J. D. COTTRELL.

LOOMS.

No. 179,402. Patented July 4, 1876.

Fig. 1.

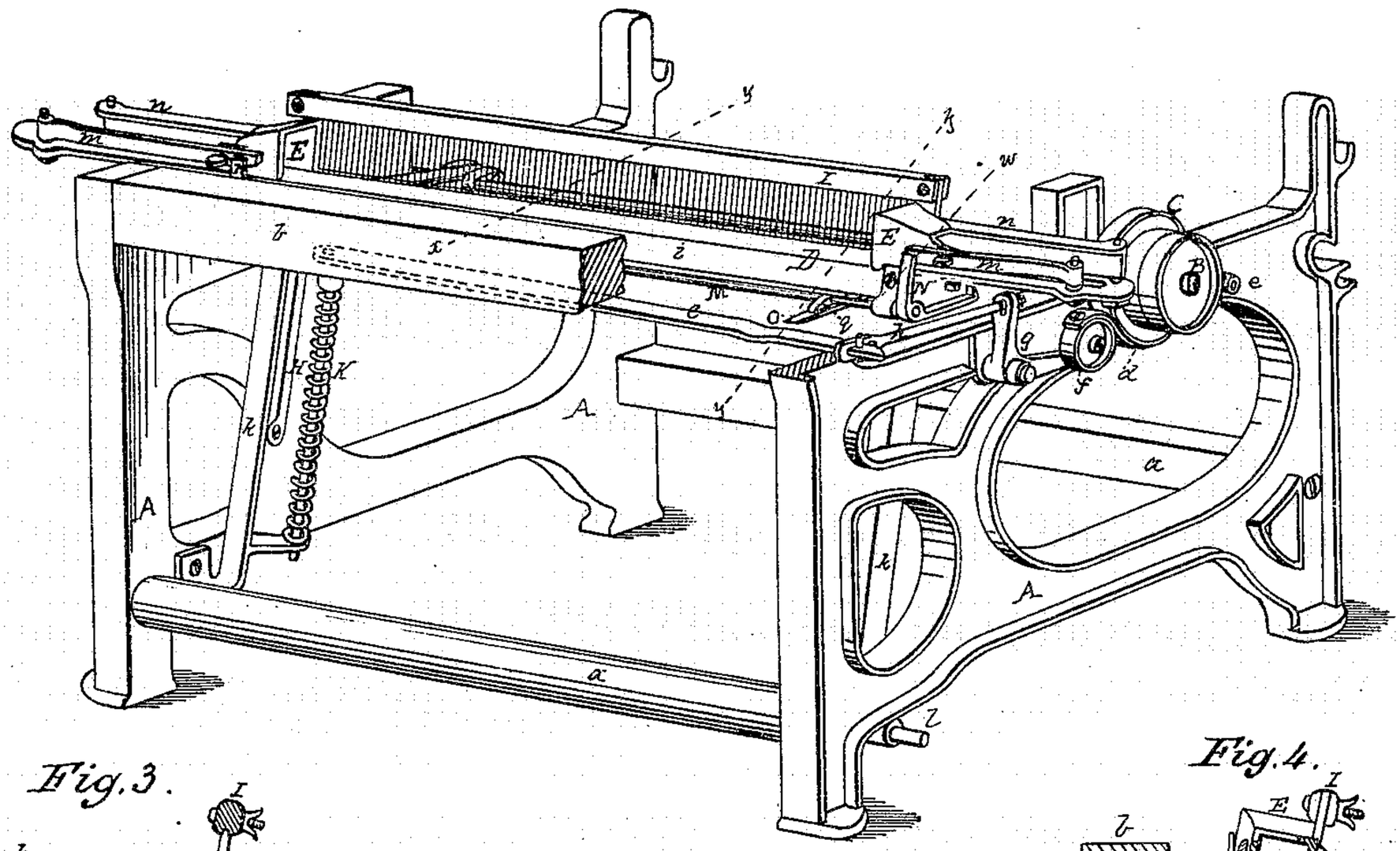

Fig. 3.

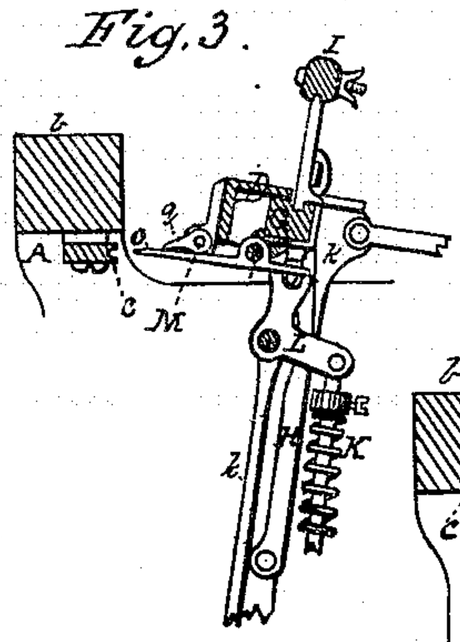

Fig. 2.

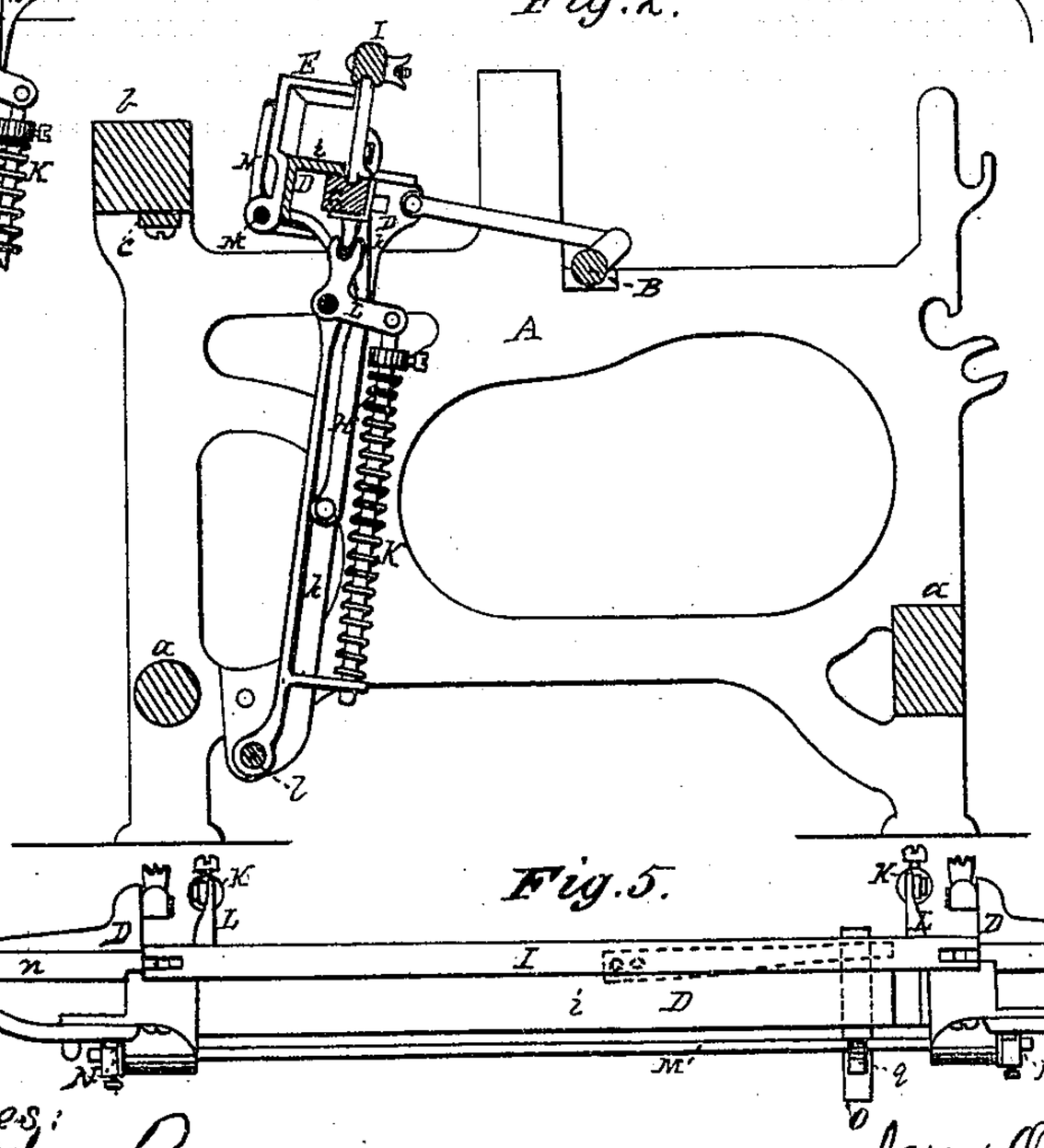

Fig. 4.

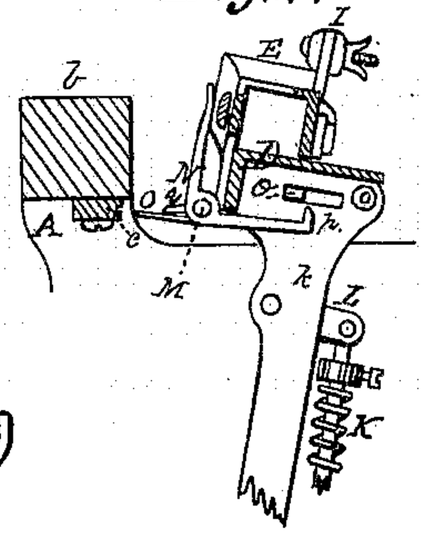

Fig. 5.

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UNITED STATES PATENT OFFICE.

JESSE D. COTTRELL, OF PAWTUCKET, RHODE ISLAND, ASSIGNOR OF ONE-HALF HIS RIGHT TO STEPHEN A. JENKS, OF SAME PLACE.

IMPROVEMENT IN LOOMS.

Specification forming part of Letters Patent No. **179,402**, dated July 4, 1876; application filed May 22, 1876.

To all whom it may concern:

Be it known that I, JESSE D. COTTRELL, of Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Looms; and I do hereby declare that the following specification, taken in connection with the drawings furnished, and forming a part thereof, is a clear, true, and complete description thereof.

The prime object of my invention is to render it safe and practicable to operate a loom at a rate of speed higher than has heretofore been successfully attained, without liability of injury to any portion of the loom during the operation of the stopping mechanism, and, at the same time, to provide for the complete protection of the warp when a shuttle fails to reach its box.

One feature of my invention consists in the combination of braking mechanism with a reed-frame, which is pivoted to the lay-frame, and held against the lay-bed by a spring or springs, and a dagger or protector-pin, which is connected to the reed-frame, whereby when the dagger is abutted against the protector-bar, which operates the shipper and the braking mechanism, the force of the blow is relieved by the springs of the reed-frame, and the reed-frame is thrown promptly to the rear for preventing the reed from injury by contact with the shuttle, and also for preventing a smash in the warp.

Another feature of my invention consists in the combination, with a spring-dagger, of a friction-brake, which is controlled in its initial and terminal movements by the action of the spring, whereby the brake is promptly operated for overcoming the momentum of the lay, and promptly released when the operative desires to throw the lay backward.

My invention further consists in a friction-brake of novel construction, embodying a bell-crank lever, connected at one of its arms by a link to the bar which operates the shipper, and carrying upon its other arm a roller, to the face of which is attached one end of a friction-strap, arranged to engage with the periphery of a drum or pulley on the crank-shaft, whereby the strap, being interposed between roller and drum, is tightened by their co-operative action, and made to engage for most of its length with the periphery of the drum.

Another feature of my invention consists in the combination, with a spring reed-frame, and a dagger attached thereto for operating a friction-brake, of a shuttle-box lever, which is actuated by the shuttle when fully in its box, and is arranged to hold the reed-frame at such time firmly to the lay, and render the dagger inoperative; whereby, also, when a shuttle fails to fully enter its box, the reed-frame will be disconnected from the lay and the friction-brake operated.

Still another feature of my invention consists in a shuttle-box having its rear side pivoted at its outer end to the lay, and at its inner end connected with the spring-reed frame, so that when a shuttle is but partially entered in its box the rear side thereof will move with the reed-frame, afford space for the shuttle, and obviate injury to the selvage-warp.

My invention also consists in connecting the rear side of a shuttle-box to the lay-bed by means of a shouldered pivot having a nut on its lower end, and a laterally-elongated hole in the bed, whereby the rear side of the box may be adjusted with relation to the longitudinal central line in the shuttle-race.

To more particularly describe my invention I will refer to the accompanying drawings, in which—

Figure 1 represents, in perspective, so much of a loom as is requisite to illustrate my improvements, with a portion of the breast-beam and frame broken away for exhibiting the parts. Fig. 2 represents the same in central vertical section on a line extending from the front to the rear of the loom on line *x y*. Fig. 3 represents in vertical section the breast-beam and lay on line *y z*, Fig. 1. Fig. 4 represents end view of lay, with shuttle-box, in section on line *w*, Fig. 1. Fig. 5 represents the top of the lay.

A denotes the end plates, which, with the usual cross-bars *a* and breast-beam *b*, constitute the frame of the loom. My improvements require no special adaptation or change of construction in the frame. The crank-shaft B is constructed as heretofore, and has the usual tight and loose pulleys. Beneath the breast-beam *b* is the usual laterally-vibrating

protector-bar *c*, which is pivoted at one end to the beam, and projects outward from the end plate of the loom for connection with a shipper, as heretofore employed in connection with any suitable stopping mechanism.

My novel friction-brake is shown in Fig. 1 at the right-hand end plate. The crank-shaft is provided with a flanged drum, C, which may or may not be attached to the tight pulley. Between the flanges the drum has a flat face. A friction-strap at *d* is fastened at one end to a pin, as at *e*, which projects laterally from the frame of the loom. The opposite end of this strap is attached to the periphery of a flanged roller, *f*, which is axially mounted on a stud laterally projecting from the lower arm of the bell-crank lever *g*, which is mounted on a stud projecting laterally from the frame.

The upper arm of the bell-crank lever *g* is connected to the protector-bar *c* by means of a link, *h*. This link is threaded at the end adjacent to the bell-crank lever, and provided with a nut for purposes of adjustment. At its opposite end this link is slotted, and loosely embraces the protector-bar.

It will be seen that when the protector-bar, through the operation of any stopping mechanism is moved toward the front of the loom, the roller will be lifted, and the friction-strap will be compressed between the roller and drum C, and that the rotation of the latter will rotate the roller, wind up the strap thereon, and thereby effect a close frictional contact of the strap throughout most of its length with the periphery of the drum, and result in promptly overcoming the momentum of the shaft and the parts operated by it, after the belt has been thrown from the fast to the loose pulley. When used without other portions of my invention the roller may be cam-shaped and weighted, so that the moment the shaft ceases to move the roller will drop automatically, and release the strap from contact with the drum.

D denotes the lay. It is constructed with special reference to a minimum of weight with the requisite strength, inasmuch as a lay of light weight is a matter of great importance in high-speed looms. The lay-bed is shown at *i*, and it can be made of thin cast-iron, or of two plates of thin wrought-metal, constituting the top or race and the front thereof. However made, it should have a longitudinal rectangular recess at the rear extending throughout that portion of its length which occupies the space between the end plates of the loom. The lay-bed is mounted on vertical standards, as at *k*, which are pivoted at their bases on the fulcrum-shaft *l*, which is supported by the frame. For securing light weight these standards are, preferably, of cast-iron, and rectangular in section.

The shuttle-boxes E, as usual, are mounted on the outer ends of the lay-bed, its top-plate constituting the bottom of each box. As heretofore, the front side *m* of the shuttle-box is hinged at its outer end to the lay-bed, and the box is provided with the usual nose-piece. Unlike those in use heretofore, the rear side *n* of each box is hinged to the lay bed at its outer end, and its inner end can be moved to and fro laterally on the lay-bed or race. The bolts or pivots are set in elongated bolt-holes in the lay-bed, as shown in Fig. 5, and being provided with nuts, the rear side of the box may be set in any desired position with relation to the longitudinal central line of the shuttle-race.

The reed is not attached to the lay, as is usual, but is carried in a reed-frame of novel construction and arrangement. The reed-frame consists of a reed-bed, G, two standards, H, and a hand-rail, I. The standards H are pivoted to the lay-standards *k* on studs parallel with the fulcrum-shaft, and located about midway between said shaft and the lay-bed. The standards extend above the lay-bed, and on them the hand-rail is mounted. At each end of the reed-bed is a square-sided stud, as at *o*, Fig. 4, which projects through a slot in the lay-standard, adjacent to the lay-bed. Above the lay-bed each reed-frame standard is slip-jointed to the inner end of the rear side *n* of each shuttle-box, so that under all circumstances the frame and the rear sides of the boxes will move together.

The reed-bed is provided with a longitudinal groove for the reception of the lower side of a reed, the upper side thereof occupying a corresponding groove in the lower side of the hand-rail I, so that the reed is held in the frame wholly independently of the lay-bed, instead of having the reed itself pressed against the rear side of the lay-bed, as is usual with swinging reeds. The pressure of the reed against the lay, as heretofore, results in battering and otherwise injuring the blades of the reed, and the warp is thereby liable to be cut or abraded.

The reed-frame is held to the lay-bed by spring-pressure. Any form of spring may be employed for this purpose; but I prefer to employ the expansive spiral springs K, one at each end. Each spring incloses a rod, which is guided in an arm projecting from the lay-standard near its fulcrum-shaft, and is pivoted at its upper end to one arm of a bell-crank lever, L. A collar and set-screw on the spring-rod provide for the adjustment of the spring in a manner well known.

The two bell-crank levers L are mounted on a fulcrum-shaft, which has bearings in the two lay-standards near the lay-bed. The upper arm of each lever L is provided with a vertical slot, which is occupied by an arm which projects laterally from the reed-frame standard, so that the springs acting through the levers force the reed-frame against the lay and hold it normally in proper working position, and also so that pressure when applied to the front of the hand-rail I of the reed-frame will compress the springs and allow the reed-frame to be moved backward independently of the lay.

I am aware that reed-frames have been here-

tofore made in which the reed is held independently of the lay, and that such frames have been arranged to move backward from the lay. Such frames have, however, been pivoted at the top of pendent arms to uprights on each end of the lay. Such a construction is of no value in high-speed looms, because of the necessary excessive height of the standards on the lay, and the presence of too much weight above the point at which the lay is connected to the crank-shaft.

With my construction no portion of the mechanism carried by the lay extends above the hand-rail. Moreover, with my construction the reed-frame in its independent movement does not depart from the line of movement traveled by it when moving with the lay, and this secures the shed from undue abrasion. On the other hand, with the pendent reed-frame, the reed, when released, is swung backward and upward.

Whenever neither box is fully occupied by the shuttle the reed-frame is only held by its springs. When the shuttle is fully in either box, it is held positively, as will be next described.

M denotes a fulcrum-shaft, which extends along the front side of the lay-bed, and is mounted in boxes attached thereto. At each shuttle-box is a rectangular shuttle-box lever, as at N, which is mounted on the end of the fulcrum-shaft and keyed thereto. The upper arm of each lever N is normally in contact with the outside of the hinged front side *m* of the shuttle-box E. The lower or horizontal arm of the lever N is provided at its outer end with a latch surface and catch, as at *p*, Fig. 4. When a shuttle is in either box it forces the front side *m* of the box outward. This gives a corresponding movement to the upper or vertical arm of lever N, and elevates the horizontal arm, so that its catch *p* engages with the rear side of the stud *o*, which projects through the lay-standard from the reed-frame, and, therefore, the reed-frame and lay under those circumstances are firmly locked together. If the shuttle be not entered into either box, then neither lever N is actuated, and the reed-frame is only held to the lay by its springs. It will be seen that either lever will rock the fulcrum-shaft, so that both levers will move together, and so hold the reed-frame at both ends, or leave both ends thereof free.

It will be understood that my improvements may be employed with any suitable stop-motion which operates with reference to the filling, and that I provide only for the failure of the shuttle to make its proper movements.

As heretofore constructed, so far as my knowledge extends, the stop-motion dagger, which operates when a shuttle fails to make its required movement, has always been attached to or operated by contact with the lay-bed. This mode of construction results in good service on low-speed looms, but when under high speed the shock incident to the abutting contact of the dagger with the protector-bar results in breakage of, or other injury to, various parts of the loom. I obviate this liability by mounting my dagger upon or operating it by contact with the spring reed-frame, as will next be described.

O denotes the dagger. It is pivoted near its rear end to the lower side of the reed-bed G of the reed-frame, as shown in Fig. 3, and is provided with a spring, the tendency of which is to elevate the front end of the dagger, which, as is usual, projects beneath the lay-bed and beyond the front of it. On the protector-bar *c*, beneath the breast-beam *b*, is a suitable surface with which the end of the dagger engages, except when deflected so as to freely pass beneath it. On the fulcrum-shaft M, to which the levers N are keyed, is a finger, *q*, which is always in close contact with the upper surface of the dagger, so that the spring of the dagger in holding its outer end elevated also holds the upper arms of the levers N in close contact with the front sides *m* of the shuttle-boxes, and on the other hand it will be seen that when levers N and fulcrum-shaft M are actuated by a shuttle in its box, the outer end of the dagger will be depressed so as to pass beneath the protector-bar. Whenever the levers N are not actuated by a shuttle, the dagger is not deflected, but abuts against the protector-bar, and through it operates the shipper and the friction-brake, as has already been described.

The dagger, having a yielding base at the reed-frame, on striking the protector-bar operates the friction-brake through the pressure exerted by the springs of the reed-frame, and, when the brake is set, the operative, on pressing backward on the hand-rail of the reed-frame, compresses the spring, withdraws the dagger, and releases the brake without any movement of the lay, and, therefore, the springs of the reed-frame control the brake in its initial and terminal movements.

It will be seen that when a shuttle remains in the shed, the dagger, having a yielding base in the spring reed-frame, not only obviates the shock heretofore incident to its abutment with the protector-bar, but it also promptly arrests the reed-frame, and prevents it from moving forward with the lay, thereby giving the shuttle sufficient space to wholly obviate any liability of injury to the warp.

It is obvious that the several features of my invention may be separately employed in connection with other well-known mechanism for producing similar results, although I prefer to combine them, as shown and described, because they have been proven to possess great practical value.

A loom embodying my improvements has been practically operated at the rate of two hundred and seventy picks a minute, and during the operation of the stopping mechanisms, with a shuttle remaining in the shed, the results were practically equivalent to those incident to the stoppage of an ordinary low-speed loom. As an experiment such a loom

has been run at upward of three hundred picks a minute, and frequently stopped with a shuttle remaining in the shed, without resulting in any injury whatever either to the loom or the warp.

I am aware that the several parts of the loom embodying my improvements may be largely varied in construction without departing from the spirit of my invention.

I claim as new and desire to secure by these Letters Patent—

1. The combination of braking mechanism with a reed-frame, which is pivoted to the lay of a loom, and held against the lay-bed by means of a spring, and a dagger or protector-pin, which is connected to the reed-frame, substantially as described, and for the purposes specified.

2. The combination, with a dagger, arranged to yield endwise through the action of a spring, of a friction-brake, substantially as described, and for the purposes specified.

3. The combination, with a friction-drum, connected with a driving or crank shaft of a loom, of a bell-crank lever linked to a shipper or protector-bar, a roller, mounted on said lever, and a friction-strap, attached to said roller and to a stationary stud, and arranged to engage with the periphery of the friction-drum, and to be compressed between the drum and roller, substantially as described, and for the purposes specified.

4. The combination, with a lay and a reed-frame, mounted on standards, which are pivoted below the lay-bed, of one or more bell-crank levers, mounted on the lay-standards, and actuating-springs, arranged to operate on the levers, and through them to hold the reed-frame against the lay-bed, substantially as described.

5. The combination, with a lay, a spring reed-frame, and a dagger attached thereto, of a protector-bar, a friction-brake, and a shuttle-box lever, which is arranged to lock the reed-frame to the lay, and render the dagger inoperative when a shuttle occupies a box, and to leave the reed-frame disconnected from the lay, and to operate the friction-brake through the dagger when a shuttle remains in the shed, substantially as described.

6. The combination, with a lay and a spring reed-frame, of a shuttle-box, having its rear side pivoted at its outer end to the lay-bed, and at its inner end connected with the spring reed-frame, substantially as described.

7. A shuttle-box, having its rear side attached to the lay-bed by a pivot, which is laterally adjustable on the lay-bed, substantially as described.

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