No. 778,612. PATENTED DEC. 27, 1904.

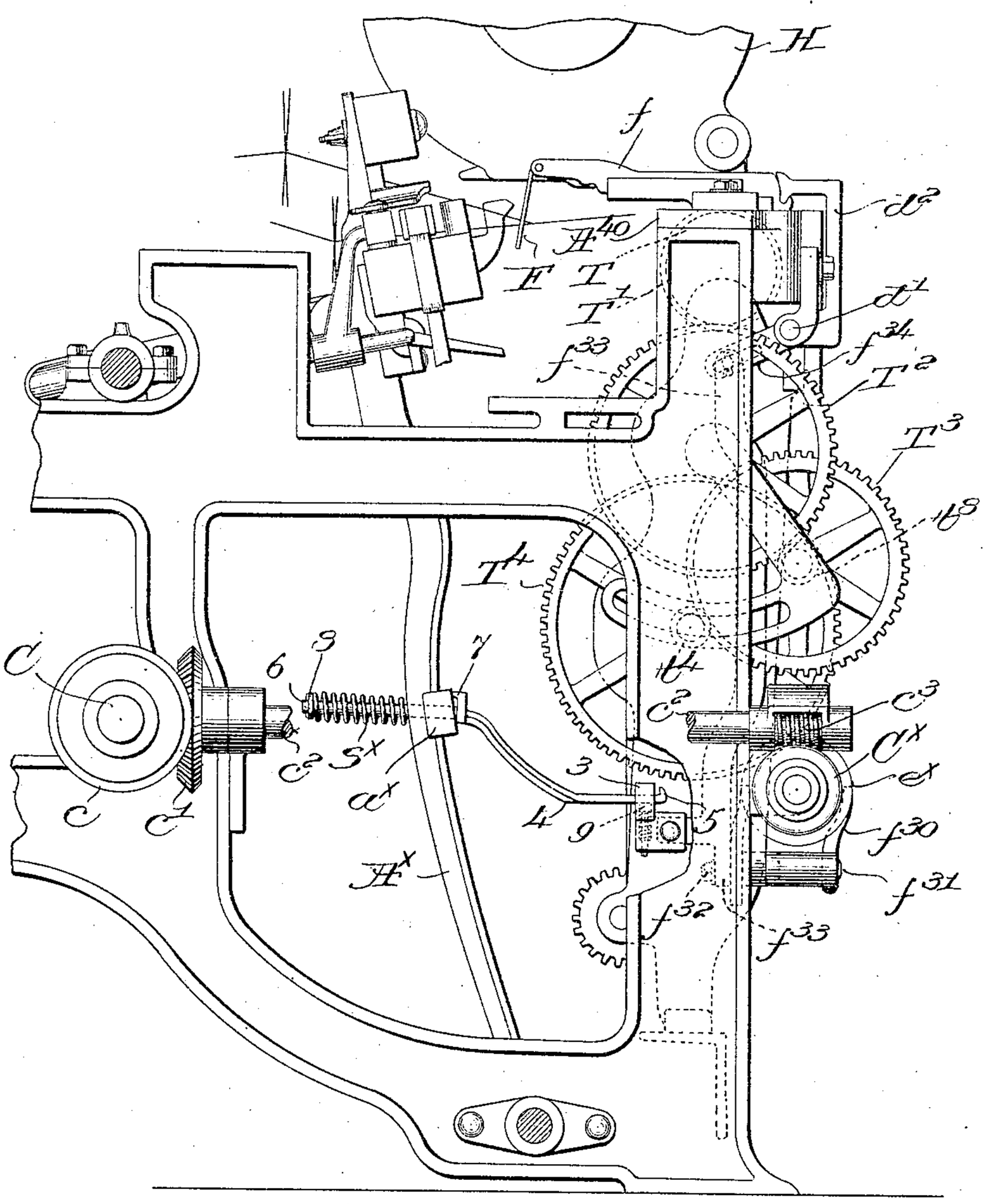
W. S. SOUTHWICK.

TAKE-UP MECHANISM FOR LOOMS.

APPLICATION FILED SEPT. 26, 1904.

2 SHEETS—SHEET 1.

Fig: 1.



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2 SHEETS—SHEET 2.

Fig: 2.

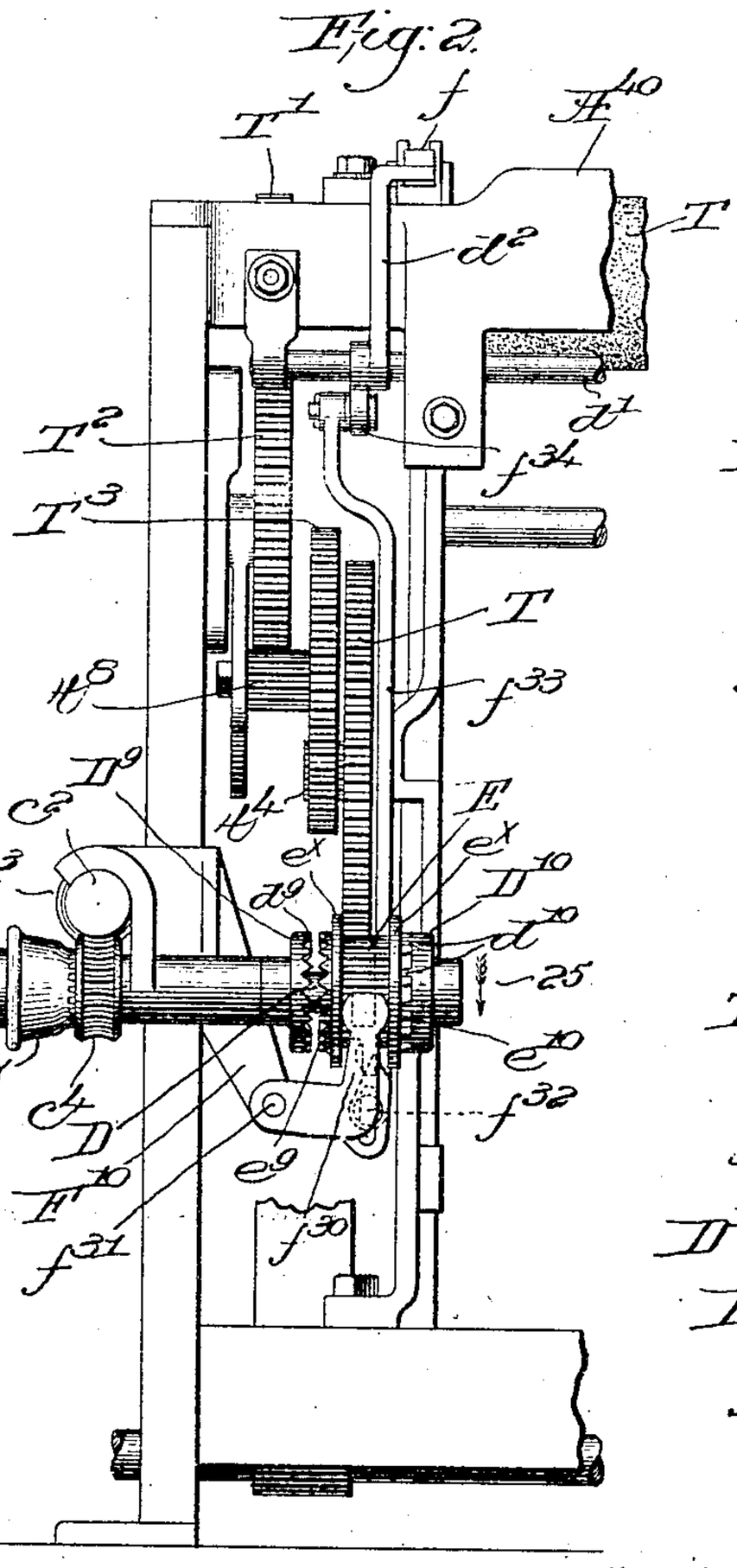


Fig: 3.

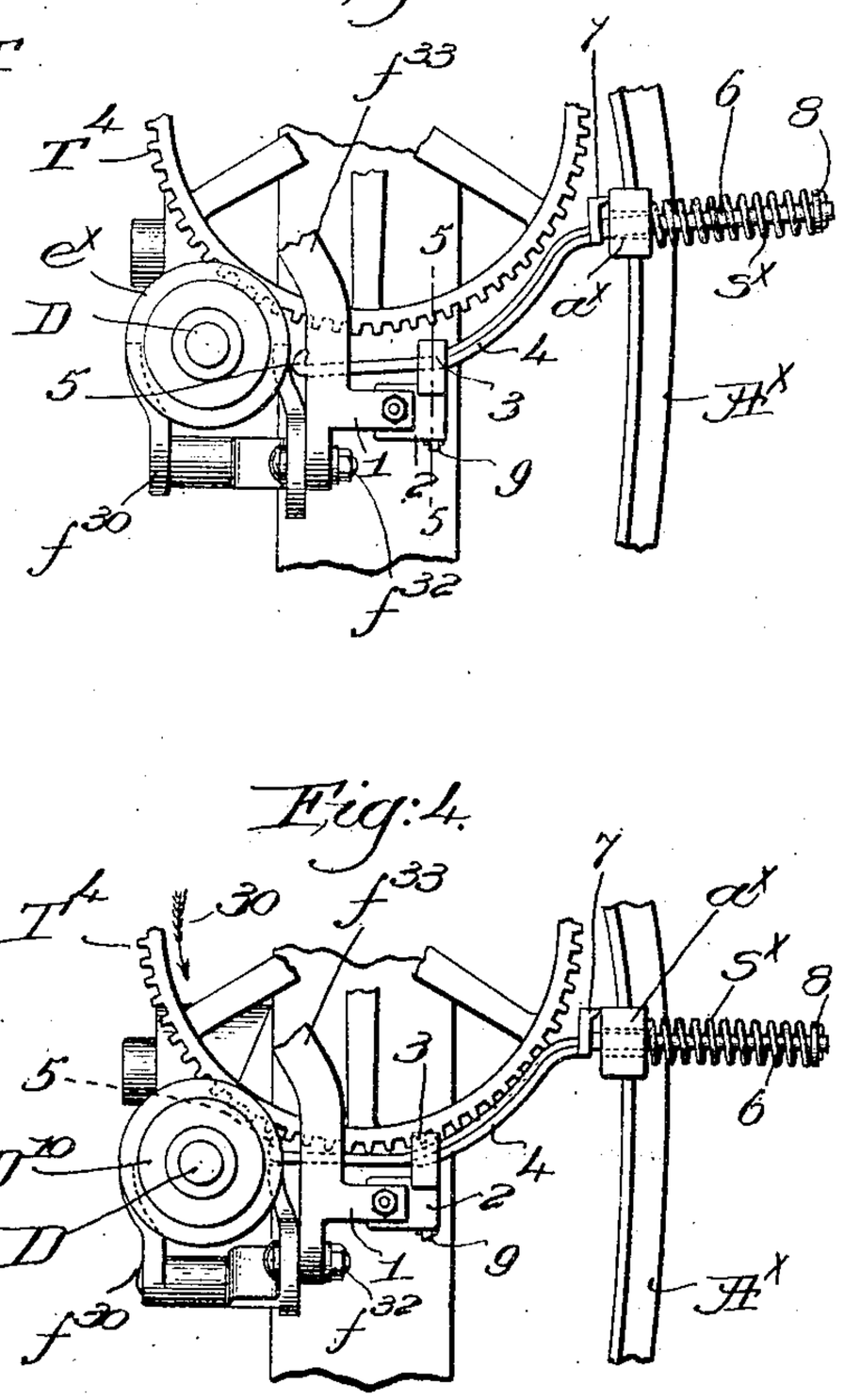
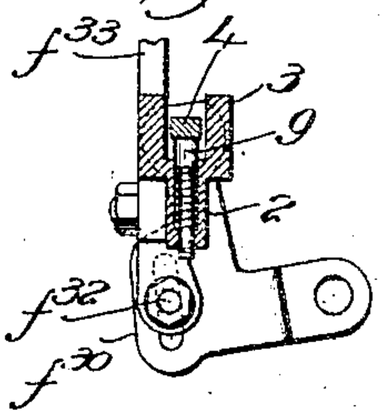


Fig: 4.

Fig: 5.



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UNITED STATES PATENT OFFICE.

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TAKE-UP MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 778,612, dated December 27, 1904.

Application filed September 26, 1904. Serial No. 226,085.

To all whom it may concern:

Be it known that I, WILLIAM S. SOUTHWICK, a citizen of the United States, and a resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Take-Up 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 more particularly to the so-called "positive" type of take-up mechanism, comprehending a continuously-rotated driving member and transmitting devices, including a worm and worm-gear between the driving member and the take-up or sand roll, as opposed to the well-known pawl-and-ratchet type of take-up.

In United States Patent No. 648,903 a take-up mechanism of the positive type is shown, and novel means are provided therein to arrest take-up during the slight interval occupied by change of filling in an automatic filling-replenishing loom and to prevent take-up when the loom is stopped automatically. Such apparatus is generally efficient in actual practice, but is open to the objection that at times some of the parts which govern the arrest of the take-up operate tardily or stick, so that the desired retardation or stoppage in the taking up of the cloth is not effected. This results in a fault in the cloth; and my present invention has for its object the production of means to positively insure not only the operation of the take-up-arresting devices, but also to cause a certain amount of let-back, my invention being illustrated in connection with take-up mechanism which forms the subject-matter of the patent referred to.

Figure 1 is a left-hand side elevation, partly broken out, of a portion of a loom provided with automatic filling-replenishing mechanism with one embodiment of my present invention operatively applied to the take-up mechanism. Fig. 2 is a front elevation of the take-up mechanism shown in Fig. 1. Fig. 3 is a detail in inner side elevation of a portion of the take-up-arresting means and the device for insuring the positive operation thereof and the letting back of the cloth, the parts being in normal position and the lay forward. Fig. 4 is a similar view, but showing the arresting means as just about to be operated by or through the action of my present invention; and Fig. 5 is an enlarged detail, partly in section, on the line 5 5, Fig. 3, looking toward the left.

Referring to Fig. 1, the cam-shaft C, filling-fork F, and its slide f, movable in a guide attached to the breast-beam A^{40}, the automatic filling-replenishing mechanism, (only the feeder or hopper H being shown,) and the controlling rock-shaft d' are of well-known construction and operate in usual manner. The slide f when moved outward upon detection of filling failure by the fork F engages the arm d^2, fast on the rock-shaft d', to turn the latter and effect filling replenishment with or without stoppage of the loom, both operations being well known.

The take-up roll T, attached gear T', meshing with gear T^2, driven by a pinion t^8, rotatable with a large gear T^3, the pinion t^4, meshing with said large gear and rotatable with another large gear T^4, which meshes with the driven member of the take-up mechanism, are of common construction.

Through bevel-gears $c\ c'$ and a shaft c^2, having at its front end a worm c^3, the cam-shaft C rotates a worm-gear c^4, which is connected by a suitable coupling $C^\times$ with a shaft D, the parts just referred to corresponding to the structure in Patent No. 648,903, and the driving member of the take-up mechanism consists of the two separated disks D^9 D^{10}, secured to the shaft and provided on their opposed inner faces with series of teeth d^9 d^{10}, respectively. (See Fig. 2.) The teeth d^{10} are shown as much more widely separated than are the teeth d^9, the difference between the number of teeth in the two series determining the amount of let-back and the duration of the arrest period of the take-up mechanism, as will be explained hereinafter. As in the patent referred to, the driving member is continuously rotated so long as the loom is running, and the driven member is the long shiftable pinion E, loosely mounted on shaft D between the disks, flanges $e^\times$ on the ends of the pinion having on their outer faces teeth e^9 e^{10}, which

correspond to the series of teeth d^9 d^{10}, respectively. Normally the pinion is in the position shown in Fig. 2 and the disk D^{10} actuates the take-up mechanism, a yoke f^{30}, fulcrumed at f^{31} on the stand F^{10}, coöperating with the flanges $e^{\times}$ and controlling the position of the pinion, the yoke having pivotally connected to it at f^{32} a link f^{33}, the upper end of the link being pivotally connected with an arm f^{34}, fast on the rock-shaft d'. When the parts are in the position shown in Fig. 2, the points of the teeth d^9 e^9 are opposite each other and the space between them is sufficient to permit complete disengagement of teeth e^{10} from the teeth d^{10} before the teeth d^9 e^9 engage. Upon rocking of shaft d' when filling failure is detected the link f^{33} throws the yoke f^{30} to the left, Fig. 2, and the driven member E will be disengaged from the disk D^{10} and shifted over into engagement with disk D^9. As soon, however, as the teeth e^{10} are cleared the disks move forward in the direction of arrow 25, Fig. 2, bringing the spaces between the teeth d^9 opposite the points of the teeth e^9, so that the two sets of teeth mesh, the rotation of the driven member E having stopped when the teeth e^{10} were disengaged from the teeth d^{10}. The advance of the disks when the driven member is in mid-position imparts a slight gain to the driving member (which comprises the disks) and the ends of the teeth e^{10} are brought opposite the ends of the teeth d^{10}. When the shaft d' returns to normal position after the operation of the filling-replenishing mechanism, the member E is shifted to the right, clearing the teeth e^9, and as they move away from the teeth d^9 the driving member increases its gain over the driven member sufficiently to cause the ends of the teeth e^{10} to pass behind the teeth d^{10} previously engaged. There is then lost motion of the driven member, while the space between the teeth d^{10} e^{10} is taken up by the forward movement of the disks. Such lost motion and the corresponding stoppage of the driven member of course causes arrest of the take-up upon the operation of the controlling rock-shaft d', the duration of arrest depending upon the space between the driving-faces of the teeth d^{10}.

With the exception of the changes in the construction and arrangement of the teeth the mechanism just described does not differ materially from that shown in the patent previously referred to, except that I have very greatly increased the duration of the period in which take-up is arrested. In said patent the stoppage of the driven member depends upon the pull of the cloth and the friction of the various moving parts of the mechanism; but if such resistance is insufficient and the toothed portions of the driving and driven members become clogged or stick the proper arrest of take-up will not be effected. To obviate such result and insure proper arrest, as well as cause definite let-back, I have herein provided means to positively effect retrograde rotation of the driven member when it is released from control of the driving member, the extent of retrograde movement being determined by the spacing of the teeth d^{10}.

The lower end of the link f^{33} has a rearward extension 1, (see Figs. 3 and 4,) on which is bolted the shank 2 of an upturned bifurcated guide 3, in which is supported a pawl-carrier 4 below the large gear T^4 and having an upturned pawl or tooth 5 adapted to at times engage said gear. The pawl-carrier has an elongated straight shank 6, which is slidably extended through a bearing $a^{\times}$ on the lay-sword $A^{\times}$ adjacent the take-up mechanism, an upturned toe 7 on the pawl-carrier bearing against the front of the bearing, so that the tension of the spring $s^{\times}$ (surrounding the shank between the back of the bearing and a collar 8) tends to normally depress the pawl-carrier and maintain the pawl out of engagement with the gear T^4. As the lay swings back and forth the pawl-carrier slides in the guide, but without any engagement of the pawl 5 with the teeth of said gear, as shown in Fig. 3, the lay being on front center. When, however, the rock-shaft d' is turned to lift the link f^{33} and shift the driven member E to the left, Fig. 2, the guide 3 is raised, bringing the pawl 5 into engagement with the gear T^4 in the position shown in Fig. 4 when the lay is fully forward. As the lay goes back the rock-shaft d' returns to normal position, lowering the link and shifting the member E to the right, and until the said driven member is disengaged from the disk D^9 the spring $s^{\times}$ is compressed. When the driven member is cleared, however, the spring expands and pulls back the pawl-carrier, and as its pawl is in engagement with the gear T^4 the latter will be turned back in the direction of arrow 30, Fig. 4. Thus let-back is imparted to the take-up mechanism and it is terminated when the teeth e^{10} enter between and are moved back against the leading faces of the teeth d^{10} on the disk D^{10}. Manifestly the fewer the teeth d^{10} the greater will be the amount of let-back. On the next forward beat of the lay the pawl is disengaged from the gear T^4 and drops into normal position in the guide 3 in readiness for the next operation of the take-up-arresting means. It will be obvious that the backward rotation of the gear T^4 by the means described causes a retrograde movement of the driven member E, so that any clogging or sticking of the parts is overcome and the let-back is effected independently of the pull of the cloth.

Referring to Fig. 5, a spring-plunger 9 is mounted in the guide to form a yielding seat for the pawl-carrier 4, preventing breakage of the parts when the pawl is raised by or through the lifting of the link f^{33} and guide 3 on the forward beat of the lay and permitting the pawl 5 to click past the teeth on gear T^4 to the

position shown in Fig. 4 in readiness to operate.

My invention is not restricted to the precise construction and arrangement shown and described herein, for the same may be modified or changed in various particulars 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, a filling-detector, a controlling-shaft adapted to be operated thereby upon detection of an abnormal condition of the filling, take-up mechanism, including a continuously-rotating driving member and a normally coöperating driven member, means to disengage said members upon the operation of the controlling-shaft, to arrest take-up, and means to automatically cause let-back when such disengagement is effected.

2. In a loom, take-up mechanism, including a continuously-rotating driving member and a normally coöperating driven member, means to throw the latter out of operation and to return it to operative position upon the detection of an abnormal condition of the filling, to thereby arrest take-up, a filling-detector to detect such condition, and means to automatically cause a predetermined amount of let-back when the driven member is thrown out of operation.

3. In a loom, a controlling-shaft therefor adapted to be operated by or through detection of filling failure, a filling-detector, take-up mechanism, including a continuously-rotating driving member and a normally coöperating driven member, means to effect relative movement of said members upon the operation of the controlling-shaft and thereby arrest take-up, and means to automatically cause let-back when such relative movement is effected.

4. In a loom, take-up mechanism, including a positively and continuously rotating driving member, and a driven member normally cooperating therewith, combined with a filling-detector, means controlled by detecting movement thereof to prevent coöperation of the driving and driven members, and means operative automatically at such time to cause a predetermined amount of let-back.

5. In take-up mechanism for looms, in combination, a take-up roll, a continuously-rotating driving member, connections, including a driven member, between said take-up roll and the driving member, means governed by the detection of an abnormal condition of the filling to disconnect the driving and driven members, to arrest take-up, and means to automatically cause reverse movement of said connections upon such disconnection, to thereby effect let-back.

6. In take-up mechanism for looms, in combination, a take-up roll, a continuously-rotating driving member, connections, including a driven member, between said take-up roll and the driving member, means governed by the detection of an abnormal condition of the filling to disconnect the driving and driven members, to arrest take-up, and means, including a normally inoperative pawl, to automatically engage and cause reverse movement of said connections upon disconnection of the driving and driven members, to thereby effect let-back.

7. In take-up mechanism for looms, a driving member having two opposed and connected disks provided on their inner faces with teeth, the number of teeth on one member being greater than those on the other disk, and a toothed driven member laterally shiftable between the disks and normally in engagement with the smaller number of teeth, combined with a filling-detector, means to shift the driven member out of engagement with said teeth and into engagement with the teeth on the other disk, and then to shift the driven member back again, whereby the driving member gains and take-up is arrested, and means to cause let-back on the return shift of the driven member, the amount of let-back being determined by the distance between the teeth in the series having the smaller number.

8. In a loom, a lay, a pawl-carrier mounted thereon and provided with a pawl, a spring to control movement of the pawl-carrier relatively to the lay, take-up mechanism, including a driving member and a normally coöperating driven member, and connections between the latter and the take-up roll, a filling-detector, means operated by or through detecting action thereon to throw the driven member out of operation and thereby arrest take-up, and means operated by detecting action of the filling-detector to cause engagement of the pawl with a rotatable member of the connections between the driving and driven members, to cause retrograde movement of said connections and thereby effect let-back.

9. In a loom provided with automatic filling-replenishing mechanism, a filling-detector, a controlling-shaft for said mechanism adapted to be operated by or through detecting action of the detector, take-up mechanism, including a take-up roll, and normally coöperating driving and driven members, means actuated by operation of the controlling-shaft to disengage said members, to arrest take-up upon filling replenishment, and means to automatically cause retrograde rotation of said take-up roll and effect let-back upon such disengagement.

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

WILLIAM S. SOUTHWICK.

Witnesses:

GEORGE OTIS DRAPER,

ERNEST W. WOOD.