

Sept. 24, 1963

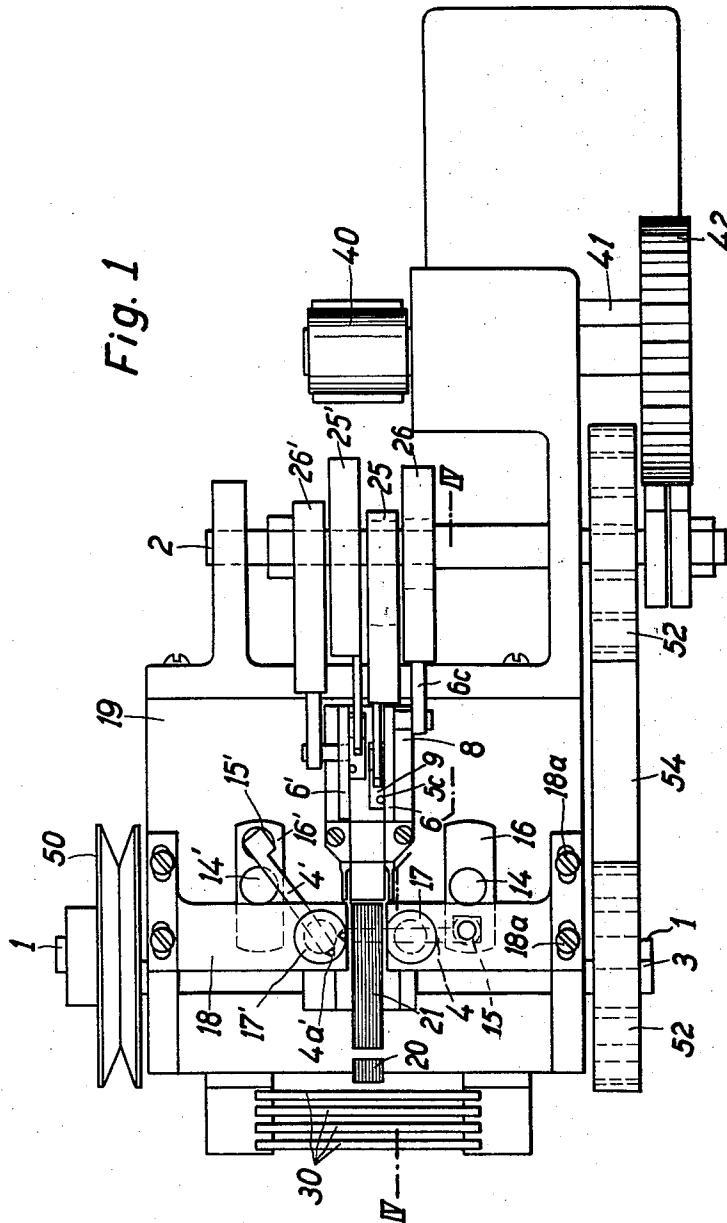
L. WEINER

3,104,683

WEB LOOM

Filed July 18, 1960

11 Sheets-Sheet 1



Inventor:

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By: Stokes & Smith

Sept. 24, 1963

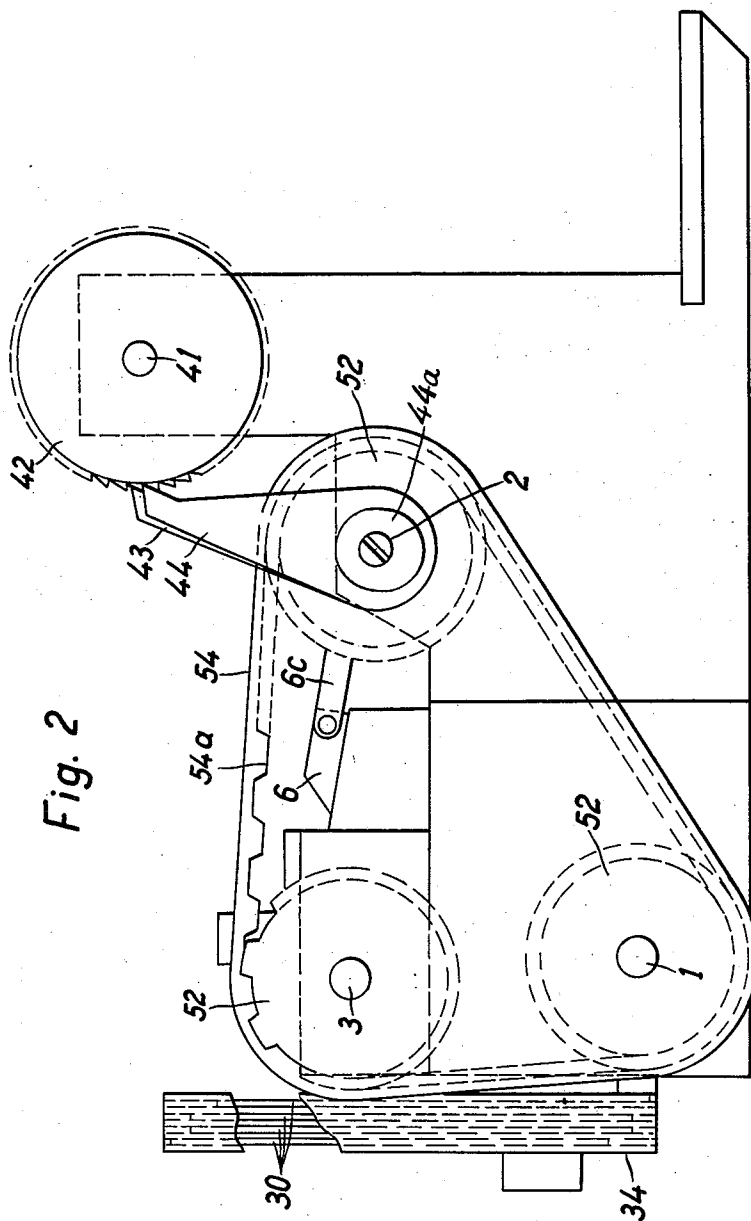
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3,104,683

WEB LOOM

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11 Sheets-Sheet 2



Inventor:

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3,104,683

WEB LOOM

Filed July 18, 1960

11 Sheets-Sheet 3

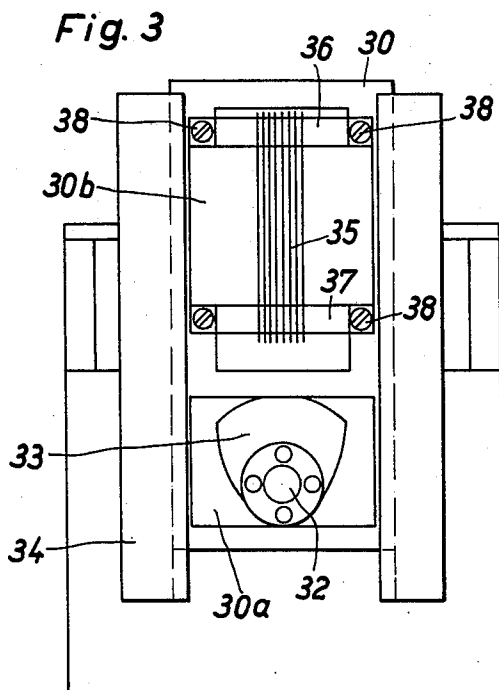
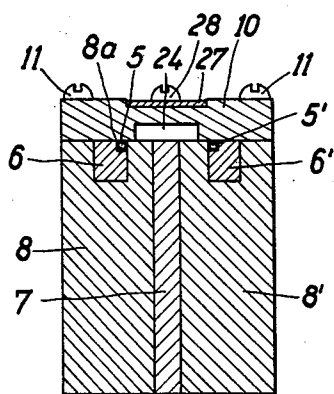


Fig. 7

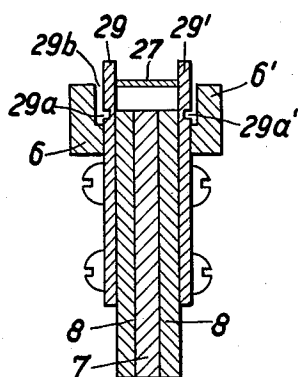


Fig. 8

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Sept. 24, 1963

L. WEINER

3,104,683

WEB LOOM

Filed July 18, 1960

11 Sheets-Sheet 4

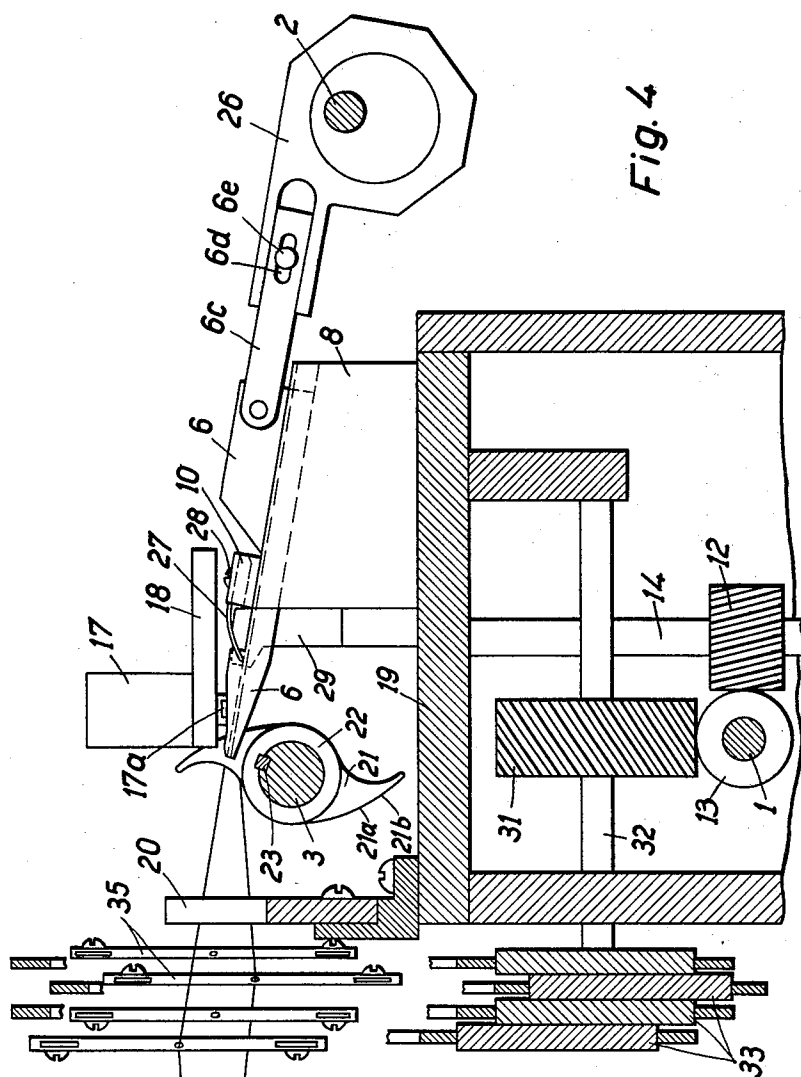


Fig. 4

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Sept. 24, 1963

L. WEINER
WEB LOOM

3,104,683

Filed July 18, 1960

11 Sheets-Sheet 5

Fig. 5

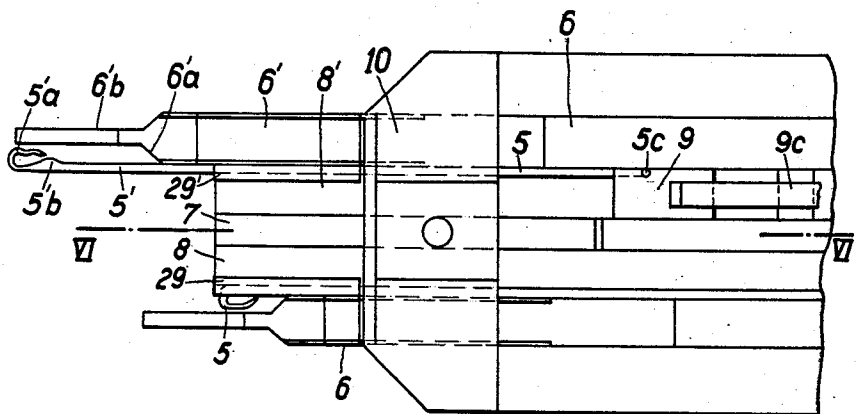


Fig. 9

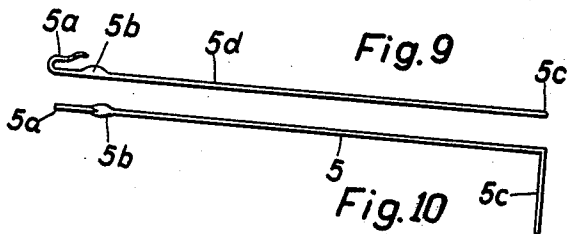
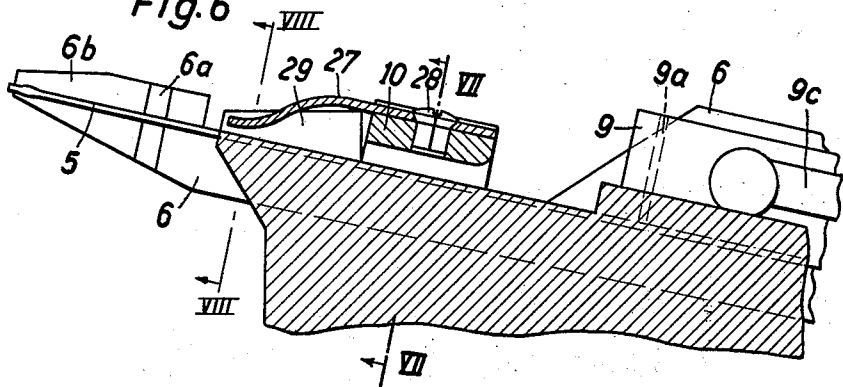


Fig. 10

Fig. 6



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Sept. 24, 1963

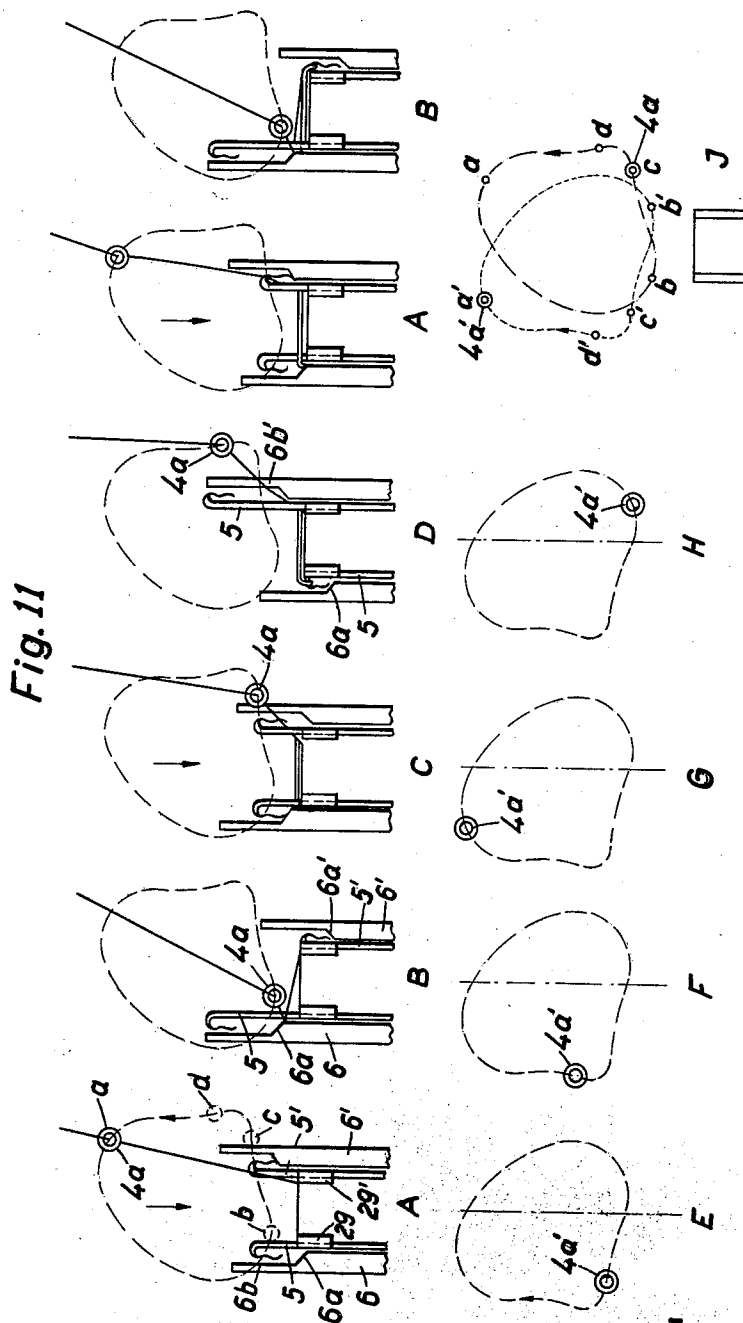
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3,104,683

WEB LOOM

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11 Sheets-Sheet 6



Inventor:

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3,104,683

WEB LOOM

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11 Sheets-Sheet 7

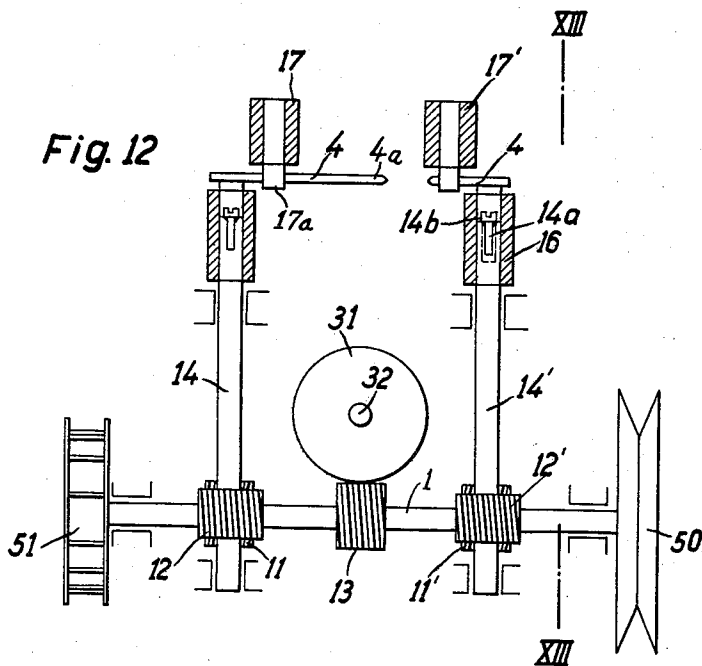
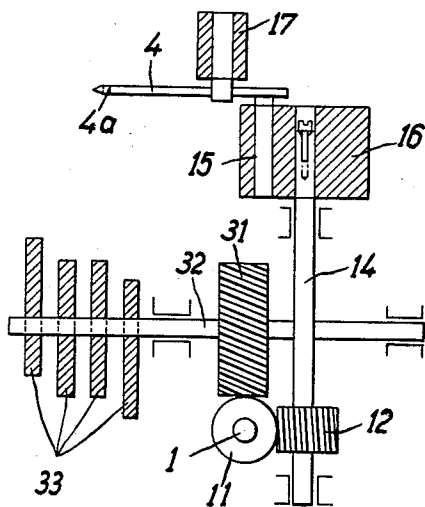
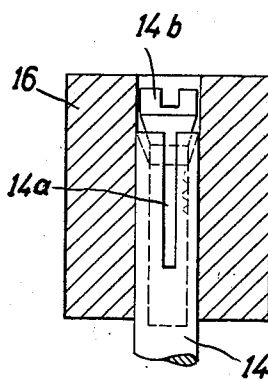


Fig. 13

Fig. 13a

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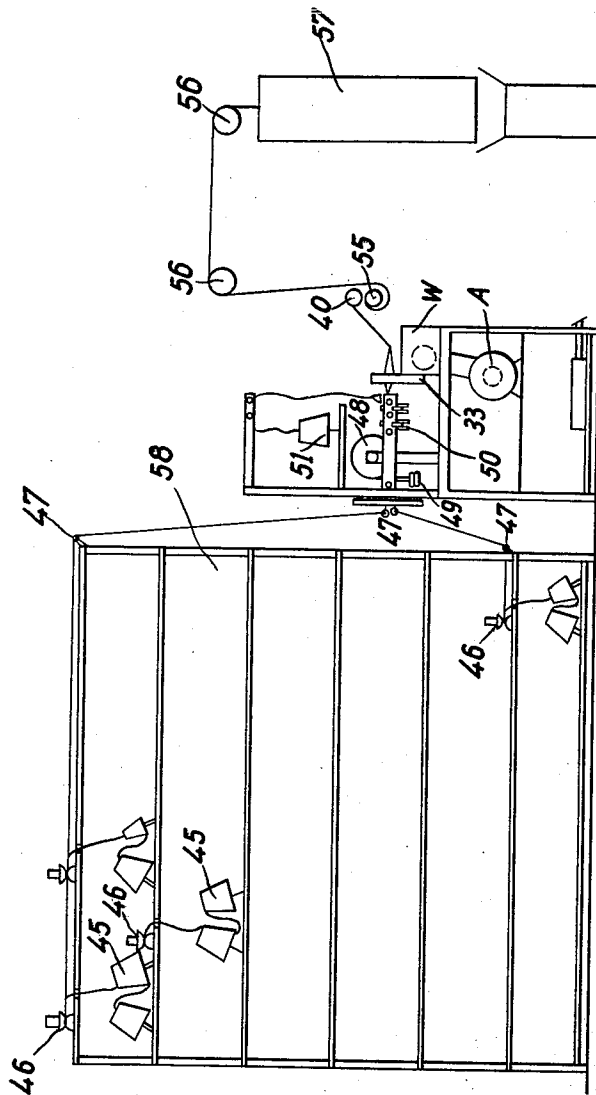
3,104,683

WEB LOOM

Filed July 18, 1960

11 Sheets-Sheet 8

Fig. 14



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WEB LOOM

3,104,683

Filed July 18, 1960

11 Sheets-Sheet 9

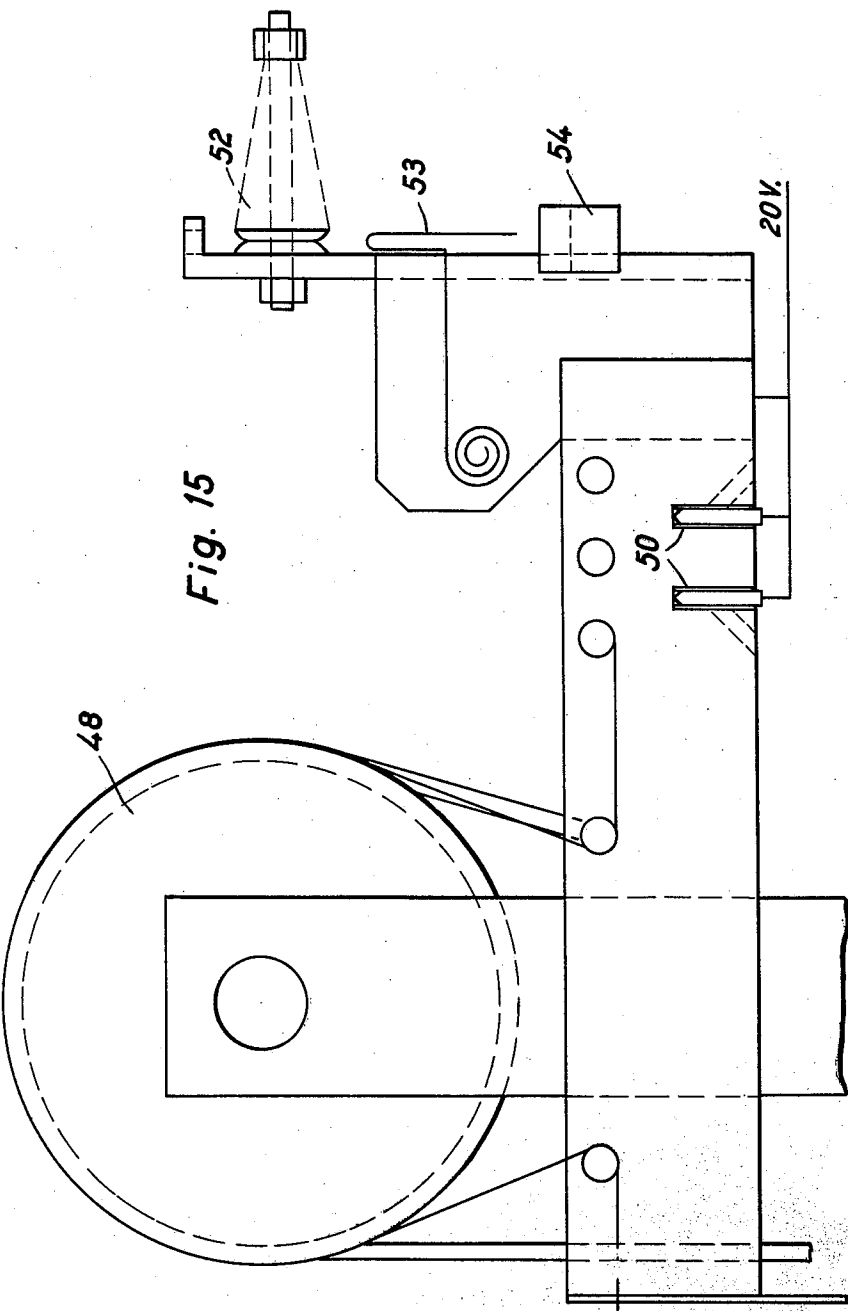


Fig. 15

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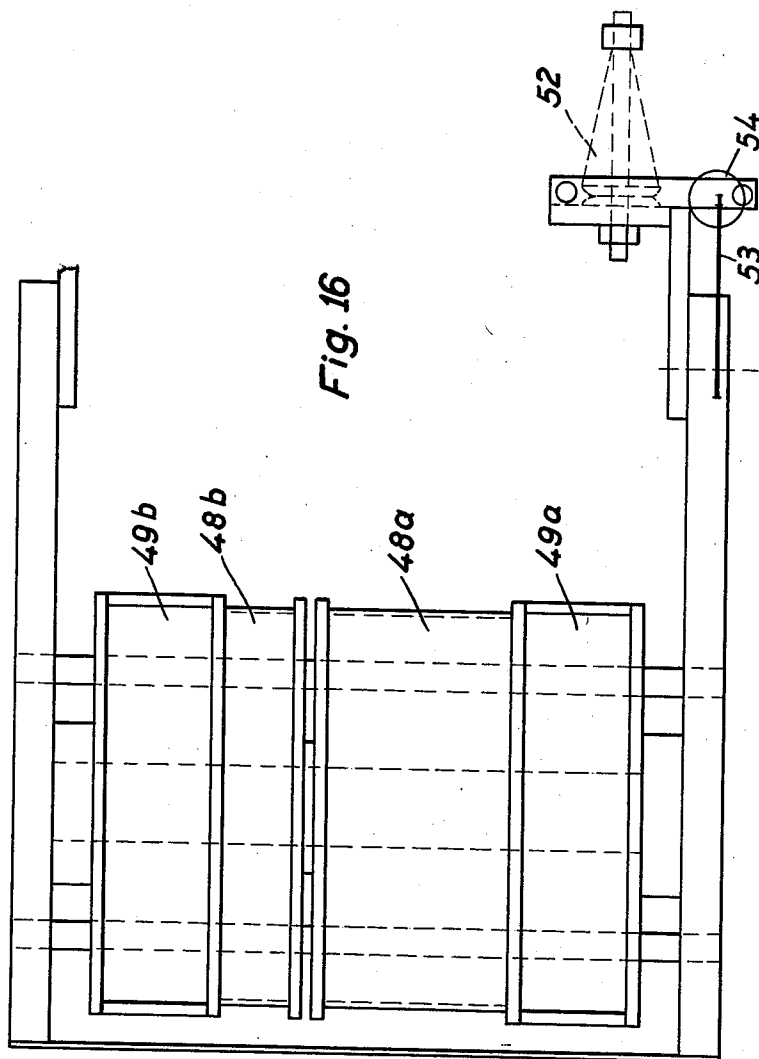
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WEB LOOM

Filed July 18, 1960

11 Sheets-Sheet 10



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3,104,683

WEB LOOM

Filed July 18, 1960

11 Sheets-Sheet 11

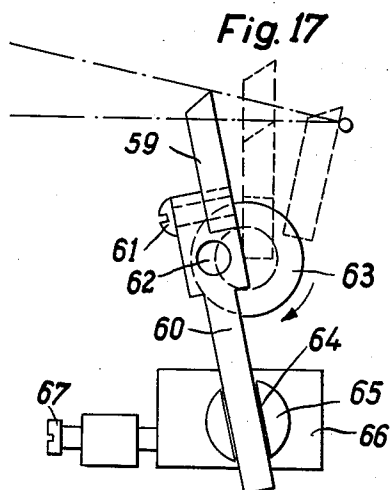
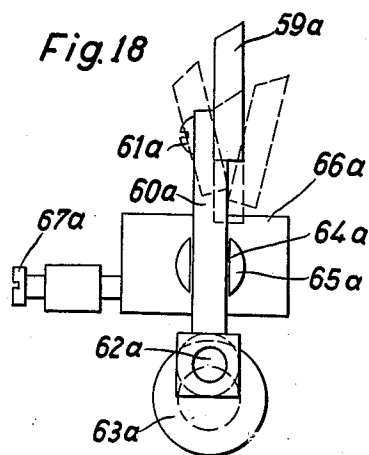
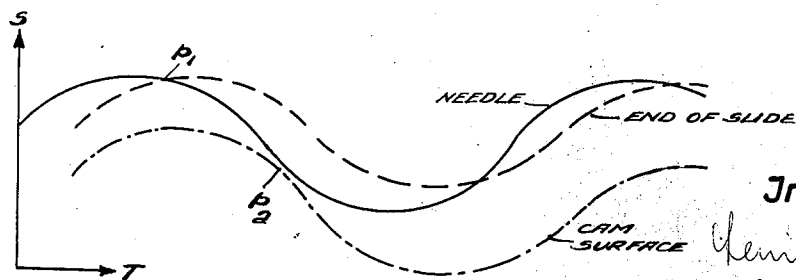


Fig. 11a.



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1

3,104,683

WEB LOOM

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Claims priority, application Germany July 18, 1959

18 Claims. (Cl. 139—124)

The invention relates to a web loom using shafts, and more particularly to a loom for weaving narrow webs of a width of a few centimeters.

Web looms are known in which, in order to increase the speed of operation, the filler is introduced into the warp not by a transversely moving shuttle which contains the weft thread but instead is drawn through the warp in the form of two-threaded loops by a weft thread carrier which has the form of a blade provided with a ring or a lever with an eye which carries the loops transversely to the warp threads. The ends of the loops are drawn by needles through the previously formed filler thread loops so as to provide a strong web edge.

Such looms have not proven satisfactory in practice. The reason for this is the complexity of such looms, the resulting cost and especially the danger, resulting from their complexity, that the loom does not operate properly, so that much repair is required and faulty webs are produced.

The primary object of the present invention is to overcome the disadvantage of prior looms of this type, and to provide a web loom in which fewer breakdowns and greater life of all the parts makes possible speeds of operation which could not previously be attained, and which produces bands of high quality, especially bands with very exact and strong edges.

According to the invention, a hooked needle moves parallel to the edge of the web, and next to it is a slide guided for movement parallel to the needle, this slide having a sloping surface acting as a closing element for the hook of the needle, the slide moving somewhat out of phase with the needle but, at the time for closing the needle, moving in the same direction but somewhat slower than the needle, so as to reduce the impact upon the needle.

The needle is provided with an end which engages in an opening in an element movable back and forth in the longitudinal direction of the needle. This allows a very simple construction of the element which traverses the warp threads. It also makes it possible to move the parts in a very simple manner, for example by eccentrics fixed side by side on a common shaft, at a high but continuous speed.

This arrangement permits the use of very fine hooked needles and thereby the production of very exact and tight web edges. The hooks of the needles, which are the most delicate part, can be operated at very high speed without destructive impacts.

The elements for moving the slides and needles may be simple ribs which lie opposite each other and slide on a common surface of a guiding body. The hooked needles, which are the elements requiring most frequent replacement, can then engage with bent over ends in a slot in the moving element, the slot being open at the end and being closed by the adjacent slide.

Advantageously, the plane of movement of the needle and slide forms an angle of a few degrees with the plane in which the double-threaded loops of the weft are formed, and the hook of the needle at the most advanced point of its movement lies on one side, and at its most retracted point on the other side, of the weft thread plane. Preferably the lever for transversing the weft thread, which has an eye at its end for the weft thread, is connected at its other end to a rotating crank and between its ends is reciprocally guided in a turnable frame. By an eccentric

2

fastening of the lever on its axis of rotation, the movement which the eye describes during the rotation of the crank can be especially well adapted to an increase in speed of operation. Usually, two weft thread carriers, the construction and movement of which are mirror images of each other, are provided on opposite sides of the web.

For the driving of the heddle shafts, there is provided for each shaft a driving element, such as an eccentric, which lies between two surfaces lying on opposite sides of the eccentric in the direction of the back and forth movement of the shaft. The shaft may be formed of a thin plate with an opening in which the driving element, such as an eccentric, is enclosed and, above such opening, a second opening in which a frame is removably held which carries the heddles. The shafts can also be moved by electrical or hydraulic means.

It is an especially advantageous construction to drive the loom parts by three parallel shafts turning at the same speed and maintained in synchronism by a non-slipping belt, one of the shafts carrying eccentrics for moving the needles and slides, the second a reed, and the third driving by toothed gearing a shaft which carries the eccentrics for moving the heddle shafts as well as the shafts for the weft thread carrying levers. The third shaft can then drive by worm gearing a perpendicular shaft on which the warp thread carrying lever is held, and this vertical shaft can drive by worm gearing the horizontal shaft on which the eccentrics for the heddle shafts are secured. Advantageously, the shaft for moving the hooked needles carries two eccentrics for actuating two pawls which engage ratchet wheels fixed on the shaft which draws off the finished web.

The simplification and improvement of the loom makes it possible to avoid warping the warp threads from a beam. Instead, each warp thread runs from an individual cop, and all the cops are arranged on a common frame, arrangements being provided for controlling and varying the tension of individual threads or groups of threads. This is especially valuable when conical rolls are used for moving the finished web, the extensive labor of preparation of the warp being then avoided.

Another advantage of the invention lies in the special manner in which the web edges are produced. In consequence of the hooked needles and the beater, the texture of the two web edges is produced by the weft threads being looped around the needle coming from below, then back out and then over the needle.

Further objects and advantages of the invention will appear more fully from the following description, especially when taken in conjunction with the accompanying drawings which form a part thereof.

In the drawings:

FIG. 1 shows in top plan view a loom embodying the invention;

FIG. 2 is a side view thereof;

FIG. 3 is an end view;

FIG. 4 is a cross-section on the line IV—IV of FIG. 1;

FIG. 5 is a plan view of a part of the loom of a larger scale;

FIG. 6 is a cross-section on the line VI—VI of FIG. 5; FIGS. 7 and 8 are cross-sections on the lines VII—VII and VIII—VIII respectively of FIG. 6;

FIGS. 9 and 10 are two views of the hooked needle;

FIG. 11 is an explanatory chart showing different positions of the working parts;

FIG. 11a is a further explanatory diagram;

FIG. 12 is a bottom plan view of the drive;

FIG. 13 is a cross-section on the line XIII—XIII of FIG. 12;

FIG. 13a is a detail of a part of FIG. 13 on a larger scale;

FIG. 14 shows the overall arrangement of the loom with the mounting and guiding of the warp threads;

FIGS. 15 and 16 show a tension arrangement for warp threads; and

FIGS. 17 and 18 show a modified form of reed.

The loom includes several heddle shafts 30 for the warp threads, a stationary reed 20, a rotating beater 21 on a horizontal shaft 3, two thread carriers 4, 4' driven by two vertical shafts 14, 14', a guide body 8 for two hooked needles 5, 5', and two slides 6, 6'. Eccentrics 25, 25', 26, 26' on a horizontal shaft 2 are connected to needles 5, 5' and slides 6, 6' respectively for producing their movement. A roller 40 takes up the finished web.

Horizontal shaft 1 is the main shaft and carries at its end a pulley 50 which is connected with the driving motor A (FIG. 14) by a belt. Shaft 1 carries two worms 11, 11' (FIG. 4) which mesh with identical worm gears 12, 12' fixed on vertical shafts 14, 14'. Between the worms 11, 11' is a worm 13, which meshes with a worm gear 31 on horizontal shaft 32 which is transverse to shaft 1 and carries an eccentric 33 for each heddle shaft. The horizontal parallel shafts 1, 2 and 3 carry at their ends identical pulleys 52 (FIG. 2) over which run a belt 54 provided at its inner side with projection 54a which engage in corresponding notches in the pulleys 54, so that the pulleys and shafts are driven synchronously. Thus complete synchronism is obtained between the movements of the warp threads through heddle shafts 30, the weft threads through thread carriers 4, 4', driven by pins or bolts 15, 15' eccentrically mounted in rotating blocks 16, 16', the hooked needles 5, 5' and the reed 21 which beats up the weft threads through shaft 3. At the same time, the number of motion transmitting parts is small and these are of a type which practically exclude inexactness of movement.

The construction, mounting and operation of one of the thread carriers is as follows:

The thread carrier 4 is a bar with an eye 4a in its end through which the weft thread runs (FIGS. 1, 11, 12). Thread carrier 4 at its other end is fastened to a turnable bolt 15 which is journaled in a crank 16 fixed on the vertical shaft 14. The crank 16 is mounted on the shaft 14 in such a way that its position can be adjusted angularly and longitudinally with respect to the shaft, and can be fixed in the adjusted position. For this purpose, the end of shaft 14 which fits in crank 16 is slotted at 14a, and in the slotted region is internally threaded, so that the diameter of the end of the shaft can be slightly increased by screwing in bolt 14b, the head of which has a sloping edge engageable in the head of the shaft to expand it and thereby secure the crank on the shaft. By loosening bolt 14b, the crank can be adjusted on the shaft to vary the movement of thread carrier 4. The crank 16 has a generally rectangular shape and extends on both sides of the shaft. During rapid rotation it acts as a fan to blow away air and dust from the web-forming area.

The thread carrier 4 between its ends is guided in a diagonal slot 17a (FIGS. 1 and 12) of a bushing 17, which is turnably mounted in the underside of a bridge 18 carried by the housing 19. Bridge 18 is adjustable on the housing by screws 18a. The thread carrier 4 thus moves in such a way that the eye 4a at each rotation of shaft 14 moves in a curve lying in a horizontal plane and of the shape shown in broken lines in the upper part of FIG. 11. This curve lies in the middle of the shed of warp threads produced by heddle shafts 30. The curve is continuous, but the velocity varies in different parts. Parts A, B, C and D of FIG. 11 show the different positions of the eye when the shaft 14 turns 90°, 180°, 270° and 360° respectively. In part A, all these four positions of the eye are indicated at a, b, c and d respectively. It is apparent that the distance, and therefore the velocity, between a and b (during which the weft thread is lead across through the shed) is much

greater than between positions b and c (during which the thread just laid is beaten up by the reed) and also greater than the distance between d and a, while the smallest distance and lowest speed is between c and d, when the thread carrier is completely outside the warp threads, the outer limits of which are represented at the bottom of FIG. 11, part J.

When two thread carriers are used, the paths of the eyes 4a, 4a' are so arranged that they lie in the same horizontal plane, but do not interfere with each other. Parts E, F, G and H of FIG. 11 show the different positions of eye 4a' during one rotation of shaft 14', corresponding to parts A to D. Part J shows the two paths superimposed.

As is shown in FIG. 1, the two thread carriers are driven 180° out of phase with each other. That is, their respective positions, during one cycle of the loom, are a and c¹, next b and d¹, next c and a¹, next d and b¹, and so on. Thus, when eye 4a is traversing the thread (from b to c), eye 4a¹ is withdrawn out of its path, moving from c¹ to d¹.

The hooked needles 5, 5' extend generally in the direction of the edges of the web. Each has a hook 5a, the point of which can be pressed in to engage between projections 5b for closing the hook. At the other end, the needles have parts 5c bent at a right angle. The stem of the needle has a bend of a few degrees at 5d.

The needle 5 is guided in an elongated groove 8a in a two-part guiding member 8, 8' and its bent end 5c lies in a groove 9a in the side face of a slide 9, which is guided for movement on the upper face of guide body 8 in the same direction as the needle. This direction is at a slight angle to the horizontal, so that the point of the needle rises somewhat during movement. Next to the needle, on the side of its hook 5a (see FIG. 5), lies a slide 6, which is also guided in groove 8a of guide body 8. The slide 6 lies against the member 9, so as to close the groove 9a in which the end of the needle engages. At its forward end, it has a slanting surface 6a, which presses the hook of the needle between the projections 5b when the hook is brought against the slanting surface. Through the slant of surface 6a and the shape of eccentrics 25 and 26, by which the relative movements of hook 5a and surface 6a are controlled, it is possible to obtain a very gentle and gradual compressing of the hook by the slide.

A nose 6b extends from the slide 6 beyond the surface 6a. The slide 6 is made symmetrical with respect to nose 6b, having a surface 6a on each side. Thus, after one of the surfaces 6a is worn, the slide can be used to replace a slide 6' on the other side of the machine. The slide 6, the forward part of which lies wholly within the groove 8a, extends rearward out of the groove and is connected by a rod 6c to the eccentric 26. The rod 6c is connected to the eccentric by screw 6e threaded in an extension of strap 26, and fitting in a slot 6d in rod 6a. Part 9 is similarly connected by rod 9a to eccentric 25.

At the front end of the guide body 8 is a stripper 29 which on the outside has a guide groove 29a (FIG. 8) for the needle 5. The stripper is so narrow that a small space 29b (FIG. 8) is left between it and slide 6.

Behind the stripper, a bridge 10 is secured on the guide body 8 by screws 11, which closes the groove 8a in which the slide 6 and needle 5 are guided. Between the needle guides the bridge has a notch 24 through which the finished web is guided (FIGS. 4, 5 and 7). A spring 27 is fastened on the bridge by screws, this spring pressing the web against the guide formed of fixedly connected parts 7, 8 directly after the beating of the weft threads (see FIGS. 6 and 7, not shown in FIG. 5).

The hooked needle 5' is mounted and actuated in the same way as needle 5, with eccentric 25' and slide 6'. Between the two parts 8, 8' of the guide body is a part 7, which can be readily substituted by a body of different width in order to change the width of the web.

5

The thread carriers 4, 4' and the hooked needles 5, 5' serve to lay the weft threads in the warp and to form them into a web. Their operation is shown in FIG. 11. During each revolution of the main shaft of the machine, each thread carrier makes a complete cycle (FIG. 11, A to AO; each selvage needle also makes a complete cycle; the take-up operates twice and the rotary beater operates twice (one complete revolution). In these drawings is shown in the first sequence the carrying of the weft threads by the thread carrier 4, of which only the eye 4a is shown. Eye 4a is in part A in the position *a* of its curve of movement. The weft thread then runs from the right-hand edge of the web to the eye 4a. As the shaft 14 turns through 90°, the eye 4a moves rapidly across through the shed of the warp threads to position *b* (part B). During this time the needle 5 moves slantingly upward from below into the plane of movement of the eye 4a, so that it is looped by the weft thread, as is shown in part B. During the next 90° turn of shaft 14, the eye 4a moves from *b* to *c* (see part C). In the last part of this period the eye is outside the warp threads. During this movement, the hook or point of the needle 5 engages the cam surface on slide 6 and the needle is closed. At this time, the reed 21 beats up on the web the weft thread which has been carried across and which is stretched between the needle 5 and the eye 4a. Simultaneously, the slide 6' moves forward far enough to engage under the warp threads and lift them. During the next 90° turn of shaft 14, the eye moves from *c* to *d* (see part D). Simultaneously the needle 5' moves forward; because it lies close on the weft thread beaten up by reed 21, it goes over the foot threads. The slide 6' moves simultaneously approximately as far forward as needle 5'. The needle 5 then moves back, so that it passes through the loops of the previous threads which have already been beaten up. In the next 90° turn of shaft 14, the eye 4a returns to position *a*. During this period the needle 5 moves forward, its hook opens, so that the weft threads introduced into the loops of the previously formed weft are held in. Simultaneously, the needle 5' goes back faster than the slide 6', so that the weft threads are threaded in the hook of the needle 5. The weft threads held between needles 5 and 5' are beat up by the reed 21.

Referring to FIG. 11a, the solid line curve shows the movement of the end of the needle 5 as a function of time *T*, the broken line the end of the slide and the dot and dash line the cam surface. It will be seen that, at point *p*₁, the slide is advanced almost as far as the needle. However, the movement of the slide is somewhat out of phase with that of the needle. As a result, as the parts approach position *p*₂, the needle is retracting faster than the slide and approaches the cam surface so as to close the hook at point *p*₂. However, since the cam surface is also moving, the shock on the hook of the needle is not nearly as great as if the cam surface were stationary.

In the same way, one complete turn of its shaft 14 causes eye 4a to draw across two loop threads. This results in the encirclement of needle 5 as well as of needle 5' outward and upward from below. In consequence of the encirclement of needle 5, the needle at the proper moment enters into the weft thread loop held by the needle carrier 4 slantingly from below, in the same way as by the needle 5' with the help of the nose 6b of the slide. The advantage of this is that the two edges of the web are formed alike.

The beater 21 (FIG. 4), which beats up the loops on the web, consists of a number of discs which are spaced apart by the intermediate discs 22 by a distance equal to that between the warp threads. These discs are secured on shaft 3 by a key 23. The discs have the shape shown in FIG. 4, consisting of two opposed wings, the leading edges 27a of which beat up the loop threads and follow a curve such that the thread is pushed forward at a speed which gradually approaches zero. The leading edge has,

6

on the part which first enters between the warp threads, a slope 21b. The trailing edge 21c is cut away beyond the radius leading to the point, so as to avoid interference with the laying of the weft threads.

Each heddle shaft is composed of a sheet metal piece 30 (FIGS. 1 and 3), these being guided in a common frame 34 and having two openings 30a, 30b. In the lower opening 30a is positioned the eccentric 33, fastened on shaft 32. Eccentric 33 fits without vertical play in opening 30a, that is, its upper and lower edge surfaces engage the lower and upper faces of the opening, and has such a shape as to impart only continuous movement to shaft 30. In the upper opening 30b the heddles 35 are secured by connecting their upper and lower carriers 36, 37 to the frame by screws 38.

The roller 40 (FIG. 1) which takes up the finished web is mounted on a shaft 41 on the other end of which is secured a ratchet 42, engaged by two pawls 43, 44 (FIG. 2) which are driven from shaft 2, being mounted thereon on eccentrics such as 44a, out of phase with each other, so that at each rotation of the shafts the pawls are alternately advanced. The pawls are so located on shaft 2 that the roller 40 is stationary at the time when the needles 5, 5' are engaging the loop threads.

The warp threads can be led directly to the heddle shafts of the loom without being warped on a beam. FIG. 14 shows the loom W according to the invention with its driving motor A, the frame 34 for the heddle shafts and the transport roll 40 for the web. Each warp thread runs from a cone 45 through an individual tensioning device 46. This may consist, for example, of two arched, convex opposed discs which rest on a piece of felt and the upper of which is pressed down by easily changeable weights. The warp threads then run over a guide 47 and all together over a drum 48, which is braked by a weight 49 (see FIGS. 14 and 15), and then past stop action 50 to heddle shafts 30. The threads, or part of them can also bypass the drum 48. They then run directly, or past a thread alarm or a tension device of the type described, to the heddles.

FIG. 16 shows the drum formed of two parts 48a, 48b, each provided with its own brake 49a, 49b. Different groups of warp threads can run over the two parts. This is advantageous in the manufacture of tapes for slide fasteners, in which a bead is to be formed. The bead forming material is then fed around drum 48a, the ordinary warp threads around drum 48b.

The loop threads are fed from a spool 51 (FIG. 14) through a thread tension 52 (FIG. 15) and an alarm 53 to the thread carrier 4. The alarm consists of a spring loop 53, the end of which dips in a container 54 filled with mercury, and which is held up by the tension of the weft thread. Breaking of the weft thread therefore lets the point engage the mercury and closes a contact in a circuit which stops the machine. Separate spools, tensions and alarms are provided for each of the two thread carriers.

The finished web runs between and around takeup roll 40 and rubber roll 55 and over reversing rolls 56 into a container 57 or to a reel. The height of reversing rolls 56 is such that a workman servicing the machines can walk beneath them. The warp thread spools 43, tensions 46 and guides 47 are all mounted on a large frame 48, preferably large enough to supply two looms which can be positioned on either side of the frame and be mounted on a common foundation. The frames are then mounted parallel to each other at such distances apart that enough space remains to allow changing of spools 45.

FIG. 17 shows a different form of reed. It consists of a comb 59 with a number of teeth, spaced apart the same distance as the warp threads, and fastened to an arm 60 by screws 61. Arm 60 is connected with a disc 63 by crank pin 62. Disc 63 is mounted on a horizontal shaft which lies somewhat lower than shaft 3. The end of arm 60 is guided in a slot 64 of a pin 65 turnably mounted in a bearing block 66. The position of block 66 in the

loom can be adjusted by screw 67. Turning of disc 63 by 90° in the direction of the arrow moves the comb-like reed 59 upward, so that it engages between both sets of warp threads; another 90° turn causes the reed to beat up the loops; during the next 180° it moves downward and remains so low that it does not engage in the shed and does not interfere with the feeding of the weft threads. Through suitable selection of the eccentricity of comb 59 with respect to guide 64 and proper positioning of bearing block 66 beats up the weft threads gently and in addition allows a long period of time for the laying of the threads.

The arrangement shown in FIG. 18 differs from that of FIG. 17 in that the position of the bearing block and disc are reversed. The parts bear the same numbers as in FIG. 17 with the subscript *a*.

While I have described herein some embodiments of my invention, I wish it to be understood that I do not intend to limit myself thereby except within the scope of the claims hereto or hereinafter appended.

I claim:

1. In a web loom having means to feed and shed warp threads and at least one thread carrier for carrying weft threads back and forth through the shed of the warp threads, a needle having a hook with a point movable to close the hook, means mounting said needle for longitudinal movement in a path transverse to the plane of the warp threads and adjacent one edge of the path of the warp threads to engage the weft threads and form successive interlocking loops therein, means for closing the hook of the needle for casting off previously formed loops comprising a slide mounted adjacent to the needle for reciprocatory movement parallel to the direction of movement of the needle and having a hook point engaging surface thereon, and means for moving the slide and needle back and forth out of phase with each other, said moving means including means to move the needle, during the latter part of the withdrawal thereof, somewhat faster than the slide whereby the point of the needle hook engages the said surface of the slide to close the hook while the slide is moving in the same direction as the needle, the needle starting its passage through a previously formed loop while such engagement exists.

2. In a loom as claimed in claim 1, means mounting the needle for movement in a plane having a constant angle of a few degrees with the plane of the warp threads and during its movement having its point move from one side to the other of the plane of the warp threads.

3. In a loom as claimed in claim 2, said slide having a projecting nose which at its point of furthest rearward movement extends beyond the hook of the needle and below the plane of the warp threads, the needle in its forward movement going above the plane of the warp threads.

4. In a loom as claimed in claim 1, said needle and slide moving means comprising eccentrics mounted on the same shaft.

5. In a loom as claimed in claim 4, means to move said thread carrier comprising a crank, one end of carrier being rotatably connected to the crank, and a turnable bearing member, the turnable bearing member having a slot opening in the end thereof; the carrier being slidably mounted in the slot in the turnable bearing member.

6. In a loom as claimed in claim 5, said crank having projections on both sides of its axis of rotation to act as a fan.

7. In a loom as claimed in claim 5, a shaft having a cylindrical internally threaded slitted end, and an expanding member threaded in said end, said crank having a cylindrical bore therein mounted on such shaft end.

8. In a web loom having means to feed and shed warp threads and at least one thread carrier for carrying weft threads back and forth through the shed of the warp threads, a pair of needles each having a hook with a point movable to close the hook, means mounting said

needles for parallel longitudinal movements each in a path transverse to the plane of the warp threads and adjacent one edge of the path of the warp threads to engage the weft threads and form successive interlocking loops therein, means for closing the hooks of the needles for casting off previously formed loops comprising, for each needle, a slide mounted adjacent to the needle for reciprocatory movement parallel to the direction of movement of the needle and having a hook point engaging surface thereon, and means for moving the slide and needle back and forth out of phase with each other, said moving means including means to move the needle, during the latter part of the withdrawal thereof, somewhat faster than the slide whereby the point of the needle hook engages the said surface of the slide to close the hook while the slide is moving in the same direction as the needle, the needle starting its passage through a previously formed loop while such engagement exists, said needles and slides being arranged in mirror image relationship.

9. In a loom as claimed in claim 8, means mounting the needle for movement in a plane having a constant angle of a few degrees with the plane of the warp threads and during its movement having its point move from one side to the other of the plane of the warp threads.

10. In a loom as claimed in claim 8, a pair of members each having a slot therein, said needles and slides being guided in said slots, and an interchangeable block between said members for varying the effective width of the loom.

11. In a loom as claimed in claim 1 in which said shedding means comprises heddle shafts and a frame carrying said shafts, said frame having an opening therein with parallel top and bottom walls and a shaft having an eccentric thereon engaged in said opening, said eccentric being of the same dimension in the direction of movement of the frame as the distance between said walls.

12. In a loom as claimed in claim 1, three parallel shafts, means connecting said shafts to turn synchronously at the same speed, eccentric means on a first of said shafts to move the needle and the slide, a reed for beating up the weft threads mounted on a second of said shafts, and means connected to the third of said shafts to operate said warp thread shedding means and to move said weft thread carrier.

13. In a loom as claimed in claim 1, three parallel shafts, means connecting said shafts to turn synchronously at the same speed, eccentric means on a first of said shafts to move the needle and the slide, a reed for beating up the weft threads mounted on a second of said shafts, said thread carrier comprising a lever having an eye therein, a vertical shaft operatively connected to said lever for moving it, a worm connection between the third of said shafts and said vertical shaft, a horizontal shaft for operating said warp thread shedding means, and a worm connection between the third of said shafts and said horizontal shaft.

14. In a loom as claimed in claim 12, a feed roll for the finished web, a pair of ratchet wheels connected with said roll, a pair of eccentrics on the first of said shafts, and pawls connected to said eccentrics and engaging said ratchet wheels to impart intermittent movement to said roll.

15. In a web loom as claimed in claim 1, said thread carrier comprising a bar having a thread guide at one end thereof, means to move the thread carrier comprising a block mounted for rotation, a pin journaled in said block eccentrically to and about an axis parallel to the block axis, said block having a thickness in the direction of said block axis and said pin having a portion journaled in the block both substantially longer than the diameter of the pin, means connecting the other end of the thread carrier to said pin, and means engaging the intermediate portion of the thread carrier for rotatably and slidably guiding the thread carrier.

16. In a loom as claimed in claim 15, said intermediate portion engaging means comprising a second block having

9

a second pin journaled therein to turn about an axis parallel to the axis of the first block, said second pin having a portion projecting outwardly beyond one face of the second block, the projecting portion having a free end and a slot opening in such free end in which the thread carrier is slidably guided, said second block having a thickness in the direction of the axis of rotation thereof and said second pin having a portion journaled in the second block both substantially longer than the diameter of the pin.

17. In a web loom as claimed in claim 1, said thread carrier comprising a bar having a thread guide at one end thereof, means to impart movement to the carrier including means to move the other end of the thread carrier in a circle, and means engaging the intermediate portion of the thread carrier for rotatably and slidably guiding the thread carrier, said intermediate portion engaging means comprising a block having a pin journaled therein to turn about an axis having a portion projecting beyond the face of the block, the projecting portion having a slot therein opening in the end thereof in which the thread carrier is slidably guided, said block having a thickness in the direction of the axis of rotation thereof and said pin having a

10

portion journaled in the block both substantially longer than the diameter of the pin.

18. A loom as claimed in claim 1 in which said moving means imparts harmonic motions to both the needle and the slide.

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