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ELECTROMAGNETIC SWITCH.

APPLICATION FILED SEPT. 29, 1917.

1,356,501. Patented Oct. 19, 1920.

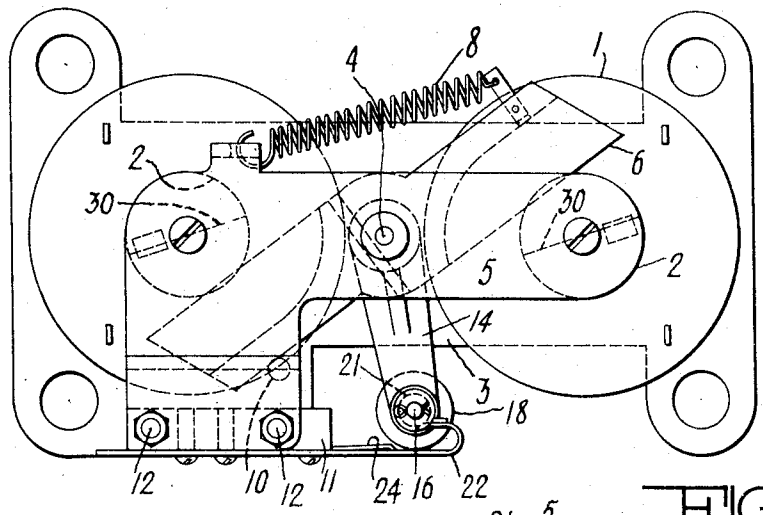

FIG. 2

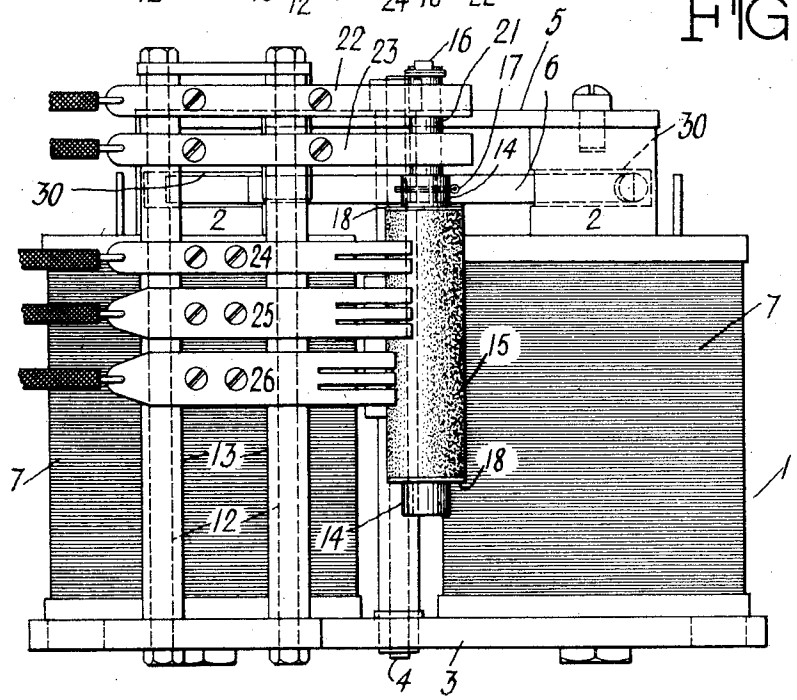

FIG. 1

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ELECTROMAGNETIC SWITCH.

1,356,501. Specification of Letters Patent. Patented Oct. 19, 1920.

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To all whom it may concern:

Be it known that we, ARTHUR A. ADAMS and FRANK A. EMERY, citizens of the United States, residing at Brookline, in the county of Norfolk, and at Wellesley Hills, in the county of Middlesex, State of Massachusetts, respectively, have invented certain new and useful Improvements in Electromagnetic Switches, of which the following is a specification.

This invention relates to electro-magnetic circuit-controlling devices or switches, and has for one of its important objects to provide a device of such character which shall be simple in construction, reliably operative and inexpensive to manufacture.

Another object of the invention lies in the provision of improved means for avoiding pitted or burned contacts and imperfect engagement.

Another object of the invention lies in the provision of a circuit-controlling device of extremely compact form.

Other objects of the invention will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists of the various features of construction, combination of elements and arrangements of parts which will be exemplified by the construction hereinafter set forth and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, wherein is shown one of various possible embodiments of the invention,—

Figure 1 is a plan view of an electro-magnetic circuit-controlling device embodying the invention.

Fig. 2 is a view in elevation of the same.

Referring now more particularly to the drawings, wherein similar reference characters refer to similar parts throughout the several views, there is indicated at 1 an electro-magnet comprising spaced core elements 2 mounted on a supporting plate 3. Between the core elements there is arranged an armature shaft 4, loosely journaled at one end in the supporting or magnet plate 3, and at its opposite end in a plate 5 which is in turn secured to the poles or core elements of the magnet. Fast on said armature shaft is a reciprocatory or rocking armature 6 adapted to be oscillated toward the poles of the magnet when its windings 7 are energized and to be oscillated in the opposite direction by a spring 8 when said windings are deënergized. The spring action is limited by a stop 10 depending from the plate 5. It will be noted that the upper and lower plates 5 and 3 provide frame elements which may be supplemented by horizontally disposed contact-supporting bars 11, spaced apart and apertured to receive posts 12 extending between and secured to said plates 5 and 3, said bars 11 being held in their spaced relation by spacing sleeves or bushings 13.

A yoke arm 14 is formed on the armature 6, and in turn carries bridging means or elements comprising a carbon roller 15 rotatively mounted on a shaft 16 secured to the yoke arm by a pin 17 and insulated therefrom by a suitably flanged bushing 18. The carbon roller, such as described, presents an advantageous construction, since each time it engages its adjacent contacts or brushes, it does not rub past said contacts, but rotates freely into engagement therewith and at each succeeding operation, presents a different portion of its surface to said contacts, reducing the wear thereon and preventing sparking, burning, pitting, etc.

The shaft 16 projects beyond the yoke arm and receives a bridging contact 20 being herein shown in the form of a brass tube. Suitably mounted upon the frame above referred to are a plurality of contact sets,—one set comprising the fixed contacts 22 and 23, which extend beyond the bridging elements and are of resilient material with their ends curved and bent back to engage with the bridging element or brass tube 21 when the electro-magnet is deënergized and the spring 8 has moved the armature to position against the stop 10. Another set of contacts comprises three fixed brushes 24, 25 and 26, the first two of which extend beyond the third in order to be initially bridged, when the magnet is energized. The third brush 26 is arranged to be bridged upon subsequent or further continued movement of the armature. The contacts of this set are suitably resilient and preferably of brass or copper with split end portions to facilitate engagement with the carbon roller.

The core elements are recessed at 30 for a portion of their diameter to receive the ar-

mature upon energization of the windings, and the magnet or supporting plate 3 is provided with attaching points, whereby the complete structure may be secured within a casing or upon a suitable standard. The loose carbon roller 15 is found highly desirable, in view of the length of movement required between this bridging element and the contacts 24 and 25 in order for the bridging element to also include the shorter fixed brush or contact 26.

As many changes could be made in the above construction and as many apparently widely different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter set forth in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:—

1. In a circuit-controlling switching device, in combination a pair of cores, energizing windings on said cores, an oscillatory armature pivotally mounted between said cores, spring means for actuating said armature in a direction opposite to the influence of said energizing windings, a plurality of contact-bridging elements carried by said armature including a carbon roller, and a plurality of sets of fixed contacts, one set being bridged by one of said elements when the windings are deënergized, and another set being bridged by said carbon roller when the windings are energized.

2. A switch of the character described having in combination, a magnet; an armature for said magnet pivotally supported to oscillate upon an axis parallel with the axis of the magnet so as to swing toward and from the pole piece of said magnet; a contact carried by said armature; two stationarily supported circuit terminal spring contacts, one engaged by said armature contact when said armature is swung in one direction and the other engaged by said armature contact when said armature is swung in an opposite direction, and means independent of said stationarily supported contacts for limiting the movements of said armature in both directions.

3. A switch of the character described having in combination, a magnet, an armature for said magnet pivotally supported to oscillate upon an axis parallel with the axis of the magnet so as to swing toward and from the pole piece of said magnet; a contact carried by said armature; two stationarily supported circuit terminal spring contacts, one engaged by said armature contact when said armature is swung in one direction and the other engaged by said armature contact when said armature is swung in an opposite direction, means independent of said stationarily supported contacts for limiting the movements of said armature in both directions, and a base plate from which said magnet, armature and stationary contacts are supported.

4. In a switch, in combination, a magnet, a rocking armature therefor, contact means comprising a loosely mounted roller carried by said armature, fixed contacts one of which is adapted to be engaged by said contact means as the armature is rocked in one direction and another of which is adapted to be engaged as the armature is rocked in the opposite direction, and stops independent of said fixed contacts for limiting the rocking movement of said armature in either direction.

5. In a switch, in combination, a pair of cores, energizing windings on said cores, an oscillatory armature pivotally mounted between said cores, spring means for actuating said armature in a direction opposite to the influence of said energizing windings, movable contact means comprising a carbon roller carried by said armature, fixed contacts arranged to be engaged by said movable contact means as the armature oscillates in opposite directions, and stops independent of said contacts for limiting the movement of said armature in either direction.

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