

1,126,384.

Fig. 1.

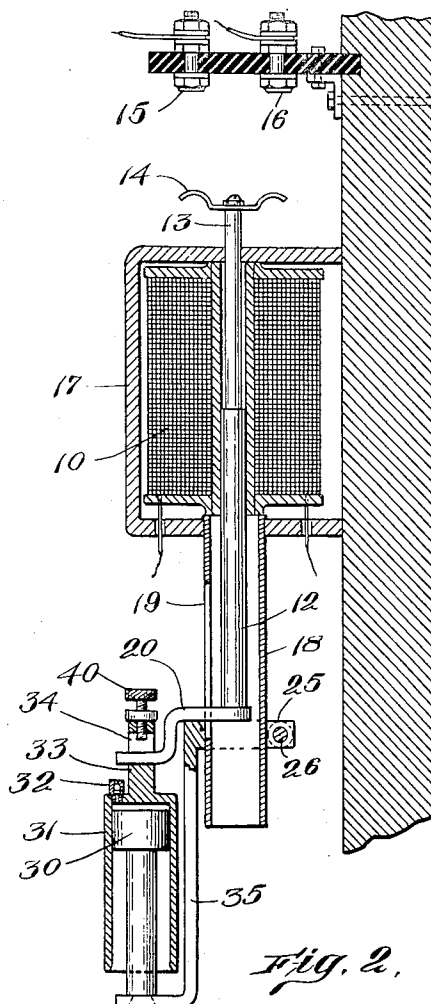


Fig. 2.

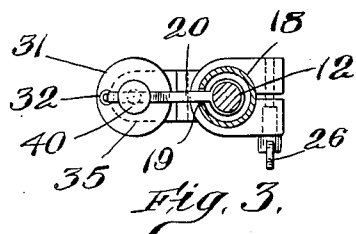


Fig. 3.

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UNITED STATES PATENT OFFICE.

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TIME-CONTROLLED TRIPPING-COIL.

1,126,384.

Specification of Letters Patent.

Patented Jan. 26, 1915.

Application filed May 4, 1912. Serial No. 695,019.

To all whom it may concern:

Be it known that I, GEORGE A. BURNHAM, a citizen of the United States, residing at Saugus, in the county of Essex and State of Massachusetts, have invented an Improvement in Time-Controlled Tripping-Coils, of which the following is a specification.

This invention relates to time controllers for electro-magnets employed as tripping-coils or other forms of electro-magnetically operated circuit-controllers. Prior to this invention numerous forms of time controllers for electro-magnet have been made involving various forms of retarding-devices connected with the armature of the magnet-coil, although usually the retarding-devices have been of the bellows or dash-pot type. In practice it is necessary to vary the retractile position of the magnet-armature so that it will start to operate upon different current-values or loads, such variation being usually termed "calibrating" the tripping-coil. So far as I am aware it has not been possible to effect this adjustment in a tripping-coil of the type wherein the time-controller is connected with the armature of the magnet-coil without changing the time of operation of the time controller, hence adjustable means have been provided for the time controller whereby it may be adjusted to compensate for adjustment of the magnet-armature, and each and every time the magnet-armature is adjusted the time-controller must be correspondingly adjusted; otherwise the apparatus is entirely inadequate for the purposes for which it is designed.

One of the objects of this invention is to provide a time-controller and adjustable means for the magnet-armature which are connected together so that whenever the magnet-armature is adjusted the time-controller will be correspondingly adjusted, thus avoiding the necessity of providing separate adjusting-means for the time-controller which must be operated each and every time the magnet-armature is adjusted. It is also necessary to provide for varying the length of time consumed by the circuit-controller in operating; and another object of the invention is to provide the time-controller with adjusting-means, which may be operated separately from and without interfering with the adjustment or setting of the magnet-armature, thus to provide for such variable lengths of time.

Figure 1 is a side elevation of a tripping coil with a time controller embodying this invention. Fig. 2 is a vertical section of the same. Fig. 3 is a transverse section taken on the dotted line 3—3, Fig. 1.

10 represents a magnet-coil of the solenoid type; 12 its armature or core; 13 a rod attached to the armature bearing the movable member 14 of a circuit-controller, and 15, 16, the stationary members of the circuit-controller. All of these parts may be of any well-known or suitable construction, so far as the present invention is concerned. The magnet-coil is here shown as arranged in and supported by a shell 17, and said shell has a downwardly extended tubular projection 18, centrally disposed thereon, to receive the armature 12. The armature has fixed to it, at its lower end, or elsewhere, an arm 20 which may be of any suitable form, and said arm extends laterally therefrom, and through a slot 19 in the tubular projection 18, said slot being arranged vertically to admit of up and down movements of the armature. For the purpose of adjusting the armature relative to the magnet-coil to occupy different retracted positions a clamping-ring 25 is here shown which embraces the tubular projection and may be held securely in any position thereon by tightening its clamping-screw 26, and the arm 20 of the armature engages said ring when in its retracted position.

A time controller of the dash-pot type is here shown for the sake of illustration, and comprises a piston 30 and cylinder 31 with vent-valve 32. Said time controller is bodily supported by a bracket 35 which is connected with the clamping-ring 25, so that it will be moved by and with said ring. As here shown, the piston is fixed to the bracket and serves as the fixed member, and the cylinder serves as the movable member, and said cylinder has a post 33 at its upper end formed with a vertical slot 34 which receives the end of the arm 20 on the armature. An adjusting-screw 40 enters a hole in the top of the post and is adapted to extend through said hole and enter the slot 34 at the top, above the arm 20, to be engaged by said arm when the latter rises, due to the attraction of the armature.

In a tripping-coil of the type herein referred to wherein the movable element of the time-controller is directly connected with

the armature, the provision of the slot 34 at the top of the movable element which receives and permits movement of the arm 20, which is connected with the armature, there-
 5 by providing a lost motion, is of great advantage as it enables the armature to start from its remote position unrestrained, and to engage the time-controller suddenly, and with sufficient impact to start the time-con-
 10 troller even though said time-controller should stick; and for the same reason it is of advantage to provide a lost motion in some equivalent manner between the time-controller and any other form of actuator,
 15 which is connected with or controlled by the tripping-coil.

It will be observed that the clamping-ring serves as a limiting stop for the armature, and also as a support for the bracket bearing the time controller, but in lieu thereof any
 20 other suitable means may be provided for accomplishing these results; and also, in lieu of a dash-pot as a time controller any other well known or suitable form of time controller may be employed.

It will be noted that as the clamping-ring or equivalent adjusting-device is moved to adjust the armature with respect to the magnet-coil, so as to vary its responsive action to
 30 different current values or loads, the time controller will be bodily moved at the same time, so that no adjustment of it is required to compensate for adjustment of the armature. Further, it will be noted that the ad-
 35 justing-means for the time controller, whereby the length of time consumed by the circuit-controller in operating is varied, is adapted to be operated separate or independent of and without interfering with the ad-
 40 justment or setting of the armature.

I claim:—

1. The combination of a magnet-coil, armature therefor, an adjustable-stop arranged to vary the retractile position of said

armature, a time controller for said arma- 45
 ture having a movable and a stationary member, its movable member being connected with the armature and its stationary member being connected with said adjustable-stop, substantially as described. 50

2. The combination of a magnet-coil, armature therefor, a slotted tube in which said armature moves, a clamping-ring adjustably arranged on said tube to limit retractile movement of said armature, a time 55
 controller for said armature having a movable and a stationary member, its movable member being connected with the armature, and its stationary member being connected with said clamping-ring, substantially as de- 60
 scribed.

3. The combination of a magnet-coil, armature therefor, an adjustable-stop arranged to vary the retractile position of said armature, a cylinder and piston, one of 65
 which is connected with the armature and the other with said adjustable-stop, substantially as described.

4. The combination of a magnet-coil, armature therefor, a time controller for the 70
 armature having a slotted member arranged on its movable element, adjustable means for varying the retractile position of said armature to which the stationary element of the time controller is connected, an arm extend- 75
 ed from the armature which enters the slot in said slotted member, and an adjusting screw which also enters said slot and is arranged to be engaged by said arm, substantially as described. 80

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

GEORGE A. BURNHAM.

Witnesses:

H. W. CALDER,
 A. L. HORTON.