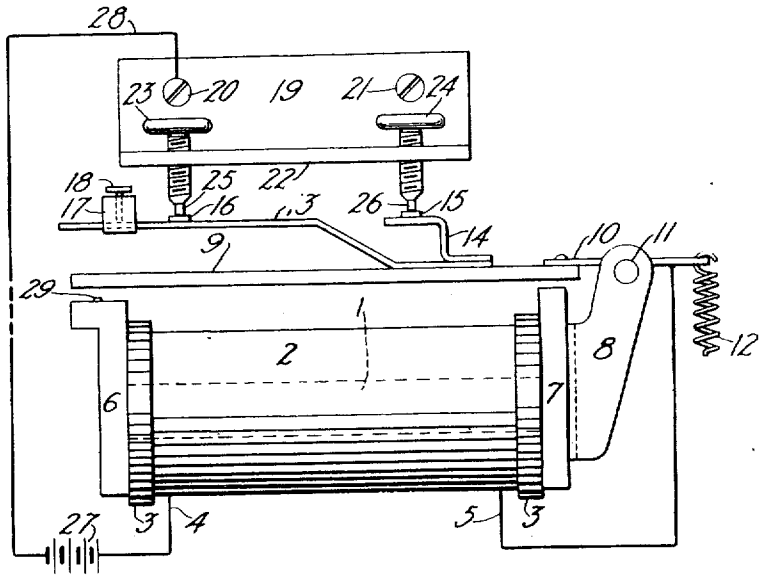
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D. T. MAY

ELECTROMAGNET

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UNITED STATES PATENT OFFICE.

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ELECTROMAGNET.

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To all whom it may concern:

Be it known that I, DAVID T. MAY, a citizen of the United States, residing at New York, in the county of New York, State of New York, have invented certain new and useful Improvements in Electromagnets, of which the following is a full, clear, concise, and exact description.

This invention relates generally to electromagnetic devices and especially to circuit interrupter devices.

The object of the invention is to provide a circuit interrupter which shall automatically cause periodic intermissions in the interruptions.

This is accomplished in accordance with the invention in its preferred form by the use, in an interrupter of the ordinary vibrating armature type, of a vibrating reed mounted on the armature and having contacts similar to, and cooperating with the armature contacts. The normal period of vibration of the reed differs from the vibratory period of the armature. When in its vibration the reed swings so as to separate its contacts, the armature vibration causes the usual circuit interruptions. On swinging back the reed closes its contacts thus temporarily establishing a connection in shunt of the armature contacts so there is a period during which the motion of the armature does not interrupt the circuit. Provision is also made for tuning the reed so that the intervals may be lengthened or shortened.

A device of this character is particularly useful in connection with the usual method of locating short-circuits and grounds in cable conductors. The usual practice is to connect the defective conductor to a source of alternating or pulsating current of a frequency within the range of audibility. The trouble hunter then locates the fault by means of an instrument known as an "exploring coil" or "fault locator" which inductively produces a tone in a receiver of a frequency like that of the current impressed on the conductor. To prevent confusion with other tones the impressed current is interrupted so that a silent period occurs at regular intervals. This invention provides a simple and satisfactory means for producing and automatically interrupting such a tone.

The invention may be understood by reference to the drawing which shows the invention in its preferred form.

An iron core 1, shown in dotted lines, is provided with an electromagnet coil 2. Wooden discs 3 supported by the core 1, serve to protect the ends of the coil 2 from mechanical injury. The winding of the coil 2 terminates in the wire ends 4 and 5.

The pole pieces 6 and 7 are fastened in any suitable manner to the ends of the core 1. A bracket 8 is provided which is supported by the pole piece 7.

An armature 9 is attached to a flat spring member 10 pivoted on the bracket 8 by means of the pivot 11. Armature 9 is adapted to swing toward or away from the pole pieces 6 and 7. A coil spring 12 is suitably attached to member 10 to produce a normal tendency in the armature 9 away from the pole pieces 6 and 7. A button of non-magnetic material 29 prevents the armature 9 from "freezing" to the pole 6.

A flexible reed of conductive material 13 is mounted on the armature 9. A contact member 14 is also attached to the armature 9. Contact surfaces 15 and 16 are located on member 14 and reed 13 respectively.

A weight 17 with a set screw 18 is adapted to be positioned on the reed 13 so that the rate of vibration thereof may be adjusted.

A supporting bracket 19, of conductive material, preferably metal, has a shelf 22 into which contact screws 23 and 24 are fitted. These screws, 23 and 24, are provided with contact points, 25 and 26, respectively. Normally, point 25 contacts with contact surface 16 and point 26 contacts with contact surface 15. The screws 20 and 21 serve to support the bracket 19 on a suitable mounting.

The wire end 5 is connected in any suitable manner to the member 10. Wire end 4 is connected to one side of a source of direct current 27. The other pole of the current source 27 is connected to the bracket 19 by the conductor 28.

Any suitable apparatus may be included which closes the circuit and such is intended, a portion of the conductor 28 being shown dotted to indicate the inclusion of such apparatus.

On closing the circuit, in the condition shown in the drawing, current flows from the source 27 through conductor 28, bracket 19, contact screws 23 and 24, points 25 and

26, contact surfaces 16 and 15, reed 13, and member 14, armature 9, member 10, wire end 5, coil 2, wire end 4, back to source 27. Poles 6 and 7 therefore energize and draw armature 9 toward them. The contact between point 26 and surface 15 breaks as member 14 is drawn away by armature 9. The contact between point 25 and surface 16, however, does not immediately break, due to the inertia of the weight 17 on the reed 13. Reed 13 is therefore set in vibration. Reed 13 then breaks contact at contacts 25 and 16 and armature 9 returns to make contact at contacts 26 and 15. The circuit interruption continues until the reed 13 returns to close the contacts 25 and 16 when the interruption in the circuit 28 ceases. The interruption starts again when the reed 13 swings downward as before breaking contacts 25 and 16.

What is claimed is:

1. In an electromagnetic circuit interrupter of the vibrating armature type, a flexible arm mounted on such armature, said flexible arm having a natural vibratory period varying from the vibratory period of such armature, and a pair of contacts for said flexible arm connected in parallel with and adapted to cooperate with the contact means of said armature to produce an intermittent series of interruptions in a circuit.

2. A circuit interrupter comprising an electromagnet, an armature electrically connected therewith and adapted to be actuated thereby, a flexible arm mounted on said armature, and stationary contacts for said flexible arm and said armature.

3. An intermittent circuit interrupter comprising an electromagnet, an armature electrically connected therewith and adapted to be actuated thereby, a flexible arm mounted on said armature, stationary electrical contact means for said armature and said flexible arm, and means for adjusting the frequency of vibration of said flexible arm.

4. An intermittent circuit interrupter comprising an electromagnet, an armature electrically connected therewith and adapted to be actuated thereby, biasing means for said armature, a flexible arm mounted on said armature, stationary electrical contact means for said armature and said flexible arm, and means for adjusting the natural vibratory period of said flexible arm.

5. An intermittent circuit interrupter comprising an iron core, an electromagnetic coil wound thereon, pole pieces supported by said core, a bracket mounted on one of said poles, an armature pivotally supported by said bracket and adapted to be actuated by the said pole pieces, said armature being electrically connected with said electromagnetic coil, biasing means for said armature, a flexible arm mounted on said armature, means for adjusting the natural vibratory period of said flexible arm, and stationary contact means for said armature and for said flexible arm.

6. An interrupter comprising an electromagnet, an armature therefor, a pair of movable contact members set in vibration by the movement of the armature, said members having different natural periods of vibration, and a pair of stationary contact members adapted to cooperate with the movable contact members.

7. An interrupter comprising an electromagnet, an armature therefor, a flexible member mounted on said armature and having a natural frequency varying from the natural frequency of said armature, a pair of contact members operated by the movement of the armature, and a second pair of contact members operated by movement of the flexible member.

8. An interrupter comprising an electromagnet, an armature therefor, a flexible member mounted on said armature and having a natural frequency varying from the natural frequency of said armature, a pair of contact members operated by the movement of the armature, a second pair of contact members operated by movement of the flexible member, and means for varying the ratio of the frequency of said armature with respect to the frequency of the flexible member.

In witness whereof, I hereunto subscribe my name this 5th day of March, A. D. 1920.

DAVID T. MAY.