

Dec. 3, 1963

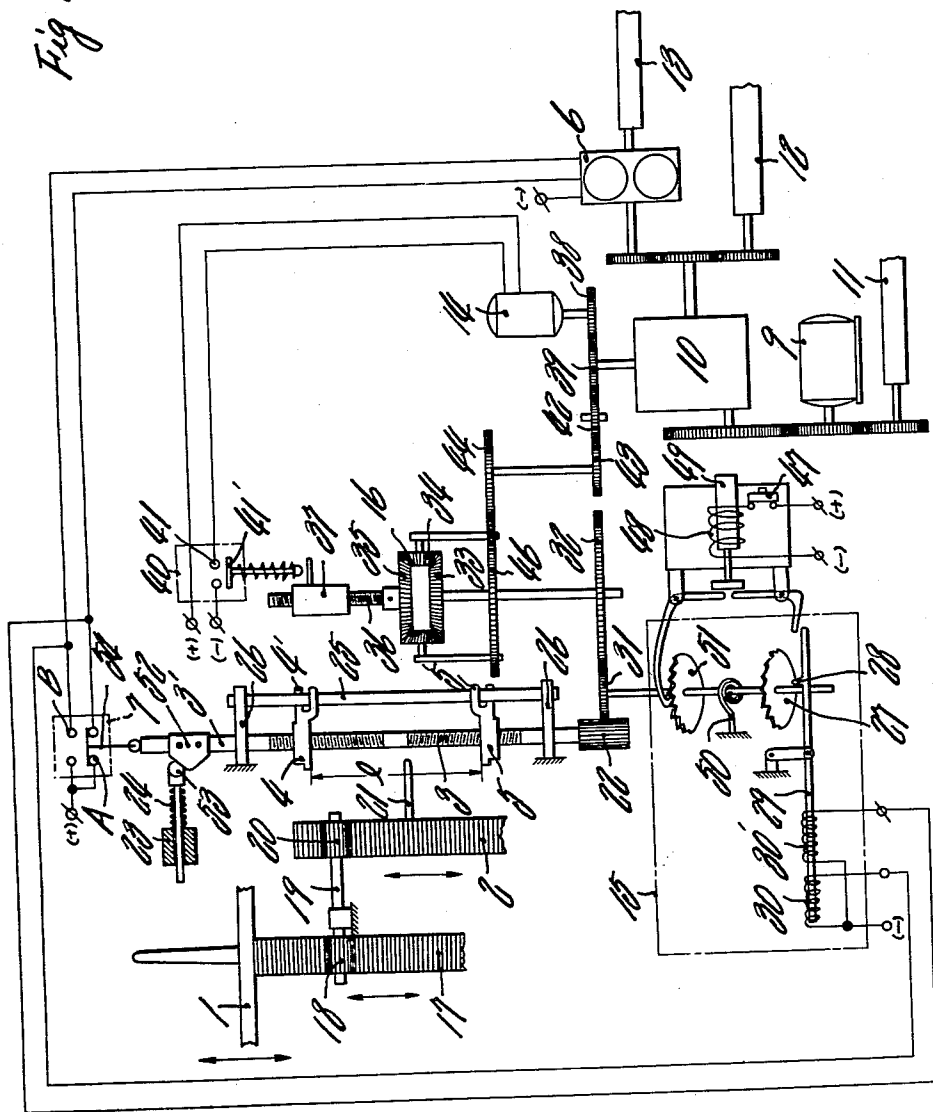
KAZUYOSHI OZAKI
APPARATUS FOR AUTOMATICALLY VARYING
THE TRAVERSE OF A SPINNING MACHINE

3,112,602

Filed March 8, 1962

2 Sheets-Sheet 1

Fig. 1



KAZUYOSHI OZAKI

INVENTOR.

BY *Hall & Houghton*
Attorney.

Dec. 3, 1963

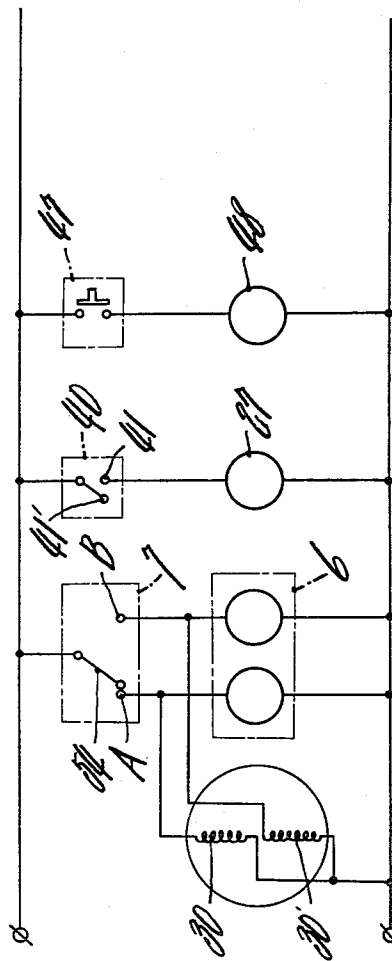
KAZUYOSHI OZAKI
APPARATUS FOR AUTOMATICALLY VARYING
THE TRAVERSE OF A SPINNING MACHINE

3,112,602

Filed March 8, 1962

2 Sheets-Sheet 2

Fig. 2



KAZUYOSHI OZAKI

INVENTOR.

BY *Hall & Houghton*
Attorney.

1

3,112,602

APPARATUS FOR AUTOMATICALLY VARYING THE TRAVERSE OF A SPINNING MACHINE

Kazuyoshi Ozaki, 56 Aza Katayama, Suita City, Japan

Filed Mar. 8, 1962, Ser. No. 178,483

9 Claims. (Cl. 57-99)

This invention relates to an apparatus for automatically changing the distance of rise and fall of the bobbin rail in a spinning machine.

The conventional fly frame has the cone-pulley and the stepless variable speed gear combined therein, which limits the transmission horsepower thereof and is thus not proper for transmitting the horsepower for rise and fall of the bobbin rail. Accordingly, an expensive and complicated differential gear system has heretofore been used in conjunction therewith, which makes the whole mechanism more complicated and often causes some errors in the belt-slip of the cone-pulley. Moreover the mechanism for change-over switching for rise and fall of the bobbin rail is so large and complicated that the shock is large, accidents are apt to occur and the adjustment of the device is difficult.

It is therefore an object of the invention to overcome the above difficulties encountered in the prior art. It is another object of the invention to provide an apparatus which ensures the bobbin formation. It is still another object of the invention to provide an apparatus which is simple, concise and inexpensive. It is a further object of the invention to provide an apparatus of which the necessary parts are all composed of electrical components.

According to the invention there is provided an apparatus for automatically changing the distance of rise and fall of the bobbin rail in the spinning machine characterized in that a movable element is permitted to reciprocate in response to the rising and falling motion of the bobbin rail and said movable element is caused to alternately hit the movable screw elements on a reciprocating screw-threaded rod on which the screws opposite to each other are being threaded while said rod is allowed to reciprocate, whereby the change-over switch of a reversible magnet clutch is caused to be switched alternately, said rod per se being permitted to rotate in conjunction with the switching in rise and fall of said bobbin rail so that said movable screw elements screwed on said rod are allowed to move each in opposite direction so as to gradually change the distance between said two elements, whereby the switching time for said switch is caused to change gradually.

The present invention is further described with reference to the accompanying drawings, in which,

FIG. 1 schematically illustrates one embodiment of the apparatus of the present invention, where the bobbin formation in a spinning machine is caused to take place by means of a stepless variable speed gear and the reversible magnet clutch, and FIG. 2 is a view showing an electric circuit used therefor.

In FIG. 1, the numeral 9 is a driving motor, 10 is a stepless variable speed gear, 11 is a draft roller, 12 is a shaft for rotating the bobbin, 13 is a rotative shaft for rise and fall of the bobbin rail, 14 is a pilot motor for changing the speed ratio of the variable speed gear 10, 15 is a movable indexing part for changing the operation speed, and 16 is a differential gear mechanism. The rotation of the driving motor 9 permits the rotation of the draft roller 11 while it permits the rotation of the shaft 12 via the stepless variable speed gear 10, which rotation in turn permits the rotation of the bobbin on the rail 1. Moreover, the rotation of the reversible magnet clutch 6 caused by the rotation of the motor 9 permits the rotation

2

of the shaft 13 for the bobbin rail 1. Thus, the movement for the rise and fall of the rail 1 is caused thereby, which in turn permits the movement for rise and fall of the rack 17 fixed to said rail 1. The numeral 18 shows a pinion meshed with the rack 17. The pinion rotates in response to the movement of the rack 17, which moves the moving element 2 through the rotation of the pinion 20 provided on one end of the shaft 19. The numeral 21 is an operation rod projecting from the element 2 to be stopped by the movable elements 4 or 5 screwed on the reciprocating screw-threaded movable rod 3. The rod 3 is supported such that it is allowed to move for a certain distance, on one end of which a wide gear 22 is provided. The other end 3' of it can be electrically engaged with the change-over switch 7 of the clutch 6. The numeral 23 shows a controlling device for the rod 3 which determines the position of the rod 3 by means of a spring 24. The numeral 25 is a guide rod for the movable elements 4 and 5 and which is fixedly supported by the bearings 26. The stops 4' and 5' of the elements 4 and 5 are engaged with said rod 25. The numeral 27 is an electromagnetic ratchet wheel. The teeth of said wheel 27 move by one pitch by means of an alternate operation of the two coils 30 and 30' of the movable iron core 29 of the ratchet 28. Thus, each time the bobbin rail 1 moves one stroke and the switch 7 turns, the teeth of the wheel 27 move by one pitch. The rotation of the ratchet wheel 27 is transmitted to the screw-threaded rod 36 via gears 31 and 32 and bevel gears 33, 34 and 35. Then a movable screw element 37 screwed to the rod 36 moves until it permits contact of the movable contact 41' of the controlling switch 40 of the pilot motor 14 with the fixed contact thereof. Accordingly, the circuit of the pilot motor 14 is closed and the pilot motor 14 rotates, which operates, via gears 38 and 39, the speed regulating part of the stepless variable speed gear 10 so that the speed ratio of said gear 10 is changed. Simultaneously a disk 46 rotates through a series of gears 42, 43 and 44 so that the rod 36 rotates in the opposite direction to that before through the bevel gears 34 and 35. Then the element 37 moves thereby in the opposite direction for an indexed distance and the switch 40 is then cut off. The disk 46 and the bevel gears 33 and 34 constitutes a differential gear system. On the other hand, when the electromagnetic ratchet wheel 27 moves by one pitch and the gear 31 rotates, the gear 22 provided on one end of the rod 3 rotates and the rod 3 also rotates thereby. Consequently, the elements 4 and 5 on the rod 3 move in the opposite direction as the rod 3 moves, which will change the distance (l) between the elements 4 and 5. With regard to FIG. 1 in which the bobbin rail 1 is moving upwards, it continues to move until the rod 21 of the element 2 is engaged with the element 4 on the rod 3. When the rod 21 hits the element 4, the rod 3 per se is caused to be pushed upwards against the elastic power of the spring 24 of the controlling device 23. When a controlling plate 52 provided on the upper part of the rod 3 rides over a controlling roller 53, the contact 54 of the switch 7 is changed over from the contact A to the contact B, which permits the reversing operation of the magnetic clutch 6 while it permits the operation of the indexing part 15 for changing the operation speed. Thus, the rod 3 rotates again an indexed time so that the distance (l) is changed. The bobbin rail 1 begins to move downwards just when the magnet clutch 6 operates, then the rod 21 of the element 2 is again engaged with the element 5 of the rod 3 and the switch 7 is switched off.

When the bobbin is filled up, a current is passed through an electromagnetic coil 43 by operation of a button 47 so that a rod 49 acts to release the ratchet 28. Accordingly, the restoration of the wheel 27 takes place automatically with aid of an elastic power of the spring 50. The nu-

3

meral 51 shows a ratchet wheel for preventing the reversing motion.

As set forth hereinbefore, in the present invention, a movable element 2 can reciprocate in response to the rising and falling motion of the bobbin rail 1 and said element 2 is caused to alternately hit the movable screw elements 4 and 5 on a reciprocating screw-threaded rod 3 on which the screws opposite to each other are being threaded while said rod is allowed to reciprocate. Thus the change-over switch 7 of a reversible magnet clutch 6 is caused to be switched alternately. In addition, said rod 3 can rotate in conjunction with the switching and with the rise and fall of said bobbin rail 1, so that said movable screw elements 4 and 5 screwed on said rod 3 are allowed to move each in opposite direction and thus the distance (1) between said elements 4 and 5 is gradually changed, whereby the switching time for said switch 7 of said clutch 6 can be changed accordingly. As a result, the range of movement of the bobbin rail 1 is sequentially changed in an electrical way so that the bobbin formation system becomes accurate. Moreover, in the present invention, such a complicated mechanism as that used in the conventional system becomes unnecessary, the entire device being simple and of a smaller volume. Thus, it can be fixed to a part of the gear end, which will permit easier adjustment and cheaper costs of the apparatus.

Moreover, the apparatus of the invention is entirely composed of an electrical system so that it will greatly facilitate provision of automatic doffing therewith.

While the invention has been described with reference to specific embodiments thereof, it will be understood that other embodiments may be resorted to without departing from the spirit of the invention.

I claim:

1. A device for a spinning frame or the like, comprising in combination:

- (a) an element mounted for back and forth movement when the bobbin rail of a spinning frame moves up and down;
- (b) a rod having threads thereon and mounted for rotation and for longitudinal reciprocation;
- (c) first and second limit means threaded onto said rod and arranged for changing the distance therebetween when said rod is rotated, said limit means being disposed in the path of movement of said element for being periodically engaged thereby to reciprocate said rod;
- (d) control means including a change-over switch responsive to longitudinal movement of said rod for reversing a reversible magnetic clutch which is arranged in the drive of the bobbin rail to thereby move the bobbin rail up and down; and
- (e) means responsive to said change-over switch and thus to longitudinal movement of said rod for rotating said rod to thus change the distance between said limit means.

2. A device for a spinning frame or the like, comprising in combination:

- (a) an element mounted for back and forth movement when the bobbin rail of a spinning frame moves up and down;
- (b) a rod having right and left hand threads thereon and mounted for rotation and for longitudinal reciprocation;
- (c) first and second limit means threaded onto said rod for changing the distance therebetween when said rod is rotated, said limit means being disposed in the path of movement of said element for being periodically engaged thereby to reciprocate said rod;
- (d) control means responsive to longitudinal movement of said rod for
 - (1) reversing a reversible clutch which is arranged in the drive of the bobbin rail to thereby move the bobbin rail up and down, and

4

- (2) rotating said rod to thus change the distance between said limit means, said control means including a two position switch actuated by longitudinal movement for causing the clutch to provide upward movement of the bobbin rail in one position of said switch and downward movement of the bobbin rail in the other position of said switch; and

(e) a mechanism including two solenoids for periodically rotating said rod including an actuating element movable in two directions responsive to the two solenoids, respectively, said solenoids being connected to be energized by said switch, one being energized in each position of said switch.

3. A device as defined in claim 2 wherein said mechanism includes a ratchet assembly having a ratchet wheel and a ratchet connected to said actuating element.

4. A device as defined in claim 3 wherein said mechanism further includes gearing.

5. A device as defined in claim 4 wherein said gearing includes a gear which is at least as long as the distance through which said rod reciprocates to provide a drive to rotate said rod regardless of its longitudinal position.

6. A device for a spinning frame or the like, comprising in combination:

- (a) an element mounted for back and forth movement when the bobbin rail of a spinning frame moves up and down;
- (b) a rod having threads thereon and mounted for rotation and for longitudinal reciprocation;
- (c) first and second limit means threaded onto said rod and arranged for changing the distance therebetween when said rod is rotated, said limit means being disposed in the path of movement of said element for being periodically engaged thereby to reciprocate said rod;
- (d) control means responsive to longitudinal movement of said rod for
 - (1) reversing a reversible clutch which is arranged in the drive of the bobbin rail to thereby move the bobbin rail up and down, and
 - (2) rotating said rod to thus change the distance between said limit means;
- (e) variable speed means for driving the bobbin and the rail of a spinning frame;
- (f) a pilot motor for varying the speed of said driving means; and
- (g) speed control means for periodically actuating said pilot motor.

7. A device as defined in claim 6 wherein said speed control means is connected and responsive to said control means for rotating said rod.

8. A device as defined in claim 7 wherein said speed control means includes a rotatable threaded shaft connected to rotate as said rod rotates, a sleeve threaded on said shaft, a switch controlling actuation of said pilot motor and disposed in the path of said sleeve to be closed thereby.

9. A device as defined in claim 8 comprising gearing means connected to said pilot motor for moving said sleeve away from said switch for a set distance each time said pilot motor is actuated.

References Cited in the file of this patent

UNITED STATES PATENTS

2,764,363	Stammwitz	Sept. 25, 1956
2,870,597	Hill et al.	Jan. 27, 1959

FOREIGN PATENTS

732,775	Germany	Mar. 13, 1943
1,051,176	Germany	Feb. 19, 1959