obtain the weave of his choice.

Obviously, it is not beyond the spirit or scope of this invention to make the loom automatic by any appropriate means.

I claim:

1. In a loom, in combination, frame means for supporting a plurality of warp threads parallel to each other substantially in a plane; a plurality of heddles respectively engaging said warp threads and being mounted on said frame means for movement in a direction substantially normal to said plane between a rest position and a displaced position in which the heddles respectively displace the warp threads out of said plane; a shuttle supported by said frame means for reciprocating movement transverse to said warp threads; displacement means mounted on said frame means for reciprocation in said transverse direction for moving during movement thereof in one direction a plurality of selected heddles one by one to said displaced position and for moving during movement thereof in opposite direction a plurality of selected heddles one by one to said displaced position; and means connecting said displacement means and said shuttle for simultaneous movement so that during movement of said displacement means and said shuttle in one direction a selected plurality of warp threads may be displaced, while during movement of said displacement means and said shuttle in said opposite direction a different selected plurality of warp threads may be displaced to form a shed through which the shuttle may pass.

2. A loom as set forth in claim 1 in which said heddles are arranged in a plurality of rows, in which said heddles extend in each row spaced from each other transversely of said warp threads and said rows are arranged spaced from each other in longitudinal direction of said warp threads, and in which said displacement means comprises a plurality of engaging means, two for each row of heddles, one for engaging and displacing a selected number of heddles in the respective row in sequence one by one during the travel of said displacement means in one direction and the other for engaging and displacing a selected number of heddles in said row in sequence one by one during the travel of said displacement means in opposite direction.

3. A loom as set forth in claim 1 in which said displacement means include a carriage mounted on said frame means for reciprocating movement in said transverse direction; a pair of roller means mounted on said carriage spaced from each other in said transverse direction and each movable between an active position in which said roller means is adapted to engage a selected number of heddles one by one during the movement of said carriage, and an inactive position; and means mounting said roller means on said carriage for moving one of said roller means to said active and the other to said inactive position.

4. A loom as set forthin claim 3 in which said mounting means include arm means tiltably mounted between opposite ends thereof on said carriage and said roller means respectively mounted in the region of said opposite ends of said arm means.

5. A loom as set forth in claim 2 in which said displacement means include a carriage mounted on said frame means for reciprocating movement in said transverse direction, in which said engaging means are constituted by a pair of roller means mounted on said carriage spaced from each other in said transverse direction and each movable between an active position in which said roller means is adapted to engage a selected number of heddles one by one during the movement of said carriage, and an inactive position, each of said roller means including a plurality of toothed discs, one for each row of heddles, the teeth of each disc extending spaced from each other in radial direction to engage and displace selected ones of said heddles in the respective row during reciprocation of said carriage.

6. A loom as set forth in claim 1 in which said displacement means include a carriage mounted on said frame means for reciprocating movement in said transverse direction; and oscillating selector means mounted on said carriage for engaging and displacing said heddles one by one during movement of said carriage and to be oscillated during engagement with one of said heddles so as to displace the next heddle engaged thereby in a direction opposite to the direction the preceding heddle has been displaced.

7. A loom as set forth in claim 6 and including separating means mounted on said carriage disposed in the direction of travel after said oscillating selector means for increasing the displacement of said heddles caused by said oscillating selector means.

8. A loom as set forth in claim 2 in which said displacement means include a carriage mounted on said frame means for reciprocating movement in said transverse direction; a plurality of oscillating selector means, two for each row of heddles, each of said oscillating selector means being mounted on said carriage for engaging and displacing said heddles of the respective row one by one during movement of said carriage and to be oscillated during engagement with one of said heddles so as to displace the next heddle engaged thereby in a direction opposite to the direction the preceding heddle has been displaced; and a separator means for each of said oscillating selector means and following the same in direction of travel of said carriage for increasing the displacement of said heddles produced by said oscillating selector means.

9. A loom as set forth in claim 2 in which said displacement means include a carriage mounted on said frame means for reciprocating movement in said transverse direction; a plurality of cam means, at least one for each row of said heddles, and mounted on said carriage movable from an active position in which said cam means engages and displaces the heddles of the respective row, to an inactive position; and means on said carriage for each of said cam means for moving the respective cam means at the will of the operator between said inactive and said active positions.

10. A loom as set forth in claim 9 and including spring means for each of said cam means tending to keep the same in said inactive position and in which said moving means include a cam for each of said cam means and being tiltably mounted on said carriage and engaging the respective cam for moving the same from said inactive to said active position.

11. A loom as set forth in claim 2 in which said displacement means include a carriage mounted on said frame means for reciprocating movement in said transverse direction; two sets of oppositely inclined cam means mounted on said carriage spaced from each other in said transverse direction, each set of cam means including one cam for each row of heddles, said cams being mounted on said carriage movable from an active position in which said cams engage and displace the heddles of the respective row, to an inactive position; and means on said carriage for each of said cams for moving the respective cam at the will of the operator between said inactive and said active positions.

12. In a loom, in combination, frame means for supporting a plurality of warp threads parallel to each other substantially in a plane; a plate mounted on said frame means above said plane and substantially parallel thereto and formed with a plurality of perforations therethrough arranged spaced from each other in a plurality of substantially parallel rows extending transverse to said warp threads; a plurality of heddles respectively mounted in said perforations for movement in direction substantially normal to said plane between a rest position and a displaced position in which said heddles respectively displace the warp threads out of said plane, said heddles having each an opposite end projecting upwardly beyond said plate; displacement means mounted on said plate for reciprocation in said transverse direction for engaging during the movement thereof said upper ends of said heddles one by one to said displaced position during movement of said displacement means in one direction and for moving during movement thereof in opposite direction a plurality of selected heddles one by one to said displaced position, said displacement means including a carriage mounted on said plate for reciprocating movement in said transverse direction, at least one set of cam means mounted on said carriage and including one cam for each row of heddles, said cams being mounted on said carriage movable from an active position in which said cams engage and displace the upper ends of the heddles of the respective row, to an inactive position, and means on said carriage for each of said cams for moving the respective cam at the will of the operator between said active and said inactive positions; a shuttle supported by said frame means for reciprocating movement transverse to said warp threads; and means connecting said displacement means and said shuttle for simultaneous movement.

13. A loom as defined in claim 2 and including removable means on said plate for depressing said upper ends of a plurality of heddles within a section of the width of the warp so that said section is not woven.

14. A loom as set forth in claim 3 in which said removable means includes a thin plate connectable to said perforated plate and engaging the upper ends of a plurality of heddles for keeping the same in said displaced position.

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