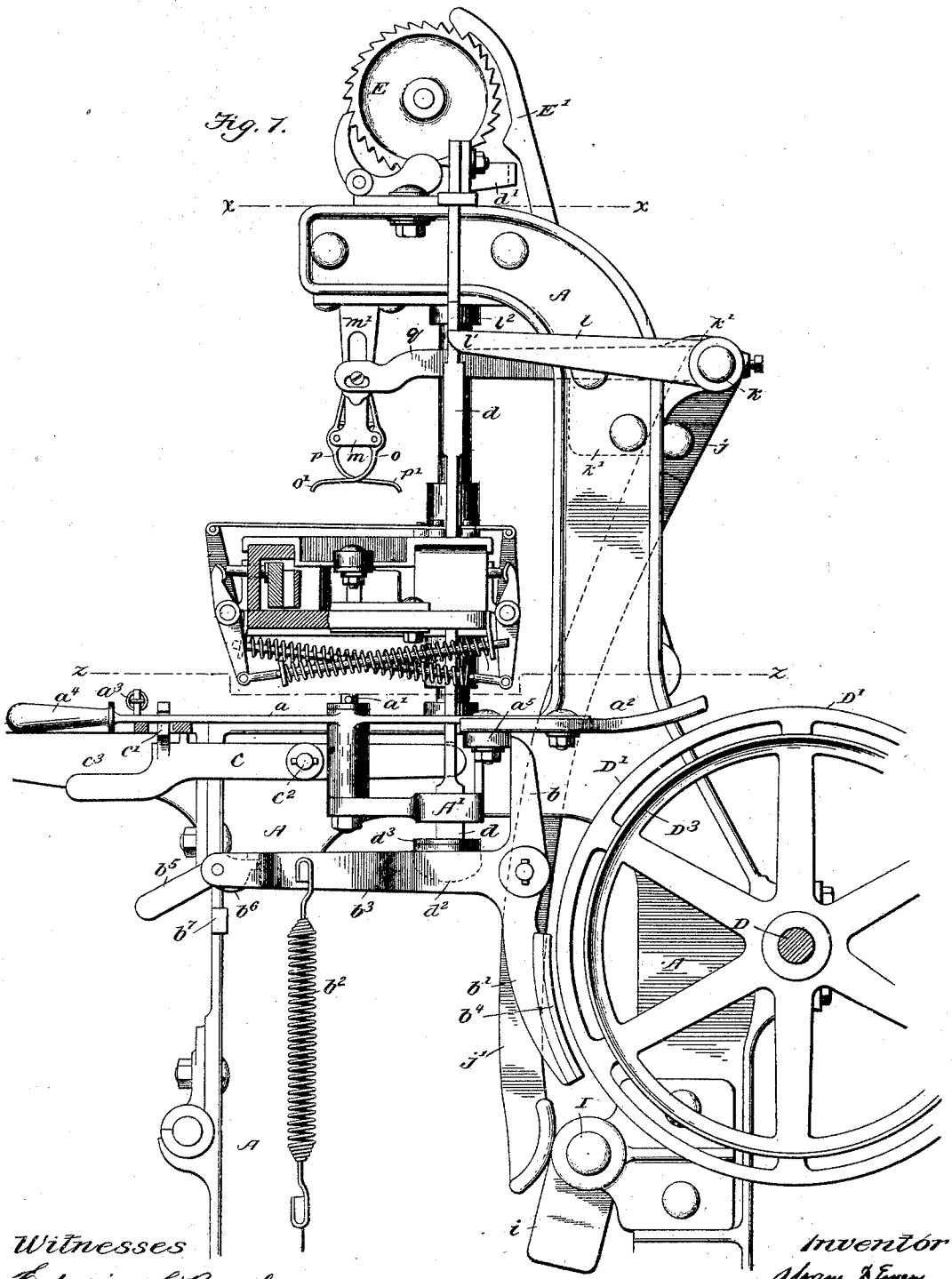
(No Model.) 3 Sheets—Sheet 1.

A. D. EMERY.

WEFT STOP MECHANISM FOR LOOMS.

No. 503,466. Patented Aug. 15, 1893.

Fig. 1.



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WEFT STOP MECHANISM FOR LOOMS.

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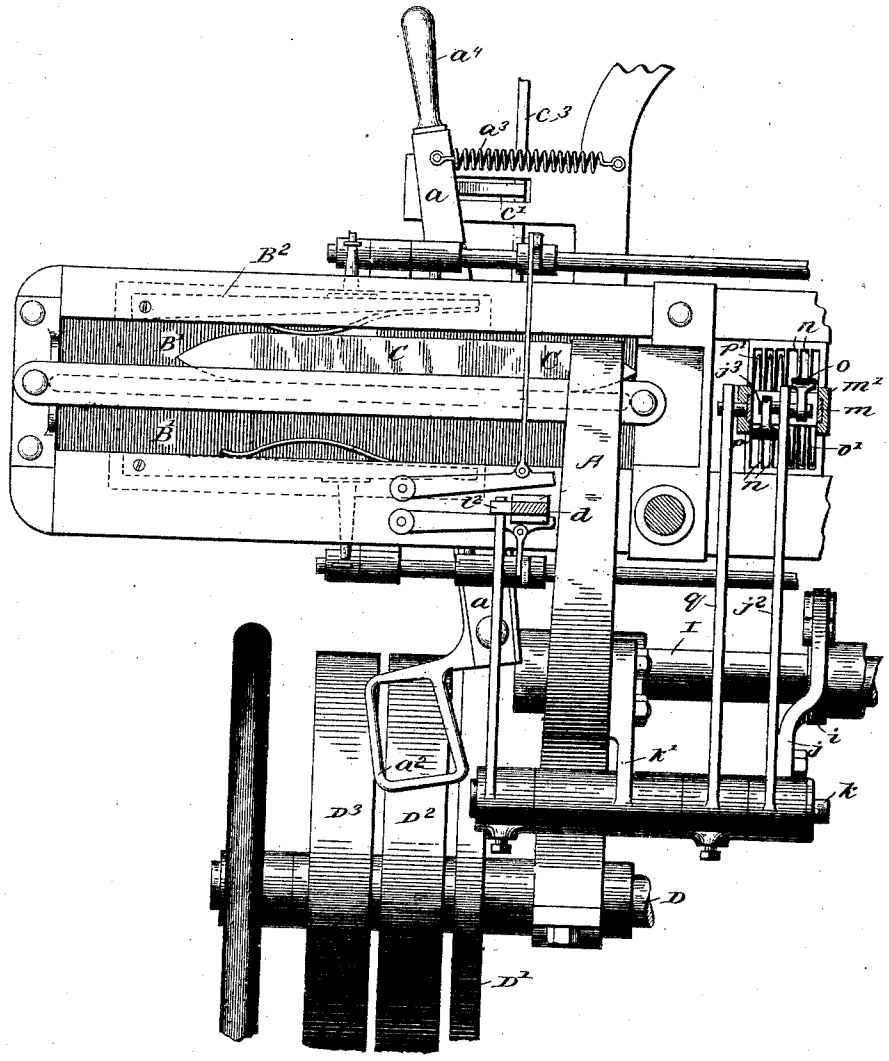
Fig. 2.



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3 Sheets—Sheet 3.

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WEFT STOP MECHANISM FOR LOOMS.

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Fig. 4.

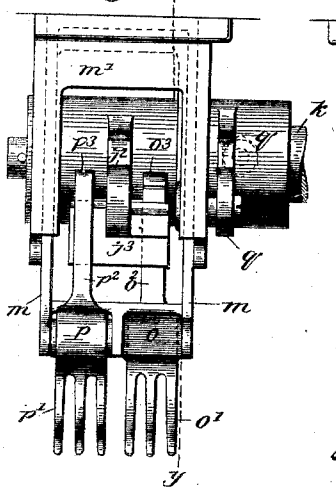


Fig. 5.

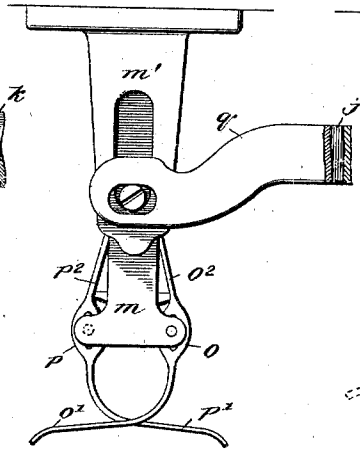


Fig. 6.

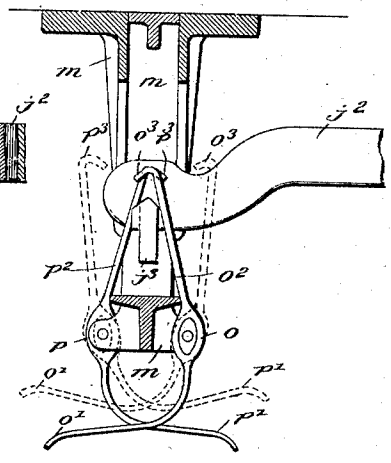
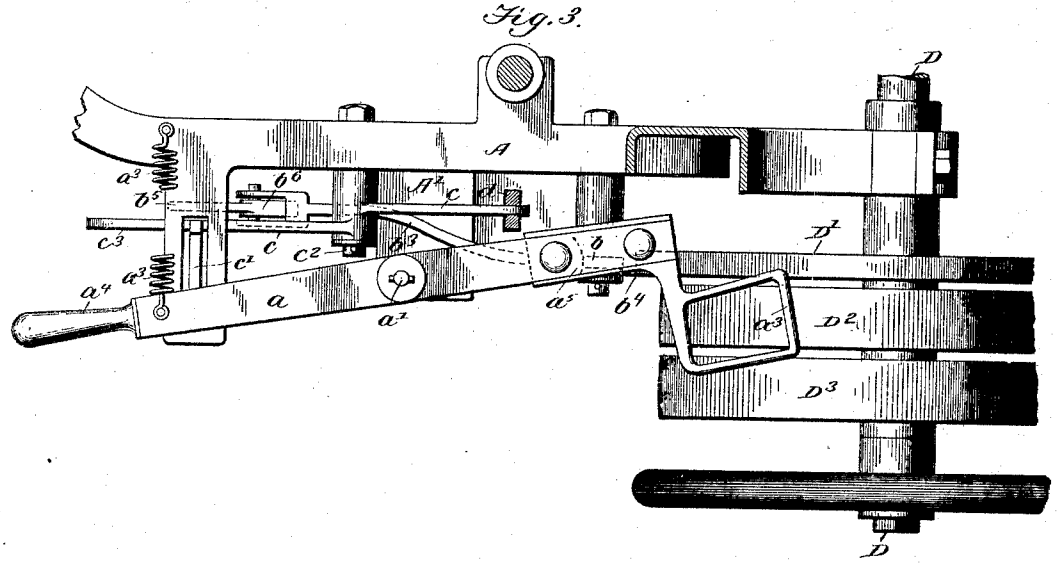


Fig. 3.



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UNITED STATES PATENT OFFICE.

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WEFT-STOP MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 503,466, dated August 15, 1893.

Application filed December 4, 1891. Renewed December 1, 1892. Serial No. 453,693. (No model.)

To all whom it may concern:

Be it known that I, ABRAM D. EMERY, a citizen of the United States, residing at Taunton, Bristol county, Massachusetts, have invented certain Improvements in Weft-Stop Mechanism for Looms, of which the following is a specification.

This invention relates to improvements in mechanism for automatically stopping a loom in case a weft thread breaks or is missing.

The invention involves the combination of a main train of stopping mechanism consisting in the present instance of a spring-operated belt-shifter, a spring-operated brake and a tripping rod having a reciprocating movement, and a supplemental train of devices governed by the weft fork, which supplemental train when set in action operates to lift the tripping rod of the main train and thereby release the belt-shifter to the action of its operating spring end resultantly to release the brake to the action of its spring. By the operation of this supplemental train of devices, the breaking of a weft thread permits the weft fork to remain in position in which it acts as a link, and transmits from a lever which is continuously vibrated by means of a cam on the cam shaft, motion to vibrate a radius arm or wiper which by engaging another tappet affixed to the tripping rod, lifts said rod and releases the belt-shifter and brake to the action of their operating springs. The tripping rod thus lifted by motion from the cam shaft does not act as a chock to arrest the upward movement of the lay which may therefore complete its beat movement.

The improvements herein shown are applied to a loom for weaving two fabrics at the same time by the employment of two simultaneously operated shuttles and of two weft forks.

While the feature of the present invention consists in the organization of stopping mechanism so related to two weft forks as to effect the automatic stopping of the loom if a weft thread breaks in either of the fabrics, it is obvious that the improvements are equally applicable to a loom for weaving a single fabric when there will be only one weft fork present.

The accompanying drawings represent so much of a loom as is necessary to illustrate my improvements and their mode of operation.

Figure 1, is an end view of a portion of the loom, showing the starting and stopping mechanism in side elevation. Fig. 2, is a horizontal section on the line x—x of Fig. 1, showing the starting and stopping mechanism in plan. Fig. 3, is also a horizontal section on the line z—z of Fig. 1, showing the belt-shifter and adjacent parts in plan. Figs. 4 and 5, are respectively front and side elevations of the weft forks and the immediately adjoining parts of the loom in which weft forks are arranged, and Fig. 6, is a vertical section on the line y—y of Fig. 4.

The drawings represent portions of the frame A, of a vertical loom employing a lay, B, wide enough to afford parallel paths for two simultaneously driven shuttles, one of which, C, is shown in Fig. 2. Motion to reciprocate the lay is derived from the crank-shaft, D, to which are affixed a tight brake-wheel, D′, a tight driving pulley, D^2, and a loose pulley, D^3. The main train of starting and stopping mechanism embraces a belt-shifter, a, which is a lever centrally pivoted upon the vertical pin, a'. The perforated rear end a^2 of the shifter is adapted to embrace the driving belt. Its front end is connected to the contracting spiral spring a^3, and is provided with a handle a^4, by means of which the shifter is manually swayed upon its vertical axis against the resisting pull of its spring a^3, when it is desired to shift the driving belt from the loose pulley D^3, to the driving pulley D^2, and thereby start the loom. When the shifter is thus swayed, a wiper cam a^5 attached to its under side bears upon and rocks backward the upright arm b, of the T-shaped brake lever b', against the downward pull of the brake spring b^2, upon the horizontal arm b^3, and thus rocks the brake shoe b^4, clear of the brake wheel D′. If, while the belt is off the driving wheel, it is desired to move the loom by hand, the brake is taken off by pushing up the radius arm b^5, affixed to hub of the eccentric b^6, which is loosely pivoted upon the forward end of the horizontal arm, b^3. The periphery of the eccentric is thus brought into contact with the stationary shoulder, b^7, projecting from the frame of the

loom, and the front end of the horizontal arm, b^3, of the brake lever is thereby elevated sufficiently to clear the brake shoe from the brake-wheel. As soon as the belt-shifter has been moved far enough to throw the belt on the driving pulley the forward end of the manually operative stopping lever, *c*, rises and interposes between the belt shifter and the frame of the loom, the chock plate, *c'*, which is affixed to the stopping lever *c*, and which when thus interposed between the belt shifter and the frame of the loom holds out the forward end of the belt shifter against the pull of its spring, a^3, and thus permits the driving belt to remain in engagement with the driving pulley. The stopping lever is loosely pivoted upon the horizontal pin c^2. At its forward end it is provided with a handle c^3, by means of which its forward end can be manually depressed when it is desired to remove the chock-plate *c'*, and thus release the belt-shifter to the action of its spring and resultantly release the brake to the action of the brake spring, for the purpose of manually stopping the loom. The rear end of the stopping lever extends through a slot in the vertical tripping rod *d*. The lower portion of the tripping rod is adapted to slide in a vertical bearing formed in the arm A', which is affixed to and projects laterally from the frame of the loom. It is the weight of the tripping rod *d*, which by pressing downward upon the rear end of the stopping lever *c*, raises the front end of the stopping lever when the belt shifter is swayed outward to start the loom. When the forward end of the stopping lever *c*, is manually depressed, the tripping rod *d*, is elevated, and a tappet *d'*, affixed to the upper portion of the tripping rod presses against and thereby throws out of engagement with the ratchet-wheel E, (which is the prime wheel of the take-up mechanism) the pawl, E', by which the take-up mechanism is actuated. The tripping rod *d*, has a limited range of upward movement. At its lower end it is affixed to a collar, d^2, upon the top of which is a cushion in the form of a washer d^3, of leather, or of other elastic or semi-elastic material for cushioning the blow when the collision of the upper surface of the washer d^3 against the under surface of the arm A' arrests the upward movement of the tripping rod, and hence arrests the further upward movement of the lay. This chock is not put in use by the breaking of a weft, but only when a shuttle fails to box, but this and the mechanism to stop the loom when a shuttle fails to box, as herein disclosed, is not claimed in this but in another pending application, Serial No. 380,681, filed February 7, 1891. This completes the description of the main train of starting and stopping mechanism.

The train of automatic stopping mechanism which is withheld from operation if the weft thread is present and is brought into operation if the weft thread breaks, may for convenience be designated the weft train. It embraces a wiper cam, *i*, mounted upon the cam shaft, I, and a bell-crank lever *j* the longer arm *j'* of which is pushed forward and swings backward by its own gravity in the course of each revolution of the cam *i*. The shorter arm j^2 is provided near its free end with a transverse pin j^3, the axis of which is parallel with the shaft *k*, upon which the bell-crank lever *j* is loosely mounted. The shaft *k* is journaled in the box *k'*, bolted to the frame of the loom. The end of the shaft *k* opposite that upon which the bell-crank lever *j* is loosely mounted has affixed to it a radius arm *l*, the free end *l'*, of which projects under the tappet l^2, affixed to the tripping rod *d*. The forward end of the short arm j^2, of the bell-crank lever *j*, carrying the transverse pin j^3, projects into the rectangular opening in the vertically sliding carriage *m*, mounted in the bracket *m'* affixed to and projecting downward from the upper horizontal member A', of the loom frame in vertical alignment with the path of motion of the weft fork grate, *n*, extending across the central portion of the lay, B. As there are two parallel raceways contemplated in my double loom, the carriage *m* has pivoted to it at its lower extremity two weft forks, *o* and *p*. In the case of an ordinary loom weaving a single fabric and hence employing only one raceway, of course only one weft fork will be needed. It will be seen that the three-tined lower portion *o'* of the weft fork, *o*, bends laterally forward underneath the carriage *m*, and that the three tined lower portion *p'*, of the weft fork *p*, bends laterally backward underneath the carriage *m*. The upper portions or stems o^2 and p^2, of the weft forks above their points of pivotal attachment to the carriage *m* incline in convergent planes and are respectively provided at their upper extremities with the hooks o^3 and p^3, which, when the web forks are subject to the influence of gravity, hook over the outwardly-projecting portions of the pin j^3, inserted through the arm j^2. As the lay rises during the normal operation of the loom, the two weft threads extending across the grate *n*, are brought into collision with the tined lower portions of the weft forks and tip the weft forks out of the positions in which they are represented in solid lines on Fig. 6 into the positions in which they are represented in dotted lines in the said figure, in which case as will be seen, the hooks o^3 and p^3 are thrown in opposite directions away from the path of movement of the transverse pin j^3, which is consequently permitted to make its vibrating movement without imparting movement to the carriage *m*. If, however, either or both of the weft threads are broken at the conclusion of the excursion of either or both shuttles toward the end of the lay adjoining the stopping mechanism then the tined lower ends of the weft forks enter the spaces between the bars of the weft fork grate as the lay rises, and the weft forks obeying the influence of gravity remain in the positions in

which they are represented in solid lines in Fig. 6 with their hooked upper ends extending across the path of motion of the transverse pin j^3. In such case the upward movement of the pin, j^3, is communicated to the carriage m. By means of a radius arm q the forward end of which is pivotally connected to the carriage m, and the rear end of which is fastened to the shaft k, the upward movement of the carriage m, rocks the shaft k, and communicates a similar upward movement to the radius arm l, which by collision with the tappet l^2, lifts the tripping rod d, and thereby releases the belt shifter and brake to the operation of their respective springs and thus automatically stops the loom. It will thus be seen that in an ordinary loom containing the present improvement, the weft fork, or in a duplex loom like that shown in the drawings either weft fork, will serve as a link which maintains the continuity of the lever system by which motion is transmitted from the cam, to lift the tripping rod and thereby set in action the main train of stopping mechanism, if its weft thread breaks, and it will also be seen that if the loom is working normally the weft threads will, as the lay rises, tilt the weft forks immediately on them and thus break the connection of said lever system and thereby prevent the transmission from the cam, of the motion which when transmitted sets in action the main train of stopping mechanism.

I claim as my invention—

1. In a duplex loom employing two simultaneously-operated shuttles, a main train of loom stopping mechanism, embracing a spring-operated belt-shifter, a spring-operated brake, and an endwise-sliding tripping rod, in combination with a constantly rotating cam, a disconnectible lever system for transmitting from said cam the motion to trip the said tripping rod, and two independently tiltable weft forks, adapted to be tilted by the wefts, respectively, as the lay rises to deliver the beat, each of which forks when not tilted, serves as a link connecting to each other two consecutive members of the said lever system, as and for the purposes set forth.

2. The combination with a main train of spring-actuated stopping mechanism, of means for holding and releasing said stopping mechanism, a longitudinally movable tripping rod connected with and controlling said means, guides on the loom frame, a movable cage supported in said guides, a continuously-operated shaft, a bell-crank lever operated thereby, a weft fork pivotally connected with said cage and adapted to be tilted by the weft threads and when not so tilted to engage said vibrating bell-crank lever and means connected with and operated by the movable cage for actuating the tripping rod, substantially as described.

3. The combination with a train of spring-actuated stopping mechanism, means for holding and releasing said stopping mechanism, a longitudinally movable tripping rod connected with said means, a guide-way on the loom frame, a movable cage supported thereby, two connected radius arms, one being connected to said cage and the other adapted to engage and move the tripping rod, a bell-crank lever, a continuously rotating cam for operating said lever, and a weft fork pivotally connected to said movable cage to normally engage an arm of the bell-crank lever and to be tripped and held out of engaging position by the weft thread, substantially as described.

4. The combination with a main train of stopping mechanism comprising a spring-operated belt shifter, a spring operated brake, a cam operated by the belt shifter to hold and release the brake, a locking lever to hold the belt shifter against the action of its spring, and a tripping rod provided with a tappet and connected with the locking lever, of a rotating cam, a bell-crank lever operated thereby, a movable cage carrying a weft fork loosely pivoted thereto and adapted to be moved by said bell-crank lever, and two connected radius arms, one of which is connected to said cage and the other of which is adapted to engage said tappet on the tripping rod, substantially as described.

5. In a weft stop motion for a vertical loom adapted to weave two fabrics side by side, the combination of slotted brackets provided with guides and secured to the loom frame, a cage adapted to slide in said guides and provided with two loosely pivoted weft forks, a vibrating bell-crank lever, one arm of which projects between said brackets and carries a pin, two radius arms, one of which is connected with and is moved by the said cage, and means operated by the said arms to stop the loom, substantially as described.

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