Sept. 11, 1923. 1,467,752

C. D. AINSWORTH

RETARDATION DEVICE

Filed March 16, 1920

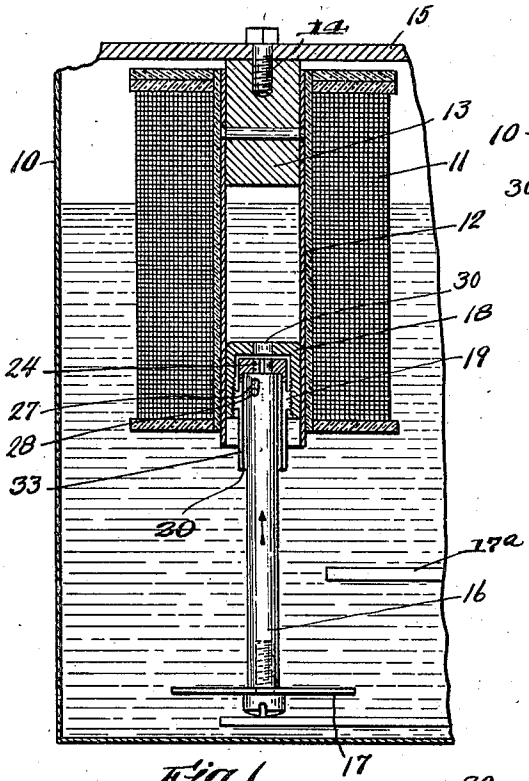

Fig. 1.

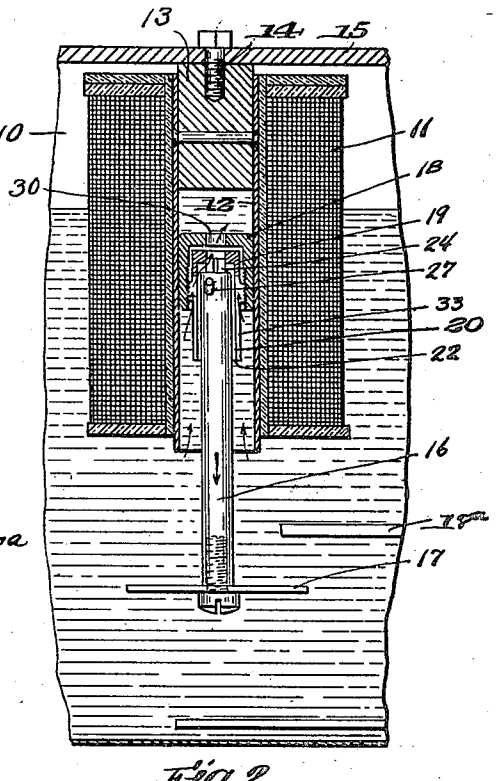

Fig. 2.

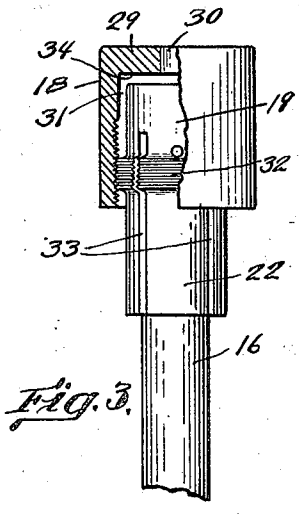

Fig. 3.

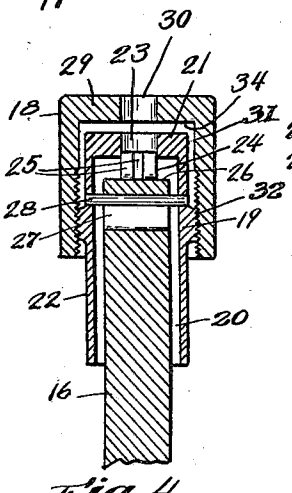

Fig. 4.

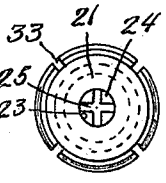

Fig. 5.

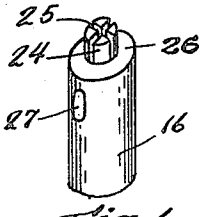

Fig. 6.

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by
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Patented Sept. 11, 1923. 1,467,752

UNITED STATES PATENT OFFICE.

CHESTER D. AINSWORTH, OF WOLLASTON, MASSACHUSETTS, ASSIGNOR TO SEARS B. CONDIT, OF BROOKLINE, MASSACHUSETTS.

RETARDATION DEVICE.

Application filed March 16, 1920. Serial No. 366,360.

To all whom it may concern:

Be it known that I, CHESTER D. AINSWORTH, a citizen of the United States, residing at Wollaston, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Retardation Devices, of which the following is a specification.

This invention relates to retardation devices especially adapted to control the interruption of an electric circuit by an electric switch, and is designed as an improvement on the retardation device set forth in my co-pending application, Serial No. 210,392, filed January 4, 1918.

The object of the invention is to provide a retardation device of improved construction and superior operating characteristics having means admitting of its rapid recovery from an operated condition and means whereby its retarding effect may be conveniently and accurately adjusted.

Fig. 1 is a sectional elevation of a retardation device embodying my invention in condition for operation.

Fig. 2 is a sectional elevation of the device of Fig. 1 with the movable elements in condition for a rapid recovery from an operated condition.

Fig. 3 is an enlarged detail in elevation, partly in section, of the movable element.

Fig. 4 is a sectional elevation of Fig. 3.

Fig. 5 is an end view of the piston sleeve and plunger.

Fig. 6 is a perspective view of the plunger.

Referring to the drawings, Figs. 1 and 2, the retardation device is immersed in the oil contained in the oil receptacle 10 which may well be the oil receptacle of an electric switch.

The retardation device includes the electrically energized actuating means or solenoid winding 11 formed on the tube 12 which forms the cylinder for the device. A core piece 13 is inserted in the upper end of the tube and seals the cylinder and the bolt 14 serves to secure the device to the support 15.

The movable element of the device includes a piston closely fitting within the cylinder arranged on the end of the iron core or plunger 16 which extends below the solenoid and has at its lower end the striking disc 17 adapted to engage the locking latch 17^a or equivalent of the switch to trip it.

Means are provided whereby the retarding effect of the device may be varied and the device may be rapidly reset or returned to its normal position after an operation. For this purpose the piston is formed of two parts, the piston cap 18 and the piston sleeve 19.

The piston sleeve is formed as a hollow member having the recess 20 in which the core or plunger 16 is loosely received and between which and the side walls 22 oil may flow freely. The end wall 21 of the sleeve has the valve opening 23 therethrough and the upper end portion of the plunger is formed with the reduced or teat portion 24 with the oil slots 25 therein which is slidably received in said aperture. The inner face of the end wall and the shoulder portion 26 of the plunger cooperate to form a valve which, when the sleeve and the plunger are in contact, closes the aperture and prevents the flow of oil therethrough, and, when separated, permits the flow of oil therethrough, such flow being further permitted by the slots or equivalent in the teat portion of the plunger. Said teat portion is for the purpose of guiding the sleeve and the plunger to a seat, and if other guiding means are provided may be omitted. The plunger is formed with an elongated slot 27 therein below the teat portion, and a pin 28 fixed in the side walls of the sleeve extends through said slot thereby securing the sleeve to the plunger yet permitting the relative movement therebetween necessary for the proper functioning of the valve.

The piston cap is formed to closely fit movably within the cylinder 12 and has the end wall 29 with the aperture 30 therein and the recess 31 in which the sleeve is adapted to be received. The cap is interiorly screw-threaded and the sleeve is formed with the exteriorly threaded portion 32 intermediate its length on which the cap is adjustably received. Said threaded portion preferably is raised somewhat above the side walls whereby to provide a clearance space between the sleeve and cap for the free passage of oil. The lower end portion of the piston sleeve has the longitudinal slots 33 therein which extend from the lower

edges through and to some extent above the threaded portion for the purpose of providing oil passages about the threaded portion and also to impart resiliency to the sleeve for the purpose of causing the threaded portion to tightly engage yieldingly the piston cap and hold it in adjusted position.

The inner face 34 of the end wall 29 of the piston cap and the outer face of the end wall of the sleeve form complementary valve faces arranged when in contact to prevent flow of oil through the recess 31 in the end wall of the cap and when separated to admit such flow. The distance between the faces of the cap and sleeve determines the retarding effect of the device and the greater the clearance the less will be the retarding effect and vice versa. Said construction provides an adjustable oil leak passage through the piston.

When the solenoid is sufficiently energized, the plunger is moved upward within the piston sleeve to close the valve opening 23 in the sleeve, and thereafter to move the piston upward within the cylinder. The rate of upward movement is determined by the setting of the piston cap on the sleeve.

Upon the deenergizing of the solenoid due to the opening of the switch controlled by the device, the plunger falls downward by its weight thereby uncovering the valve opening and providing a large and practically unrestricted passage for oil into the cylinder, thereby admitting of the rapid resetting or return of the piston to its low position.

I claim:—

1. In a retarding device, a cylinder, a piston operable therein having a leak opening therethrough, means admitting of the adjustment of the extent of the opening, and electrically energized actuating means for the piston including a plunger loosely connected with said adjusting means.

2. In a retardation device, a cylinder, and a piston movable in said cylinder, said piston including a piston cap having a fluid passage through it, a piston sleeve disposed in said passage having screw-threaded means adjustably connecting it with said cap to vary the flow of fluid through said passage, and a plunger connected loosely with said sleeve.

3. In a retardation device, a cylinder, and a piston operable therein comprising a piston sleeve, a piston cap having a fluid passage therethrough adjustably carried by said sleeve whereby to vary the extent of the passage, said piston sleeve having a fluid passage through it, and a plunger carried loosely by said piston sleeve arranged to close and open the passage in said piston sleeve.

4. In a retardation device, a cylinder, and a piston comprising a piston cap slidably received within the cylinder and having an aperture in its end wall, a piston sleeve threaded within said piston cap cooperating with said cap to provide a passage therebetween from the cylinder and movable toward and away from the end wall of the piston cap to vary the extent of the passage, said piston sleeve having a fluid passage through it, and a plunger carried loosely by said piston sleeve arranged to close and open the passage in said piston sleeve.

5. In a retardation device, a cylinder, and a piston comprising a piston cap slidably received within the cylinder and having an aperture in its end wall and an interiorly threaded portion, and a piston sleeve having an intermediate portion of its side wall screw-threaded and raised above the main body of the sleeve and received within the piston cap, said cap and sleeve cooperating to provide a passage therebetween from the cylinder, and said cap adjustable on said sleeve to vary the extent of said passage.

6. In a retardation device, a cylinder, a piston operable therein comprising a piston cap slidably received in the cylinder and having an aperture in its end wall and an interiorly threaded portion, a recessed piston sleeve having an intermediate threaded portion raised above the main body of the sleeve and adjustably received within said cap, said sleeve having slots therethrough extended from its lower edge through the threaded portion thereof, and a plunger loosely received in the recessed portion of the sleeve.

7. In a retardation device, a cylinder, a piston operable therein comprising a piston cap slidably received within the cylinder and having an aperture in its end wall and an interiorly threaded portion, and a piston sleeve adjustably threaded within said cap and cooperating therewith to provide a passage through the piston, having means yieldingly to hold the cap in adjusted position on the sleeve, and operating means for the piston.

8. In a retardation device, a cylinder, a piston operable therein comprising a piston cap having an interiorly threaded portion, a piston sleeve having an exteriorly threaded portion on which said cap is adjustably received, said cap and sleeve cooperating to provide a passage through the piston from the cylinder, said cap adjustable on said sleeve to vary the extent of the passage and operating means for said piston including a plunger loosely connected with said piston sleeve.

9. In a retardation device, a cylinder, a piston operable therein comprising a piston cap having an aperture in its end wall and an interiorly threaded portion, and a piston sleeve having an exteriorly threaded portion on which said cap is adjustably received, said sleeve having slots

therethrough extending from its lower edge through said threaded portion, said cap and sleeve cooperating to provide a passage through the piston from the cylinder, and said cap adjustable on said sleeve to vary the extent of said passage, said sleeve having an interiorly recessed portion and an aperture in its end wall opening into said recessed portion, and a plunger loosely received in said recessed portion movable to cover and uncover said aperture and means connecting said plunger and sleeve admitting of restricted relative movement therebetween.

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

CHESTER D. AINSWORTH.

Witnesses:
CLIFTON V. BROWN,
GEORGE W. O'KEEFFE.