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A. R. CHEYNEY.

RETARDING DEVICE FOR ELECTRIC CIRCUIT BREAKERS.

APPLICATION FILED DEC. 2, 1903.

NO MODEL.

Fig. 1.

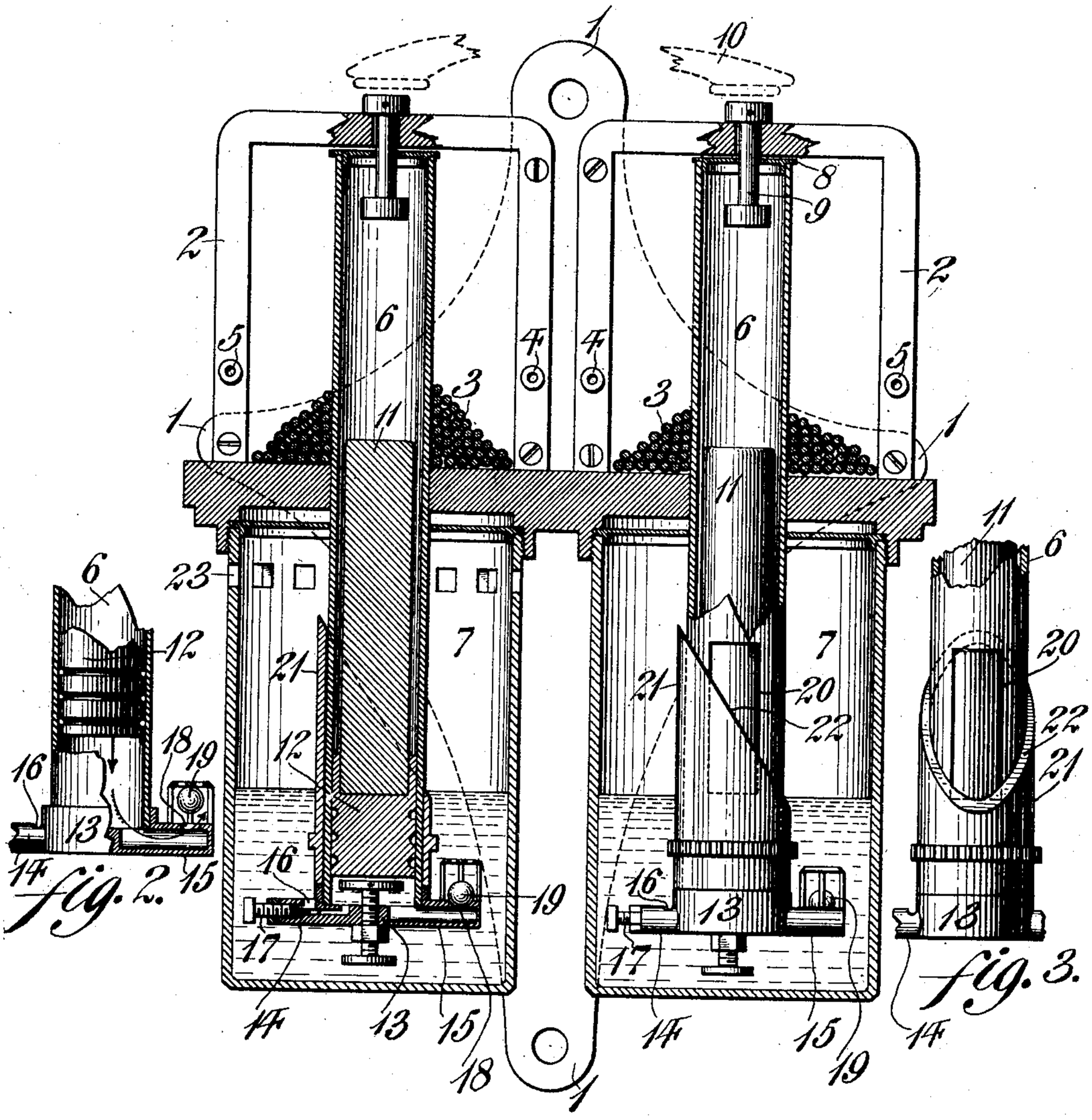

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

ALGERNON R. CHEYNEY, OF PHILADELPHIA, PENNSYLVANIA.

RETARDING DEVICE FOR ELECTRIC-CIRCUIT BREAKERS.

SPECIFICATION forming part of Letters Patent No. 755,358, dated March 22, 1904.

Application filed December 2, 1903. Serial No. 183,437. (No model.)

To all whom it may concern:

Be it known that I, ALGERNON R. CHEYNEY, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Retarding Devices for Electric-Circuit Breakers, of which the following is a specification.

My invention relates to a retarding device for electric-circuit breakers; and it consists of means for introducing a time element or retardation in the movement of a solenoid-core.

It further consists of novel features of construction, all as will be hereinafter fully set forth.

Figure 1 represents, partly in elevation and partly in vertical section, a portion of a circuit-breaker embodying my invention. Figs. 2 and 3 represent portions of the device in different positions from those shown in Fig. 1.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates a bracket or back adapted to support a portion of the magnetic circuit or case 2, in which is a solenoid-coil 3, the ends of which connect with binding-posts 4 and 5. Within and insulated from the coil 3 is a tube 6, which extends downward into a cup 7. Passing through a cap 8, at the upper end of the tube 6, and through the casing 2 is a striker 9, headed at each end to prevent its displacement. Above the striker 9 is the end of a lever 10, connected mechanically with the trip of a circuit-breaker. (Not shown.) Within the tube 6 is a piston 11, which may be provided at its lower end with a bushing 12. Secured to the lower end of the tube 6 is a foot 13, having tubular offset portions 14 and 15. In one of these is an aperture 16, adjustable by a needle-valve 17. In the other offset is an aperture 18, closed by a ball-valve 19. In the tube 6, adjacent its lower end, is a vertical slot 20. Snugly fitting around the cylinder is a rotatable sleeve 21, cut at its upper end to form a beveled portion 22. In the upper end of the cup 7 may be cut, if desired, one or more apertures 23.

I have shown the device in duplicate; but it is clear that any number of the circuit-breakers may be put together, if desired.

The operation is as follows: It is understood that the current flowing through the solenoid 3 bears a constant relation to that flowing through the main circuit and that the normal current flowing through the solenoid is insufficient to raise the core or piston 11. Any excess of current will of course act to draw the core 11 up into the coil 3. The cup 7 being partially filled with oil, glycerin, or similar liquid, any upward movement of the core is necessarily retarded by the slow flow of the oil through the aperture 16 in the tubular offset 14, such flow being regulated by an adjusting-screw 17. As soon as the lower end of the bushing 12 reaches the uncovered portion of the aperture 20 in the wall of the cylinder 6 it is evident that the piston will shoot upward rapidly into the coil and that its upper end will engage with the striker 9, thereby acting through the lever 10 to break the main circuit. It is also evident that the point at which the unimpeded upward movement of the core 11 begins is regulatable by the rotation of the sleeve 21 to cover the aperture 20 to a lower or higher point. As shown in Fig. 3, almost the entire slot 20 is uncovered. In Fig. 1 the slot is shown as partially covered, and it is evident that the sleeve 21 may still further be rotated, so that the accelerated movement of the core 11, due to the admission of the air, and the consequent breaking of the partial vacuum behind the core, would be still further delayed. When the current flowing through the coil 3 is lowered to or below the normal, the core 11 drops back to its lowermost position, the oil in the lower part of the cylinder then flowing out through the aperture 18, the ball-valve 19 rising from its seat for this purpose, as shown in Fig. 2. The object of the perforation at the upper end of the cup 7 is obviously to permit the free entrance of air to the cup and to the tube 6. The advantage of this retardation of the circuit-breaking is that it permits momentary overload due to sudden changes of speed or voltage and allows

time for the blowing out of safety-fuses on subfeeders.

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

1. A solenoid comprising a coil, a tube, a core in said tube and means for successively admitting to said tube behind said core a liquid and an aeriform fluid.

2. In a solenoid, a coil, a tube, a core in said tube and adjustable means for admitting to said tube behind said core a liquid and an aeriform fluid.

3. In a solenoid, a coil, a core, a tube in which said core is supported, a liquid-receptacle surrounding the lower end of said tube, means for retarding the flow of liquid from said receptacle into said tube whereby the movement of said core is retarded and means for breaking the partial vacuum behind said core during its entering movement.

4. In a solenoid, a coil, a core, a tube in which said core is supported, a liquid-receptacle surrounding the lower end of said tube, means for retarding the flow of liquid from said receptacle into said tube whereby the movement of said core is retarded and adjustable means for breaking the partial vacuum behind said core during its entering movement.

5. A solenoid comprising a coil, a tube, a core in said tube and means for successively admitting to said tube behind said core a plurality of fluids of different viscosities.

6. In a solenoid, a coil, a tube, a core in said tube and adjustable means for admitting to said tube behind said core a plurality of fluids of different viscosities.

7. In a solenoid, a coil, a core, a tube in which said core is supported, a liquid-receptacle surrounding the lower end of said tube, means for retarding the flow of liquid from said receptacle into said tube whereby the movement of said core is retarded and means for admitting air to said tube behind said core during its entering movement.

8. In a solenoid, a coil, a core, a tube in which said core is supported, a liquid-receptacle surrounding the lower end of said tube, means for retarding the flow of liquid from said receptacle into said tube whereby the movement of said core is retarded and adjustable means for admitting air to said tube behind said core during its entering movement.

9. In a solenoid, a coil, a tube, a core supported in said tube, a liquid-receptacle surrounding the lower end of said tube, means for retarding the flow of such liquid from said receptacle into said tube, separate means for the flow of such liquid from said tube into said receptacle and means for admitting air to said tube during the entering movement of said core.

10. In a solenoid, a coil, a tube, a core supported in said tube, a liquid-receptacle surrounding the lower end of said tube, means for retarding the flow of liquid from said receptacle into said tube and a lateral opening in said tube.

11. In a solenoid, a coil, a tube, a core supported in said tube, a liquid-receptacle surrounding the lower end of said tube, means for retarding the flow of liquid from said receptacle into said tube, a lateral opening in said tube and a sleeve adjustable over said lateral opening.

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Witnesses:
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