(No Model.)

3 Sheets—Sheet 1.

J. D. COTTRELL.

LOOM.

No. 265,486. Patented Oct. 3, 1882.

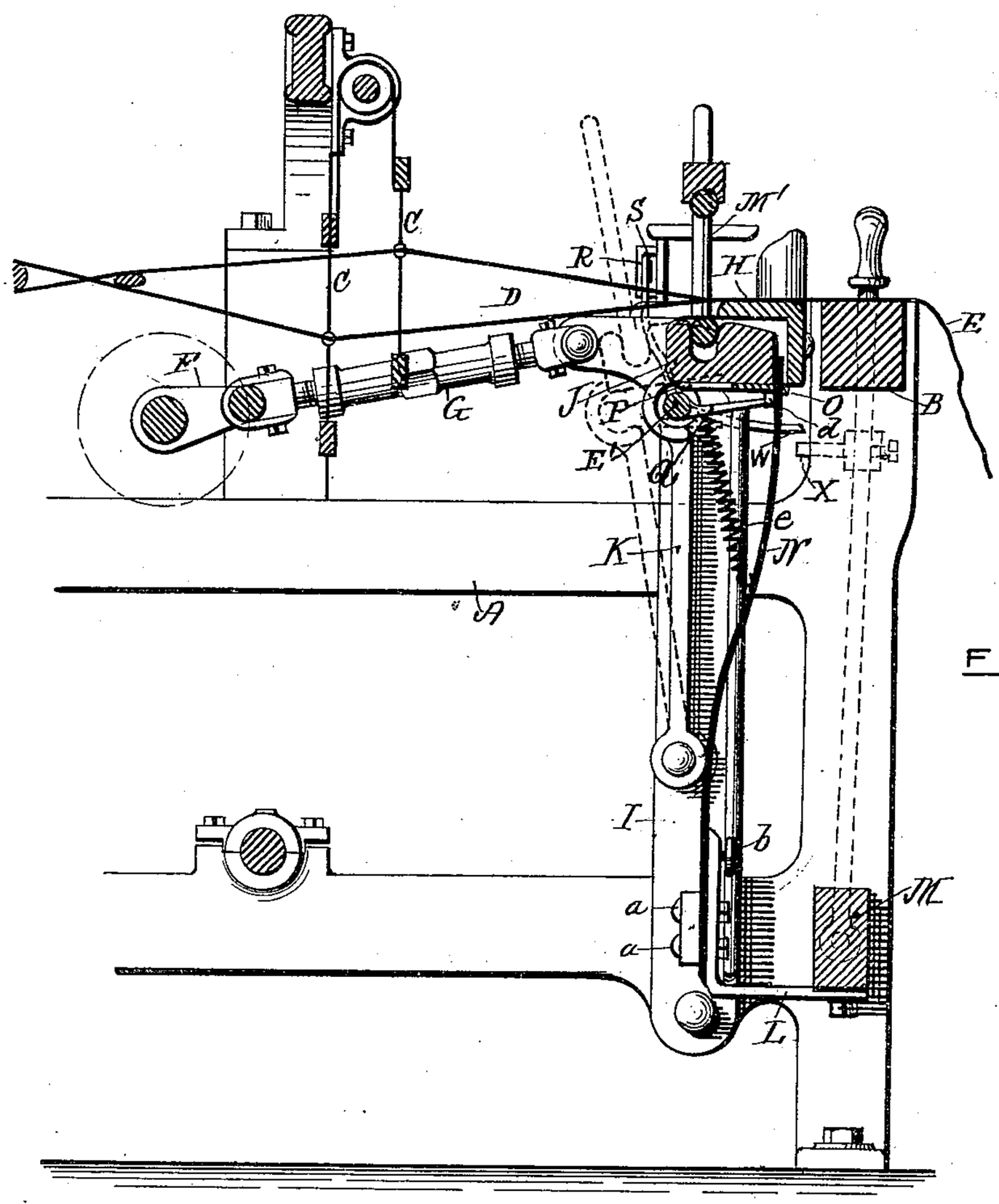

FIG. 1.

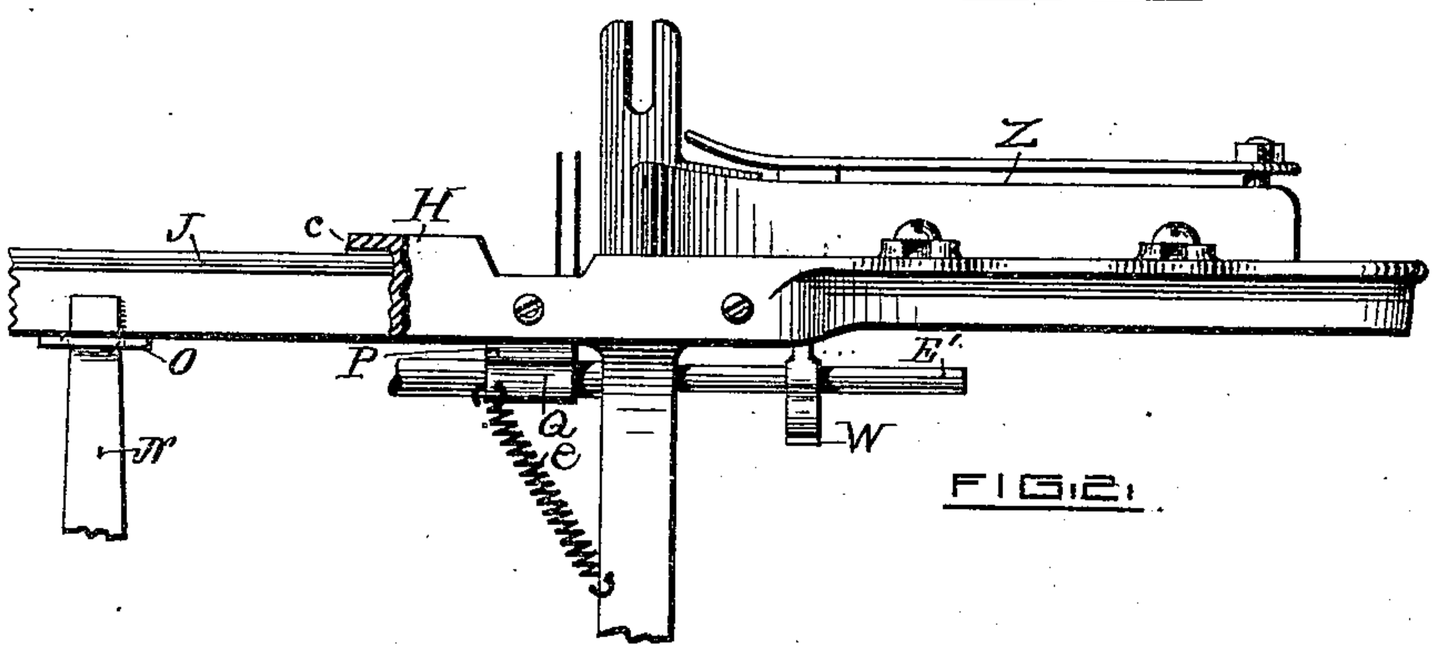

FIG. 2.

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Charles Hannigan

INVENTOR:

Jesse D. Cottrell

(No Model.) 3 Sheets—Sheet 2.

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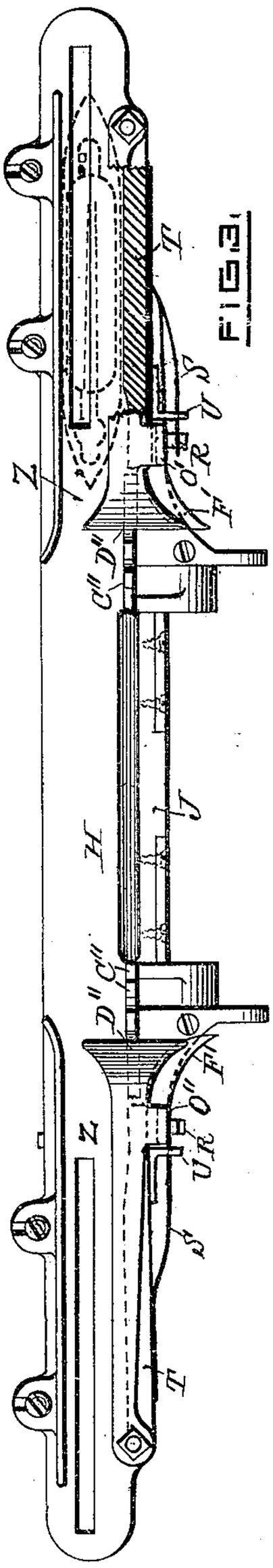

FIG. 3.

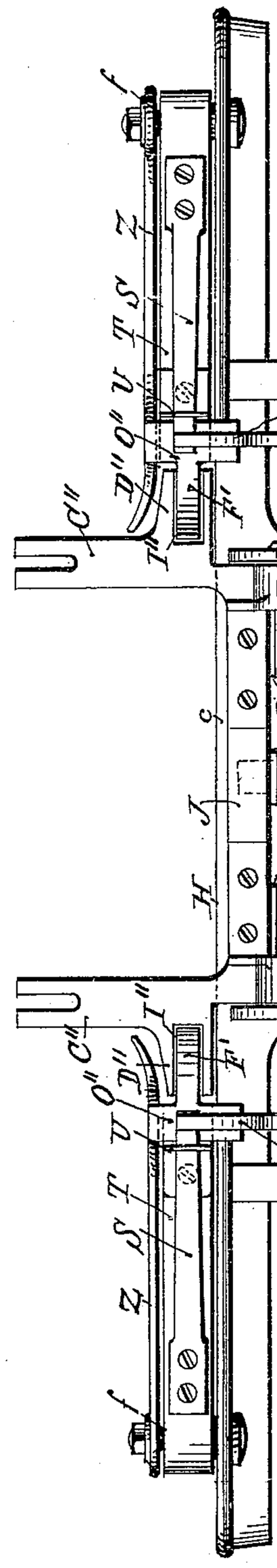

FIG. 4.

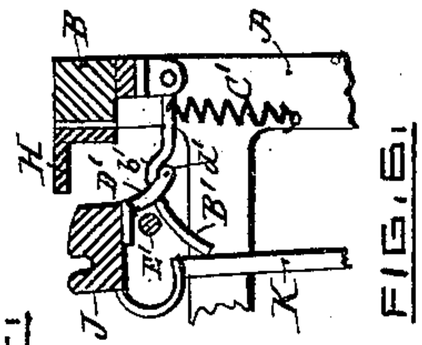

FIG. 6.

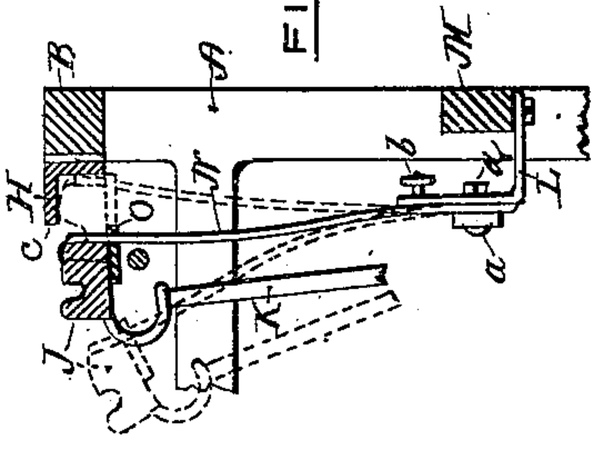

FIG. 5.

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(No Model.) 3 Sheets—Sheet 3.

J. D. COTTRELL.

LOOM.

No. 265,486. Patented Oct. 3, 1882.

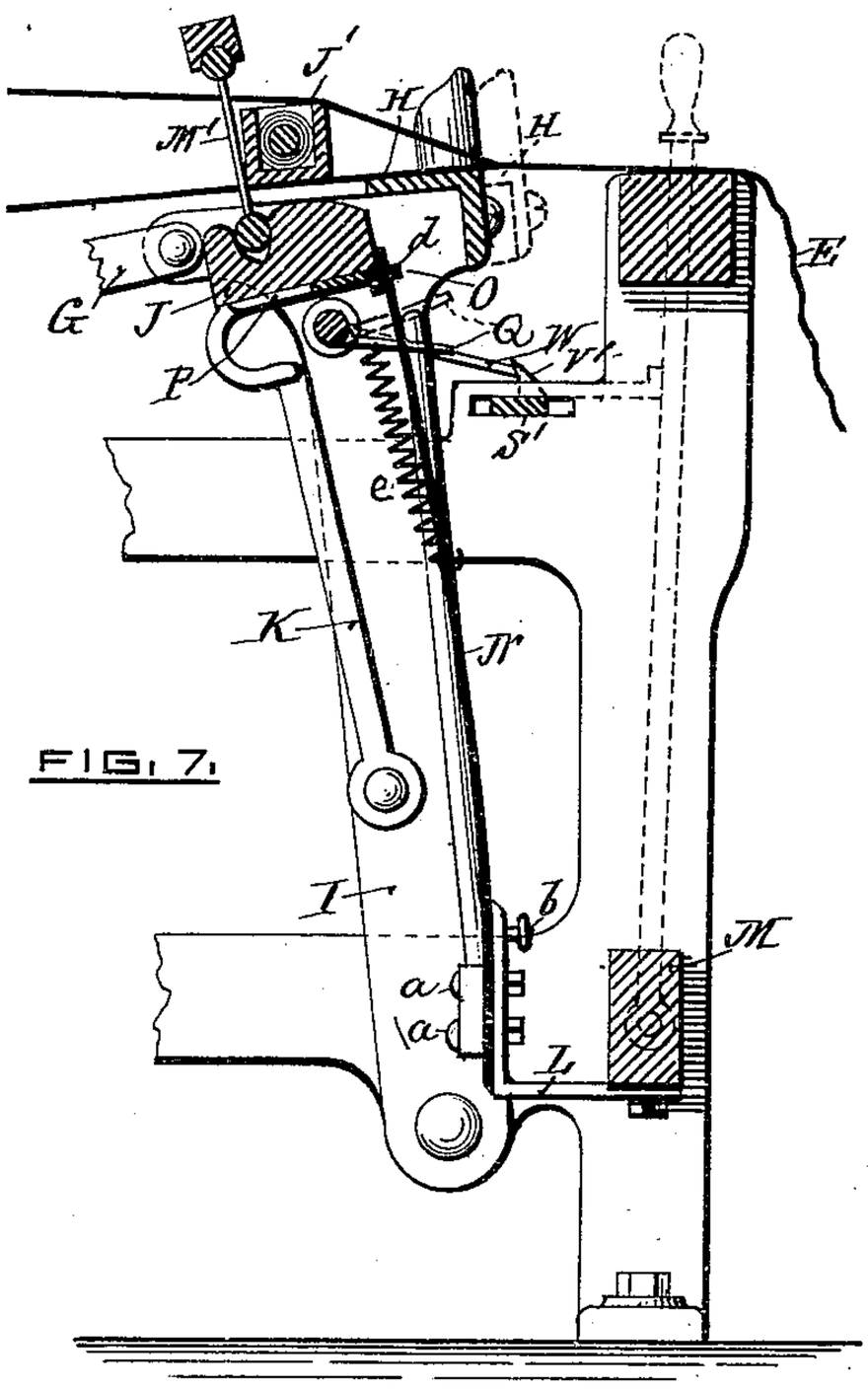

FIG. 7.

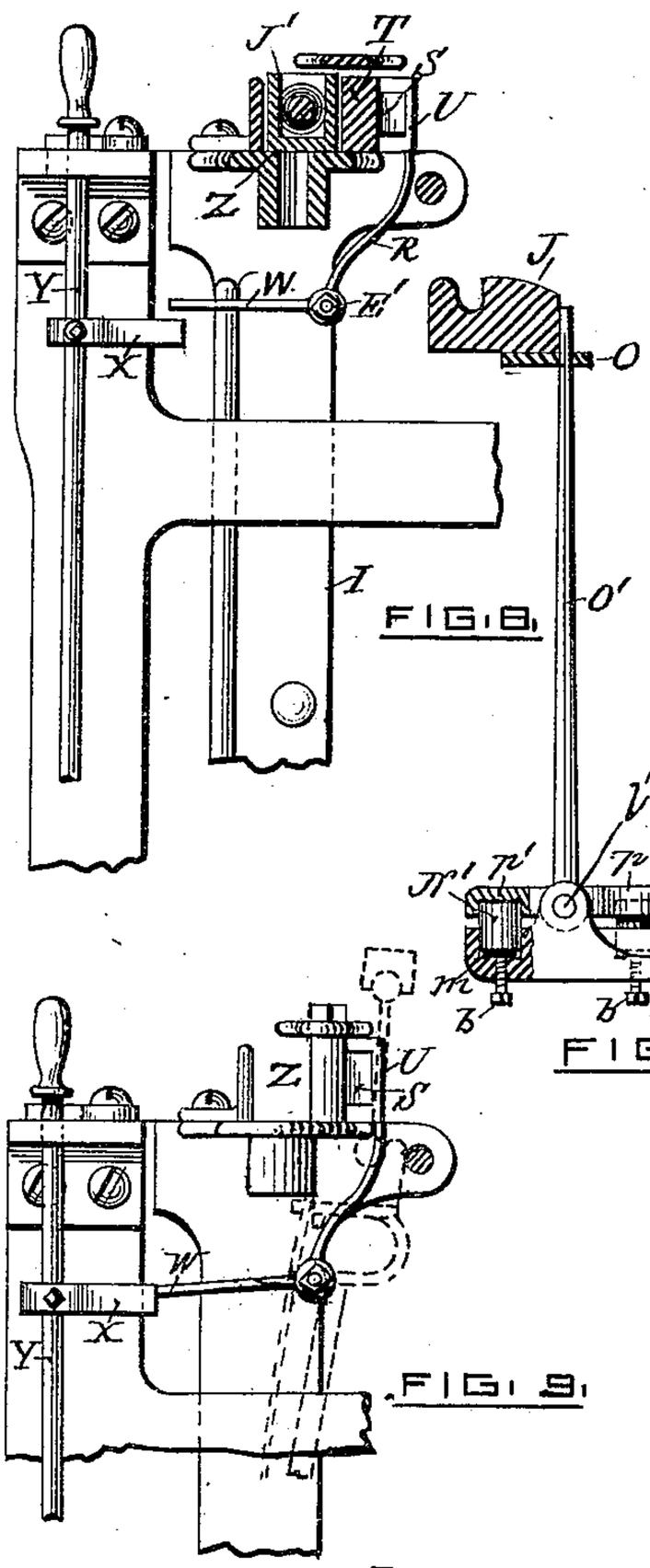

FIG. 8.

FIG. 12.

FIG. 9.

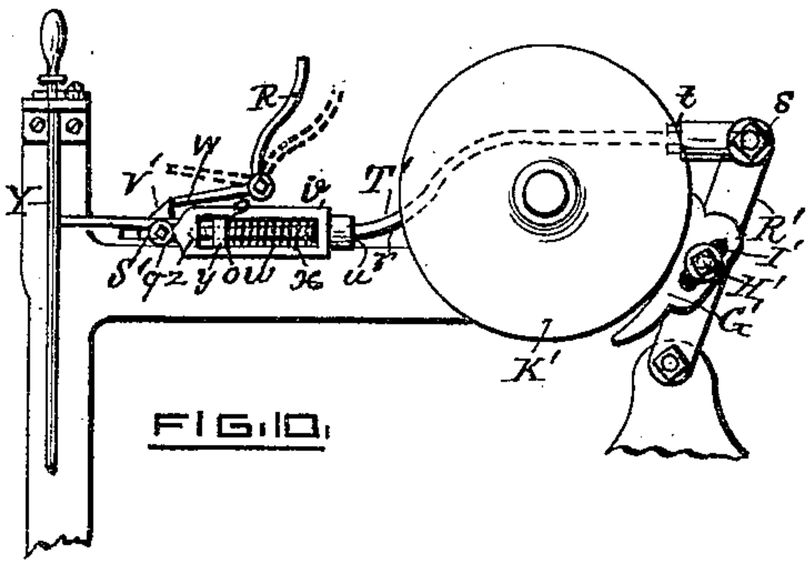

FIG. 10.

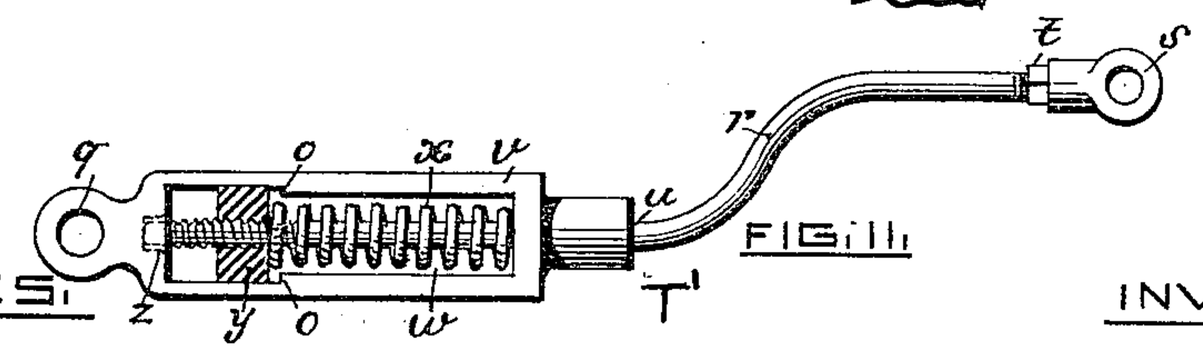

FIG. 11.

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UNITED STATES PATENT OFFICE.

JESSE D. COTTRELL, OF CENTRAL FALLS, RHODE ISLAND.

LOOM.

SPECIFICATION forming part of Letters Patent No. 265,486, dated October 3, 1882.

Application filed February 24, 1882. (No model.)

To all whom it may concern:

Be it known that I, JESSE D. COTTRELL, of Central Falls, in the county of Providence and State of Rhode Island, have invented an Improvement in Looms, of which the following is a specification.

My invention relates to improvements in that class of looms in which the reed-frame is made automatically separable from the lay-frame; and the objects of my improvement are to provide against damage caused by the accidental entanglement of a shuttle within the shed, to afford facilities for stopping the reed-frame at an intermediate point of its course, and to guard against the rebound of the shuttle. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 represents a vertical transverse section through the forward part of the loom, showing the reed bed or frame locked to the lay-frame. Fig. 2 represents a front elevation of one end of the lay, showing the side of one of the shuttle-boxes. Fig. 3 represents a top view of the lay without the reed and partly in section. Fig. 4 represents a back elevation of the lay without the reed. Fig. 5 is a partial section of the loom on a reduced scale with the lay-frame moved fully forward, showing in full lines the reed-frame at its intermediate stopping-point and indicating in dotted lines the extreme forward and rearward positions that are assumed by the reed-frame. Fig. 6 represents a modification of the parts shown in Fig. 5. Fig. 7 represents a sectional view, showing the reed bed or frame unlocked, with the lay-frame at the proper point for stopping the loom. Fig. 8 represents a partial view of the right-hand end of the loom with the shuttle and shuttle-box in section, showing the position of the shipper-dagger when the reed-frame is locked to the lay-frame. Fig. 9 represents a similar view with the shuttle-box in elevation, showing the position of the shipper-dagger when the reed-frame is unlocked. Fig. 10 represents a partial end view of a loom having a protector-bar and brake, showing a spring interposed between the protector-bar and the friction-brake for stopping the momentum of the loom. Fig. 11 represents an enlarged side elevation of the rod shown in Fig. 10 for connecting the protector-bar to the friction-brake. Fig. 12 represents a modification of the spring mechanism for stopping the reed-frame at its intermediate position.

In the accompanying drawings, A is the frame of the loom; B, the breast-beam; C C, the harness; D, the shed formed in the warps; E, the woven web; F, one of the cranks for operating the lay; G, one of the pitmen connecting the cranks and lay. The lay-frame, carrying the shuttle-race H, is pivoted to the loom-frame A at the lower end of the lay-standards I I, and the reed-frame J is pivoted to the lay-standards I I at the lower end of the reed-frame swords K K.

To the bracket L, attached to the cross beam M of the loom-frame A, is secured the flat spring N, having its upper end connected loosely to the front of the reed-frame by means of the strap O, attached to the bottom of the reed-bed. The spring N is secured to the upright arm of the bracket L by means of the bolts *a a*, so that the lower end of the spring will be firmly held against the face of the bracket, and at the upper end of the upright arm of the bracket is placed the set-screw *b*, made to screw through the bracket, with the point of the screw resting against the surface of the spring, whereby when the screw *b* is made to advance by screwing it through the bracket the upper end of the spring N will be thrown backward, thus adjustably controlling the forward position assumed by the reed-frame J, connected to and operated by the spring N when said reed-frame is unlocked, as hereinafter described. The flat bar-spring N, being thus rigidly attached to the frame of the loom, will serve in its unbent condition to hold the reed-frame J, when the latter has been unlocked from the lay-frame, in the intermediate position shown in dotted lines in Fig. 1 and in full lines in Fig. 5, while the lay-frame, carrying the shuttle-race H, moves from that position to the limit of the forward stroke of the cranks F, as indicated in Fig. 5 by full lines. The extreme backward stroke of the reed-frame is represented by the dotted lines at the left-hand side in Fig. 5.

When the lay-frame and shuttle-race on the backward stroke reach the reed-frame they will carry the reed-frame backward against the ac-

tion of the spring N, the projecting flange *c* of the race-plate passing immediately over the top of the reed-bed, so that its edge will extend to near the lower portion of the front of the reed, and after the loom-cranks F have passed their center the lay-frame and reed-frame will move forward together, the one with a positive and the other with a spring movement, until the spring N is relieved from backward flexure, after which the lay-frame will be carried to its forward limit without the accompaniment of the reed-frame, if the latter still remains unlocked. The point for thus stopping the reed-frame by causing the spring N to become released from tension may be adjustably controlled within desirable limits by means of the adjusting-screw *b*, as above described.

To the under side of the reed-bed, and at each end of the same, are secured the catch-pieces P, each provided with a notch or downward lip, *d*.

The protector-shaft E′, held in the lay-standards I I, is provided with rigidly-attached pawls Q for locking the reed-frame to the lay-frame, the pawls Q being forced downward to their unlocking position by means of the springs *e e* and thrown up to lock the reed-frame to the lay-frame by the action of the shuttle when entering a shuttle-box upon the shuttle-binder thereof.

To the extreme ends of the protector shaft E′ are secured the curved fingers R R, made to press against the ends of the flat springs S S, secured to the outer sides of the shuttle-binders T T, which are pivoted to the shuttle-boxes at the points *f f*. The free end of each spring S is made to spring outward from the side of the shuttle-binder, and the extent of its movement from the side of the binder is regulated by means of the limiting-strap U, secured to each binder. The springs S S of the shuttle-binders may be properly adjusted to press outward against the inner face of the straps U U to such a degree that a slow outward movement of either one of the shuttle-binders will cause the proper upward movement of the ends of the pawls Q against the downward action of the springs *e e* without causing an inward movement of the spring S from its contact with the retaining-strap U; but upon the sudden movement of the shuttle-binder, resulting from the entrance of the shuttle into the shuttle-box, the inertia of the shaft E′ and pawls, in conjunction with the force of the springs *e e*, will cause the comparatively stronger spring S to yield, and thus form a lively quick-acting spring-cushion for the shuttle to prevent the rebound of the same after its entrance into the shuttle-box. When the shuttle passes properly from one shuttle-box to the other the consequent outward movement of the shuttle-binder of the latter box will cause the pawls Q to be elevated so as to catch behind the lips *d* of the catches on the reed-bed, thus bringing the reed-frame forward (from its stopping position) against the backward action of the spring N to beat up the weft; but in case the shuttle fails from any cause to enter the box, then the pawls Q, remaining in their depressed position, will allow the reed-frame to stop in an intermediate position at the end of the forward beat of the spring N, so that in case the shuttle has become entangled in the shed the warp-threads will be protected from damage, the momentum of the reed-frame being properly checked by the reflex action of the spring N.

The springs S S, which intervene between the shuttle-binders and pawls, serve to allow for the insertion of a filled shuttle into the shuttle-box at every required point in the stroke of the lay, and the interposition of a spring between the pawls and the shuttle-binders becomes necessary in order to allow for the proper passage of the lips *d* over the ends of the pawls Q under all the required conditions of the insertion of the shuttle. The position of the lay in which it would be inexpedient to insert a shuttle without the interposition of a spring between the pawls and the shuttle-binder is shown in Fig. 7, where, upon the insertion of a shuttle into the shuttle-box, the pawls Q will be brought to their elevated position, as indicated by the dotted pawl in the figure, and at the backward movement of the lay-frame the ends of the pawls will be brought in contact with the lips *d* in such a manner that in the absence of a yielding movement applied to the pawls the connected parts would either become broken or be soon thrown out of adjustment.

The pawls Q and the fingers R are so adjusted relatively to each other and fixed to the protector-rod E′ that the pawls, by striking against the under side of the catch-pieces P at the bases of the lips *d*, will form a stop to the backward movement of the fingers R, which will thus be firmly held against the springs S, the pressure of which will be transmitted through the shuttle-binder to the shuttle, and will serve, when properly adjusted, to prevent the rebound of the shuttle from the shuttle-box.

In carrying out my invention the reed-frame may be spring-connected to the frame of the loom in a variety of ways, so as to be brought forward at the back of the lay-frame, and be stopped at an intermediate point in the forward stroke by a spring.

An example of an alternative construction of spring mechanism for operating the reed-frame as above described is shown in Fig. 6, in which a curved cam, B′, is pivoted to the breast-beam B or to the frame A, so as to be depressed at its outer end by the downward action of the spring C′. The cam B′ passes through a slotted guide, D′, attached to the reed-bed, and carrying a friction-roll, *d′*. The tension of the spring C′ is so adjusted that the downward pressure of the curved cam B′ upon the friction-roll *d′* will be sufficient to bring the reed-frame forward with the lay-frame to the intermediate point, and the forward momentum of the reed-frame will be checked by the reflex

action of the cam and springs exerted upon the roll d' after passing the highest point, b', in the curve of the cam; and, in case the reed-frame becomes locked to the shuttle-race by the proper movement of the shuttle, as above described, then the reed-frame will be brought forward to beat up the weft against the action of the cam B′ and spring C′.

Another construction of the spring mechanism for operating the reed-frame is shown in Fig. 12, in which the stand L′, bolted to the cross-beam M of the loom, serves to support the lever O′, joined to the reed-bed, and pivoted to the stand L′ at the point l'. The lever O′ is provided with two oppositely-arranged recessed arms, $p\ p'$, under which are placed rubber springs N′ N″, made adjustable in their degree of tension by means of the screws $b\ b$. A portion of the arm p' and a corresponding part of the stand L′ is represented as broken away to show the cylindrical rubber spring N′ with a metallic plate, m, intervening between the end of the screw b and the spring. By means of this arrangement the reed-frame will be brought forward by the upward action of the spring N′, and will be checked at its intermediate point by the opposing action of the spring N″, thus bringing the reed-frame to a full stop by the reflex action of the spring mechanism.

To one end of the protector-shaft E′ is rigidly secured the dagger W, the angular position of which is controlled by the entrance of the shuttle into the shuttle-box. If desired, this dagger may be arranged to engage with the arm X upon the spring-shipper handle Y, as shown in Fig. 8, so that in case the shuttle J′ properly enters the shuttle-box the dagger will, at the completion of the forward stroke of the lay, pass over the top of the arm X; but in case the shuttle should fail to enter the shuttle-box, as shown by the empty shuttle-box Z in Fig. 9, and by the backward position of the reed-frame indicated in said figure, then the failure of the shuttle-binder to raise the end of the dagger W will allow the forward end of the dagger to strike against the end of the arm X and throw the spring-shipper Y out of its resting notch, thus stopping the further movement of the loom.

One of the great advantages secured by my improved reed-frame operated by the locking device and an opposing spring, as above described, is that I am enabled to bring the point at which dagger W acts upon the protector-bar or shipping devices of the loom farther forward in the stroke of the lay-frame than when a fixed reed-frame is employed, and thus secure more time for effecting the proper elevation of the dagger W by the movement of the shuttle. In ordinary fast-reed looms the dagger is caused to engage with the shipper-handle so early in the forward movement of the lay that there is great liability of the dagger striking the extreme point of the spur on the protector-bar whenever the shuttle arrives late in the shuttle-box, thus seriously wearing and damaging the points of contact.

In connection with the features of my invention already described, I prefer to employ a brake which is applied to the driving-shaft of the loom simultaneously with the movement of the shipper from its retaining-notch in order to prevent the momentum of the driving-shaft from continuing the movement of the loom, which would cause the shuttle to be again thrown into the shed. To secure this result, I employ the releasing-pulley brake shown in Fig. 10, in which the pivoted brake-lever R′ is connected to the end of the protector-bar S′, by means of the connecting-rod T′, which is provided with a rod, r, having a screw-thread upon both ends. Upon one end of the rod r is screwed the connecting-eye s, with a check-nut, t, and the opposite end of the rod r passes loosely through a central hole, u, in the rear end of the slotted bar v. Over the rod r, within the slot w of the bar v, is placed the spiral spring x, which is adjustably compressed by means of the nut y, held loosely in an enlarged portion of the slot w, between the forward end of the slot and the opposite shoulders $o\ o$, and the forward end of the rod r enters the guiding-socket z. The distance between the eye q for connecting the rod v with the protector-bar and the eye s may be properly adjusted by turning the eye s upon the rod r and securing the same in position by means of the check-nut t, and the tension of the spring x may be properly adjusted by turning the rod r, while the nut y is held stationary. The spring x, operating between the rear end of the slot w and the side of the nut y, serves to force the forward end of the rod r against the bottom of the guiding-socket z. The brake-shoe G′ is loosely pivoted upon the brake-lever R′ by means of the stud H′, which enters a slot, I′, made inclined to the curved friction-face of the shoe.

The dagger W is arranged to engage with the spur V′, upon the protector-bar, to stop the loom, and in the proper action of the shuttle upon the shuttle-binder passes above the spur V′, as shown by the dotted lines; but in case of the failure of the shuttle to reach its shuttle-box, then the dagger W will remain in its depressed position, and by its consequent engagement with the spur V′ will cause the simultaneous movement of the spring-shipper Y from its retaining-notch and the application of the brake G′ to the brake-pulley K′, the resulting compression of the spring x of the connecting-rod T′ serving to gradually check the momentum of the lay, thus bringing the loom to a full stop without serious shock, the brake-shoe G′ being provided with the inclined slot I′, through which the pivot or stud H passes, will now become released from strain upon a slight movement of the loom in a backward direction. The spring x will cause a backward movement of the lay-frame in this way: The spring being compressed when the dagger abuts against the

protector-bar, will, by its reaction upon the protector-bar, (to which the spring is connected by means of the connecting-rod,) cause the lay-frame to move backward until the resistance of the movable parts of the loom becomes just equal to the tension of the spring, and the backward movement will be sufficient to release the brake-shoe; but in case the lay-frame is made to stop at its complete forward stroke or movement, or thereabout, then the position of the cranks will be at or near the dead-center and prevent the spring on the connecting-rod from action to produce the movement desired. In that case a slight movement may be imparted by hand, causing the backward movement of the brake-pulley K′ and the immediate rise of the brake-shoe G′ upon the stud H′ and the release of the brake-shoe by reason of the incline of the slot I′, which will allow the loom to be subsequently started by the proper movement of the belt-shipper.

The ordinary position of the lay of a loom provided with a fixed reed, when stopped by means of the contact of the dagger with the protector-bar, is indicated by the position of the lay-frame shown in full lines in Fig. 7, which shows the dagger W in engagement with the spur of the protector-bar. In this arrangement there is left between the reed and fell of the cloth being woven a space sufficient for only one shuttle; but with my improved spring-operated reed-frame, stopping at an intermediate point, as described, sufficient space may be left for two shuttles, J′, between the reed M′ and the fell of the web E by adjusting the spring stopping mechanism to hold the reed-frame back a suitable distance from the fell. I can also bring the stopping-point of the loom, or the point at which the dagger W engages with the protector-bar, farther forward in the crank-stroke, as represented in Fig. 7 by the dotted lines, which show the front of the lay-frame in the forward position, and thus secure more time for effecting the proper elevation of the dagger W by the movement of the shuttle.

In order to provide for the possibility of a shuttle completing its travel and arriving at the opposite shuttle-box subsequent to the separation of the reed-frame from the lay-frame, I attach the backward-curved arms F′ F′ to the standards O″ O″ at the rear of the shuttle-boxes, and provide open slots I″ for the passage of the arms F′ through the shuttle-guiding wings D″ D″, which extend from the side of the reed-swords C″ C″ toward the shuttle-boxes Z. The curved arms F′ F′ serve to guide the point of the shuttle into the shuttle-box whenever the shuttle arrives after the reed has been stopped back from the shuttle-race, as above mentioned.

In my patent of July 4, 1876, No. 179,402, I have shown a reed-frame locked to the lay-frame by the entrance of a shuttle into the shuttle-box; but the reed-frame there shown and described is made to partake of the full movement of the lay-frame by means of springs arranged to continuously act upon the reed-frame in the direction of the forward movement of the lay, except when the reed-frame is stopped in its forward movement by the contact of the attached dagger with the protector-bar; but in my present improvement the springs or spring employed to act upon the reed-frame operate at its initial forward movement in the direction of the movement of the lay and at its terminal forward movement in the opposite direction, whereby the former dagger upon the reed-frame (shown in said patent) is dispensed with and the reed frame stopped, when necessary, without sudden shock by the action of the opposing spring, which operates from an intermediate point in the stroke of the lay to resist the forward movement of the reed-frame.

I am aware that friction-brakes in looms have been operated under a yielding pressure, and that the releasing brake-shoe described in this specification is embraced in my patent, No. 217,270, of July 8, 1879, which patent shows the releasing brake-shoe connected to the protector-lever and combined with spring-cushions in the pitmen, whereby the momentum of the lay would be suddenly thrown upon the brake and the crank-shaft and brake-pulley become cushioned by the pitman-springs; but with my improved spring-operated reed-frame, by the employment of which a greater portion of the forward movement of the lay may be utilized for the movement of the shuttle to its shuttle-box, as hereinbefore set forth, I am practically enabled to spring-cushion the momentum of both the lay and the crank-shaft by means of the spring arranged between the protector-bar and brake and by the employment of a spring in this position, by means of which the stopping shock of the loom is lessened, I am enabled to make certain portions of the lay lighter than heretofore and increase the speed of the loom.

Another advantage obtained by the spring used for stopping the reed-frame is that it counterbalances the momentum of the lay in its backward movement, overcomes its inertia, and lessens or prevents the backlash of the lay.

I claim as my invention—

1. The combination of the lay-frame with the reed-frame, means for operating said lay-frame and reed-frame, and the spring which serves to stop the reed-frame back from the lay-frame at an intermediate point in the forward beat of the lay, with a shuttle-operated locking device for bringing the reed-frame forward from its intermediate point against the action of the reed-opposing spring upon the proper entrance of the shuttle into the shuttle-box, substantially as described.

2. The combination of the lay-frame with the reed-frame, means for operating said lay-frame and reed-frame, and a spring adapted to cause said reed-frame to move simultaneously in its primary forward movement with the lay-frame, and to check the motion of the reed-frame at an intermediate point in the forward beat of

the lay by the reflex action of the spring mechanism, substantially as described.

3. The combination of the lay-frame, means for operating the same, the reed-frame, and the devices for locking the reed-frame to the lay-frame with the shuttle-binder, shuttle-binder spring, and a stop upon the binder to limit the outward movement of the shuttle-binder spring, whereby the shuttle-binder is enabled to yield quickly to the entrance of the shuttle into the shuttle-box without imparting a similar sudden movement to the locking device, substantially as described.

4. The combination of the lay-frame, means for operating the same, a shuttle-binder, a shuttle-binder spring, and a stop for limiting the outward movement of the shuttle-binder spring with the protector-rod, its finger, and a stop for limiting the backward movement of the rod, whereby a uniform resistance may be secured against the rebound of the shuttle from the shuttle-box, substantially as described.

5. The combination of the lay-frame and means for operating the same, the reed-frame, the spring which serves to stop the reed-frame back from the lay-frame at an intermediate point in the forward movement of the lay-frame, the shuttle-operated locking device for bringing the reed-frame forward from its intermediate point against the action of the reed-opposing spring, with the protector-rod and dagger, protector-bar, the releasing pulley-brake shown and described, and a spring arranged between the protector-bar and the pulley-brake, substantially as described.

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Witnesses:
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