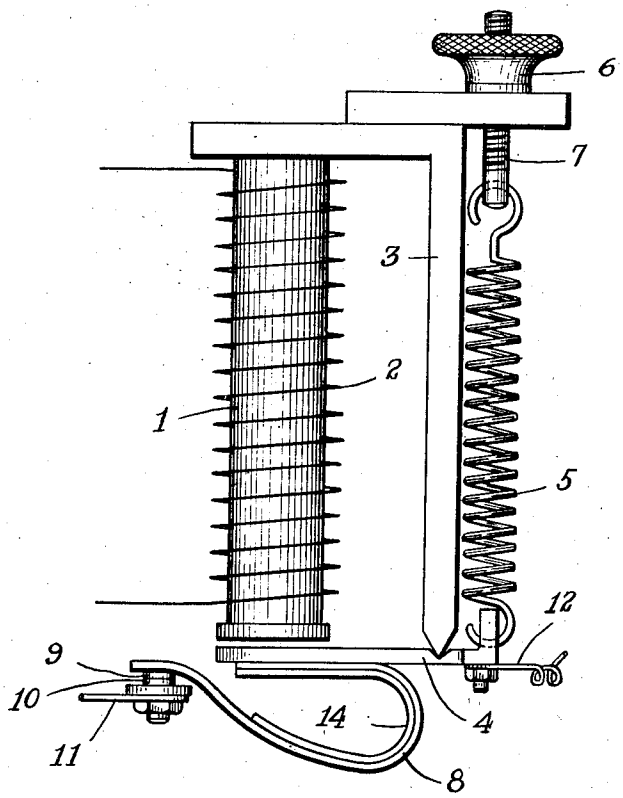
J. W. JEPSON.

ELECTROMAGNET.

APPLICATION FILED FEB. 20, 1915.

1,202,392. Patented Oct. 24, 1916.



WITNESSES

John C. Templer

Herbert Hasseler

INVENTOR

John W. Jepson

BY

Kenyon & Kenyon

ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN W. JEPSON, OF DEPEW, NEW YORK, ASSIGNOR TO GOULD COUPLER COMPANY, A CORPORATION OF NEW YORK.

ELECTROMAGNET.

1,202,392. Specification of Letters Patent. Patented Oct. 24, 1916.

Application filed February 20, 1915. Serial No. 9,551.

To all whom it may concern:

Be it known that I, JOHN W. JEPSON, a citizen of the United States, and a resident of Depew, county of Erie, and State of New York, have invented certain new and useful Improvements in Electromagnets, of which the following is a specification.

My invention relates to improvements in electro-magnets and more particularly to means for compensating for the effect of temperature changes on the electromagnet, whereby variations in the attractive force with which the armature of the electromagnet is attracted, due to the changes in temperature is compensated for.

Further objects, features and advantages will more clearly appear from the detailed description given below, taken in connection with the accompanying drawing which forms a part of this specification.

In the drawing is shown an electromagnet having a core 1, on which is wound the magnet turns 2 adapted to be energized from any suitable source of electric current. Attached to the core 1 is a frame piece 3, on the lower end of which is pivoted an armature 4 adapted to be attracted to the core 1 when the turns or coil 2 is suitably energized. A spring 5, the tension of which may be adjusted by a thumb nut 6 on a screw 7, serves to withdraw the armature 4 from the core 1. Rigidly secured to the armature 4 is a steel spring 8, carrying at its outer end an electrical contact 9, adapted to contact with a fixed contact 10. An electrical conductor 11 is shown connected with the contact 10. Also an electrical conductor 12 is shown connected with the armature 4.

When the armature 4 is attracted by the energizing of the electromagnet, the contacts 9 and 10 are separated, thus breaking the electrical circuit through conductor 11, contacts 9 and 10, spring 8, armature 4 and conductor 12. Upon the strength of the electromagnet being decreased, the spring 5 will withdraw the armature 4 from the core 1 and cause the said circuit to be closed through the electrical switch contacts 9 and 10. Thus, upon certain variations of voltage being applied to the energizing turns of the electromagnet, the armature 4 is adapted to vibrate rapidly and the circuit through the parts 11, 10, 9, 8, 4, 12, is adapted to be opened and closed by vibrations of the armature 4. It is found that in such electromagnets, especially where they are contained in small spaces in which the temperature varies and which become much heated, that such temperature variations materially change the resistance of the magnet turns 2, thus varying the strength of the electromagnet, so that the armature 4 is not attracted with the same voltage applied to the turns 2, but, on the contrary, the voltage at which the armature 4 is attracted to the core 1 varies very considerably with the changes in temperature.

If it is desired that the armature 4 be always attracted, whenever a given voltage is applied to the terminals of the turns 2, then it will be seen that temperature changes have a very disadvantageous effect on the electromagnet. To compensate for such changes in temperature, I provide rigidly secured to the inside of steel spring 8 a strip of brass 14, or other metal different from that of the spring 8. The strip 14 is designed to have a different temperature coefficient from that of the steel spring 8. That is, it is designed to expand more rapidly than does the spring 8, so that as the temperature increases, thereby increasing the resistance of the coil 2, the strip 14 will expand to a greater extent than the spring 8, so as to move the armature 4 somewhat nearer the core 1, against the action of spring 5, thus varying the relative position of the armature to the core, so as to decrease the air gap between the armature and the core of the magnet, to compensate for changes in the resistance of the turns and the weakening of the current resulting therefrom.

While I have described one embodiment of my invention in a preferred form, nevertheless, it will be clear that the invention may be embodied in several forms and many changes and modifications may be made in the apparatus without departing from the spirit and scope of my invention in its broader aspects. Accordingly, I do not desire to be limited to the details shown and described, except as clearly pointed out in the appended claims.

Having fully and clearly described my improvements, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. Means for compensating for the effect of temperature changes on an electromagnet, comprising a device responsive to

changes in temperature, adapted to vary the distance between the armature and core of the magnet, to compensate for changes in the current in the electromagnet due to changes in temperature, said device having two adjacent strips having different temperature coefficients of expansion, whereby an increase in temperature causes a bending of said strips to decrease the distance between said armature and core.

2. Means for compensating for the effect of temperature changes on an electromagnet, comprising a device responsive to changes in temperature adapted to vary the relative position of the armature, to compensate for changes in the current in the electromagnet due to changes in temperature, said device having two adjacent strips having different temperature coefficients of expansion, and normally bent into the form of an arc.

3. Means for compensating for the effect of temperature changes on an electromagnet, comprising a device responsive to changes in temperature adapted to vary the relative position of the armature of the electromagnet to decrease the air gap between the armature and core of the magnet as the temperature increases, to compensate for changes in the current in the electromagnet due to changes in temperature, said device having two adjacent strips secured together at their ends and having different temperature coefficients of expansion, whereby an increase in temperature causes a bending of said strips to decrease the distance between said armature and core.

4. Means for compensating for the effect of temperature changes on an electromagnet, comprising a temperature compensator varying the relative position of the armature to the magnet to compensate for changes in the current in the electromagnet due to changes in temperature and having two adjacent strips having different temperature coefficients of expansion, one end of said strips being secured to the movable armature of the electromagnet and the other end being relatively fixed.

5. Means for compensating for the effect of temperature changes on an electromagnet, comprising means responsive to changes in temperature to change the magnetic path of the magnet to compensate for changes in resistance of the magnet turns due to changes in temperature, said means having two bent strips with different temperature coefficients of expansion, said strips being carried and supported by the movable armature of the electromagnet and adapted to engage a relatively fixed part.

6. The combination of an electromagnet having a fixed core, energizing turns thereon and a pivoted armature adapted to be attracted thereby, a circuit adapted to be opened and closed by the movement of said armature, and means responsive to changes in temperature adapted to automatically change the magnetic path of the magnet, to compensate for changes in resistance of the turns due to changes of temperature, said means being connected to said armature and carrying a switch contact, whereby movement of the armature causes the said contact to open and close said circuit.

7. The combination of an electromagnet having a fixed core, energizing turns thereon and a pivoted armature adapted to be attracted thereby, a circuit adapted to be opened and closed by the movement of said armature, and means responsive to changes in temperature adapted to decrease the air gap of the magnet as the temperature increases, to compensate for changes in resistance of the turns due to changes of temperature, said means embracing a thermal responsive device carried by the armature and carrying a contact for engagement and disengagement with a relatively fixed contact to close and open said circuit.

8. Means for compensating for the effect of temperature changes on an electromagnet, comprising a device responsive to changes in temperature, adapted to vary the distance between the armature and core of the magnet, to compensate for changes in resistance of the magnet turns due to changes in temperature, said device comprising a thermal responsive member carried by the armature and adapted to engage a relatively fixed member to move the armature responsive to temperature changes.

9. Means for compensating for the effect of temperature changes on an electromagnet, comprising a device responsive to changes in temperature adapted to vary the attractive force with which the armature of the electromagnet is attracted, to compensate for changes in resistance of the magnet turns due to changes in temperature, said device comprising a thermal responsive member composed of two strips of metal having different thermal characteristics, said members being carried by the armature and adapted to engage a relatively fixed member to move the armature responsive to temperature changes.

10. The combination of an electromagnet having a pivoted armature adapted to vibrate rapidly upon certain variations of voltage being applied to the energizing turns of the electromagnet, a circuit adapted to be opened and closed by the vibrations of said armature, and means for compensating for the effect of changes in the temperature on the turns of the electromagnet, said means acting to vary the magnetic path of the magnet, to compensate for changes in resistance of the magnet turns due to changes in temperature, said means compris-

ing a thermal responsive member carried by the armature and having a movable contact for opening and closing said circuit.

11. In combination of an electromagnet having a pivoted armature adapted to vibrate rapidly upon certain variations of voltage being applied to the energizing turns of the electromagnet, a circuit adapted to be opened and closed by the vibrations of said armature, and means for compensating for the effect of changes in temperature on the turns of the electromagnet, said means acting to vary the magnetic path of the magnet, to compensate for changes in resistance of the magnet turns due to changes in temperature, said compensating means comprising two metallic strips lying parallel to one another, suitably connected together, having different temperature coefficients and adapted to bring the armature nearer the core of the magnet as the temperature increases.

12 The combination of an electromagnet, a movable pivoted armature therefor, a spring normally tending to move said armature away from the magnet, a fixed contact, a movable contact coöperating therewith, and a thermal responsive member carrying said movable contact, said thermal responsive member being connected to said armature whereby it forces the armature toward the magnet upon increases in temperature.

13. The combination of an electromagnet, a movable armature therefor, a fixed contact, a movable contact coöperating therewith, and a thermal responsive member carrying said movable contact, said thermal responsive member being connected to said armature, whereby it forces the armature toward the magnet upon increases in temperature.

14. The combination of an electromagnet, a movable armature therefor, switch contacts operated by said armature, and a thermal responsive device having one end connected with said armature and the other relatively fixed whereby an increase in temperature decreases the air gap of the electromagnet and compensates for the effect of temperature on its windings.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN W. JEPSON.

Witnesses:
P. W. ENGLISH,
A. R. CLIFFORD.