No. 754,024. PATENTED MAR. 8, 1904.

E. S. STIMPSON.

FILLING REPLENISHING LOOM.

APPLICATION FILED DEC. 14, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

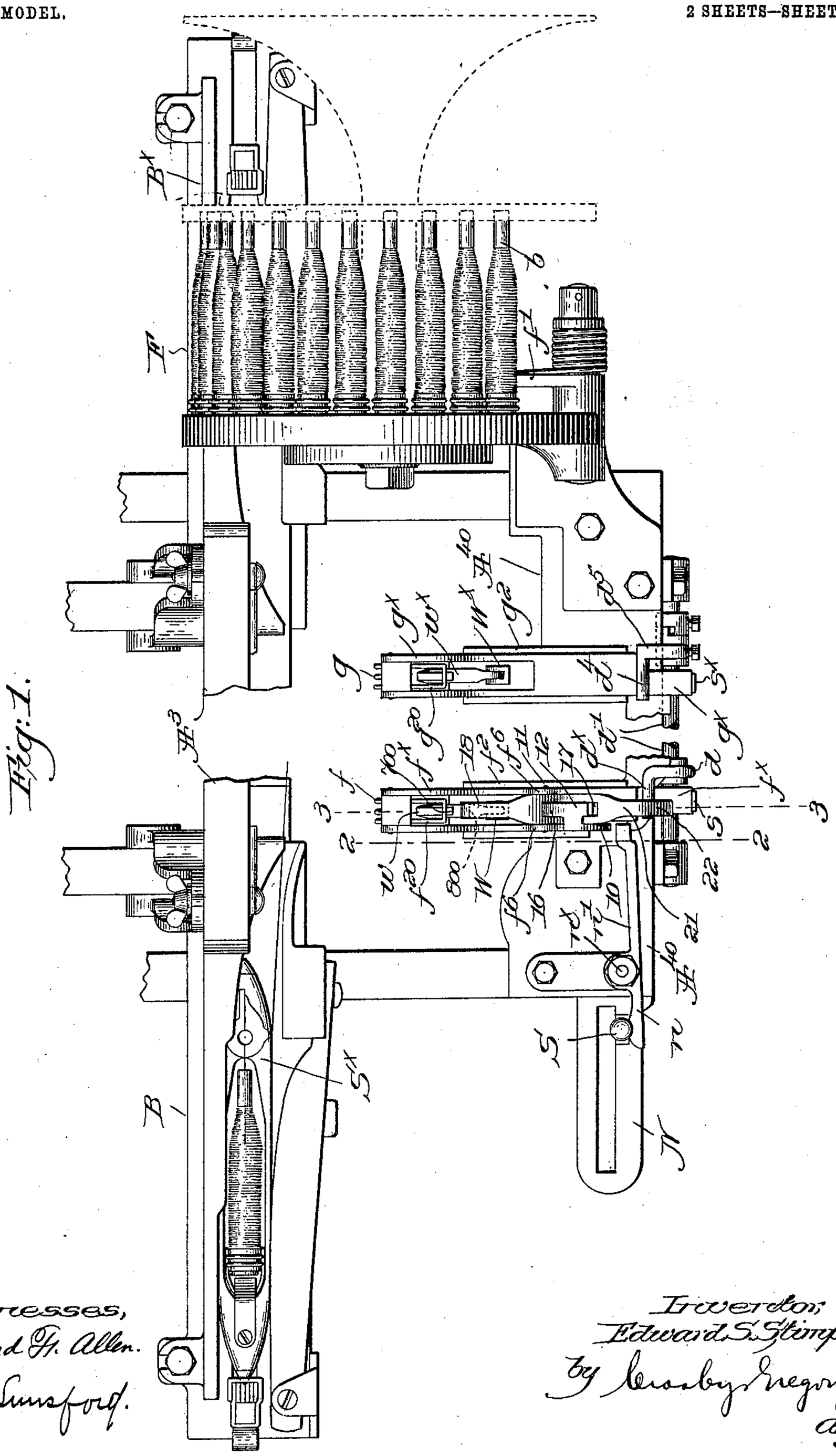

Fig. 1.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig: 2.

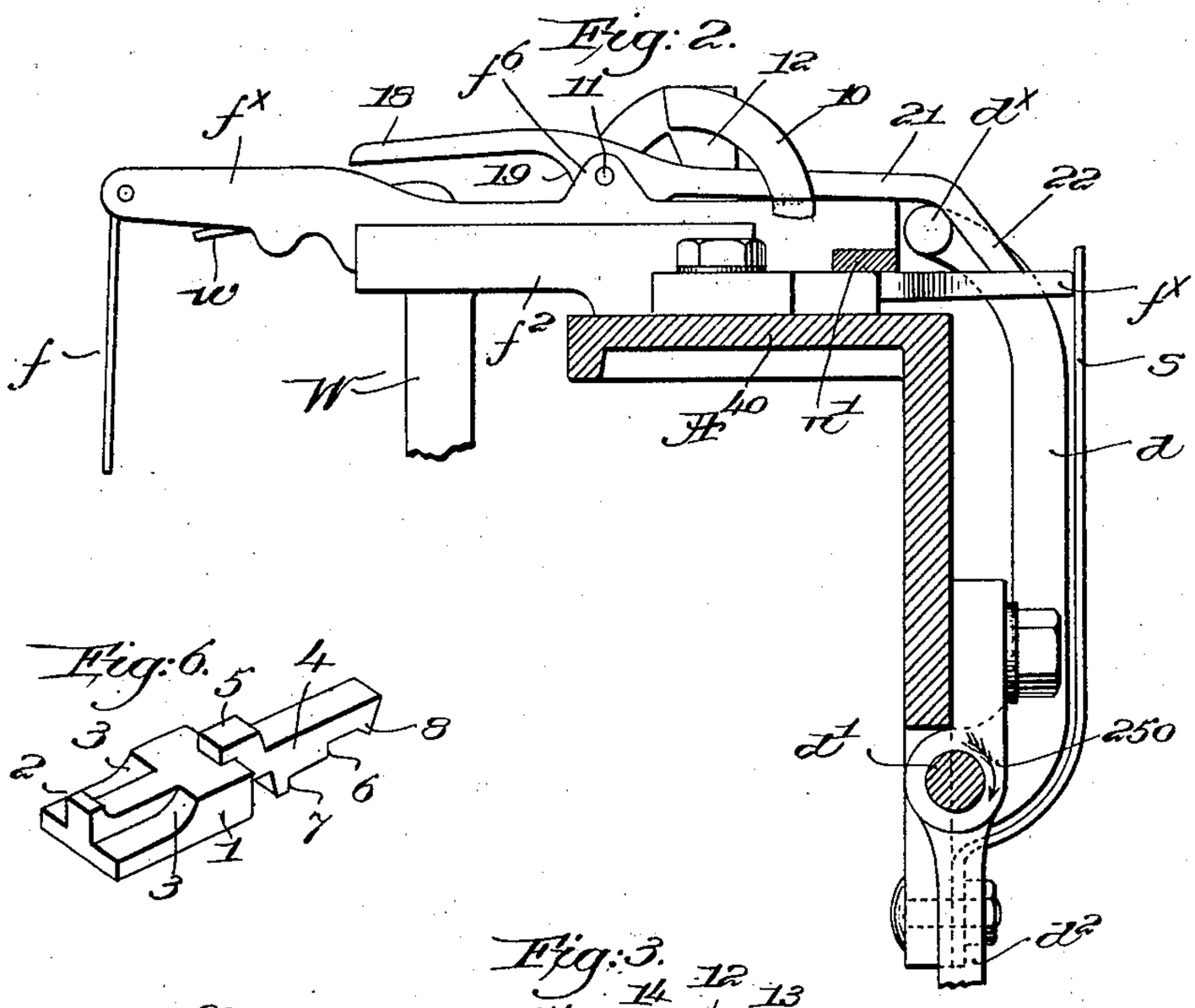


Fig: 6.

Fig: 3.

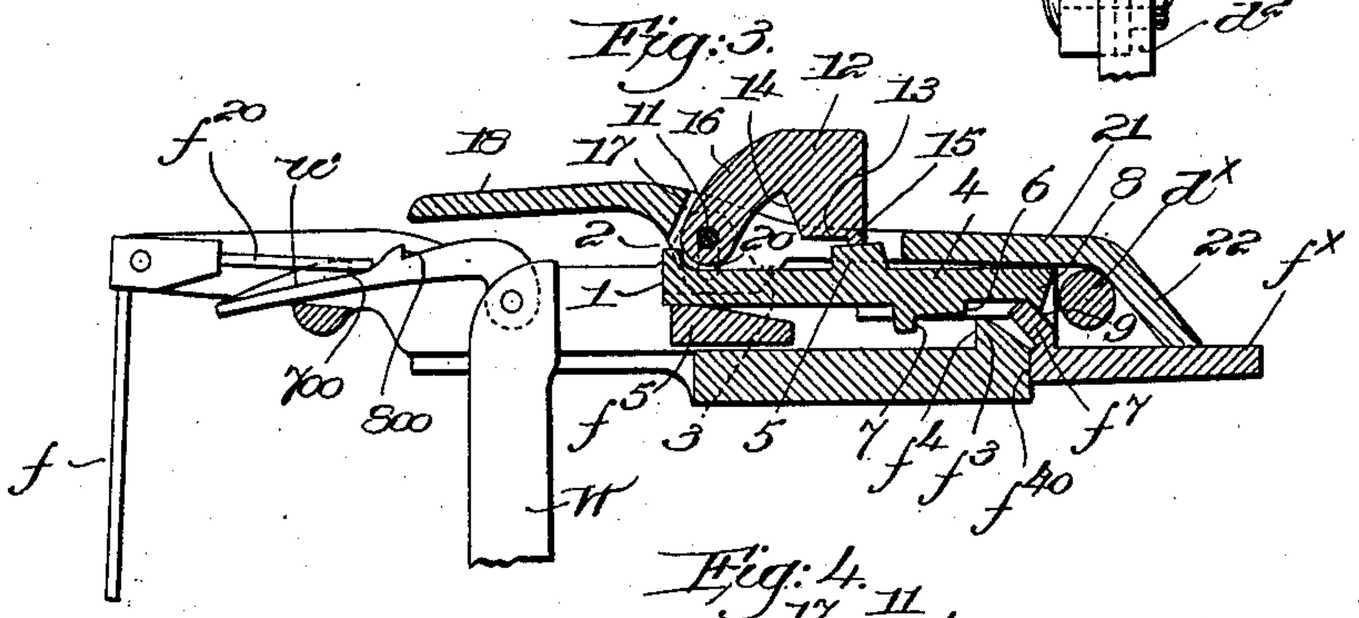


Fig: 4.

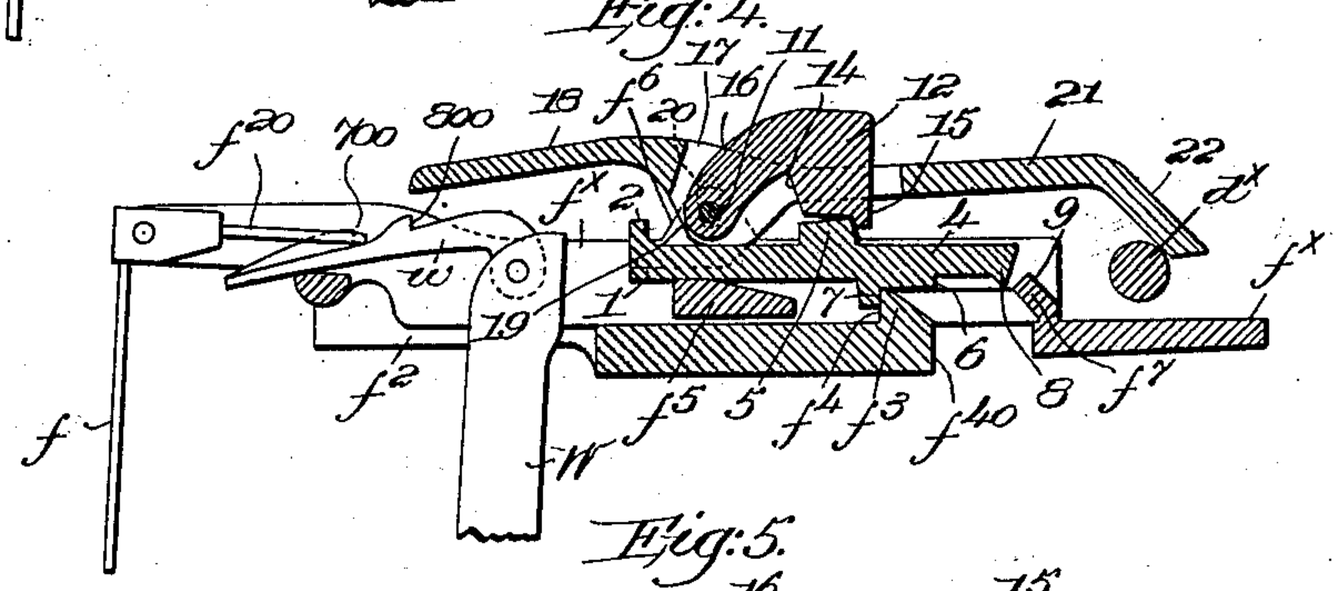
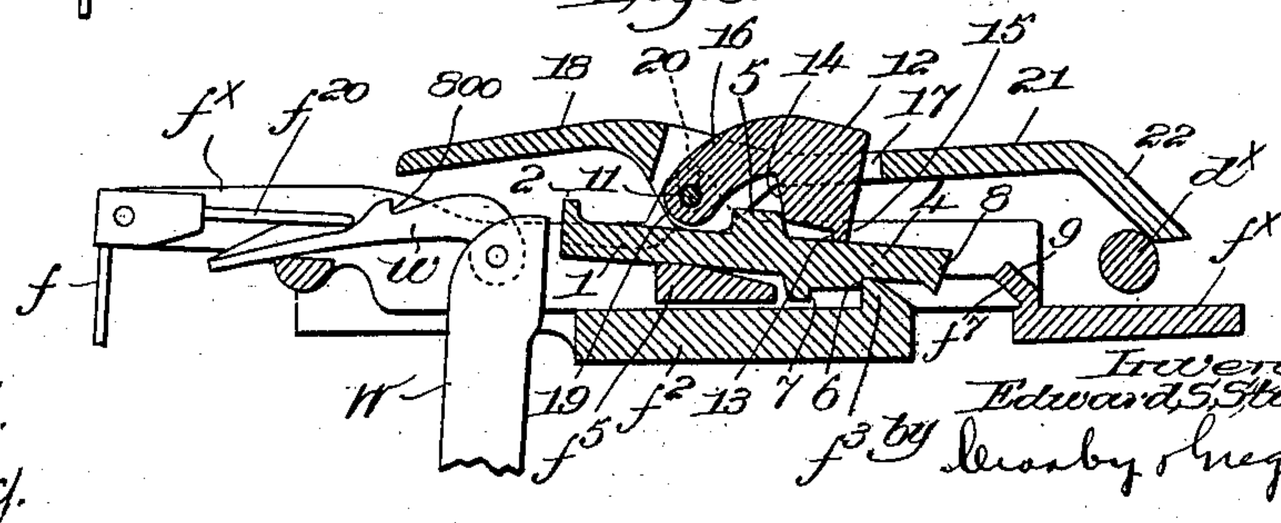


Fig: 5.



Witnesses,
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Inventor:
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No. 754,024. Patented March 8, 1904.

UNITED STATES PATENT OFFICE.

EDWARD S. STIMPSON, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

FILLING-REPLENISHING LOOM.

SPECIFICATION forming part of Letters Patent No. 754,024, dated March 8, 1904.

Application filed December 14, 1903. Serial No. 185,028. (No model.)

To all whom it may concern:

Be it known that I, EDWARD S. STIMPSON, a citizen of the United States, and a resident of Hopedale, county of Worcester, State of Massachusetts, 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 to looms provided with mechanism to automatically replenish the running-shuttle with filling.

If after replenishment the shuttle fails to thread properly, a second operation of the replenishing mechanism is automatically effected, and ordinarily the shuttle then threads properly. Should the shuttle again fail to thread, however, it is desirable to stop the loom in order to avoid unnecessary emptying of the filling feeder or hopper and useless operations of the filling-replenishing mechanism. Automatic looms of this character have been heretofore constructed to automatically stop the loom after a predetermined number of successive operations of the replenishing mechanism, such a loom forming the subject-matter of United States Patent No. 727,014, dated May 5, 1903. The loom therein shown is provided with two detecting devices, so that detecting takes place on each pick in order to insure the operation of the replenishing mechanism, even if an end of filling trails from the shuttle, and also to arrest take-up in such manner that no thin places will be made in the cloth. The operation of the filling-replenishing mechanism is effected upon filling failure whether the same is detected by either or both of the detecting devices, thereby obviating any delay in replenishment.

My present invention relates to the same type of loom, and one of the principal objects in view is the accomplishment of the results contemplated in such patented structure, but with a much simpler mechanism, containing fewer parts, which in themselves are more easily and cheaply made.

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 top or plan view, centrally broken out, of a portion of an automatic filling-replenishing loom embodying one form of my present invention. Fig. 2 is an enlarged detail, partly in section and partly in side elevation, on the line 2 2, Fig. 1, looking toward the right, of the main filling-detecting means and the parts adjacent thereto shown in normal position. Fig. 3 is a sectional view thereof, also enlarged, on the line 3 3, Fig. 1, but with the weft-hammer and its hook in elevation. Fig. 4 is a similar view, but showing the position of the parts after the first outward movement of the main fork-slide to effect filling replenishment. Fig. 5 is also a sectional view on the line 3 3, Fig. 1, but with the parts in the relative positions due to a second and successive outward movement of the main fork-slide; and Fig. 6 is a detached perspective view of the latch-controller shown in Figs. 3, 4, and 5, to be hereinafter referred to.

Referring to Fig. 1, the lay A^3, having the shuttle-boxes B $B^\times$, the automatically self-threading shuttle $S^\times$, the filling-replenishing mechanism supported at the side of the loom adjacent the shuttle-box $B^\times$ and including the transferrer f' and filling-feeder F to contain a supply of filling-carriers *b*, the controlling rock-shaft d', which governs the operation of the replenishing mechanism, the shipper S, and its notched holding-plate N, may be and are substantially as shown in the patent referred to and operate in well-known manner.

I have herein shown two filling-detecting devices at the replenishing and shipping sides of the loom, respectively, the main detecting device including a filling-fork *f*, its slide $f^\times$, longitudinally movable in the guide f^2, secured to the breast-beam A^{40}, and a tail f^{20} to coöperate in usual manner with a notch 700 of the hook *w* on the weft-hammer W, said hook having a second notch 800.

Upon absence of filling when the shuttle is in box B, Fig. 1, the slide $f^\times$ is moved outward in well-known manner, acting through the head $d^\times$ of an arm *d*, fast on the shaft d', to rock the latter and effect filling replenishment.

Such rocking of the shaft d' in the direction of arrow 250, Fig. 2, operates through a depending arm d^2, fast on the shaft, to arrest take-up, substantially as provided for in the patent referred to. The other detecting device, which for convenience is termed the "auxiliary filling-detector," is located at the replenishing side of the loom and includes the filling-fork g, its slide $g^\times$, longitudinally movable in the guide g^2, and the fork-tail g^{20}, to be engaged by the hook $w^\times$ of the weft-hammer or actuator $W^\times$ when the fork is not tilted to thereby move the slide outward. At such time the slide engages the upper end d^4 of an arm d^5, loosely mounted on the rock-shaft d' and having some lost motion with relation thereto, as in Patent No. 727,014, so that while outward movement of the slide $g^\times$ will turn the rock-shaft far enough to arrest take-up it will not turn it far enough to effect operation of the filling-replenishing mechanism. Either slide by its outward movement will thus control the take-up mechanism and arrest its operation; but filling replenishment can only be effected when the main slide $f^\times$ is moved outward, as will appear hereinafter. Suitable springs s and $s^\times$, acting against the outer ends of the fork-slides, serve to move them inward to normal position.

If filling fails on the shot of the shuttle to the box B, the trailing end may be long enough to engage and tilt the fork f, while on the next pick the fork g will detect failure and slide $g^\times$ will be moved outward to rock the shaft d' and swing the arm d outward. As will appear hereinafter, such movement of the arm will cause operative movement of the main slide $f^\times$ and effect thereby the operation of the replenishing mechanism; but if initial detection of filling failure is made by the main detector f the subsequent detecting action of the detector g will be ineffective so far as concerns the replenishing mechanism.

Referring particularly to Figs. 3, 4, and 5, the main slide $f^\times$ has a cross-bar f^5, having an inclined upper face and located below upturned ears f^6, while nearer the outer end the slide is provided with a transverse inclined cam f^7 for a purpose to be described. The outer end of the fixed guide f^2 has a transverse upturned abutment f^3, having a perpendicular rear face f^4, and its outer face f^{40} serves as a stop to limit inward movement of the main slide, as shown in Fig. 3. A controller is mounted on the slide and is shown separately in Fig. 6, said controller comprising a body portion 1, having an upturned lug 2 at its rear end, cam portions 3, and a narrower forwardly-extended prolongation 4. An upturned lump or rest 5 is formed on the upper face of the controller about midway between its front and rear ends, and the lower face of the controller is shaped to present two stepped shoulders 6 and 7, while the outer end of the prolongation 4 is shaped to present a downturned V-shaped lug 8. The controller is supported on the cross-bar f^5 between the upturned sides of the slide $f^\times$, and normally the inner face of lug 8 rests upon the outer face 9 of the cam f^7, as shown in Fig. 3, so that the shoulder 6 is held above the top of the abutment f^3. A downturned releasing-latch 10 is fulcrumed between the ears f^6 on a pin 11, secured in said ears, the latch being laterally offset to rock in a path outside of the slide $f^\times$ and in front of the outer end of the guide f^2, and an enlargement of the latch-casting forms a heavy downturned detent 12, provided on its under side with two stepped shoulders 13 and 14, the toe 15, adjacent the shoulder 13, normally being supported by the rest 5, as shown in Fig. 3. The latch is thereby held up in inoperative position with its depending end well above the free end n' of a knock-off lever $n\,n'$, fulcrumed at $n^\times$ on the breast-beam A^{40}, Fig. 1, the weight of the detent and latch both tending to throw the latch down.

The controller is made as a single casting, and the latch and detent are cast as a single piece, both ready for use when taken from the molds after the usual tumbling operation to which castings are generally subjected. The slide $f^\times$ and its guide f^2 are also complete castings, the slide requiring only the attachment of the fork f to complete it.

The shank 16 of the latch-casting and the detent extend through an elongated slot 17 in a rearwardly-extended dog 18, having downturned cheeks 19, said cheeks entering between the ears f^6 of the slide and having upright slots 20, through which extends the pin 11. The dog is provided with a forwardly-extended and elongated tail 21, which projects above the slide and is downturned at its outer end at 22 to overhang the head $d^\times$ of the arm d. Ordinarily the weight of the tail maintains the dog in inoperative position (shown in Figs. 2 and 3) with its rear end above the path of the shoulder 800 on the hook w, and the upper ends of the slots 20 turn on the fulcrum-pin 11 if the dog is rocked or tilted. At such time the low parts of the cam portions 3 of the controller are beneath the cheeks 19 of the dog and offer no obstruction to tilting of the latter.

When the detector f detects filling failure, the hook-shoulder 700 engages the tail f^{20} and outward movement of the slide $f^\times$ is effected through the actuator or weft-hammer W.

The dog 18 forms an independent connection between the slide and the actuator W, for if the the dog is tilted to bring its end into engagement with the shoulder 800 of the hook the slide $f^\times$ will be moved outward through the medium of the dog. Such tilting of the latter occurs if initial detection of filling failure is made by the detector q, for then the outward movement of slide $g^\times$ acts, as has been described, to swing the arm d outward, and its head $d^\times$ engages

and lifts the depending end 22 of the tail 21, depressing the dog to engage the shoulder 800. Thereupon the main slide will be moved outward and filling replenishing will be effected. If the initial detection of filling failure is made by the detector *f*, however, the replenishing mechanism will be operated and the detector *g* will of course detect the absence of filling on the next pick when the shuttle is in the box $B^{\times}$. At such time, however, it would be improper to cause engagement of the dog with the hook of the weft-hammer W, as such engagement would cause a second replenishing operation when unnecessary. The first outward movement of the main slide $f^{\times}$ moves outwardly the controller until the shoulder 7 thereof engages the rear face of the abutment f^3, such engagement taking place before the slide completes its outward movement, and as the slide reaches the limit of such movement the cam f^7 is withdrawn from beneath the lug 8. This is shown clearly in Fig. 4, and at the same time the toe 15 of the detent drops down off the rest 5, bringing the detent-shoulder 13 against the outer transverse wall of the rest. When the outward movement of the controller is stopped, the continued movement of the slide causes the cheeks 19 of the dog to ride up on the high parts of the cam portions 3, so that the lower ends of the slots 20 become the fulcrum on which the dog can tilt.

In Fig. 4 I have shown the dog tilted as it would be by an outward movement of the arm *d*, it being manifest that such tilting cannot possibly effect engagement between the rear end of the dog and the hook *w* of the weft-hammer. Thus the subsequent detection of filling failure by the fork *g* cannot render the dog operative, inasmuch as the controller has made the dog irresponsive to a secondary detecting action by the auxiliary detector.

With the parts in the position shown in Fig. 4 a transfer of filling is effected when the shuttle is in the box $B^{\times}$, and if the shuttle threads properly upon the shuttle being picked out of the box $B^{\times}$ the parts will resume their normal position, the spring *s* moving the slide $f^{\times}$ inward and the engagement of the shoulder 13 with the rest 5 will move the controller inward with the slide, and at the next outward stroke of the weft-hammer W the controller will be returned to the position shown in Fig. 3, the same being the normal position, and of course the fulcrum of the dog changes from the bottom to the top of the slots 20, the positive movement of the controller to normal position by or through engagement with the weft-hammer being of sufficient force to cause the outer face of the rest 5 to wipe over the shoulder 13, both being inclined, and to lift the detent to bring the toe 15 onto the top of the rest 5.

Were it not for the shifting of the fulcrum of the dog by the controller on the first outward movement of the main slide the filling-replenishing mechanism would operate every time the auxiliary detector detected absence of filling, it being manifest that the auxiliary detector will detect filling failure even if the initial detection is made by the main detector.

Remembering that the position of the main slide and the parts carried thereby, including the controller, upon the first outward movement of the slide is shown in Fig. 4 the return movement of the slide will carry the controller with it until the slide resumes its normal position, and then the outer end of the controller drops to bring the shoulder 6 into the path of the abutment f^3. If now the shuttle has failed to properly thread after the first replenishment, the second outward movement of the slide, whether it be due to detection of filling failure by one or both of the detectors, will bring the shoulder 6 against the rear face of said abutment, holding the controller stationary, while the slide continues to move outward. This outward movement of the slide carries the detent 12 forward, so that its second shoulder 14 drops in front of the rest 5, the parts then assuming the relative position shown in Fig. 5. This lowering of the detent then causes the latch to drop down in front of the arm n' of the knock-off lever. (Shown in Fig. 1.) The slide then moves back, the controller being moved with it by engagement of the detent-shoulder 14 with the rest 5, the latch lifting over the knock-off lever and dropping behind it. If now there is a failure to thread, there will be a third outward movement of the slide $f^{\times}$, and the latch will be moved forward against the arm n', turning the knock-off lever and releasing the shipper from its holding notch to stop the loom; but before it stops the replenishing mechanism will be operated to effect a third filling replenishment. When the weaver has corrected the fault and started the loom, the first outward movement of the weft-hammer W after the main slide has resumed its normal position will act upon the rear end of the controller and restore it to normal position, the inclined face of shoulder 14 riding up over the outer face of the rest 5, the shoulder 13 being then similarly lifted, and the lug 8 at the outer end of the controller rides up over the cam f^7 and into the position shown in Fig. 3. The parts are then set, and the engagement of the lug and cam prevent accidental displacement of the controller through jarring of the loom. The upturned lug 2 serves as a stop to prevent accidental withdrawal of the controller in an outward direction.

The dog and its tail are made as a single casting, and it will be seen that the parts are few in number, direct and positive in their operation, and requiring no machining or hand manipulation to complete them other

than what is necessary to connect the detector *f* with its slide and to mount the fulcrum-pin 11 in the ears of the main slide.

The difference in width between the body 1 of the controller and its prolongation 4 is to cause the controller to conform to the difference in width between the main portion of the slide and the forward end thereof, the latter being reduced in width, as shown in Fig. 1.

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

1. In a loom, a filling-detector, its slide adapted to be moved upon detection of filling failure, filling-replenishing mechanism, controlled by or through the slide, a shipper, a releasing-latch therefor pivotally mounted on the slide and having an attached detent, a latch-controller movable with and also longitudinally of the slide, and a fixed abutment, the latter and the detent coöperating alternately with the controller a plurality of times to effect step-by-step movement thereof relatively to the slide and thereby position the latch to release the shipper after a predetermined number of successive movements of the slide.

2. In a loom, a filling-detector, its slide adapted to be moved upon detection of filling failure, filling-replenishing mechanism controlled by or through the slide, a shipper, a releasing-latch therefor pivotally mounted on the slide and having an attached detent, provided with a plurality of shoulders, a latch-controller movable with and also longitudinally of the slide and having a shouldered rest on its upper face and a plurality of shoulders on its lower face, and a fixed abutment, the latter and the detent coöperating alternately with the controller by the shoulders and the rest thereon to move it step by step relatively to the slide and thereby position the latch to release the shipper after a predetermined number of successive movements of the slide.

3. In a loom, a filling-detector, its slide adapted to be moved upon detection of filling failure, filling-replenishing mechanism controlled by or through the slide, a shipper, a releasing-latch therefor pivotally mounted on the slide and having an attached detent, provided with a plurality of shoulders, a latch-controller movable with and also longitudinally of the slide and having a shouldered rest on its upper face and a plurality of shoulders on its lower face, the rest normally supporting the detent and maintaining the latch inoperative, and a fixed abutment to coöperate successively with the shoulders on the lower face of the controller, a predetermined number of successive movements of the slide causing the detent and abutment to change the relative position of the controller and thereby withdraw the rest from beneath the detent, to position the latch to effect release of the shipper on the final successive movement of the slide.

4. In a loom, a filling-detector, its slide adapted to be moved upon detection of filling failure, filling-replenishing mechanism controlled by or through the slide, a shipper, a releasing-latch therefor pivotally mounted on the slide and having an attached detent, provided with a plurality of stepped shoulders, a latch-controller movable with and also longitudinally of the slide and having an upturned rest to engage the detent, two shoulders on the lower face of the controller, and a fixed abutment to coöperate therewith, a predetermined number of successive movements of the slide causing the abutment to cooperate successively with the shoulders on the controller and the shouldered detent with the rest, to move the controller step by step relatively to the slide into position to permit the detent to clear the rest and thereby lower the latch into position to effect release of the shipper.

5. In a loom, a filling-detector, its slide adapted to be moved upon detection of filling failure, filling-replenishing mechanism controlled by or through the slide, a shipper, a releasing-latch therefor pivotally mounted on the slide and having an attached detent, provided with a plurality of shoulders, a latch-controller movable with and also longitudinally of the slide and having a shouldered rest on its upper face and a plurality of shoulders on its lower face, a fixed abutment, the latter and the detent coöperating alternately with the controller by the shoulders and the rest thereon to change the position thereof relatively to the slide and thereby position the latch to release the shipper after a predetermined number of successive movements of the slide, and a cam on the slide to elevate the outer end of the controller when reset in its normal position with relation to the slide.

6. In a loom, a filling-detector, its slide adapted to be moved upon detection of filling failure, filling-replenishing mechanism controlled by or through the slide, a shipper, a downturned releasing-latch therefor pivotally mounted on the slide and having an integral shouldered detent, a latch-controller supported by and movable with and also longitudinally of the slide and shouldered on its lower face, an upturned rest on the controller to normally support the detent and maintain the latch inoperative, a fixed abutment to coöperate successively with the shoulders on the controller, and a cam integral with the slide to coöperate with the controller and prevent accidental movement thereof and also to position the outer end of the controller when reset.

7. In a loom, a filling-detector, its slide adapted to be moved upon detection of filling failure, filling-replenishing mechanism controlled by or through the slide, a shipper, a

knock-off lever therefor, a latch pivotally mounted on the slide and having a detent provided with a series of stepped shoulders, a latch-controller mounted on and having a limited longitudinal movement relatively to the slide, said controller having an upturned rest to coöperate with the shouldered detent and provided on its under side with a corresponding series of shoulders, a fixed abutment to coöperate with one after another of the shoulders and permit one shoulder after another of the detent to coöperate with the rest, a predetermined number of successive movements of the slide causing the abutment and detent to coöperate with and effect movement of the controller relatively to the slide and likewise gradually lower the latch, the final movement of the slide causing the latch to engage and actuate the knock-off lever to release the shipper.

8. In a loom, two filling-detectors, filling-replenishing mechanism directly controlled as to its operation by one detector, means operative by or through detecting action of the other detector to cause filling replenishing through the operation of the first-named detector, said means including a tilting dog, and a device to automatically render the dog irresponsive when the first-named detector has detected filling failure.

9. In a loom, main and auxiliary filling-detectors, their slides, filling-replenishing mechanism directly controlled as to its operation by the main detector, means operative by or through detecting action of the auxiliary detector to cause filling replenishing through the operation of the main detector, said means including a dog mounted on the main detector-slide, and a device operated by movement of said slide to render the dog irresponsive when the main detector has detected filling failure.

10. In a loom, main and auxiliary filling-detectors, their slides, filling-replenishing mechanism directly controlled as to its operation by the main detector, means operative by or through detecting action of the auxiliary detector to cause filling replenishing through the operation of the main detector, said means including a dog shiftably fulcrumed on the main detector-slide, and a controller having a cam to coöperate with the dog and shift its fulcrum when filling failure is first detected by the main detector, to thereby render the dog irresponsive when filling failure is thereafter detected by the auxiliary detector.

11. In a loom, main and auxiliary filling-detectors, their slides, filling-replenishing mechanism directly controlled as to its operation by the main detector, means operative by or through detecting action of the auxiliary detector to cause filling replenishing through the operation of the main detector, said means including a dog shiftably fulcrumed on the main detector-slide, and a controller having a cam, movement of the main slide upon detection of filling failure by the main detector causing the cam to engage the dog and shift its fulcrum, to thereby render the dog irresponsive to detecting action of the auxiliary detector.

12. In a loom, main and auxiliary filling-detectors, their slides, an actuator for and to operatively move each slide upon detection of filling failure, filling-replenishing mechanism the operation whereof is directly controlled by operative movement of the main slide, means governed by the auxiliary detector upon detection thereby of filling failure to cause operative movement, by its actuator, of the main slide and effect the actuation of the replenishing mechanism, said means including a dog movable with and also relatively to the main slide, and a controlling device to render the dog irresponsive to detecting action of the auxiliary detector, operative movement of the main slide upon detection of filling failure by the main detector causing the controlling device to coöperate with the dog.

13. In a loom, a main filling-detector, its slide, an actuator, to move the latter by or through said detector upon detection of filling failure, a tilting dog shiftably mounted on the slide to form an independent connection between it and the actuator, said dog having a tail which acts to normally maintain the dog inoperative, filling-replenishing mechanism controlled by or through the slide, an auxiliary filling-detector, means governed by detecting action thereof upon filling failure to act upon the tail and tilt the dog to render it operative, whereby said slide will be moved to effect the actuation of the replenishing mechanism, and a controlling device, moved by the slide when the main detector detects filling failure, to engage the dog and shift it relatively to the slide, whereby the dog is rendered irresponsive to subsequent detecting action of the auxiliary detector.

14. In a loom, a main filling-detector, its slide, an actuator to move the latter by or through said detector upon detection of filling failure, a dog shiftably fulcrumed on the slide, and having a forwardly-extended tail, said dog being adapted to coöperate with the actuator, a controlling device to shift the dog on its fulcrum, filling-replenishing mechanism, the actuation of which is effected through operative movement of the slide, an auxiliary filling-detector, and means governed by detecting action thereof, upon filling failure to engage and lift the tail, and thereby positively cause coöperation of the dog and actuator, to effect operative movement of the slide and cause filling replenishing, detection of filling failure by the main detector moving its slide, and causing the controller to lift and shift the dog to prevent subsequent detecting action of the auxiliary detector from tilting the dog into operative engagement with the actuator.

15. In a loom, a shipper, a main filling-detector, its slide, an actuator to move the latter

by or through said detector upon detection of filling failure thereby, a shipper-releasing latch mounted on said slide, means to render said latch operative when the slide has been moved a predetermined number of times in succession, said means including a controller movable with and also longitudinally of the slide and provided with a cam portion, a dog shiftably fulcrumed on the slide and adapted to form an independent connection between it and the actuator, filling-replenishing mechanism the actuation of which is effected through operative movement of the slide, an auxiliary filling-detector, and means governed by initial detecting action thereof to rock the dog into coöperative relation with the actuator for and thereby move the main slide, to cause filling replenishment, initial detection of filling failure by the main detector acting through the controller to effect engagement of its cam portion with the dog and shift its fulcrum, to thereby render the dog irresponsive to subsequent detecting action of the auxiliary detector.

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

EDWARD S. STIMPSON.

Witnesses:
GEORGE OTIS DRAPER,
ERNEST W. WOOD.