No. 759,854. PATENTED MAY 17, 1904.

A. E. BENSON.

FILLING REPLENISHING LOOM.

APPLICATION FILED JAN. 25, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig: 1.

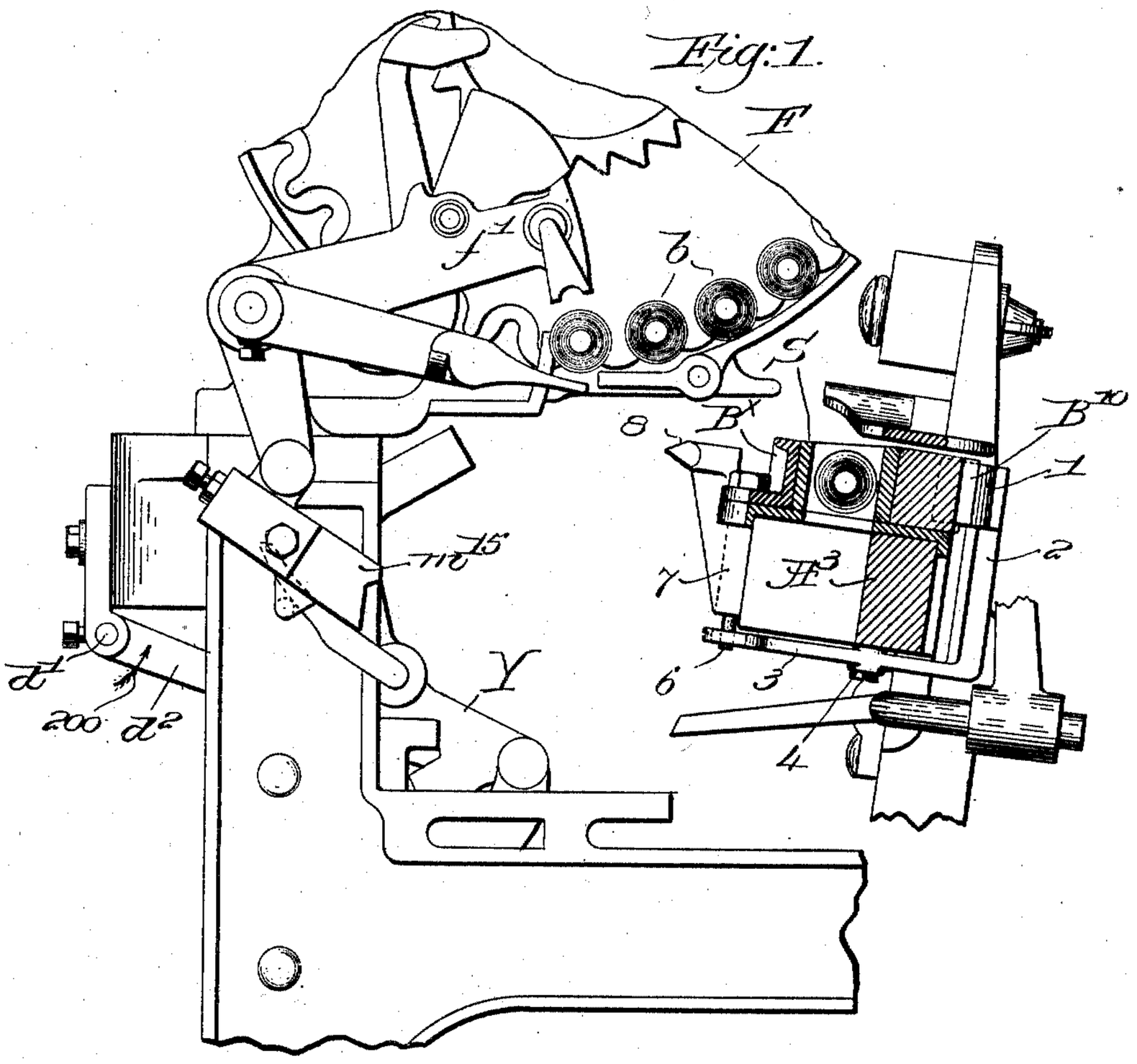
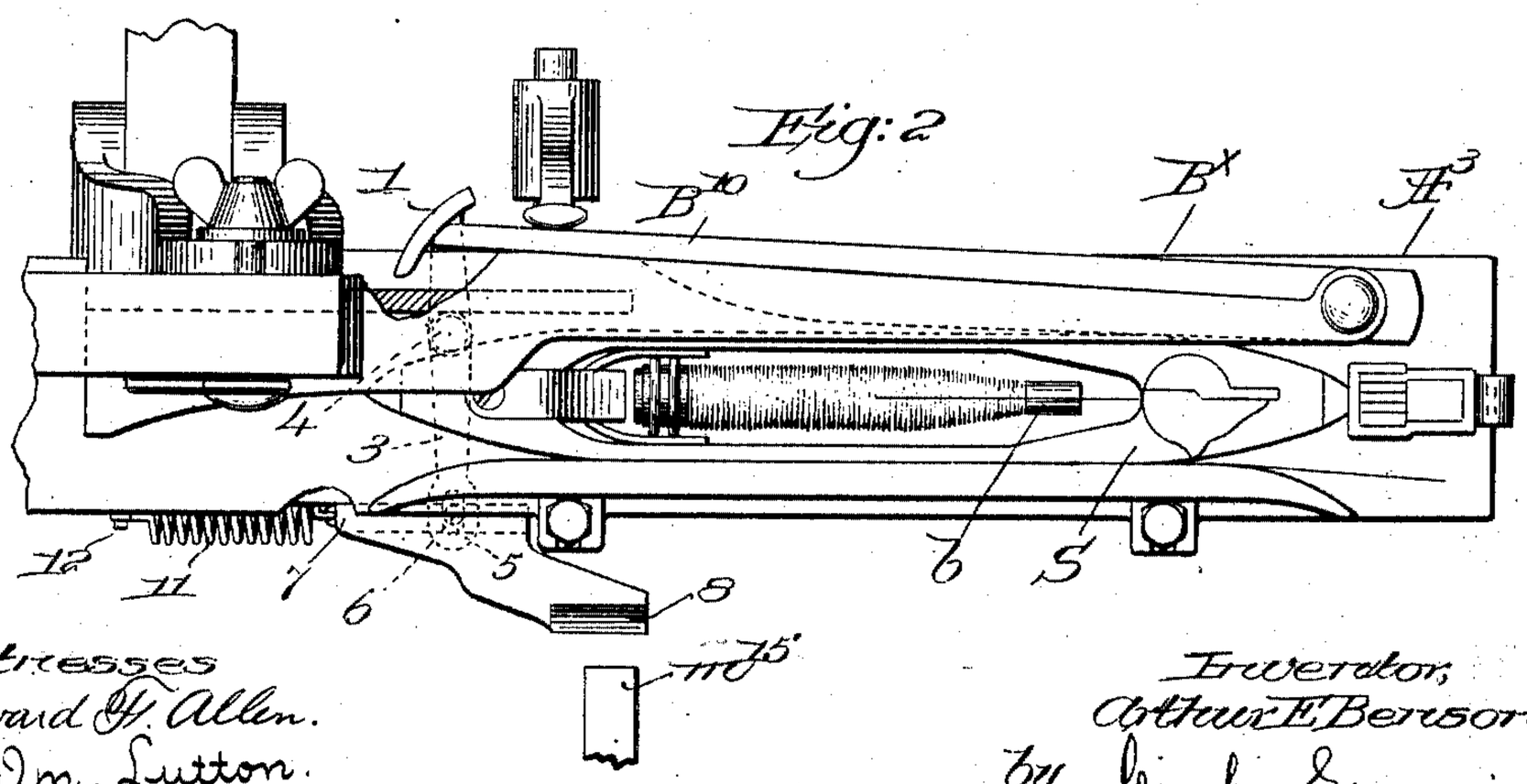


Fig: 2.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig: 3.

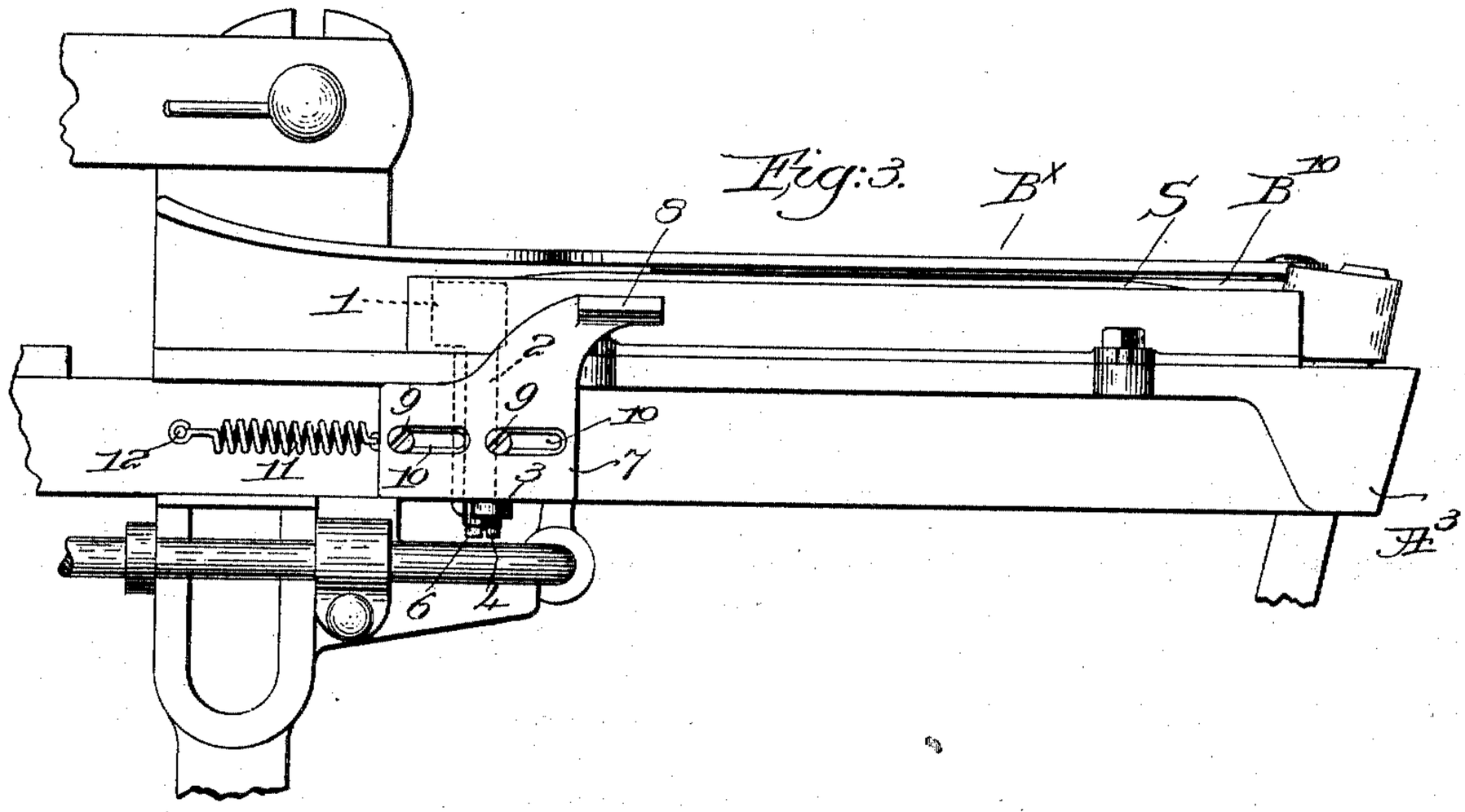


Fig: 4.

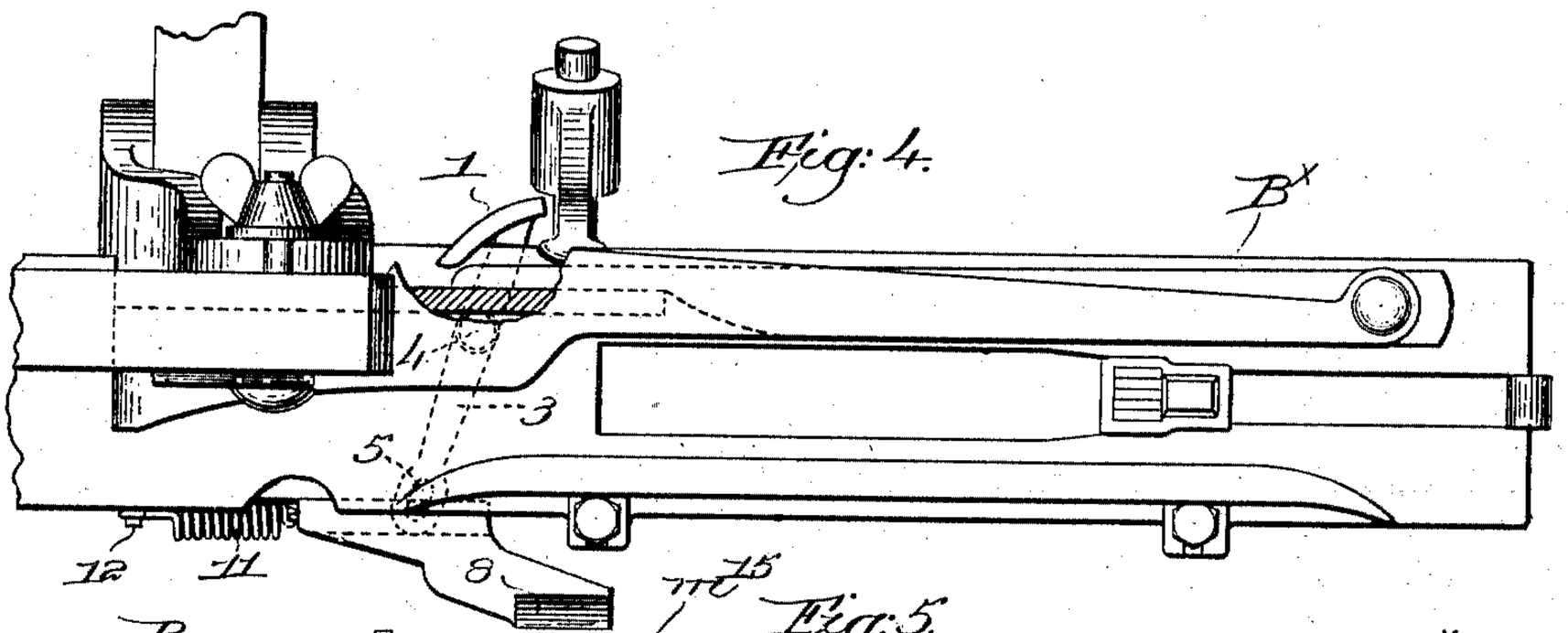
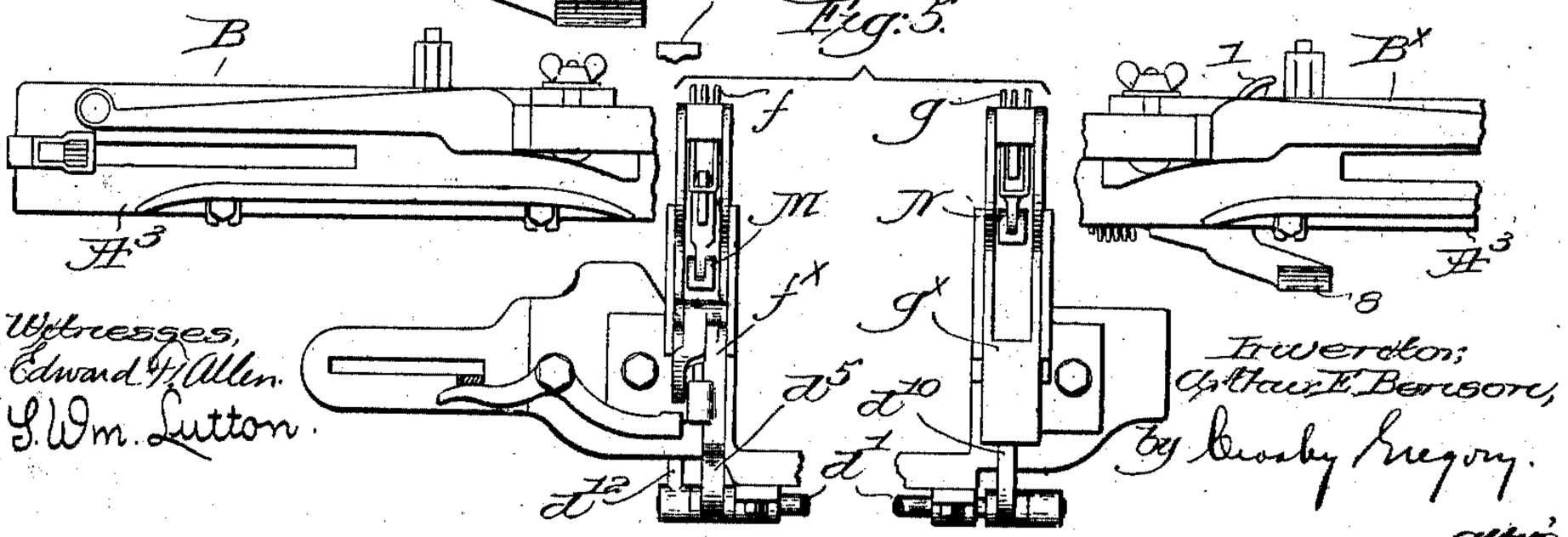


Fig: 5.



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No. 759,854. Patented May 17, 1904.

UNITED STATES PATENT OFFICE.

ARTHUR E. BENSON, OF MAGNOLIA, MISSISSIPPI, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

FILLING-REPLENISHING LOOM.

SPECIFICATION forming part of Letters Patent No. 759,854, dated May 17, 1904.

Application filed January 25, 1904. Serial No. 190,422. (No model.)

To all whom it may concern.

Be it known that I, ARTHUR E. BENSON, a citizen of the United States, and a resident of Magnolia, county of Pike, State of Mississippi, have invented an Improvement in Automatic Filling-Replenishing Looms, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates more particularly to automatic filling-replenishing looms of the Northrop type, wherein the running shuttle is provided with a fresh supply of filling, as shown in United States Patent No. 529,940 and others. The feeder or hopper which contains the reserve supply of filling-carriers prior to transfer to the shuttle is mounted at one side of the loom, and filling replenishment is effected when the shuttle is boxed at the adjacent end of the lay. Should the replenishing mechanism be operated when the shuttle is in the opposite box, the transferred filling-carrier is inserted in the empty shuttle-box, and if it does not pass through the open bottom will, of course, cause damage when the shuttle on the next pick is thrown into the box. Even if the filling-carrier passes through the bottom of the box it may fall into some of the operating parts of the loom and cause damage. Manifestly, then, it is highly desirable to prevent operation of the filling-replenishing mechanism when the shuttle is in the wrong box, entirely aside from unnecessary diminution of the supply of filling sustained in the filling-feeder.

My present invention has for its object the production of means which will prevent the operation of the replenishing mechanism when the shuttle is in the wrong shuttle-box.

Sometimes after a loom has stopped the weaver in starting up the loom pushes the shuttle into the wrong box, and as the filling may be slack or on account of carelessness of the weaver, the fork will not be operated and a filling-carrier is transferred when the transferring shuttle-box is empty.

My present invention is constructed and arranged to prevent such transfer, and it is very desirable on a loom of the automatic replenishing type equipped with two filling detectors or forks, as will be fully explained hereinafter.

In double-fork looms means have been provided to arrest the take-up when either fork detects filling failure and to cause filling replenishment primarily through the fork farthest from the filling-feeder. A rock-shaft is arranged to be turned by detecting action of either fork, but it is turned far enough to cause filling replenishment and arrest take-up by only one fork. The other fork turns the rock-shaft only enough to arrest take-up, and to effect such operation there is lost motion between the slide of such fork and the rock-shaft, or the corresponding weft-hammer is given a shorter stroke. In either case careful adjustment must be made, and if the two weft-hammers have different strokes their cams must be different.

By the construction to be hereinafter described I obviate the use of lost-motion connections and the requisite adjustment thereof, and I am enabled to use like cams and coöperating parts for both the forks, simplifying construction and making the operation more positive and direct.

The various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a transverse sectional view of a portion of a loom, taken through the filling-feeder and the adjacent shuttle-box with one embodiment of my invention applied thereto. Fig. 2 is a top or plan view of the replenishing shuttle-box with the shuttle therein, showing the novel controlling means for the filling-replenishing mechanism in operative condition. Fig. 3 is a front elevation thereof. Fig. 4 is a plan view showing the shuttle-box empty and the controlling means positioned to prevent filling replenishment; and Fig. 5 is a plan view, on a much smaller scale, of the two filling-detectors and their connections with the rock-shaft, forming a part of the

controlling means for the replenishing mechanism.

The lay A^3, having shuttle-boxes B $B^\times$ at its opposite ends, (see Fig. 5,) the filling-replenishing mechanism comprising a filling-feeder F for the filling-carriers or bobbins b, the transferrer f', dog m^{15}, operatively connected with the transferrer and held normally in the position shown in Fig. 1 by connections between said dog and the controlling rock-shaft d', said connections including an arm d^2 and a yoke Y, may be and are of usual construction and operate in a manner well known to those familiar with the Northrop type of automatic filling-replenishing loom. In such loom when filling replenishing is called for the controlling rock-shaft d' is turned in the direction of the arrow 200, Fig. 1, to thereby permit the movement of the dog m^{15} into the path of a bunter on the lay, such bunter having been heretofore rigidly secured to the lay. When the bunter and dog cooperate, as the lay beats up, the transferrer f' removes or transfers a filling-carrier from the feeder to the shuttle S, Figs. 1 and 2, which shuttle is then in the replenishing shuttle-box $B^\times$—viz., that box which is at the end of the lay adjacent the feeder F. Filling replenishment is effected by or through the coöperation of two members—such, for instance, as the dog and the bunter hereinbefore referred to—but I have so arranged the apparatus that even though one of said members may be moved into operative position the other of said members will not be enabled to coöperate therewith unless the shuttle is in the replenishing shuttle-box.

Referring to Figs. 1 to 4, inclusive, the inner end of the binder B^{10} of the replenishing shuttle-box is adapted to coöperate with a cam 1, secured to or forming part of an upturned arm 2 of a lever 3, fulcrumed beneath the lay at 4, the upturned end 2 rising behind the lay. The lever 3 extends forward below the lay near the mouth of the shuttle-box, as shown in Figs. 2 and 4, and its forward end is provided with a longitudinal slot 5, which is entered by a depending pin or stud 6 on the body portion 7 of the bunter 8. The body portion 7 is mounted slidably upon the front of the lay and is held in place thereon by headed screw or other fastenings 9, (see Fig. 3,) extended through horizontal slots 10 in the body. By rocking the lever 3 from the position shown in Fig. 4 to that shown in Fig. 2 the bunter will be moved from inoperative to operative position.

In Fig. 4 the rear end of the dog m^{15} is shown, and it will be seen that the path of movement of the bunter is at one side of said dog, whereas when the bunter is moved into operative position, as shown in Fig. 2, it will coöperate with the dog m^{15} on the forward beat of the lay and effect filling replenishment in a well-known manner. A spring 11 is secured at one end to a pin 12 on the lay, and its other end is attached to the bunter-body to move the latter to the left, viewing Fig. 3, when permitted so to do.

When the replenishing-box $B^\times$ is empty, the binder B^{10} assumes the position shown therein, and the spring 11 is then free to move the bunter to inoperative position, the cam 1 assuming the position shown. When the shuttle enters such replenishing-box, however, the binder is thrown outward, and its free end engages and wipes over the cam 1, and thereby rocks the lever 3 into the position shown in Figs. 2 and 3, moving the bunter against the action of the spring into operative position, such position being maintained, of course, while the shuttle is in the box. It will be manifest, therefore, that unless the shuttle is properly positioned in the replenishing-box, and by such term is meant so far in the box that the bunter will have been moved into operative position, filling replenishment cannot be effected, even if the other controlling member—viz., the dog m^{15}—is in its operative position. If, therefore, the weaver in starting up the loom should push the shuttle into the wrong box and the usual filling detector or fork should fail to tilt owing to slackness of the filling or absence, according to the box in which the shuttle was inserted, the subsequent movement of the lay and the filling-detector could not cause the replenishing mechanism to be operated when the shuttle was in the non-replenishing box.

My invention is of particular value in looms wherein two filling-detectors are provided to detect filling failure on alternate picks, and I have so constructed the mechanism herein that the connection between each detector and the controlling rock-shaft d' is positive in its action when absence of filling is detected, and I am also enabled to obviate the use of any lost motion or variation in the shape of the weft-hammer cam for one of the detector-slides.

Referring to Fig. 5, I have shown two filling detectors or forks f and g, respectively, pivotally mounted on their slides $f^\times$ $g^\times$, the outer ends of the slides engaging, respectively, upturned arms d^5 d^{10}, fast on the rock-shaft d'. Weft-hammers M N are arranged to coöperate with the tails of the forks f and g when upon absence of filling either of the forks is not tilted to move the slide outward, and thereby turn the rock-shaft d' in the direction of the arrow 200, Fig. 1. The weft-hammers are given the same stroke, so that the two cams are interchangeable, and as the hammers have the same stroke it is manifest that the fork-slides will have the same stroke, and consequently whichever fork by detection of filling failure causes turning of the rock-shaft d' the angle through which the rock-shaft is turned will be the same. This rock-shaft can readily be arranged to arrest the operation of any suitable take-up instrumentality by means of

an arm d^{12}, Fig. 5, adapted to govern the operation of the take-up instrumentality, as, for instance, in United States Patent No. 727,014.

If the filling fails as the shuttle is moving to the box B, the detector f will usually detect such failure, and the shaft d' will be turned to cause the dog m^{15} to be set or operatively positioned, and on the next pick when the shuttle enters the replenishing-box $B^{\times}$ the bunter 8 will be moved into operative position, as has been described, and filling replenishment will be effected.

Should the filling fail on the shot of the shuttle from left to right, such failure will be detected by the fork g, and the rock-shaft d' will be turned, as before, to cause the operative positioning of the dog m^{15} on the next pick; but on that next pick the shuttle will have been thrown from the box $B^{\times}$, so that notwithstanding the fact that the dog is in its operative position the filling-replenishing mechanism will not be operated, for the reason that the bunter 8 will be in its inoperative position. No thin place in the cloth will be made, however, because the turning of the rock-shaft by detecting action of either detector will cause the arrest of the take-up instrumentality.

My invention is not restricted to the precise construction and arrangement shown, as various changes or modifications may be made by those skilled in the art without departing from the spirit and scope of my invention.

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

1. In a loom provided with filling-replenishing mechanism, a lay, means to control the time of operation of said mechanism, including an actuating member, movably mounted on the lay, and a device operative independently of the quantity of filling in the shuttle to positively move said member into operative position by the shuttle when properly boxed for filling replenishment.

2. In a loom provided with filling-replenishing mechanism, a lay, a shuttle-box thereon provided with a binder, controlling means for said mechanism, including an actuating member movably mounted on the lay, and a connection between the binder and said member to operatively position the latter by or through movement of the binder when the shuttle is properly positioned for filling replenishment in said shuttle-box.

3. In a loom provided with filling-replenishing mechanism, a lay, a shuttle-box thereon provided with a binder, controlling means for said mechanism, including an actuating member movably mounted on the lay, a spring to render said member inoperative, and a connection between the binder and said member to positively move the latter into operative position when the shuttle is properly boxed for filling replenishment.

4. In a loom provided with filling-replenishing mechanism, a lay, means to control the time of operation of said mechanism, including an actuating member movably mounted on the lay, a dog, a filling-detector, devices intermediate said detector and dog to render the latter operative upon detection of filling failure, and a device to operatively position the actuating member with relation to said dog when the shuttle is properly positioned for filling replenishment.

5. In a loom provided with filling-replenishing mechanism, controlling means therefor, including two members adapted to coöperate to effect the operation of said mechanism, an instrumentality to operatively position one of said members upon the occurrence of an abnormal condition of the running filling, and a device to operatively position the other of said members when the shuttle is properly positioned for filling replenishment.

6. In a loom provided with filling-replenishing mechanism, controlling means therefor, including two members adapted to coöperate to effect the operation of said mechanism, the lay, one of said members being mounted thereon and the other member being mounted independently of the lay, and independently-acting means to move said members into cooperative relation when an abnormal condition of the running filling occurs and the shuttle is properly boxed for filling replenishment.

7. In a loom, a lay, two filling-detectors to detect filling failure on alternate picks, filling-replenishing mechanism, controlling means therefor including two members adapted to cooperate to effect filling replenishment, one of said members being movably mounted on the lay, means to operatively position said member when the shuttle is properly boxed for filling replenishment, and operative connections between the other of said members and the filling-detectors, to operatively position such member upon detection of filling failure.

8. In a loom, a lay provided with shuttle-boxes, mechanism to replenish filling when the shuttle is in one of said shuttle-boxes, controlling means for said mechanism, including two normally non-coöperating members, an instrumentality to operatively position one of said members upon filling failure, and means acting only when the shuttle is in the replenishing-box to operatively position the other member, coöperation of said members causing replenishment of filling in the shuttle.

9. In a loom, a lay having shuttle-boxes, a bunter movably mounted on the lay, means operated by positioning of the shuttle in one of said boxes to render the bunter operative, mechanism including a filling-feeder and a transferrer to provide the shuttle with filling, and a dog operatively connected with the transferrer, combined with means to automatically effect movement of the dog into operative position upon the occurrence of an abnormal con-

dition of the filling, coöperation of the dog and bunter when both are positioned as set forth actuating the transferrer.

10. In a loom provided with filling-replenishing mechanism, controlling means therefor including a rock-shaft having arms fast thereon at opposite sides of the loom, a dog rendered operative when said shaft is rocked, two filling-detectors and their slides, the latter cooperating with said arms to turn the rock-shaft, and a weft-hammer to actuate each slide, combined with the lay, a bunter movable thereon, and means to move said bunter into operative position when the shuttle is in position for filling replenishment, to coöperate with the dog and actuate the replenishing mechanism.

11. In a loom, a lay having a shuttle-box and its binder, a bunter movably mounted on the lay, connections between the bunter and binder, including a cam, to operatively position the bunter when the shuttle properly enters the box, filling-replenishing mechanism, means to control its operation, including a dog, two filling-detectors, and connections between them and the dog, to operatively position the latter upon detection of filling failure by either detector, coöperation of the dog and bunter when both are operatively positioned effecting the actuation of the replenishing mechanism.

12. In a loom, a lay, shuttle-boxes thereon, two filling-detectors located at opposite sides of the loom, and adapted to arrest the operation of a take-up instrumentality upon detection of filling failure, filling-replenishing mechanism directly controlled as to its operation by or through detecting action of either detector, an actuator for said mechanism movably mounted on the lay, and means to operatively position said actuator only when the shuttle is in the replenishing shuttle-box.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR E. BENSON.

Witnesses:
E. E. THEGPEN,
SAM R. STEVENS.