

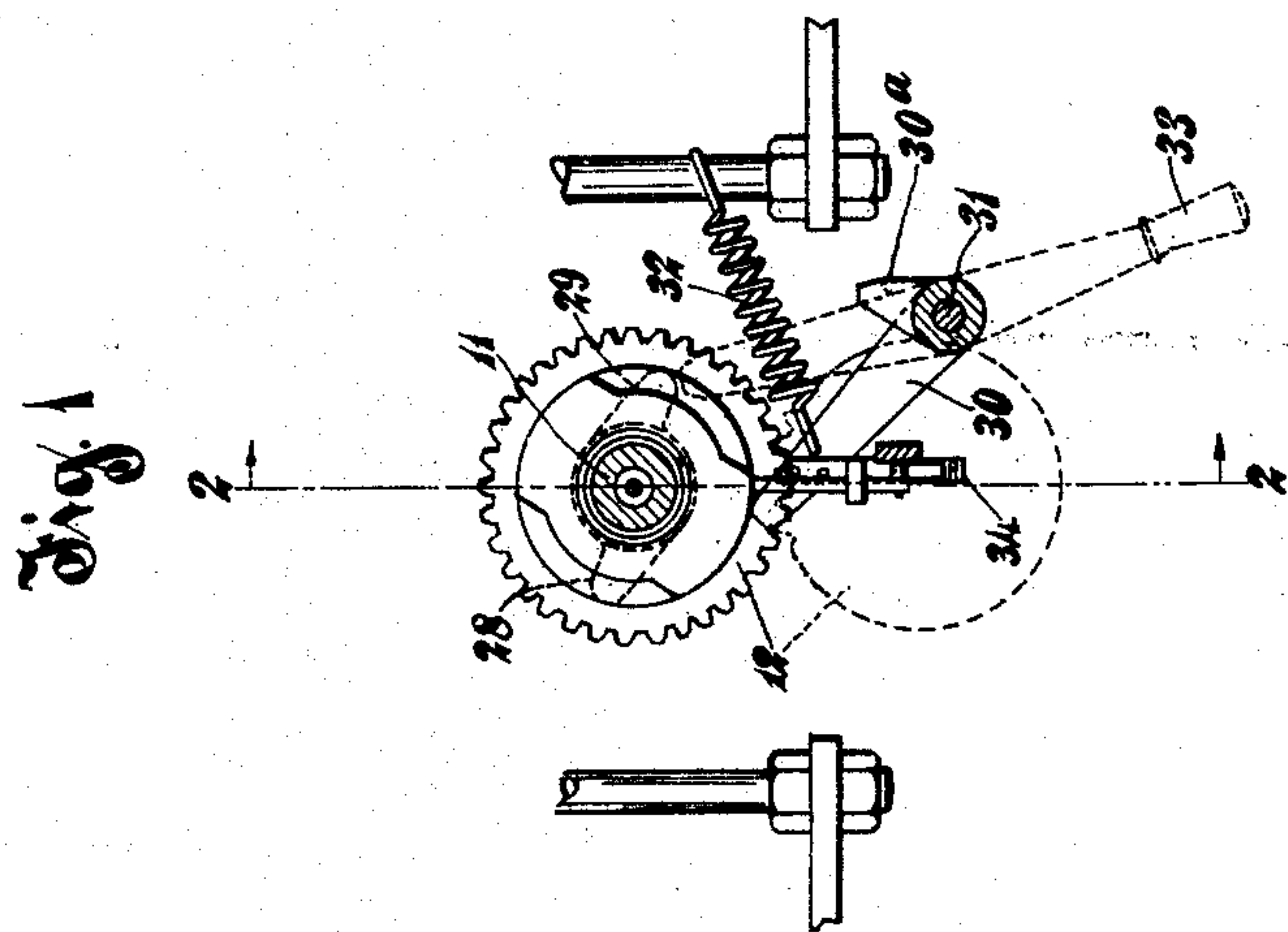
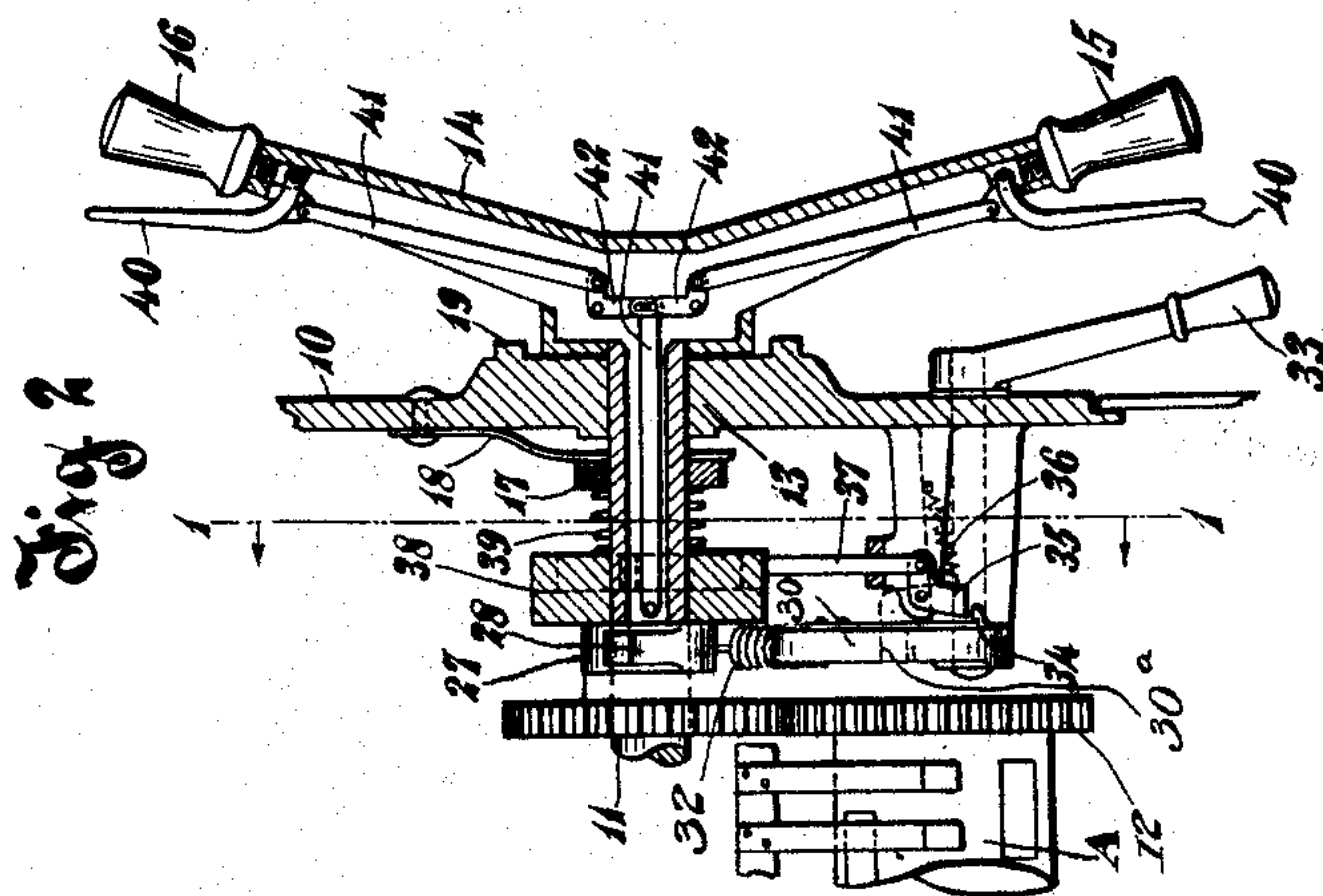
No. 886,733.

PATENTED MAY 5, 1908.

G. B. SCHLEY.
CONTROLLER.

APPLICATION FILED DEC. 31, 1906.

2 SHEETS—SHEET 1.



Witnesses

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2 SHEETS—SHEET 2.

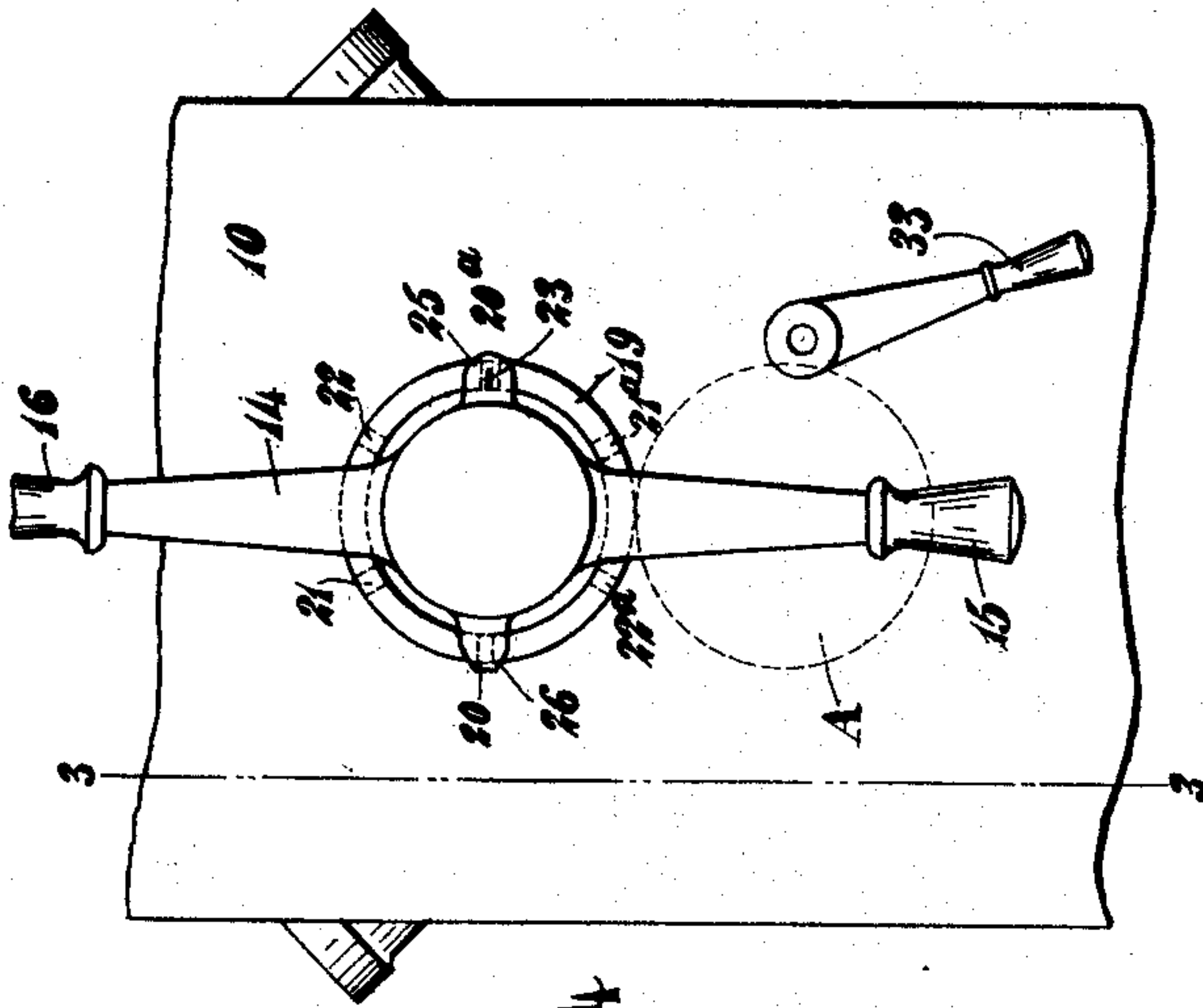


Fig. 4

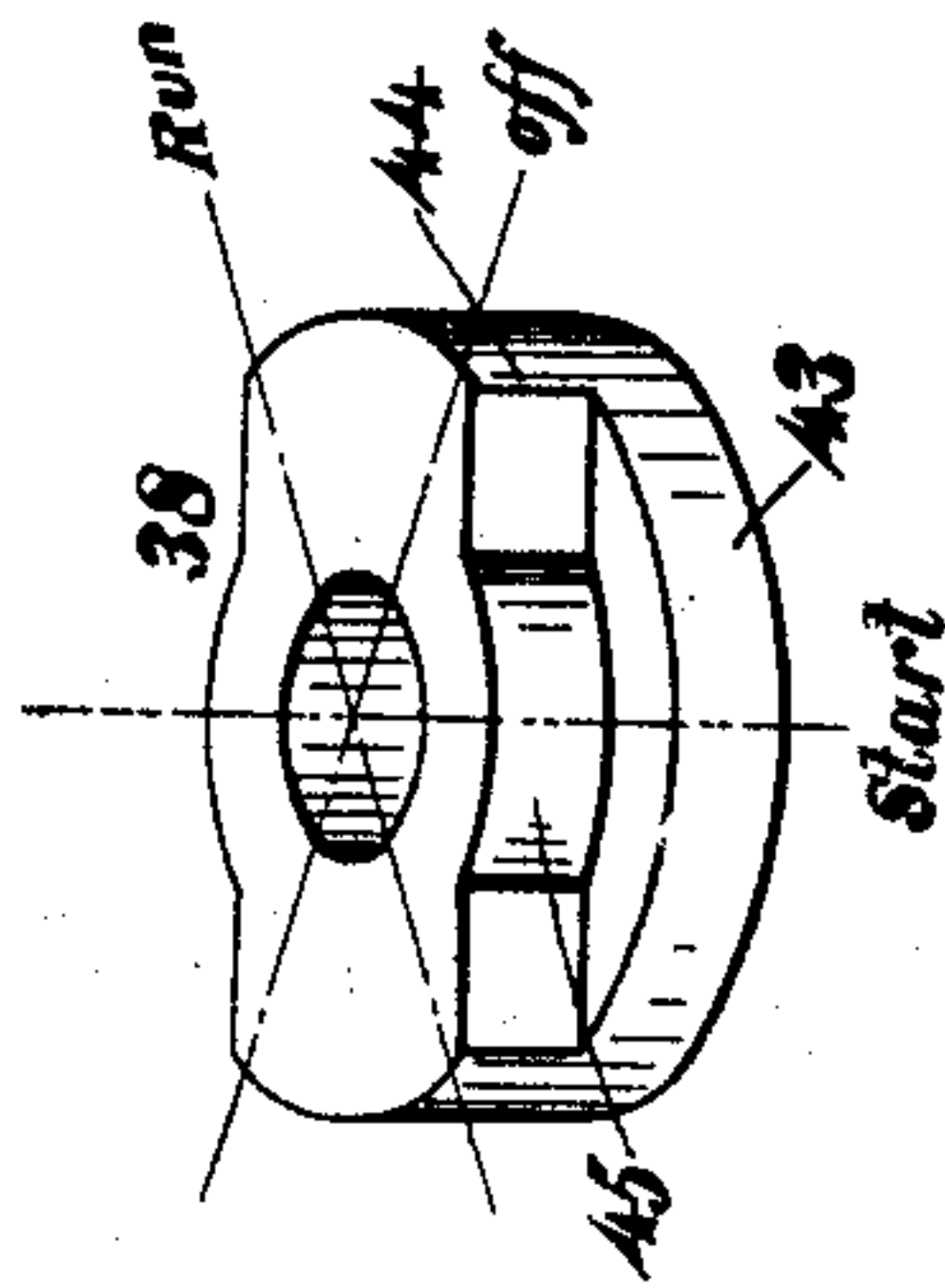


Fig. 5

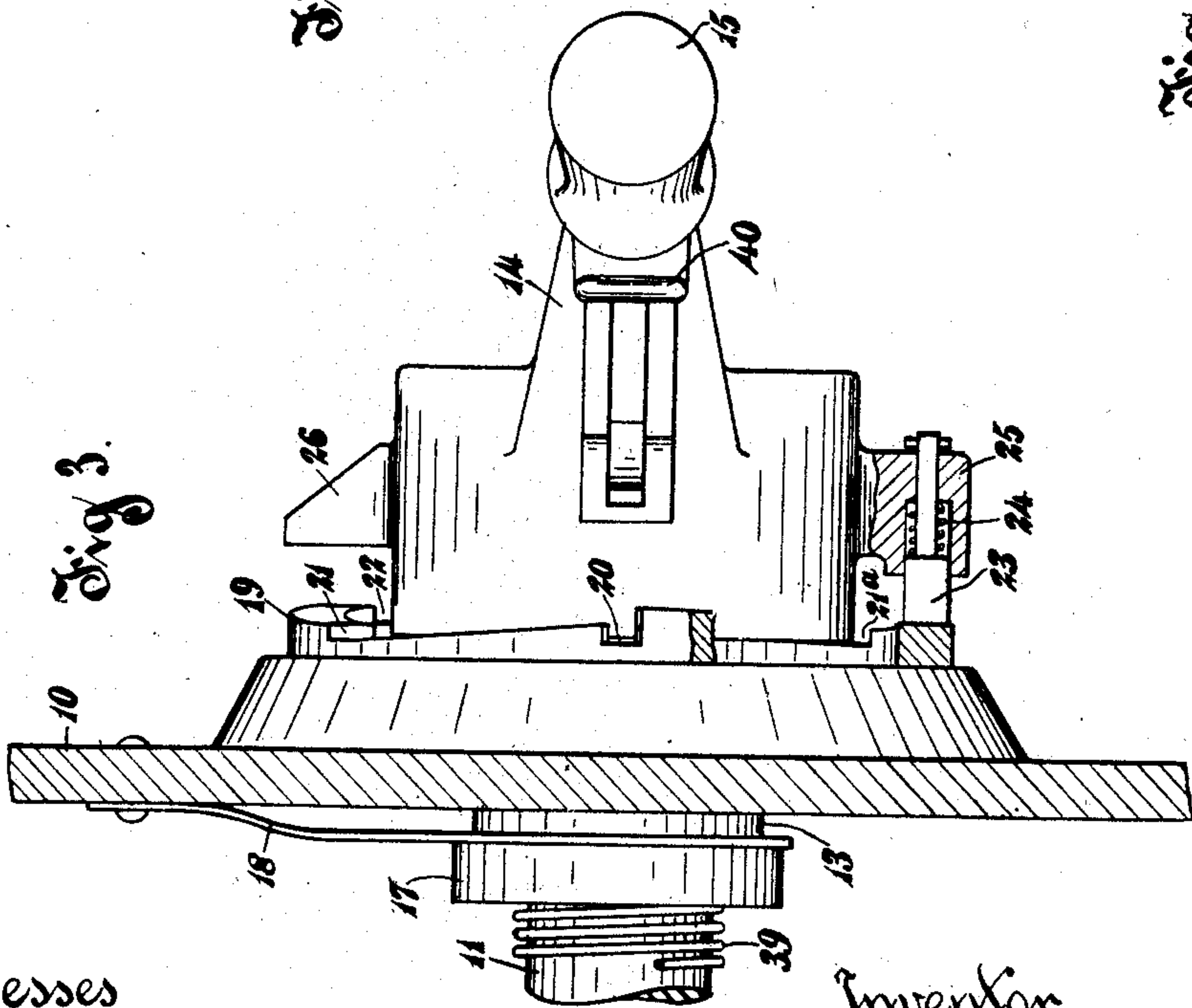


Fig. 6



Fig. 7

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UNITED STATES PATENT OFFICE.

GEORGE B. SCHLEY, OF NORWOOD, OHIO, ASSIGNOR TO ALLIS-CHALMERS COMPANY, A CORPORATION OF NEW JERSEY, AND THE BULLOCK ELECTRIC MANUFACTURING COMPANY, A CORPORATION OF OHIO.

CONTROLLER.

No. 886,733.

Specification of Letters Patent.

Patented May 5, 1908.

Application filed December 31, 1906. Serial No. 350,130.

To all whom it may concern:

Be it known that I, GEORGE B. SCHLEY, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Controllers, of which the following is a full, clear, and exact specification.

My invention relates to starting controllers for electric motors, and particularly to devices for rendering such controllers fool-proof.

In operating starting devices for some types of motors, especially in potential starters for induction motors, it is often undesirable that the controller be moved backward from a "running" to a "starting" position. To this end controllers have been designed which move directly from the "running" to the "off" position without passing through the "starting" positions, and in which means are provided for preventing the controller from being moved backward from a "running" to a "starting" position, or from an "off" position directly to a "running" position, while allowing a backward movement of the controller from any "starting" position. It is possible however for controllers such as these to be left in a "starting" position indefinitely instead of being moved to a "running" position as soon as the motor has gained sufficient speed. As the various windings which are connected in circuit when the controller is in a "starting" position may not be proportioned to carry current continuously but only for a brief period during starting, the result of leaving the controller indefinitely in a "starting" position may be to cause such windings to be burned out.

In the co-pending application of Herbert W. Cheney Serial No. 324,128, filed June 30, 1906, a device is shown whereby it is made impossible for an operator to leave the controller in a "starting" position, arrangements being made whereby the controller is automatically moved backward to "off" position if it is released by the operator while it is in a "starting" position.

My present invention is intended to be an improvement on the device set forth in said application, and is especially applicable to the larger sizes of controllers where it would perhaps be undesirable to have a spring which, while necessarily strong enough to move the controller, must be put under strain by the operator in the same movement

which operates the controller. Moreover with my arrangement there is no sudden diminution of the resistance to be overcome by the operator as the controller is moved to a "running" position, and therefore no tendency to involuntarily "overrun" such position.

In one aspect my invention consists of a controller unbiased while properly held by the operator, but biased toward "off" position when released by the operator in a predetermined position.

In a more specific aspect my invention consists of a controller for an electric motor, comprising a rotatable drum, contact fingers coöperating therewith, an operating handle for said drum, a spring which exerts no influence on said drum except when the operating handle is released while the controller is in a predetermined position, when it tends to move said controller to "off" position.

Other features of my invention will appear hereinafter and will be particularly pointed out in the claims.

Figure 1 is a partial section on the line 1—1 of Fig. 2, the controller being in "off" position; Fig. 2 is a section on the line 2—2 of Fig. 1; Fig. 3 is an enlarged partial section on the line 3—3 of Fig. 4, the controller handle being pulled out to its limit of movement and turned through 90°; Fig. 4 is a partial front elevation of the controller of Fig. 1, the parts being shown in "off" position. Fig. 5 is a view showing the cut-away disk for locking and releasing the handle-returning device; and Fig. 6 is a development of the notched ring shown in Fig. 3.

The details of the starting controller proper will not be fully described or shown herein because they form no part of the present invention and are unnecessary to an understanding thereof. For what does not appear in the following description, reference is made to the aforesaid co-pending application.

Referring now to the figures of the drawings 10 is the controller casing within which is a controller drum A of any desired construction. The operating mechanism here shown is especially designed for a controller drum having duplicate halves, respectively co-acting with two sets of diametrically opposite contact fingers during one complete operation of the controller and with the opposite sets during the next complete operation thereof. Such a controller has dupli-

cate "off", "starting" and "running" positions as indicated in Fig. 4. The controller here shown passes through but one "starting" position between the "off" and the "running" positions, though any desired number of "starting" positions may be used. In the arrangement shown analogous positions are 180° apart. The particular construction and arrangement of the controller drum, however, forms no part of my invention, which is equally applicable to controllers having but one "off" and one "running" position with any desired number of "starting" positions between them.

The controller drum A is driven from an operating shaft 11 in any desired manner as through gears 12. The shaft 11 is journaled in a bearing 13, here shown integral with the frame or casting 10. Mounted on the outer end of the shaft 11 is the operating handle 14, which, as best shown in Figs. 2 and 4, is secured at its center to said shaft and is provided with two hand grips 15 and 16. As here shown the handle 14 is vertical when the controller is in "off" position. The shaft 11 carries a collar 17. The distance between this collar and the base of the handle 14 is slightly greater than the length of the bearing 13, so that there can be a slight longitudinal movement of the shaft 11. A leaf-spring 18 normally maintains the shaft and its attached parts in their innermost position (see Fig. 2) from which they can be moved outwardly by pulling out the handle 14 until the collar 17, spring 18 and the bearing 13 are all in contact (see Fig. 3).

Integral with the frame 10 and surrounding the shaft 11 and bearing 13 is a ring 19. This ring is provided with three pairs of notches 20 and 20^a, 21 and 21^a, and 22 and 22^a, the notches of each pair being located diametrically opposite each other. These notches are adapted to be engaged by a sliding pawl or plunger 23 pressed by a spring 24 into engagement therewith. The plunger 23 is mounted in an extension 25 from the handle 14. This extension also serves as a pointer to indicate the position of the controller, there being another extension 26 which also serves as a pointer and may or may not contain a spring-pressed plunger similar to 23. The three pairs of notches above referred to indicate respectively the "off", "starting" and "running" positions of the controller.

The ring 19 is constructed so that between certain of the notches, as between 21 and 22, 22 and 20^a, 21^a and 22^a, and 22^a and 20, ratchet teeth are formed to prevent backward movement of the controller, while between the remaining notches lower ratchet teeth facing in the other direction are formed. All of the notches on that side toward the next position in a forward or clockwise direction are of the same height,

which is such that the plunger 23 may be lifted over said sides by pulling out the handle 14 to its limit of movement. The notches 21 and 21^a have that side toward the next position in the backward or counter-clockwise direction cut away to form the low sides of the low ratchet teeth; while the notches 20, 22, 20^a and 22^a have the side toward the next backward position of such height that the plunger 23 cannot be lifted to clear them by pulling out the handle 14 to allow a backward movement, but can be raised over them, compressing the spring 24, in the forward movement by the inclined-plane action of the surfaces approaching said notches in a forward or clock-wise direction. With the arrangements just described a controller can be moved forward from any position upon pulling out the handle 14. From the "off" and "running" positions, backward movement is impossible because of the height of the rear sides of the notches 20, 22, 20^a and 22^a. From the "starting" positions backward movement is possible without pulling out the handle 14.

Mounted on the shaft 11 is another collar 27 having projections 28 and 29. A lever 30 is pivoted at 31 and is so arranged that its free end travels through the same path as the projections 28 and 29. The lever 30 is biased toward the right (Fig. 1) by a spring 32, its movement in this direction being limited by a stop 30^a, and may be moved toward the left against the spring 32 by a handle 33. The lever 30 carries a spring latch 34 arranged to be engaged by a latch 35 when said lever is moved to the position shown in full lines in Fig. 1, to hold the lever in such position against the action of the spring 32. A spring 36 tends to move the latch 35 out of engagement with the latch 34. A sliding rod 37 is attached to the latch 35, the other end of the rod 37 engaging a cut-away disk 38 carried by the shaft 11 but longitudinally movable relatively thereto. A spring 39 normally presses the disk 38 against the collar 27. By means of grip levers 40 adjacent to the grips 15 and 16 and connected to the disk 38 through links 41 and bell-crank levers 42, the disk 38 may be moved along the shaft 11 to the right (Fig. 2), against the action of the spring 39. This movement is preferably greater than that due to the longitudinal movement of the shaft 11 caused by pulling the handle 14 bodily outward.

The disk 38 is cut away, as best shown in Fig. 5, to form a continuous ring 43 and a notched ring 44 having notches 45. Unless the grip levers 40 are pressed, the end of the rod 37 bears against the ring 44 whether the handle 14 is in its normal position or pulled out. If the grip levers 40 are pressed the end of rod 37 bears against the ring 43 whether the handle 14 is in its normal position or pulled out. The ring 44 is not cut-away at

the "off" or the "running" position, but is cut away at the "starting" positions and around nearly to the "off" and "running" positions on either side of the respective "starting" positions as shown. The places on the disk 38 where the end of rod 37 engages it in the various controller positions are indicated in Fig. 5.

The operation of the device is as follows:—
 10 When the controller is in "off" position and the lever 30 has not been set, the end of said lever is directly in the path of the projection 28 or 29 and prevents forward movement of the drum. Backward movement of the
 15 drum is prevented by the high sides of the notch 20 or 20^a. Thus before moving the controller it is necessary to set the lever 30 by moving the handle 33 to the right (Fig. 1) and causing the latches 34 and 35 to engage
 20 to hold said lever in such position. At this time the end of the rod 37 engages that part of the ring 44 which is not cut-away. If the lever 30 is set, as shown in full lines in Fig. 1, the controller may be moved forward or in a
 25 clockwise direction after first drawing out the handle 14 to raise the plunger 24 above the low side of one of the notches 20 or 20^a. In thus drawing out the handle 14 it is natural to press or squeeze the levers 40, thus mov-
 30 ing the disk 38 to bring the ring 43 under the end of the lever 37. When the controller is moved into "starting" position the ring 43 slides under the end of the rod 37 and brings the notches 45 adjacent to said rod. But the
 35 rod does not drop into said notches as long as the grip levers 40 are firmly grasped by the operator. Upon reaching the "starting" position the operator may let the handle 14 slide inward but must maintain his grasp
 40 upon the grips 15 and 16 together with the grip levers 40. At this time there is no tendency for the controller to move backward or forward. If the operator releases the grip levers 40 when the controller is in
 45 "starting" position, or does not press them in moving forward from the "off" position, the end of rod 37 drops down into the notches 45, and the latches 34 and 35 separate to allow the spring 32 to move the lever 30 to the
 50 right (Fig. 1). In this movement the lever 30 strikes the projection 28 or 29 and carries the controller backward to "off" position, from which it cannot be moved again until the lever 30 is reset. In this automatic back-
 55 ward movement of the controller the end of the rod 37 rides up the inclined plane at the end of the notch 45. If the operator does not release his grasp on the grips 15 and 16 and the grip levers 40 while the controller is
 60 in "starting" position, but after a sufficient time again pulls out the handle 14 and moves the controller forward to the "running" position, he can then release the handle 14 entirely. When the handle is thus released
 65 with the controller in "running" position,

the end of rod 37 slides from the ring 43 to the portions of the ring 44 which are not cut away and so the lever 30 is not released. On pulling out the handle 14 the controller may now be moved forward from the "running" 70 position to the "off" position to disconnect the motor or other apparatus to be controlled. From the "off" position, the cycle above described may be repeated. The controller cannot be moved backward from either the 75 "off" or the "running" positions because of the high side of the notches corresponding to such positions.

With my invention there is no tendency for the controller to move backward as long 80 as the operator properly grasps the handle, nor does the operator have to overcome the tension of a spring strong enough to move the controller backward to "off" position. Moreover there is no sudden diminution in 85 the opposition to the forward movement of the controller as it reaches the "running" position and so there is no tendency to over-run such position.

Many modifications may be made in the 90 precise arrangements herein shown and described and all such which come within the spirit and scope of my invention I aim to cover in the following claims.

What I claim as new is:—

1. A controller unbiased while its operating handle is properly grasped by the operator, but biased toward "off" position when its operating handle is released by the operator when the controller is in a "start- 95 ing" position. 100

2. A controller for electric motors, comprising fixed and movable contacts, and an operating handle, said movable contact being unbiased except when its operating 105 handle is released with said contact in a predetermined position, when it is biased toward "off" position.

3. In a controller, contact fingers, a rotatable drum co-acting therewith, said drum 110 having "off", "starting" and "running" positions, an operating handle for said drum, and a spring which tends to move said drum to "off" position when the handle is released when the drum is in "starting" posi- 115 tion but exerts no influence on said drum when the latter is in other operative positions.

4. In a controller, contact fingers, a rotatable drum coöperating therewith, said 120 drum having "off", "starting" and "running" positions, an operating handle for said drum, and a spring which tends to move said drum to "off" position only when the handle is released when the drum is not in 125 "off" or "running" position.

5. In a controller, contact fingers, a rotatable drum coöperating therewith, an oper- 130 ating handle for said drum, and a spring which tends to move said drum to "off"

position only when the handle is released when the drum is in predetermined positions.

6. In a controller, a rotatable drum, fixed contact with which said drum coöperates, an operating handle for said drum, and means whereby said drum is biased toward "off" position when said handle is released in certain operative positions of said drum, but is unbiased when in certain other operative positions and when said handle is not released in the first mentioned positions of said drum.

7. A controller for electric motors comprising a rotatable drum, fixed contacts co-operating therewith, and an operating handle for said drum, said drum being biased toward "off" position when said handle is released with said drum in any "starting" position, but unbiased in "running" position and also in the "starting" position when said handle is not released.

8. A controller biased toward "off" position when its operating handle is released with the controller in a predetermined position, but unbiased when its operating handle is not so released.

9. A controller for electric motors, comprising a rotatable drum, contact fingers co-operating therewith, means for preventing backward movement of said drum from the "off" and "running" positions, an operating handle for said drum, and a spring which has no tendency to move the drum when the drum is in "off" or "running" position or when said handle is held by the operator when the drum is in any other operative position, but which tends to move said drum to "off" position when said handle is released by the operator when the drum is in any of said other operative positions.

10. A controller for electric motors, comprising a rotatable drum, contact fingers co-operating therewith, means for preventing backward movement of the drum from certain positions, an operating handle for said drum, and a spring which tends to move the drum to "off" position only when the handle is released when the drum is in a position from which it may be moved backward.

11. A controller for electric motors, comprising a rotatable drum, contact fingers co-operating therewith, an operating handle for said drum, a collar movable with said drum, a projection from said collar, and a spring-pressed lever which travels in the same path as said projection and is arranged to engage it to return the drum to "off" position only when said handle is released in predetermined positions of said drum.

12. A controller for electric motors, comprising a rotatable drum, contact fingers co-operating therewith, an operating handle for said drum, a collar movable with said drum,

projections from said collar, a spring-pressed lever which moves in the same path as said projections and is arranged to engage one of them to return the drum to "off" position when said handle is released with said drum in a "starting" position, and a latch which holds said spring-pressed lever out of the path of said projection when the drum is in a "running" position.

13. A controller for electric motors, comprising a rotatable drum normally movable always in the same direction, an operating handle for said drum, means for preventing backward movement of said drum from "off" or "running" position, and means which tend to move said drum backward to "off" position only when said handle is released when said drum is in other than "off" or "running" position.

14. A controller for electric motors, comprising a rotatable drum, contact fingers co-operating therewith, an operating handle for said drum, a collar movable with said drum, a projection from said collar, and a spring-pressed lever which travels in the same path as said projection and is arranged to engage it to move the drum to "off" position if said handle is released when said drum is in a "starting" position, the lever and the projection being so arranged that movement of the drum from "off" position is prevented unless said lever is moved out of the path of said projection.

15. A controller for electric motors, comprising a rotatable drum, contact fingers co-operating therewith, an operating handle for said drum, a spring-pressed lever, and means for locking said lever with the spring under tension save when the handle is released with said drum in a "starting" position, said lever being arranged when unlocked to move the drum to "off" position.

16. A controller for electric motors, comprising a rotatable drum, contact fingers co-operating therewith, an operating handle for said drum, a spring-pressed lever, and means for locking said lever with the spring under tension save when the handle is released when said drum is in a "starting" position, said lever being arranged to move the drum to "off" position upon being unlocked and to prevent movement of the drum from "off" position when unlocked.

17. A controller for electric motors, comprising a rotatable drum, an operating handle for said drum, means which tend to move said drum to "off" position when said handle is released when said drum is in certain positions, and means for locking said returning means when the handle is not released when said drum is in said positions.

18. A controller for electric motors, comprising a rotatable drum, an operating handle for said drum, means which tend to move said drum to "off" position when said handle

is released with the drum in certain positions, and means for locking said returning means when the handle is not released with said drum in said positions, the returning means
5 when not locked being arranged to prevent movement of the drum from "off" position.

19. A controller for an electric motor, comprising a rotatable drum, contact fingers co-operating therewith, an operating handle for
10 said drum, a spring which exerts no influence

on said drum except when the operating handle is released while the drum is in a predetermined position, when it tends to move said drum to "off" position.

In testimony whereof I affix my signature, 15
in the presence of two witnesses.

GEORGE B. SCHLEY.

Witnesses:

RUBY ROBINSON,
FRED J. KINSEY.