F. EICHBERG & H. BALKE.

SPEED CONTROLLING DEVICE FOR RING SPINNING FRAMES.

APPLICATION FILED AUG. 16, 1913.

**1,200,327.** Patented Oct. 3, 1916.

Fig. 1.

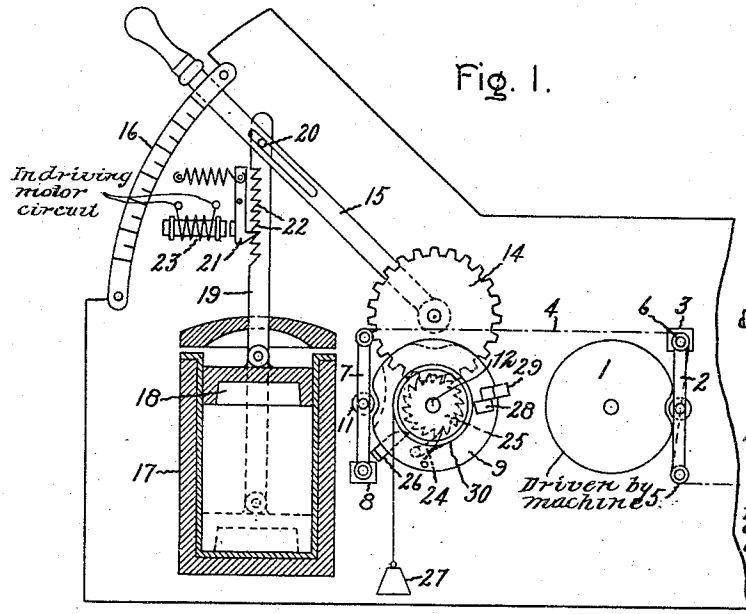



Fig. 3.

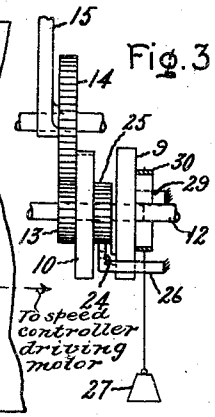
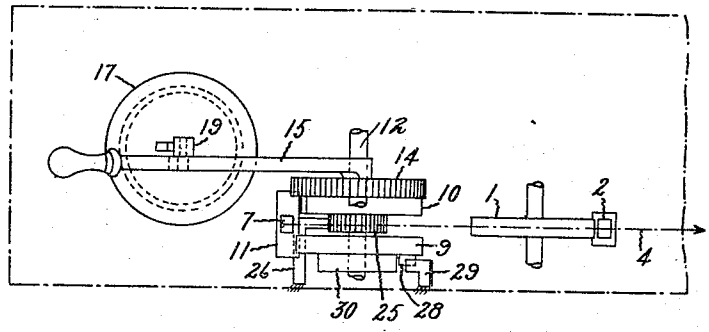


Fig. 2.



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# UNITED STATES PATENT OFFICE.

FRIEDRICH EICHBERG, OF BRESLAU, AND HERMANN BALKE, OF BERLIN, GERMANY, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## SPEED-CONTROLLING DEVICE FOR RING-SPINNING FRAMES.

1,200,327. Specification of Letters Patent. Patented Oct. 3, 1916.

Application filed August 16, 1913. Serial No. 785,019.

*To all whom it may concern:*

Be it known that we, FRIEDRICH EICHBERG, a subject of the Emperor of Austria-Hungary, residing at Breslau, and HERMANN BALKE, a subject of the King of Prussia, residing at Berlin, Germany, have invented certain new and useful Improvements in Speed-Controlling Devices for Ring-Spinning Frames, of which the following is a specification.

This invention relates to electrically-driven ring spinning machinery, and its object is to gradually increase the speed at which the thread is wound upon the cop, so that the tension may be practically uniform at all parts of the bobbin.

It has been found that when the speed of the machine is uniform, the thread is wound too tightly upon the smaller diameter of the bobbin and too loosely upon its large portion. This difficulty increases as the bobbin builds up. In order to give a uniform tension, a variable speed has been given to the machine by suitably controlling the electric motor which drives it. Our invention provides new and improved means for accomplishing this result.

The motor drives a shaft carrying a cam which rotates synchronously with the travel of the ring rail and operates upon suitable controlling devices which regularly accelerate and lessen the speed of the motor, so that when the rail is down and operating on the large end of the bobbin the motor will run more slowly than when the rail is up and the thread is being laid upon the smaller diameter of said bobbin. In addition to this mechanism, we provide mechanism which slowly accelerates the mean speed of the motor. This idea is not broadly new with us, but our solution of the problem we regard as simple, cheap, reliable and durable, and for these reasons an improvement in the art.

Our invention will be better understood from the following detailed description taken in connection with the accompanying drawings in which—

Figure 1 is a sectional side elevation showing the essential elements of the invention; Fig. 2 is a top plan view of the same; and Fig. 3 is an edgewise elevation of the twin cams and the gearing.

The cam 1 is driven from the main shaft of the spinning frame, and rotates synchronously with the rise and fall of the ring rail. It actuates at each revolution a lever 2, which is fulcrumed at 3. A flexible connection 4, such as a cord, band, chain, or the like, runs under a pulley 5 on the free end of the lever and over a pulley 6 at its fulcrum, being led thence to the free end of a lever 7, fulcrumed at 8, to which said flexible connection is made fast. The oscillation of the lever 2 by the cam 1 therefore causes the flexible connection to be alternately pulled and slacked. The connection is attached to some suitable speed controller for the electric motor which drives the spinning frame, such as a rheostat arm, a rocker carrying the motor brushes, or the like, so that at each revolution the cam 1 causes the motor to speed up and slow down alternately.

The gradual acceleration accompanying the building up of the bobbin is effected by two cams 9 and 10 operating upon a cross bar 11 on the lever 7. The cam 9 is loose on the shaft 12, but the cam 10 is secured fast thereto. A pinion 13 fast on said shaft 12 meshes with a spur or segment gear 14 whose shaft carries a long arm 15 working over a graduated quadrant 16. The weight of the arm tends to swing it downward and thus turn the shaft 12 and actuate the cam 10. This tendency is retarded but not entirely prevented by some kind of time-limiting device, such as a dash-pot 17 in which works a heavy plunger 18 whose stem 19 is pivotally connected to the arm 15 by a pin and slot joint 20. A locking device cooperates with the stem 19 to stop the descent of the arm and plunger when the spinning frame is stopped for any reason, as for instance to tie a broken thread. Such locking device may be a spring catch 21 engaging teeth 22 in the stem and adapted to be withdrawn from its operative position by an electromagnet 23 in circuit with the electric motor which operates the machine. When this motor circuit is opened to stop the machine, the electromagnet will be deenergized and will release the catch which will automatically engage and lock the stem.

A pawl 24 on the loose cam 9 coöperates with a ratchet wheel 25 fast on the shaft 12 and causes the cam 9 to rotate with the fixed cam 10 until a trip 26 disengages the pawl,

whereupon some suitable device, such as a weight 27 attached to a cord wound on a drum 30 projecting from one side of the cam 9,—returns the cam 9 to its starting point, where a lug 28 on said cam strikes a fixed stop 29. During the return of the cam 9 in this manner the pawl 24 remains disengaged.

The operation is as follows: The dashpot or other time-limiting device is set to let the arm 15 drop through its predetermined range in the time required to build up a complete bobbin. As it moves slowly downward, it turns the gear 14 in a counterclockwise direction and thus causes the cams 9 and 10 to rotate clockwise. At the start, the lever 7 rests against the cam 9, both cams having a depression at this point, as shown, but that in cam 10 being the deeper and longer. As the cams rotate, the lever 7 is forced slowly to the left, taking up the flexible connection 4 bit by bit though leaving the lever 2 free to impart it normal oscillation to the motor-controller. The taking up of the connection 4, however, slowly shifts the mean angular position of the controller, so that the mean speed of the motor is correspondingly increased and the tension on the thread maintained as the bobbin builds up, without interfering with the variation of the speed to avoid variation of tension in different portions of each layer of thread effected by the cam 1. When the cams have finally pushed the lever 7 to its extreme left-hand position, the bar or roller 11 rests first against the circular periphery of the cam 9 and then against that of the cam 10 as well. At this point in the spinning, the shoulder of the bobbin will have attained its full diameter and the building operation will be over, so that from here on the speed has to be varied merely from shoulder to nose, which will be accomplished by the operation of the cam 1. At the end of the building operation, the pawl 24 is disengaged from the ratchet-wheel 25 by the trip 26 and the cam 9 is returned to its original position by the weight 27. On the further rotation of the cam 10, the lever 7 will be held by it in the extreme left-hand position until a second recess in said cam 10 comes into registry with the notch in the cam 9, so that the lever 7 is allowed to return, gradually but more quickly, to its orginal position, causing a corresponding slowing down of the motor. The apparatus can be reset for a new bobbin by lifting the arm 15 and by reëngaging the pawl 24 with its ratchet wheel. The arm can be stopped at any point along the quadrant when bobbins of less than the maximum length are to be wound. When the arm is thus set to begin its downward movement from some intermediate point along the quadrant, the cam 9 will nevertheless stand in its original position at the commencement of the operation, with its notch engaging the bar 11 on the lever 7. The notch in the cam 10 will be angularly displaced from its original position, but as it is longer than the notch in the cam 9, the two will still register and permit the lever 7 to lean to the right. The lever will be actuated just as before, to take up the predetermined amount of the flexible connection 4, but the circular periphery of the cam 10 will come into play sooner, according to the intended length of the bobbin. It will be seen that the two cams 9 and 10 are in effect an adjustable cam equivalent to a large number of double notched cams with different angles between the notches, and that by suitable adjustment of these cams the spinning speed can be varied in many different ways.

In accordance with the provisions of the patent statutes, we have described the principle of operation of our invention, together with the apparatus which we now consider to represent the best embodiment thereof; but we desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What we claim as new and desire to secure by Letters Patent of the United States, is,—

1. Means for controlling the tension of the thread in a ring spinning machine driven by an electric motor, comprising means actuated by the motor for producing a periodic motion corresponding with the up and down movement of the ring rail, means independent of said motor for producing a gradual motion corresponding to the building up of a bobbin, and a connection controlling the speed of the motor including means for combining the motions aforesaid.

2. Means for controlling the tension of the thread in a ring-spinning machine driven by an electric motor, which consists in a flexible connection controlling the speed of the motor, means for gradually taking up said connection, and a time-limiting device for actuating the take-up mechanism independently of the spinning machine and its motor.

3. Means for controlling the tension of the thread in a ring-spinning machine driven by an electric motor, which consists in a flexible connection controlling the speed of the motor, means for imparting a regular movement to said connection, a lever and a cam for taking up said connection, and a time-limiting device for gradually actuating said cam.

4. Means for controlling the tension of the thread in a ring-spinning machine

driven by an electric motor, which consists in a flexible connection controlling the speed of the motor, a lever engaging said connection, a cam driven by the motor and actuating said lever, and a time-limiting device operating to take up gradually said flexible connection.

5. Means for controlling the tension of the thread in a ring-spinning machine driven by an electric motor, which consists in a flexible connection controlling the speed of the motor, a lever engaging said connection, a cam driven by the motor and actuating said lever, and a time-limiting device operating to take up gradually said flexible connection, said device comprising a lever attached to said connection, a cam for actuating said lever, an arm geared to said cam, and means for retarding the movement of said arm.

6. Means for controlling the tension of the thread in a ring-spinning machine driven by an electric motor, which consists in a flexible connection controlling the speed of the motor, means operated by said motor for imparting a regular movement to said connection, and a time-limiting device for taking up said connection gradually, said device operating entirely independent of the spinning machine and its motor.

7. Means for controlling the tension of the thread in a ring-spinning machine driven by an electric motor, consisting of a flexible connection controlling the speed of said motor, means operated by said motor for imparting a regular movement to said connection, a lever attached to said connection, a cam for operating said lever, an arm geared to said cam, and a dash-pot connected to said arm.

8. Means for controlling the tension of the thread in a ring-spinning machine driven by an electric motor, consisting of a flexible connection controlling the speed of said motor, means operated by said motor for imparting a regular movement to said connection, a lever attached to said connection, two independently rotatable cams bearing against said lever, a detachable connection between said cams, and a time-limiting device for actuating one of said cams.

9. Means for controlling the tension of the thread in a ring-spinning machine driven by an electric motor, which consists of a flexible connection for controlling the speed of said motor, a lever pivoted at one end and having said connection running over both ends thereof, means driven by the motor for oscillating said lever in synchronism with the movement of the ring rail, and a time-limiting device, independent of the motor, for taking up said connection gradually during a predetermined portion of the time required to wind a bobbin.

10. Means for controlling the tension of the thread in a ring-spinning machine driven by an electric motor, which consists of a flexible connection for controlling the speed of the motor, means actuated by said motor for imparting a regular movement to said connection, a lever attached to said connection, two cams for operating said lever, one loose on their common shaft, a pawl and ratchet connection between said cams, gearing for actuating the shaft carrying said cams, an arm for actuating said gearing, a dash-pot connected to said arm, and a locking device for automatically arresting the descent of said arm when the spinning machine stops.

11. Means for controlling the tension of the thread in a ring-spinning machine driven by an electric motor, which consists in a flexible connection for controlling the speed of said motor, means actuated by said motor for imparting a regular movement to said connection, a lever attached to said connection, two cams on a common shaft bearing against said lever, one cam being loose on said shaft, a time-limiting device for gradually rotating the cam shaft, a pawl and ratchet connection between said cams, a trip for releasing said pawl, and means for returning the loose cam to its original position.

In witness whereof, we have hereunto set our hands this 30th day of July, 1913.

FRIEDRICH EICHBERG.
HERMANN BALKE.

Witnesses for Friedrich Eichberg:
WALTER HORN,
HERMANN KÜBACH.
Witnesses for Hermann Balke:
RICHARD NEUMANN,
LEOPOLD JANISCH.

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