No. 749,364. PATENTED JAN. 12, 1904.

E. CUNNIFF.

# FILLING DETECTING MECHANISM FOR LOOMS.

APPLICATION FILED JULY 11, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig: 1.

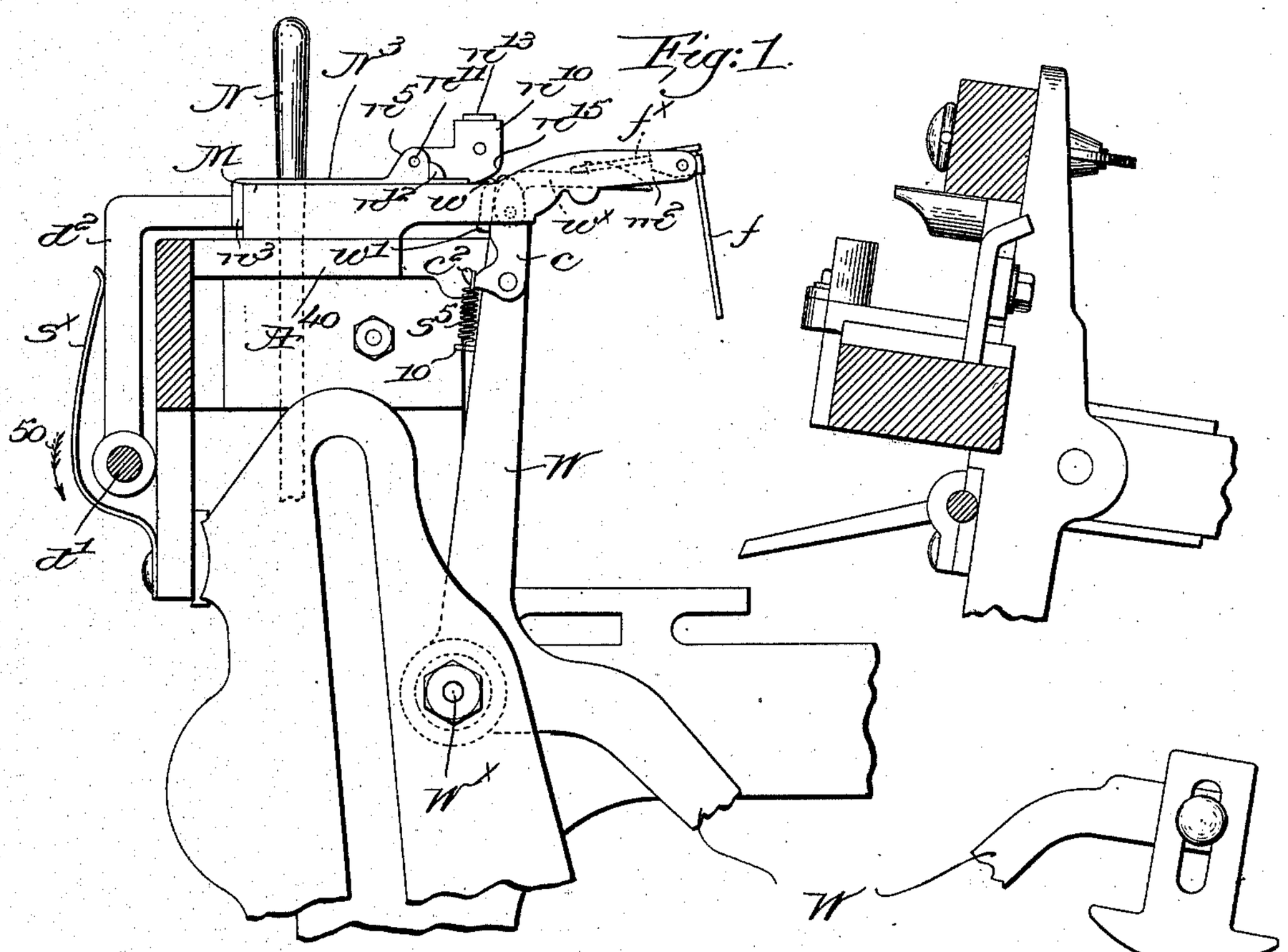





Fig: 6.

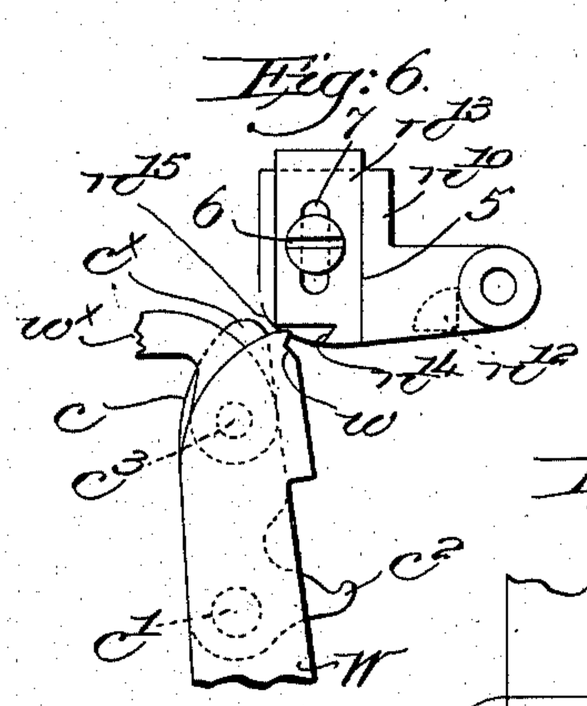


Fig: 2.




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NO MODEL. 2 SHEETS—SHEET 2.

Fig: 3.

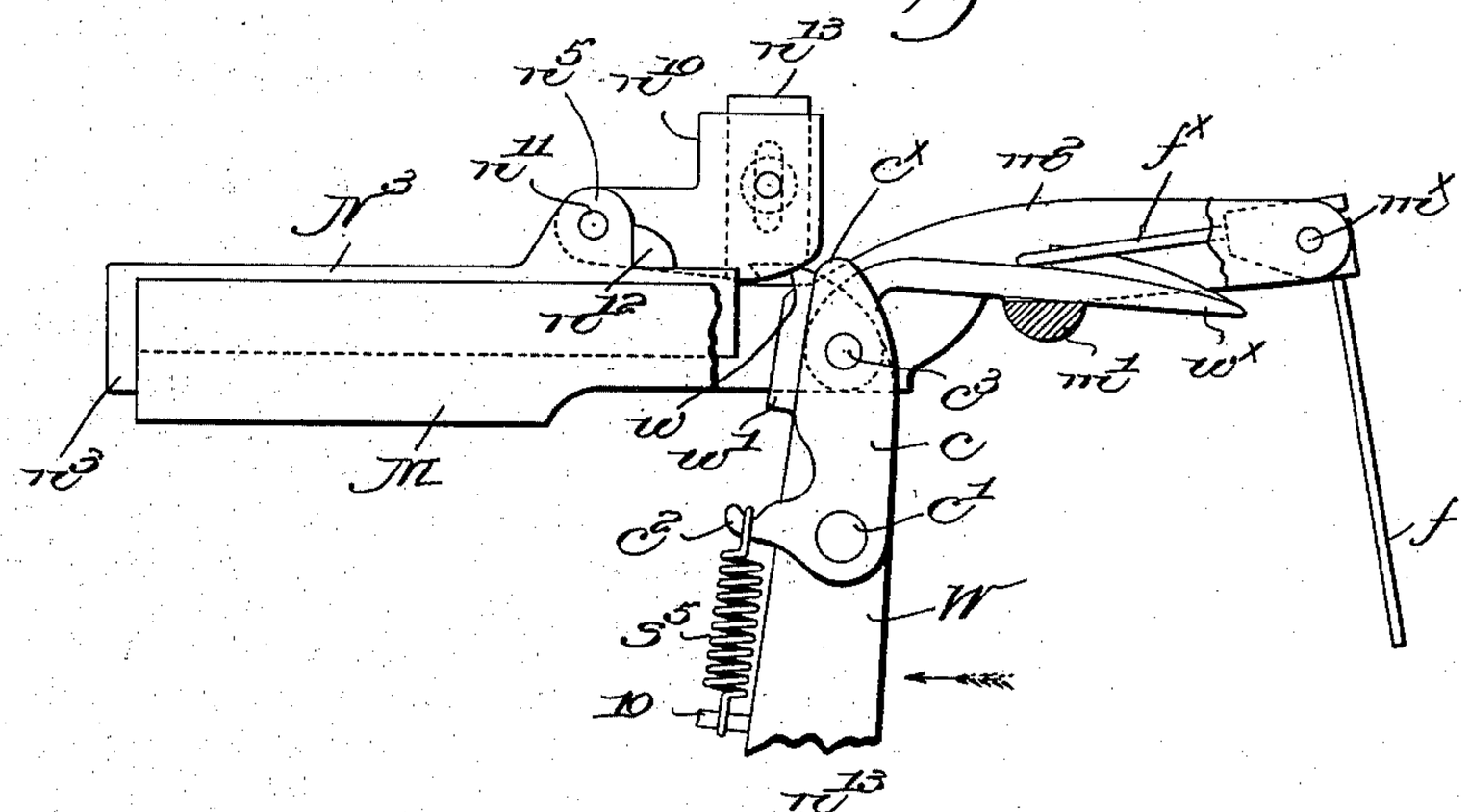



Fig: 4.

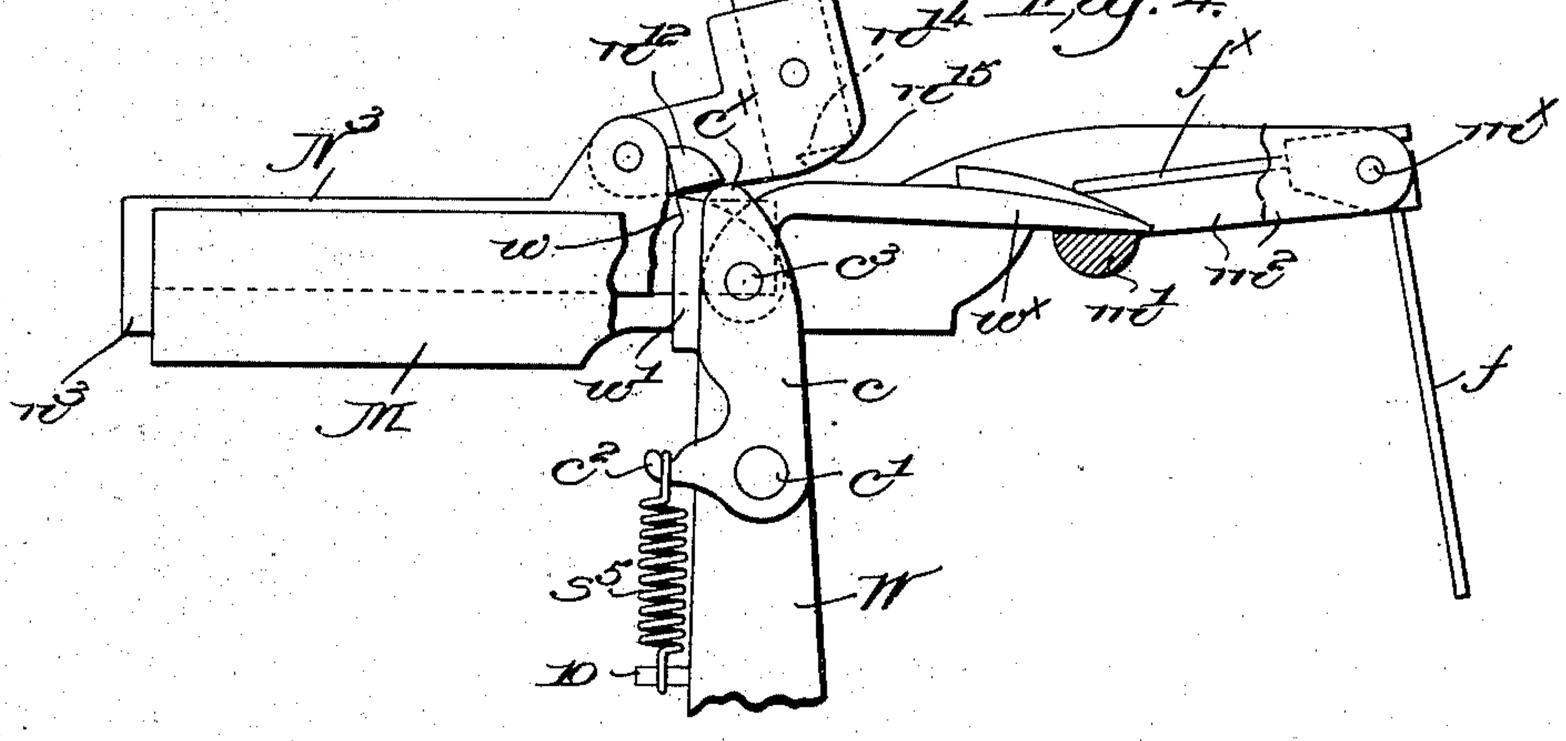
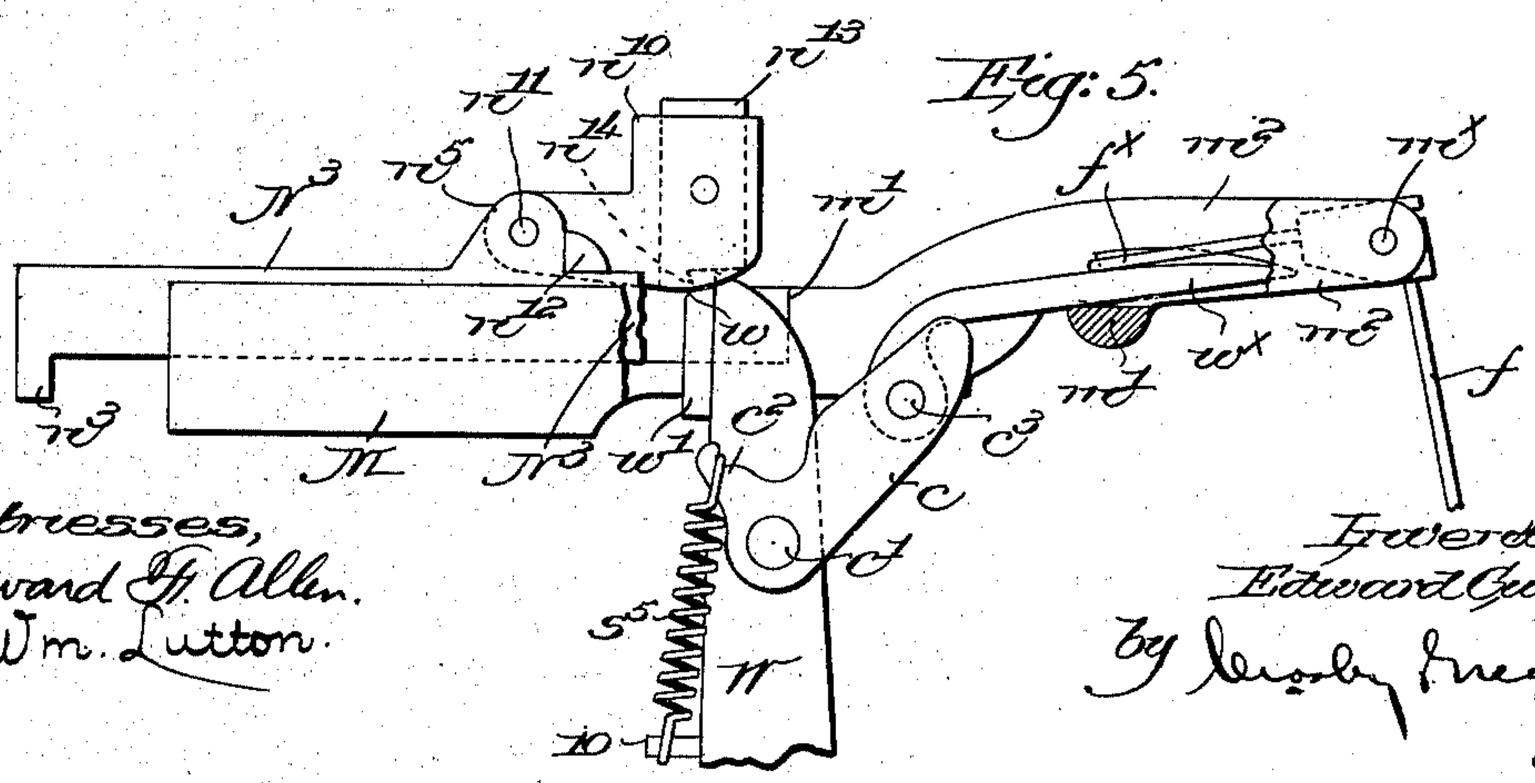



Fig: 5.

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No. 749,364. Patented January 12, 1904.

# UNITED STATES PATENT OFFICE.

EDWARD CUNNIFF, OF NEW BEDFORD, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

## FILLING-DETECTING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 749,364, dated January 12, 1904.

Application filed July 11, 1903. Serial No. 165,095. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD CUNNIFF, a citizen of the United States, and a resident of New Bedford, county of Bristol, State of Massachusetts, have invented an Improvement in Filling-Detecting Mechanism for 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 mechanism for detecting the failure or absence of filling in a loom, and it is applicable either to a plain loom or to one provided with automatic filling-replenishing mechanism, as will be apparent hereinafter. In either type of loom the filling-fork not only detects the presence or absence of filling, but it is also usually called upon to assist in the movement of the fork-slide by or through the loop or tail, which latter may or may not be an integral part of the fork. The fork has to perform more work in a filling-changing loom, for when there is no filling in front of the fork on the detecting-pick the fork-tail catches on the hook of the cam-follower or weft-hammer and is carried forward by the latter to actuate the various devices controlled by or operated from the starting-rod or operating rock-shaft—viz., the shuttle-feeler, latch, shipper knock-off, &c. In order to perform such work, the fork has to be made quite strong, and this strength is secured by increased weight. A fork which then is strong enough to perform properly the work required may not be delicate enough in its action for certain very fine yarns nor so good as a lighter one for any yarn.

The present invention has for its object the production of means for materially reducing the work which the fork must perform or in performing which the fork is an active element, so that the fork itself may be made very light in weight and correspondingly delicate in its action.

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, on the line 1 1, Fig. 2, of a sufficient portion of a loom with one embodiment of my present invention applied thereto. Fig. 2 is a top or plan view of the shipper side of the loom, showing the mechanism illustrated in Fig. 1 with the exception of the lay. Fig. 3 is an enlarged detail, in side elevation and partly broken out, of the weft-hammer, filling-fork, and the means whereby the weft-hammer effects movement of a slide when the fork detects absence of filling, the fork being just ready to detect. Fig. 4 is a similar view, but showing the manner in which the fork prevents movement of the slide by or through the weft-hammer when the presence of filling is detected by the fork. Fig. 5 is a like view, but showing how the slide is moved when the absence of filling is detected and without subjecting the fork to any material strain; and Fig. 6 is a detail of the upper end of the weft-hammer and the coöperating part on the slide in the position shown in Fig. 3, but viewed from the opposite side.

Heretofore, so far as I am aware, the weft or filling fork has been mounted on a slide, and the latter is moved outward by or through the agency of the fork itself when the absence of filling is detected; but in my present invention the fork is mounted wholly independent of the slide and on a relatively fixed part of the loom. The slide is provided with a dog adapted to be engaged on the outward stroke of the "actuator;" (by which term I mean the vibrating cam-follower or weft-hammer;) but the latter is provided with a relatively movable controller, which under normal conditions prevents coöperation of the dog and actuator. When, however, the fork detects the absence of filling, it renders the said controller inoperative, and the actuator engages the dog and moves the slide outward to effect the actuation of other mechanism, such as stopping means or filling changing or replenishing means. The only work which the fork is called upon to perform, therefore, is the detection of the presence or absence of filling and the movement of the dog-controller relatively to the

actuator, so that the fork can be made exceedingly light and delicate in its operation to properly act with the finest or softest filling.

In Figs. 1 and 2 the breast-beam $A^{40}$, the shipper N, its notched holding-plate $N^{\times}$, Fig. 2, the knock-off lever $n\,n'$, and the rock-shaft or controlling-rod $d'$, having an upturned arm $d^2$ and a spring $s^{\times}$, Fig. 1, to maintain the arm in the position shown, may be and are all of well-known construction, and said rock-shaft $d'$ may be arranged to effect the operation of a filling-replenishing mechanism—such, for instance, as shown in United States Patent No. 529,940—when the rock-shaft is turned in the direction of arrow 50, Fig. 1, as will be described. A vibrating actuator or weft-hammer (shown as a cam-follower W in Fig. 1) is fulcrumed at $W^{\times}$ on the loom side and is vibrated toward and from the front of the loom by a cam W' on the usual cam-shaft $C^{\times}$ in usual manner. A stand or guide M is rigidly secured to the breast-beam and transverse thereto for a slide $N^3$, having a downturned lug $n^3$ at its front end to limit rearward movement of the slide, the arm $d^2$ and the arm $n'$ of the knock-off lever $n\,n'$ being located in front of the outer end of the slide, as clearly shown in Fig. 2. This slidable member corresponds in function essentially to the usual so-called "fork-slide" in a loom in so far that its outward movement (which is effected by or through the actuator W) causes the operation of some mechanism, such as a loom-stopping instrumentality or a filling-replenishing mechanism; but it widely differs from the usual slide in that it does not support and is wholly independent of the filling detector or fork. The guide is herein shown as prolonged at its rear end to form two laterally-separated extensions $m^2$, connected at their extremities by a pin $m^{\times}$, on which the filling detector or fork $f$ is fulcrumed, said detector having a forwardly-extended loop or tail $f^{\times}$, substantially of well-known construction, except that the fork and tail may be made light enough to operate properly with very delicate yarn. A cross-bar $m'$ connects the lower portions of the extensions $m^2$, forming a support for the hook $w^{\times}$, connected with the weft-hammer or actuator W in a novel manner, to be described, the upper end of the latter vibrating between said extensions, and, referring to Fig. 2, they have upright shoulders $m$ at their inner ends, which form stops to limit rearward movement of the slide $N^3$, the latter being cut away at its inner end at $n^4$. The spring $s^{\times}$ normally holds the slide against the shoulders. Upturned ears $n^5$ on the slide receive between them the prolonged end of a dog $n^{10}$, fulcrumed on said ears by a transverse pin $n^{11}$, a lateral lug $n^{12}$ on the dog near its fulcrum normally resting on the top of the slide, Figs. 1, 3, and 5.

Referring to Fig. 6, one side of the dog has an upright groove 5 formed in it to receive a block $n^{13}$, having its lower end shouldered at $n^{14}$ and held in vertically-adjusted position by a set-screw 6, passed through a slot 7 in the block and into the bottom of the groove. The lower edge of the dog at the side of the block is convexed, as at $n^{15}$, Figs. 3, 4, and 5, and when the loom is running properly this curved edge will be engaged intermittingly and the dog $n^{10}$ lifted by the rounded upper end $c^{\times}$ of a controller $c$, fulcrumed on the side of the actuator W at $c'$ and having an offset hooked arm $c^2$. A spring $s^5$, attached at one end to the hooked arm and at its other extremity secured to a pin 10 on the actuator, serves to hold the controller in the position shown in Figs. 3 and 4, with its rounded end $c^{\times}$ above a bunter $w$ on the actuator, the bunter being laterally extended at $w'$ to form a stop for the controller. The spring is only strong enough to hold the controller in operative position with sufficient force to lift the dog, as shown in Fig. 4, on the forward stroke of the actuator, and the hook $w^{\times}$ is fulcrumed at $c^3$ on the side of the controller. The block $n^{13}$ is so adjusted in the dog that its shoulder $n^{14}$ will be in the path of and will be engaged by the bunter $w$ on its forward stroke if the dog is not lifted, and when such engagement is effected the slide $N^3$ will be moved outward, as shown in Fig. 5, to operate a stopping instrumentality or through the rock-shaft $d'$ cause the operation of a filling-replenishing mechanism.

Supposing that in Fig. 3 the lay is on its forward beat and the actuator W is moving forward, as it does on alternate picks, then if the filling is present the fork will be tilted and the movement of the actuator will draw the hook $w^{\times}$ forward, the tail $f^{\times}$ thereafter dropping, as shown in Fig. 4. The controller $c$ is in position to lift the dog $n^{10}$ into inoperative position, and the shoulder $n^{14}$ is raised above the path of the bunter $w$, and the slide $N^3$ will not be moved. If, however, the filling is absent, the fork will not be tilted and its tail will remain in engagement with the hook $w^{\times}$, and when the actuator moves forward the controller $c$ will be moved on its fulcrum $c'$ relatively to the actuator against the pull of the spring $s^5$, as in Fig. 5, and the dog will not be moved into inoperative position. Thereupon the shoulder $n^{14}$ and the bunter engage and the slide is moved outward, as described, the bunter being notched to prevent disengagement of the shoulder therefrom. On the backward stroke of the actuator the parts are restored to the position shown in Fig. 3, and if filling-replenishment has been effected and the new filling is properly laid the fork will be tilted on the next detecting-pick and on succeeding detecting-pick until another fault occurs. It will be manifest that the only work the fork must perform is to detect presence or absence of filling and to move the controller $c$ into inoperative position when the filling is absent, and in the latter case the only

strain upon the fork is that required to stretch the spring $s^5$, which can be made very weak, so that a fork of very light weight can be employed. The stop-lug $n^{12}$ prevents the dog $n^{10}$ from dropping down below its proper position when the actuator moves back.

My invention is not restricted to the precise construction and arrangement herein shown and described, for, so far as I am aware, ii ts broadly new to mount the filling fork or detector independently of the movable member or slide to be operated by an actuator, such as a weft-hammer, upon the detection of absence of filling, and accordingly 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, means, including an actuator and a slide, to effect the operation of a filling-replenishing mechanism or a loom-stopping instrumentality, a fixed stand in which the slide moves, a filling-detector mounted independent of the actuator and the slide, and means controlled by the detector to prevent coöperation of the slide and actuator when presence of filling is detected.

2. In a loom, means, including an actuator and a slide, to effect the operation of a filling-replenishing mechanism or a loom-stopping instrumentality, a dog pivotally mounted on the slide, to be engaged at times by the actuator, a filling-detector, a stationary support therefor and means controlled by said detector to prevent operative engagement of said dog and actuator when presence of filling is detected.

3. In a loom, means, including a vibrating actuator and a slide, to effect the operation of a loom-stopping instrumentality or a filling-replenishing mechanism, and a member movably mounted on and supported wholly by the slide to be operatively engaged by the actuator and move the slide, a filling-fork mounted independent of the slide and actuator, and means controlled by the detector to move the said member into inoperative position when presence of filling is detected.

4. In a loom, a slidable member adapted by its movement to cause the operation of a filling-replenishing mechanism or a loom-stopping instrumentality, a dog mounted thereon, an actuator, and means automatically operative when the filling is present to prevent, and when the filling is absent to permit, coöperation of the actuator and dog, such coöperation causing movement of the slide, said means including a tilting filling-detector mounted independent of the actuator and the slide.

5. In a loom, a slidable member adapted by its movement to cause the operation of a filling-replenishing mechanism or a loom-stopping instrumentality, a dog pivotally mounted thereon, a fixed stand for the slidable member, an actuator, and means mounted independently of the slide and operative when the filling is present to prevent, and when the filling is absent to permit, coöperation of the actuator and dog, said means including a filling-detector mounted on a stationary support.

6. In a loom, a slidable member adapted by its movement to cause the operation of a filling-replenishing mechanism or a loom-stopping instrumentality, a dog mounted thereon, an actuator, and means mounted wholly independent of the slide and including a part mounted on the actuator, and operative when the filling is present to prevent, and when the filling is absent to permit, coöperation of the actuator and dog.

7. In a loom, a vibrating actuator, a member moved by coöperation therewith to cause the operation of a filling-replenishing mechanism or a loom-stopping instrumentality, and means mounted wholly independent of said member and operative when the filling is present to prevent such coöperation of said member and the actuator, said means including a filling-fork pivotally mounted on a stationary support.

8. In a loom, a vibrating actuator, a member moved by coöperation therewith to cause the operation of a filling-replenishing mechanism or a loom-stopping instrumentality, and means mounted wholly independent of said movable member and including a part mounted on the actuator, to effect coöperation of the latter with the actuator when the filling is absent and to prevent such coöperation when the filling is present.

9. In a loom, a vibrating actuator, a member moved by coöperation therewith to cause the operation of a filling-replenishing mechanism or a loom-stopping instrumentality, and means, including a part mounted on the actuator and a filling-detector mounted independently of the actuator and said movable member, to effect coöperation of the latter with the actuator when absence of filling is detected by the filling-detector.

10. In a loom, a vibrating actuator, a member moved by coöperation therewith to cause the operation of a filling-replenishing mechanism or a loom-stopping instrumentality, and means, including a part mounted on and movable relatively to the actuator, and a filling-detector controlling such part and mounted independently of the actuator and said movable member, to effect coöperation of the latter when absence of filling is detected and to prevent such coöperation when the filling is present.

11. In a loom, a movable member to cause by its movement the operation of a loom-stopping instrumentality or a filling-replenishing mechanism, a dog on said member, a vibrating actuator to at times coöperate with the dog and effect movement of said member, a

controller on and movable relatively to said actuator, to normally render the dog inoperative, and a filling-detector independent of said member and governing the relative movement of the controller, said detector upon detection of the absence of filling rendering the controller inoperative and permitting coöperation of the dog and actuator.

12. In a loom, a slide, a dog mounted thereon, an actuator having a bunter to coöperate with the dog and move the slide, a dog-controller on and also movable relatively to the actuator, and a filling-detector to cause relative movement of the controller into inoperative position when absence of filling is detected, to thereby effect coöperation of the dog and actuator.

13. In a loom, a slide, a dog mounted thereon, an actuator having a bunter to coöperate with the dog and move the slide, a controller pivotally mounted on the actuator and having a hook, said controller normally engaging the dog and moving it out of the path of the bunter, and a filling-fork pivotally mounted independently of the slide and having a tail to engage the hook when the filling is absent, such engagement rocking the controller and permitting the dog to be engaged by the bunter.

14. In a loom, a slide, a dog mounted thereon, a weft-hammer having a bunter to coöperate with the dog and move the slide, a controller pivoted on the weft-hammer and having a hook, a spring to retain the controller in position to move the dog out of the path of the bunter, and a filling-fork mounted independently of the slide and having a tail to engage the hook when the filling is absent, such engagement rocking the controller against its spring relatively to the weft-hammer and permitting the dog to be engaged by the bunter.

15. In a loom, a slide having a dog, a stationary guide for the slide, a filling-fork mounted on said guide, a weft-hammer having a bunter to coöperate with the dog and move the slide, a controller on and movable relatively to said weft-hammer, to normally move the dog out of the path of the bunter, and a hook on the controller to be engaged by the fork upon detection of filling failure, such engagement moving the controller into inoperative position and permitting the bunter to coöperate with the dog.

16. In a loom, a slidable member adapted by its movement to cause the operation of a loom-stopping instrumentality or a filling-replenishing mechanism, a fixed stand in which said member is slidably mounted, an actuator to move said member, and means operative automatically upon absence of filling, and including a filling-detector mounted on a fixed support and independent of said member and actuator, to effect their coöperation and consequent movement of said member.

17. In a loom, a slide, a vibrating actuator to effect its movement by coöperation therewith, and means, including a filling-fork mounted independent of the slide and actuator, to effect their coöperation upon detection of absence of filling.

18. In a loom, a slide, a guide therefor, a vibrating actuator to move the slide when in engagement therewith, a filling-fork mounted on the guide, and means governed by the fork to effect engagement of the slide and actuator upon detection of the absence of filling.

19. In a loom, a slide, a vibrating actuator to move the slide when in coöperative engagement therewith, means to prevent such engagement when the filling is properly laid, and a device mounted independently of the slide and actuator, to render said means inoperative when the continuity of the filling is interrupted.

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

EDWARD CUNNIFF.

Witnesses:

FREDERICK DA TERRA,

MANARD C. CRUZ.