E. E. BLAKE & W. H. GOLDSMITH, Jr.

BELT SHIFTER.

APPLICATION FILED DEC. 17, 1909.

1,029,338.

Patented June 11, 1912.

6 SHEETS—SHEET 1.

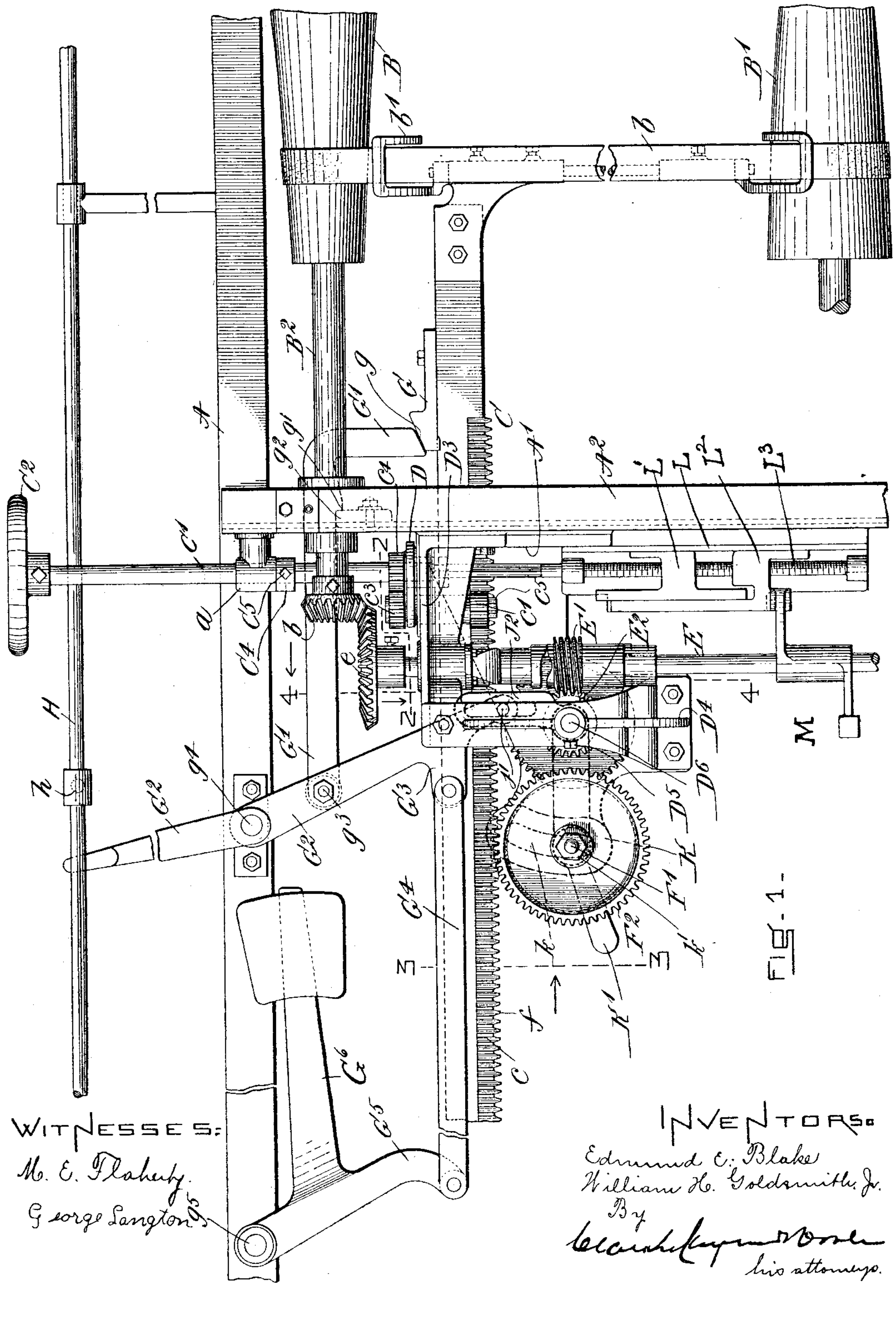

FIG-1.

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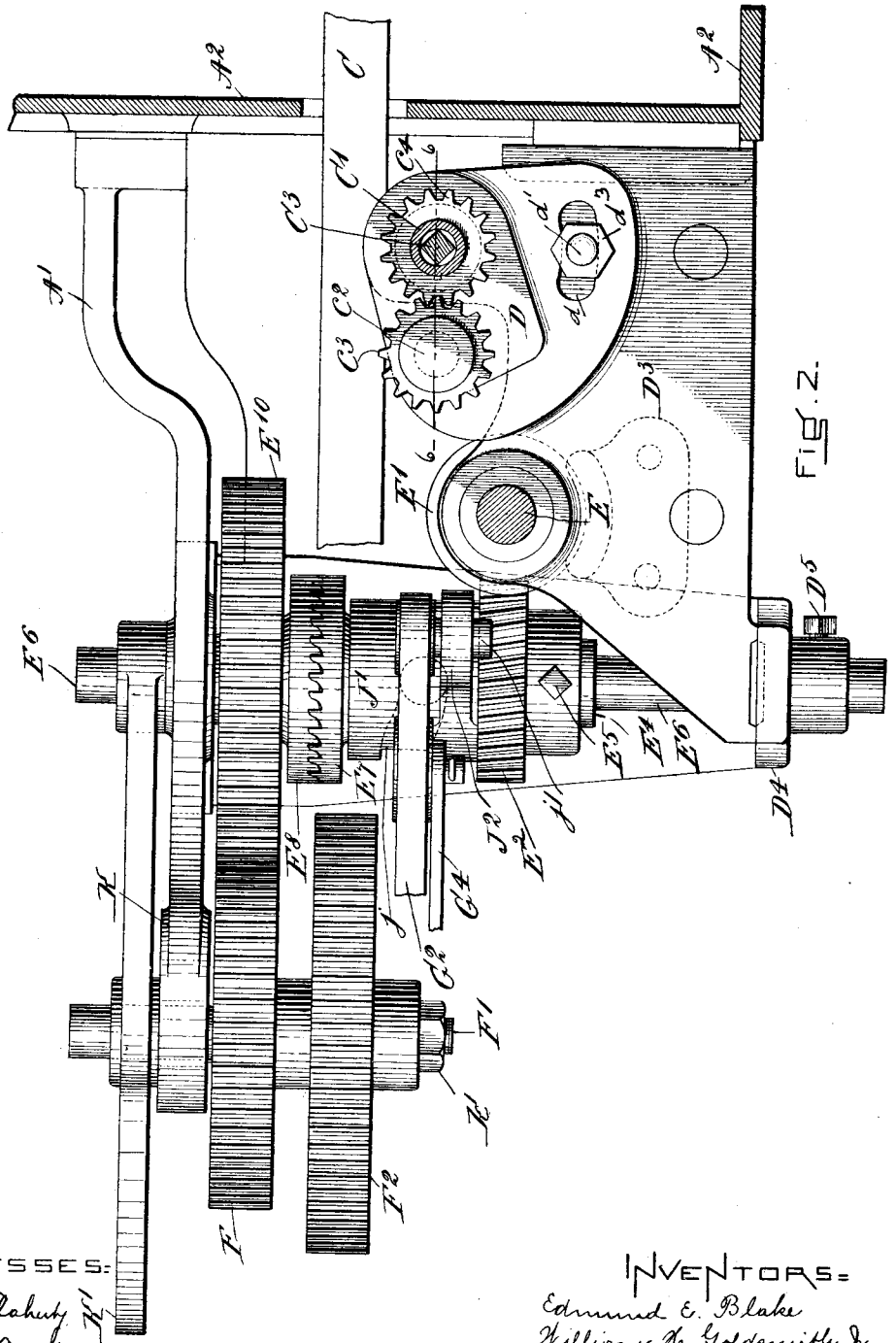

Fig. 2.

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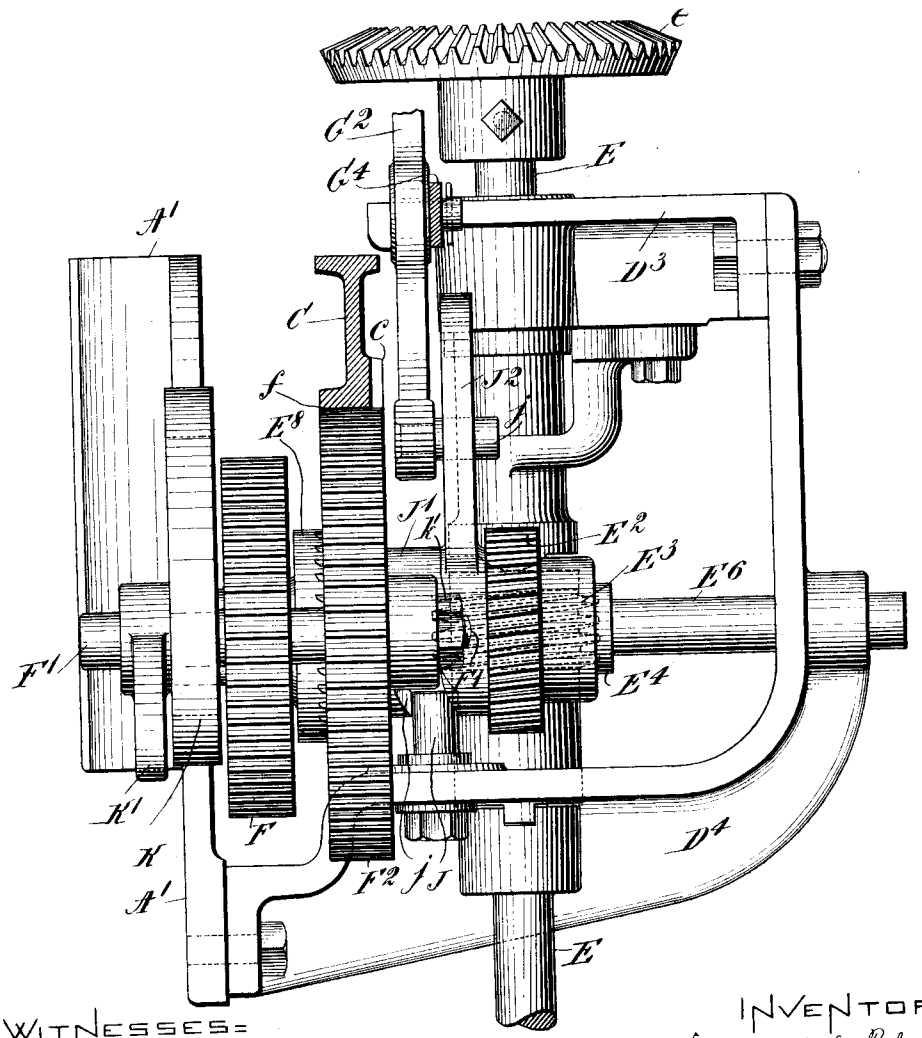

WITNESSES=

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FIG. 3.

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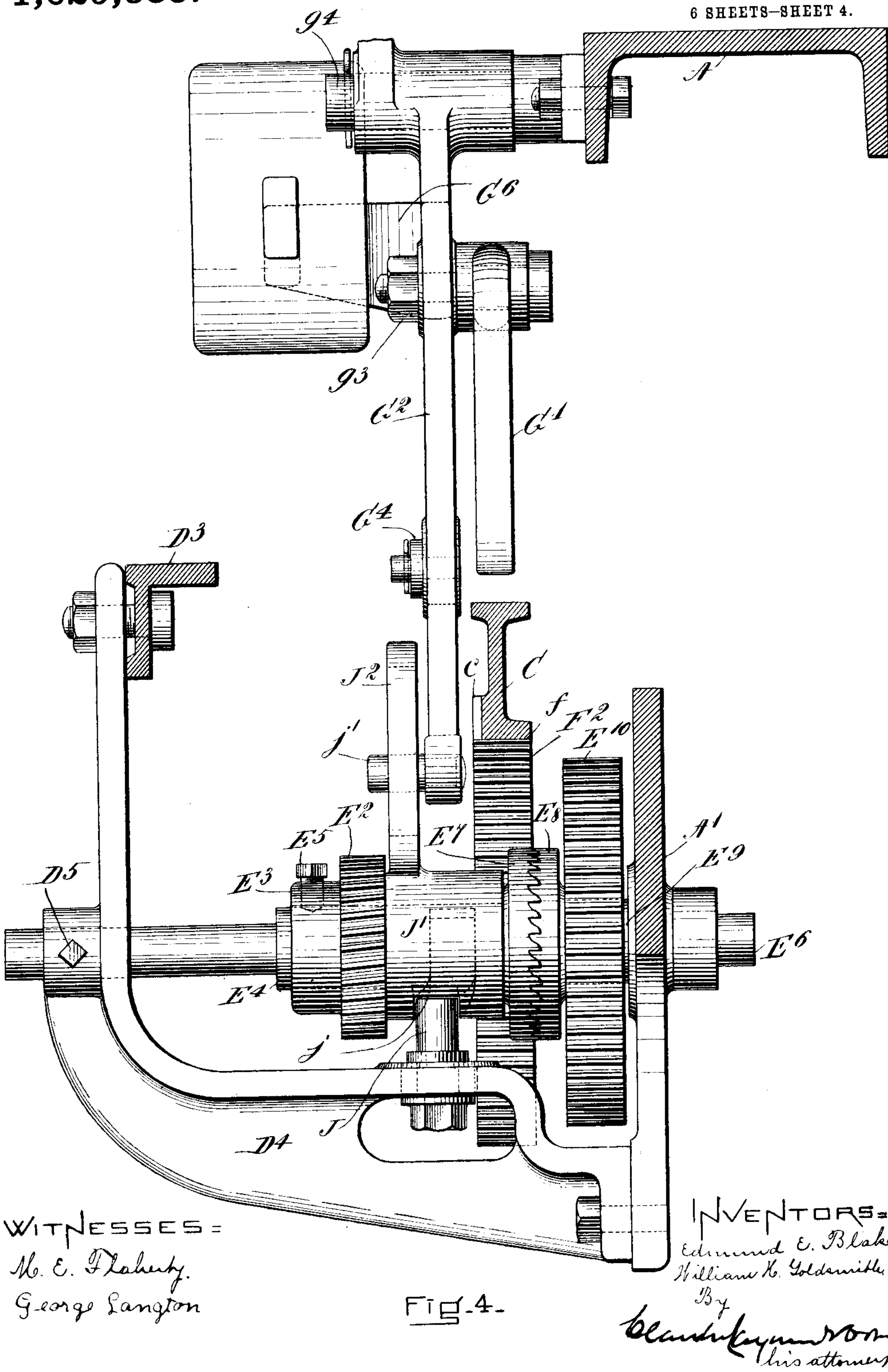

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Fig. 4.

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6 SHEETS—SHEET 5.

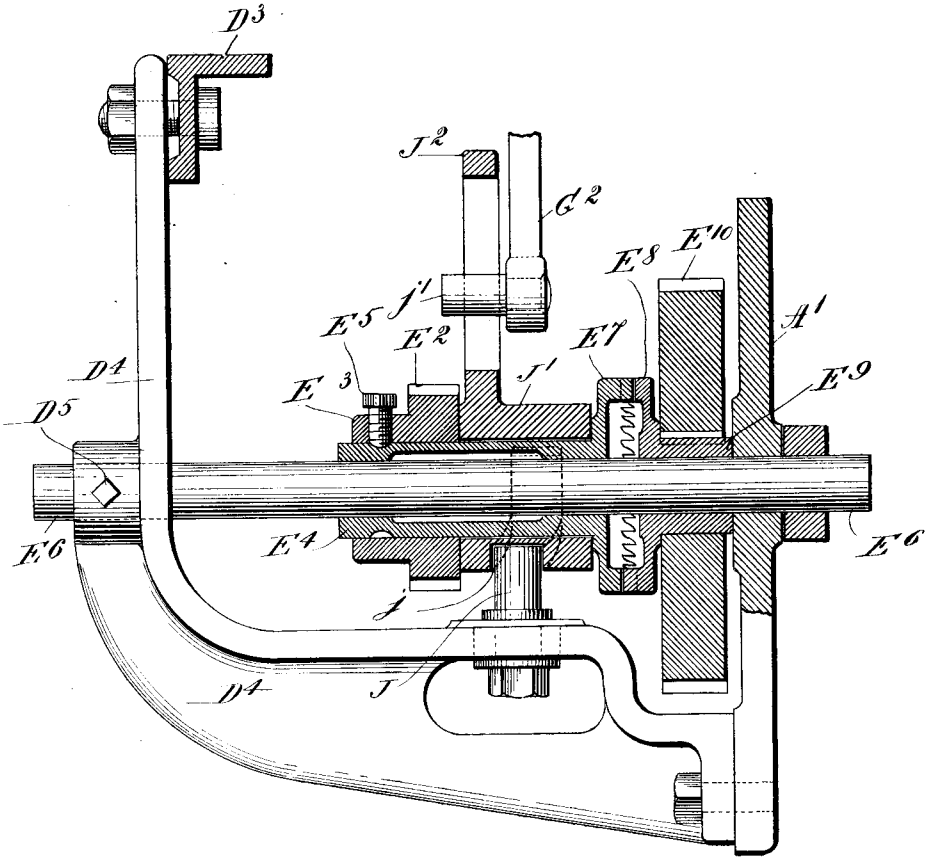

Fig. 5.

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6 SHEETS-SHEET 6.

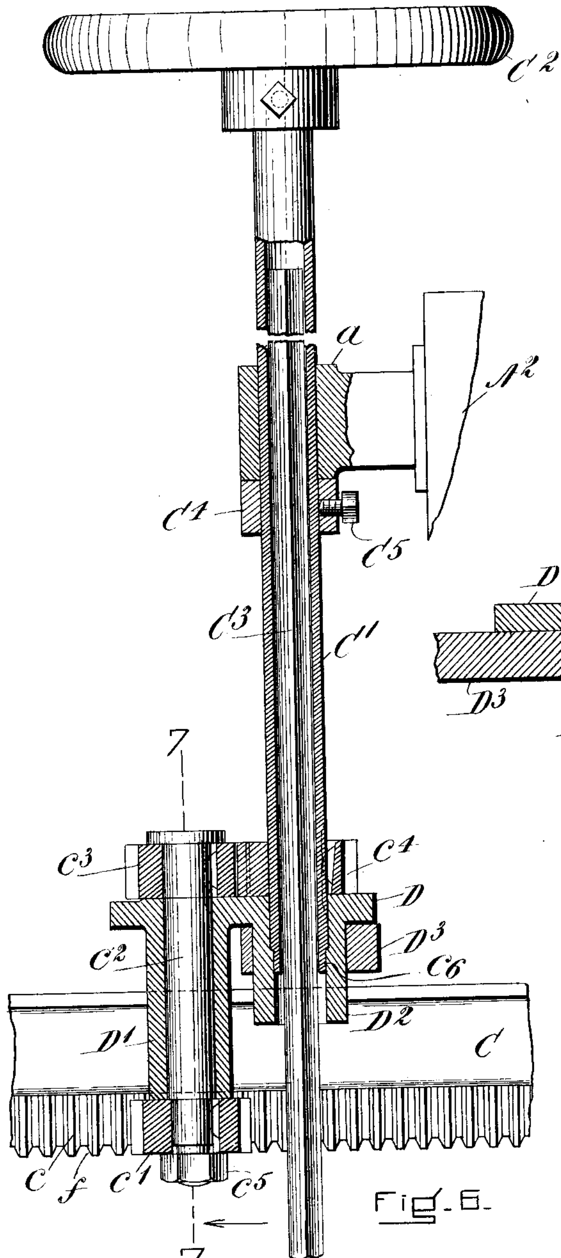


Fig. 6.

Fig. 9.

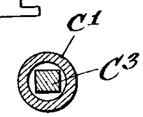
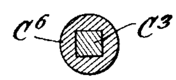


Fig. 10.



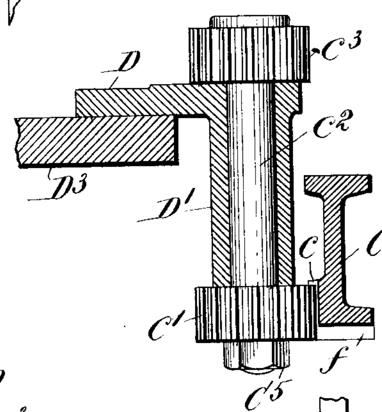


Fig. 7.

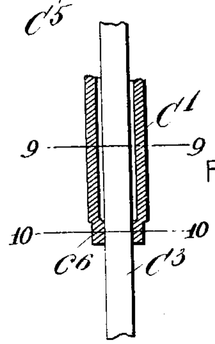


Fig. 8.

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UNITED STATES PATENT OFFICE.

EDMUND E. BLAKE, OF SACO, AND WILLIAM H. GOLDSMITH, JR., OF BIDDEFORD, MAINE, ASSIGNORS TO SACO-PETTEE COMPANY, OF NEWTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

BELT-SHIFTER.

1,029,338. Specification of Letters Patent. Patented June 11, 1912.

Application filed December 17, 1909. Serial No. 533,511.

To all whom it may concern:

Be it known that we, EDMUND E. BLAKE, of Saco, in the county of York and State of Maine, and WILLIAM H. GOLDSMITH, Jr., of Biddeford, in said county and State, both citizens of the United States, have invented certain new and useful Improvements in Belt-Shifters, of which the following is a specification.

Our invention relates to the mechanism for stopping the frame automatically and resetting the parts, and will be understood by reference to the drawings in which the best form of our invention known to us is shown in connection with enough other parts of the roving frame to show the utility of our invention.

Figure 1 is an elevation of so much of a roving frame as embodies our invention, its location with relation to the cone pulleys being indicated. Fig. 2 is an enlarged plan view of the rack-operating mechanism, the rack being moved and a portion of the frame, being a section on the line 2—2 of Fig. 1. Fig. 3 is a section on line 3—3 of Fig. 1. Fig. 4 is a section on line 4—4 of Fig. 1. Fig. 5 is a section through the clutch and showing the operation of the stop motion. Fig. 6 is a section showing the telescoping driver construction on line 6—6 of Fig. 2. Fig. 7 is a section on line 7—7 of Fig. 6, and Fig. 8 is a detail of the telescoping driver connection. Fig. 9 is a section on line 9—9 of Fig. 8. Fig. 10 is a section on line 10—10 of Fig. 8.

In the drawings:—A indicates one of the horizontal beams of the frame running lengthwise of the machine, A^1 being a bracket attached to the samson A^2.

B, B^1 are the concave and convex cone pulleys, respectively, b being the belt connecting them. Power is applied from the main shaft not shown to rotate the concave pulley in the usual manner and common to all roving frames.

C is the rack mounted as usual and carrying at one end the belt guide b^1 which engages and moves the belt b on the cone pulleys. The rack C has as usual teeth c to engage with the pinion c^1 forming part of the usual driver. The pinion c^1 is keyed to the lower end of a stud c^2 to the upper end of which is keyed a pinion c^3 in mesh with a pinion c^4 keyed to a hollow shaft C^1 carrying at its upper end the hand wheel C^2.

The stud c^2 is headed at its top and threaded at its lower end to receive the nut c^5. D is a plate, from which depends a bearing D^1 for the stud c^2 and which incloses the stud between the pinion c^3 which rests on the plate D, and the pinion c^1 which is held against the end of the bearing D^1 by the nut c^5. The plate D also carries a bearing D^2 for the hollow shaft C^1. This shaft is reduced in external diameter somewhat at its lower end as at c^6 so that a shoulder is formed which rests upon a corresponding shoulder in the bearing D^2. The plate D and bearings D^1 and D^2 form a housing to protect the moving parts from lint and fly which otherwise would stick to them. The plate D is adjustably mounted on the plate D^3 which is supported from the bracket D^4 attached to the bracket A^1. For this purpose the plate D is slotted as at d and a screw d^1 attached to the plate D^3 passes up through the solt d. A nut d^2 clamps the plate D in place.

Within the hollow shaft C^1 is the usual square rod C^3 which terminates in the right and left handed screw by which the usual taper wind is given to the bobbins. This taper winding mechanism *per se* is of the ordinary character and hence need not be described. Its location and character are sufficiently indicated in the drawing. The square rod is turned to re-set the taper motion simultaneously with the re-setting of the rack and the belt on the cone pulley by means of the hand wheel. Where the lower end of the hollow shaft is reduced in diameter as at c^6 its interior is squared to fit the square rod C^3 so that the turning of the hand wheel will turn the square rod and the parts connected with it. This allows the square rod to telescope inside the hollow shaft as the rail (not shown) lifts. The hollow shaft serves to protect the square rod from dust. The upper end of the hollow shaft sets in a bearing a mounted on the samson A^2 and carries a collar C^4 attached to it by a set screw C^5 to limit its upward movement as the shoulder in the bearing D^2 limits its downward movement.

Suitably supported by the samson A^2 or other part of the framework is the usual

taper winding mechanism including a taper-motion head L upon which are slidably mounted jaws L^1 and L^2 coöperating with a tumbling dog M on the shaft E hereinafter described. The jaws L^1 and L^2 are automatically adjusted relative to one another, to release the dog M at progressively shorter intervals, by a right and left screw L^3. This mechanism is well known in the art and will require no further description. In the present instance, however, the taper-motion screw L^3 is formed upon an extension of the shaft C^3 instead of upon a separate shaft, thereby simplifying the machine and greatly facilitating the resetting of the taper mechanism simultaneously with the return of the rack.

The above mechanism relates to the resetting of the rack C and the taper mechanism after the machine has stopped for doffing. The stop motion will now be described.

At the end of the shaft B^2 carrying the cone pulley B is a bevel gear b in mesh with the usual bevel gear e on the tumbler shaft E supported in bearings in the plate D^3. The tumbler shaft E carries a worm E^1 which engages a worm gear E^2. This worm gear has a hub E^3 and is mounted on a sleeve E^4 to which it is attached by a set screw E^5. The sleeve E^4 is free to turn on the shaft E^6 one end of which is supported in the bracket A^1 and the other in the bracket D^4. It is kept from rotation by the set screw D^5. The sleeve E^4 has at its farther end one member E^7 of a clutch, the other member E^8 of which has a hub E^9 loose on the shaft E^6 and free to turn thereon. By this means power applied to the tumbler shaft E causes the rotation of the clutch member E^7 and also the clutch member E^8 and its connecting parts. These parts comprise the gear E^{10} keyed to the hub E^9 which gear is in mesh with the gear F on the stud F^1 which also carries the gear F^2 which is in mesh with the teeth f on the under edge of the rack C.

The clutch is of ordinary construction, each member having teeth which engage with teeth in the other member. Hence when these parts are engaged they communicate motion from the tumbler shaft to the rack C.

The clutch member E^7 is separated from the clutch member E^8 so as to stop the operation of the machine in the following manner: The rack C carries on its upper side a wedge piece or stop G. This piece engages the under beveled surface g of the turned down end of a slide rod or trigger G^1 which is mounted to slide in the samson A^2. This trigger has a shoulder g^1 which engages with a stop g^2 on the samson A^2 and is pivotally connected at g^3 to the shipper lever G^2 pivoted at g^4 to the frame A. The lower end of this lever G^2 has a projection G^3 which is pivotally connected by the link G^4 to the lever G^5 which is pivoted also to the frame A at g^5. It has a weighted arm G^6 which is normally horizontal, but which when the lever G is released from engagement with the stop g^2 drops, and through the link G^4 moves the shipper lever G^2 so that its upper end engages the lug h on the shipper rod H to unship the belt. This last mechanism is so well known in the art that it is neither shown nor otherwise described. This same action of the lever G^2 disengages the source of power from the rack in the following manner: The member E^7 of the clutch is mounted to slide on the shaft E^6 and its movements and position are controlled by the pin J on the bracket D^4. Fitting the space between the clutch member E^7 and the pinion E^2 is a cam J^1 having a groove j with which the end of the pin J engages. The pin being stationary, the turning of the cam withdraws the clutch member E^7 from engagement with the clutch member E^8 or causes the engagement of these members according to the direction in which the cam is turned.

The cam is operated by a slotted arm J^2 in the slot of which runs the pin j^1 carried by the lower end of the lever G^2. Thus when the arm G^1 has been released and the weighted lever G^5 has fallen and pulled over the lever G^2, the arm J^2 is also moved to turn the cam J^1 on its pin j and withdraws the clutch member E^7 from engagement with the member E^8 so that the parts operated from the pinion E^2 become inoperative.

The stud F^1 in which are the gears F and F^2 is adjustably mounted in a slot k on the end of an arm K which is an extension on the bracket A^1, being clamped in place by the nut k^1 at one end, its other end being enlarged to bear against the farther side of the arm K. A handle lever K^1 free to turn on the shaft E^6 and through which the stud F^1 passes, serves as a means of holding up the stud F^1 and its gears while any adjustment is being made.

The operation of these parts is as follows: As the rack C is moved to the left (see Fig. 1) by means of the gear F^2, which is operated from the cone pulley B through the shaft E and clutch E^7, E^8, and the various intermediate connections, the bobbins gradually are filled. This gradual movement shifts the belt b along the cone pulleys, thus controlling the speed of the bobbins. Fig. 1 shows the rack in substantially its extreme left-hand position. As the wedge piece G engages the surface g of the end of the slide rod or trigger G^1 it lifts the trigger, disengaging its shoulder g^1 from the stop g^2, thus releasing the weighted arm G^6 which drops, and by means of the link G^4 operates the lever G^2 and throws the shipper rod H to ship the main belt from the fast

to the loose pulley. At the same time the pin j^1 carried by the extension of the lever G^2 operates the slotted arm J^2 to turn the cam J^1 so that the pin j causes it to withdraw the clutch member E^7 from the member E^8 and so disengages the operating mechanism from connection with the fast pulley. The full bobbins being replaced by empty bobbins, the rack is returned by turning the hand wheel C^2 and the trigger G^1 is reset against the stop g^2, thus bringing the weighted arm G^6 into operative position and resetting the clutch. The machine is ready for starting up. The shipper rod H is then moved to throw the belt from the loose to the fast pulley and the machine starts up.

It will be noted during the rise and fall of the bolster and step rail the square rod telescopes in the hollow shaft C^1.

We have shown our mechanism applied to a roving frame, but it is evident that it is equally applicable to other machines of a kindred nature; in fact it will be apparent to those skilled in the art that certain of its features will be very useful elsewhere. It is of course clear that so far as its sliding relation with the worm shaft is concerned the rod C^3 described as "square" need only be angular in cross section where it slides into the hollow shaft, or provided with a feather which will allow the two to move longitudinally with relation to each other, but will require them to turn together. The adjustment of the plate D is desirable to compensate for wear and the adjustment of the stud F^1 may also be utilized when it is desired to change the speed of the rack by using gear of different diameter therewith.

What we claim as our invention is:—

1. In a machine of the kind described, a rack and a taper winding mechanism, automatic operating means for said rack, means for disconnecting said operating means, and manually operated means connected with both said rack and said taper winding mechanism for simultaneously resetting the same.

2. In a machine of the kind described, a rack and a taper winding mechanism, means for setting said rack and means for setting said taper winding mechanism, said means comprising a hollow shaft and means for turning it, and a rod slidable in said shaft and rotatable therewith.

3. In a machine of the kind described, a driver connection comprising a hollow shaft, a hand wheel mounted thereon, a gear mechanism also mounted on said shaft, a belt shifter comprising a rack engaging said gear mechanism, in combination with a rod slidable in said hollow shaft, and rotatable therewith, and a taper winding mechanism connected to said rod to be operated thereby whereby the rotation of said hand wheel and said shaft will move the said belt shifter and said taper mechanism.

4. In a machine of the kind described, a driver connection comprising a hollow shaft, a hand wheel mounted thereon, a gear mechanism also mounted on said shaft, a belt shifter comprising a rack engaging said gear mechanism, in combination with a rod angular in cross section slidable in said hollow shaft and rotatable therewith, and a taper winding mechanism connected to said rod to be operated thereby whereby the rotation of said hand wheel and said shaft will move the said belt shifter and said taper mechanism to re-set said parts after the bobbins have been wound.

5. In a machine of the character specified, a driver connection comprising a hollow shaft, a hand wheel mounted thereon, a gear mechanism also mounted on said shaft, a belt shifter comprising a rack engaging said gear mechanism, in combination with a rod slidable in said hollow shaft and rotatable therewith, and a taper winding mechanism connected to said rod to be operated thereby whereby the rotation of said hand wheel and said shaft will move said belt shifter and said taper mechanism simultaneously, said rack having two sets of rack teeth, means connecting said hollow shaft with one of the sets of said rack teeth whereby said rack may be operated by hand in one direction, and means engaging the other set of rack teeth whereby said rack will be moved automatically in the other direction.

6. In a machine of the kind described, a hollow hand operated shaft, a pinion mounted thereon, a rack, a stud, a pinion mounted at one end of said stud in mesh with said rack, a pinion mounted at the other end of said rack in mesh with the pinion on said hand operated shaft, and means for supporting said shaft and said stud, said means comprising a plate having a tubular bearing for said stud, and a tubular bearing having a shoulder to support said shaft, in combination with a rod slidable in said shaft and rotatable therewith passing down through said shaft bearing and a taper winding mechanism connected thereto.

7. In a machine of the character specified, a plate having bearings, a stud mounted in one of said bearings, two pinions one mounted at each end of said stud, a hollow shaft stepped in another of the bearings in said plate, a pinion on said hollow shaft connected to one of the gears on said stud, a rod slidable in said hollow shaft and adapted to be rotated thereby, and a taper winding mechanism connected to said rod adapted to be operated thereby, in combination with a rack engaging the other gear on said stud, a hand wheel mounted on said hollow shaft whereby said stud may be turned to move the rack in one direction, and at the same

time re-set the taper mechanism, and means for operating the rack in the other direction.

8. In a machine of the kind described, a rack and means for driving it in one direction, comprising a worm, a shaft, a worm gear mounted on said shaft, a gear engaging said rack and intermediate gears between said worm gear and said rack-engaging gear, a clutch mounted on said shaft, and means operated by said rack to disengage said clutch, in combination with separate means operated by hand for moving said rack in the opposite direction.

9. In a machine of the kind described, cone pulleys, a belt connecting said pulleys, a belt shifter to move said belt and means for operating said belt shifter comprising a rack bar having teeth on two adjacent faces thereof, means for engaging said teeth on one face thereof whereby said bar is moved in one direction comprising a hand operated shaft and a pinion mounted thereon, and means engaging the other set of teeth whereby said rack bar will be moved in the opposite direction comprising a shaft, a gear mounted thereon and engaging said other set of teeth, a shaft parallel with said last-named shaft, a clutch carried by said parallel shaft and means for operating said clutch comprising a worm gear mounted to turn one member thereof, a worm and means for connecting said worm with one of said cone pulleys.

10. In a machine of the kind described, a belt shifting mechanism and means for operating it comprising a rack bar having teeth on two adjacent faces thereof, means engaging one set of teeth comprising a hand wheel whereby the rack bar and belt shifter may be moved in one direction by hand, and means engaging the other set of rack teeth to move said rack bar in the other direction, said means comprising a horizontal shaft, a gear thereon, a second horizontal shaft, a clutch on said shaft, and a worm gear also on said shaft, in combination with a vertical shaft having a worm engaging said worm gear, and means for rotating said vertical shaft.

11. In a machine of the character specified, in combination, a rack bar carrying a rack, mechanism including a clutch for operating said rack, and means for separating the members of said clutch comprising a rotatable cam, a stationary pin and means connecting said cam and said rack whereby when said rack has reached a predetermined point said pin will cause said cam to separate said clutch members and means for returning said rack bar operable upon the disengagement of said clutch.

12. In a machine of the character specified, in combination, a rack bar carrying a rack, mechanism including a clutch for operating said rack, and means for separating the members of said clutch comprising a rotatable cam, a stationary pin connected thereto and means for rotating said cam comprising a weighted lever, means for normally holding it out of action, and means operated by said rack whereby said weighted lever is released to operate said cam, said rack bar carrying a second rack and means engaging said second rack whereby after said weighted lever has been operated said rack bar may return to its original position.

13. In a machine of the character specified, in combination, a rack, mechanism including a clutch for operating said rack, and means for separating the members of said clutch comprising a rotatable cam, a stationary pin and means for rotating said cam comprising an arm connected to said cam, a lever connected to said arm and means for operating said lever normally out of action, and means connecting said lever and said rack whereby when said rack has reached a predetermined point said lever-operating mechanism will be brought into action, and separate means for returning said rack after the disengagement of said clutch.

14. In a machine of the character specified, a rack having teeth on two adjacent sides thereof, means engaging one set of teeth and operated by power whereby said rack will be caused to travel in one direction, means controlled by said rack for disconnecting said engaging means from its source of power, and means engaging the other set of teeth and comprising a shaft and a hand wheel carried by said shaft whereby said rack may be returned to its starting position.

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