June 26, 1934. W. POOL 1,964,079

LOOM IN WHICH WEFT IS FED FROM A STATIONARY SUPPLY

Filed Dec. 12, 1931 2 Sheets-Sheet 1

FIG. 1.

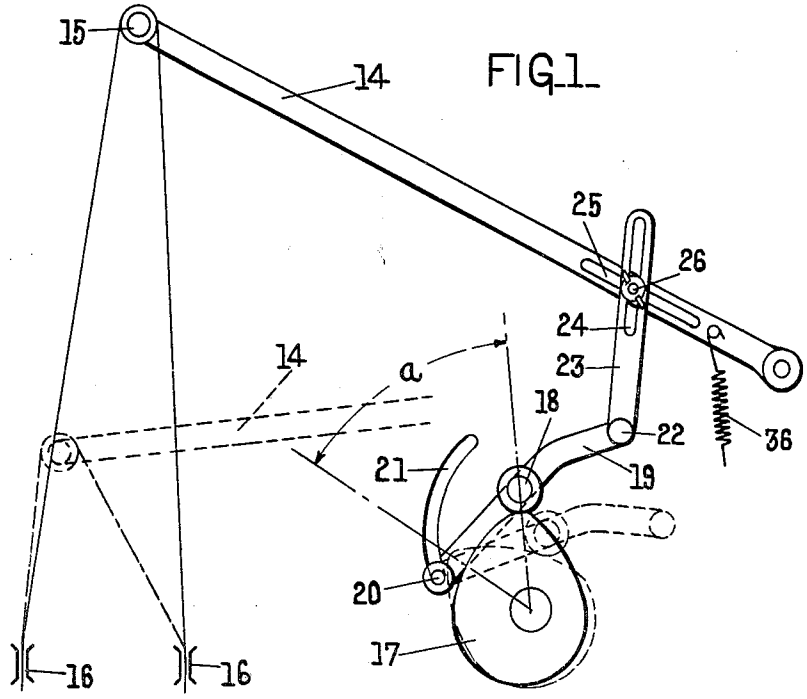
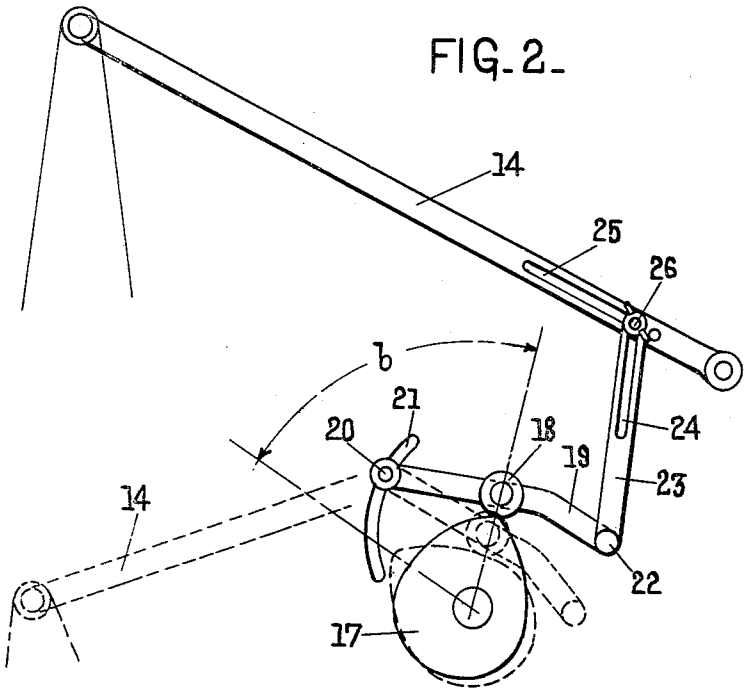


FIG. 2.



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FIG_3_

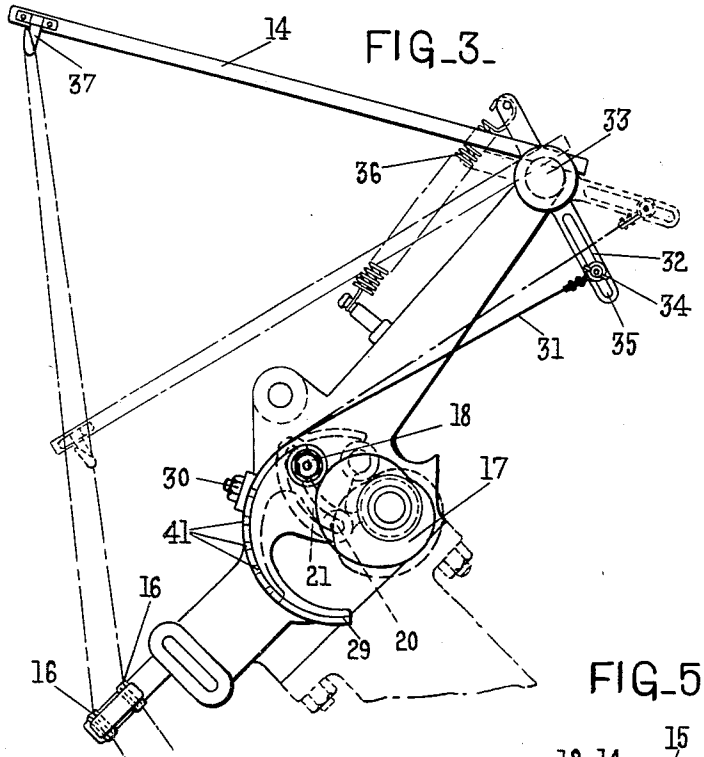


FIG_4_

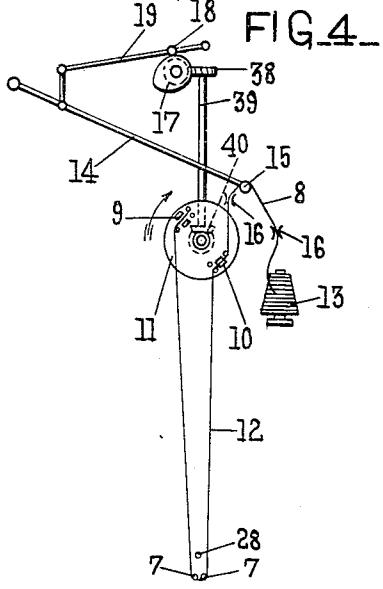
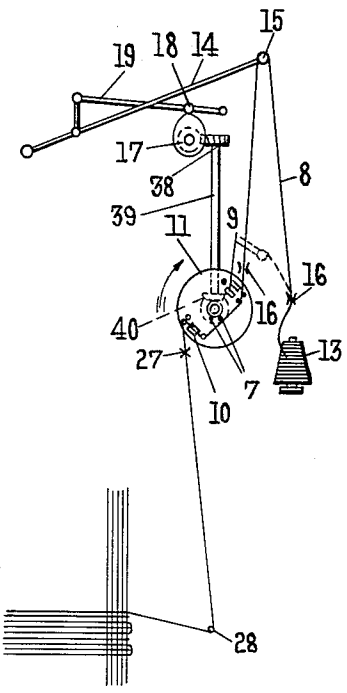


FIG_5_



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UNITED STATES PATENT OFFICE

1,964,079

LOOM IN WHICH WEFT IS FED FROM A STATIONARY SUPPLY

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Application December 12, 1931, Serial No. 580,618
In Great Britain February 6, 1931

13 Claims. (Cl. 139—122)

This invention relates to looms in which weft is taken from a stationary supply, i. e. a supply which does not pass through the shed, and laid in the shed by rods, dummy shuttles, or other inserting devices.

The invention is concerned particularly with the withdrawal of weft from such supply packages. In looms of the above character the weft may be withdrawn from the supply package directly by the action of the inserting device, or a length of weft may be drawn, generally in measured amount, at the side of the loom, and then presented to the inserting device. One method of drawing the weft from the package for presentation to the inserting device consists in drawing the weft in loop form so that each limb of the loop can be inserted into separate sheds to form a "hairpin" of weft in the fabric.

Whether the weft is drawn directly from the supply by the inserting device or by other means prior to insertion, there is the danger of the weft being subjected to excessive stress owing to the fact that the weft is required for actual insertion in the fabric at intervals, and not at a steady rate. It is particularly the case where a weft loop of sufficient length for two picks is drawn from the package prior to insertion, since the weft leaves the package at double the rate of the travelling member of the loop forming device, or even when an additional loop is drawn within the main loop for length adjustment, as described in U. S. application S. No. 484,785 filed 27th September, 1930 at four times the rate of the travelling member. The stress imparted by reason of the varying rate at which weft is drawn from the package may be sufficient to strain or even to break the weft thread, especially if it is of a weak nature, either as regards its structure or its component material.

The object of the present invention is to avoid such excessive stress being applied to the weft, and according to the invention means are provided to withdraw weft from the package in a continuous manner, independent of the rate of movement of the weft inserting or weft length forming devices. These means continue the withdrawal of weft from the package in the intervals between the drawing movements of the weft inserting or weft length drawing device.

The means for drawing the weft from the package may be arranged to cause the weft to leave the package continuously, and preferably at a uniform or substantially uniform rate. Thus the weft drawing means may comprise a loop-drawing compensator operated by a cam whose profile is so formed that the action of the compensator alone gives continuous weft withdrawal, or, combined with the weft inserting or weft length forming device when these are tending to draw weft from the package simultaneously with the compensator, results in continuous or uniform or substantially uniform withdrawal of the weft. A crank, eccentric or similar means may be employed in place of the cam to operate the compensator in a manner which will ensure continuous withdrawal of the weft where substantially uniform withdrawal is not necessary. When weft insertion takes place from both sides of the loom, similar compensating means are provided at each side.

Two forms of mechanism according to the invention will now be described in greater detail with reference to the accompanying drawings, but it is to be understood that the following description is given by way of example only and is in no way limitative.

Figs. 1 and 2 show in side elevation one form of apparatus adjusted for different timing;

Fig. 3 is a view similar to Fig. 1 showing a modified type of apparatus; and

Figs. 4 and 5 show diagrammatically the operation of the apparatus shown in Figs. 1 and 2.

The following description sets out the operation of the apparatus as applied to a loom in which weft is drawn out from a stationary supply in the form of a loop by an endless chain as described in U. S. application S. No. 484,785 and British applications Nos. 3895/31 and 3896/31 both filed 6th February, 1931. This chain (not shown) carries a travelling member comprising a pair of pegs 7 which engage weft 8 extending between a pair of trapping devices 9, 10 carried by a rotatable disc 11, the rotation of the disc bringing the trapping devices 9, 10 successively into positions in which weft trapped in one of the devices can be drawn into the form of a loop 12 for insertion into the warps. The trapping devices may be moved at a steady rate or may be moved intermittently in the manner described in British application No. 3895/31 in order to facilitate the passage between the devices of the travelling member which draws out the weft loop and to enable a lower rate of weft drawing to be adopted. More than one travelling member may be provided on the endless chain, each being adapted to draw out a loop in turn.

Before passing from a package 13 to the trapping devices the weft 8 is taken over a compensating device which comprises an oscillating arm 14 carrying a small pulley 15 adapted to draw the

weft into a loop between two fixed guides 16 through which it runs between the supply and the trapping devices.

The arm 14 derives its movement from a cam 17 and follower 18. As shown in Figs. 1 and 2 the follower 18 is carried by a lever 19 whose pivot 20 is adjustable along the arcuate slot 21. The free end 22 of the lever 19 is connected by a link 23 to the arm 14, the link and arm being provided with slots 24, 25 which enable the pivot connection 26 between them to be adjusted. The contour of the cam is such that before the travelling member commences to form the loop, the compensator draws weft from the supply at the average rate of draw-off required, while during loop formation the compensator arm recedes to allow the travelling member to take up the slack of the weft and at the same time maintain the average rate of draw-off. Thus the compensator begins to draw weft just as a loop has been released from the travelling member for insertion into the warps and recedes just as the next travelling member commences loop formation.

When weft is inserted alternately from the two sides of the loom, to form "hairpins" of weft in the fabric, the weft-inserting cycle occupies the time required to insert four picks, while the time taken to draw a loop on one side of the loom is approximately that required to insert two picks. The compensator cam is thus required to continue the withdrawal of weft during the remainder of the cycle.

Means are preferably provided to enable the compensator timing to be adjusted in accordance with the weft requirements of different widths of fabrics. It will be understood that, assuming for simplicity the same rate of picking for different fabric widths, the compensator is required to commence drawing weft from the package always at the same point in the weaving cycle, viz. when one loop has just been formed by a travelling member, and the member has ceased to draw weft from the supply. This point may be accurately determined by the guide means described in British application No. 3897/31 filed 6th February, 1931 for preventing vibration of the chain carrying the travelling member or members. In the case of shorter picks, necessitating a shorter loop, loop-formation commences at a later point in the cycle, and in the case of larger picks, earlier in the cycle, for the same rate of movement of the travelling members, and the compensator has therefore to commence to recede at different points in accordance with the length of pick. In order to provide for this different timing, inter-changeable cams may be used to operate the compensator. However, since the compensator movement can be substantially the same apart from the timing, it is convenient to use a single cam and to effect the timing adjustment in the following way:—

The centre about which this curved slot 21 along which the pivot 20 of the lever 19 can be adjusted is struck as at the centre of the roller 18 when the roller engages with the lowest part of the cam 17, that is when the arm 14 is at the lowest point of its travel, this point always occurring at the same time in the weaving cycle, that is just when one loop has been completely formed by the travelling member. Thus, the rod 14 always reaches the lowest point of its travel at precisely the same time in the revolution of the cam 17, and therefore, loop drawing commences at the same point of the cycle.

With different lengths of loop 12 the arm 14 has to commence to recede from its uppermost position of travel at different points in the cycle. Consequently, the peak of the cam 17 which brings the arm 14 to its highest position must be caused to act on the roller 18 at different times in the cycle. This is simply effected by the adjustment possible along the slot 21, Fig. 1 showing the highest point of the cam giving a full lift to the roller 18 after the cam has turned through an angle *a* from contact of the roller 18 with the lowest part of the cam, and Fig. 2 showing the highest lift occurring after the movement of the cam through a greater angle *b*.

The length of movement of the arm 14 is regulated by adjustment of the pivot connection 26, this adjustment of course not affecting the timing of the arm movements effected by the cam 17.

The operation of the apparatus is as follows:—

Fig. 4 shows the guide roller 15 at the lowest point of its travel and about to draw a compensating loop between the fixed guides 16 just as the pegs 7 have drawn out the loop 12 to the fullest extent. In Fig. 5 the guide pulley 15 has drawn out the weft 8 into a loop which is available for drawing into a loop 12 by the pegs 7 which are just about to engage the weft 8 extending between the trapping devices 9, 10. In Fig. 4 the trapping device 9 has just been opened to allow the left-hand limb of the loop 12 to be picked into the shed while the trapping device 10 has closed on to the right-hand limb of the loop. Fig. 5 shows the trapping device 10 still closed on to the remaining limb of the loop which is about to be cut at the point 27, the left-hand limb of the loop being shown picked into the fabric. Prior to picking of the second loop, the weft is held taut by passing round a tension finger 28. In Fig. 5, the trapping device 9 is open and is about to receive the weft 8 on the continued rotation of the disc 11 during the drawing of the weft into a further loop by the pegs 7.

Referring to the modification shown in Fig. 3, the cam follower 18 is carried on a curved lever 29, attached to a point 30 of whose periphery is a flexible band 31 connected to a lever 32 secured to the pivot 33 of the arm 14. The pivot 20 of the lever 29 is adjustable along an arcuate slot 21 in a manner similar to the pivot of the lever 19, so that the timing of the compensating arm 14 through the intermediary of the band 31 and lever 32 can be adjusted in accordance with the requirements of the pegs 7. The band 31 is connected to the lever 32 by a wing nut 34 and slot 35 so as to permit adjustment of the length of movement of the arm 14. The point of connection 30 between the lever 29 and the band 31 may also be adjusted, as by the provision of a series of connecting holes 41 arranged round the surface of the lever 29. In both Figs. 1 and 3 a spring 36 provides for the return of the loop to the arm 14.

In Fig. 3 the guide roller 15 is replaced by a hooked thread guide 37. The cam 17 and the disc 11 rotate in synchronism, being connected by spiral gears 38, a shaft 39 and bevel gears 40 preferably as described in British application No. 3895/31.

The movement of the weft-engaging end of the compensator arm is preferably such that the weft is compelled to bend as little as possible in passing from the supply package to the travelling member. Thus the compensating loop may have

one limb passing more or less directly from the supply, and the other more or less in the direction of one limb of the weft loop being drawn by the travelling member, so reducing to as low degree as possible the tension on the weft.

The weft package is mounted on any convenient part of the loom, and the tail of a package being consumed may be connected to the head of a reserve package, so that the loom is not required to stop on exhaustion of the one package. The package or packages is or are preferably of large size.

In looms where weft insertion takes place from both sides, the one cam may be used to control the compensator arms for each side by appropriately positioning the cam levers to give the required timing for each arm, or independent cams may be used.

What I claim and desire to secure by Letters Patent is:—

1. Weft-withdrawing means for looms having a stationary weft-supply package comprising means adapted to draw at intervals a controlled and measured loop of weft from the supply preparatory to the insertion of weft from said loop into the warp-shed, and means adapted to continue the withdrawal of weft in the form of a further loop from the supply between said intervals, so that weft is drawn from the supply at a substantially uniform rate.

2. Weft-withdrawing means for looms having a stationary weft-supply package comprising a rotatable disc, weft trappers on said disc, means adapted to engage a length of weft connected to the supply and extending between said trappers and to draw said lengths into a loop preparatory to the insertion of weft from said loop into the warp-shed, a compensating member and a cam for operating same, said compensating member being adapted to engage said weft between said rotatable disc and the supply to draw a further loop in the weft, and said cam having a profile of such contour as to cause the said compensating member to continue the withdrawal of weft from the supply between said intervals in such a manner that weft is drawn from the supply at a substantially uniform rate.

3. Weft-withdrawing means for looms having a stationary weft-supply package comprising a rotatable disc and a rotatable cam, means adapted to drive said disc and said cam in synchronism, weft-trappers on said disc, means adapted to draw a loop of weft of predetermined but adjustable length for insertion into the warp-shed from weft extending between said trappers and connected to the supply, a cam-follower lever, and a compensating lever connected to said cam-follower lever and operated by said cam through said cam-follower lever, so as to engage the weft between the disc and the supply and to draw a further loop in said weft, so continuing the withdrawal of weft from the supply between said intervals at a substantially uniform rate, an adjustable pivot for said cam-follower lever and a curved slot in which the pivot is adjustable so that while the loop-drawing movement of the compensating member always commences at the same time in the cam cycle, the movement of said compensating member is completed at an adjustable time in the cycle in accordance with the commencement of the loop-drawing movement of the first-named drawing means.

4. A loom having a stationary weft-supply package comprising means adapted to draw at intervals a controlled and measured loop of weft from the supply for insertion within the warp-shed, and means adapted to continue the withdrawal of weft from the supply between said intervals, so that weft is drawn from the supply at a substantially uniform rate.

5. A loom having a stationary weft-supply package comprising means adapted to draw at intervals controlled and measured lengths of weft from the supply in loops each sufficient for two picks for insertion within the warp-shed, means adapted to insert picks from said loops in turn within the warp-shed, means adapted to present said pick-lengths to said inserting means, and means adapted to continue the withdrawal of weft from the supply between said intervals so that weft is drawn from the supply at a substantially uniform rate.

6. A loom having a stationary weft-supply package comprising means adapted to draw at intervals controlled and measured lengths of weft from the supply for insertion within the warp-shed, means adapted to insert said lengths within the warp-shed, means adapted to present said lengths to said inserting means and a compensating member adapted to continue the withdrawal of weft from the supply between said intervals so that weft is drawn from the supply at a substantially uniform rate.

7. A loom having a stationary weft-supply package comprising means adapted to draw at intervals controlled and measured lengths of weft in loop form from the supply for insertion within the warp-shed, means adapted to insert said lengths within the warp-shed, means adapted to present said lengths to said inserting means, and a compensating member adapted to continue the withdrawal of weft in the form of a further loop from the supply between said intervals, so that weft is drawn from the supply at a substantially uniform rate.

8. A loom having a stationary weft-supply package comprising means adapted to draw at intervals lengths of weft from the supply for insertion within the warp-shed, means adapted to insert said lengths within the warp-shed, means adapted to present said lengths to said inserting means, a compensating member, a cam for operating said compensating member and having a profile of such contour as to cause the said compensating member to continue the withdrawal of weft from the supply between said intervals in such a manner that weft is drawn from the supply at a substantially uniform rate.

9. A loom having a stationary weft-supply package comprising means adapted to draw at intervals lengths of weft from the supply for insertion within the warp-shed, means adapted to insert said lengths within the warp-shed, means adapted to present said lengths to said inserting means, a cam, a cam-follower lever, a compensating member operated by said cam through said cam-follower lever so as to continue the withdrawal of weft from the supply between said intervals in such a manner that weft is drawn from the supply at a substantially uniform rate, and means adapted to adjust the position of said cam-follower lever relative to said cam, to control the time of operation of said compensating member by said cam.

10. A loom having a stationary weft-supply package comprising means adapted to draw at intervals lengths of weft from the supply for insertion within the warp-shed, means adapted to insert said lengths within the warp-shed, means adapted to present said lengths to said inserting

means, a rotatable cam, a cam-follower lever, a compensating member operated by said cam through said cam-follower lever so as to continue the withdrawal of weft from the supply between said intervals in such a manner that weft is drawn from the supply at a substantially uniform rate, and means adapted to adjust the position of said cam-follower lever relative to said cam to control the time of operation of said compensating member by said cam so that the loop-drawing movement of the compensating member always commences at the same time in the cam cycle while the maximum movement is concluded at an adjustable time.

11. A loom having a stationary weft-supply package comprising means adapted to draw at intervals lengths of weft from the supply for insertion within the warp-shed, means adapted to insert said lengths within the warp-shed, means adapted to present said lengths to said inserting means, a cam, a cam-follower lever, a compensating member operated by said cam through said cam-follower lever so as to continue the withdrawal of weft from the supply between said intervals in such a manner that weft is drawn from the supply at a substantially uniform rate and an adjustable pivot for said cam-follower lever to enable the operation of said compensating member to be controlled in relation to the operation of the weft-drawing means.

12. A loom having a stationary weft-supply package comprising means adapted to draw at intervals lengths of weft from the supply for insertion within the warp-shed, means adapted to insert said lengths within the warp-shed, means adapted to present said lengths to said inserting means, a rotatable cam, a cam-follower lever, a compensating member operated by said cam through said cam-follower lever so as to continue the withdrawal of weft from the supply between said intervals in such a manner that weft is drawn from the supply at a substantially uniform rate, an adjustable pivot for said cam-follower lever, and a curved slot adapted to house said adjustable pivot, said cam-follower lever being adjustable along the curved slot so that the position of said cam-follower lever may be adjusted relative to said cam to control the time of operation of said compensating member by said cam in order that the loop-drawing movement of the compensating member always commences at the same time in the cam cycle while the maximum movement is concluded at an adjustable time.

13. A loom having a stationary weft-supply package comprising means adapted to draw at intervals weft in loop form from the supply preparatory to the insertion of weft from said loop into the warp-shed, means adapted to insert said weft within the warp-shed, means adapted to present said weft to said inserting means, a rotatable cam, a cam-follower lever, a compensating member operated by said cam through said cam-follower lever so as to continue the withdrawal of weft in the form of a further loop from the supply between said intervals in such a manner that weft is drawn from the supply at a substantially uniform rate, an adjustable pivot for said cam-follower lever, a curved slot adapted to house said adjustable pivot, said cam-follower lever being adjustable along the curved slot so that the position of said cam-follower lever may be adjusted relative to said cam to control the time of operation of said compensating member by said cam in order that the loop-drawing movement of the compensating member always commences at the same time in the cam cycle while the maximum movement is concluded at an adjustable time, and adjustable means connecting the cam-follower lever and the compensating member, adapted to allow the extent of movement of the compensating member to be adjusted.

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