

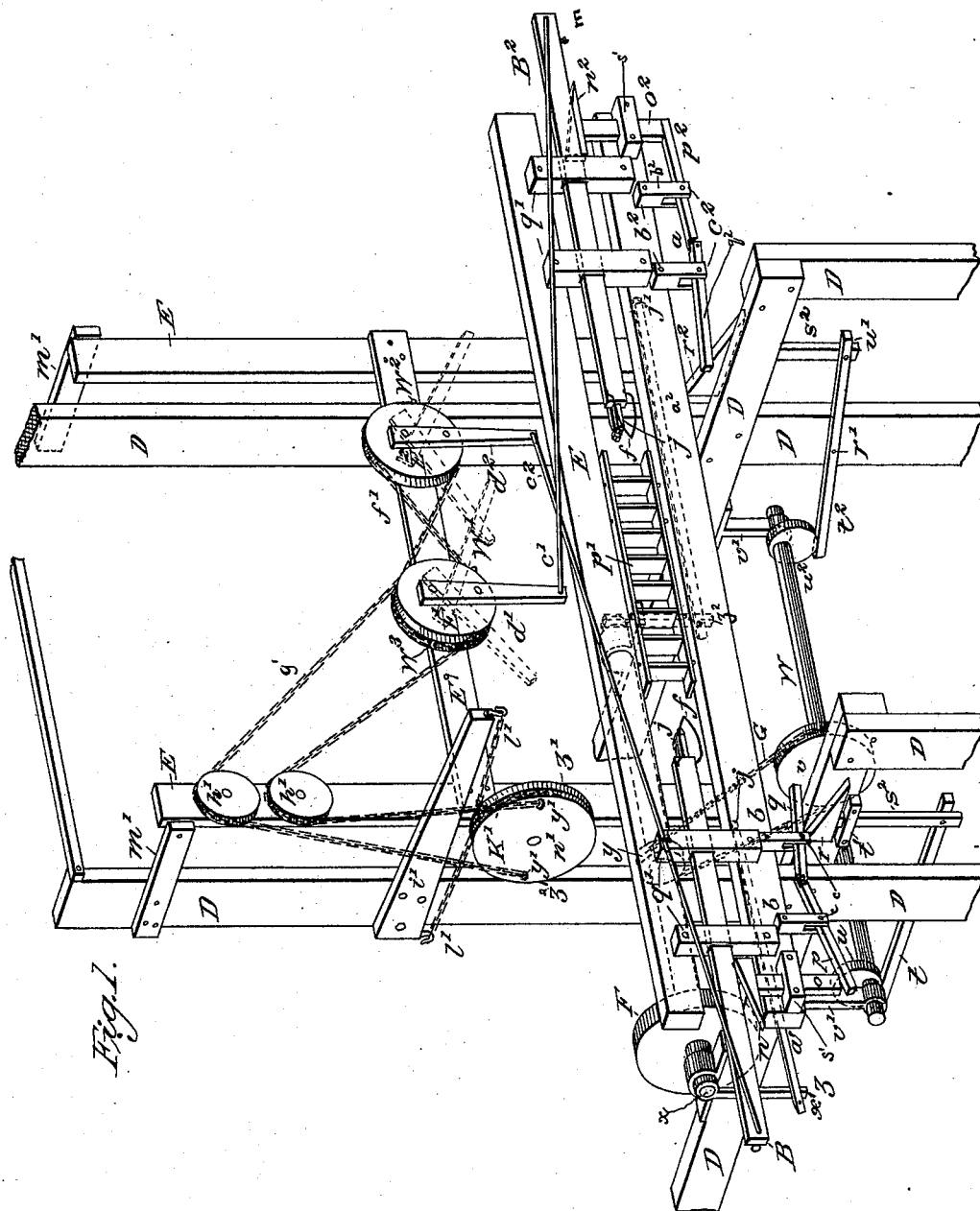
(No Model.)

2 Sheets—Sheet 1.

S. C. & F. L. BURNHAM.  
POSITIVE SHUTTLE MOTION FOR LOOMS.

No. 418,863.

Patented Jan. 7, 1890.



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Fig. 2.

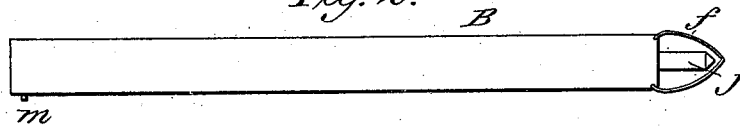


Fig. 3.

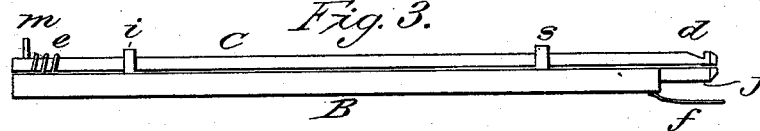


Fig. 4.

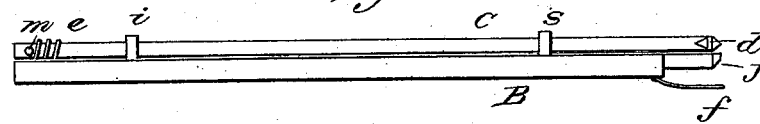


Fig. 5.

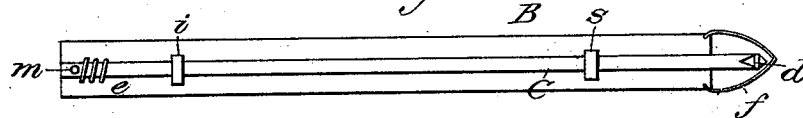


Fig. 8.

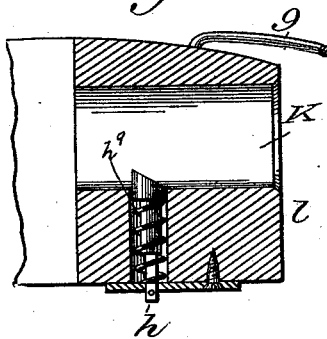


Fig. 6.

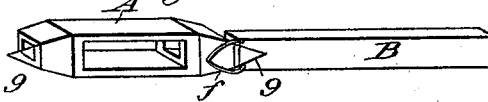
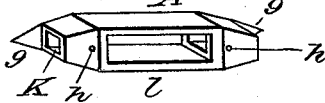


Fig. 7.



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# UNITED STATES PATENT OFFICE.

SHEPARD C. BURNHAM AND FRANK L. BURNHAM, OF HOMER, NEW YORK.

## POSITIVE SHUTTLE-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 418,863, dated January 7, 1890.

Application filed January 2, 1889. Serial No. 295,264. (No model.)

*To all whom it may concern:*

Be it known that we, SHEPARD C. BURNHAM and FRANK L. BURNHAM, citizens of the United States, residing at Homer, in the county of Cortland and State of New York, have invented certain new and useful Improvements in Positive Shuttle-Motions for Looms, of which the following is so full, clear, and exact a description as will enable others skilled in the art to which our invention appertains to make and use the same.

The objects of our invention are to construct a positive shuttle-motion for use in looms for the weaving of wire-cloth which shall not only weave with greater rapidity, but also, by not breaking the texture, enable the looms to make stronger wire-cloth than the looms now in use do. With these objects in view we proceed to construct a device which will be hereinafter fully described, and those features constituting our invention will be particularly pointed out in the claims at the end of this specification.

Reference to the accompanying drawings is hereby had, wherein the same letters refer to corresponding parts throughout the various figures.

Figure 1 is a view of our invention put together and ready for use. Fig. 2 is a view of the front side of the shuttle-bar used in our invention. Fig. 3 is a side view of said shuttle-bar, showing the connecting-rod thereof ready to receive and take on the shuttle. Fig. 4 is a side view of said shuttle-bar, showing the connecting-rod thereof turned over to let off and discharge the said shuttle. Fig. 5 is a view of the back side of said shuttle-bar, showing the connecting-rod thereof in position to receive and take on the shuttle, and also showing its connection with the said shuttle-bar. Fig. 6 is a view of the shuttle and the end of the shuttle-bar used in our invention when the two are connected and of the wire-guards thereon and the manner in which the shuttle and guard pass each other. Fig. 7 is a view of the shuttle used in our invention. Fig. 8 is a sectional view of the shuttle used in our invention, showing the pin *h* therein and the spiral spring which holds said pin in position.

A is the shuttle.

B B<sup>2</sup> are the shuttle-operating bars.

C is a connecting-rod mounted on the side of each of said shuttle-bars.

D is the frame of the loom.

E is the frame of the lathe.

F is the band-wheel fastened to the shaft *a*, by means of which the power is applied to the loom.

*d* is a notch which is formed in the outer end of each of the connecting-rods C for engagement with pins *h*, carried by the shuttle.

*e* is a spiral spring attached to the connecting-rod C in such a manner as to throw said rod back in position after it has been turned from the position of Fig. 3 to that of Fig. 4 to let off the shuttle.

*f* is a wire guard on the end of each of the shuttle-bars B B<sup>2</sup>.

*g* is a corresponding wire guard on the side of each end of the shuttle A. These guards are so constructed, relatively, that the guard on the shuttle passes under the guard on the shuttle-bar.

*h* is a spring-actuated movable pin in the throat at each end of shuttle A to engage in the notch *d* of the connecting-rod C when it is desirable to connect said rod to said shuttle. The said pin is kept in position by means of a spiral spring *h* applied to the same.

*i* *i* are bands around the connecting-rod C and inserted in the shuttle-bar B to hold said rod in position on said shuttle-bar.

*j* is a projection at the outer end of the shuttle-bar B, forming a tenon so shaped as to enter the mouth of the shuttle A.

*k k k* are the mouths or throats at the ends of said shuttle.

*l* is the hole in said shuttle to receive the bobbin.

*m* is a pin in the end of each connecting-rod C, by which the said rod is turned to let off the shuttle to discharge the same when it comes in contact with the other shuttle-bar *n*.

*n*<sup>2</sup> are wedge-shaped blocks lying under and parallel to the shuttle-bars B B<sup>2</sup>, each with its thin edge toward the outer end of the corresponding one of said shuttle-bars, and so situated that it will catch the pin *m m*<sup>2</sup> and by means thereof turn the connecting-rod C and discharge the shuttle attached thereto just as

the end of the other shuttle-bar enters the mouth of the shuttle from the otherside. It will be seen later that these blocks are so arranged and geared that the one under the shuttle-bar in possession of the shuttle is always in place to catch the pin on the connecting-rod of that particular shuttle-bar at the precise moment it is desirable to let off and discharge said shuttle therefrom, and that is at the exact moment the other shuttle-bar is in position and ready to take on and receive the same.

$o o^2$  are the standards holding the said blocks  $n n^2$ , which standards are held in place by the slotted blocks  $s' s'$ , fastened to the lathe-frame E firmly, the slots in said slotted blocks  $s' s'$  being just large enough to allow the free movement of said standards  $o o^2$  up and down through the same.

$p p^2$  are levers, the outer ends of which are applied, respectively, to the lower ends of the standards  $o o^2$ .  $q q^2$  are corresponding levers connected, respectively, with the levers  $p p^2$  at the points  $a a$ . These levers work upon the pivots  $c c c^2 c^2$  in the blocks  $b b b^2 b^2$ , respectively, which said blocks are firmly fastened to the lathe-frame E. It will be readily seen that the connection of these two levers  $p q$  or  $p^2 q^2$  forms a compound lever, and that there is one of these compound levers at each side of the loom.

$r r^2$  are wedge-shaped blocks lying immediately under the inner ends of the levers  $q q^2$ , respectively, and parallel to the sides of the frame of the loom and at right angles to the lathe-frame E, the thin edges of said blocks being toward the front of said loom.  $s^2 s^2$  are the standards to said last-mentioned blocks, said standards being held in position by the slotted blocks  $t' t'$ , fastened firmly to the loom-frame D. The slots in said slotted blocks are just large enough to allow said standards to pass freely up and down through the same.

$t t^2$  are levers attached, respectively, to the standards  $s^2 s^2$  at  $u' u'$  and working on pivots  $r' r'$ , fastened in the legs of loom-frame D.

$u u^2$  are eccentrics fastened to the ends of the shaft  $w$  in such a way that when one is turned upward the other will hang downward. The rear ends of the levers  $t t^2$  are so placed as to come directly under and close to the eccentrics  $u u^2$ .

$v$  is a wheel fastened at or near the center of said shaft  $w$ , which shaft is held in position by means of the stays  $v' v'$ , having sockets in the lower ends thereof to receive the said shaft.

$x$  is the driving-shaft.

$y$  is a wheel fastened to the driving-shaft  $x$  at or near the middle thereof and immediately over the band-wheel  $v$ . Said wheels  $y$  and  $v$  are connected by means of the chain belt G. Wheel  $y$  should be half as large as wheel  $v$ .

$z z^2$  are cranks fastened to the ends of shaft  $x$ .

$a' a^2$  are pitmen jointed to the cranks  $z z^2$  at  $x'$  and to the lathe-frame E.

$d' d^2$  are arms fastened to the wheels  $E' E^2$ .  $c' c^2$  are rods connecting the outer ends of the shuttle-bars  $B B^2$  with the arms  $d' d^2$ .

$E' E^2$  are wheels fastened to the cross-bar  $E^3$  of the lathe-frame E.

$f'$  is an iron chain belt crossed and connecting the last two mentioned wheels. Any other suitable material than iron may be used for this belt or the chain G. Said chain  $f'$  is fastened to said wheels at the points  $w^2$  and  $w^3$ .

$k'$  is a wheel fastened to the lathe-frame E by the pivot  $n'$ , upon which it oscillates.

$h' h'$  are pulleys fastened to the lathe-frame E.

$g'$  is a chain fastened to the sides of the wheel  $k'$  at the points  $y' y'$  and passing over the pulleys  $h' h'$  and around the wheel  $E'$  and attached thereto by a pin at  $w'$ , which said wheel  $E'$  is necessarily a double wheel, while wheel  $E^2$  is single, which not only allows  $E'$  to have two bands, but permits arm  $d'$  to readily pass arm  $d^2$  without interfering with it.

$i'$  is an arm fastened to the loom-frame D immediately over the wheel  $k'$ .

$l' l'$  are chains fastened to the ends of arm  $i'$  and to the sides of the wheel  $k'$  at  $z' z^2$ , the object being to regulate the action of the wheel  $k'$ .

$m' m'$  are the pivots upon which the lathe-frame E hangs and moves, which said pivots are placed upon arms attached to and extending from the upper part of the standards of the loom-frame D.

$p'$  are the reeds of the lathe.

When our invention or device is put firmly together, and its several parts adjusted and fastened, as herein indicated, and the power applied thereto at the band-wheel F or in any other way or manner which may be preferred, and the manner of which is immaterial to us, as we claim nothing as to the mode of applying the power, it will be readily seen that as the shaft  $w$  is turned, the eccentric  $u^2$ , being downward, presses on the end of the lever  $t^2$ , whereby the standard  $s^2$  is carried upward, taking the wedge-shaped block  $r^2$  with it.

Now, as the lathe-frame goes back after beating up the cloth, taking with it the lever system thereto attached, the inner end of the lever  $q^2$  runs upon said block and is carried upward, whereby the inner end of lever  $p^2$  is pressed down, thus raising the outer end thereof and carrying upward the wedge-shaped block  $n^2$  until it is so situated that it catches the pin  $m^2$  in the end of the connecting-rod in shuttle-bar  $B^2$  just as the opposite end carrying the shuttle A comes in contact with the inner end of the shuttle-bar B, advancing from the opposite direction, and at the instant the tenon of said shuttle-bar B enters the mouth of the shuttle the connecting-rod attached to said shuttle-bar  $B^2$  is turned, so that the notch  $d$  is loosened from the pin  $h$ , thus detaching and discharging

therefrom said shuttle, which has at that instant been received by and become connected with the connecting-rod of such other shuttle-bar B. It will be apparent, also, that when the shaft *w* has turned sufficiently the eccentric *u*<sup>2</sup> will be turned upward, letting the block *n*<sup>2</sup> fall down, and by ceasing its pressure on the pin *m* allow the connecting-rod of the shuttle-bar B<sup>2</sup> to resume its position, and at the same time the eccentric *u* at the other end of said shaft will be turned downward, and thereby brought to bear on the end of lever *t*, when the same thing will take place on the left side of the loom in regard to the shuttle-bar and shuttle as has already been described as occurring on the right side thereof, and the shuttle will in turn be played onto the advancing shuttle-bar B<sup>2</sup>. It can also be readily seen that the guards *g g* on the shuttle A and the guards *f f* on the shuttle-bars B B<sup>2</sup>, being pointed, enter between the warp of the cloth as it parts and carry the individual wires thereof over the ends of said shuttle and shuttle-bars and prevent the same from being caught and broken by the ends of said shuttle and shuttle-bars, as is often done in looms where such guards are not used. As the shaft *x* turns, the cranks *z z*<sup>2</sup> revolve with it and cause the pitmen *a' a*<sup>2</sup> to move back and forward, carrying with them the lathe-frame E, to which they are jointed, as before described. This backward and forward movement of the lathe-frame E not only serves to beat up the cloth by means of the reeds *p'*, but it also causes the wheel *k'*, fastened to the side of the said lathe-frame, to oscillate, whereby the chain *g'*, attached to said wheel *k'*, is made to move backward and forward over the pulleys *h' h'*, and said chain *g'*, being also fastened to the wheel *e'*, causes the same also to oscillate, and through the agency of the chain band *f'* the wheel *e*<sup>2</sup> is likewise made to oscillate, the effect of which is to throw the arms *d' d*<sup>2</sup> first from each other or outward to the outermost position shown by dotted lines, and then toward each other or inward to the middle dotted-line position, whereby by means of the rods *c' c*<sup>2</sup>, which connect one of said arms with the shuttle-bars aforesaid and the other of said arms with the other of said bars, the said shuttle-bars are played backward and forward toward and from each other, the same being so adjusted as to work in harmony with the lever system hereinbefore described, and also to carry said shuttle-bars together in the center of said loom and of the cloth therein just at the instant one of the blocks *n* or *n*<sup>2</sup> presses the pin *m* of the connecting-rod of the corresponding shuttle-bar, and turns the connecting-rod *c* in the shuttle-bar then holding the shuttle, and causes it to give off and discharge said shuttle, which is at the same instant received and taken on by the other shuttle-bar and carried through the cloth to be again returned and passed in the same way. As the result of the action of the ec-

centrics *u* and *u*<sup>2</sup>, whereby the action of the lever systems is made alternating, the shuttle is caused to be discharged first by the block *n*<sup>2</sup> and then by the block *n* on the opposite side of the loom, which action is facilitated by the fact that the wheel *y* is half the size of the band-wheel *v*, whence result two revolutions by the shaft *x* to one revolution by the shaft *w*.

Having now described the objects, uses, and advantages of our invention, what we desire to secure by Letters Patent, and what we therefore claim, is—

1. The shuttle A, having the movable pin *h* therein, and the spiral spring attached thereto, in combination with the guards *g g* therein, the shuttle-bar B, the guards *f* thereon, the connecting-rod C, the pins *m* thereon, the spiral spring *e* attached thereto, the block *n*, the eccentric or cam wheel *u*, the band-wheel F, the shaft *x*, the pitman *a'*, the crank *z*, the band *i*, the standard *o*, the lever *p*, the lever *q*, the pivots *c c*, the wedge-shaped block *r*, the standard *s*<sup>2</sup>, the lever *t*, the pivot *r'*, the shaft *w*, the band-wheel *v*, the stays *v'*, the band-wheel *y*, the belt G, and the lathe E, as herein described, substantially as and for the purpose herein specified.

2. The connecting-rod C in the shuttle-bar B, with the pin *m* therein, and the spiral spring *e*, in combination with the shuttle-bar B, the shuttle A, having the movable pin *h* therein, the spring on said pin *h*, the block *n*, the eccentric or cam wheel *u*, the band-wheel F, the shaft *x*, the bands *i s*, the standard *o*, the lever *p*, the lever *q*, the pivots *c c*, the wedge-shaped block *r*, the standard *s*<sup>2</sup>, the lever *t*, the pivot *r'*, the shaft *w*, the band-wheel *v*, the stays *v'*, the band-wheel *y*, the belt G, the crank *z*, the pitman *a'*, and the lathe E, as herein described, substantially as and for the purpose herein specified.

3. The connecting-rod C, having the notch *d*, the pin *m*, and the spiral spring *e*, in combination with the shuttle-bar B, the bands *i s*, the shuttle A, provided with the movable pin *h*, having a spring thereon, the block *n*, the eccentric or cam wheel *u*, the band-wheel F, the shaft *x*, the standard *o*, the lever *p*, the lever *q*, the pivots *c c*, the wedge-shaped block *r*, the standard *s*<sup>2</sup>, the lever *t*, the pivot *r'*, the shaft *w*, the band-wheel *v*, the stays *v'*, the band-wheel *y*, the belt G, the crank *z*, the pitman *a'*, and the lathe E, as herein described, substantially as and for the purpose herein specified.

4. The shuttle-bar B, with the tenon *j*, the guard *f*, the connecting-rod C, having the notch *d*, the pin *m*, the bands *i s*, and spiral spring *e*, in combination with the shuttle A, having the movable pin *h*, with the spiral spring applied thereto, the block *n*, the eccentric wheel or cam *u*, the band-wheel F, the shaft *x*, the standard *o*, the lever *p*, the lever *q*, the pivots *c c*, the wedge-shaped block *r*, the standard *s*<sup>2</sup>, the lever *t*, the pivot *r'*, the shaft *w*, the band-wheel *v*, the stays *v'*, the

band-wheel  $\gamma$ , the belt G, the crank  $z$ , the pitman  $a'$ , and the lathe E, as herein described, substantially as and for the purpose herein specified.

5 5. The shuttle-bar B, with the tenon  $j$ , the guard  $f$ , and having the connecting-rod C, provided with the pin  $m$ , the notch  $d$ , and spiral spring  $e$ , rod and bar being attached to each other by the bands  $i$   $s$ , the block  $n$ ,  
10 the standard  $o$ , the slotted block  $s'$ , the levers  $p$  and  $q$ , the pivots  $c$   $c$ , the wedge-shaped block  $r$ , the standard  $s^2$ , the slotted block  $t'$ , the lever  $t$ , the pivot  $r'$ , the shaft  $w$ , the shaft  $x$ , the band-wheel  $v$ , the stays  $v'$ , the band-  
15 wheel  $\gamma$ , the band-wheel F, the belt G, and the eccentric wheel or cam  $u$ , as herein described, substantially as and for the purpose herein specified.

6. The combination of the connecting-rod  
20 C, the shuttle-bar B, the pin  $m$ , the spiral spring  $e$ , the guard  $f$ , and shuttle A, having the movable pin  $h$ , with the spiral spring applied thereto, with the block  $n$ , the standard  $o$ , the lever  $p$ , the lathe E, the lever  $q$ , the  
25 block  $r$ , the standard  $s^2$ , the lever  $t$ , the slot-

ted blocks  $t' s'$ , the eccentric wheel or cam  $u$ , and the shaft  $w$ , having connection with the power, as herein described, substantially as and for the purpose herein described.

7. The shuttle A, having the guards  $g$   $g$ , 30 and the movable pin  $h$ , provided with and held in position by a spiral spring, in combination with the shuttle-bar B, provided with the connecting-rod C, having the tenon  $j$  and the notch  $d$ , the pin  $m$ , the bands  $i$   $s$ , the 35 spiral spring  $e$ , and guard  $f$ , the block  $n$ , the standard  $o$ , the levers  $p$  and  $q$ , the lathe E, the block  $r$ , the standard  $s^2$ , the lever  $t$ , the slotted blocks  $t' s'$ , the eccentric wheel or cam  $u$ , and the shaft  $w$ , having connection with the 40 power, as herein described, substantially as and for the purpose herein specified.

In testimony that we claim the above as our invention we hereunto set our hands and affix our seals in presence of witnesses.

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Witnesses:

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