No. 807,580. PATENTED DEC. 19, 1905.

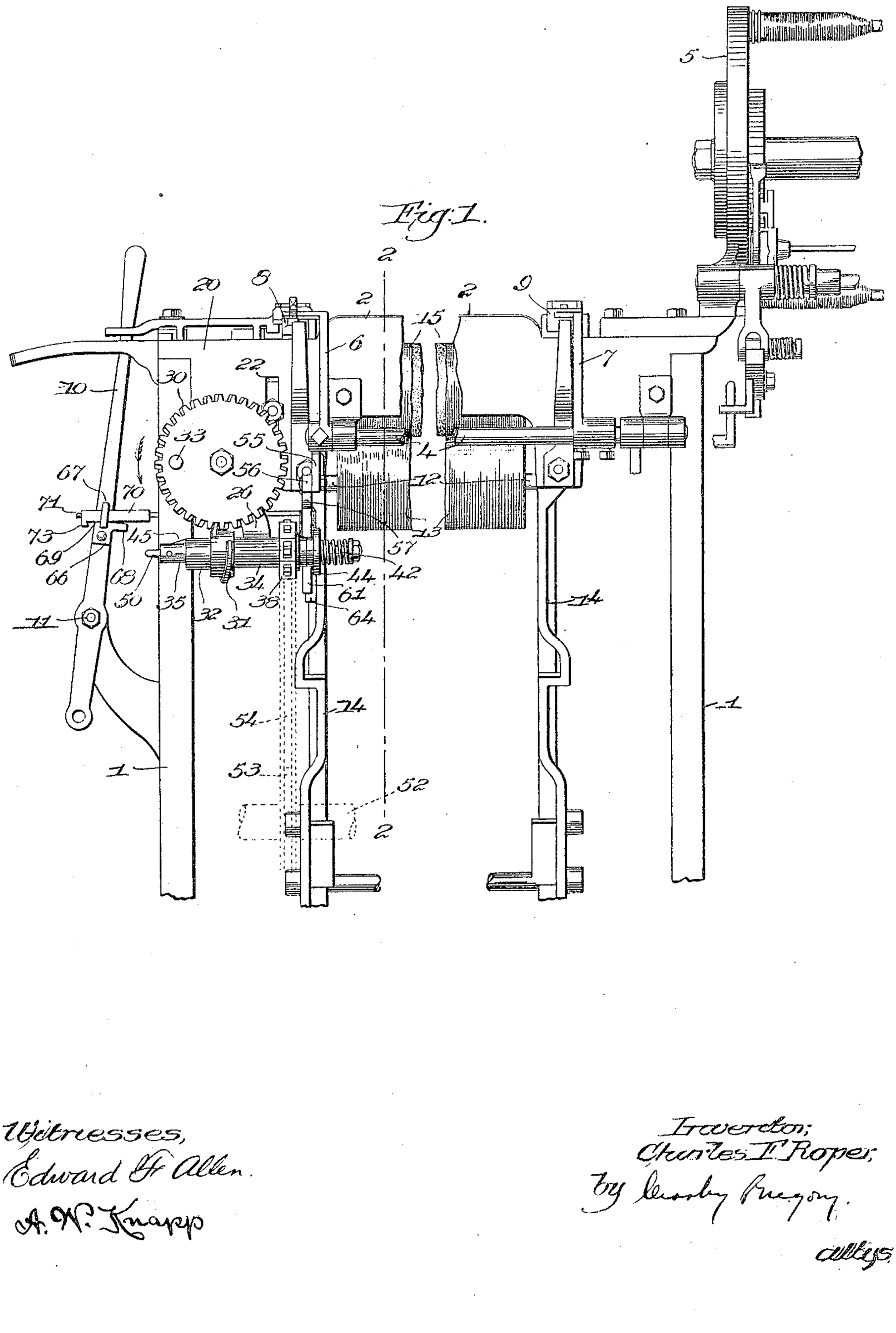
C. F. ROPER.

TAKE-UP MECHANISM FOR LOOMS.

APPLICATION FILED MAY 8, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig: 2.

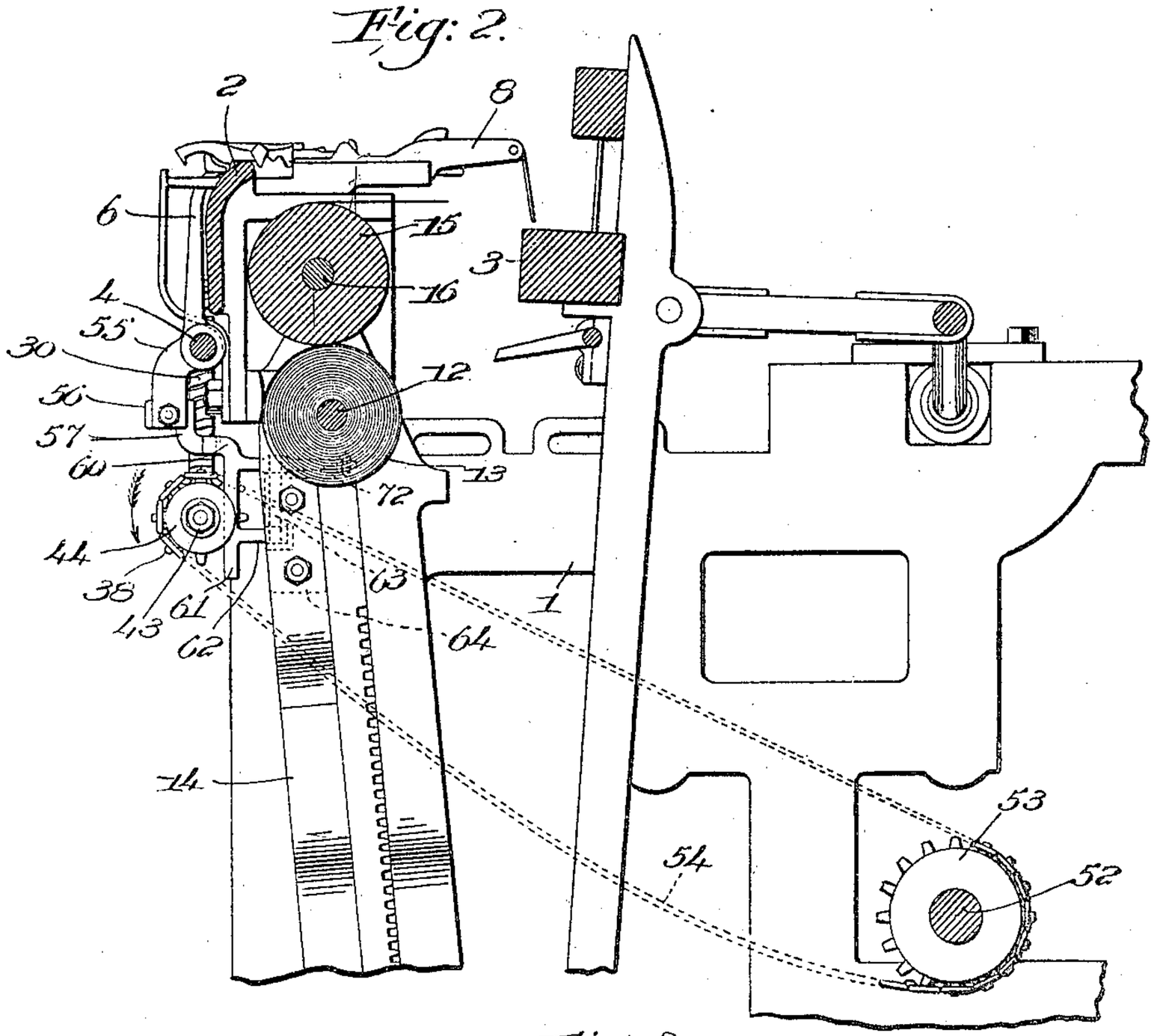
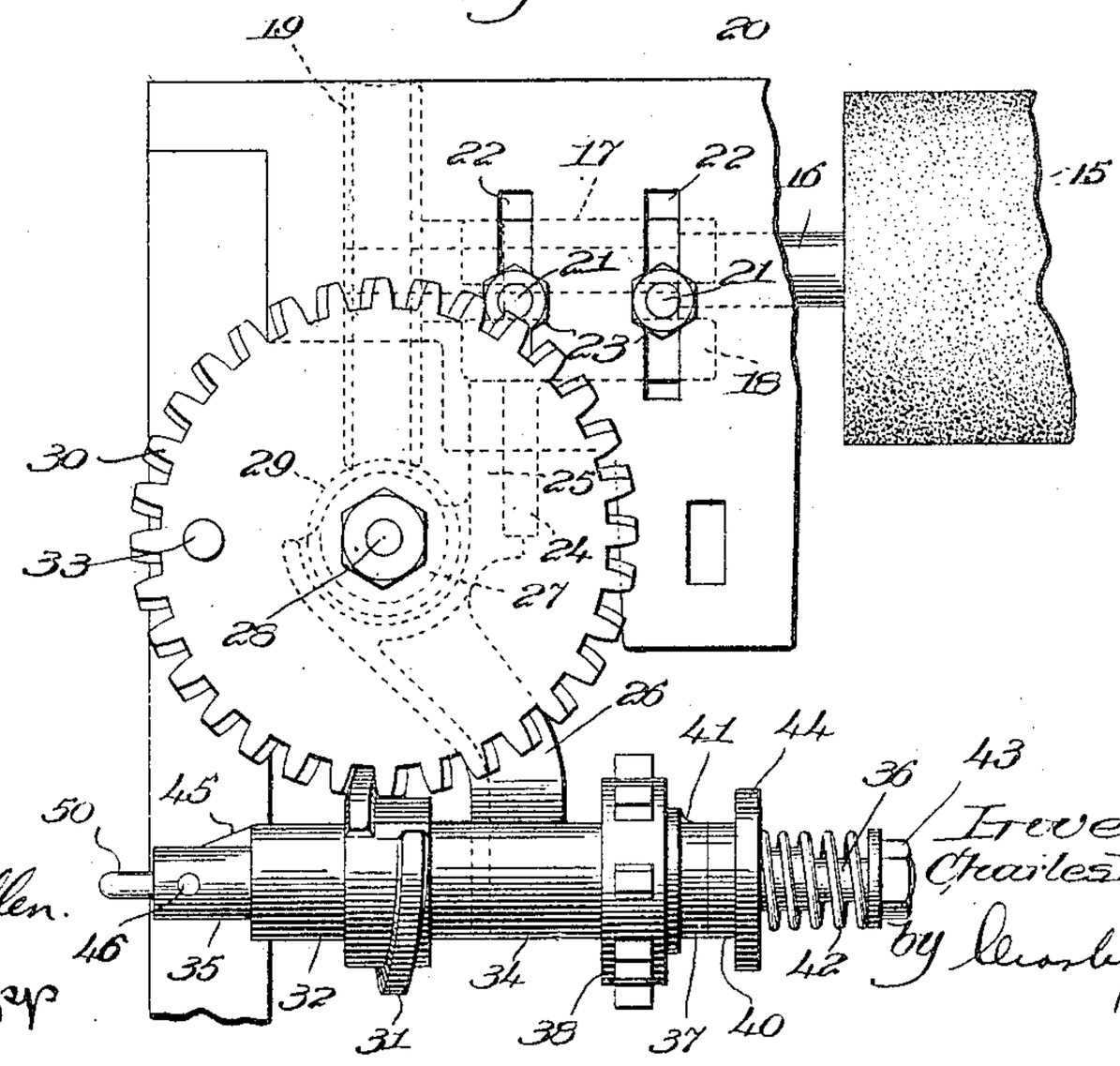


Fig: 3.



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3 SHEETS—SHEET 3.

Fig. 4.

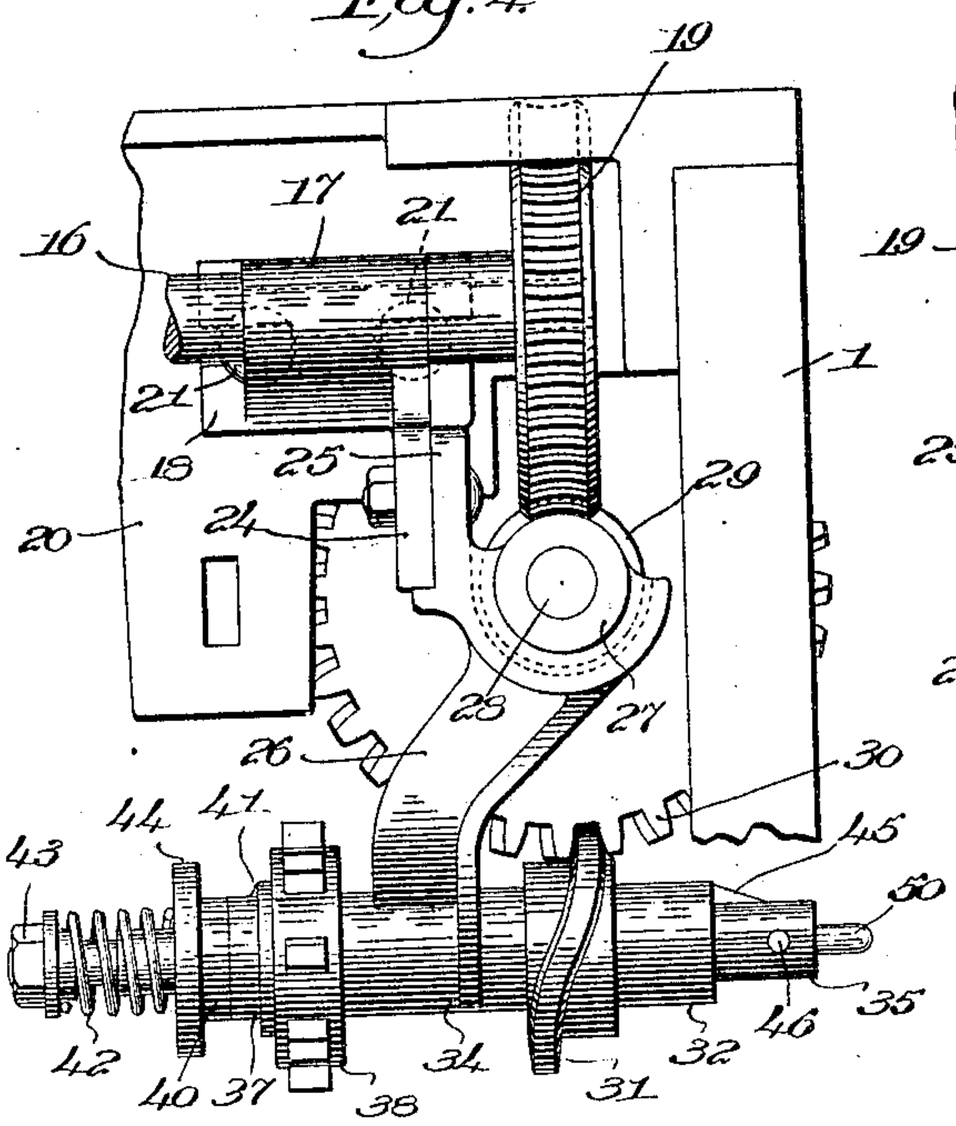


Fig. 5.

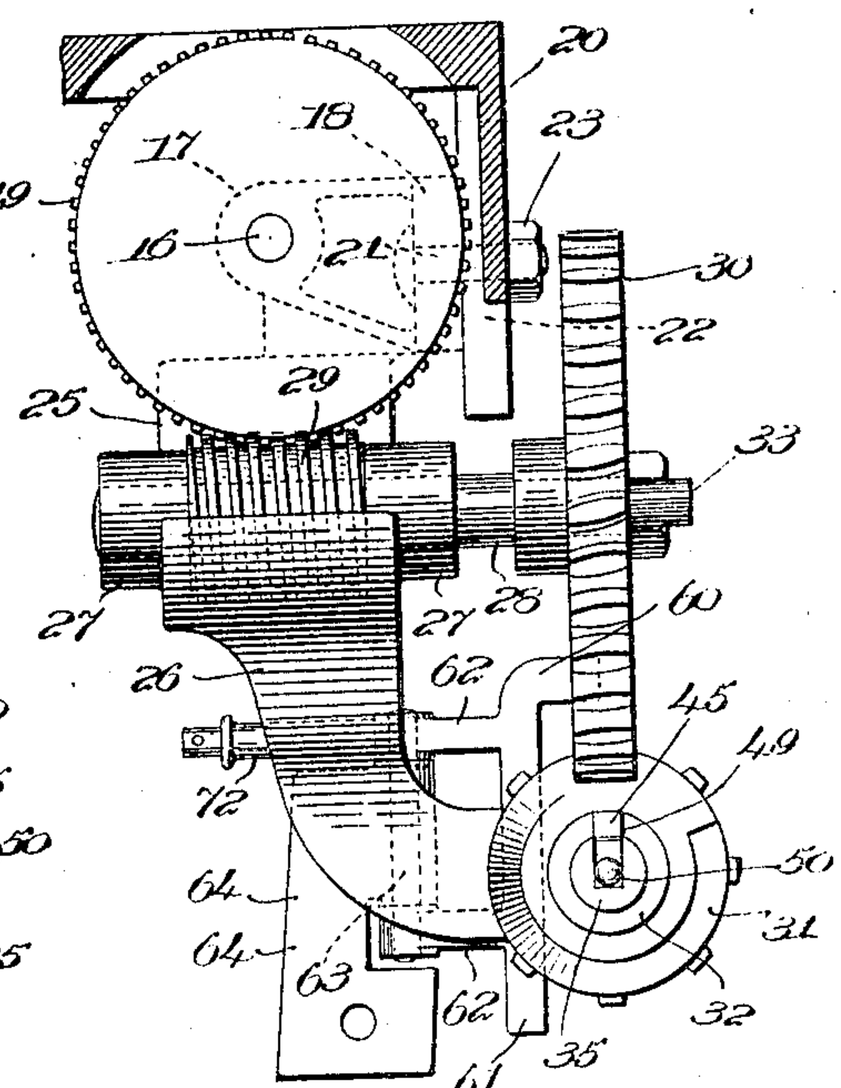


Fig. 6.

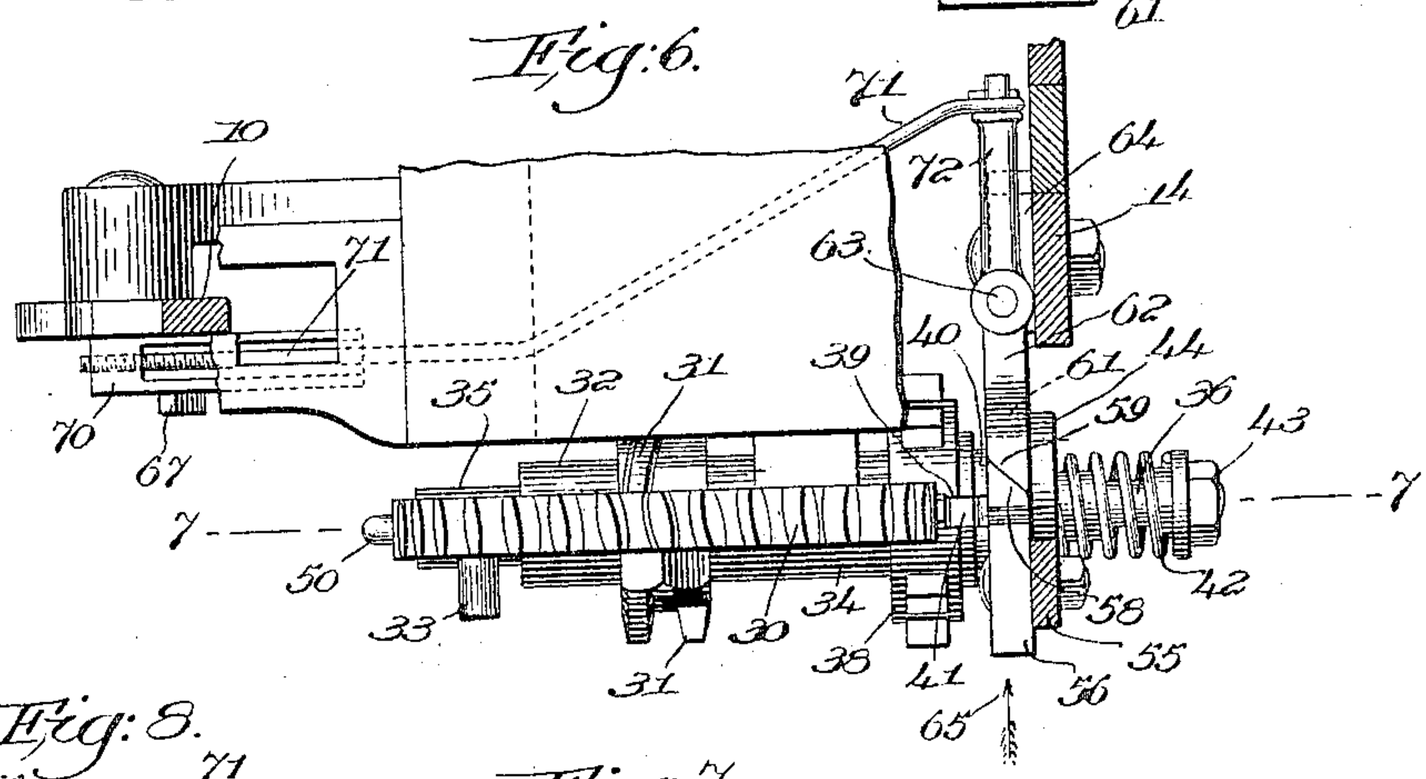


Fig. 8.

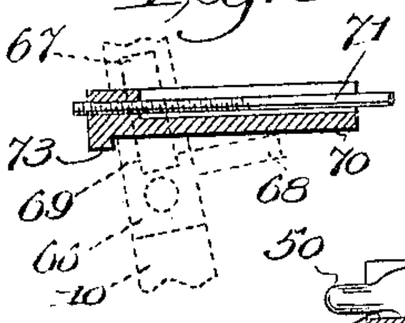
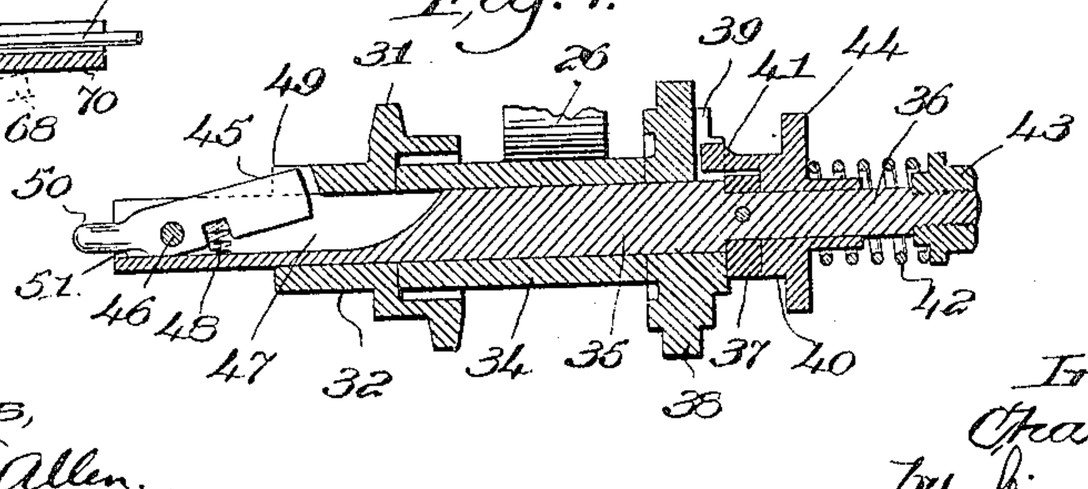


Fig. 7.



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UNITED STATES PATENT OFFICE.

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TAKE-UP MECHANISM FOR LOOMS.

No. 807,580. Specification of Letters Patent. Patented Dec. 19, 1905.

Application filed May 8, 1905. Serial No. 259,289.

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 drawings, is a specification, like numerals on the drawings representing like parts.

This invention has for its object the production of a positive take-up mechanism for looms containing a number of novel features of construction, arrangement, and operation, the term "positive" being used to indicate the positive and continuous take-up of the cloth as opposed to the step-by-step or intermittent action of the well-known pawl-and-ratchet type of take-up mechanism.

While the take-up motion embodying my present invention is absolutely positive, very simple in construction, and easy to manipulate to let back the cloth when necessary, yet it is so constructed and arranged that it is impossible for the weaver to advance or turn it ahead while the loom is running.

One of the novel features is the construction whereby the entire take-up mechanism, including the take-up roll, can be raised or lowered as an entirety to suit the conditions of weaving and to impart the desired effects to the cloth without requiring any relative or separate adjustment of the several parts. Such bodily adjustment is simplified and made possible by a flexible positive connection with the rotating primary actuating member of the loom, such connection being herein shown as a sprocket-chain.

I have shown my invention in connection with an automatic filling-replenishing loom of the double-fork type, means being provided whereby either fork, upon detection of absence of filling will arrest take-up until a change or replenishment of filling has been effected automatically.

While the loom is in operation the driving member of the take-up mechanism is continuously rotated and a clutch is interposed between said member and a worm and worm-gear transmitting-train positively connected with the take-up roll. The clutch is thrown out of action by either of the filling-forks, as before referred to. I have also provided means for arresting take-up one pick when the shipper is released from running position to thereby prevent a crack in the cloth, which is liable to occur whenever a loom stops owing to the slowing up of the moving parts and the consequent loss of momentum of the lay. These and various other novel features of construction 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 a sufficient portion of an automatic filling-replenishing loom of the double-fork type 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, of the driving member of the take-up mechanism, the clutch and the transmitting-train between the clutch, and the take-up roll. Fig. 4 is a rear elevation, also enlarged, of the mechanism shown in Fig. 3. Fig. 5 is a right-hand end view of the parts shown in Fig. 4, the loom side being omitted and a portion of the adjacent connection with the breast-beam being shown in section. Fig. 6 is a top plan view of the parts illustrated in Fig. 3 and also showing a portion of the shipper. Fig. 7 is a longitudinal section on the line 7 7, Fig. 6, of the driving member of the take-up mechanism, the clutch, and the manually-controlled device for permitting let-back; and Fig. 8 is a detail in section of a portion of the connection between the shipper and the clutch-controller to be referred to.

The loom sides 1, breast-beam 2, lay 3, the controlling or operating rock-shaft 4, mounted in suitable bearings below the breast-beam and adapted to control the operation of the automatic filling-replenishing mechanism 5, (shown at the right-hand side of the loom, Fig. 1,) the upturned arms 6 and 7, fast on said rock-shaft and in the paths of movement of the outer ends of the weft-fork slides 8 and 9, respectively, (the loom being shown in Fig. 1 as equipped with double-fork mechanism,) and the shipper 10, fulcrumed at 11 on the loom side, may be and are all of well-known construction and operate in usual manner. Rocking of the rock-shaft by or through detecting action of either filling-fork, one being mounted on each of the slides 8

and 9, acts to effect filling replenishment and also to arrest the operation of the take-up mechanism, as will be described.

The core or bar 12, upon which the roll of cloth 13 is wound, is mounted in suitable bearings in rigid upright stands 14, forming no part of my present invention, the take-up roll 15 in this invention having its shaft 16 supported in suitable bearings, one of which is herein shown at 17 as a sleeve-like portion of a bracket 18, Figs. 3, 4, and 5, the end of the shaft projecting through the bearing having an attached worm-gear 19.

The bracket 18 is connected with the part 20 of the loom-frame by bolts 21, extended through vertical slots 22 in the part 20, (see Figs. 1 and 3 and dotted lines, Fig. 5,) clamping-nuts 23 on the bolts rigidly clamping the bracket in vertically-adjusted position.

The bracket 18 has a depending apron 24, to which is rigidly and permanently secured the web 25 of a depending casting 26, having bearings 27 (see Fig. 5) for a shaft 28 at right angles to the take-up-roll shaft, the shaft 28 having secured upon it between the bearings 27 a worm 29 in mesh with the worm-gear 19. At the front end of such worm-shaft 28 is secured a second worm-gear 30, shown as considerably larger than the gear 19 and with coarser teeth, meshing with a worm 31, formed on an elongated hub 32, the worm-gear 30 being located at the front of the loom and having a handle 33 thereon for a purpose to be described.

The lower end of the casting 26 is turned forward and enlarged to form a long sleeve-bearing 34, parallel to the bearing 17 and having rotatably mounted in it a shaft 35, (see Fig. 7,) reduced in diameter at one end at 36. A notched collar 37 is pinned on the reduced end of the shaft, and between said collar and the adjacent end of the bearing 34 is rotatably mounted the driving member, shown as a sprocket 38, having a radial recess 39 in its outer face.

A clutch shown as a collar 40, slidable on the part 36 of the shaft 35, is provided with a tooth or lug 41, which enters the notch of the collar 37 and normally is held in the radial notch 39 of the driving member by a spring 42, bearing against the outer face of the clutch and held in place by a nut 43 on the end of the shaft.

The continuous engagement of the clutch-lug 41 with the collar compels the clutch to rotate at all times in unison with the shaft 35, while longitudinal movement of the clutch on the shaft against the action of the spring 42 withdraws the lug from engagement with the driving member 38, so that the latter may rotate upon the shaft.

An annular enlargement or disk 44, forming a part of the clutch, is arranged to coöperate with clutch-releasing means to be described.

Referring to Fig. 7, it will be seen that the inner end of the worm-hub 32 is enlarged to loosely fit over the adjacent end of the bearing 34, the worm normally rotating against the bearing end in the position shown. I have provided a spring-latch to normally lock the worm and shaft 35 together, and for this purpose a latch 45 is pivoted at 46 in an elongated slotted portion or recess 47 of the shaft, a spring 48 (see Fig. 7) acting upon the latch to raise its inner end into a notch 49 in the worm-hub 32. A finger-piece 50 is provided on the outer end of the latch, projecting beyond the end of the shaft, and a flattened portion 51 on the bottom of the latch is normally held by the spring 48 against the bottom of the recess 47, so that the latch not only locks the worm to the shaft, but prevents any improper outward movement of the worm thereon.

Under normal conditions the clutch connects the driving member 38 and the shaft to rotate the latter, and the shaft and worm 31 are normally connected by the latch, as has been described, so that through the worm-gear 30, worm 29, and worm-gear 19 the take-up roll is positively rotated, but at a greatly reduced speed compared to that of the shaft.

All of the parts of the take-up mechanism described are carried by the bracket 18 and its rigidly-attached casting 26, so that when it is necessary to vertically adjust the take-up roll to suit the conditions of weaving by means of the bolts 21 and slots 22 the entire mechanism for driving the take-up roll is simultaneously adjusted without any relative change in position. This simplifies the labor of adjustment and provides for better and more effective operation of the take-up roll, for when adjustment of the roll has been made all of the other parts have been adjusted correspondingly by the one operation.

Owing to the worms and worm-gears herein shown as forming a portion of the transmitting means between the driving member 78 and the take-up roll, said means is self-locking when the clutch is released, holding the take-up roll from retrograde rotation.

If it is necessary to let back the cloth for the purpose of picking out, &c., the weaver grasps the finger-piece 50 and depresses the inner end of the latch 45 out of the hub-notch 49, and the worm 31 is then loose on the shaft 35, and it can be removed entirely, or being loose the weaver can let back by turning the worm-gear 30 back by means of the handle 33. By this device worms of different pitch can be substituted for the worm 31, so that the take-up can be regulated according to the number of picks per inch.

While the latch can be manually released when the loom is at rest, it cannot be so operated while the loom is running, for then it is practically impossible for the weaver to move the handle 50 relatively to the rapidly-rotating shaft 35, and thus the take-up mechanism

cannot be turned ahead of its actuating means in order to produce more cloth.

The usual cam-shaft 52 of the loom, Fig. 2, is provided with a sprocket 53, and a sprocket-chain 54 (see dotted lines, Fig. 2) connects it with the driving member 38, the sprocket-chain thus serving as the actuator for the said member and rotating it continuously so long as the loom is running.

By making the driving member 38 rotate twice for each revolution of the cam-shaft each revolution of said driving member corresponds to one pick of the loom, and the revolution of the take-up roll is thus positively measured by the amount of revolution of the cam-shaft.

The flexible actuator or chain 54 permits the vertical adjustment of the take-up mechanism hereinbefore described without requiring any change in the actuating devices to compensate for such adjustment.

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 I have provided means to arrest or stop take-up until such replenishment is effected, and in the double-fork structure shown in Fig. 1 I have arranged the mechanism so that take-up is arrested upon detection of the absence of filling by either fork.

Referring to Figs. 1 and 2, the rock-shaft 4 has secured to it a downturned arm 55, to which is bolted a plate 56, having a depending and rearwardly-curved extension 57, provided with a beveled face 58, (see Fig. 6,) adapted to coöperate with the beveled face 59 of a finger 60, projecting from the upper end of an elongated upright bar 61, having lugs 62, by which it is fulcrumed on a vertical pin 63 to swing laterally, the pin being held by a stand 64, bolted or otherwise secured to the adjacent cloth-roll stand 14. The swinging bar 61 is normally located against or close to the inner face of the clutch-disk 44, as shown in Fig. 6, with the beveled faces 58 and 59 substantially in contact, the length of the bar being sufficient to always engage the inner face of the disk, no matter what the vertical adjustment of the take-up mechanism. Such swinging bar, its finger having the beveled face, and the bevel-faced extension of the plate 56 constitute a clutch-releasing device.

When the rock-shaft 4 is turned by outward swing of either arm 6 or 7, the downturned arm 55 is swung rearward and forces the plate 56 in the direction of arrow 65, Fig. 6, and as the beveled face 58 slides over the face 59 the finger 60 and depending bar 61 will be swung to the right on the fulcrum 63, viewing said figure. Thereby the clutch is moved bodily outward relatively to shaft 35; compressing spring 42 and withdrawing the clutch lug or tooth 41 from engagement with the driving member 38, and take-up will thus be arrested as long as the clutch is maintained inoperative, which will be until the rock-shaft 4 returns to its normal position. Upon such return the plate 56 resumes the position shown in the drawings, and the spring 42 will again throw the clutch into operative engagement with the driving member when the notch 39 comes opposite to the lug 41.

Detection of filling absence by either filling-fork will operate the rock-shaft 4 sufficiently to arrest take-up, as described.

I have provided means to arrest take-up for one pick when the shipper is moved to stopping position in order to prevent a "crack" in the cloth, which is liable to occur whenever a loom stops and which is due to the slowing down of the moving parts and the consequent loss of momentum of the lay.

When the take-up is stopped finally upon movement of the shipper to stopping position, it is quite possible to make a thick place, for supposing the warp stop-motion should stop the loom it might run on for several picks after actual shipper-release, putting filling in the shed and making a thick place, because of stoppage of take-up prior to stoppage of the loom.

In my present invention I arrest take-up for only one pick, which is enough to prevent a crack, and then the take-up is thrown into action and remains in operation until the loom actually comes to a stop as a whole, thus obviating the formation of a thick place.

The shipper 10 has rigidly attached to it a casting 66, Figs. 1 and 8, having an upturned guide-finger 67, an inward extension 68, forming a trip, and a shoulder 69, and a tip-piece 70 is adjustably secured to the outer end of a link 71 by screw-threading the latter, (see Fig. 8,) the tip-piece resting on the casting 66 between the upright face of the shipper and the guide-finger 67. At its opposite end the link 71 is connected with an arm 72, (see Fig. 6,) extended rearwardly from one of the lugs 62, so that when the link is pulled to the left, Fig. 6, the clutch-releasing bar 61 will be swung to the right to disengage the tooth 41 from the driving member 38. The tip-piece 70 has a depending transverse shoulder 73 at its outer end in the path of movement of the shoulder 69 when the shipper 10 moves from running to stopping position; but, as shown in Fig. 1, there is some lost motion before the two shoulders 69 and 73 engage, as the angular movement of the arm 72 is relatively slight.

With the parts in the position shown in Figs. 1 and 6 when the shipper is released it brings the two shoulders into engagement and then moves the trip-piece and link therewith far enough to give the arm 72 the required swing to release the clutch, and at this instant the trip 68 is raised by the swing of the shipper into engagement with the bottom of the trip, lifting the latter far enough to disengage

the shoulders 69 and 73 while the shipper completes its movement to stopping position.

The clutch-tooth 41 when withdrawn from the notch 39 frees the continuously-rotating driving member 38 from operative connection with the take-up mechanism, and the trip automatically frees the tip-piece and the link 71, so that as soon as the driving member has made one revolution (corresponding to one pick) the notch 39 is brought opposite the tooth 41 and the spring 42 effects clutching. Consequently the take-up mechanism is again brought into action after its temporary arrest of one pick and will operate while the loom continues to turn over, the arrest preventing the formation of a crack and the subsequent operation of the take-up preventing the formation of a thick place.

My invention is not restricted to the precise construction and arrangement herein shown and described, as the same may be varied or rearranged in different 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 vertically-adjustable stand having a bearing for the take-up roll, said roll, a rotating driving member, positive and self-locking transmitting means, including a clutch, interposed between the driving member and said roll, all carried by the stand, whereby simultaneous adjustment of said parts and the take-up roll can be effected, and a flexible actuating connection between the driving member and a rotating part of the loom.

2. In a loom, a take-up roll, driving means therefor, including a continuously-rotating driving member, said roll and driving means being vertically adjustable as a unit, and a flexible actuating connection between the driving member and a rotating part of the loom.

3. In a loom, take-up mechanism, including a take-up roll, a continuously-rotating driving member for and operatively connected with said roll to normally rotate the roll, and an actuating sprocket-chain between and connecting said driving member and a rotating part of the loom.

4. In a loom, take-up mechanism including a vertically-adjustable take-up roll, and a rotating driving member for and vertically adjustable with the roll, said member having sprocket-teeth, combined with a sprocket-chain in engagement with said member and operated by a rotating part of the loom.

5. In a loom, a take-up roll having an attached worm-gear, a vertically-adjustable stand having a bearing for said roll and having two attached shaft-bearings, a shaft rotatably mounted in one of such bearings and provided with a worm and a worm-gear, the former meshing with the gear on the roll, a second shaft mounted in the other shaft-bearing, a worm thereon adapted to coöperate with the second worm-gear, a clutch on and rotatable with the second shaft, and a continuously-rotating driving member loosely mounted on the said second shaft and adapted to be connected therewith by the clutch, a double worm and worm-gear connection being thereby interposed between the driving member and the take-up roll and all adjustable simultaneously therewith.

6. In a loom, a rotating shaft having a sprocket thereon, take-up mechanism, including a vertically-adjustable take-up roll and a sprocket driving member operatively connected with said roll and adjustable in unison therewith, and a sprocket-chain connecting the sprocket on the rotating shaft and the said driving member, to continuously rotate the latter.

7. In a loom, a filling-detector, a rotating shaft having a sprocket thereon, take-up mechanism, including a take-up roll, a sprocket driving member, and a clutch between it and the roll, a chain connecting said member and the sprocket on the rotating shaft, to positively and continuously rotate the driving member, and means operative by or through detection of filling failure by the detector to render the clutch inoperative.

8. In a loom provided with automatic filling-replenishing mechanism, and a filling-fork to effect the operation of said mechanism upon filling failure, in combination, take-up mechanism, including a continuously-rotating driving member, a take-up roll, and a clutch between it and said driving member, a sprocket and sprocket-chain to rotate said member, and means operative upon detection of filling failure to render the clutch inoperative and arrest take-up until replenishment of filling has been effected.

9. In a loom, two filling-forks to detect on alternate picks, take-up mechanism, including a take-up roll, a chain-and-sprocket actuating device therefor, a clutch intermediate the said device and the roll, and means to render the clutch inoperative and arrest take-up upon detection of absence of filling by either fork.

10. In a loom, two filling-forks to detect on alternate picks, a vertically-adjustable take-up mechanism, including a take-up roll, a continuously-rotated driving member, and a clutch between it and the roll, a chain-and-sprocket actuating device for said member, and means operative upon detection of absence of filling by either fork to render the clutch inoperative and arrest take-up.

11. In take-up mechanism for looms, a take-up roll, a rotatable shaft, a continuously-rotating driving member loose thereon, a clutch to connect said member and the shaft, a worm on the shaft, a locking device to normally connect the worm and shaft and adapted to be manually released when the shaft is at rest, to

permit let-back, and transmitting-gearing between the take-up roll and the worm, including a worm-gear in mesh with the latter.

12. In take-up mechanism for looms, a take-up roll, a normally rotating driving-shaft, a worm loosely mounted thereon, a normally operative locking device to connect the worm and shaft and adapted to be manually released and transmitting-gearing intermediate the take-up roll and the worm, including a worm-gear in mesh with the latter.

13. In take-up mechanism for looms, a take-up roll, a normally rotating driving-shaft, a worm loosely mounted thereon, a normally operative locking device to connect the worm and shaft and capable of manual release only when the shaft is at rest, to permit let-back, and speed-reducing gearing intermediate the take-up roll and the worm, including a worm-gear in mesh with the worm.

14. In take-up mechanism for looms, a take-up roll, a normally rotating shaft, a worm rotatable and also longitudinally movable thereon, a spring-latch to normally connect the worm and shaft, a finger-piece on the latch to permit release of the worm only when the shaft is at rest, to permit retrograde motion of the take-up roll, and positive transmitting-gearing between said roll and the worm, including a worm-gear in mesh with the latter.

15. In take-up mechanism for looms, a take-up roll, actuating-gearing therefor, including a worm-gear, a worm in mesh therewith, a driving-shaft on which the worm is mounted and with which it normally rotates, and a device manually operative only when the shaft is at rest to effect disconnection of the shaft and worm.

16. In take-up mechanism for looms, a take-up roll, actuating-gearing therefor, including a worm-gear, a worm in mesh therewith, a driving-shaft on which the worm is mounted and with which it normally rotates, a normally operating device to connect the shaft and worm and rendered inoperative manually only when the shaft is at rest, a positively-actuated driving member rotatably mounted on the shaft, and a clutch to normally connect said member and shaft to rotate the latter.

17. 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 clutch to normally connect said member and shaft, a spring to render the clutch operative, and a clutch-releasing device adapted to be operated upon absence of filling and also upon the actuation of a loom-stopping instrumentality.

18. In a loom, a shipper, take-up mechanism, means to arrest the operation thereof for one pick by or through release of the shipper, and means to thereafter restore the operation of the take-up mechanism.

19. In a loom, a shipper, take-up mechanism, including a take-up roll, a continuously-rotating driving member, and a clutch between it and the roll, combined with a clutch-releasing device to render the clutch inoperative for one pick by or through movement of the shipper into stopping position, and means to thereafter restore automatically the clutch to operative condition.

20. In a loom, a shipper, take-up mechanism, including a take-up roll, a continuously-rotating driving member, a shaft on which it is loosely mounted and operatively connected with the take-up roll, a clutch to normally connect said driving member and shaft, a disk forming a part of the clutch, and means operated by movement of the shipper to stopping position to act upon the disk and render the clutch inoperative for one pick.

21. In a loom, a shipper, take-up mechanism, including a take-up roll, a continuously-rotating driving member, having a notch, a shaft on which said member is loosely mounted and operatively connected with the take-up roll, a clutch device rotatable with the shaft and having a lug to enter the notch of and connect the driving member and the shaft, and means operative upon release of the shipper to withdraw the lug from the notch and thereby release the shaft until the driving member has made one revolution thereon.

22. In a loom, a shipper, take-up mechanism, including a clutch, a releasing device therefor operated by movement of the shipper to stopping position, and means to automatically disconnect the shipper and releasing device after release of the clutch.

23. In a loom, a shipper, take-up mechanism, including a take-up roll, a continuously-rotating driving member, and a clutch between it and the roll, combined with a clutch-releasing device operated by movement of the shipper to stopping position, and means to automatically disconnect the shipper and releasing device after release of the clutch, whereby the clutch can again become operative after temporary arrest of take-up.

24. In a loom, a shipper, take-up mechanism, including a take-up roll, a continuously-rotating driving member, making one revolution for each pick, and a clutch between said member and the take-up roll, combined with a clutch-releasing device operated by movement of the shipper to stopping position to release the clutch, and means to render said device inoperative after clutch release, whereby the clutch again becomes operative after 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.