No. 847,608. PATENTED MAR. 19, 1907.

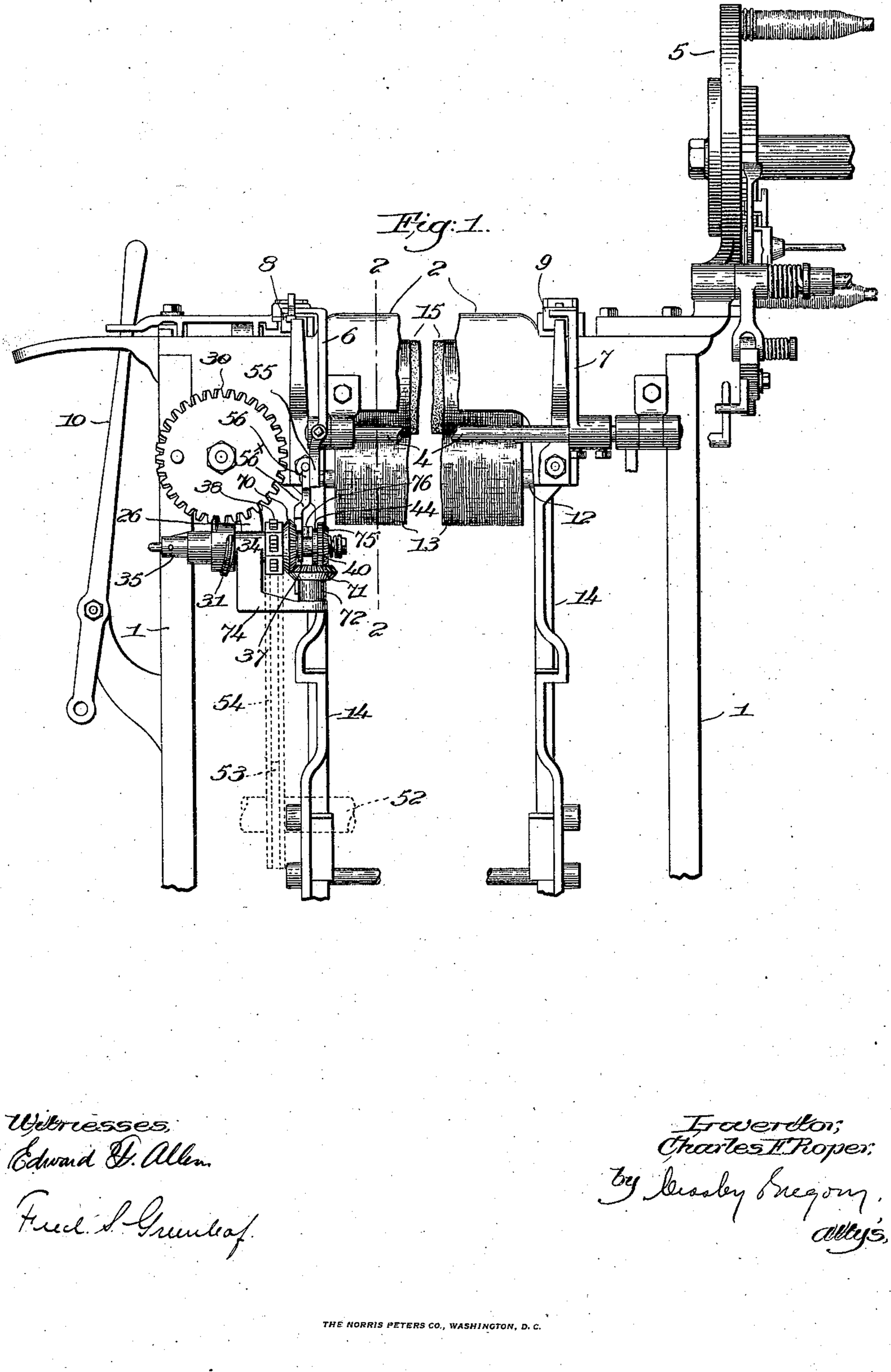
C. F. ROPER.

TAKE-UP MECHANISM FOR LOOMS.

APPLICATION FILED JAN. 17, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig: 2.

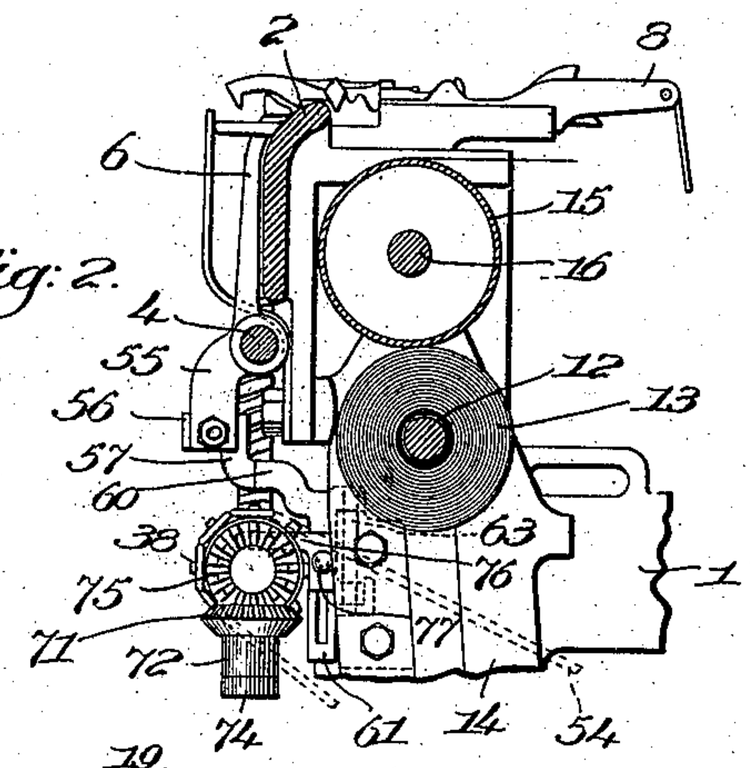


Fig: 3.

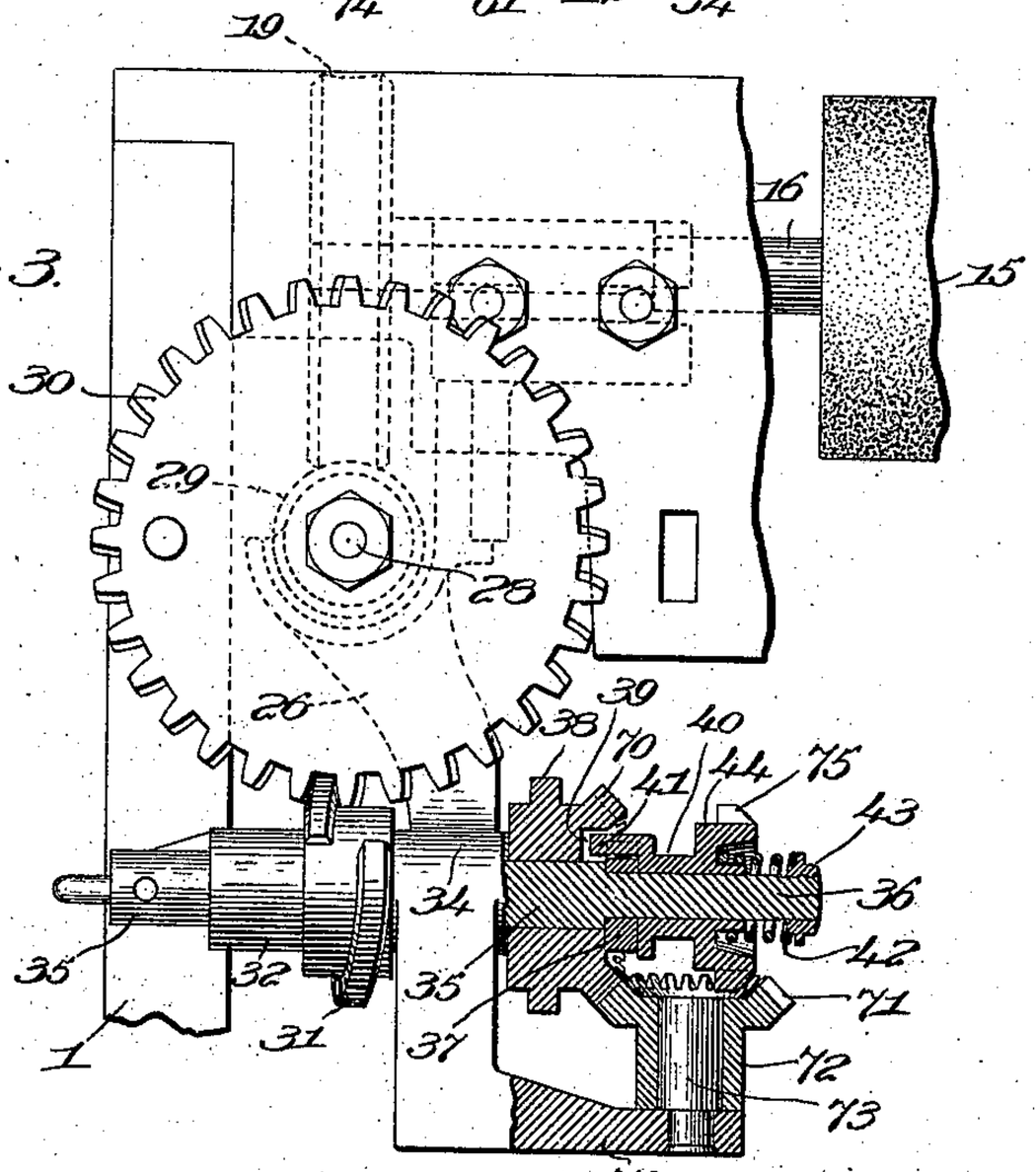
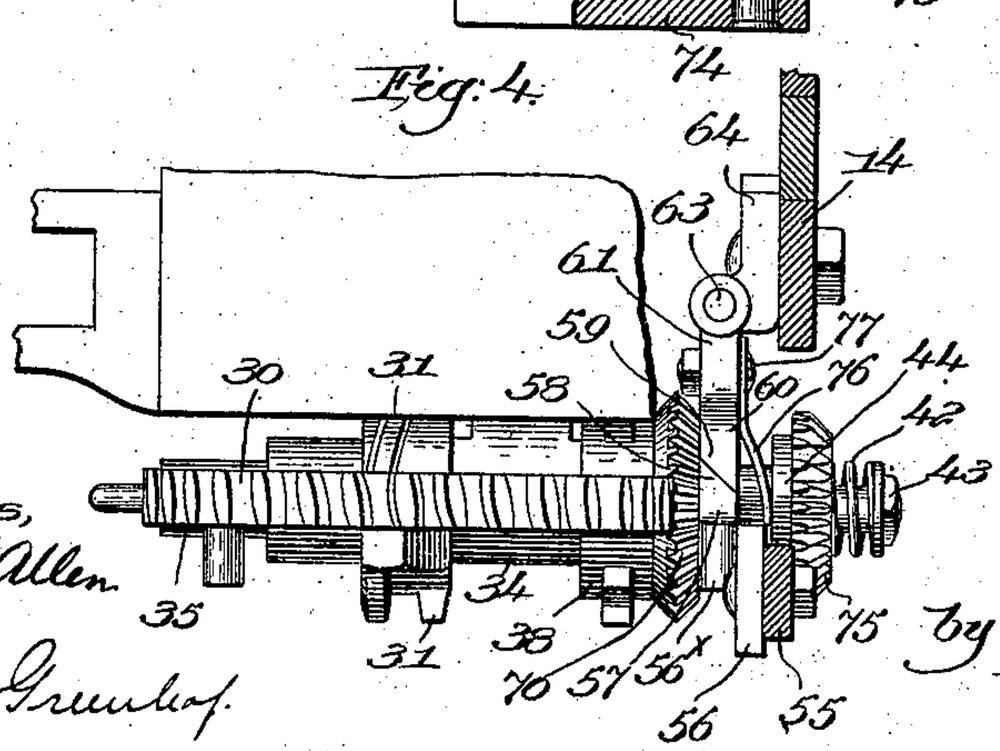


Fig: 4.



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UNITED STATES PATENT OFFICE.

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TAKE-UP MECHANISM FOR LOOMS.

No. 847,608. Specification of Letters Patent. Patented March 19, 1907.

Application filed January 17, 1906. Serial No. 296,456.

To all whom it may concern:

Be it known that I, CHARLES F. ROPER, 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 drawing, is a specification, like letters on the drawings representing like parts.

In United States Patent No. 807,580, granted to me December 19, 1905, a positive take-up mechanism for looms is shown and described embodying a positive and continuous take-up of the cloth, which permits of easy manipulation by the weaver to let back the cloth when necessary, but preventing any advance or turning ahead by the weaver while the loom is running.

My present invention has for its object the production of take-up mechanism of the positive type combined with means for effecting automatically let-back in an equally positive manner, and I have herein shown my present invention embodied in take-up mechanism comprehending the general structure and arrangement set forth in the aforesaid patent.

An automatic filling-replenishing double-fork loom is herein shown, detection of filling absence effecting arrest of take-up until a change or replenishment of filling has been effected automatically, and in accordance with the present invention the arrest of take-up is accompanied by positive let-back of the cloth, the means for effecting the same being rendered inoperative automatically when the take-up action is resumed.

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 front elevation, centrally broken out, of part of a double-fork automatic filling-replenishing loom with one embodiment of my present invention applied thereto. Fig. 2 is a transverse sectional view on the line 2 2, Fig. 1, looking toward the left. Fig. 3 is an enlarged detail in front elevation and partial section of the driving member of the take-up mechanism, the let-back means, the clutch, and the transmitting-train between it and the take-up roll. Fig. 4 is a top plan view of the parts illustrated in Fig. 3.

The loom side 1, breast-beam 2, operating rock-shaft 4 to control the operation of the automatic filling-replenishing mechanism 5, (shown at the right-hand side of Fig. 1 and substantially the same as shown and described in United States Patent No. 529,940, granted November 27, 1894, to J. H. Northrop,) the upturned arms 6 and 7, fast on the rock-shaft and in the paths of movement of the outer ends of the weft-fork slides 8 and 9, respectively, the loom being equipped with double-fork mechanism, and the shipper 10 may be and are all of well-known construction and operate in usual manner.

Detecting action of either of the filling-forks mounted, respectively, on the slides 8 and 9 turns the rock-shaft 4 and effects filling replenishment and arrests the operation of the take-up mechanism, as in my patent referred to.

The core 12, on which the roll of cloth 13 is wound, the stands 14, in which said core is mounted, the take-up roll 15, having its shaft 16 suitably supported, and the worm-gear 19, Fig. 3, fast on the shaft, the casting 26, having bearings for a shaft 28, provided with a worm 29, in mesh with the worm-gear 19, and the large worm-gear 30, fast on the front end of the shaft 28, in mesh with a worm 31 on the hub 32, are all as in my before-mentioned patent.

The casting 26 has a sleeve-bearing 34, in which is rotatably mounted a shaft 35, reduced in diameter at one end at 36, (see Fig. 3,) and a notched collar 37 is pinned onto the reduced part of the shaft, adjacent to which collar the driving member (shown as a sprocket 38) is rotatably mounted on the larger part of the shaft 35, said sprocket having a radial recess 39 in its outer face.

A clutch device, comprising a collar 40, is slidable on the part 36. The collar 40 of the clutch device has a tooth or lug 41 to enter the notch of the collar 37, and it is normally held in the radial notch 39 of the driving member by a spring 42, bearing against the outer face of the annular enlargement or disk 44, forming a part of the clutch, said spring being held in place by a nut 43, as clearly shown in Fig. 3. The clutch is at all times rotated in unison with the shaft 35, as will

be manifest, while longitudinal movement of the clutch against the spring 42 withdraws the lug 41 from engagement with the driving member 38, so that the latter may rotate freely upon the shaft.

The usual cam-shaft 52 (see dotted lines, Fig. 1,) is provided with a sprocket 53, and a sprocket-chain 54, also shown in dotted lines, connects it with the driving member 38, said sprocket-chain serving as the actuator for the driving member and rotating it continuously so long as the loom is running. The driving member 38 rotates twice for each revolution of the cam-shaft, so that each revolution of the driving member corresponds to one pick of the loom, and the revolution of the take-up roll when connected with the driving member is positively measured by the amount of revolution of the cam-shaft, all of the mechanism so far described being substantially as shown in my Patent No. 807,580. In said patent, however, when the clutch is disengaged from the driving member by means to be referred to hereinafter the rotation of the take-up roll 15 is arrested, and take-up of the cloth is thereby arrested or ceases while the driving member makes one complete revolution or until the notch 39 again comes opposite to the clutch-lug 41, such arrest of take-up corresponding to one pick. The worm 31, which is normally connected to rotate with the shaft 35, the worm-gear 30, worm 29, and intermeshing worm-gear 19 constitute an operating, connecting, or train of transmitting gearing between the shaft 35 and the take-up roll, so that rotation of the said shaft will effect rotation of the take-up roll.

In my present invention I have provided means for effecting positive let-back of the take-up roll when take-up is arrested, and this is secured by reversing the direction of rotation of said take-up roll, the let-back taking place while take-up is arrested and consequently for one pick in the structure herein illustrated.

In accordance with my present invention the driving member 38 is provided with a beveled gear 70, secured to or forming a part of said member and meshing with a second beveled gear 71, which latter constitutes a reversing device or member, it being continuously driven by the member 38 so long as the loom is running and in an opposite direction, as will be manifest. The hub 72 of said reversing member or gear is mounted on an upright stud 73 at right angles to the shaft 35 and fixedly supported in a suitably-shaped arm or bracket 74, forming a part of the casting 26, the axial lines of the shaft 35 and stud 73 intersecting. The disk or enlargement 44 of the clutch is provided with a gear 75, which is, as shown in Figs. 3 and 4, a combination of spur and bevel gear, the normal position thereof being shown in said Fig. 3 out of mesh with the teeth of the reversing member or gear 71. When, however, the clutch is moved to the right, viewing Fig. 3, to disengage the lug 41 from the driving member, the gear 75 is brought into mesh with the reversing-gear 71, and immediately the rotation of shaft 35 is resumed, but in a reversed direction. This will be clear from an inspection of Fig. 3, for the gears 70 and 75 (when both are in mesh with the reversing-gear 71) mesh with the same on opposite sides of its center of rotation, hence the reversal of rotation of the shaft 35. Such reverse rotation of the shaft acts through the transmitting-gearing to positively turn the take-up roll 15, but in the reverse direction or backward, so as to positively let back the shaft. The let-back continues while take-up is arrested, which manifestly is for one complete revolution of the driving member 38. Should the absence of filling be detected, the replenishing mechanism will be operated to provide the shuttle with a fresh supply of filling in well-known manner, and the arrest of take-up and positive let-back are effected during the replenishing operation by or through detection of filling absence by either fork.

The downturned arm 55, fast on the rock-shaft 4, has bolted to it a plate 56, Figs. 1 and 2, laterally offset at its lower end at $56^{\times}$ and provided with the rearward extension 57, having a beveled face 58 (see Fig. 4) coöperating with the beveled face 59 of the finger 60, Fig. 2, projecting from the upright bar 61, the latter being fulcrumed on a vertical pin 63 to swing laterally, said pin being held in the stand 64, secured to the cloth-roll stand 14, all substantially as in my patent above referred to, except that the bar 61 in the present instance does not of itself engage the disk 44 of the clutch. A resilient or spring finger 76 is attached by a bolt 77 to the bar 61 and projects forward against the inner face of the disk portion 44 of the clutch, as best shown in Fig. 4, the said finger being, however, considerably stiffer or stronger than the spring 42. I have shown in Fig. 2 this finger as adjustably mounted on the upright bar 61 to enable the finger to at all times engage the inner face of the clutch-disk 44, no matter what the adjustment of the take-up mechanism, for it will be remembered by reference to my previous patent that said take-up mechanism is vertically adjustable practically as a unit. When the rock-shaft 4 is turned by outward movement of either arm 6 or 7, the downturned arm 55 is swung rearward and forces the plate 56 rearward, and as the beveled face 58 slides over the face 59 the finger 60 and the bar 61 will be swung to the right on the fulcrum 63, viewing Fig. 4. This movement causes the finger 76 to press against the clutch-disk and to move the clutch bodily outward upon the

shaft 35, compressing the spring 42 and withdrawing the clutch-lug 41 from engagement with the driving member 48 to arrest take-up, and at the same time the teeth of the gear 75 will be brought into mesh with the teeth of the reversing member or gear 71, such engagement being effected after the driving member and the clutch have been disengaged. Inasmuch, however, as the teeth of the gear 75 may not at the instant enter or be opposite spaces between the teeth of the reversing-gear 71, the finger 76 will give or flex sufficiently to prevent any damage to the parts, it being of course understood that the rock-shaft 4 is always given a predetermined angular movement, and the spring-finger 76 will cause the proper meshing of the gears 75 and 71 the instant it can be effected.

Of course take-up is arrested as soon as the driving member 38 is disengaged from the shaft 35; but at the same time the reversing device is brought into operation to reversely rotate the shaft 35, and consequently the take-up roll is reversed in its rotation and positive let-back is effected. When the rock-shaft 4 returns to its normal position, the plate 56 resumes the position shown in the drawings, and the spring 42 will then act to throw the clutch into operative engagement with the driving member when the notch 39 comes opposite to the lug 41, the gears 75 and 71 being simultaneously disengaged. Detection of filling absence by either fork operates the rock-shaft 4 sufficiently to arrest take-up and cause positive let-back in the manner above described. The arresting of take-up and the letting back of the cloth absolutely prevent the formation of a crack.

It will be manifest from the foregoing that the reversal of rotation of the take-up roll is effected by or through the driving means for said roll when take-up is arrested, the driving means including the continuously-rotating driving member 38. The clutch operates to effect rotation of the take-up roll in a forward direction to take up the cloth or to effect reverse rotation of the roll to effect let-back of the cloth, according to the position of the clutch, so that the latter may be termed a "controlling" device and is so designated in some of the following claims.

Various changes or modifications may be made by those skilled in the art without departing from the spirit and scope of my invention, one practical embodiment whereof is particularly described in the specification hereof and illustrated in the accompanying drawings.

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

1. In a loom, a take-up roll, driving means therefor, including a continuously-rotating driving member, and means to automatically reverse the rotation of said roll by or through said driving means when take-up is arrested, to effect positive let-back of the cloth.

2. In a loom, a take-up roll, means to positively rotate the same, including a continuously-rotating driving member, and means to automatically reverse the normal direction of rotation of the said roll when take-up is arrested to effect positive let-back of the cloth.

3. In a loom, a take-up roll, means to positively rotate the same, and controlling mechanism intermediate said roll and the means for rotating it, to reverse automatically the direction of rotation of said roll when take-up is arrested, to thereby cause positive let-back.

4. In a loom, take-up mechanism, including a take-up roll, a continuously-rotating driving member, and transmitting connections between it and the roll to normally effect rotation thereof in one direction and cause take-up of the cloth, said connections including an automatic controlling device to arrest take-up and reverse the direction of rotation of said roll, whereby positive let-back is effected.

5. In a loom, a filling-detector, take-up mechanism, including a take-up roll, a continuously-rotating driving member, a roll-reversing device actuated thereby, a clutch operatively connected with said take-up roll, and means operative by or through detection of filling failure by the detector to shift the clutch from coöperation with the driving member into coöperation with the reversing device, to reverse the rotation of the take-up roll and cause positive let-back.

6. In take-up mechanism for looms, a take-up roll, a rotatable shaft, positive transmitting connections between it and the said roll, a continuously-rotating driving member loose on the shaft, a reversing member in continuous engagement with and oppositely rotated by the driving member, and a clutch to connect either the driving member or the reversing member and the shaft, to effect positive take-up or positive let-back of said roll.

7. In take-up mechanism for looms, a take-up roll, a rotatable shaft positively connected with and to rotate the roll, two continuously and oppositely rotating members, and means to connect either member with said shaft to thereby rotate the take-up roll, one of said members effecting positive take-up and the other positive let-back of the roll.

8. In take-up mechanism for looms, a take-up roll, a rotatable shaft, positive transmitting connections between it and the said roll, a continuously-rotating driving member loose on the shaft, and having an attached gear, a reversing-gear in mesh at one side of its center with said attached gear, and continuously driven thereby, and a clutch con-

nected with the shaft and having a gear adapted to at times mesh with the reversing-gear at the opposite side of its center, movement of the clutch into coöperation with the driving member disengaging the clutch-gear and the reversing-gear, and vice versa, to effect take-up or let-back rotation, respectively, of the take-up roll.

9. In a loom provided with automatic filling-replenishing mechanism, and a filling-fork to effect the operation thereof upon filling failure, in combination, take-up mechanism, including a take-up roll, a continuously-rotating driving member, a reversing device, and means operative upon detection of filling failure to arrest take-up and bring into operation the reversing device to positively turn back the take-up roll while filling is being replenished.

10. In a loom, two filling-forks to detect on alternate picks, a take-up roll, a positively and continuously moving actuating device therefor, a clutch intermediate said device and roll, a reversing device for the latter, and means to render the clutch inoperative to effect take-up and to render operative the reversing device to cause positive let-back upon detection of absence of filling by either fork.

11. In a loom, two filling-forks to detect on alternate picks, take-up mechanism, including a take-up roll, a continuously-rotated driving member, an oppositely-rotated reversing member actuated thereby, transmitting-gearing connected with said roll, and means operative upon detection of absence of filling by either fork to disconnect the driving member and said transmitting-gearing arresting take-up, and connect said gearing and the reversing member, to effect positive let-back.

12. In take-up mechanism for looms, a take-up roll, a rotatable shaft, speed-reducing gearing operatively connecting it and said roll, a continuously-rotating driving member loose on the shaft, a reversing-gear continuously rotated by said member, a clutch to normally connect the shaft and said driving member, said clutch having a connected gear, and yieldingly-acting means to release the driving member and clutch and bring the connected gear of the latter into mesh with the reversing-gear, the latter remaining in mesh with the driving member to reverse the take-up roll and effect let-back.

13. In a loom, take-up mechanism, including a take-up roll, a continuously-rotating driving member, having a notch and an attached gear, a shaft on which said member is loosely mounted and operatively connected with the take-up roll, a reversing-gear in mesh with said connected gear, a clutch device rotatable with the shaft and having a lug to enter the notch of and connect the driving member and the shaft, to effect take-up, a gear on the clutch device movable into and out of mesh with the reversing-gear, and means operative automatically upon a predetermined change in the operation of the loom to withdraw the lug from the notch, releasing the shaft, and thereafter bringing into mesh the clutch and reversing gears, to reverse rotation of the take-up roll until the driving member has made one revolution.

14. In a loom, take-up mechanism, including a take-up roll, a continuously-rotating driving member, making one revolution for each pick, a reversing device actuated by said driving member, transmitting-gearing connected with the take-up roll, and means operative automatically upon a predetermined change in the operation of the loom to disconnect the driving member and said transmitting-gearing and operatively connect the latter and the reversing device, to arrest take-up and effect positive let-back during one revolution of the driving member.

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

CHARLES F. ROPER.

Witnesses:
GEORGE OTIS DRAPER,
ERNEST W. WOOD.