

J. C. BROOKS.

SHUTTLE SUPPLYING MECHANISM FOR LOOMS.

No. 473,377.

Patented Apr. 19, 1892.

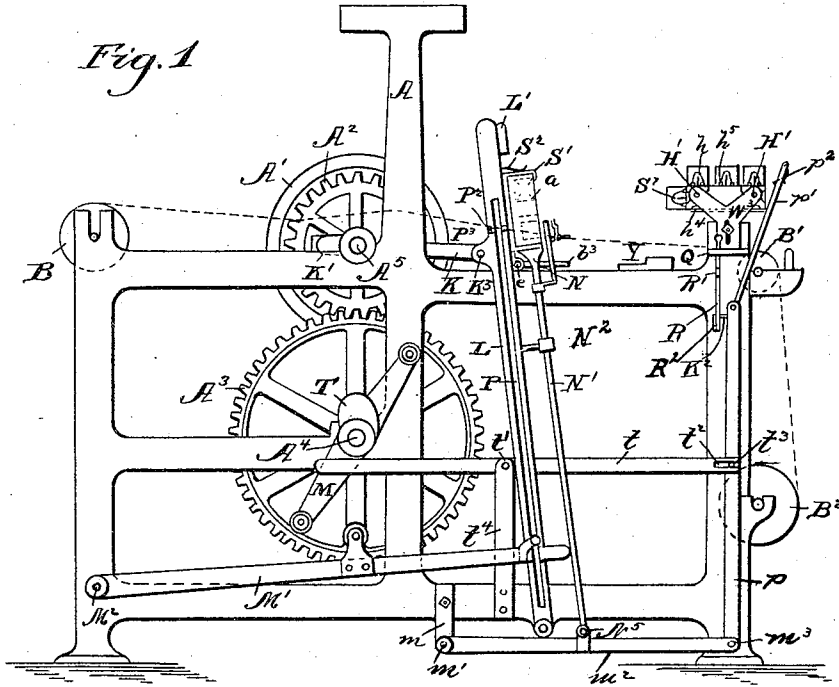


Fig. 1

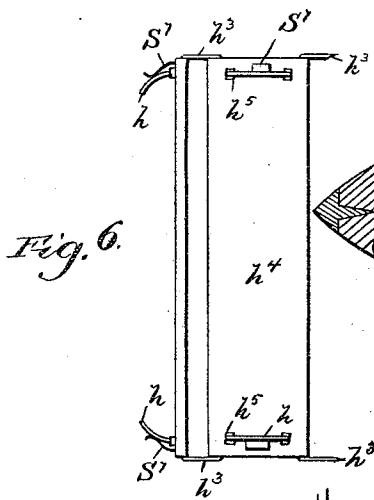


Fig. 6.

Fig. 7.

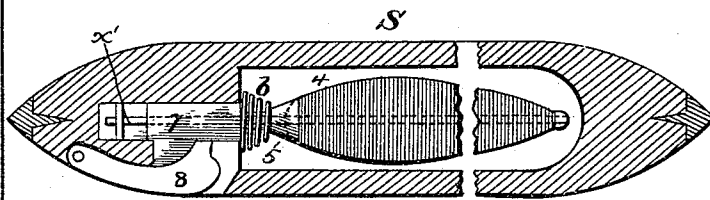
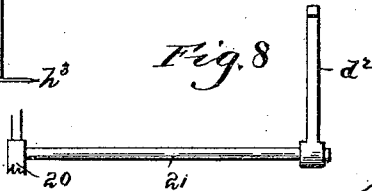


Fig. 8



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Inventor:

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Fig. 2.

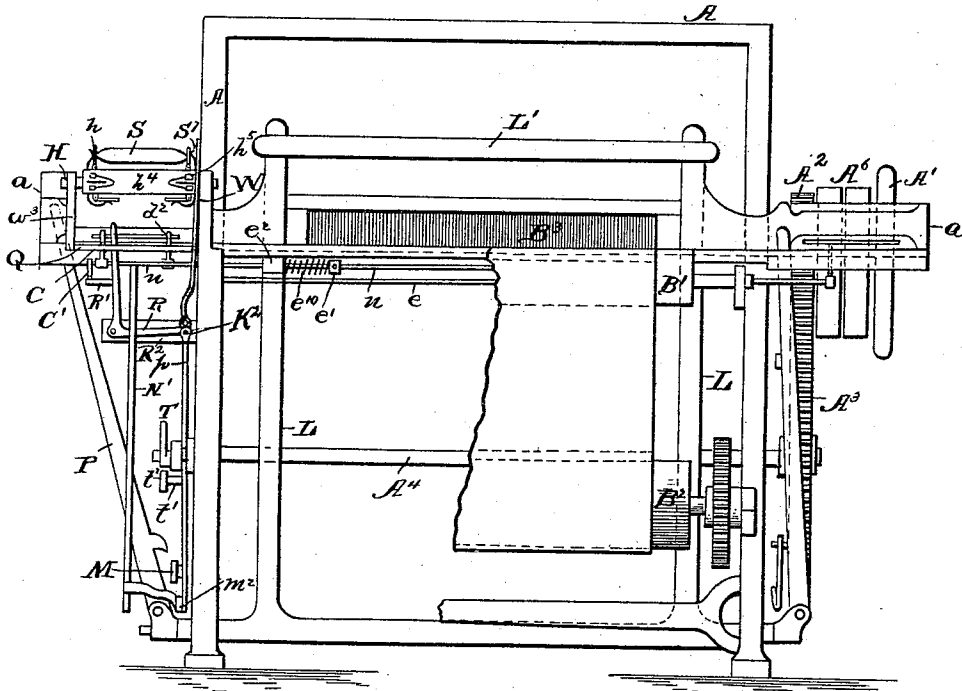
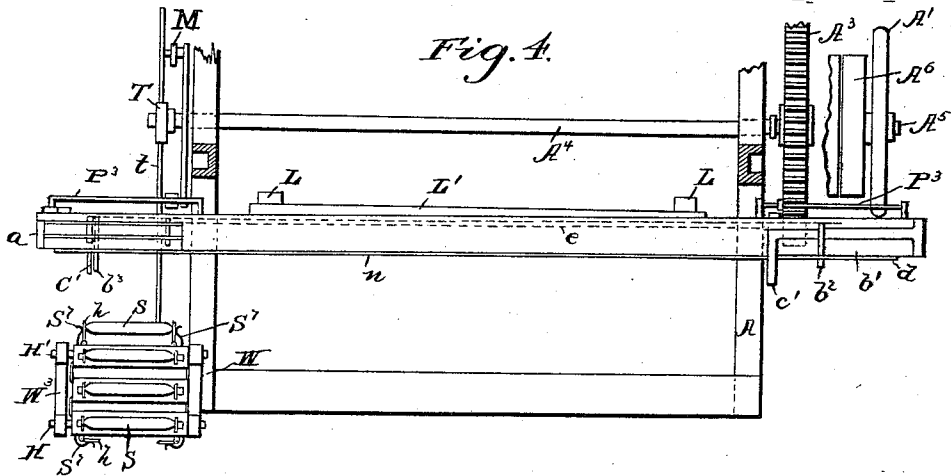


Fig. 4.



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(No Model.)

3 Sheets—Sheet 3.

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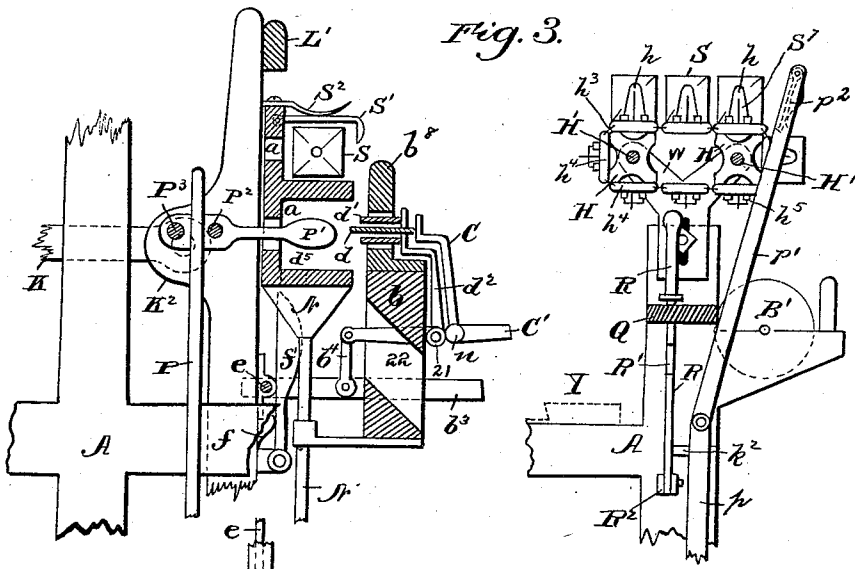


Fig. 3.

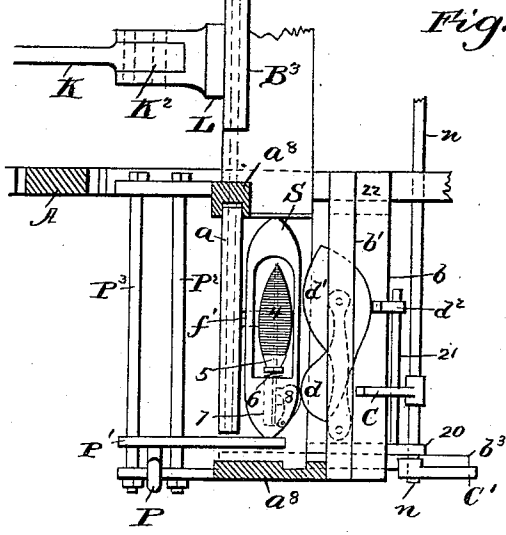
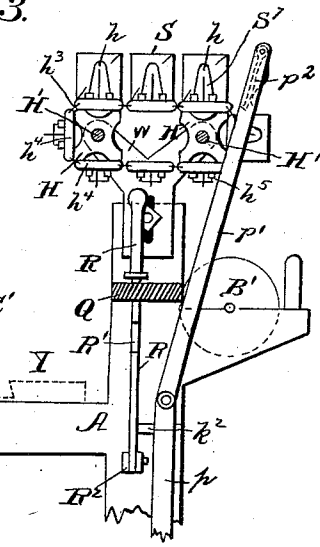
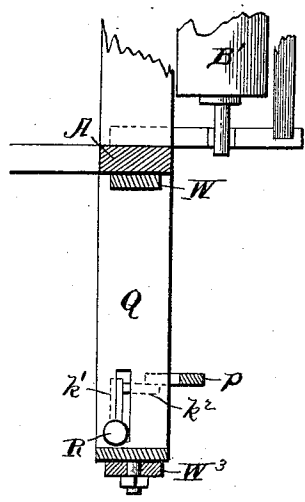


Fig. 5.



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# UNITED STATES PATENT OFFICE.

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## SHUTTLE-SUPPLYING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 473,377, dated April 19, 1892.

Application filed May 9, 1891. Serial No. 392,236. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN C. BROOKS, of Paterson, in the county of Passaic and State of New Jersey, have invented Improvements in Shuttle-Supplying Mechanism for Looms, of which the following is a specification.

My present invention relates to improvements in looms; and the object is to effect the changing of shuttles in a power-loom while it is in motion, and especially to throw out from the loom the shuttle from which the weft has been used and the replacement of a fresh shuttle on the raceway without stopping the loom.

In my patent, No. 371,299, issued October 11, 1887, a number of shuttles is carried on the lay and a complicated mechanism is used to effect the changing of shuttles while the loom is in motion. The present invention, however, is designed particularly for weaving silk fabrics.

This invention, which is an improvement on the above patent, obviates the objections thereto and provides a simple and effective means for accomplishing the desired purpose.

With these ends in view the invention consists, primarily, of a drop-box mechanism arranged and adapted to discharge the emptied shuttle and take a fresh one on one end of the lay only, and carrying a supply of fresh shuttles on a belt supported from the loom-frame instead of being on the lay.

My invention consists, further, of details of construction and arrangement of parts, as will be fully pointed out hereinafter.

In the accompanying drawings, Figure 1 is an end elevation of a loom having my invention applied thereto. Fig. 2 is a front elevation of the loom with breast-rail, cloth-roller, and cloth partly broken away. Fig. 3 is a transverse part-sectional view, on a larger scale, of the shuttle-boxes, shuttle-carrier, and the various parts associated therewith. Fig. 4 is a part-sectional plan view of the parts shown in Fig. 2, and Fig. 5 is a similar view of the parts shown in Fig. 3. Fig. 6 is a detail enlarged view of a card and the clips. Fig. 7 is an enlarged view of the shuttle, and Fig. 8 is a detail view of the bracket and binder-finger  $d^2$ .

Referring to the drawings, in which like

letters and numerals of reference denote corresponding parts in all the figures, A designates the frame, in which is journaled the crank-shaft  $A^5$ , carrying the balance-wheel  $A^7$ , pinion  $A^2$ , and driving-pulley  $A^6$ , and the bottom shaft  $A^4$ , which carries the gear  $A^3$ , meshing with said pinion  $A^2$ . The warp-roll B, breast-roller  $B'$ , and cloth-roller  $B^2$  are also journaled in the frame in their usual relative positions, and the reed  $B^3$  and lay-swords L are also provided, as customary in looms of this character. On the upper portion of the swords is the reed-cap  $L'$ . The picking-bowls M are arranged on the lower shaft  $A^4$  to operate the picking-levers  $M'$ , pivoted on the frame at  $M^2$ , and the picking-sticks P, which latter are operated through the usual connections. The picking-sticks are adapted to operate the pickers  $P'$ , arranged to slide on the spindles  $P^2$   $P^3$  to knock the shuttle back and forth, and the swords and the mechanism carried thereby are reciprocated by the connections with the shaft  $A^5$ , consisting of the pitman K and cranks  $K'$ , the said pitman being pivoted at  $K^5$  to the lay.

Having thus generally described the parts of an ordinary loom so far as they pertain to my invention, I will now proceed to a detailed description of my improvements, in which I provide on one end of the lathe  $b$  the ordinary shuttle-box; but on the opposite end, as shown in the figures of the drawings, the box is provided with a double shuttle-rack  $a$ , which is supported on the forked end N of the rod or beam  $N'$  and arranged to be moved vertically by said rod in the slotted frame  $a^8$ . (Shown in Fig. 5.) This rod is guided in its vertical movement in the guides  $N^2$ . The lower end of this rod  $N'$  is pivotally connected to the lever  $m^2$  by the pin  $N^5$ , and this lever  $m^2$  is fulcrumed on a pivot-pin  $m'$ , secured on the bracket  $m$  on the main frame. A vertical rod or lever  $p$  is pivotally secured to the outer free end of the lever  $m^2$  by a pin  $m^3$ , and this rod is connected at its upper end to an angle-lever R and another lever  $p'$ , carrying a hook-pawl  $p^2$ .

Secured on the lower part of the frame, near the bracket  $m$ , is an upright bracket  $t^4$ , on which a lever  $t$  is pivotally secured by the pin  $t'$ , and this lever extends rearward below

and beyond the shaft  $A^4$  in position to be operated by the cam  $T$  on shaft  $A^4$ , and it has a slot  $t^2$  at its forward end, through which a pin  $t^3$  on the rod  $p$  projects. By this arrangement the rod  $p$  is elevated and lowered by its connection with the lever  $t$  as the latter is operated by the cam  $T$ , and the slot  $t^2$  provides an easy and free movement.

A slotted angle-bracket  $Q$  is secured to the frame  $A$  near the forward upper end thereof, and the angle-lever  $R$ , pivotally secured on a bracket  $R^2$  beneath said bracket  $Q$ , is arranged to extend upward through the slot, and its vertical part is normally fitted in a notch at one end of the slot. The short arm of this angle-lever  $R$  is connected with the upright rod  $p$  by a pin  $K^2$ , and the longer vertical arm has a projection  $R'$  on one side thereof, the function of which will be described hereinafter.

At the outer end of the slotted bracket  $Q$  is a bracket  $W^3$ , having a forked upper end, and a similar bracket  $W$  is secured to the frame  $A$  in alignment with said bracket  $W^3$ . Journalled in the opposite ends of these forked brackets  $W^3$   $W$  are the shafts  $H'$ , which carry the sprocket-rollers  $H$   $H$ . An endless belt, consisting of a series of plates  $h^4$ , which I call "cards," joined together at their ends by links  $h^3$ , is arranged to run over the rollers  $H$ , and the four angular projections on said rollers are adapted to engage with the belt where the cards are connected together. This construction will permit the cards to lie flat across the face of the sprocket-rollers and move forward as the rollers are operated. On the upper face of each card, near the outer ends thereof, are provided lugs or projections  $h^5$ , in which small clips  $h$  are pivotally secured, and springs  $S^7$  are arranged to bear on the outer sides of these clips to force them toward each other. The shuttles  $S$  are inserted between these clips  $h$ , the springs  $S^7$  serving to cause the clips to grasp them firmly, and the relative sizes of the sprocket-rollers and cards should be proportioned to provide a uniform relation and operation of the respective parts. The pawl  $p^2$  is adapted to engage with one of the cards, as shown in dotted lines in Fig. 3, and as the lever  $p'$  is elevated the pawl pulls the card up and moves the belt and rollers around the distance of one card.

The shuttles  $S$  used in this machine are somewhat different from those in general use, being provided with a tongue carrying a cone-shaped collar or block  $5$ , which is forced forward by a coiled spring  $6$ , operating against the shuttle-body. (See Figs. 5 and 7.) This tongue has a butted end  $7$ , and a dog  $8$  is arranged on one side thereof, and an inclined projection on the butted end  $7$  is adapted to force the dog or plate  $8$  out against the binder  $d$  when the tongue is moved forward as the yarn is used up by the spring  $6$ . The spindle  $x'$  passes through an opening in the butted end  $7$  and the collar  $5$  and receives the cop, said spindle being pivoted in the usual man-

ner, as shown in Fig. 7. When the cop is placed in position in the shuttle, the block or collar  $5$  impinges against the weft, and the spring  $b$  is compressed against the shuttle by the block or collar. As the weft becomes exhausted, the collar  $5$  is gradually forced forward by the spring  $b$ , and the butted end  $7$  and collar  $5$  being rigidly connected together said butted end will also move forward with the collar as the latter is forced forward by the spring  $b$ . At the same time the dog  $8$  will be forced outward by the inclined projection on the butted end  $7$  to operate the binder-finger  $d$ , as hereinafter described.

In the usual construction of shuttle-boxes in series the binders or swells are carried in and with the boxes; but in the construction of the present improvements the front of said boxes are left open and the binders are carried in a stationary box-front  $b^8$ , secured on the lay-beam  $b$ . For the purpose of operating this invention, however, the usual binder-swell  $d'$  is slotted to receive an engaging or temporary binder  $d$ , pivotally secured in a horizontal slot at one end therein. The looms to which this invention is applied have the usual protector-rod  $e$ , adapted to operate in the ordinary way from the back of the shuttle-box; but as it is necessary to provide for the action of said protector-rod at the front of the shuttle-box I have devised the following improved arrangement.

Brackets  $20$  are secured to the lay-beam  $b$  in which a pin  $21$ , carrying the angular binder-finger  $d^2$  is fitted, and the upper end of this finger is arranged to bear against the binder-swell  $d'$ , while the lower end projects under the lay-beam from its pivotal point and is connected to the lever  $b^3$  on the ordinary protection-rod by a link  $b^4$ . A rod  $n$  is carried in brackets  $e^2$ , fastened to the lay-swords  $L$ , and this rod has on each end thereof a binder-finger  $C$ . A striker  $C'$  is also secured to the rod  $n$ . This finger  $C$  is adapted to bear against the temporary binder-swell  $d$  and is held in contact therewith by a coiled spring  $e$  on said rod  $n$ , which is secured at one end to the sword at  $e^2$  and at its other end to a collar  $e'$  on the rod  $n$ , so that the finger  $C$  is held against the binder-swell  $d$ . This horizontal projection or striker  $C'$  is adapted to contact with the projection  $R'$  on the angle-lever  $R$  and release it from engagement with the notch in the end of the bracket  $Q$ , and to compensate for the blow occasioned by such contact the end of the said rod  $n$  is also supported in bracket  $20$ .

The lay-beam  $b$ , adjacent to the bracket  $Q$  is provided with a diagonal slot or recess  $22$  beneath the binders, through which slot the emptied shuttle is ejected, and this is accomplished by a feather-shaped lever  $f'$ , normally pressed forward by a spring  $f$ , which is arranged beneath the shuttle-box and projects upward through a slot  $d^3$  therein, so that when the shuttle-boxes descend, as hereinafter described, the lever  $f'$ , projecting through

the slot, will force the shuttle out of the box and through the slot or recess 22.

Having thus described the construction of the several parts of my invention, the operation thereof may be briefly described as follows: Rotary motion being applied to the crank-shaft  $A^5$  in the usual manner, the pinion  $A^2$  and gear  $A^3$  turn the shaft  $A^4$ , and by intermediate strokes given to the lever  $M'$  the picker-stick is actuated in the usual manner by connections well known in the art and the fly-shuttle is propelled across the lay-beam and between the warp-threads. Similar mechanism on the opposite side of the loom returns the shuttle, and the reciprocating movement of the shuttle is continued throughout the weaving operation. Rocking motion is imparted to the lay-beam coincident with the reciprocating movement of the shuttle by means of the cranks  $K'$ , connected to the lay-swords by the pitmen  $K$ , the object and result of this movement being to beat up each pick of weft in a line to the previously-woven cloth. The above stated operations continue until the loom is stopped for a fresh supply of filling in the shuttle in looms of the old construction; but when my invention is applied to a loom it is not necessary to stop it at all, and thus much time and annoyance is saved, as the loom automatically supplies itself with fresh shuttles by the following operations of the several parts: As the filling 4 on the quill or bobbin in the shuttle becomes exhausted, the cone-shaped block 5 on the tongue is forced forward by the spring 6 until the incline on the butted end 7 of the tongue is brought forward sufficiently to force the dog 8 out against the binder  $d$ . This is done when the filling is almost, if not quite, exhausted, and the binder  $d$  forces the binder-finger  $C$  outward, thus depressing the horizontal projection or striker  $C'$ . As the lay-beam approaches on the forward stroke, the striker  $C'$  is now in such a position that it will engage with the projection  $R'$  of the angle-lever  $R$  and release said lever from engagement with the notch in the bracket  $Q$ . This allows said lever to pass into the opposite end of the slot in the said bracket, at the same time lowering the rod  $p$  sufficiently to bring the lever  $m^2$  and rod  $N'$  down far enough, so that the idle-shuttle  $S$ , held in readiness in the upper box, will be in alignment with the raceway and is driven across the lay-beam by the picker  $P$  in the usual action of the loom. As the shuttle-boxes are lowered, the feathered lever  $f'$ , operating in the slot  $d^5$  in the lower box, expels the emptied shuttle through the slot or recess 22 in the lay-beam. As the lay-beam approaches the front center or stroke, the sector-cam  $T$  on the bottom shaft  $A^4$  strikes the lever  $t$  and depresses it at that end, thus elevating the other end and the rod  $p$ . This operation also raises the lever  $m^2$ , rod  $N'$ , and the shuttle-boxes carried thereby, and the angle-lever  $R$  is thrown into the recess in the slot of the

bracket  $Q$ , so that the loom will continue in action until the filling is again exhausted.

Coincident with the elevation of the shuttle-boxes and rod  $p$  the lever  $p'$ , carrying the pawl  $p^2$ , is raised, and as the pawl engages with the belt or the cards  $h^4$  they will be fed forward until a supply-shuttle is carried into the position shown in Fig. 1, and as the lay-beam again approaches the front center the grabber  $S'$ , having the hooked end and pivoted in the rack  $a$ , will strike the fresh shuttle as the lay moves forward and move up and over the same until it reaches entirely across one side thereof and grasps it firmly by means of its hooked end. The grabber is held in a horizontal position by the spring  $S^3$ , operating on the upper side thereof. As the lay-beam recedes, the grabber will pull the shuttle from between the spring-controlled clips  $h$  into its proper position in the upper shuttle-box in readiness to repeat the aforementioned operation of replacing the emptied shuttle. When the shuttle is removed from the carrier or belt, the springs  $S^7$  cause the clips  $h$  to fall into a horizontal position on the card  $h^4$ , and the shuttle is placed between said clips by inserting one end thereof under one clip and raising the opposite clip, so that the other end of the shuttle can be put in position, and when this is done the clips hold the shuttle firmly between them.

If the shuttle-carrier should become exhausted, the motion of the loom would be arrested in the ordinary manner by the lever  $b^3$ , which is arranged to engage with a protecting frog  $Y$  on the frame of the loom and shift the belt back to stop the loom, as is customary.

I am aware that changes in the form and proportion of parts and details of construction may be made without departing from the spirit or sacrificing the advantages of my invention, and I therefore reserve the right to make such changes as fairly fall within the scope of my invention.

Having thus described my improvements, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the lay-swords, the lay-beam, and shuttle-boxes of a loom, of the rod  $N'$ , supporting the shuttle-boxes, the lever  $m^2$ , the vertical rod  $p$ , the bracket  $Q$ , the angle-lever  $R$ , engaged in a slot in said bracket and connected at its short end to the vertical rod  $p$ , and means for releasing said lever  $R$  to allow the upper shuttle-box to descend to the level of the raceway, substantially as and for the purpose set forth.

2. The combination, with the lay-swords, lay-beam, and shuttle-boxes of a loom, of the rod  $N'$ , supporting said shuttle-boxes, the lever  $m^2$ , and vertical rod  $p$ , the bracket  $Q$ , having a slot therein, the angle-lever  $R$ , adapted to be engaged in a notch in the slot and connected at its short end to the vertical rod  $p$ , the lever  $p'$ , the shuttle-carrier, the pawl carried by said lever  $p'$  and adapted to engage with the shuttle-carrier, the sector-cam ar-

ranged on the bottom shaft, the lever *t*, pivotally secured to the rod *p* and adapted to be moved by said sector-cam, and means for releasing the angle-lever R to actuate the several parts, substantially as and for the purpose set forth.

3. In a loom, the shuttle-rack, the rod N', supporting said rack and adapted to move the same vertically, the lay-beam having a slot therein, and the feathered lever *f'*, arranged to operate through a slot in the lower shuttle-box to expel the shuttle through the slot in the lay-beam, substantially as described.

4. In a loom, the combination of the aligned brackets W W<sup>3</sup>, the sprocket-rollers journaled in bearings in said brackets, the belt or carrier comprising a series of cards adapted to travel over said rollers, the spring-controlled clips pivoted in lugs *h*<sup>5</sup> on the cards, and means for turning said rollers, substantially as described.

5. In a loom, the belt or carrier comprising a series of cards, the links connecting said cards, and the spring-controlled clips carried by the cards at opposite ends thereof to hold the shuttles, substantially as described.

6. In a loom, the combination, with brackets W W<sup>3</sup>, and the sprocket-rollers journaled in bearings in said brackets, of the shuttle-carrier arranged to run on the rollers, the lever *p'*, the pawl *p*<sup>2</sup>, carried by said lever and adapted to engage with the belt or carrier to

move the same forward, and means for automatically elevating said lever and pawl to feed the shuttles forward, substantially as and for the purpose set forth.

7. In a loom, the combination of the shuttle-rack, the supporting-rod, the lever *m*<sup>2</sup>, the vertical rod *p*, the bracket Q, having a slot therein, the angle-lever R, adapted to engage a recess in the slot and connected at its short end to the rod *p*, the shuttle-carrier, the lever *p'*, carrying a pawl *p*<sup>2</sup>, arranged to engage with said carrier, the sector-cam, and the lever *t*, pivotally secured to said rod *p* and adapted to be moved by said sector-cam on the bottom shaft, substantially as and for the purpose set forth.

8. In a loom, the combination, with a shuttle-rack, a stationary box-front *b*<sup>8</sup>, the binder-swells *d d'*, arranged in a slot in said front, the pin 21, secured on the front, the finger *d*<sup>2</sup>, carried thereby and arranged to engage with the swell *d'*, the protector-rod *e*, the lever *b*<sup>3</sup>, pivoted on said rod and adapted to be operated by connections with the finger *d*<sup>2</sup>, the rod *n*, and the finger C, carried by said rod and arranged in engagement with the swell *d*, substantially as and for the purpose set forth.

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Witnesses:

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