H. B. POST.

TIME CONTROLLER.

APPLICATION FILED NOV. 11, 1914.

1,157,960.

Patented Oct. 26, 1915.

3 SHEETS—SHEET 1.

FIG. 1.

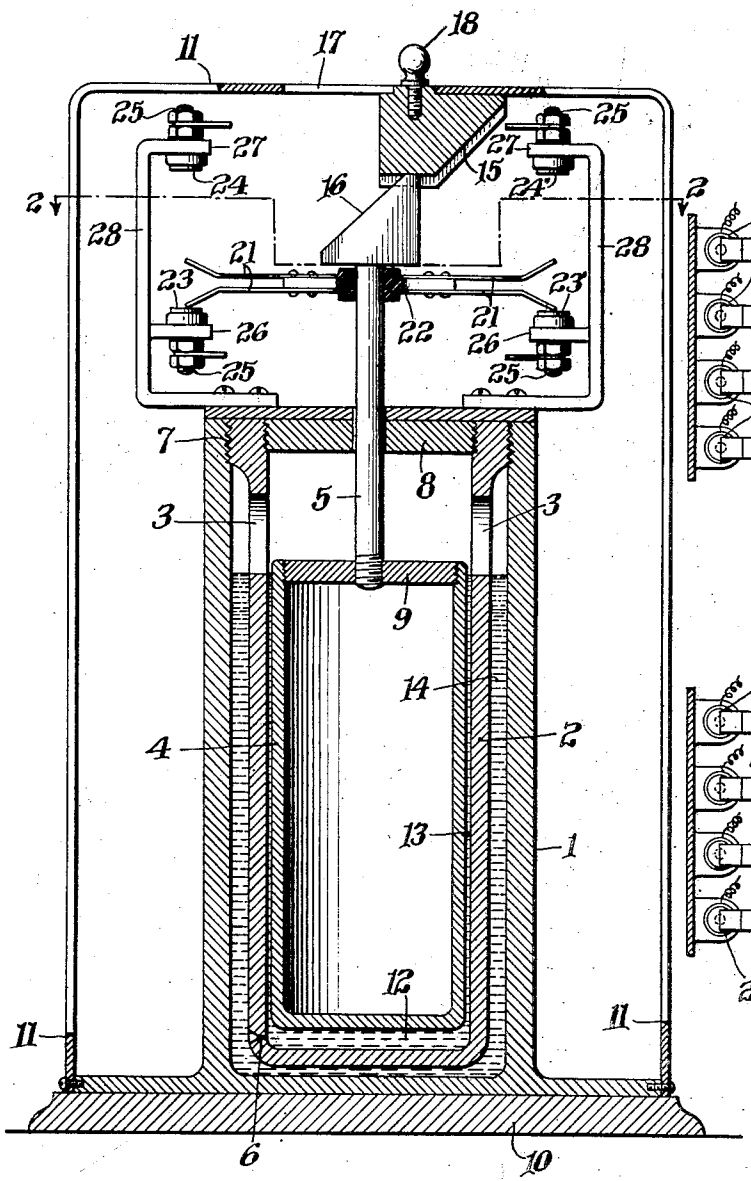


FIG. 2.

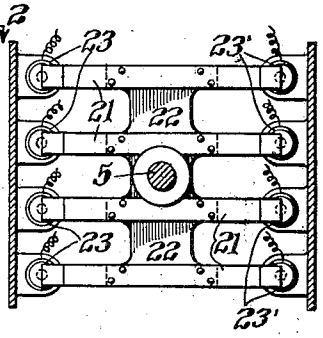


FIG. 3.

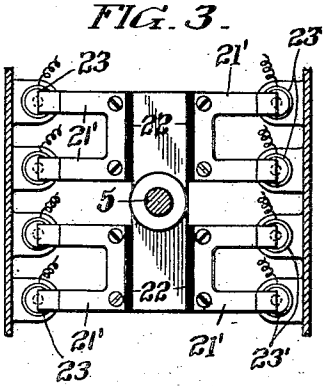
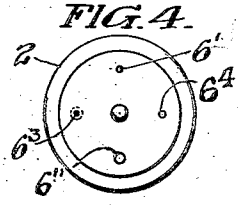


FIG. 4.



WITNESSES

Gertrude Bader

Thos. D. Mowlds

INVENTOR

Howell B. Post

BY

Wm. Steell & Richmond

ATTORNEY

H. B. POST.

TIME CONTROLLER.

APPLICATION FILED NOV. 11, 1914.

1,157,960.

Patented Oct. 26, 1915.

3 SHEETS—SHEET 2.

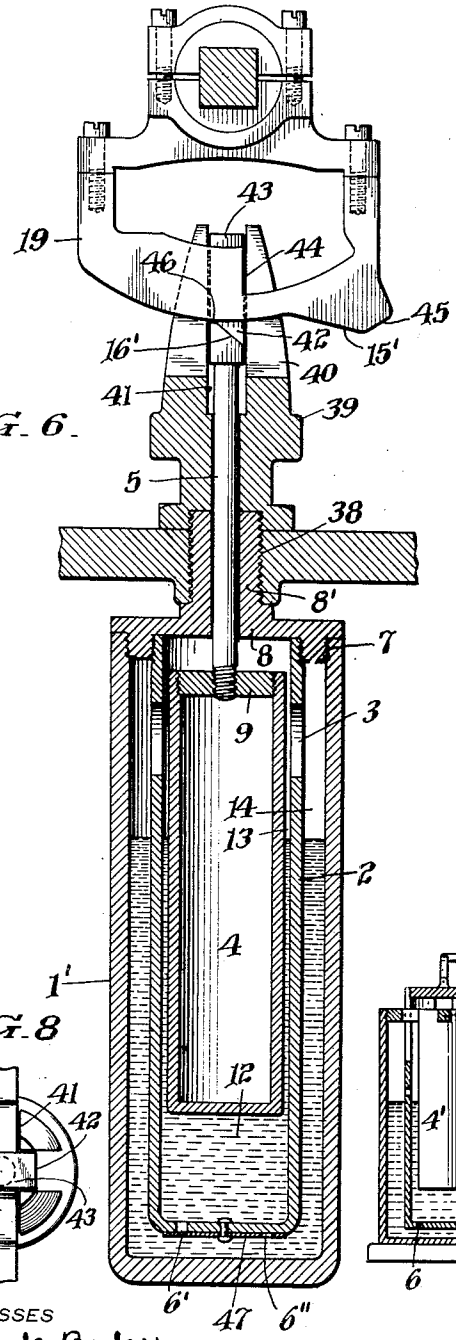


FIG. 6.

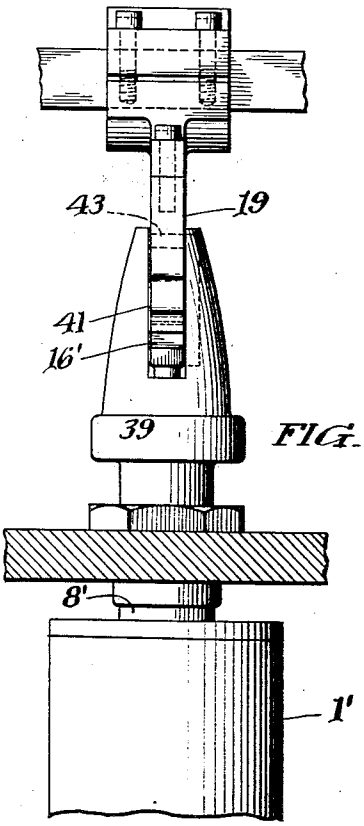


FIG. 7.

FIG. 8.

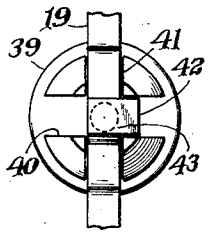
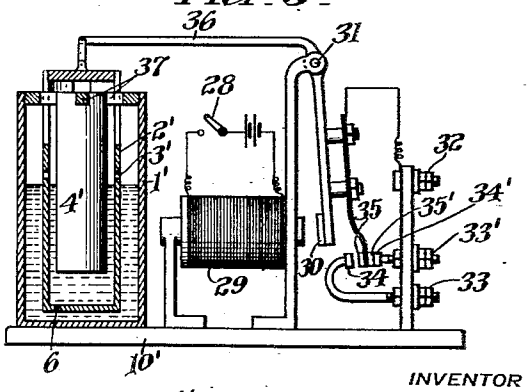


FIG. 5.



WITNESSES

Gertrude Bader.

Thos. D. Moulds

INVENTOR

Howell B. Post

BY

W. Steell Jackson.

ATTORNEY

H. B. POST.

TIME CONTROLLER.

APPLICATION FILED NOV. 11, 1914.

1,157,960.

Patented Oct. 26, 1915.

3 SHEETS—SHEET 3.

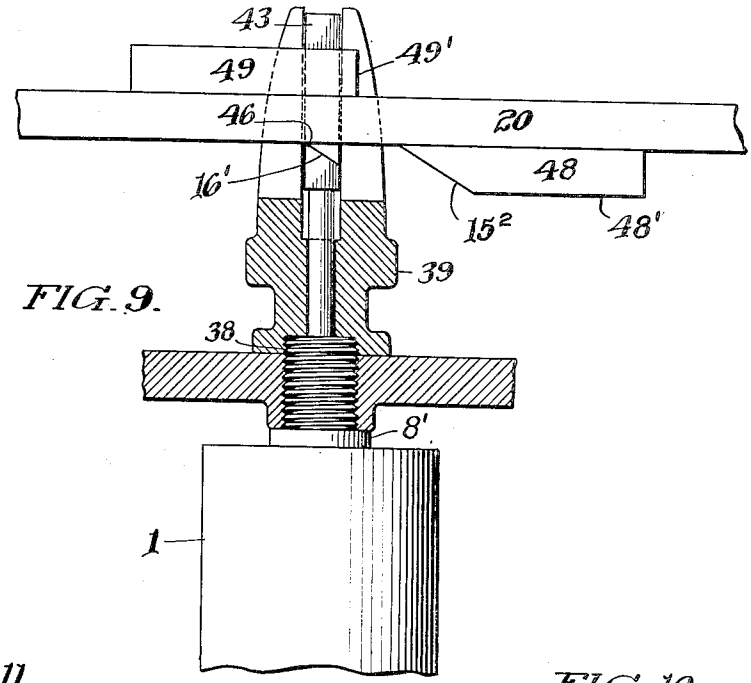


FIG. 9.

FIG. 11.

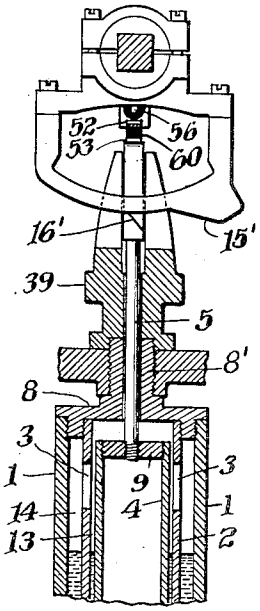


FIG. 12.

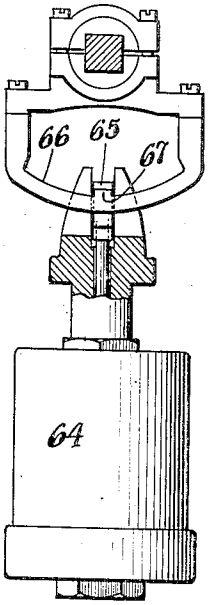
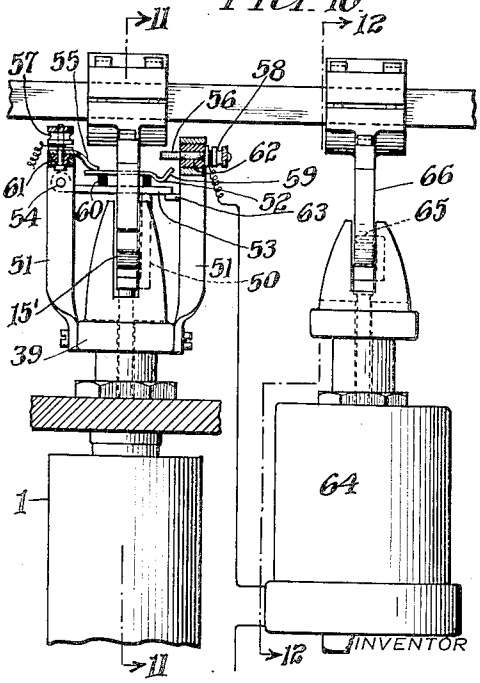


FIG. 10.



WITNESSES

Gertrude Bader.

Thos. D. Moulds

INVENTOR

BY Howell B. Post

Stuart Jackson.

ATTORNEY

UNITED STATES PATENT OFFICE.

HOWELL B. POST, OF LANSDOWNE, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO WALTER P. ALLEN, OF ARDMORE, PENNSYLVANIA.

TIME-CONTROLLER.

1,157,960. Specification of Letters Patent. Patented Oct. 26, 1915.

Application filed November 11, 1914. Serial No. 871,474.

To all whom it may concern:

Be it known that I, HOWELL B. POST, a citizen of the United States, residing at Lansdowne, in the county of Delaware and State of Pennsylvania, have invented a certain new and useful Time-Controller, of which the following is a specification.

My invention relates to time elements introduced into the operation of movable parts.

The purpose of my invention is to make the time element operative by flotation of parts in a liquid, preferably mercury, bath.

A further purpose of my invention is to secure straight line, or approximately straight line, movement for the time controlling mechanism.

A further purpose of my invention is to adapt my time element for uses requiring considerable pressure in the return stroke of the time element.

A further purpose of my invention is to control the movement of the operating lever for a railway switch or signal by a time element having substantially straight line movement.

A further purpose of my invention is to provide relatively movable parts with an intervening fluid content, movable slowly in one direction between and rapidly in the opposite direction thereof; to set the parts by cam or other suitable engagement of operating mechanism and to control the throw of any elements, such, for example, as a signal lever, segment plate or interlocking system by the position of the parts.

Further purposes of my invention will appear in the specification and claims hereof.

I have preferred to illustrate my invention by several forms thereof showing uses to which it may be applied, without intending to attempt a complete showing of these uses and with knowledge that the device may be applied to other arts and in many other ways within the same art.

I have selected the forms illustrated as practical, efficient and relatively inexpensive forms which at the same time well illustrate my invention.

Figure 1 is a central, longitudinal section through one form of my invention. Fig. 2 is a transverse section of Fig. 1 upon lines 2—2 of Fig. 1. Fig. 3 is a similar cross section to Fig. 2, showing a modification. Fig. 4 is a plan view of a check for the liquid flow. Fig. 5 is a central longitudinal section of a second form of time element. Figs. 6 and 7 are a longitudinal section and a broken side elevation, partly in section, of another application of my invention. Fig. 8 is a broken top plan view of a portion of the structure seen in Figs. 6 and 7. Fig. 9 is a side elevation partly in section, showing another application of my invention. Fig. 10 is an end elevation, partly sectioned, showing my invention applied in connection with a signal indication lock. Figs. 11 and 12 are sections of Fig. 10, taken upon lines 11—11 and 12—12, looking in the direction of the arrow and partly broken.

In the drawings, similar numerals of reference indicate like parts.

As I am required to show some use of my invention I shall describe it as applied to the application and release of a lock to a lever operating a railway signal, as, for example, to introduce a time element in connection with interlocking machines, between the placing of a switch lever in position and a change in the position of the signal governing that route. This is the greatest utility now known to me for my invention and is necessary in this use in order to give time for a train to come to a full stop, between the time it has been signaled for a given route and any change made in that route.

In most of the forms of my invention which I have illustrated, I have shown the same mechanism for introducing the time element, comprising in the form shown a relatively fixed outer casing or container 1, an intermediate casing or container 2, fixed with respect to the outside casing and apertured in its upper portion to permit free fluid flow through the apertures 3 into the outer casing and a movable central plunger 4 connected with the operating rod 5 and capable of overflowing fluid through the apertures 3 into the interior of the outer casing. The casing 2 is apertured at 6 to permit restricted return flow of fluid. The intermediate casing 2 may be secured within the casing 1 by any suitable means. I have shown it as screw-threaded therein at 7 and have closed it at the upper end by a plug 8.

The plunger 4 is shown in the form of a casing for convenience of manufacture and lightness of weight and is closed at the upper end by a disk or plug 9 within which

the operating rod 5 is connected as by threading. The plunger 4 fits within the casing 2 so as to move freely and permit fluid to flow between the two as hereinafter indicated.

The casing 1, in the form shown in Fig. 1, is rested upon any convenient base 10, and, as electrical contacts are there intended to be made and broken by it, the contacts are preferably inclosed as by casing 11. My device operates in substantially a straight line, and in these forms, upon the principle that a light plunger normally floated in a heavy liquid 12, such as mercury, may be forced down into the casing to start it in operation, forcing the liquid out of the casing, and is gradually lifted by the pressure of the liquid entering through a restricted passage, returning the plunger to normal position and thus interposing the time element. The plunger 4, in its downward travel, causes the mercury to flow upwardly through the space 13 and pour out of the openings 3 into the space 14 and the weight of the mercury in the space 14 causes it to return through the passage 6, slowly lifting the plunger to its initial position. Obviously, a great variety of means of forcing the plunger downwardly could be utilized and I have made no pretense at illustration of these various means, contenting myself with the illustration of simple cams 15, 15′, 15^2, coöperating with preferably beveled terminals 16, 16′, for this purpose.

In Fig. 1, I have illustrated the cam 15 as carried by a hand operated slide mounted in slot 17 and guided by the walls of the slot within the case 11 and moved by hand by means of the handle 18.

In the forms shown in Figs. 6 and 7 the cam 15′ is mounted on (here shown as integral with) the segment 19 normally carried by a switch- or signal-operating lever, usually by the latter, and in the form shown in Fig. 9 the cam 15^2 is carried by the locking bar 20 of an interlocking machine or sliding switch- or signal-operating lever. Electrical circuits controlled by a time element vary greatly, even in the practice of railroad work and I have, therefore, in the electrical applications of my invention, suggested some of the forms of contact by which the circuits may be closed without indicating the character or purpose of the circuits. Part at least of their normal function is the operation of a locking magnet controlling the movement of a lever in any suitable way, usually through a segment, such as in Fig. 11, or operating more directly upon a slide lever of the form shown in Fig. 9.

In Fig. 1 I utilize a plurality of sets of contact strips 21, which sets are preferably insulated from each other by strips 22 and extend from one side of the rod to the other. They span between lower contacts 23 and 23′ in one position and between upper contacts 24 and 24′ in the other position. I connect the circuits to these contact pieces by binding posts 25 suitably insulated from the arms 26, 27 of the supporting brackets 28.

In the form shown in Fig. 3, another of the many possible contact forms is shown in which the several parts of the same circuit lie on the same side of the view and the contacts are made by contact pieces 21′.

In operation, starting with the plunger in its raised or abnormal position, such as is seen in the similar time element in Fig. 6, the cam 15 is moved to the right to the position shown in Fig. 1, which is the normal or "set" position. This operation forces the mercury within the inner container upwardly past the sides of the plunger and out through the openings, the mercury momentarily occupying the unequal heights shown in Fig. 1. It will, of course, quickly come to an even height and will tend to lift the lighter plunger, flowing in through the aperture 6 as fast as the plunger is raised. This lifting of the plunger cannot take place as long as the slide carrying the cam holds the plunger down as seen in Fig. 1. In this "set" position the lower contacts are made. When the cam 15 is moved to the left, the mercury beneath and about the plunger in the container 2 tends to lift it and that in the outer container flows through the aperture 6, causing the plunger to come to rest in a position corresponding to that shown in Fig. 6. In this position any upper contacts desired may be made and will continue in contact as long as the slide remains at the left of Fig. 1. When the handle 18 is moved to the right, the plunger is forced down again to reset the device. It may be used to introduce a time element within any controlling magnet or other device operated, as for the release of a signal-operating lever so that it can continue its throw.

In the form shown in Fig. 5, I have intended to suggest three of the many ways in which the arrangement and operation of the parts in Fig. 1 may be varied. Here the device is electrically "set" by closing key 28 to complete any suitable circuit through the magnet winding 29. This attracts an armature 30, pivoted at 31 making or breaking an electric circuit. I have shown the operation as closing one portion of an electric circuit shown between binding posts 32, 33, by bringing together the switch members 34 and 35. The time element then slowly opens the circuit. At the same time that the circuit above is closed by operation of the key 28 a second circuit between binding posts 32 and 33′ is opened to be slowly closed by the operation of the time element bringing contacts 34′ and 35′ together. Thus, as in the form shown in Fig. 1, the time element may be utilized for either pur-

pose of making or breaking a circuit and both sets of contacts may be used upon the same device. Obviously, either set might be used alone. In the "setting" of the element, I utilize an arm 36, rigidly connected with the armature at one end and linked to the time element at the other. This arm is preferably long enough to swing without causing much deviation of its link end from straight line motion. The time element is itself capable of some rocking movement. This shows the adaptation of a preferably substantially "straight line" time element to a use involving rocking movement.

The time element shown in Fig. 5 is intended to illustrate permissive reversal of the parts as compared with Fig. 1. The central plug 4′ is fixed and the inner cylinder 2′ is movable. The base 10′ is extended to carry other parts and the upper part of the inner cylinder is slotted to provide for the strips 37 by which the plug is supported. When the arm 36 is lifted by reason of energization of winding 29, the inner cylinder 2′ is lifted, pouring mercury through openings 3′. The weight of cylinder 2′ and associated parts slowly sinks it within the mercury as fast as the slow flow through opening 6 will permit.

In the form shown in Figs. 6, 7 and 8 the base 10 and casing 11 have been omitted from casing 1′ and the entire structure is supported from the base board of a railroad "interlocking" frame for the control of switch and signal levers. This mounting is conveniently accomplished by extending the plug 8′ so that it may be secured to this board in any suitable manner, as by threads 38. In the form illustrated, the extension of the plug forms a convenient means of attachment for the head 39, which is slotted, as at 40, 41 in opposite directions to permit the movement of and support and guide the segment 19 of a switch or signal lever and the cam 16′ respectively. The cam 16′ here constitutes the lower part of a yoke having sides 42 and top 43. The top constitutes a latch, hereinafter called a lock, engaging the face of an abutment 44 upon the segment 19, when the plunger and, correspondingly the yoke, are in depressed position, preventing the movement of the segment toward the right beyond this point, until the abutment 44 is released by the lifting of the yoke. It will be noted that the cam and plunger will be in depressed position and remain in depressed position as long as the segment 19 is in its extreme position to the left, but that movement of the segment toward the right will release the cam and permit the gradual lifting of the yoke permitting the further movement of the segment after the lapse of the time provided for by my mechanism.

In operation, the time element of Fig. 6 works in the same manner as that of Fig. 1. There is one marked difference, however, that the rod 5 of Fig. 6 is mechanically connected directly to the lock 43, whereas such cannot be the case in the form of Fig. 1. Where the form of Fig. 1 is used for railway signal work and a lock corresponding to 43 must be operated, it is moved by electric means through the switch contacts shown. In Fig. 6, with the segment in the extreme left hand position, the face 45 retains the plunger in depressed position by engaging the top 46 of the cam 16′. The segment can move freely to the right until the edge of abutment 44 comes in contact with the lock 43. The engagement of the segment abutment 44 with the lock 43 of the yoke prevents further movement of the segment and lever until the plunger 4 has been floated sufficiently by the mercury to raise the yoke lock 43 above the arc face of the segment, after which the lever can be thrown the remainder of the distance to the right. When it is desired to return the lever to its initial position by left hand or counter clockwise movement, the lever can be thrown the entire distance without delay as the cam face 15′ will engage with the face 16′ on the top of the rod 5 and will quickly depress the plunger. In Fig. 6 I have shown a disk 47 pivoted conveniently upon the inner container so that any one of different sized apertures 6′, 6″, 6^3, 6^4 may be brought in line with aperture 6 to regulate the time for which the time element is set by merely removing the inner container and turning this disk.

In the form shown in Fig. 9, the general construction of the time element may be identical with that shown in Fig. 6. The structure is here accommodated to a longitudinally movable (slide) lever or locking rod 20, though with the same principle of operation. With the locking bar or lever initially at the extreme left, the plunger of the time element will be in depressed or "set" position and will be held so by engagement of the face 48′ of the block 48 with the end 46 of the rod 5. The locking bar can be moved freely from left to right until the face 49′ of the block 49, engages with the lock 43 of the yoke, blocking further movement until the time element has operated and has lifted this lock 43 to the height shown in Fig. 9 where the block 49 can pass under it and the locking bar can be moved to the right the entire extent of its throw. When the locking bar is moved in the reverse direction to reset the time element, the cam face 15^2 of the block 48 will engage the cam face 16′ or other terminal of rod 5 and depress the plunger of the locking element quickly, providing uninterrupted movement of the bar 20 to the extreme left.

In the form shown in Figs. 10, 11 and

12, I have shown my invention forming a different set of electrical contacts for completion of the circuit of an electric indication lock, shown upon a different signal segment. The circuit may, of course, have "indication" contacts at any desired points, which contacts must be made before the circuit will be complete. This will be clear to any signal engineer or inspector. I have placed the time element physically close enough to the segment for a cam or other operating mechanism upon the segment to cause depression of the plunger. There is, however, no lock directly connected with this time element for engagement with cooperating parts upon the segment.

Describing the entire device more in detail: I have utilized the same construction of time element as that shown in Fig. 6, but have substituted an arm 50 for the upper terminal of the rod 5, or yoke in that figure. This arm coöperates with a contact device supported from the head 39 by arms 51. The particular form of contact device shown comprises a contact 52 which is mounted upon a swinging arm 53 pivoted at 54 in such manner that upward movement will assure contact with the strips 55 and 56 connected with binding posts 57 and 58. The engagements of the strips 55 and 56 with the contact 52 are preferably spring. The spring in the one case is due to the resilience of the strip 55 and in the other case to the resilience and shape of the end 59 of the contact 52. The parts described are insulated from the frame. This insulation is shown in the case of the contact 52 as provided by insulating blocks 60, whereas the insulation for the binding posts and contacts 55 and 56 is shown at 61 and 62. The swinging arm 53 is raised and permitted to lower by movement of the rod 5 and arm 50 according to the height of the plunger 4. Excessive downward movement of the swinging arm may be controlled by a stop 63. Upward movement of the plunger and, correspondingly, of the arm 50 results in swinging the arm 53 upwardly until the contact or contacts are made. As shown, the finger 55 is preferably in contact with the strip 52 at all times. The time element of Fig. 11 will obviously be set by engagement of the cam 15′ with the beveled face of terminal 16′ and will remain in set or depressed position as long as the segment there shown is in its extreme left hand position. When the segment is swung to the right sufficiently to free the terminal 16′ from the cam, the plunger will rise slowly with flow of mercury into the inner container, causing electrical connection to be made.

The contact device just described is shown as in series with the winding of an electric indication lock 64 of any recognized type. I have illustrated one common form of this lock in Fig. 12 where the locking member 65 in its raised position permits free swinging of the segment 66, but when depressed, engages with projection 67 upon the segment, limiting the movement of the segment till the lock has been released.

It will be evident that my time element operates upon the principle of flotation as distinguished from that of mere transfer of weight and that with a liquid as heavy as mercury, this action would take place even with a solid metal plunger, though lacking the force obtained by use of the lighter plunger shown.

It will be evident that my invention makes it possible to obtain direct connection of the time element with the segment or rod and to place the cam upon the segment or rod so that the setting of the time element is accomplished by reason of the normal movement of the segment or rod. It will also be evident that the application of the time element to railroad uses may be either directly or indirectly as convenience in design, location of the parts or requirements as to other features may dictate.

It will be evident that the term plunger may be applied to the part 4′ shown in Fig. 5, as well as to the part 4 in other figures, inasmuch as the relative movement between this member and the inner container in both figures causes effective plunger movement of the member 4 or 4′, with respect to the inner container. It will further be evident that in both of the forms of container shown, the device is float-operated. In the form shown in Fig. 1, the constant tendency of the float 4 to rise causes this movement as rapidly as the admission of fluid through the aperture 6 will permit, while in the form shown in Fig. 5, the weight of the inner container would cause it to sink rapidly, but for the flotation value which must be overcome by admission of fluid through the aperture 6.

It will be evident that the operating means utilized need not be cam, as various equivalents therefor will occur to any one skilled in the art; and that where the cam form is used, there need not be any dwell, such as shown at 45, in Fig. 6, for retaining the parts in depressed position, as this function can be accomplished by other means.

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

1. In a device of the character stated, outer and inner fluid containers, the inner having two apertures of different sizes, the larger aperture being above the smaller aperture, fluid therein, a plunger of lighter specific gravity in its entirety than the fluid movable up and down within the inner container and means for forcing the plunger

downwardly to pass fluid rapidly from the inner container to the outer container.

2. In a device of the character stated, an outer container, an inner container having apertures in its upper and lower parts for flow of fluid therethrough, the upper aperture being the larger, a plunger movable within the inner container and a fluid content in the containers heavier for the same volume than the plunger, adapted normally to float the plunger and to flow out of the upper aperture during downward movement of the float.

3. In a device of the character stated, an outer container, an inner container having apertures in its upper and lower parts, the upper aperture being the larger, a plunger within the inner container and movable therein, a fluid content heavier for the same volume than the plunger and adapted normally to float the plunger, a connection for the plunger and cam operating means engaging the connection to depress the plunger.

4. In a device of the character stated, an outer container, an inner container having apertures in its upper and lower parts, the upper aperture being the larger, a plunger within the inner container and movable therein, a fluid content heavier for the same volume than the plunger and adapted normally to float the plunger, a connection for the plunger and an electrical contact carried by the connection and closed when the plunger is at one extremity of its movement.

5. In a device of the character stated, a time element having a member movable up and down and a cam for forcing the movable member downwardly and retaining it in depressed position.

6. In a device of the character stated, a time element having its movable member moving up and down, a cam adapted to engage the upper end of the movable member to depress it and an extension from the cam adapted to overlie the movable member and retain it in depressed position.

7. In a device of the character stated, a float-operated time element in combination with means for depressing the float and locking it in depressed position.

8. In a device of the character stated, a float-operated time element, in combination with a member for depressing and locking the float in depressed position.

9. In a device of the character stated, a float-operated time element, adapted for rapid depression and slow rising of the float in combination with laterally movable depressing means for the float adapted to retain the float in depressed position.

10. In a device of the character stated, a float-operated time element, a rod connected with the float and having a terminal, a cam engaging the terminal to depress it, electric contacts carried by the rod and fixed contacts closed by the electric contacts by reason of movement of the rod.

11. In a device of the character stated, a float-operated time element, a rod moved thereby and having a terminal, electrical contacts movable with the rod, upper and lower fixed contacts engaged by the movable contacts at the extremities of its stroke and means for depressing the terminal and retaining it in depressed position.

12. In a device of the character stated, a float-operated time element, a rod connected therewith, a terminal upon the rod, electrical contacts movable with the rod, fixed contacts engaged by the movable contacts, a cam adapted to depress the terminal and retain it in depressed position and a support for the cam.

13. In a device of the character stated, a float-operated time element having a rod connected with the float, a guide for the rod, a support for the element and cam means movable across the terminal of the rod transversely to depress the rod and retain it in depressed position.

14. In a device of the character stated, a float-operated time element having a rod attached to the upper end of the float, a support for the element, a cam movable across the end of the rod to depress it and a dwell connected with the cam adapted to retain the rod and float in depressed position.

15. In a device of the character stated, an outer container, an inner container having a liquid overflow side aperture in its upper portion and a smaller aperture below, a plunger in the inner container, the plunger and inner container being relatively movable up and down, a liquid heavier than the volume of plunger adapted to be immersed therein and lying within the outer and inner containers and means for moving the inner container and plunger relatively to set the time element by overflow of liquid.

HOWELL B. POST.

Witnesses:
WM. STEELL JACKSON,
J. LUTHERIA KAUFFMAN.