A. E. RHOADES.

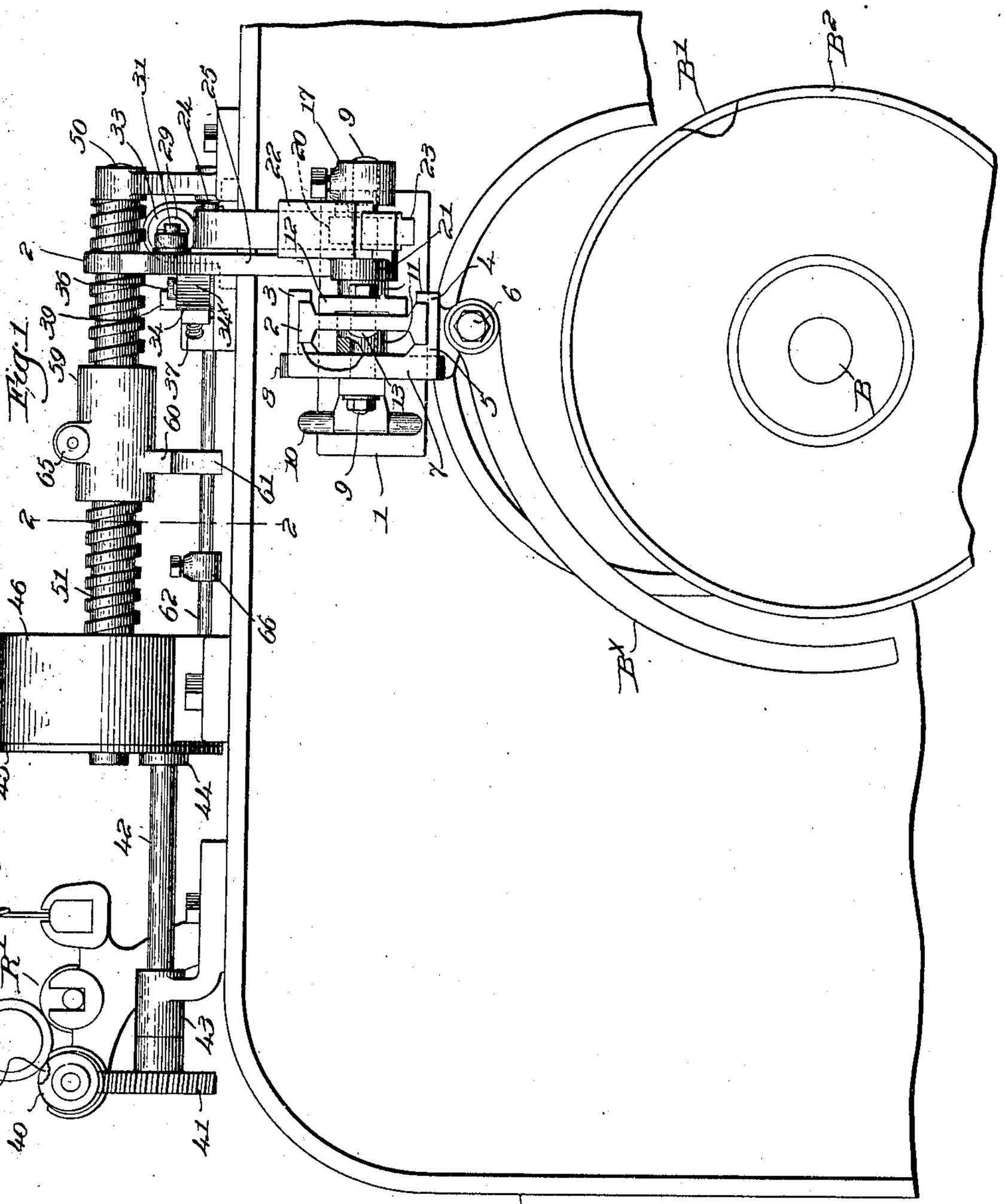
STOP MOTION AND MEASURING MECHANISM FOR TWISTERS.

APPLICATION FILED SEPT. 22, 1908.

918,473.

Patented Apr. 13, 1909.

2 SHEETS—SHEET 1.



Witnesses,
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2 SHEETS—SHEET 2.

Fig: 7.

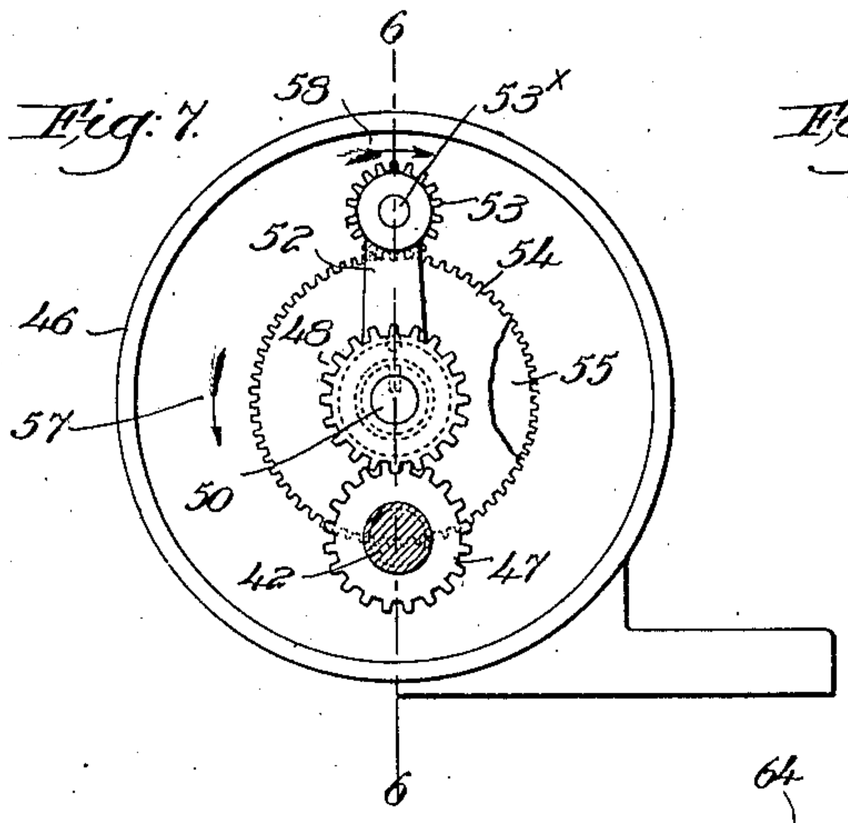


Fig: 6.

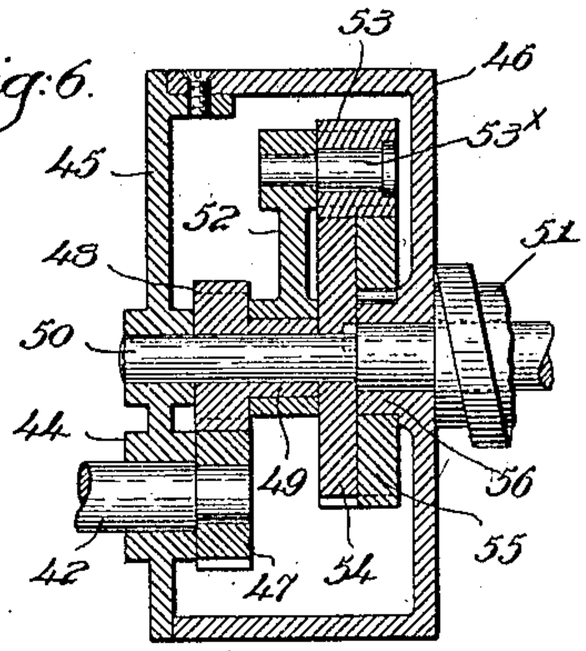


Fig: 2.

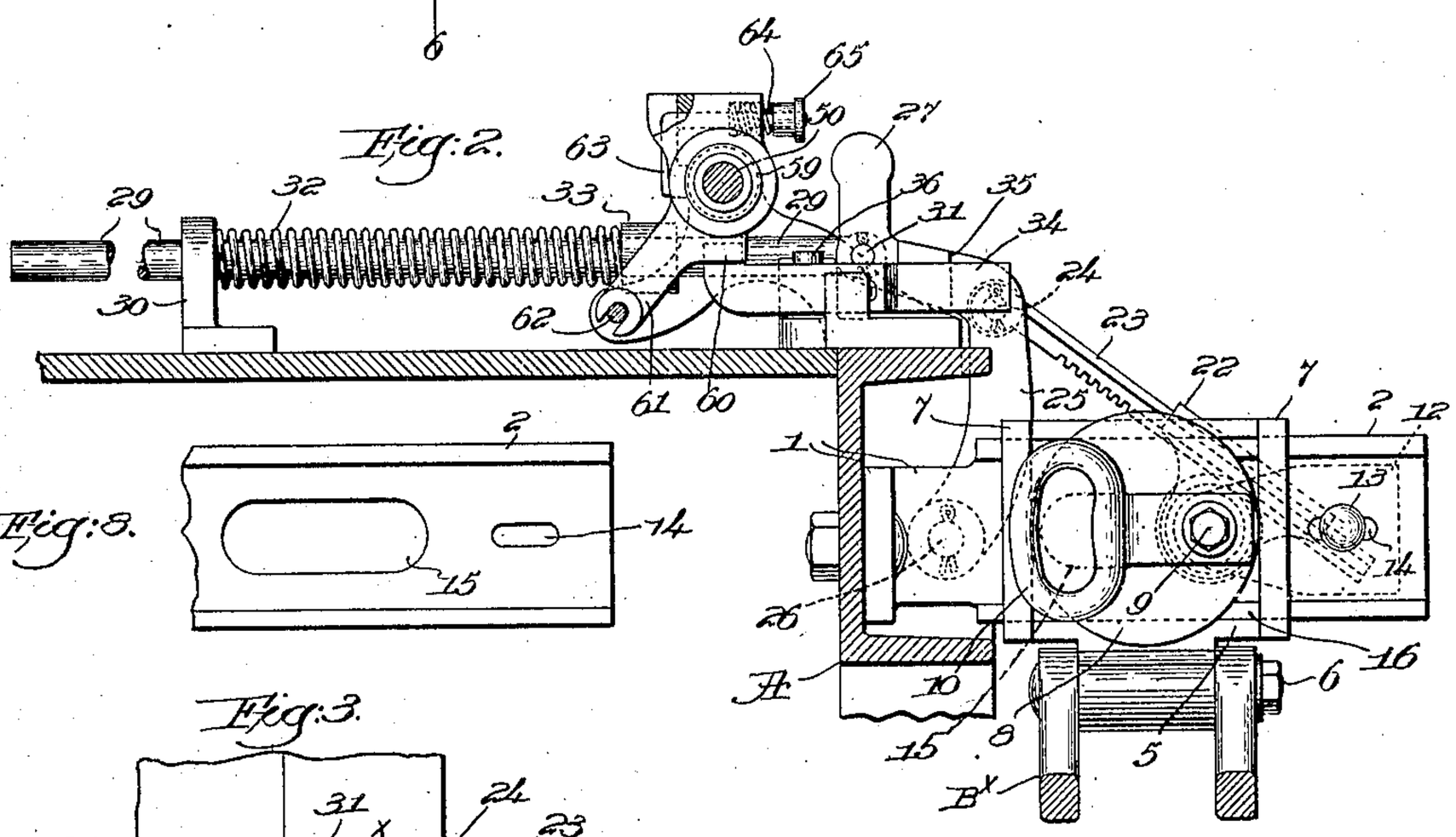


Fig: 8.

Fig: 3.

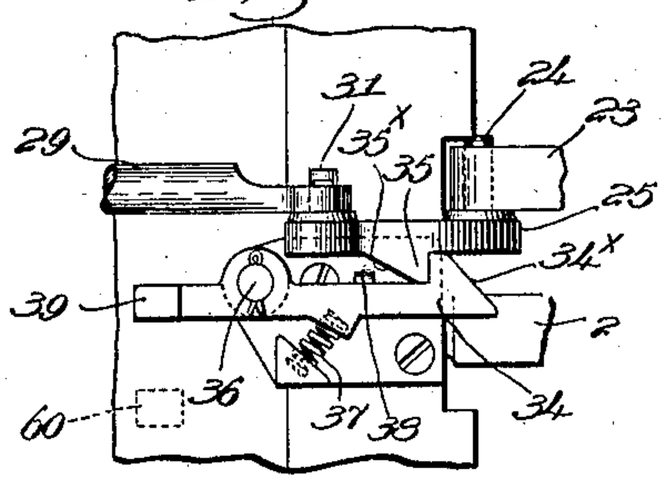


Fig: 4.

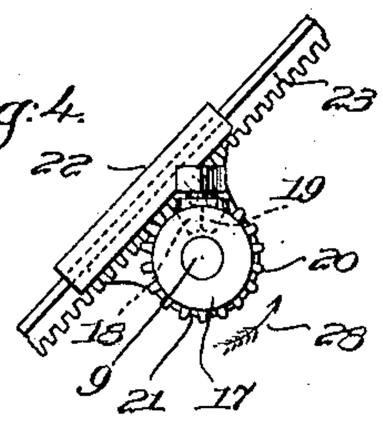
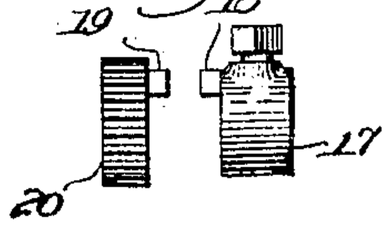


Fig: 5.



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UNITED STATES PATENT OFFICE.

ALONZO E. RHOADES, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

STOP-MOTION AND MEASURING MECHANISM FOR TWISTERS.

No. 918,473. Specification of Letters Patent. Patented April 13, 1909.

Application filed September 22, 1908. Serial No. 454,158.

To all whom it may concern:

Be it known that I, ALONZO E. RHOADES, a citizen of the United States, and resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Stop-Motion and Measuring Mechanism for Twisters, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention has for its object the production of a novel stop-motion and measuring mechanism particularly adapted for use in twisters or similar apparatus, whereby when a predetermined length of yarn has passed through the rolls of the twister the stop-motion is rendered operative automatically to stop the machine.

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 an end elevation of a sufficient portion of a twister to be understood, taken at the belt-shipping end, with one embodiment of my invention; Fig. 2 is a transverse sectional detail on the line 2—2, Fig. 1, looking toward the right, showing more clearly the means for shifting the power belt and certain portions of the controlling mechanism coöperating therewith; Fig. 3 is a top plan view of the means by which the belt-shifter is locked in running position; Fig. 4 is a rear elevation of the rack and pinion connection between the belt-shifter and the controlling mechanism; Fig. 5 is a detail to be hereinafter referred to; Fig. 6 is an enlarged vertical section, on the line 6—6, Fig. 7, of the measuring mechanism by or through which the twister is stopped automatically when a predetermined length of yarn has passed through the rolls; Fig. 7 is a left hand side elevation of the mechanism shown in Fig. 6, the cover of the casing being omitted; Fig. 8 is a detail in front elevation of a portion of the guide for the carriage on which the belt-shifter is mounted.

Referring to Fig. 1 the end frame A, driving shaft B having fast and loose pulleys B′, B^2 thereon; the belt-shifter or fork $B^\times$ by means of which the power belt (not shown) is shifted from one to the other pulley; the rolls R, R′, and the yarn-guides $R^\times$, may be and are all of well known construction in twisting machines and operate in the usual manner.

In the present embodiment of my invention a guide, shown as a bracket 1 having an extension 2 projecting horizontally above the driving shaft B, is rigidly bolted to the end frame A, the extension being shown in Fig. 1 as substantially an I-beam and constituting a guide for the coöperating head and foot portions 3, 4 of a longitudinally slidable carriage 5 to the bottom of which the fork or belt-shifter $B^\times$ is secured at 6. Parallel upright lips 7 are formed on the front face of the carriage, to receive between them and coöperate with a shifting disk 8 rigidly secured to a horizontal shaft 9 extended eccentrically through the disk and having fixed to its front end a handle 10, best shown in Fig. 2. Said shaft is rotatably mounted in a hub 11 oppositely extended from a plate 12 adjustably clamped on the back of the guide 2 by a bolt 13 passed through a longitudinal slot 14 in said guide, the latter having another and larger slot 15, Fig. 8, through which the forward end of the hub 11 passes. The carriage is open between its head and foot portions 3, 4 and between the upright lips 7, such opening 16 being shown in Fig. 2 as rectangular, the front end of the hub 11 projecting through the opening, so that there is no obstruction to the in and out movement of the carriage when shifting the belt. Viewing Fig. 2 it will be manifest that if the handle 10 is swung upward and to the right through 180° the disk 8 will be given a half revolution and the carriage 5 will be moved to the right to shift the fork $B^\times$ from running to stopping position.

The rear end of the shaft 9 has fast upon it a collar 17 provided on its inner face with a lug 18, see Fig. 5, and dotted lines Fig. 4, the lug being adapted to coöperate at times with a corresponding lug 19 on a pinion 20 mounted loosely on the shaft 9 between the collar and the hub 21 of a rack-guide 22. As the hub 21 is loosely mounted on the shaft the rack-guide can move angularly or rock upon the shaft as a fulcrum, as will be apparent. A rack 23 is longitudinally movable in the said guide and is by it held in mesh with the pinion 20, so that the latter will be rotated by longitudinal movement of the rack, the upper end of which is pivotally connected at 24 with a setting

member, shown as an upturned and bent arm 25 fulcrumed at 26 on the bracket 1 and provided with a suitable handle 27 conveniently accessible by the attendant. Movement of the setting member on its fulcrum 26 will move the rack 23 and thereby effect rotation of the pinion 20, and it will be seen that if said member 25 is moved from the position shown in Fig. 2 the pinion will be rotated in the direction of arrow 28, Fig. 4. The lug 19 then coöperates with the lug 18 on the collar 17, and as the latter is fast on the shaft 9 such shaft will be turned in the same direction as the pinion, to give a half revolution to the shifting disk 8 and thereby cause the belt to be shifted from the fast to the loose pulley. I have provided a spring-operated actuator to effect this shifting automatically, said actuator being shown as a slide-rod 29 mounted in a support 30 on the top of the twister frame and pivotally connected at its outer end, at 31, with the setting member 25, a strong spring 32 being coiled about the slide-rod between the support 30 and a collar 33 fast on the rod, see Fig. 2.

The spring is compressed when the apparatus is running, and is so maintained by the engagement of a latch 34, see Fig. 3, with a shoulder or keeper 35 on the side of the setting member 25, the latch being pivoted on an upright stud 36 and held in operative position by a spring 37. The locking faces of the latch and keeper are at right angles to the path of movement of the setting member, and said parts are beveled, as at $34^{\times}$, $35^{\times}$, Fig. 3, so that when the member 25 is moved to running position the latch will snap into locking position.

If the parts are in the position shown in Figs. 2 and 3 movement of the latch to release the setting member frees the compressed spring 32 and as it expands it moves the slide-rod 29 to the right, Fig. 2, and throws the setting member 25 forward, so that the rack and pinion operate as described to revolve the shifting member or disk 8 and thereby cause the fork $B^{\times}$ to change the belt from the fast to the loose pulley, stopping the machine. Movement of the latch due to the spring 37 is limited by a stop 38, Fig. 3.

The inner end of the latch is upturned at 39, to coöperate with the means for releasing the setting member at the proper time, but before describing the releasing means I will state that when the twister is at rest the actuator is preferably set into operative condition by the setting member 25, and then the shifting disk is revolved by the handle 10. That is, the attendant grasps the handle 27 and swings the setting member 25 into the position shown in Fig. 2, thereby compressing the operating spring of the actuator 29, and the latch 34 locks the parts automatically when so set, the compression of the spring 32 being thereby effected with comparative ease. Such movement of the member 25 causes the rack to turn the pinion 20 opposite to the arrow 28, Fig. 4, and hence the lug 19 moves away from lug 20, so that the shifting shaft 9 remains quiescent, but said shaft is thereafter turned by movement of the handle 10 to operative position, shown in Fig. 2, moving the fork-carriage 5 into running position. To compress the spring by turning the shaft 9 with the handle 10 would make it hard to start the twister, as will be manifest, but by first setting the mechanism and then shifting the belt the starting operation is effected easily. Should the attendant wish to stop the apparatus manually he can do so by swinging the handle 10 through 180° from the position shown in Fig. 2, the setting member, rack and pinion, and the actuator 29 remaining in the position shown. Thus the stop-motion can be brought into operation automatically or manually, and under normal conditions the stopping of the apparatus will be effected automatically.

I will now describe the means for causing the operation of the stop-motion when a predetermined length of yarn has passed through the rolls. The front roll R, Fig. 1, has an attached worm 40 meshing with a worm-gear 41 fast on a shaft 42 having a bearing at 43 and extended through a bearing boss 44 in the cover plate 45 of a substantially circular casing 46 fixedly mounted on the top of the main frame. Within the casing the end of shaft 42 has fast upon it a pinion 47 meshing with a like pinion 48 having a long hub 49, Fig. 6, and loosely mounted on the reduced end of a rotatable shaft 50 having a spirally threaded sleeve 51 fixed thereon outside the casing and extending above and at right angles to the actuator 29. A radial arm 52 fast on the hub 49 carries a wide faced, rotatable pinion 53 which has a planetary motion, said pinion meshing with two gears 54, 55, the former fast on the shaft 50 and the latter being pinned or otherwise secured to a boss 56 on the back of the casing.

In practice the pinions 47 and 48 have twenty teeth each, and the planetary pinion 53 has eighteen teeth, while the fixed gear 55 has sixty-three teeth and the rotatable gear 54 has one tooth more, said gears thus being differential gears.

The shaft 42 is rotated at a very low speed from the front roll R, and the pinion 53 will be revolved bodily about the shaft 50 through the intermediate pinions 47, 48 and as the planetary pinion meshes with both the fast and loose differential gears the loose gear 54 will be moved one tooth for each bodily revolution of the pinion 53 and in the direction of arrow 57, Fig. 7. The pinion 53,

having eighteen teeth, will make three and one-half revolutions on its own axis 53× for each complete revolution of the pinion 48, as the fast gear 55 has sixty-three teeth, but as the loose differential gear has sixty-four teeth it will move an angular distance equal to one tooth, and opposite to the direction of bodily revolution of the pinion 53, which is indicated in Fig. 7 by arrow 58.

As will be apparent the rotation of the threaded sleeve 51 is very slow, and each turn of the thread is equal to a certain number of yards of yarn passed through the rolls, so that the length of the movement of a follower governed by the threaded sleeve will be equivalent to a fixed number of yards of yarn, the follower being utilized to effect the operation of the stop-motion.

The follower is shown herein as a cylindrical body 59 embracing the threaded sleeve 51 and having a depending abutment 60 and a leg 61 forked at its end, Fig. 2, to loosely embrace a fixed guide-rod 62 and prevent rotative movement of the body, the latter having a thread-engaging finger 63 normally held by a spring 64 in engagement with the screw-thread. By pushing in the head 65 the finger is thrown out and then the follower can be moved freely longitudinally along the threaded sleeve 51 to any desired starting point, an adjustable stop 66 on the guide-rod 62 being arranged to engage the leg 61 and thereby provide a fixed starting point for the follower.

When the follower has been set at the desired starting point the machine is started and the rotation of the threaded sleeve 51 gradually moves the follower to the right, Fig. 1, until finally the abutment 60 engages the upturned end 39 of the latch 34 and turns it on its pivot into inoperative position, disengaging it from the locking shoulder 35. This releases the setting member 25 and the spring-operated actuator 29 is free to act, throwing the member 25 to the right, Fig. 2, and the rack and pinion operate to turn the shaft 9 and the disk 8, shifting the belt-fork B× from running to stopping position.

The farther away from the latch the stop 66 is set the longer will the machine run before it is stopped automatically, and consequently the greater the length of yarn which passes through the rolls, so that when the stop is once set for a certain number of yards all that is required of the attendant preparatory to starting up is to throw out the finger 63 and slide the follower to the left, Fig. 2, against the stop.

The follower is moved away from the locking latch, after stoppage of the machine, before the setting member 25 is returned to the position shown in Fig. 2, such return causing the latch to reëngage the shoulder 25 and lock said member, as described.

The latch is released by a speed-reducing mechanism which is also a measuring mechanism, as will be obvious, said mechanism being driven positively from the front roll.

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

1. In a twister or the like, a stop-motion, including a belt-shifter, a spring-operated actuator to effect the operation of the stop-motion, a locking device to retain the actuator inoperative, and measuring mechanism, including a longitudinally movable abutment, to directly engage and move the locking device to release the actuator from the control of the locking device when a predetermined length of yarn has been acted upon.

2. In a twister or the like, a belt-shifter shifting means therefor including a pivoted, setting member manually movable into operative position independently of the belt-shifter, a spring-operated actuator directly connected with said member, to move it from operative position automatically, a latch to coöperate with the latter and hold it in running position, and mechanism to trip the latch automatically when a predetermined length of yarn has been acted upon.

3. In apparatus of the class described, a belt-shifter, a carriage on which it is mounted, a rotatable, eccentrically mounted disk coöperating with and to move the carriage back and forth, a swinging setting member operatively connected with and to rotate the shaft, spring-operated means to swing said member and shift the belt-shifter to stopping position, means to lock the setting member against the action of said spring-operated means, and mechanism to unlock the setting member automatically at a predetermined time.

4. In a twister or the like, a belt-shifter, shifting means therefor including a pivoted setting member, a spring-operated actuator for said member, a latch to coöperate with the latter and hold it in running position, mechanism, including a longitudinally movable abutment to engage and trip the latch automatically at a predetermined time, and a device to vary the time at which said abutment is to act.

5. The combination, in a twister, of measuring mechanism driven from the front roll, said mechanism including a longitudinally movable abutment, a stop-motion, a spring-operated actuator to effect the operation thereof, and a locking device to maintain the actuator inactive, the abutment coöperating with said locking device at a predetermined time and automatically releasing the actuator.

6. The combination, in a twister, of measuring mechanism driven from the front roll, said mechanism including a rotating threaded sleeve, a follower moved longitudinally

thereby and provided with an abutment, a locking latch in the path of the abutment and rendered inoperative by the same, a stop-motion, a swinging member operatively connected therewith and held locked by the latch when the apparatus is running, and a spring-operated actuator to move said member and thereby effect the operation of the stop-motion when the latch is rendered inoperative.

7. The combination, in a twister, of measuring mechanism driven from the front roll, said mechanism including a rotating threaded sleeve, a follower moved longitudinally thereby and provided with an abutment, a locking latch in the path of the abutment and rendered inoperative by the same, a stop-motion, a swinging member operatively connected therewith and held locked by the latch when the apparatus is running, a spring-operated actuator to move said member and effect the operation of the stop-motion when the latch is rendered inoperative, and an adjustable stop to determine the starting point of the follower.

8. The combination, in a twister, of measuring mechanism driven from the front roll, said mechanism including a rotating threaded sleeve, a follower moved longitudinally thereby and provided with an abutment, a locking latch in the path of the abutment and rendered inoperative by the same, a stop-motion, a swinging member operatively connected therewith and held locked by the latch when the apparatus is running, a spring-operated actuator to move said member and effect the operation of the stop-motion when the latch is rendered inoperative, and a manually operated device to release the follower from the threaded sleeve and permit ready movement of the follower to the starting point of its path of travel.

9. In apparatus of the class described, a carriage provided with a belt-shifter, a rotatable shaft having an eccentrically attached disk coöperating with and to shift the carriage, a handle fixedly attached to the shaft to rotate the same, a pivoted setting member, a spring-operated actuator therefor, a rack and pinion connection between said member and the shaft, to operatively rotate the latter when the setting member is swung by operation of its actuator, and means whereby return of the setting member to running position is ineffective with respect to the shaft.

10. In apparatus of the class described, belt-shifting means, including a rotatable shaft, means to rotate it manually to running or stopping position, a pivoted setting member, a spring-operated actuator to move it in one direction, connections between said member and the shaft to turn the latter to stopping position when the actuator swings the setting member, return movement of the latter having no effect on the shaft, a locking device for the setting member, to hold it against the operation of its actuator, and mechanism to release the locking device automatically at a predetermined time.

11. In apparatus of the class described, belt-shifting means, including an eccentrically mounted, rotatable shifting member, a handle to move it manually to running or stopping position, a spring-operated actuator, connections between it and the shifting member, to turn the latter to stopping position while permitting independent manual movement of said shifting member to starting position, a device to retain the actuator from operation, and mechanism to release the actuator automatically when a predetermined length of yarn has been acted upon.

12. In apparatus of the class described, belt-shifting means, including a rotatable shaft, means to rotate it manually to running or stopping position, a pivoted setting member, manually movable to running position, a spring-operated actuator to move said member to stopping position, connections between said setting member and the shaft to turn the latter to stopping position when the setting member is moved by its actuator, manual return of said member having no effect on the shaft, a device to lock said member in running position, and measuring mechanism to act upon said device and release the setting member automatically at a predetermined time.

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

ALONZO E. RHOADES.

Witnesses:

JESSE D. BROMLEY,

EDWARD DANA OSGOOD.