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J. SMITH & E. S. STIMPSON.

FILLING REPLENISHING LOOM.

APPLICATION FILED AUG. 18, 1906.

Fig: 3.

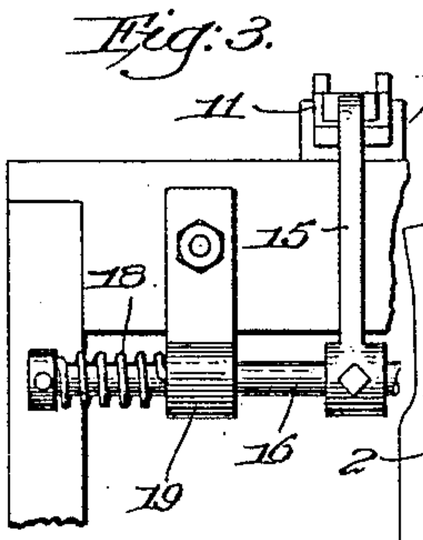


Fig: 1.

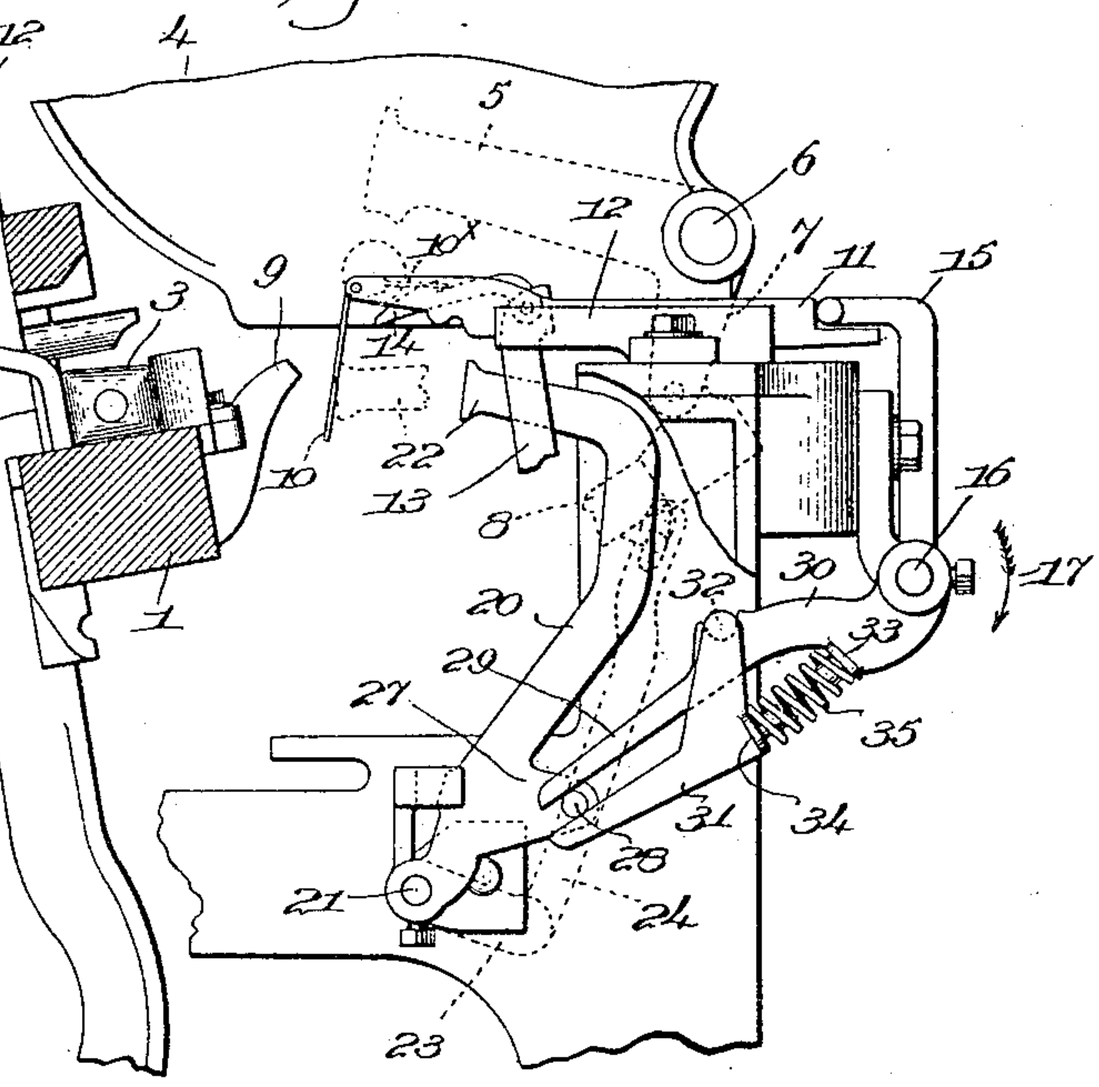


Fig: 4.

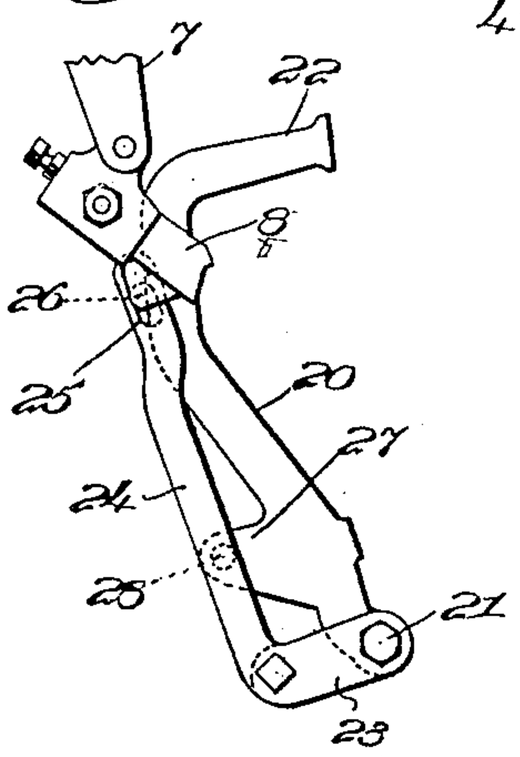
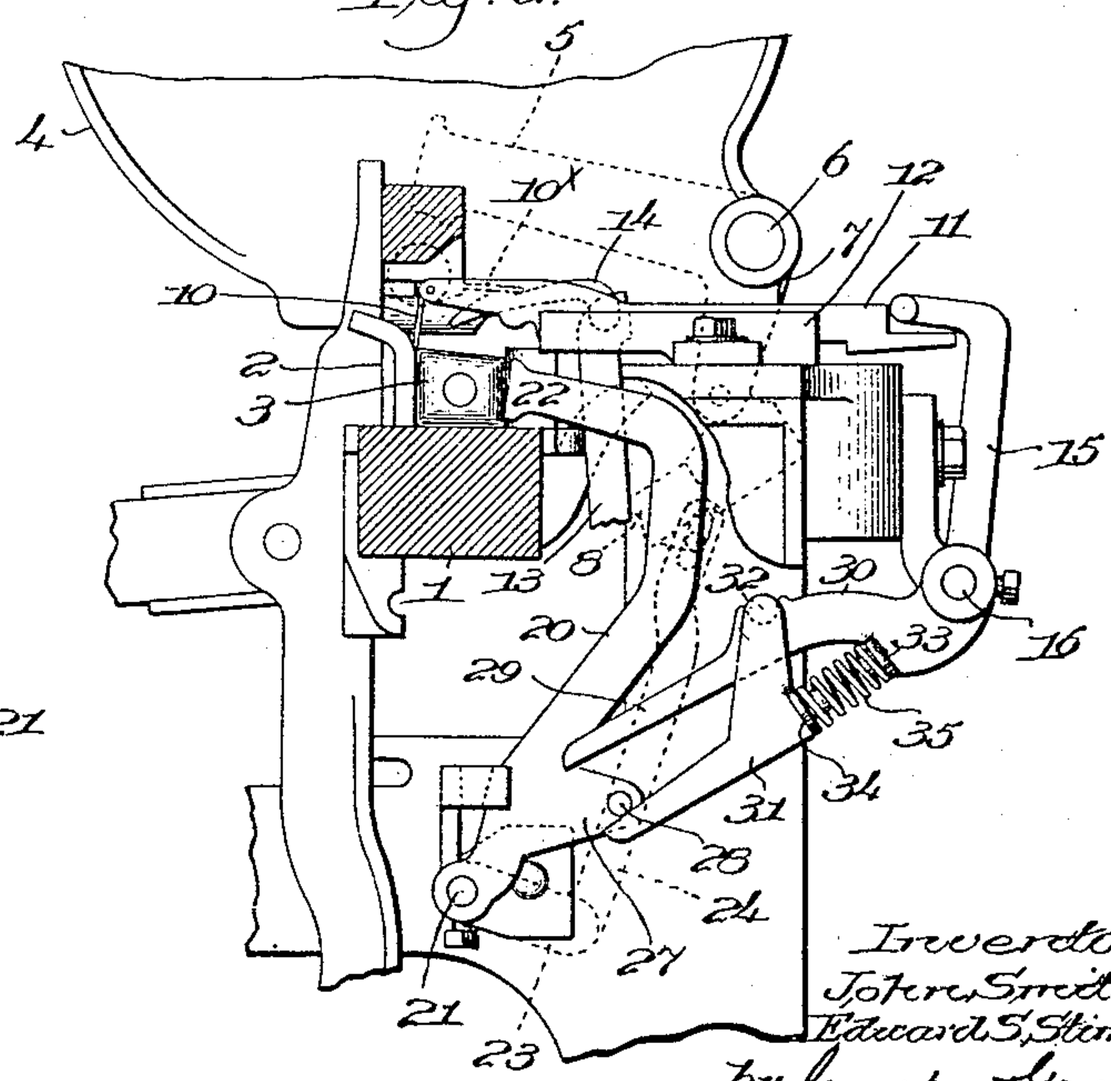


Fig: 2.



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UNITED STATES PATENT OFFICE.

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FILLING-REPLENISHING LOOM.

No. 846,700. Specification of Letters Patent. Patented March 12, 1907.

Application filed August 18, 1906. Serial No. 331,116.

To all whom it may concern:

Be it known that we, JOHN SMITH and EDWARD S. STIMPSON, citizens of the United States, and residents of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Filling-Replenishing Looms, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention relates to automatic filling-replenishing looms wherein the running-filling is replenished automatically at the proper time—as, for instance, when filling absence is detected by a filling detector or fork.

In the Northrop loom, one embodiment of which is shown and described in United States Patent No. 529,940, dated November 27, 1894, the filling replenishment is effected by inserting a fresh supply of filling in the running-shuttle.

The replenishing mechanism is located at one side of the loom and its operation is controlled by an operating rod or rock-shaft, turning of the latter serving to bring into cooperation a dog and a bunter to thereby effect transfer of filling from a filling feeder or hopper to the shuttle if the latter be properly boxed. If the shuttle is not so boxed, its improper position is detected by a shuttle-feeler, and the latter prevents the turning of the rock-shaft far enough to effect filling replenishment.

The shuttle-feeler is moved into detecting position by the initial turning of the rock-shaft, which latter has heretofore been held in normal position and returned thereto by a strong spring. The turning of the rock-shaft from normal position is in looms of the class referred to effected by or through coöperation of a vibrating actuator, such as the weft-hammer, and the tail of the fork when the latter is not tilted, as when filling is absent. Such filling detector or fork is located at the opposite side of the loom from the replenishing mechanism, and the operation of the said mechanism has heretofore caused a heavy strain to be put upon the fork. In the first place the rock-shaft had to be turned against the stress of the strong spring above referred to, the tension of the spring increasing as the shaft was turned, and in the second place the torsion or twist of the long rock-shaft had to be provided for. In addition the fork-slide had to be moved outward against the stress of a retracting-spring, made as a leaf-spring and of necessity made heavy and stiff in order to accomplish the desired function of returning the fork-slide to normal position after detection of filling failure. The heavy strain to which the fork was thus subjected caused rapid wear of the parts and required the fork and various adjacent parts to be made very heavy and strong, so that considerable delicacy in the fork action was sacrificed.

Our present invention has for its object the production of simple and efficient means to effect the control of the filling-replenishing mechanism by or through the filling detector or fork upon detection of filling absence, while relieving the fork of a great deal of the strain which it has previously been obliged to withstand.

We have herein shown one practical embodiment of our invention for purposes of illustration, and in the subjoined specification, taken in connection with the accompanying drawings, the various novel features of our invention will be fully explained, and more particularly pointed out in the following claims.

Figure 1 is a partial transverse sectional view of a sufficient portion of a loom with one embodiment of our invention applied thereto, the nearer or left-hand loom side being broken out to show parts of the mechanism beyond it, the apparatus being in normal running condition. Fig. 2 is a similar view, but showing the shuttle-feeler in engagement with the improperly-positioned shuttle to prevent the operation of the replenishing mechanism. Fig. 3 is a detail in front elevation of a part of the controlling or operating rock-shaft and our novel form and arrangement of the retracting-spring for the fork-slide. Fig. 4 is a detail of parts of the mechanism outside of the loom-frame at the replenishing side and shown in dotted lines, Figs. 1 and 2.

The lay 1, shuttle-box 2 thereon at the replenishing side of the loom, the shuttle 3, the filling feeder or hopper 4, Figs. 1 and 2, to contain a reserve supply of filling-carriers or

bobbins, the transferrer 5, fulcrumed at 6 and having a depending arm 7, the notched dog 8, pivotally mounted on said arm and adapted (when filling replenishment is called for) to be engaged by the bunter 9 on the lay to rock the transferrer, and thereby transfer a filling-carrier from the feeder to the running shuttle, may be and are all of well-known construction and operate in a manner familiar to those skilled in the art.

A filling detector or fork 10, pivoted in usual manner on a slide 11, mounted in a fixed guide 12 on the loom-frame, the vibrating actuator or weft-hammer 13, having a shouldered hook 14 to engage the fork-tail $10^{\times}$ and move the slide outward upon detection of filling absence by the fork, the upturned arm 15 in the path of the slide when so moved, and the controlling or operating rock-shaft 16, to which the arm 15 is rigidly attached, are also of well-known construction in the Northrop type of loom hereinbefore referred to.

Outward movement of the fork-slide acts through the arm 15 to turn the rock-shaft 16 in the direction of arrow 17, Fig. 1, to effect filling replenishment when the shuttle is properly boxed therefor.

We have herein provided a retracting-spring for the slide and also to return the rock-shaft to normal position, and, referring to Fig. 3, such spring is shown at 18 as a spiral spring coiled around the rock-shaft and at one end attached to it, the other end of the spring being fixed, as to one of the shaft-bearings 19. The spring is so wound as to normally turn the rock-shaft oppositely to the arrow 17, Fig. 1; but as it is a coil-spring it can be made much lighter or easier in its action and still properly perform its function than can a leaf-spring such as heretofore employed to retract the fork-slide. Not only can the spring be made easier in action by reason of its form, but also because it is in a measure aided in its work by some other portions of the mechanism yet to be referred to, the retractive influence of the spring on the fork-slide being transmitted from the rock-shaft 16 by or through the attached arm 15.

Heretofore the slide-retracting spring has had no control or influence over the rock-shaft.

A shuttle-feeler, shown as an upturned arm 20, fast on a short shaft 21, fulcrumed in the loom side adjacent the replenishing mechanism, is bent rearwardly at its upper end at 22, constituting the feeler proper and adapted to move across the mounth of the replenishing shuttle-box 2 if the shuttle is properly boxed when replenishment of filing is called for.

In Fig. 1 the operative position of the shuttle-feeler 22 is shown in dotted lines, and in Fig. 2 the feeler is shown in engagement with the shuttle 3, the latter being improperly boxed for replenishment.

The outer end of the short shaft 21 has an attached short arm 23, (see Fig. 4,) to which is rigidly secured an upturned finger 24, having a slot 25 in its upper end to loosely receive a pin or stud 26 on the dog 8, the shuttle feeler and finger swinging in unison.

When the shuttle-feeler is free to assume the dotted-line position, Fig. 1, the finger by its slot-and-pin connection swings the dog 8 upward on its pivot on the arm 7 and into the path of the bunter 9 to thereby actuate the transferrer as the lay beats up.

The center of gravity of the feeler-arm 20 and the attached finger 24 is always in front of the fulcrum-shaft 21, so that said parts tend by gravity to resume their normal position. (Shown in Fig. 1.)

A forwardly-extended enlargement 27 on the lower part of the arm 20 is provided with a lateral stud 28, over which projects a jaw-like portion 29 of an arm 30, fast on the rock-shaft 16, and a relatively movable jaw 31 is fulcrumed at 32 on the arm and extends beneath the stud 28. Substantially opposite seats 33 34 are formed on the arm 30 and movable jaw 31, offset from a line between the rock-shaft 16 and jaw-fulcrum 32, and a relatively light coiled expansion-spring 35 is mounted on and between the seats, as clearly shown in Figs. 1 and 2, the spring by its normal expansion keeping the jaws closed upon the stud 28. When the shaft 16 is rocked to effect filling replenishment, the arm 30 is swung upward, carrying the jaw 31 with it, the spring 35 being strong enough to normally hold the jaws closed and from relative movement, so that the arm 20 will be swung rearward to effect the feeling stroke of the shuttle-feeler 22.

It will be manifest that the fork-slide 11 in its outward movement consequent upon detection of filling absence has in our present invention merely to overcome the inertia of the parts operated by such slide movement plus the stress of the light spring 18, so that there is really very little strain exerted upon the fork, its tail and pivot, and the shouldered hook 14.

If the shuttle is properly boxed, the dog 8 is operatively positioned in the path of the bunter 9, and the replenishing mechanism is operated.

Should the shuttle stick out of the replenishing-box 2, it will engage the feeler 20 and hold it in the position shown in Fig. 2, the finger 24 then acting to hold the dog out of the bunter-path, so that no operation of the replenishing mechanism will be effected. Such arrest of the shuttle-feeler takes place before the slide 11 has completed its outward movement, and as this movement is com-

pleted the arm 30 continues to move upward, lifting the jaw 29 from stud 28, while the latter causes the jaw 31 to rock on its fulcrum 32, compressing the spring 35 somewhat as the jaws separate. While such compression of the spring 35 of course increases the strain on the filling-fork and adjacent parts to some extent, it is a very slight increase, as the spring is light, so that the additional strain is of no moment. This is very apparent when comparing this apparatus with the heavy and strong spring, which has heretofore been referred to, previously used to return the operating or controlling rock-shaft 16 to normal position.

The disposal of the major part of the weight of the swinging members carried by the short shaft 21 tends of itself to return such members to normal position, the stud 28 then acting, through the jaw 31 and spring 35, to depress arm 30 and return the rock-shaft 16, to that extent assisting the spring 18. Such parts, however, do not weigh enough in the aggregate to create any objectionable strain on the filling-fork and adjacent parts. As the heavy returning-spring for the rock-shaft has been eliminated and the light returning-spring is at the same end of the rock-shaft as the filling-fork and its slide, the torsion or twist of said rock-shaft, hereinbefore referred to, is practically eliminated, the operation of the entire apparatus being made easier and better by our invention.

The strain upon the filling-fork and adjacent parts has been reduced to a minimum, so that such parts can be made very light and correspondingly more delicate and accurate in operation.

Various changes or modifications may be made by those skilled in the art in different particulars of detail and arrangement without departing from the spirit and scope of our invention.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A loom having, in combination, mechanism to replenish filling in the running shuttle, a shuttle-feeler, a rock-shaft to control the time of operation of said mechanism, an operating connection between the rock-shaft and feeler, to move the latter into feeling position when the shaft is turned to effect the operation of the replenishing mechanism, said connection including two relatively movable, spring-controlled members, and a returning-spring for and coiled around the rock-shaft, engagement of the feeler with the shuttle causing relative movement of the spring-controlled members as the turning movement of the rock-shaft is completed, and means to effect such turning movement when filling replenishment is called for, said spring-controlled members offering no resistance to the turning movement when the shuttle is properly positioned.

2. A loom having, in combination, a lay provided with a bunter, mechanism to replenish filling in the running shuttle, means to effect the operation thereof, including a dog normally out of the bunter-path, a rock-shaft, a shuttle-feeler, a member movable therewith to govern the position of the dog, an operating connection between the rock-shaft and feeler, including a rocker-arm carrying jaws, a spring mounted on the arm to close the jaws upon a stud movable with the feeler, said stud, and means to turn automatically the rock-shaft when filling replenishment is called for, said spring offering no resistance to movement of the rock-shaft and arm when the shuttle is properly positioned, arrest of the feeler by the shuttle when improperly positioned for replenishment preventing operative positioning of the dog and causing the jaws to open as the turning movement of the rock-shaft is completed.

3. In a loom provided with filling-replenishing mechanism, in combination, a rock-shaft to control the time of operation of said mechanism, a filling-fork and its slide, outward movement of the slide upon detection of filling absence turning the rock-shaft to effect actuation of the replenishing mechanism, a swinging shuttle-feeler having a projecting stud, an arm fast on said shaft and provided with a fixed jaw and a relatively movable jaw, to embrace the stud, a spring mounted on the arm to normally close the jaws and effect swinging movement of the feeler as the shaft is turned, the spring at such time offering no resistance to such turning of the rock-shaft, while permitting separation of the jaws if the shuttle-feeler engages the shuttle, and a returning-spring for the rock-shaft.

4. In a loom provided with filling-replenishing mechanism, controlling means therefor, including a rock-shaft having an arm fast thereon and provided with a jaw, a co-operating jaw pivotally mounted on the arm, a light spring between the arm and pivoted jaw, to normally close the jaws, a swinging shuttle-feeler having a lateral stud embraced by the jaws, turning of the rock-shaft acting through said arm, jaws and stud to move the shuttle-feeler into operative position prior to filling replenishment, the jaw-spring yielding when the feeler engages an improperly-positioned shuttle, to prevent filling replenishment, a filling-fork, means governed thereby to turn the rock-shaft upon detection of filling absence, and a light spring to return the rock-shaft to normal position and retract the means governed by the fork.

5. In a loom, in combination, mechanism to replenish filling in the running shuttle, a rock-shaft to control the time of operation of

said mechanism, a filling-fork and its slide, movement of the latter upon detection of filling failure turning the rock-shaft to cause the operation of the replenishing mechanism, and a returning-spring for the rock-shaft, acting thereupon and located at the end adjacent the fork and slide.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN SMITH.
EDWARD S. STIMPSON.

Witnesses:
GEORGE OTIS DRAPER,
ERNEST W. WOOD.