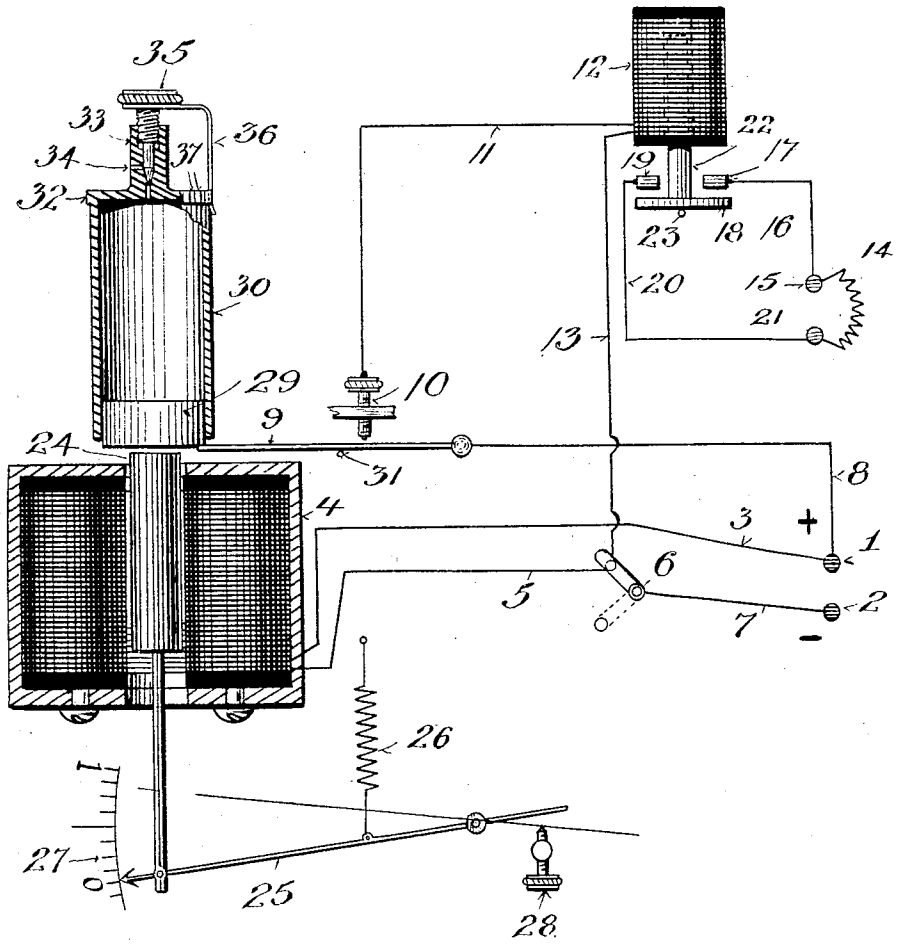
H. F. WAITE.

TIME CONTROLLED SWITCH FOR X-RAY AND OTHER MACHINES.

APPLICATION FILED NOV. 4, 1916.

1,235,261. Patented July 31, 1917.



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TIME-CONTROLLED SWITCH FOR X-RAY AND OTHER MACHINES.

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Application filed November 4, 1916. Serial No. 129,429.

To all whom it may concern:

Be it known that I, HARRY F. WAITE, a citizen of the United States, and a resident of Whitestone Landing, county of Queens, city and State of New York, have invented a new and useful Improvement in Time-Controlled Switches for X-Ray and other Machines, of which the following is a specification.

The object of my invention is to provide a switch of this class which may be used so as to open a circuit at a pre-determined time after it is closed. This, and other objects, are accomplished by my invention, one embodiment of which is hereinafter more particularly set forth.

For a more particular description of my invention, reference is to be had to the accompanying drawings, in which appears a diagrammatic view of my improved switch.

This improved switch may be used with either a direct or an alternating current system, although it is shown connected to a direct current. Assuming that the two poles or bus bars of the system are designated by the characters 1 and 2, the parts and circuits may be determined as follows: Beginning with the pole 1 a circuit may be traced through a wire 3, solenoid 4, wire 5, switch 6 and wire 7 back to the pole 2. Again starting with the pole 1 a second circuit may be traced through a wire 8 which runs to a spring 9 which may engage an adjustable screw 10, and does engage the same unless forced away therefrom by a means which will be described below. The screw 10 is connected by a wire 11 to a solenoid 12 which also has a wire 13 which runs to the wire 5 or the same pole of the switch 6 that the wire 5 runs to, so that when the switch 6 is closed the circuit is completed through this switch and the wire 7 to the pole or bus bar 2.

Yet a third circuit through an X-ray machine or other device 14 may be traced from this machine through a pole 15, wire 16, contact 17, armature 18, second contact 19, wire 20 and pole 21. In this circuit the armature 18 is separated from the contacts 17 and 19 unless the magnet 12 is energized so as to raise its core 22, to which the armature 18 is secured, and thereby close the circuit. If the magnet 12 is not energized the armature 18 rests on a suitable support 23, or any other suitable means, and away from the contacts 17 and 19.

The solenoid 4 is provided with a suitable core 24 which has a lever 25 pivotally connected at its lower end. This lever is normally held in place by a suitable spring 26 which is connected, as indicated, so as to raise the core 24. The lever 25 is extended to a suitable scale 27, and an adjusting screw 28 is provided at its other end so that the distance which the spring 26 can raise the lever 25 is indicated by the scale 27 and limited by the screw 28. The position of the core 24 is determined by the screw 28 when the apparatus is not in use, and when the magnet 4 is energized this core is drawn into the middle of the solenoid in the conventional manner, and thereby lowered against the tension of the spring 26, and the distance which it is lowered will depend upon the initial position of the core 24, which initial position depends upon the adjustment of the screw 28. This is important because of the mechanism which will now be described.

Immediately above the core 24, and normally resting thereon, is a piston 29 which slides with a close but not a tight fit in a cylinder 30. The bottom of the cylinder 30 is so placed that the piston 29 may rest on the spring 9 and force the same against a stop 31 and away from the screw 10 and thereby open the circuit through the wire 11 and solenoid 12. When the piston 29 is raised by the core 24, the spring 9 is released and then the circuit is complete through the parts 9 and 10, as they are in engagement. Of course the circuit may be broken through the switch 6, as above described, but this is another matter. The upper end of the cylinder 30 is closed by a suitable cylinder head 32 which has a central stem 33 with a vent opening or port 34 controlled by a needle valve 35 so that there may be a slight leakage of air into the upper portion of the cylinder 3 and above the piston 29, according to the size of the opening about the stem of the needle valve 35. To facilitate the

regulating of this valve 35 it is provided with a suitable spring 36 adapted to enter corresponding recesses 37 on the edge of the cylinder head 32 so that this valve may be held securely at any predetermined position and easily shifted from one position to another, as desired. As the leakage through the valve 35 and port 34 is very small indeed, this matter has to be carefully adjusted.

Operation.

In view of the foregoing, the operation of my improved switch will be readily understood. Assuming that the screw 28 is set so as to give the core 24 the desired elevation, and the plunger 29 rests on the core 24, it is obvious that when the core 24 is withdrawn by the action of the magnet 4, which is energized as above described, when the switch 6 is closed, then, the plunger or piston 29 begins to fall, but it cannot fall rapidly because of the slow admission of air through the needle valve 35. Therefore the speed at which the plunger 29 falls is determined by the needle valve 35 and may be varied by varying the opening through this valve. The switch 6 is kept closed until the plunger 29 rests upon the spring 9 and opens the circuit at the screws 10 and spring 9. It is obvious also that the circuit is closed at this point as long as the plunger 29 is off the spring 9, that is as long as the switch 6 is closed the circuit is closed through the magnet or solenoid 12 and remains closed until the piston 29 rests on the spring 9, as above set forth. This permits the core 22 to be raised so that the armature 18 is against the contacts 17 and 19 and thus the apparatus 14 is permitted to operate during a predetermined time and no more. The switch 6 must be kept closed until the piston 29 is on the spring 9, because if it is not kept closed as long as that, the time the circuit through the wire 11 and solenoid 12 is closed will not be determined by the apparatus. When the switch is opened the apparatus is ready for another operation because the spring 26 restores the core 24 and connected parts to their initial positions.

While I have shown and described one embodiment of my invention, it is obvious that it is not restricted thereto but is broad enough to cover all structures that come within the scope of the annexed claims.

Having thus described my invention, what I claim is:

1. In a switch of the class described, means for closing a circuit, a solenoid in said circuit, a core drawn downwardly into said solenoid when it is energized, means for ejecting the core from said solenoid when the solenoid is not energized, a piston above the core and adapted to be supported by said core when the solenoid is not energized, and means for permitting a gradual lowering of the piston when the core is withdrawn into the solenoid.

2. In a system of the class described, two circuits and a common switch for closing both of them, two solenoids, one in each circuit, and a core in each solenoid, a third circuit adapted to be closed by the action of one of these cores, a switch in the circuit of the solenoid of the last mentioned core, and time controlled means connected to the other solenoid for opening this last mentioned switch after a predetermined time has elapsed after the closing of the last mentioned switch.

3. In a system of the class described, a solenoid with a core with connections for closing a circuit, a second solenoid with a core adapted to support a piston above the same, means for permitting said piston to fall gradually after the core is withdrawn, means for opening a circuit through the first mentioned solenoid by the piston when it has reached a predetermined point.

4. In a system of the class described, a solenoid and means for energizing the same, a core for said solenoid, a lever connected with said core, means for elevating said core, means for limiting the amount of elevation of said core, a piston and a cylinder in which said piston slides, said piston being mounted above said core and being adapted to be supported thereby when the same is raised, means for regulating the amount of air which may be admitted above said piston, so as to determine the time of fall of the same after the piston is withdrawn, a second circuit and means for opening the same connected to said piston when the same is lowered.

5. In a system of the class described, two circuits each of which is provided with a solenoid, one solenoid having a core connected to circuit closing means, so that when the solenoid is energized, a circuit is closed, a core in the other solenoid and a piston above the same, means for guiding said piston, means for regulating the amount of air that may be admitted above said piston so as to determine its time of fall when the core is withdrawn from below the same, means for closing a circuit through said solenoids simultaneously, and means connected with said system for opening the circuit through the solenoid containing the contact making device, so that the circuit may be closed through both of said solenoids simultaneously, and opened through one of them after a predetermined time.

6. In a system of the class described, a solenoid and means for closing the circuit to the same, a core for said solenoid, a lever connected to said core, a spring for raising

said lever and thereby raising said core, a scale, and an adjusting screw so that the upward movement of said core may be limited and determined, a cylinder above said core with a piston mounted therein which is adapted to rest on said core when the same is elevated, and means for admitting air above said piston so that the same may fall slowly after the piston is withdrawn, the speed of movement of the piston being determined by the amount of air admitted above the same in said cylinder.

HARRY F. WAITE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."