

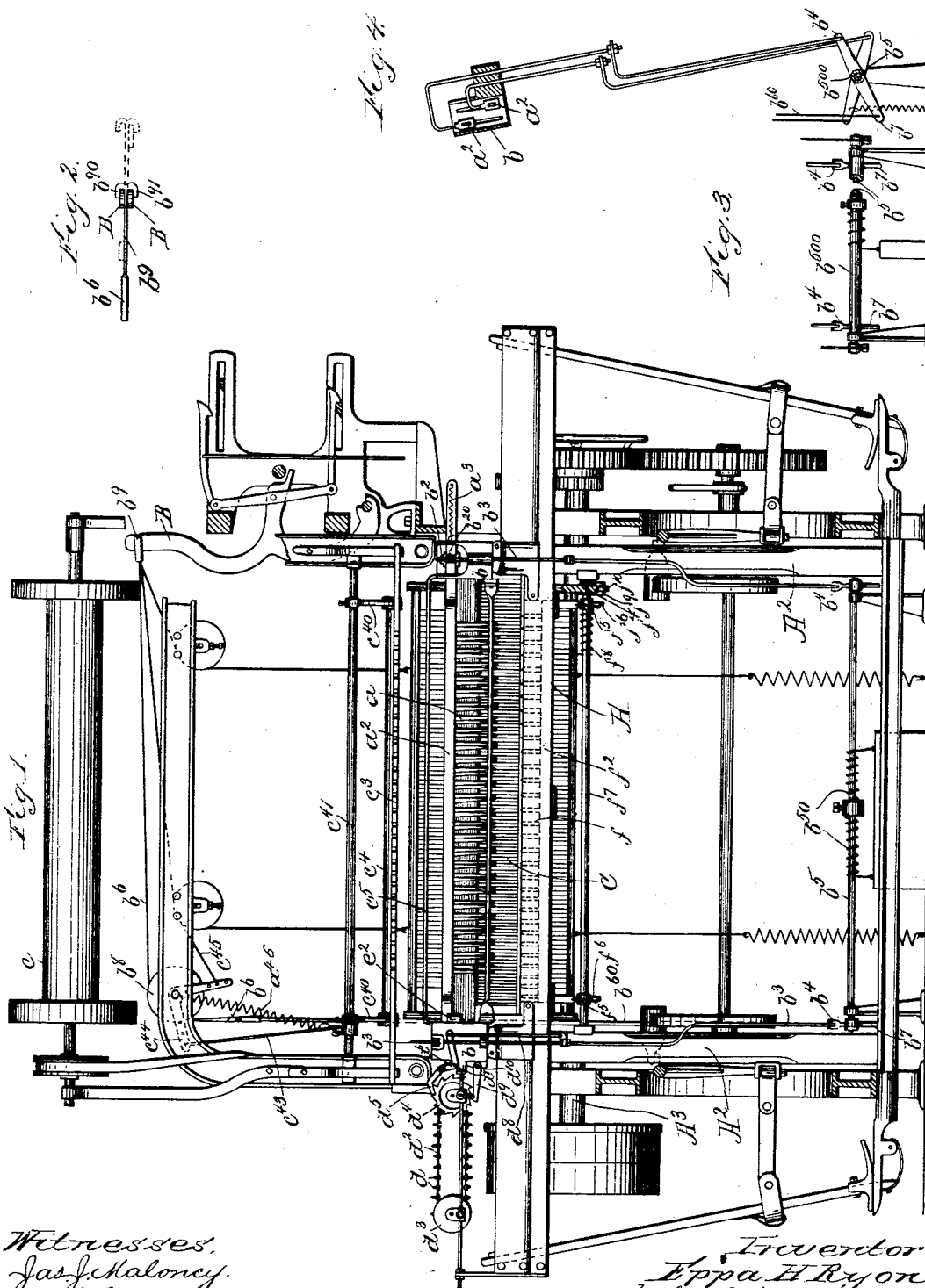
(No Model.)

3 Sheets—Sheet 1.

E. H. RYON.
LAPPET LOOM.

No. 587,865.

Patented Aug. 10, 1897.



Witnesses,
Jas. J. Maloney.
H. Livermore.

Inventor
Eppa H Ryon
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Att'y.

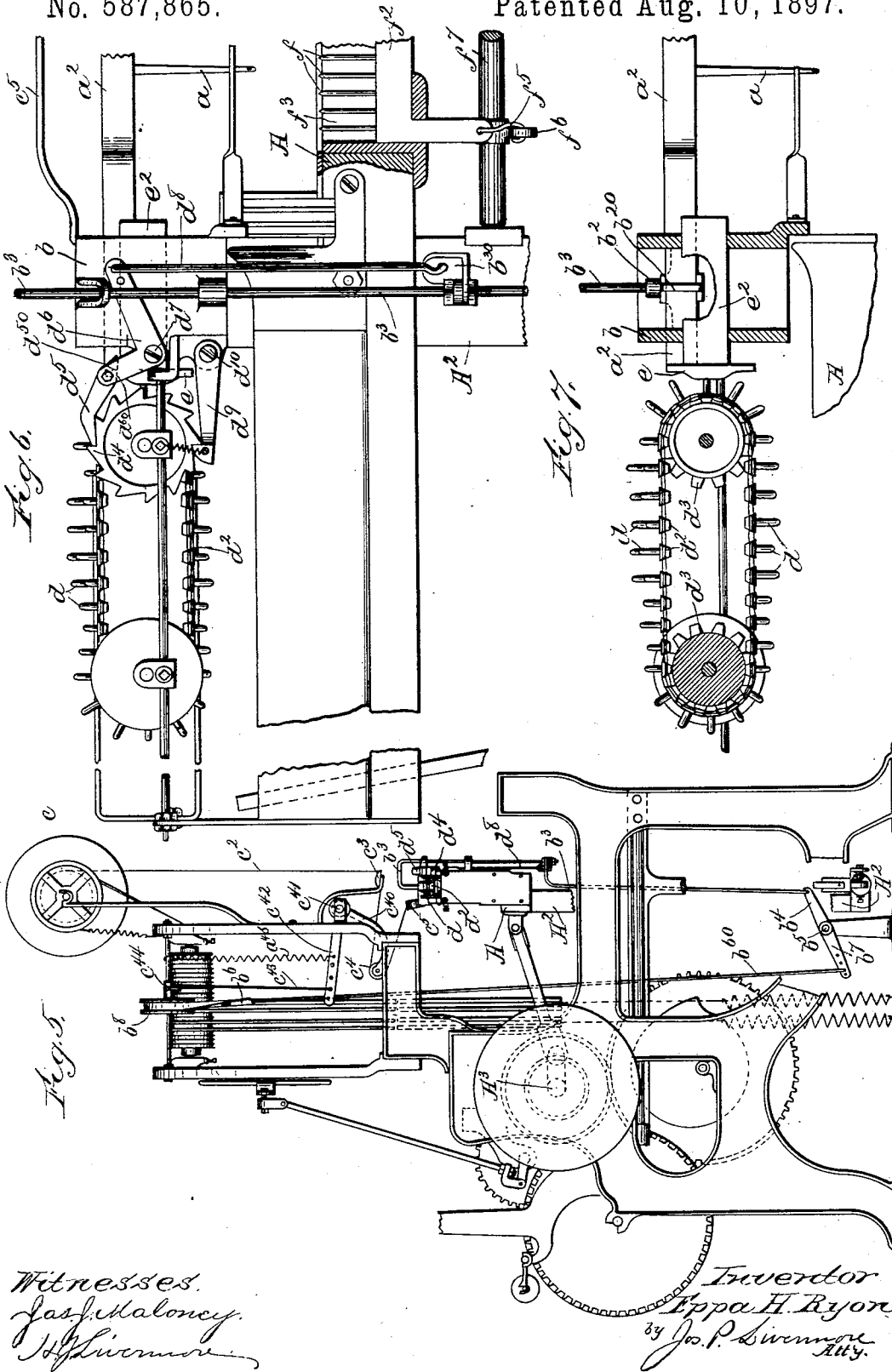
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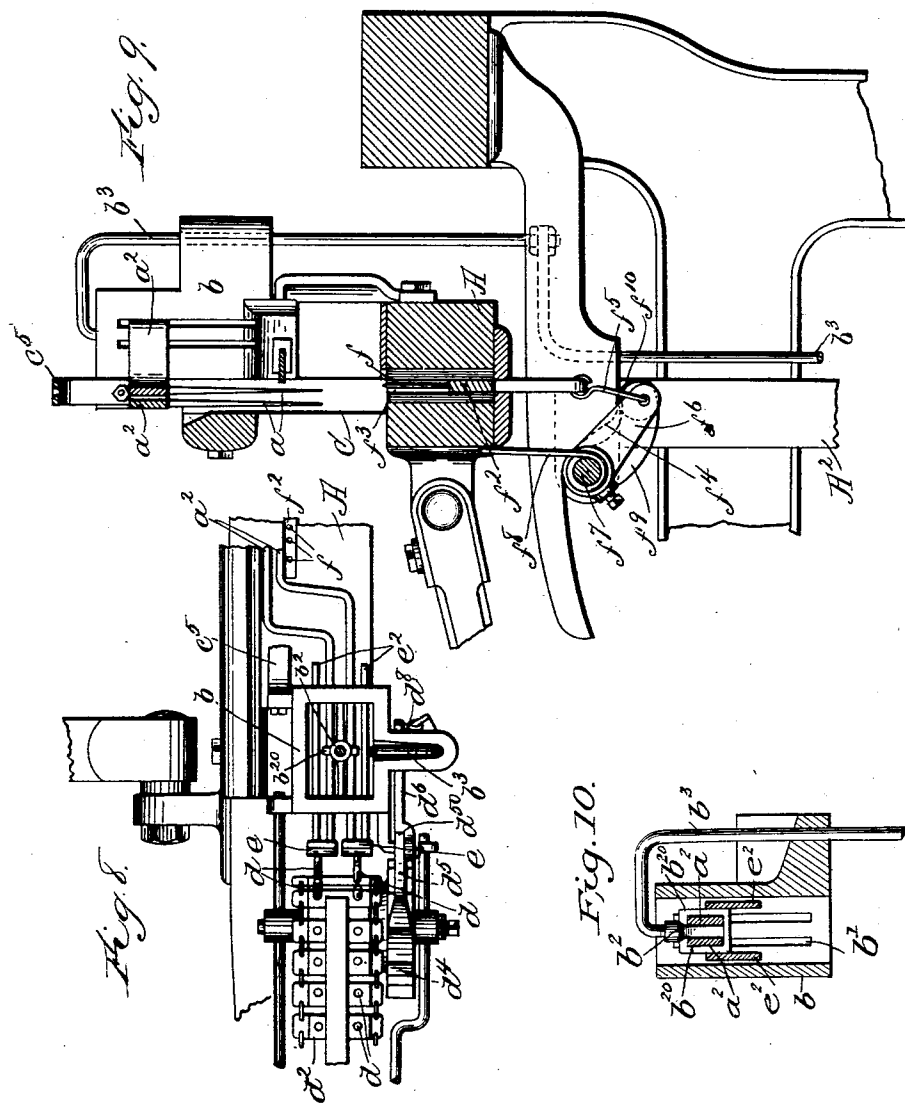
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UNITED STATES PATENT OFFICE.

EPPA H. RYON, OF WALTHAM, MASSACHUSETTS, ASSIGNOR OF ONE-HALF
TO ALFRED M. GOODALE, OF SAME PLACE.

LAPPET-LOOM.

SPECIFICATION forming part of Letters Patent No. 587,865, dated August 10, 1897.

Application filed April 27, 1896. Serial No. 589,233. (No model.)

To all whom it may concern.

Be it known that I, EPPA H. RYON, of Waltham, county of Middlesex, and State of Massachusetts, have invented an Improvement in
5 Lappet-Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to a lappet-loom and is embodied in a novel construction and arrangement of the devices for weaving lappet, including the means for determining the pattern, said devices being so constructed as to be readily applicable to plain or fancy
15 looms as now constructed without materially altering the arrangement thereof or modifying their operation.

In accordance with the present invention the reciprocating movement of the needles
20 for making the lappet-stitch is produced by connecting mechanism coöperating with the devices which move the harness-frames, the said mechanism being so arranged that a complete reciprocation of the needles is produced
25 at each pick, while the pattern device which controls the lateral movement of said needles and regulates the length of the lappet-stitches is operated directly by the same mechanism that reciprocates the needles.

The attachments forming the subject of the invention are especially adapted for use with a dobby-loom and will be shown and described in connection with such a loom, but they may obviously be used in connection with looms
35 of different types.

The take-up device for the lappet-threads is operated by a connection with the device which operates the needles, while the shuttle-guide-pin bar, which is provided in lappet-
40 looms to protect the needles, is moved into position before the throw of the shuttle and out of the way of the reed after the shuttle is thrown by means of a cam engaging therewith during the forward and backward movement of the lay.

When, as herein shown, the lappet attachment forming the subject of the present invention is applied to a dobby-loom, the needles, the tension device, and the pattern-chain are all operated by a strap or flexible
50 connection with the dobby-blades similar to

the strap which operates the harness-frames, and in order to produce a complete reciprocation of the needles at each pick means are provided for shifting the connection from one
55 to another of the two alternately-operating dobby-blades, so that the movement of each dobby-blade from an intermediate position to one of its extremes and back to the said intermediate position produces a complete
60 up-and-down movement of the needles. This is accomplished by providing at the end of the flexible strap by which the needles are operated a double hook or hook having two
65 members so arranged that one of said members is in the path of one dobby-blade and the other in the path of an adjacent dobby-blade which moves alternately with the blade first mentioned. At the intermediate point,
70 therefore, or point at which two dobby-blades pass each other in reversing the position of the warp-threads to open a new shed the hook will embrace both of said blades, being immediately engaged by one of said blades and
75 following the same from its intermediate to its extreme position and back again, thus producing a complete up-and-down reciprocation of the needles, and on again returning to said intermediate position the said hook is caught
80 by the alternately-moving dobby-blade as it passes the one which has previously engaged the hook, thus repeating the operation and causing a second complete reciprocation of the needles. Thus the needles are always
85 down when the shed is formed and while the shuttle is passing therethrough and up as the harness-frames pass each other or when the shed is closed, or, in other words, when the dobby-blades pass each other at their intermediate positions, as above described, at
90 which time the filling-thread is beaten up and the threads of the lappet-needles are also taken up to tighten the lappet-stitches just formed.

The pattern device is mounted on the lay,
95 and consists of a band or chain provided with pins, differing in length, which control slides or followers, against the ends of which the needle-bars are held by means of a spring, and the said pattern-chain is advanced the
100 distance between two adjacent pins at each reciprocation of the needles by a direct con-

nection with the lifting-rod which actuates the needle-bars—as, for example, a pawl co-operating with a ratchet.

Figure 1 is a front sectional elevation of a dobby-loom provided with lappet-weaving devices embodying the present invention; Fig. 2, a detail showing the dobby-blades and the connecting-hook whereby the needles are operated; Figs. 3 and 4, details showing, respectively, a front elevation and a sectional elevation of a modification; Fig. 5, a side elevation of the loom; Fig. 6, a detail on an enlarged scale, showing in front elevation the pattern devices and means for operating the same; Fig. 7, a similar view, partly in section, showing the means for supporting and guiding the needle-bars and the manner of their coöperation with the pattern-chain and pattern devices; Fig. 8, a similar detail showing the pattern devices and the needle-bars in plan; Fig. 9, a sectional detail showing the shuttle-guide-pin bar and means for operating the same; and Fig. 10 is a section of one of the boxes or guides for the needle-bars, showing the yoke which carries said needle-bars.

The lappet-needles a project downward from the needle-bars a^2 , which are supported in guides or boxes b , mounted at the ends of the lay A , which is constructed and operated in the ordinary way, it being mounted upon the swords A^2 , which are rocked to produce a backward-and-forward movement of the lay by means of a crank and pitman operating from the main shaft A^3 , it not being deemed necessary to specify the construction and arrangement, since the invention is shown as applied to a loom of usual construction, the main elements of which of themselves embody no part of the present invention.

The shuttle-boxes and picker-staffs are of usual construction and operated in the usual way, and need not, therefore, be referred to by letter nor described.

The needles and needle-bar thus move with the lay in its forward-and-backward movement, and are capable of an up-and-down and lateral movement with relation thereto in order that the threads carried by the needles may be carried below the shed, so as to be caught by the filling at each pick and afterward carried up through and across a portion of the warp-threads to form the lappet-stitch determined by the pattern, after which they are again carried below the shed to be caught at the opposite end of said stitch at the next pick. To this end the needle-bars a^2 are movable both vertically and longitudinally in guide-slots b' , formed in the walls of the guide-boxes b , there being one of said boxes at each end of the lay, securely supported thereon over the shuttle-box at the end of the shuttle-race. Within each of the said boxes is a yoke or bracket b^2 , adapted to be moved up and down in said box, as will be hereinafter described, in order to give the proper up-and-down reciprocating move-

ment of the needles. The said yoke b^2 is provided with recesses (see Fig. 10) for the needle-bars, preferably formed in lateral wings or extensions b^{20} , through which recesses the said needle-bars are longitudinally movable, so that while the up-and-down movement of said yoke produces a corresponding up-and-down movement of the needle-bars the said bars are capable of longitudinal movement with relation to the yoke, thus giving a corresponding lateral movement of the needles, which movement is controlled by the pattern device which will be hereinafter described.

To produce the reciprocating movement of the needles corresponding to a pick of the loom, the yoke b^2 is moved up and down by the same mechanism which operates the harness-frames, (shown in this instance as the dobby-blades B ,) which are arranged and operated in the usual manner, the construction and operation thereof being well known and needing no further description. The movement is imparted to the yoke or yokes b^2 (there being a box b and yoke b^2 at each end of the needle-bars, which extend the length of the lay) by means of a rod b^3 , connected to one end of an arm b^4 , mounted on a rock-shaft b^5 , adapted to be oscillated by a strap or flexible connecting-piece b^6 , conducted, as by a rod b^{60} , to the end of an arm b^7 , projecting from said rock-shaft, (see Fig. 5,) the said strap passing over a pulley b^8 and terminating in a hook b^9 , operated by the dobby-blades B . The said hook b^9 is made with double prongs b^{90} b^{91} , projecting from opposite sides thereof, (see Fig. 2,) the shank of said hook passing between two adjacent dobby-blades, which are operated to reverse their position at every pick of the loom. At the time, therefore, when the lay is in its rearmost position and the shed open for the passage of the shuttle that one of the said pair of dobby-blades B which is farthest to the right of a person facing the loom, as shown in Fig. 1, is engaged with the corresponding prong of the hook, as shown in dotted lines, Fig. 2, drawing up the strap b^6 to its highest position and thus causing the needles to be carried down to the lowermost position, where the eyes thereof are below the lower warp-threads and the needle-threads running from the point of engagement with the fabric to the eyes of the needles rest upon the shuttle-race, so that the filling-thread passes above them when the shuttle is thrown across. Then while the lay is advancing to beat up the filling-thread and returning the position of the pair of dobby-blades B is again reversed, and in the movement of the dobby-blade, which has been engaged with the hook b^9 , from the extreme right-hand position to an intermediate position (shown in full lines, Fig. 2) the strap b^6 is lowered and the rock-shaft b^5 permitted to be turned by the action of one or more springs b^{50} to raise the needle-bar-lifting rods b^3 and needle-bars, thus carrying the lappet-

threads above the warp-threads, at which time the position of the needle-bars is shifted by the longitudinal movement controlled by their pattern.

5 The springs b^{50} are shown as right and left coiled springs, connected at one of their ends with the rock-shaft b^5 and at their other ends with the floor or a stationary object, such as the framework, so that they have a torsional effect on the shaft with a tendency to lift the needle-bar.

As the two blades B pass one another at substantially their intermediate position and at substantially the time when the lay is in its extreme forward position, the blade which is moving from left to right engages the corresponding prong of the hook b^9 and again lifts the strap b^6 , this movement taking place during the backward movement of the lay and being completed and the needles again wholly depressed by the time the shed is fully opened and the shuttle again thrown across therethrough. Thus at each operation of the blades and at the proper time in the corresponding pick of the loom the needle-bars are caused to have a complete up-and-down reciprocation, being lowered when the lay is back and the shed open and raised when the lay is forward and the last pick of filling-thread is being beaten up.

The needles are supplied with thread from one or more beams c , mounted in any suitable way, each thread c^2 passing down across a stationary guide-bar c^3 , provided with slots for the threads, one corresponding to each needle, and thence across a movable take-up device c^4 , and thence through a guide-bar c^5 on the lay, provided with a hole for each thread, and thence through the eye of the needle.

40 The take-up device, which is provided for the purpose of taking up the slack thread as the needles rise, consists of a bar or roll mounted on arms c^{10} , projecting from a rock-shaft c^{11} , having a lever-arm c^{12} , connected by a rod c^{13} with an elbow-lever c^{14} , (best shown in Fig. 1,) said elbow-lever being rocked in one direction by means of a tie c^{15} , connected with the hook b^9 , which operates the needles, as has been described, and in the opposite direction by a spring a^{16} , connected to a stationary portion of the frame. As the needles rise, therefore, the tension or take-up device c^4 swings back to the position shown in Fig. 5, taking up the slack thread, and thereafter moves forward to allow the said slack to be carried down by the said needles when the needles descend at the next operation.

The pattern device is mounted on the lay and preferably consists in series of pins d of 60 different lengths, one series for each needle-bar, so arranged that the ends of said pins cooperate with the ends of the needle-bars to determine the position of said needle-bars in their longitudinal movement, which obviously depends upon the length of the pin in engagement therewith at any given time. As herein shown, the said pins are carried upon a

chain d^2 , running over sprocket-wheels d^3 , arranged to travel intermittently such a distance as to bring the pins d of each series 70 carried by the chain consecutively into engagement with the head e of a slide or follower, (best shown in Figs. 7 and 8,) provided with a guiding portion e^2 , extending through a slot in the box b , (see Fig. 10,) so that it is 75 capable of longitudinal movement therein, and the opposite or inner side of the head e is engaged by the end of the corresponding needle-bar a^2 , each of which needle-bars is pressed against the corresponding follower-head by means of a spring a^3 , herein shown as located at the opposite end of said needle-bar, it being obvious, therefore, that the position of each needle-bar is determined by the length of the pin engaged by the corresponding head e , this being clearly illustrated in Fig. 7.

The pattern-chain d^2 is driven directly from the reciprocating rod b^3 , which produces the up-and-down movement of the needles, one 90 of the sprocket-wheels d^3 being provided with a ratchet-wheel d^4 , cooperating with a pawl d^5 , mounted at the end of an elbow-lever d^6 , pivoted at d^7 , and connected by a rod d^8 with the rod b^3 aforesaid, a lug or extension b^{50} being preferably secured to the said rod, to which extension the said rod d^8 is directly connected. Thus at each upward movement of the rod b^3 , which raises the needles from the shed, the pattern-chain will be advanced the distance 100 between two adjacent pins, so that the pin which has previously determined the position of the needle-bars is carried beyond the surface of the follower e , while the next pin comes in contact therewith, the said surface 105 being preferably, as shown, curved and constituting a cam cooperating with the pattern-pins, so that if the succeeding pin is longer than the one which is moved away it will engage an inclined surface on the head e , so as 110 to move the same and carry the needle-bars to the right, as seen in Fig. 7, against the stress of the springs a^3 above described.

In order to securely hold the pattern-chain and to prevent any possibility of a reverse 115 movement thereof, a retaining-pawl d^9 is provided, pivoted at d^{10} , as best shown in Fig. 6.

To prevent an overthrow of the pattern-carrier, the pawl d^9 is preferably provided with a rearward extension d^{50} , (shown in dotted lines, Fig. 6,) adapted to be engaged by a shoulder d^{60} (also dotted) on the elbow-lever d^6 , so that when said elbow-lever is actuated by the rod d^8 the said shoulder will engage the said extension, thus holding the under 125 surface of the pawl against the upper surface of the preceding tooth of the pawl, (the said under surface being, as shown, shaped to conform thereto,) thus effectually preventing a further forward movement of the ratchet-wheel until the rod d^8 again moves down. 130

It is obvious that one or more needle-bars may be employed, if desired, two being herein shown to illustrate the invention, each needle-

bar being provided with a separate series of pattern-pins, all operated simultaneously by means of the ratchet d^4 and pawl d^5 , above described.

5 As herein shown, the two needle-bars are both operated simultaneously by a single connection or strap b^6 from the mechanism that shifts the harness-frames, and the said needle-bars have an independent longitudinal
10 movement, each being controlled by its own series of pattern-pins, although both series move simultaneously, being actuated by the mechanism that raises and lowers the needles. It is obvious, however, that each needle-bar
15 might be actuated independently in its up-and-down reciprocations as well as in its longitudinal movement, it being necessary only to provide separate lifting-bars b^3 and connecting mechanism therefrom to a corresponding pair of dobby-blades or equivalent
20 actuating means. Such construction is illustrated in Figs. 3 and 4, wherein the arms $b^4 b^7$, that connect, respectively, with the needle-bar-lifting rods and the dobby-blades are
25 mounted upon a second rock-shaft b^{500} , shown as a sleeve inclosing the rock-shaft b^5 , that operates the other needle-bar. It is obvious, furthermore, that the pattern and feeding devices therefor illustrated in Fig. 6 may be
30 duplicated for each independently-operated needle-bar lifter, and inasmuch as the dobby-blades may be controlled by the usual pattern, so as to operate only at predetermined picks, each lappet needle-bar may be controlled entirely
35 independently of the others, as may be sometimes desirable for certain forms of lappet-pattern.

In lappet-loom it is necessary to provide a guide for the shuttle in order to protect the
40 needles from injury, and it is obviously necessary that the said guide should be movable in order to permit the reed to beat up the filling during the forward movement of the lay. In accordance with the present invention the
45 said guide consists of a series of pins f , mounted on a pin bar or blade f^2 , (see Fig. 6,) movable vertically in a slot f^3 , extending longitudinally through the lay A. The said bar
50 f^2 is arranged to move through the said slot as the lay moves back and forth, so that when the said lay is in the position assumed just before the pick takes place the pins f will have been carried up above the surface of the lay in front of the needles a to form the necessary
55 guide for the shuttle as it is thrown across.

The pin-bar is lowered just before the lay completes its beating-up movement, as shown in Fig. 9, by means of a cam f^4 , supported on
60 the main frame below the lay, which is shown in this figure in its forward position with the lappet-needles raised and the guide-pins lowered and the reed C in the position assumed when the filling is practically fully beaten up.

65 The bar or blade f^2 is connected at its ends by means of ties or links f^5 to arms f^6 of a rock-shaft f^7 , provided with a spring f^8 , tend-

ing to press the said arms upward, and said rock-shaft is also provided with another arm f^9 , having a cam-roll f^{10} , cooperating with the
70 cam-surface f^4 , it being obvious, therefore, that as the lay moves back the cam-roll will ride up the inclined surface f^4 , causing the blade f^2 to rise and carry the pins f up above the surface of the lay, and conversely as the
75 lay moves forward the cam-roll and pin-bar are depressed.

The appliances for weaving lappet, as herein described, may be applied to various forms of existing looms without substantial change
80 in the main operative elements of the loom employed for weaving plain or fancy fabrics.

It is necessary only to provide the slot or passage for the pin-bar in the shuttle-race
85 and the lay, and to apply to the lay thus slotted the pin-bar and its actuating rock-shaft, and to apply to the loom-frame a cam for actuating the pin-bar.

The guides and pattern for the needle-bars and the parts directly cooperating therewith
90 are all supported upon the boxes b , which may be secured to the swords of the lay of existing looms without interfering with any of the functions thereof, and the remaining
95 connections from the needle-bar mechanism to the actuating part of the loom and for lappet-thread take-up mechanism are readily supplied as an attachment to looms of the usual construction. Moreover, by supporting
100 the pattern device directly on the lay a very positive control of the needle-bars is afforded, which produces a more perfect pattern in the woven fabric, there being no necessity of providing complicated connecting
105 mechanism, the use of which is liable to result in considerable lost motion and consequent inaccuracy, as has heretofore been necessary. By this construction, on the contrary, the pattern device cooperates directly
110 with the needle-bars, there being practically no intermediate connection, the device therefore not only being productive of better results, but also being more readily applied to existing looms.

It is not intended to limit the invention to
115 the specific construction herein shown and described, since modifications might obviously be made without departing from the invention.

I claim—

1. The combination with the lay, of the
120 needle-bar, vertically-movable yokes therefor, guides for said yokes secured to said lay near the ends thereof, the needles secured to said bar, the harness-frames, levers for operating
125 the same to open and close the shed, and means for connecting said movable yokes with said levers to produce an up-and-down movement of the needles, substantially as described.

2. The combination with the lay, of the
130 needle-bars and needles supported and vertically movable thereon, the harness-frame-actuating levers, means for connecting said

needle-bars with said levers, and a device whereby the said connecting means are shifted from one harness-operating lever to another as they pass each other in intermediate position, substantially as described.

3. In a dobby-loom, the combination with the lay, of the needle-bar and needles mounted thereon, a pair of adjacent dobby-blades and a flexible strap or connecting member extending therefrom to the said needle-bar, and a double hook at the end of said flexible connecting member in the path of said dobby-blades whereby the connection is shifted from one to the other as they pass each other, substantially as and for the purpose described.

4. The combination of the lay and needle-bar guides fixed thereon near the ends of the shuttle-race, with the needle-bar capable of longitudinal and vertical movement in said guides, a pattern-bearing pulley supported in bearings fixed on the lay adjacent to the end of the needle-bar, a pattern-chain on said pulley, a follower arranged in the needle-bar guides and having a longitudinal movement only and adapted to be acted upon by the pattern-chain for controlling the position of the needle-bar longitudinally, and means for producing a vertical movement of said needle-bar independently of said pattern, and for intermittently rotating said pulley, substantially as described.

5. The combination of the needle-bars mounted and capable of vertical and longitudinal movement on the lay, with the lifting-rod for said needle-bars and means for actuating the same, the pattern-bearing pulley fixedly mounted on the lay adjacent to the needle-bars, a pattern thereon for controlling the position of the needle-bars longitudinally, and a device for advancing or shifting said pattern connected to and operated by said lifting-rod whereby the said pattern is shifted in the vertical movement of the needle-bars, substantially as described.

6. The combination with the needle-bars and guides therefor supported on the lay of a loom, of means for reciprocating said needle-bars vertically in said guides, and a pattern-bearing pulley fixedly mounted on said lay in proximity to said needle-bars and a pattern thereon adapted by its movement to produce a longitudinal movement of said needle-bars, the extent of said movement being also determined by said pattern, and a device for actuating said pattern connected to and operated by said needle-bar-reciprocating means, substantially as described.

7. The combination with the needle-bars mounted on the lay and capable of vertical and longitudinal movement with relation thereto, of the harness-operating devices, the lifting-rod for said needles connected with the said harness-operating devices, the pattern device comprising a series of pins mounted on an endless chain, said pins cooperating with the needle-bars to determine the posi-

tion thereof longitudinally with relation to the lay, a ratchet adapted by its movement to drive said chain, and a pawl connected with said lifting-rod and cooperating with said ratchet, substantially as described.

8. In a lappet-loom, the combination of the lay and needle-bar guides fixed thereon near the ends of the shuttle-race, with a needle-bar capable of longitudinal and vertical movement in said guides, means for vertically moving said bar, a follower for said needle-bar arranged in said needle-bar guides, and having a vertical guide-surface engaging the end of the needle-bar, and a pattern supported in bearings fixed on the lay having projections cooperating with said follower to move it only longitudinally, substantially as and for the purpose described.

9. The combination of the lay and needle-bar guides fixed thereon near the end of the shuttle-race, with the needle-bar capable of longitudinal and vertical movement in said guides, means for vertically moving said bar, a pattern-chain-bearing pulley supported in bearings fixed on the lay with its axis at right angles to the length of the needle-bar, and means for intermittently rotating the same, a pattern-chain having its links provided with pins or projections carried by said pulley, and a cam-surface cooperating therewith interposed between said pins and the needle-bar, whereby said pins cause longitudinal movement of the needle-bar as they are successively brought forward by the intermittent rotation of the pulley, substantially as described.

10. The combination with the needle-bars, of guides therefor supported on the lay, the harness-operating levers, a device for connecting said needle-bars with said levers to produce a reciprocating vertical movement of said bars in said guides, and a take-up for the needle-threads also operated by said levers through said connecting devices, substantially as described.

11. In a lappet-loom the combination with the lay, of the guide-pins and guide-pin bar supported and guided in a vertical longitudinal slot in said lay, a spring-actuated rock-shaft mounted on said lay and provided with an arm or projection connected to said pin-bar and a cam secured to the frame of the loom and adapted to engage a cam projection on said rock-shaft during the movement of the lay, to produce an oscillation thereof, substantially as described.

12. In a lappet-loom, the combination with the harness-operating levers, of a rock-shaft mounted near the base of the loom, a transverse arm on said rock-shaft, one end of which is connected with one or more of said levers, a needle-bar, and a lifting-rod therefor connected with the opposite end of said arm, substantially as described.

13. In a lappet-loom, the combination with the harness-operating levers, of a rock-shaft mounted near the base of the loom, means for

connecting said rock-shaft with said levers to produce an oscillation of said shaft, the lay provided with guides, a needle-bar vertically and longitudinally movable in said guides, a
5 needle-bar-lifting rod connected with an arm or projection from said rock-shaft, a pattern device cooperating with the end of the needle-bar to produce a longitudinal movement thereof and determine the extent of such move-
10 ment, and an actuator for said pattern device connected with said lifting-rod, substantially as described.

14. In a lappet-loom, the combination with the lay, of a needle-bar supported thereon and
15 vertically and longitudinally movable with relation thereto, a pattern device comprising

a series of pins mounted on an endless chain, sprockets or pulleys for said chain mounted on the lay, a follower interposed between the said pattern device and the end of the needle- 20 bar, the needle-bar-lifting rod, and a pawl connected therewith and adapted to cooperate with a ratchet-wheel connected with one of said sprockets, substantially as described.

In testimony whereof I have signed my 25 name to this specification in the presence of two subscribing witnesses.

EPPA H. RYON.

Witnesses:

H. J. LIVERMORE,
N. P. FORD.