April 8, 1930. J. THEXTON, JR., ET AL 1,753,457

LOOM

Filed Feb. 1, 1928 3 Sheets-Sheet 1

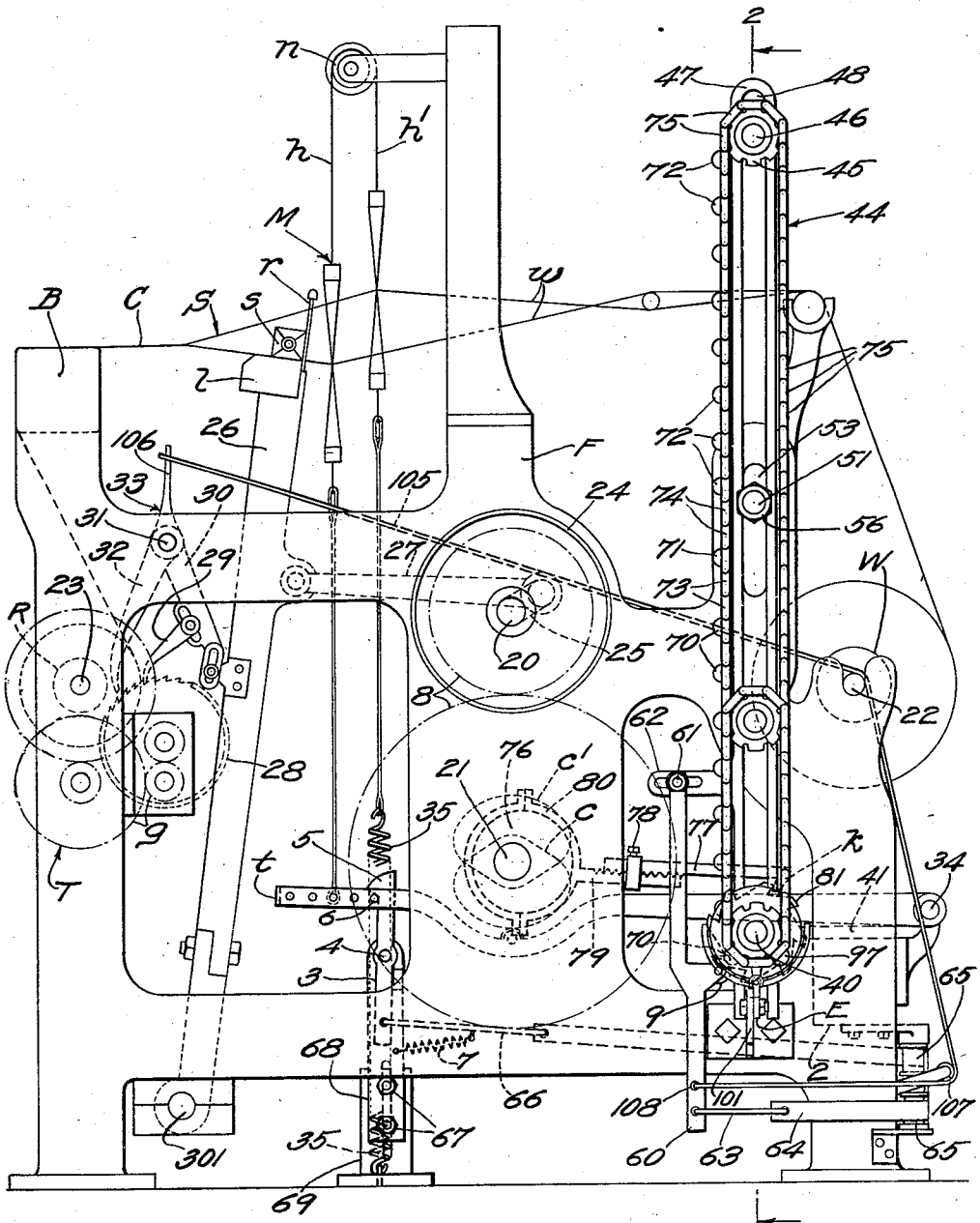


Fig. 1.

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LOOM

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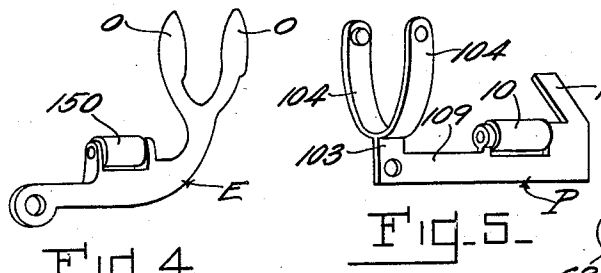


Fig. 4.

Fig. 5.

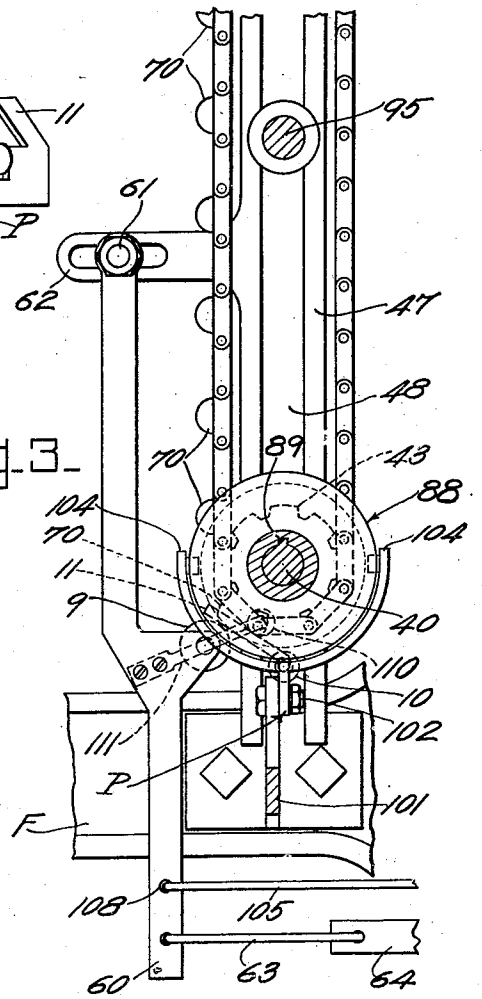


Fig. 3.

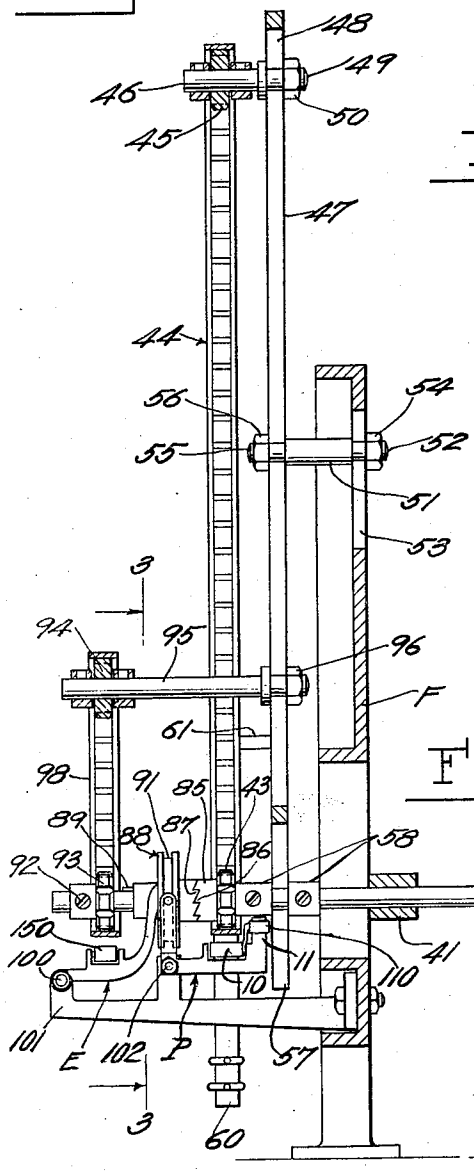
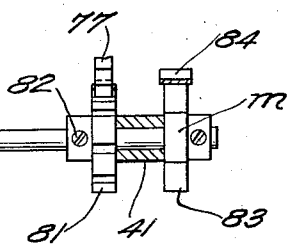


Fig. 2.



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LOOM

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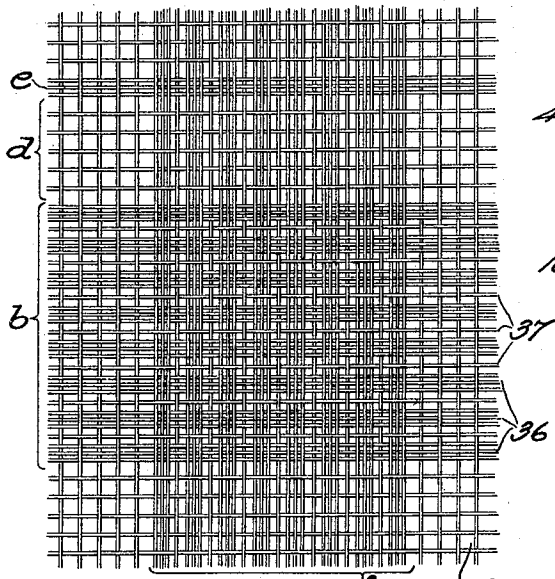


Fig. 9.

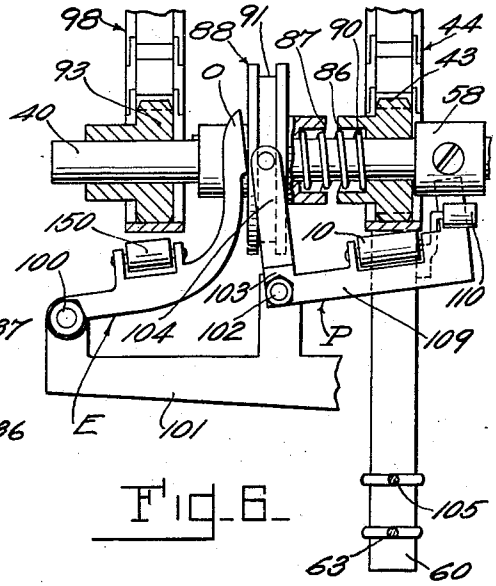


Fig. 6.

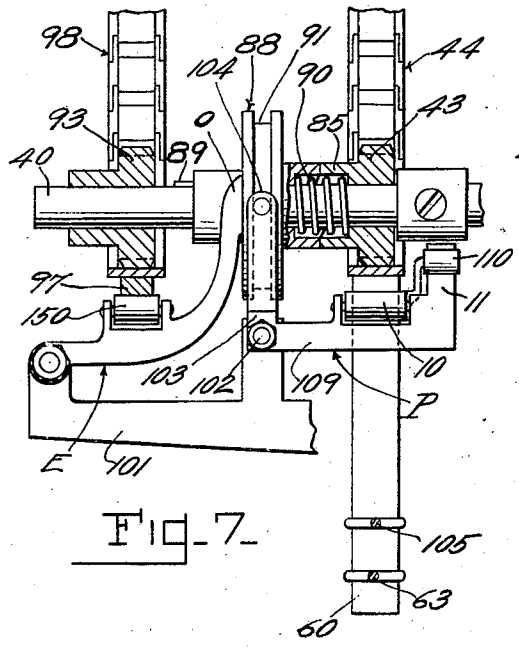


Fig. 7.

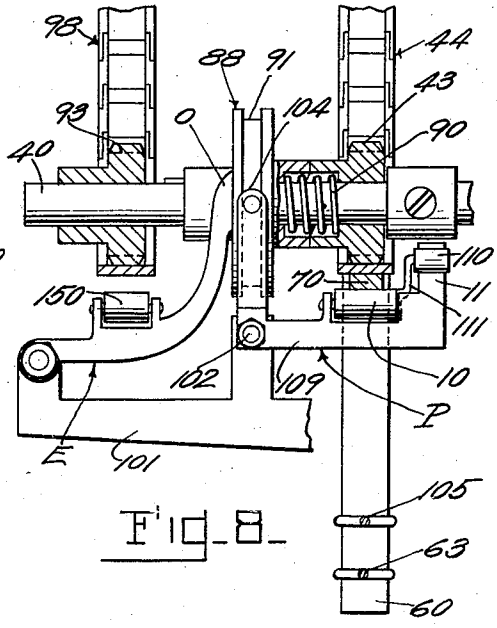


Fig. 8.

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UNITED STATES PATENT OFFICE

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LOOM

Application filed February 1, 1928. Serial No. 251,152.

This invention relates to looms and particularly to mechanism to be applied to a plain loom for controlling the pattern as it is woven into the cloth. It is particularly, though not exclusively, adapted for use in weaving handkerchief cloth, and is an alternative construction to that shown in a copending application.

One object of the present invention is to provide pattern controlling mechanism for application to a plain loom so that pattern cloth can be woven thereon or the loom used for weaving plain cloth.

Other objects of the invention will be more fully understood from the following description when taken in connection with the accompanying drawings and the novel features thereof will be pointed out and clearly defined in the claims at the close of this specification.

In the drawings,

Fig. 1 is a side elevation of a loom having attached thereto pattern controlling mechanism embodying the invention, the parts being shown in operative position.

Fig. 2 is a vertical section taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged vertical section taken on the line 3—3 of Fig. 2.

Figs. 4 and 5 are detail views in perspective of the arm and lever respectively of the clutch engaging mechanism.

Figs. 6, 7 and 8 are fragmentary views similar to Fig. 2 and illustrating successive positions of the clutch engaging mechanism.

Fig. 9 is a diagram of handkerchief cloth produced by a loom having attached thereto mechanism embodying the invention.

As herein shown the pattern controlling mechanism embodying the invention is applied to a plain loom of the two harness type. Referring to Fig. 1 of the drawings, at F is shown one of the side frames of such a loom which is provided with bearings for the crank shaft 20, the cam shaft 21, the shaft 22 of the spool W from which the warp threads *w* are drawn in the process of weaving, and the shaft 23 of the cloth drum R upon which the finished cloth C is wound after passing over the breast beam B. The crank shaft 20 has fixed thereto a pulley 24 by which it is driven it is driven from any suitable source of power (not shown). It is provided with cranks 25 which impart an oscillating motion to the lay beam *l* carried by the lay swords 26 to which the cranks are connected by intermediate links 27. The lay swords are pivoted at 301 to the frame of the loom. The cam shaft 21 is driven by the crank shaft to which it is rotatably connected by gears 8.

The takeup motion of the loom, shown at T, is of the intermittent type and comprises a train of gears *g* and a ratchet 28 which receives motion from a pawl 29 carried by an arm 30 pivoted at 31 to the frame and actuated by one of the lay swords 26. The ratchet 28 is locked against retrograde movement after each action of the pawl 29 by one arm 32 of a lever 33 pivoted at 31 to the frame, said arm acting as a locking pawl. This motion draws down the cloth after it is woven and winds it upon the drum R.

The shedding motion of the loom is indicated at M and includes shedding cams, one treadle, front and back harnesses, a coiled spring and a harness roller. The shedding cams indicated at *c* and *c'* are mounted fast on the cam shaft 21. The cam *c* operates the treadle *t* which is pivoted at 34 to the frame. The front and back harnesses are indicated at *h* and *h'* respectively and are connected at their upper ends to the harness roller *n*. At its lower end the front harness *h* is connected to the treadle *t*. The treadle ordinarily supplied for the rear harness *h'* has been removed and the rear harness is connected to the floor by a coiled spring 35. As the front harness *h* is depressed by the extended portion of its cam *c*, the rear harness *h'* is raised, thus storing up energy in the spring 35. When the front harness *h* is permitted to rise the rear harness *h'* is depressed under the action of the spring 35. In this manner the shed indicated at S is formed which permits the passage therethrough of the shuttle *s* to lay the weft threads or filling. The shuttle *s*, actuated by the picking motion (not shown), travels on the lay beam *l* which is actuated by the crank shaft as heretofore described. At *r* is shown the reed which beats up the

last pick of the filling after it has been laid in the shed by the shuttle, the constant repetition of which results in the formation of the cloth.

With the exception of the omission of one treadle and the addition of the spring 35 which connects the rear harness h' to the floor, the foregoing mechanism may be of any well known construction as it forms no part of the present invention except in its combination therewith to bring about the desired results.

Referring now to Fig. 9 of the drawings, there is shown in diagram a fragmentary view of handkerchief cloth as it comes off the loom wherein a designates the body portion which is of plain weave, b designates one of the borders made by the weft threads or filling and which in this instance comprises a group of eight cords shown at 36 and seven single threads or picks shown at 37. Each cord of this border is made up of three threads or picks and each pair of cords has one of the single threads or picks therebetween. At d is shown one of the hems which is of plain weave and at e one of the so-called "severing cords" which in this instance is made up of three threads or picks. As is well known to those skilled in the art, handkerchief cloth is made up in a large bolt comprising a large number of handkerchiefs and the severing cords are woven into the cloth at predetermined intervals to define the individual handkerchiefs, it being only necessary for the handkerchief maker to cut along these lines to divide the cloth into individual handkerchiefs which may afterwards be finished up in any well-known manner. At f is shown one of the borders made up by the warp threads which is similar in construction to the border previously described.

It is with the weaving of the borders b and the severing cords e made of the weft threads or filling that the invention is concerned and it is one of the objects of the present invention to provide pattern controlling mechanism adapted for application to a plain loom of the two harness type and capable of producing the pattern above referred to.

In accordance with the present invention and with particular reference to Figs. 1 and 2 of the drawings, at 40 is indicated a shaft journaled in bearings 41 secured to a cross member 2 connecting the side frames F of the loom. A portion of this shaft extends outwardly beyond one of the side frames and has loosely mounted thereon a sprocket 43 which engages a chain 44 herein termed the "pattern chain." This chain is provided with a series of cams for a purpose to be hereinafter described and extends upwardly in a plane parallel to the loom frame and at its upper end runs over a sprocket 45 loosely mounted on a stud 46 which is adjustably secured to a bracket 47 located between said chain and the side frame of the loom.

The bracket 47 is provided with an elongated slot 48 for the reception of the threaded end portion 49 of the stud 46, said stud being fixed in adjusted position by a nut 50. The bracket is itself adjustably secured to the side frame of the loom by a stud 51 the reduced threaded portion 52 of which is received in an elongated slot 53 in the side frames F to which the inner end of the stud is clamped by a nut 54. The stud 51 is provided at its outer end with a reduced threaded portion 55 which is received in the slot of the bracket to which it is clamped by a nut 56. The bracket terminates at its lower end in a fork indicated at 57 which engages the shaft 40 and is held immovably in place thereon between collars 58 secured to said shaft.

It will thus be seen that adjustment is provided between the side frame F of the loom and the bracket 47 for the pattern chain, and furthermore between the bracket 47 and the stud 46 which carries the upper sprocket 45. In this manner various lengths of pattern chains for a wide variety of patterns may be employed.

The pattern chain 44 comprises a series of links for engagement with the sprockets 43 and 45 and is provided on its periphery with knobs or cams arranged in groups and adapted at certain intervals during the operation of the loom, to actuate mechanism to engage the treadle t and restrain the harnesses. As shown in Fig. 1 this mechanism includes an arm 60 having its upper end loosely mounted on a stud 61 adjustably secured to an extension 62 on the bracket 47. The lower end of the arm 60 has attached thereto a wire 63 that is connected to a belt 64 that passes around pulleys 65 and is connected to a wire 66 that is attached to the lower end of a latch 3 pivoted intermediate its ends at 4 to a post 68. The post 68 is adjustably secured by bolts 67 to a slotted standard 69 fixed to the floor directly under the forward end of the treadle t. The upper end of the latch 3 is provided with a hook 5 adapted to engage a pin 6 on the forward end of the treadle when the treadle engaging mechanism is actuated. The hooked end of the latch 3 is released to free the treadle, when the treadle engaging mechanism is inoperative, by a coiled spring 7 attached at one end to the post and at the other end to the wire 66 as shown in Fig. 1. The arm 60 is provided, intermediate its pivot point 61 and its connection with the flexible member which connects it to the latch 3, with a roller 9 which lies in the path of movement of the cams on the pattern chain and normally rests against the plain links thereof due to the force exerted by the spring 7 in retracting the connections 63, 64 and 66.

The cams on the pattern chain are as heretofore stated arranged in groups and as shown for the particular pattern illustrated in Fig. 9 comprise a group of eight cams indicated at 70, a single cam 71 and another group of eight cams indicated at 72. Between each pair of cams in the eight-cam group is a single plain link. Between the groups 70 and the single cam 71 are two plain links indicated at 73 and between the single cam 71 and the next group 72 are two plain links indicated at 74 and between each group of cams to complete the chain are 41 plain links indicated at 75.

The group of eight cams indicated at 70 actuates the treadle engaging mechanism above described to restrain the harnesses while the eight cords 36 of the border *b* shown in Fig. 9 are being laid. The seven plain links in this group permit the treadle engaging mechanism to release the harnesses under the action of the spring 7 at which time the seven single picks in the border *b* are being laid. As shown in Fig. 1 the first cam of the group 70 is engaging the roller 9 of the arm 60. This action has swung the arm 60 on its pivot to the left as viewed in this figure, causing the arm to exert a pull on the lower end of the latch 3 through the intermediate connections 63, 64 and 66 and force the hooked end 5 of said latch into engagement with the pin 6 on the forward end of the treadle. At this time the harnesses are held in a fixed position thus keeping the shed S in the position shown in Fig. 1 while the three picks constituting the first cord of the border *b* are being laid. The single cam 71 actuates the treadle engaging mechanism in like manner to restrain the harnesses while the severing cord *c* of three picks is being laid. The next group of eight cams indicated at 72 actuates the treadle engaging mechanism to restrain the harnesses while the next border (not shown) which is similar to border *b* is being laid.

The pattern chain 44 may be moved to actuate the treadle engaging mechanism by any suitable means, one type of which as herein shown will now be described. Secured to the cam shaft 21 for rotation therewith is an eccentric 76 which actuates a pawl 77 having a hook-shaped end *k* and adjustably secured by a set screw 78 to a projection 79 on the eccentric strap 80. The pawl 77 overlies a ratchet 81 secured by a set screw 82 to the shaft 40 and is adapted during the operation of the loom to engage the teeth of the ratchet and impart a partial rotation to the shaft 40 upon which is mounted the sprocket 43 that engages the pattern chain. It will thus be seen that the shaft 40 is given a step by step rotation by the pawl.

Means are provided to prevent the shaft 40 from overrunning under the pull exerted by the pawl 77, and as shown in Fig. 2 said means comprises a wheel 83 fixed to said shaft and a flat spring 84 secured to the loom frame. The wheel is provided with flat surfaces *m* on its periphery corresponding in number to the number of teeth in the ratchet 80 and sprockets 43 and 45, said surfaces being adapted to be engaged one at a time by the free end of the spring 84 as the shaft is given its step by step rotation. In this manner the ratchet is advanced to the extent of only one tooth by each movement of the pawl, the spring 84 preventing its further movement by the pressure exerted on its corresponding surface *m* on the wheel 83.

It will thus be seen that the shaft 40 is given a partial rotation by each movement of the pawl, and this intermittent movement of the shaft continues throughout the entire operation of the loom.

The pattern chain 44 is driven in a step by step movement by the shaft 40 to actuate the treadle engaging mechanism to restrain the harnesses while the pattern, in this instance, consisting of the borders and severing cords of the handkerchief cloth, is being laid. Means for connecting the pattern chain to the shaft 40 for rotation therewith will now be described. Integrally cast with the sprocket gear 43 on the outer face thereof is a hub 85 which is provided with teeth indicated at 86, said gear constituting one member of a clutch. The inner face of the gear bears against the outer collar 58 on the shaft 40. The teeth 86 of the clutch member are adapted to be engaged, at predetermined intervals, to advance the pattern chain, with teeth indicated at 87 formed on the hub of a disk 88, said disk constituting the other member of the clutch. The clutch member 88 is slidably mounted on the shaft 40 and is rotatively connected therewith by a spline 89 on said shaft which engages a slot in the clutch member 88. A coiled spring 90 (see Figs. 6, 7, and 8) surrounding the shaft 40 and interposed between the clutch members tends to keep the clutch disengaged. The clutch member 88 is provided on its periphery with an annular groove 91 for a purpose to be hereinafter described.

Means are provided to engage the member of the clutch to permit the shaft 40 to advance the pattern chain in a step by step motion throughout its range of forty-one plain links indicated at 75 and into a position as shown in Figs. 1 and 3 for the first cam 70 to actuate the treadle engaging mechanism to restrain the harnesses while the first cord of the border *b* of the handkerchief cloth is being laid. The movement of the forty-one plain links of the pattern chain past the roller 9 of the treadle engaging mechanism permits the normal action of the harnesses in weaving the plain cloth constituting the body of the handkerchief. This means will now be described:

Secured to the outer end of the shaft 40 by a set screw 92 is a sprocket 93 which engages and drives a chain 98 herein termed the "multiplier chain." This chain extends upwardly in a plane parallel to the pattern chain and at its upper end runs over a sprocket 94 loosely mounted on a stud 95 which is adjustably secured by a nut 96 to the bracket 47 previously referred to. The multiplier chain for the particular pattern shown in Fig. 9 comprises a series of twenty-six links, twenty-five of which are plain and one of which is provided with a cam 97. This cam is adapted at each complete revolution of the multiplier chain to engage as shown in Fig. 7 a roller 150 on an arm E pivoted at 100 to a bracket 101 secured to the side frame F. The arm E (see Figs. 2 and 4) is bifurcated at its free end to form fingers O, which straddle the shaft 40 and engage the clutch disk 88 on the outer face thereof. It will thus be seen that the arm E is turned down on its pivot by the engagement of the cam 97 with the roller 150 on said arm, once for each complete revolution of the multiplier chain 98. As the arm E is depressed it moves the clutch member 88 into engagement with the clutch member 43 and permits the shaft 40 to drive the pattern chain 44 until the arm is released and the clutch is disengaged by the action of the spring 90. In this manner the pattern chain is intermittently advanced one link at a time until the plain weave of the body portion of the handkerchief is completed and until the first cord of the border is being laid. In like manner the pattern chain is advanced the two plain links indicated at 73 to permit the weaving of plain cloth in the hem *d* and into a position to actuate the harness engaging mechanism to restrain the harnesses while the severing cord *e* is being laid. The pattern chain is also similarly advanced the two plain links indicated at 74 to permit the weaving of plain cloth in the succeeding hem and into a position to actuate the harness engaging mechanism while the first cord of the next border is being laid.

Means for engaging the clutch to permit the shaft 40 to advance the pattern chain for the completion of the border *b* will now be described. Pivoted at 102 to the bracket 101 is a lever P (see Figs. 2 and 5 to 8, inclusive), which is substantially in the form of a bell crank. One arm 103 of the lever P extends upwardly from the pivot point and terminates in a fork, the arms 104 of which are adapted to engage the clutch member 88 in the groove 91 thereof. The other arm 109 of the lever P extends inwardly and is provided with a roller 10 which lies in the path of movement of the cams on the pattern chain 44. At its extreme inner end the arm 109 is provided with a tail portion 11 which is angularly disposed relative to said arm and is inclined upwardly toward its free end (see Fig. 5). The tail portion 11 lies in the path of movement of a roller 110 (see particularly Fig. 3) secured to the free end of an arm 111 which is itself secured to the arm 60 of the treadle engaging mechanism.

With the foregoing construction it will be seen that the cam 97 in the multiplier chain 98 actuates the arm E to engage the clutch to advance the pattern chain while plain cloth constituting the body portion of the handkerchief is being woven. The pattern chain is advanced thereby until the first cam of the group 70 is in engagement with the roller 9 on the cam 60 of the treadle engaging mechanism as shown in Figs. 1 and 3. As the arm 60 is moved by this cam it moves the roller 110 which is attached thereto into engagement with the tail portion 11 of the lever P thus depressing the arm 109 of said lever and holding the clutch engaged for the completion of the first cord of the border. After the completion of this cord, the first cam of the group 70 engages the roller 10 of the lever P, thus holding the arm 109 thereof in its depressed position (see Fig. 8) and keeping the clutch still engaged until the next cam of the group 70 actuates the treadle engaging mechanism to restrain the harnesses while the next cord is being laid. At this time the roller 110 again engages the tail portion 11 of the lever P, thus holding the clutch engaged until the completion of this cord. In like manner the pattern chain is moved to actuate the treadle engaging mechanism to restrain the harnesses while the remainder of the border *b* is being completed. The pattern chain is then advanced as heretofore explained by the action of the multiplier chain while the hem is being woven and until the cam 71 engages the roller 9 and actuates the treadle engaging mechanism while the severing cord is being laid. The clutch is held in engagement until the completion of this cord by the action of the roller 110 on the lever P as heretofore described. The pattern chain is then further advanced by the action of the multiplier chain until the succeeding hem is woven and until the first cord of the succeeding border is being laid and the clutch is held in engagement to permit the completion of this border, by the action of the cams 72 and the roller 110 on the lever P, as previously described. In this manner a complete cycle of operations of the pattern controlling mechanism is effected.

As previously stated, the take-up motion, generally indicated at T in Fig. 1, draws down the cloth after it is woven and winds it upon the drum R. This action must take place after the reed *r* beats up each pick of the filling in the plain weave which constitutes the body and hems of the handkerchief, but must be stopped temporarily while the cords of the borders and the severing cords are being laid to make the picks thereof more compact

in the finished cloth. Means are provided for checking the take-up motion during this operation, and as shown in Fig. 1, said means comprises a flexible connection indicated at 105, which is secured at one end to the arm 106 to the locking pawl lever 33 and extends downwardly over the shaft 22 of the spool *w*, thence over a pulley 107 and forwardly to its connection at 108 with the lower end of the arm 60 previously referred to for actuating the treadle engaging mechanism. It will thus be seen that when the treadle engaging mechanism is actuated to restrain the harnesses while the cords of the borders and the severing cords are being laid, the take-up motion will be checked, thus permitting the completed cord to be laid before the cloth is again taken up. When the plain weave of the body and hems of the handkerchief is made, the take-up motion will be permitted to operate as is ordinarily the case after each pick of the filling is laid.

When the loom is to be used for weaving plain cloth it is simply necessary to remove the pawl 77 when the treadle engaging mechanism is in an inoperative position, after which the pattern controlling mechanism will remain idle during the operation of the loom. This requires but a few minutes' time and practically permits the continuous operation of the loom in weaving either plain or fancy goods.

From the foregoing description it will be seen that a plain loom equipped with pattern controlling mechanism embodying the invention is adapted to weave either plain or pattern cloth. Furthermore such mechanism is comparatively simple and inexpensive and requires little attention after it is set up and running. It requires considerably less power to operate than mechanisms now in common use for performing similar operations, and permits of a higher speed with a consequent greater output per machine.

The foregoing advantages therefore result particularly in a lower first cost, less power consumed, lower labor costs and increased production.

We claim:

1. A loom adapted to weave plain cloth having an attachment whereby it is adapted to weave a border comprising cords consisting of a plurality of picks alternating with plain weave, said attachment comprising means for restraining the harness at predetermined times while a plurality of picks are being laid to form one of the cords, a pattern controlling member consisting of a cam carrier, a plurality of cams carried by said carrier to actuate the restraining mechanism according to the pattern to be formed, a driving shaft, clutch mechanism on said shaft adapted to make and break driving connection with said cam carrier, means for actuating the clutch engaging mechanism to cause the cam carrier to be moved and to bring one of its cams into operative position to restrain the harnesses while the cord is being laid, means for holding the clutch engaged to advance the pattern controlling cam carrier during the restraint on the harnesses, means for holding the clutch engaged to advance the said cam carrier into position for another cam to actuate the harness restraining mechanism for the laying of another cord, a second cam carrier, means for driving said second cam carrier and means whereby said second cam carrier controls the duration of the continuous plain weave while the pattern controlling cam carrier is inoperative and means whereby said second cam carrier controls the shifting from plain weave to the pattern weave and renders operative the pattern controlling mechanism after a predetermined continuous plain weave.

2. A loom adapted to weave plain cloth and an attachment therefor adapted to weave a patterned border consisting of cords and plain weave, said attachment comprising a cam carrier, a series of cams mounted on said carrier at predetermined intervals according to the pattern to be woven, means actuated by said cams to restrain the harnesses at predetermined intervals and during a predetermined number of picks, a rotary shaft for driving said cam carrier, clutch mechanism adapted to make driving connection between said shaft and said cam carrier, said means comprising two clutch members, means for normally holding said clutch members disengaged from each other, a second cam carrier, a cam carried thereby, means for actuating said second cam carrier, and means actuated by the cam on said second carrier to engage the clutch and thereby permit the first cam carrier to be actuated by said rotary shaft.

3. A loom adapted to weave cloth and an attachment therefor adapted to weave a patterned border consisting of cords and plain weave, said attachment comprising a cam carrier, a series of cams mounted on said carrier at predetermined intervals according to the pattern to be woven, means actuated by said cams to restrain the harnesses at predetermined intervals and during a predetermined number of picks, a rotary shaft for actuating said cam carrier, clutch mechanism adapted to make driving connection between said shaft and said cam carrier, said means comprising two clutch members, one of which is movable with relation to the other, means for normally holding said clutch members disengaged from each other, a second cam carrier, a cam carried thereby, means for actuating said second cam carrier, means actuated by the cam on said second carrier to engage the clutch and thereby permit the first cam carrier to be actuated by said rotary

shaft, auxiliary means carried by said harness restraining mechanism, means actuated thereby to hold the clutch members in engagement with each other during the laying of the cord, and means for continuing the clutch engagement consisting of a member carried by the movable member of the clutch adapted to be engaged by a cam on said first cam carrier.

4. A loom adapted to weave plain cloth having an attachment whereby it is adapted to weave a border comprising cords consisting of a plurality of picks alternating with plain weave, said attachment comprising means for restraining the harnesses at predetermined times while a plurality of picks are being laid to form one of the cords, a pattern controlling member consisting of a cam carrier, a plurality of cams mounted on said carrier to actuate the restraining mechanism according to the pattern to be formed, a driving shaft, clutch mechanism on said shaft adapted to make and break driving connection with said cam carrier, means for engaging the clutch and thereby rendering the cam carrier operative to bring one of its cams into operative position to restrain the harnesses while the cord is being laid, means for holding the clutch engaged to advance the pattern controlling cam carrier during the restraint on the harnesses, and means for holding the clutch engaged to advance the said cam carrier into position for another one of said cams carried thereby to actuate the harness restraining mechanism for the laying of another cord.

5. A loom adapted to weave plain cloth and an attachment whereby it is adapted to weave a border consisting of cords alternating with plain weave, said attachment having means for restraining the harnesses while a plurality of picks are being laid to form a cord, a movable pattern controlling member adapted at intervals to actuate the harness restraining mechanism, driving mechanism for the pattern controlling member, a clutch whereby the driving mechanism may be operatively connected with the movable pattern controlling member, means for engaging the said clutch and thereby causing the pattern controlling member to be actuated to bring the pattern controlling member into position to restrain the harnesses, means controlled by the harness restraining mechanism to hold the clutch engaged to permit advance of the pattern controlling mechanism during said restraint, and other means carried by the harness restraining member to hold the clutch engaged while the pattern controlling member advances to a position to again restrain the harnesses.

6. A loom adapted to weave plain cloth and an attachment whereby it is adapted to weave a border consisting of cords alternating with plain weave, said attachment having means for restraining the harnesses while a plurality of picks are being laid to form a cord, a movable pattern controlling member adapted at intervals to actuate the harness restraining mechanism, driving mechanism for the pattern controlling member, a clutch whereby the driving mechanism may be operatively connected with the movable pattern controlling member, means for engaging the said clutch and thereby causing the pattern controlling member to be actuated to bring the pattern controlling member into position to restrain the harnesses, means controlled by the harness restraining mechanism to hold the clutch engaged to permit advance of the pattern controlling mechanism during said restraint, other means carried by the harness restraining member to hold the clutch engaged while the pattern controlling member advances to a position to again restrain the harness, and means whereby said clutch is engaged to render the movable pattern controlling member operative only after predetermined periods of continuous plain weave.

7. In combination with a loom adapted to weave plain cloth, an attachment having means whereby it is also adapted to weave a border portion consisting of plain weave interspersed with cords composed of a plurality of picks, means for actuating the border forming mechanism, said border forming mechanism being normally held in suspense, means for rendering the said border forming mechanism operative after a predetermined operation of the plain weave, means for rendering the border forming mechanism inoperative after a predetermined period of operation, driving mechanism, clutch mechanism for connecting the driving mechanism with the border forming mechanism and a cam carrier adapted to make the clutch connection at predetermined intervals in the operation of the loom.

In testimony whereof we affix our signatures.

JOSEPH THEXTON, JR.
HENRY TOMLINSON.