J. GOOD.

TENSION REGULATOR.

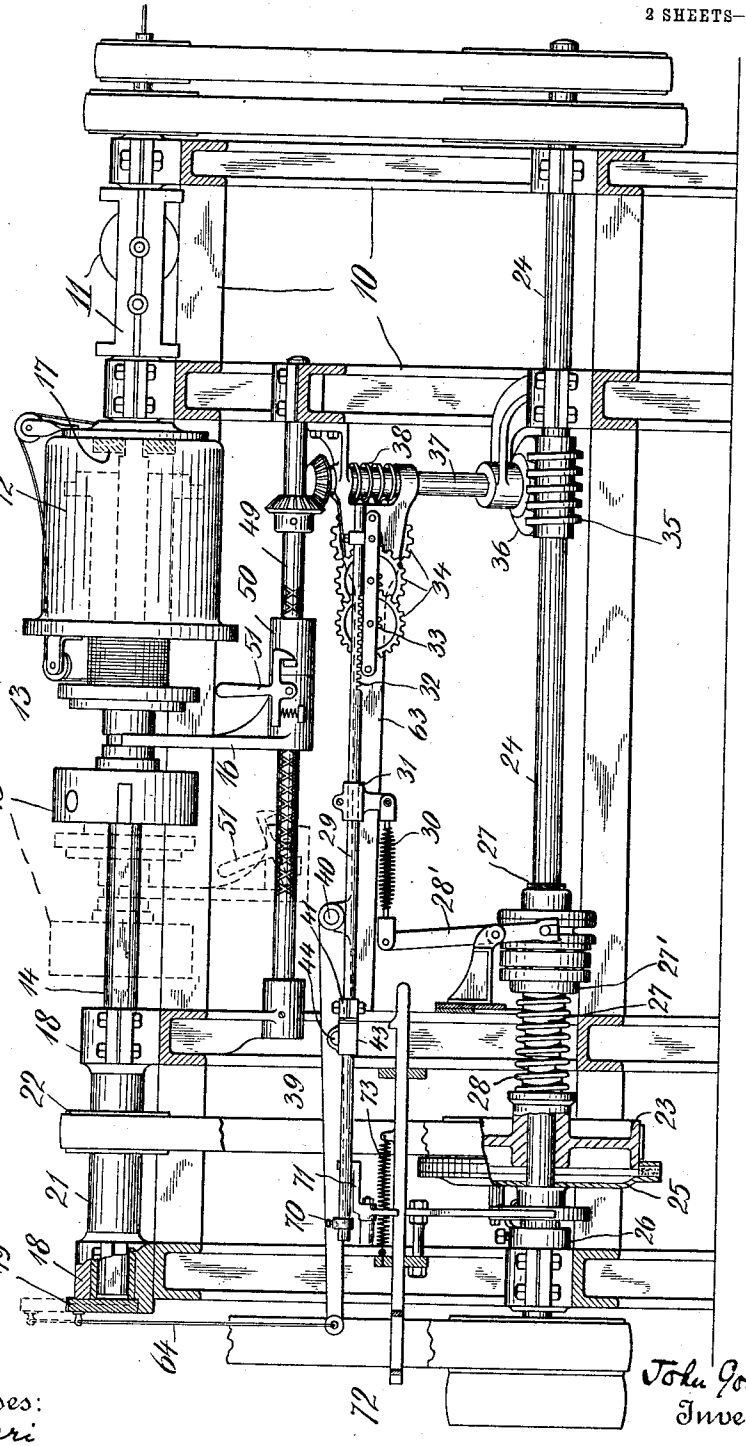
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1,109,580.

Patented Sept. 1, 1914.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

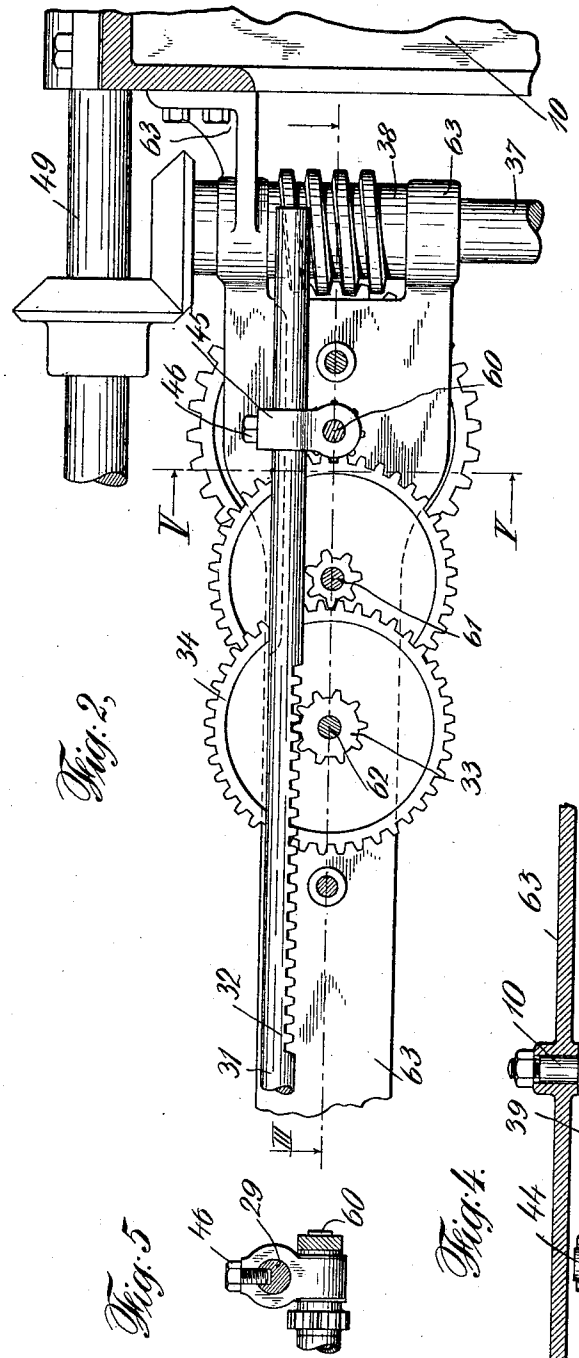


Fig. 2.

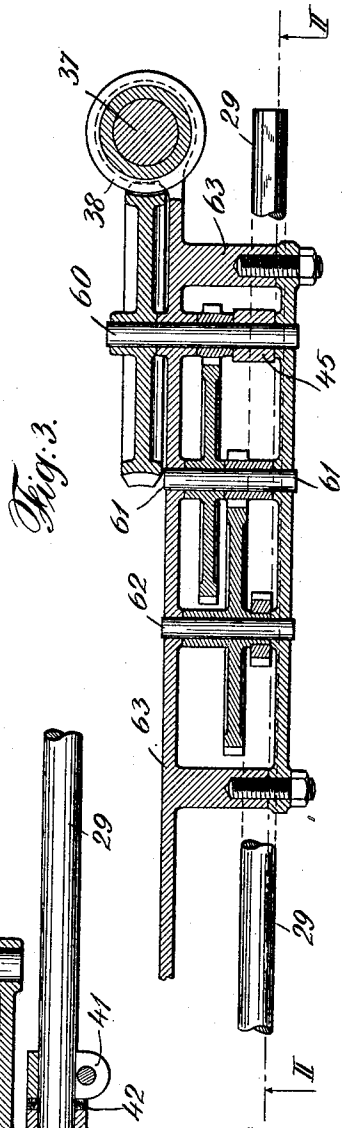


Fig. 3.

Fig. 5.

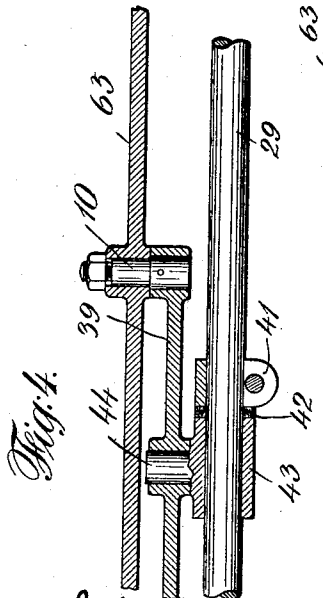


Fig. 4.

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JOHN GOOD, OF NEW YORK, N. Y.

TENSION-REGULATOR.

1,109,580. Specification of Letters Patent. Patented Sept. 1, 1914.

Application filed August 9, 1911. Serial No. 643,075.

To all whom it may concern:

Be it known that I, JOHN GOOD, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Tension-Regulators, of which the following is a full and true specification, as required by statute.

This invention is an improvement in tension regulators for long-line spinning or twisting machines and its object is to improve the construction and mode of operation of such regulators and more especially, to produce an automatic tension controlling device that will exert a variable, retarding effect on the bobbin, to produce substantially constant tension in the yarn being wound thereon, and that will be automatically shifted from its position of maximum retarding effect to that of minimum effect, by the operation of removing a full bobbin from the machine or replacing it with an empty one, and without attention by the operator.

In the drawings forming part hereof, Figure 1 is a vertical sectional view of a spinning machine embodying my invention. Fig. 2 is a fragmental sectional view along the line II—II of Fig. 3. Fig. 3 is a fragmental sectional view along the line III—III of Fig. 2. Fig. 4 is a fragmental sectional view along a continuation of the line III—III of Fig. 2. Fig. 5 is a fragmental sectional view along the line V—V of Fig. 2.

The machine illustrated as an embodiment of my invention includes a flier spindle mounted in the frame 10, and having a hauling-off device 11 and a can type of flier 12, over which the twisted or spun material passes and from which it is delivered to a spool or bobbin 13 mounted on a bobbin spindle 14 and attached to the head 15 thereon of any suitable construction.

The head 15 is splined, on the bobbin spindle 14, and is capable of being moved along the spindle by a traversing carriage 16, so as to build the convolutions of yarn on the bobbin in uniform layers. The spindle 14 is journaled at one end in a bearing 17, provided within the can flier 12, and at its other end it is supported in a rotary sleeve 21 in which it is suitably splined so that it can be moved lengthwise through the sleeve and also through the head for the purpose of disengaging it from its bearing 17, in order to remove a full bobbin and substitute an empty bobbin in its place. A gate or latch 19 of any suitable form is mounted on the outer bearing 18 of the sleeve 21 and is preferably adapted to confine the spindle against such lengthwise movement when it is in its operative position engaging the bearing 17, although for the purposes of this invention any suitable device moved or requiring to be moved, by the shifting of the bobbin spindle will be equally serviceable. Any suitable type of stop mechanism may be employed with the latch or device 19, which will prevent the machine from being started until the spindle is locked in place, such mechanism being omitted from the drawings, as forming no part of this invention.

The tension or retarding sleeve 21, journaled in and between the bearings 18, is provided with a pulley 22 belted to a friction pulley 23 loosely mounted upon the power shaft 24. The friction pulley 23 is provided with a radial friction flange to engage the annular cork-face of a friction disk 25 which is mounted on the power shaft and normally connected to rotate therewith by its connection with a collar 26 which is set-screwed to the shaft. The parts shown in the drawing as intervening between the friction disk 25 and collar 26, by which the two are connected, are parts of a stop-motion which is not claimed herein and it will be sufficient for the purposes of the present case to assume that the said disk is keyed or otherwise secured to the shaft, as in the case of the familiar long-line spinner.

The power shaft 24 is belted as usual to the flier spindle and also to the hauling-off tube in the usual manner and at an intermediate point in its length it is provided with a worm 35 for driving the traverse motion and the tension regulating device constituting the special subject of this invention.

The traverse carriage 16, by which the head 15 and the bobbin are traversed on the bobbin spindle, is mounted on a double pitch traverse screw 49, which is bevel-geared to an inclined counter-shaft 37, the latter being provided with a worm-wheel 36, and driven slowly by the worm 35 on the power shaft. The carriage 16 is free to

slide on the screw 49, but is provided with a latch or hook 51 by which it can be connected with the nut 50 of the shaft, to be thereby moved back and forth as the screw rotates. With this arrangement the bobbin can be manually shifted on the spindle 14 by releasing the latch 51 and sliding the carriage and head 15 on the shaft as indicated by the dotted lines of Fig. 1. Broken yarn can thus be repaired without releasing and shifting the bobbin spindle, or disturbing the retarding device or the position of the traverse screw 50.

During the operation of winding the yarn on to a bobbin, the yarn itself, as it leaves the flier revolves the head 15 and consequently the spindle 14, the retarding sleeve 21 and the friction pulley 23. The degree of tension in the yarn is determined by retarding the bobbin spindle which is accomplished by the friction of the pulley 23 upon the friction disk 25, and which for convenience I term herein the retarding device. The diameters of the pulleys 22 and 23 are so proportioned that the latter moves in the same direction at a higher angular velocity than the disk 25, driven by the shaft 24, so that the friction upon the disk acts as a brake upon the movement of the bobbin spindle.

In order that the tension of the yarn passing to the bobbin shall remain constant from the beginning of the winding operation to the end, it is necessary that the braking action on the bobbin be increased as the bobbin fills, because the pull of the yarn leaving the flier then becomes more effective, due to its increasing effective radius of action thereon. This increase is obtained by increasing the friction on the disk 25 at a rate corresponding to the increasing radius of the bobbin, for which purpose a sleeve 27 is loosely mounted on the power shaft 24 so as to be capable of being moved longitudinally toward and from the friction pulley 23 by means of a lever 28′ which is fulcrumed on a bracket mounted in a convenient position on the frame 10. A coil spring 28 surrounds the shaft 24 between the hub of the pulley 23 and a collar or enlargement 27′ of the sleeve 27, in a position to impart the thrust of the sleeve to the pulley. The lever 28′ is actuated by a slide rod 29 through the agency of a coiled spring 30, one end of which is secured to the lever and the other end to a collar 31 which is rigidly and also adjustably mounted on the rod. Rack teeth 32 are provided near one end of the rod 29, adapted to engage a pinion 33 which forms the terminal of a reducing gear-train 34, the said gear-train 34 being driven from the power shaft 24 through any suitable agency, as for example, by the worm 38 of the counter-shaft 37. By these means the rack pinion 33 is slowly driven and in a direction to move the rod 29 toward the flier end of the machine so that it increases the tension on the spring 30 and through it produces movement of the lever 28′ and gradual compression of the friction spring 28, which gradually increases the friction in the retarding mechanism, and the retarding force acting on the bobbin.

The springs 28 and 30, are one or both set with a normal condition of compression and tension respectively, corresponding to the minimum retarding effect ever required for the bobbin, and such effect can be varied in several ways, as for instance, by adjusting the collar 31 on the rack rod, or by adjusting the limits of the movement of the latter in obvious manner. The extent of operation of the rack-pinion 33 on the rack rod is arranged in accordance with the diameter of the bobbin, being sufficient to increase the retarding effect thereon proportionately to the growth in the size of the wound yarn upon the bobbin so that the resulting tension on the yarn will at all times be substantially constant. The reducing train of gearing is conveniently formed, as shown in Figs. 2 and 3, by three parallel shafts 60, 61 and 62 journaled in the frame piece 63 which supports the counter-shaft 37. The slowest of these shafts (62) carries the rack pinion 33, while the one at the other end, marked 60, forms the support for one of the ends of the rack rod 29. For this purpose a small bracket 45 is pivotally mounted on, or concentric to, the shaft 60 embracing the rack-rod, and in which the latter is free to slide as moved by the pinion. Preferably a spline screw 46 is threaded into the bracket to engage a spline groove in the rack rod to prevent its rotation as indicated in Fig. 5, but it will be understood that any suitable means of sliding support may be provided for the rack rod instead of that shown. The opposite end portion of the rack rod 29 is carried in a sleeve 43 pivotally hinged on a stud 44 projecting from the side of a lever 39. The end of the sleeve is provided with a cushion washer 42, adapted to be engaged by an adjustable stop collar 41 set-screwed onto the rack rod to limit its sliding-movement. The lever 39 is fulcrumed at 40 to the frame piece 63 and is connected in any suitable way, as for instance by the link 64, with the bobbin spindle-latch 19 above referred to, so that the operation of the latter in one direction or the other, will effect the disengagement of the rack-pinion 33 from the rack teeth of the rod, as for instance by lifting sleeve 43 and thereby swinging the rack rod about the shaft 60 as an axis, far enough to lift its rack-teeth out of mesh with the teeth of the rack-pinion 33. When such disengagement has taken place, the tension of the springs 28 or 30, or both, will serve to draw the rod through

its supports until its stop collar 41 abuts against the supporting sleeve 43, thereby replacing the rod in its initial position corresponding to minimum retarding effect. By reason of the fact that the flier is of the open-end type as shown, and also that the traverse carriage is readily disconnected from the traverse nut, as above explained, it will be observed that the latch-device 19 is operated only when a bobbin is removed from the machine, so that the gradual increase in the retarding effect will thus take place without interruption, continuing for as long as the same bobbin remains in the machine and until it is full or removed. The succeeding empty bobbin will in every case encounter the minimum retarding effect which thereupon increases in like manner, thereby insuring constant tension in the yarn.

So far as my invention is concerned with the relation above described between the bobbin and the tension controlling means it will be further observed that the particular construction and mode of operation of the latter is not of consequence, provided the same is capable of applying progressive retarding effect and of instantly relieving the same or restoring it to the minimum, by the movement or operation of the agencies by which the bobbin is removed from the bobbin spindle. The invention, however, also includes the specific construction of the means for increasing the retarding effect and the other features and combinations of features pointed out in the following claims.

The invention further includes the application of an automatic power knock-off device to the type of tension controlling mechanism above described. Such means, in the present embodiment, comprises a collar 70 adjustably fastened to the rack rod 39 and appropriately formed to have engagement with a bell-crank 71, which is a part of the regular stop motion mechanism. When such engagement takes place the bell-crank is lifted from a notch in the belt shipper bar 72, which is thereupon free to move under the influence of its spring 73 to shift the belt from the fast to the loose pulley, or otherwise to turn off the power.

I claim:

1. In a spinning machine, a flier and suitable parts for supporting a bobbin in operative relation thereto, means for applying an increasing retarding effect to the bobbin, and means for automatically reducing such effect in connection with the removal of the bobbin from its support.

2. In a spinning machine, the combination of the flier spindle and a part for maintaining a bobbin in operative relation thereto, with a tension device for maintaining constant tension in the yarn passing from the flier to the bobbin, and means controlled by said part when moved to permit replacement of the bobbin for automatically setting the said tension device.

3. In a spinning machine, a bobbin confining member, a bobbin retarding device, means for increasing the retarding force exerted by said device and means controlled by the said confining member when moved to release the bobbin for reducing the retarding force of said device.

4. In a spinning machine, a head to which the bobbin is connected, a spindle on which said head is mounted, means for locking the spindle in its operative position, a retarding device for said head, means for increasing the retarding force of said device, and means actuated by the locking means when operated to release the spindle for reducing the retarding force.

5. In a spinning machine an open end flier and a movable support for the bobbin therein provided with an obstruction to its removal from bobbin-supporting position, in combination with means for applying an increasing retarding effect to the bobbin and means for reducing such effect, rendered operative by the movement of the said obstruction.

6. In a spinning machine, a flier, a removable bobbin spindle, a head, a traverse device and means for separating said head from the traverse device, whereby the bobbin may be moved outward from the flier for inspection without removal of the spindle, in combination with means for applying an increasing retarding force to the bobbin, and means for automatically restoring said force to a predetermined minimum in connection with the removal of the spindle.

7. In a spinning machine, an open-end flier, a bobbin spindle, a traverse nut for moving the bobbin thereon and means for disconnecting the bobbin from the nut, whereby the bobbin may be moved outward from the flier for inspection without removal of the spindle, in combination with means for maintaining constant tension in the yarn passing from the flier to the bobbin, and a bobbin spindle latch controlling the setting of said means, said latch being operated when it is desired to replace the bobbin.

8. In a spinning machine, a bobbin-holding head, a spindle driven by the head, means for locking the spindle in an operative position, a retarding device comprising a friction disk driven by the spindle, and a friction disk coöperating therewith, means for increasing the pressure between the said disks and means actuated by said spindle locking means when moved to release the bobbin for releasing the pressure increasing means and thereby reducing the pressure between said disks.

9. In a spinning machine, a head, a spindle driven by said head, means for ob-

structing removal of the spindle, a retarding device comprising a friction disk driven by said spindle, and a friction disk coöperating therewith, gear actuated means for increasing the pressure between said disks and means actuated by said obstructing means when moved to release the spindle for disengaging said gear actuated means so as to reduce the pressure between said disks.

10. In a spinning machine, a flier, a bobbin support driven by the tension of the yarn passing from the flier to the bobbin, means for applying power to the machine, a train of gearing constantly driven thereby, a rack-rod movable lengthwise by said gearing, and friction means for retarding the bobbin support, said rack-rod forming a connection between said gearing and friction means whereby the power transmitted through the former is applied to the latter to increase the friction.

11. In a spinning machine, a bobbin support and flier, means for varying their relative speeds comprising a train of gearing, including a rack-pinion, a rack-rod therefor, means for disengaging said pinion and rod, and means for automatically restoring said pinion and rod to initial relation when disengaged.

12. In a spinning machine, a head, a spindle driven by said head, a retarding device comprising a friction disk driven by the spindle and a friction disk coöperating therewith, and means for increasing the friction between said disks comprising a train of reducing gearing and a rod or member forming a power transmission element between said train and one of said disks to vary the pressure between the disks.

13. In a spinning machine, the combination of a flier, a head driven by the tension of the yarn passing from the flier to the bobbin, a spindle driven by the head, means for retarding the spindle and head comprising coöperating friction members, means for increasing the friction of these members from an initial minimum effect suitable for an empty bobbin to a maximum effect suitable for a full bobbin, the said means comprising a train of gearing and a rack-rod driven thereby and connected with the retarding means, and a power knock-off device operated by said rack-rod.

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

JOHN GOOD.

Witnesses:
G. A. TAYLOR,
H. G. KIMBALL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."