H. F. STRATTON.

ELECTROMAGNETIC DEVICE.

APPLICATION FILED DEC. 22, 1915.

1,227,341.

Patented May 22, 1917.

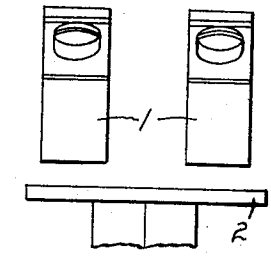


Fig. 2

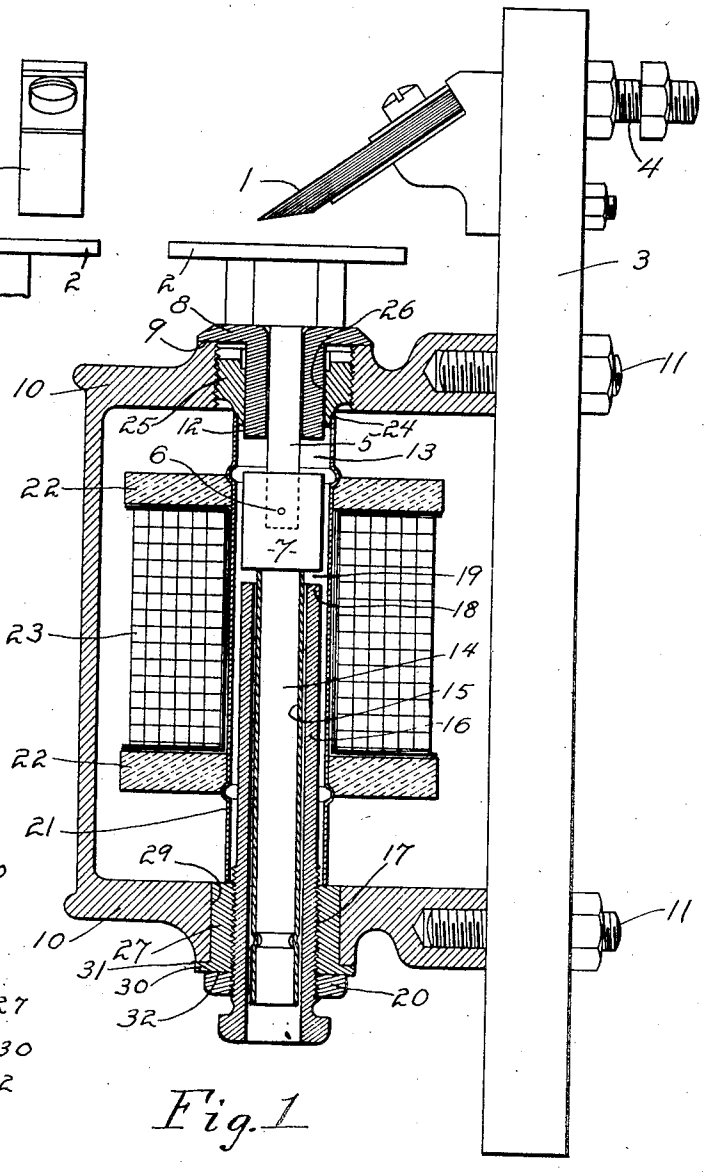


Fig. 1

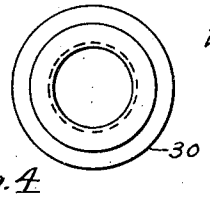


Fig. 4

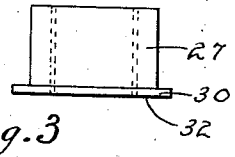


Fig. 3

INVENTOR

Harry F. Stratton

by F. N. Barber

Att'y.

UNITED STATES PATENT OFFICE.

HARRY F. STRATTON, OF CLEVELAND, OHIO, ASSIGNOR TO THE ELECTRIC CONTROLLER & MANUFACTURING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

ELECTROMAGNETIC DEVICE.

1,227,341. Specification of Letters Patent. Patented May 22, 1917.

Application filed December 22, 1915. Serial No. 68,219.

To all whom it may concern:

Be it known that I, HARRY F. STRATTON, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Electromagnetic Devices, of which the following is a specification.

This invention relates to electro-magnetic devices, such as electro-magnetic switches, and particularly to means for accelerating the decay of magnetism in the magnetic circuits of such devices upon their deënergization.

It has been found that electro-magnetic switches or like devices are usually slow in opening when deënergized, due to a slow dying out or decay of magnetism in the magnetic circuit; in applications, such as reversing controllers, in which it is desirable to reverse with extreme rapidity, it is necessary to provide some means to assist the decay of magnetism to cause the switches to open as quickly as possible.

The object of my invention is to provide an improved means for accelerating the decay of magnetism in magnetic circuits upon deënergization thereof, which means can be easily and cheaply applied, and does not interfere with the normal working of the magnetic circuit.

Referring to the accompanying drawing, Figure 1 is a view, partly in elevation and partly in cross-section, of an electro-magnetic switch employing my invention; Fig. 2, the front view of a part of Fig. 1; Fig. 3, a side view of a non-magnetic bushing forming a part of my invention; and Fig. 4, a top plan view of Fig. 3.

On the drawing, 1 represents the stationary contact, and 2 the movable contact of a switch, the contact 1 being secured to the insulating slate or base 3 by the stud 4, to which connection to a source of electric current may be made.

The contact 2 is carried on the upper end of the stem 5 having its lower end secured by the pin 6 to the cylindrical core-member or armature 7 which is movable vertically in the upper portion of the winding 23.

The non-magnetic stem 5 extends down through the magnetic plug 8, on which the stem is suspended. The plug is suspended on the upper end of the magnetic frame 10 by the flange 9, and the frame is secured to the base 3 by the studs 11.

The lower end of the plug constitutes a pole 12 which is separated from the upper end of the armature 7 by the operating gap 13.

The lower end of the armature has a downward magnetic cylindrical extension or tail-piece 14 of smaller cross-area than that of the armature. The extension 14 is provided with a closely fitting non-magnetic sleeve 15 fixed thereon and guided vertically in the hollow cylindrical magnetic pole piece or sleeve 16, which is adjustable vertically by the threaded portion 17 working in the non-magnetic bushing 27 in the lower end of the frame 10. The upper end 18 of the pole piece 16 is separated from the lower end of the armature 7 by the lock-out gap 19 which may be adjusted by rotating the pole-piece. The lock-nut 20 working on the portion 17 of the pole-piece 16 is screwed up tightly against the bottom surface 32 of the bushing 27 to hold the pole-piece in any selected adjustment.

The spool 21 surrounds the armature 7 and those portions of the extension 14, the sleeve 15 and the pole-piece 16, as lie between the upper and lower members of the frame 10. The spool has thereon the spool-heads 22 and the winding 23 situated between the spool-heads. The upper end of the spool is centered with respect to the armature and its extension 14 by means of the tapering shoulder 24 on the magnetic sleeve 25 threaded in the upper member of the frame 10 around the plug 8, which is guided to the opening 26 in the said sleeve. The lower end of the spool is seated on the bushing 27. By screwing the sleeve downwardly the spool is not only centered but it is also rigidly clamped between the sleeve and the bushing. The said bushing 27 may be secured in the frame 10 by a press fit in the bore 29 or otherwise. It has the flange 30 in contact with the shoulder 31 on the bottom of the frame.

When the winding 23 is energized with current above a predetermined amount, the pull on the armature 7 in the gap 19 predominates over that in the gap 13, and the parts all remain in their normal positions, as shown on Fig. 1. When, however, this current falls to the predetermined value, or when the winding 23 is initially excited with current below this predetermined value, the pull in the operating gap 13 predominates

over that in the lock-out gap 19, causing the armature 7 to move upward into contact with the pole 12, and the contact 2 to be moved into engagement with the contact 1. The plug 8 being loose cushions the blow of the armature 7 on the pole 12 and prevents drawing an arc between the contacts.

Without the employment of my improvement, if the winding 23 is deënergized after the switch has closed, the magnetism between the pole 12 and the armature 7 may decay so slowly as to hold these two members together, and the switch closed.

This bushing 27 provides for the magnetic circuit a permanent gap which accelerates the decay of magnetism upon deënergizing the winding 23, thereby permitting the switch to open promptly, and does not interfere with the exact distribution of the lines of magnetic force necessary in the operation of the device.

This permanent gap may be located elsewhere in the magnetic circuit than at the place shown provided the flux passing through the permanent gap passes also through the working, or armature-actuating, gap.

I claim—

1. In an electromagnetic device, a winding, a magnetic circuit including a stationary part, a movable core-member, and a pole-piece, all energized by current in the winding, the core-member having a reduced extension reciprocable in the pole-piece, means for establishing an operating gap between the core-member and the stationary part of the magnetic circuit and a lock-out gap between the unreduced portion of the core-member and the pole-piece, and a non-magnetic spacing means disposed between the stationary part of the magnetic circuit and the pole-piece.

2. In an electromagnetic device, a winding, a magnetic circuit including a stationary part, a movable core-member, and a pole-piece, all energized by current in the winding, the core-member having a reduced extension reciprocable in the pole-piece, means for establishing an operating gap between the core-member and the stationary part of the magnetic circuit and a lock-out gap between the unreduced portion of the core-member and the pole-piece, and a non-magnetic sleeve surrounding the pole-piece and spacing the latter from the stationary part of the magnetic circuit.

Signed at Cleveland, Ohio, this 27th day of November, A. D. 1915.

HARRY F. STRATTON.