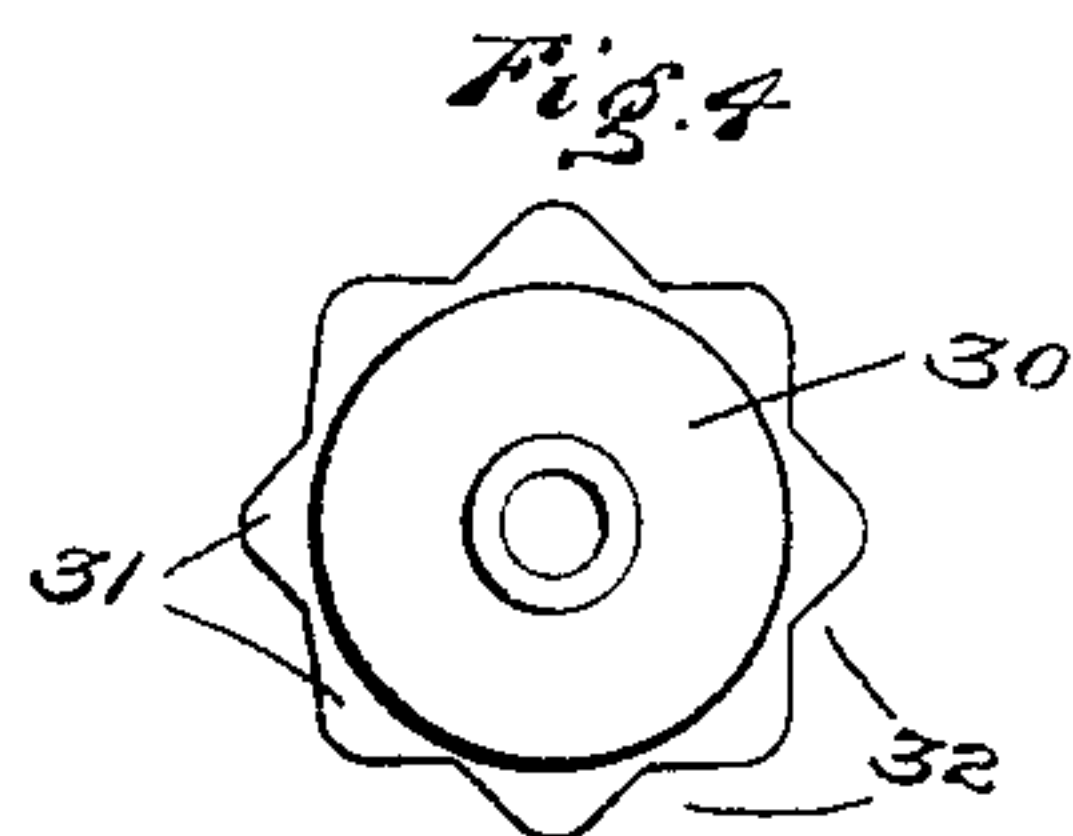
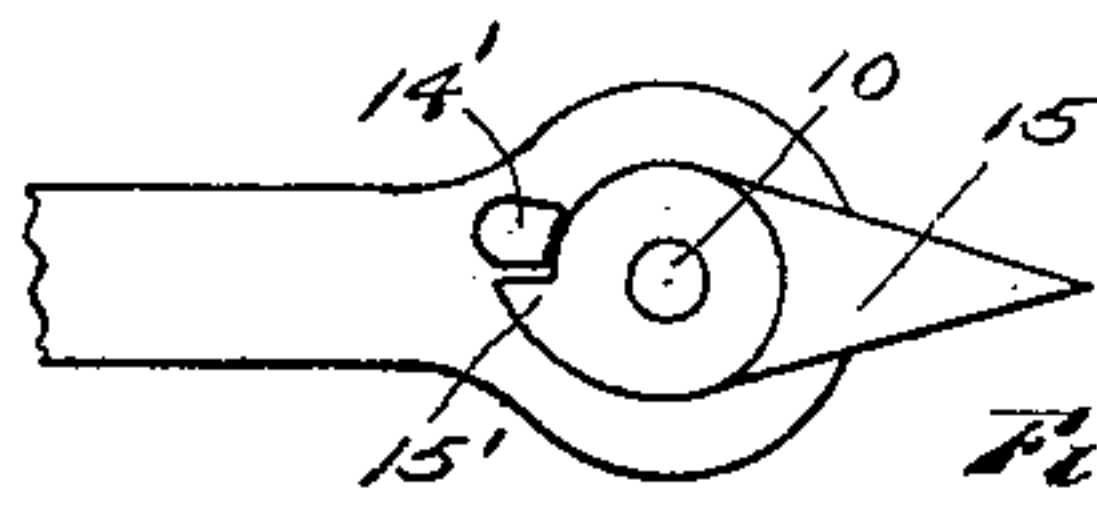
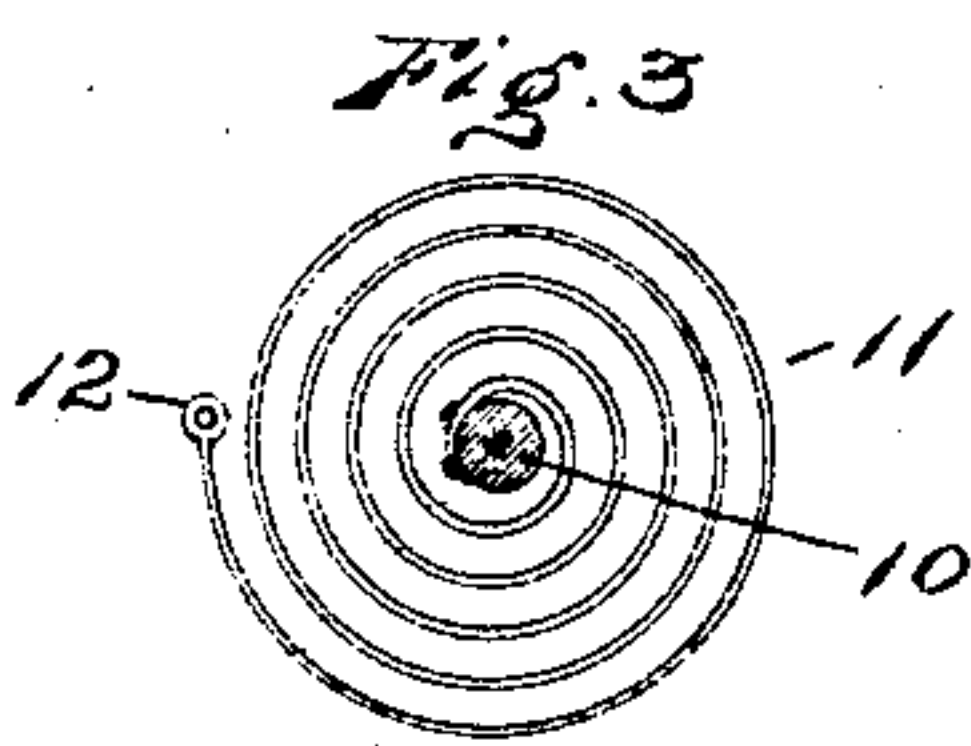
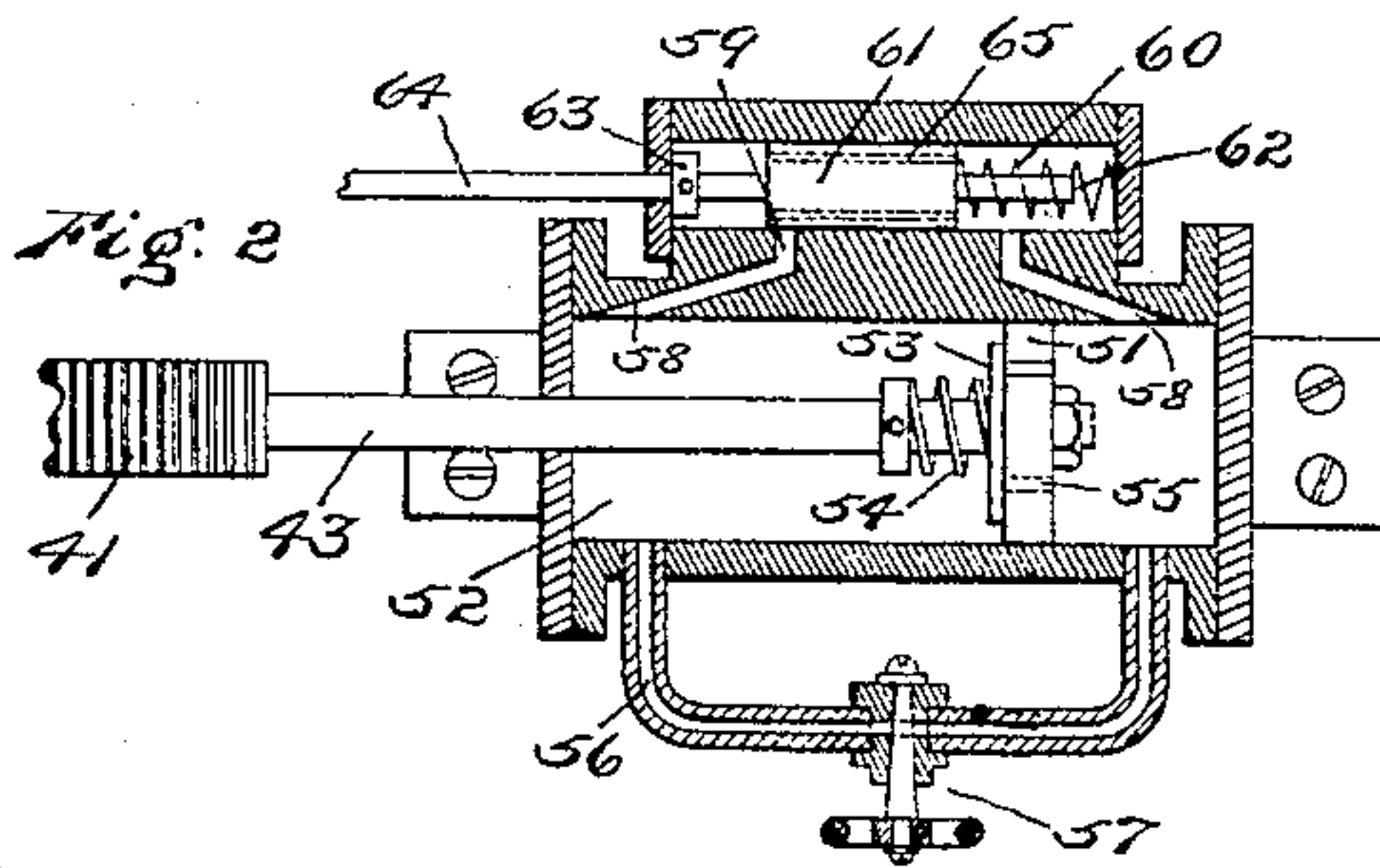
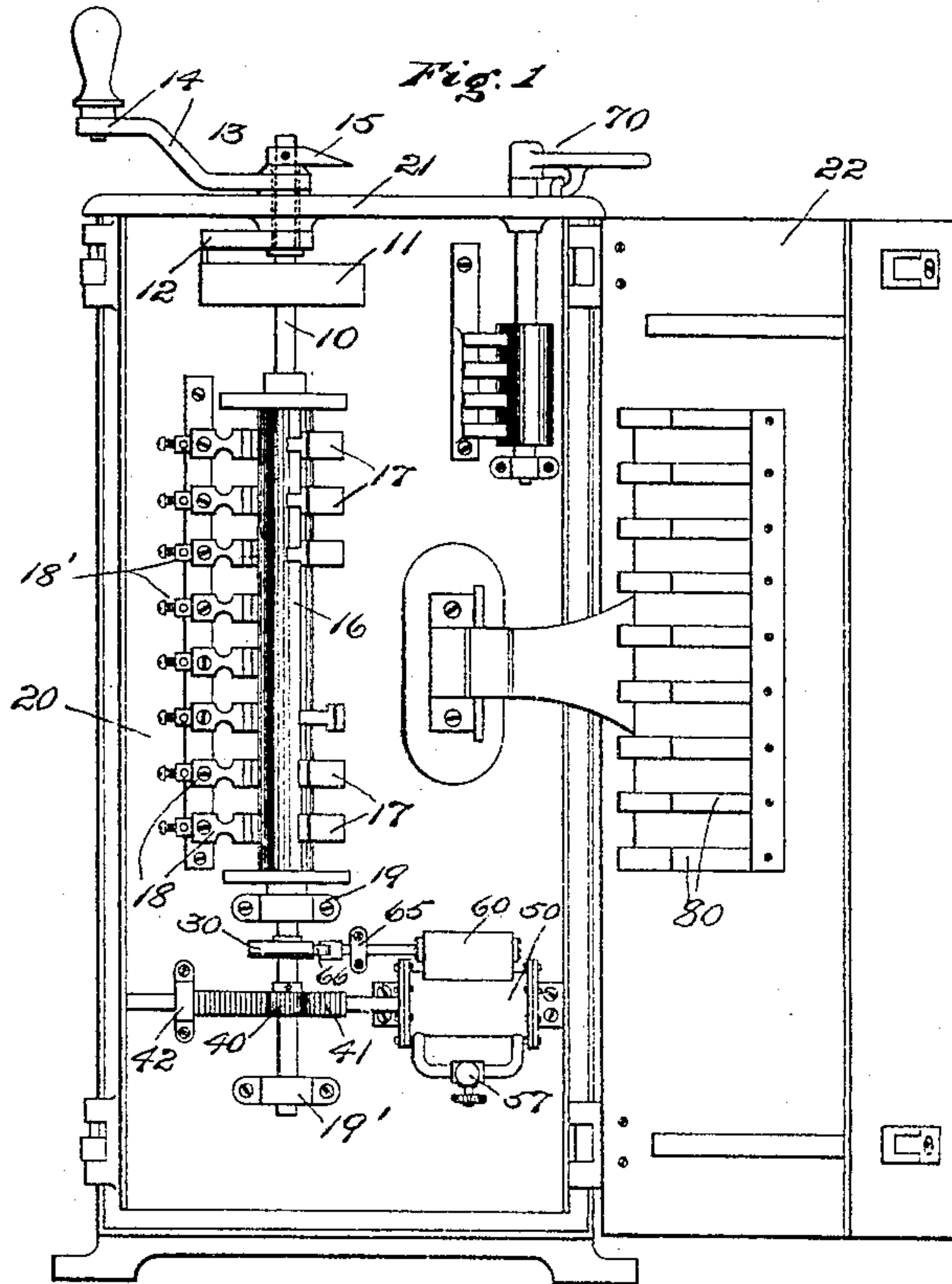


No. 772,067.

PATENTED OCT. 11, 1904.

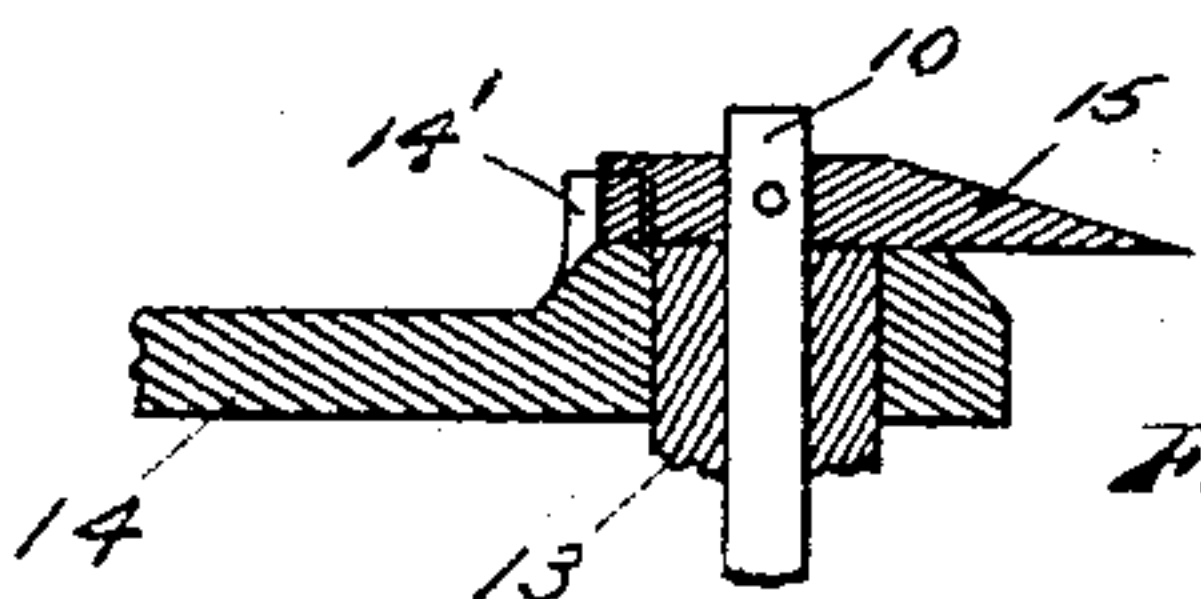
A. SUNDH.
ELECTRIC CONTROLLER.
APPLICATION FILED JULY 20, 1904.

NO MODEL.



WITNESSES:

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AUGUST SUNDH, OF YONKERS, NEW YORK, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF EAST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ELECTRIC CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 772,067, dated October 11, 1904.

Application filed July 20, 1904. Serial No. 217,402. (No model.)

To all whom it may concern:

Be it known that I, AUGUST SUNDH, a citizen of the United States, and a resident of Yonkers, county of Westchester, State of New York, have invented certain new and useful Improvements in Electric Controllers, of which the following is a specification.

My invention relates to that type of controllers which is used for starting, stopping, and reversing the rotation of electric motors for cranes, cars, elevators, or similar apparatus; and its object is to provide a simple device for automatically regulating the action of such controllers.

I will describe a controller built according to my invention and point out the novel features thereof in claims.

Referring to the drawings, Figure 1 represents a side elevation of a controller built according to my invention with its cover open, showing the various parts exposed to view. Fig. 2 is an enlarged sectional elevation showing in detail a mechanism used for carrying out this invention. Fig. 3 is a plan view of a spring; and Fig. 4 a plan view of a cam, both of which are attached to the operating-shaft of the drum. Figs. 5 and 6 show a detail of construction in sectional elevation and in plan view, respectively.

Like characters of reference designate corresponding parts in all of the figures.

10 designates an operating-shaft. 11 designates a spring one end of which is attached to this operating-shaft and the other end of which is attached at 12 to a lever which is securely attached at its other end to a collar 13, which revolves in the top 21 of the casing 20 of the controller. An operating-handle 14 is attached to this collar 13 above the top of the casing of the controller, and a pointer or indicator 15 is attached to the operating-shaft 10.

16 designates a drum of insulating material, upon which are attached contacts 17. These contacts are adapted to be moved into contact with stationary contacts 18, which are mounted upon but insulated from the casing 20 of the controller. These stationary contacts are provided with winding-posts 18', to which wires may be attached.

70 designates a reversing-switch which is mounted upon the casing 20. 80 designates a series of insulating-blocks which are attached to the hinged cover 22 of the casing 20 and are adapted to be interposed between the contacts 17 and 18 when the cover is closed. Both of these features are well known and as they form no part of my invention I will not describe them further.

Near the lower end of the operating-shaft 10 two bearings 19 and 19' are provided for supporting and guiding the shaft 10, with the various mechanisms which are attached thereto. Below the insulating-drum, which carries the contacts 17, a cam 30 is securely attached to the operating-shaft 10. This cam comprises a series of projections 31 and depressions 32, as is shown clearly in Fig. 4.

40 designates a pinion which is securely attached to the operating-shaft below the cam 30 and which is adapted to work in a rack 41. One end of this rack is supported in a bearing 42, which is mounted upon the casing 20, and its other end is attached to the piston-rod 43 of a dash-pot 50. This dash-pot is of special construction, which is clearly shown in Fig. 2. Its piston 51 slides in a cylinder 52, which may contain any desired fluid. It is provided with a valve 53, which is pressed against one of its surfaces by a spring 54. This valve closes one or more holes 55, which are provided in the piston when the latter is at rest or is being moved to the left, but will be released and allow the fluid to pass freely through the holes 55 when the piston is moved back to the right. In this way the dash-pot will have a retarding effect when it is moved to the left, but will not have a retarding effect in the opposite direction, as the passage of the fluid through the holes 55 will allow it to move freely. There are two by-passes from one end of the cylinder 52 to the other provided, one of which, 56, is provided with a regulating-valve 57, the other of which, 58, passes through another cylinder, 60, in which a piston-valve 61 is provided. This piston-valve is normally pressed to the left by a spring 62 until its movement is stopped by a collar 63, which is attached to its piston-rod

64. While the piston-valve is thus pressed to the left it closes the by-pass 58. The piston-valve is provided with longitudinal openings 65, which permit a free circulation of fluid through it. When the piston-valve 61 is pushed to the right against the spring 62, it uncovers the port 59 of the by-pass 58. This allows the fluid in the cylinder 52 to pass freely through the by-pass 58 and piston-valve 61, so that the retarding effect of the dash-pot is destroyed whenever the port 59 is uncovered. The piston-rod 64 extends through a bearing 65, mounted upon the casing 20, and is provided at its outer end with a roller 66, which is adapted to coact with the cam 30. When this roller is opposite one of the depressions 32 of the cam 30, the spring 62 will move the piston-valve 61 to the left, so that port 59 of the by-pass 58 will be closed. As soon as the cam is rotated until one of its projections 31 is opposite the roller 66 it will push the latter to the right. This in turn will cause the piston-valve 61 to be moved to the right, so that the port 59 will be uncovered and the by-pass 58 will be opened.

The operation of this device is as follows: Whenever the operator desires to move the contacts 17 of the controller, he moves the handle 14 and compresses the spring 11. This spring, as we have already shown, is attached to the operating-shaft 10, and when it is thus put under compression it has a tendency to move the insulating-drum 16, with its attached contacts. This movement of the drum 16 will be retarded by the action of the dash-pot 50 until a circuit is closed between one of the contacts 17 and its opposed stationary contact 18. It is desirable to have the contacts move quickly over the point of breaking the circuit and slowly between the points of making contact. This is accomplished by means of the dash-pot of special construction and its connected mechanisms, which I have described. At such point of breaking contact one of the projections 31 of the cam 30 will be moved against the roller 66 and will cause the piston-valve 61 to open the by-pass 58. This, I have shown, will take away the retarding effect of the dash-pot, so that the drum 16 and its contacts 17 will move quickly. This movement will cause the projection 31 of the cam to be removed from the roller 66, so that the latter will be pushed into one of the depressions 32 of the cam by the spring 60. The by-pass 58 of the dash-pot will therefore be closed and the dash-pot again have its retarding effect until another circuit is closed between one of the movable contacts 17 and its opposed stationary contact 18. Further movement of the insulating-drum 16 and its contacts 17 will be similarly made quickly and slowly, as desired, because of the relative position of the projections and depressions of the cam 30 and the position of the contacts 17 on the drum 16. In this way the rate of

movement of the controller is taken away from the control of the operator, so that this controller is what may be called "semi-automatic." The operator simply turns the handle in the direction for closing the circuits; but the rate of movement of the controller itself depends on the action of the spring 11 and the dash-pot 50, so that the steps between the contacts and the movement of the controller will be made slowly at the desired rate of speed, which may be regulated by means of the valve 57; but the movement of the controller at the points of breaking circuits will be rapid. The pointer 15 is attached to the shaft 10, which is carried up through the top of the controller, so that the operator may see the exact position of the insulating-drum and its contacts inside of the controller. When the operator desires to shut off the current, he may do so by returning the handle to its initial position. A lug 14' is provided on the handle-lever 14 and a stop 15' on the pointer 15, which is attached to the shaft 10, so that the shaft 10 may be returned positively by means of the handle 14. This arrangement provides a controller which will always be moved at the desired rate of speed, and this insures the proper operation of the motor or other apparatus to which it is connected.

This invention is peculiarly adaptable for use in connection with electrical capstans, such as that described in Patent No. 700,470, issued to William D. Baldwin and myself on the 20th of May, 1902. In some of these cases it is desirable to place the controller under the floor and operate it by foot. In such cases the hand-lever may be replaced by other suitable mechanism.

I do not mean to restrict the use of this invention to electric controllers, as it may be applied to any device where it is desired to apply a varying retarding effect to a rotating shaft and to vary the retarding effect automatically by the movement of the shaft itself.

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

1. The combination with an electrical controller having a rotary shaft provided with contacts, and stationary contacts in the controller coöperating with said rotary contacts, of a retarding device connected to the said rotary shaft and means controlled by such shaft modifying the effect of the retarding device.

2. The combination with an electrical controller having a rotary shaft provided with contacts, and a casing having stationary contacts coöperating with the movable contacts, of a retarding device controlling the rate of movement of the shaft, and means controlled by such shaft for changing the rate of movement of said retarding device.

3. The combination with an electrical controller provided with stationary and movable

contacts coöperating with each other, of a retarding device controlling the rate of movement of the movable contacts and automatic means controlled by the movement of the contacts and operating at predetermined periods to modify the effect of the retarding device.

4. The combination with an electrical controller provided with stationary and movable contacts coöperating with each other of a dash-pot for controlling the rate of movement of the movable contacts, a by-pass for such dash-pot and automatic means for opening and closing the by-pass at predetermined points of movement of the movable contacts.

5. The combination with an electrical controller having a rotary shaft provided with contacts, and stationary contacts in the controller with which the rotary contacts coöperate, of a retarding device connected to the said rotary shaft, a cam attached to the shaft and arranged to act upon the retarding device to modify its effect at predetermined points of the rotation of the shaft.

6. The combination with an electrical controller having a rotary shaft provided with contacts definitely spaced about it, and stationary contacts in the controller with which the rotary contacts coöperate, of a dash-pot having a by-pass to change its retarding effect, said dash-pot being connected to the rotary shaft, a cam attached to the shaft and arranged to open and close the by-pass of the dash-pot at predetermined points of the rotation of the shaft.

7. The combination with an electrical controller having a rotary shaft provided with contacts definitely spaced about it, and stationary contacts in the controller with which the rotary contacts coöperate, of a dash-pot having a retarding effect in one direction and provided with two by-passes, one of which is provided with means for regulating the retarding effect of the dash-pot and the other of which is provided with a valve for opening and closing the by-pass in which it is placed, said dash-pot being connected to the rotary shaft, a cam attached to the shaft and arranged to operate the valve at predetermined points of the rotation of the shaft.

8. The combination with an electrical controller having a rotary shaft provided with contacts definitely spaced about it, and stationary contacts in the controller with which the rotary contacts coöperate, of a spring attached to the shaft, a hand-lever attached to the spring, a dash-pot provided with a by-pass and a valve which normally closes the by-pass, said dash-pot being connected to the rotary shaft, a cam attached to the shaft and arranged to cause the valve to open the by-pass at predetermined points of the rotation of the shaft.

9. The combination with an electrical controller having a rotary shaft carrying contacts definitely spaced about it, stationary contacts

in the controller with which the rotary contacts coöperate, a spring attached to the shaft, a hand-lever attached to the spring and connected to the shaft and arranged to accomplish a movement of the shaft by means of the hand-lever through the intervention of the spring in one direction and positively in the other direction, a dash-pot provided with a by-pass and a valve which normally closes the by-pass, said dash-pot being connected to the rotary shaft, a cam attached to the shaft which causes the valve to open the by-pass at predetermined points of the rotation of the shaft.

10. The combination with an electrical controller having a rotary shaft carrying contacts definitely spaced about it, stationary contacts in the controller with which the rotary contacts coöperate, a spring attached to the shaft, a hand-lever attached to the spring, a dash-pot provided with a by-pass and a valve adapted to open and close the by-pass and a spring which normally keeps the valve in closed position, said dash-pot being connected to the rotary shaft, a cam attached to the shaft which opens the valve against the action of the spring at predetermined points of the rotation of the shaft.

11. The combination with an electrical controller having a rotary shaft carrying contacts definitely spaced about it, stationary contacts in the controller with which the rotary contacts coöperate, a spring attached to the shaft, a hand-lever attached to the spring and connected to the shaft and arranged to accomplish a movement of the shaft by means of the hand-lever through the intervention of the spring in one direction and positively in the other direction, a dash-pot provided with a by-pass and a valve adapted to open and close the by-pass and a spring which normally keeps the valve in closed position, said dash-pot being connected to the rotary shaft, a cam attached to the shaft which opens the valve against the action of the spring at predetermined points of the rotation of the shaft.

12. The combination with an electrical controller having a rotary shaft carrying contacts definitely spaced about it, stationary contacts in the controller with which the rotary contacts coöperate, a spring attached to the shaft, a hand-lever attached to the spring and connected to the shaft and arranged to accomplish a movement of the shaft by means of the hand-lever through the intervention of the spring in one direction and positively in the other direction, a pointer attached to the shaft, a dash-pot provided with a by-pass and a valve adapted to open and close the by-pass and a spring which normally keeps the valve in closed position, said dash-pot being connected to the rotary shaft, a cam attached to the shaft which opens the valve against the action of the spring at predetermined points of the rotation of the shaft.

13. The combination with a movable shaft
of a retarding device controlling the rate of
movement of the shaft and automatic means
controlled by the movement of the shaft for
5 modifying the effect of the retarding device
at predetermined points of the movement of
the shaft.

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

AUGUST SUNDH.

Witnesses:

ERNEST W. MARSHALL,
HENRY E. KIRBY.