No. 638,101. Patented Nov. 28, 1899.

J. L. CUTLER.

TELEGRAPH INSTRUMENT.

(Application filed Apr. 7, 1899.)

(No Model.)

Fig. 1,

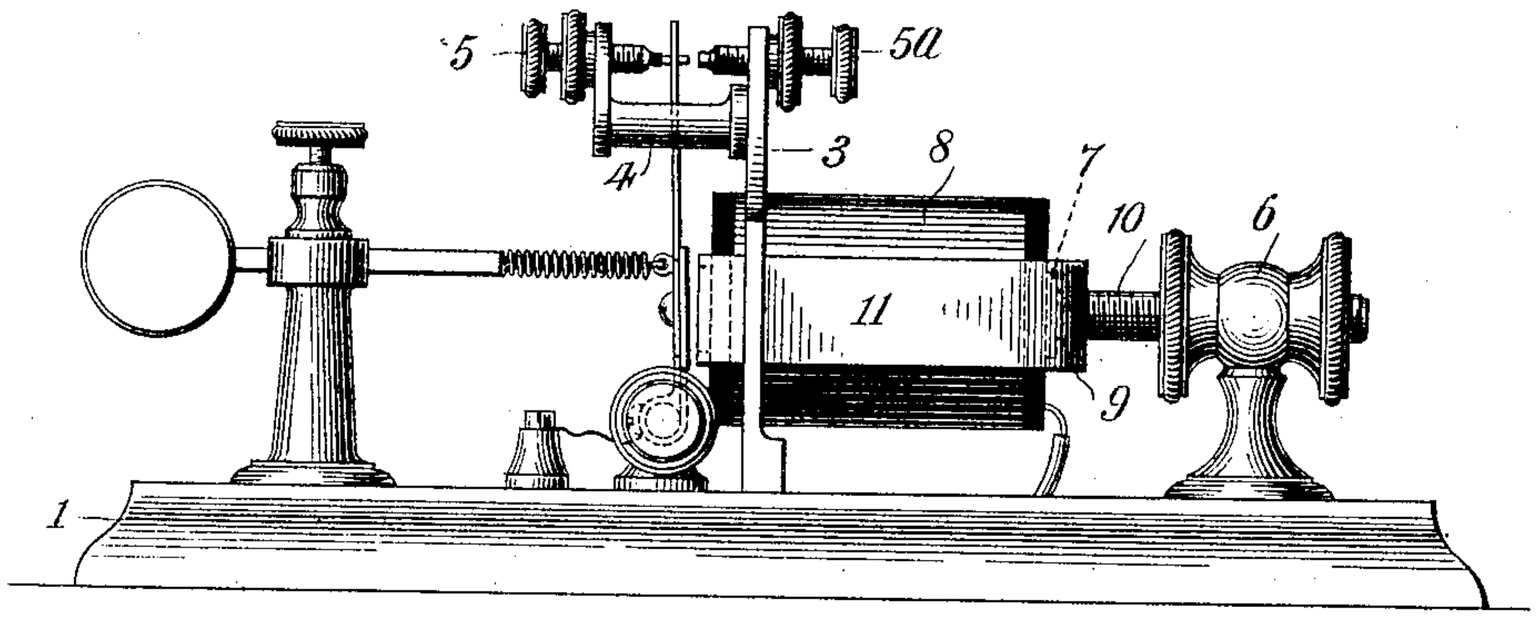


Fig. 2,

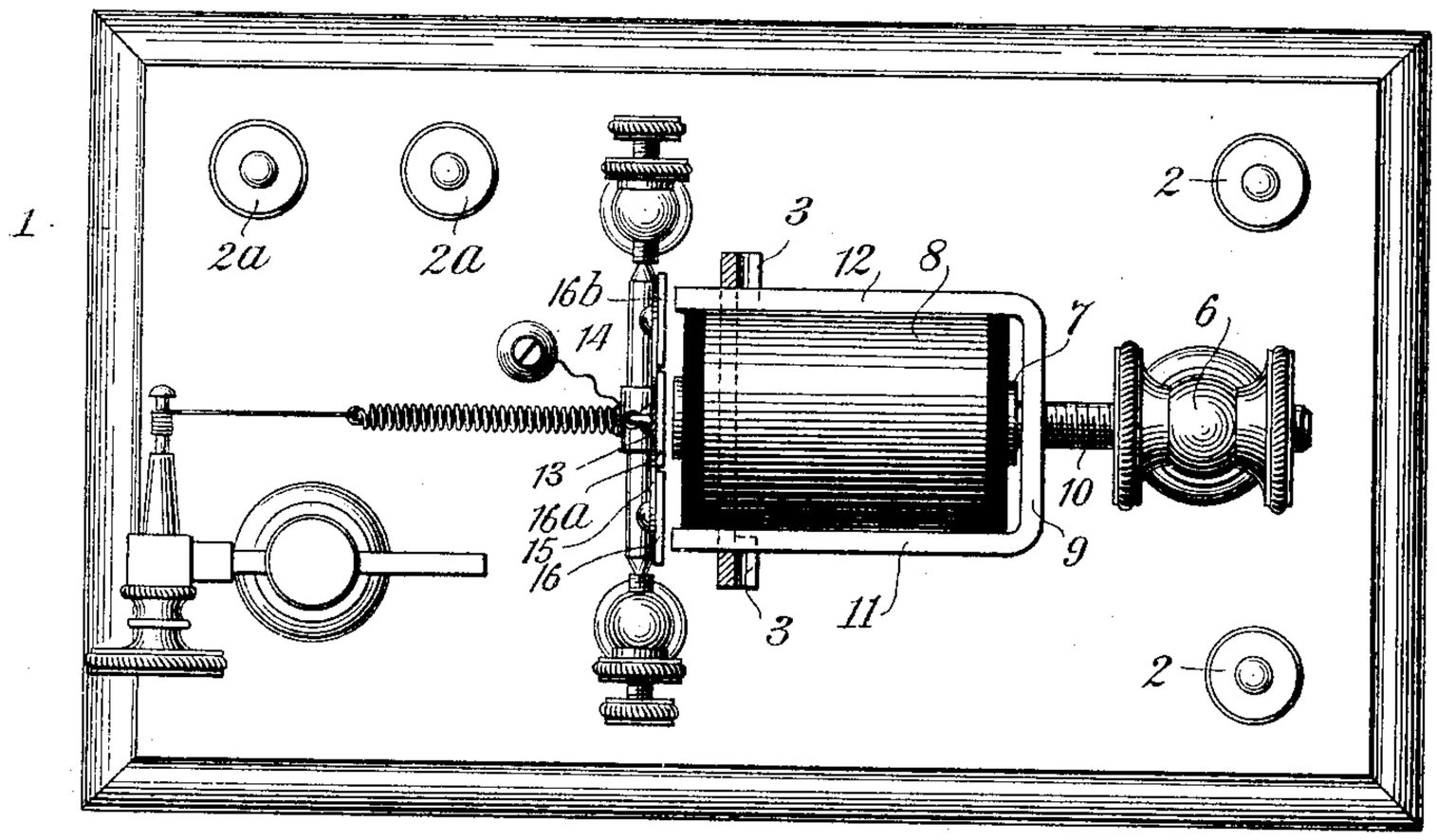
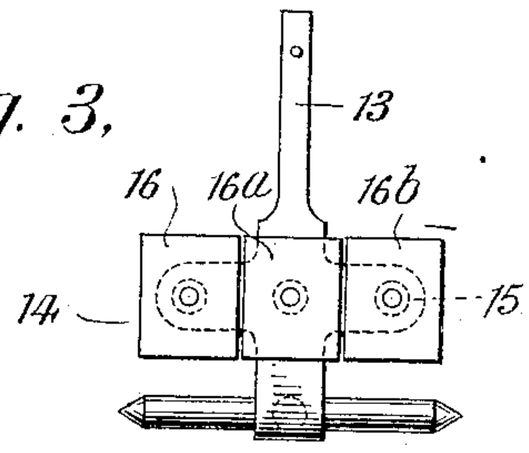


Fig. 3,



WITNESSES:

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UNITED STATES PATENT OFFICE.

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TELEGRAPH INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 638,101, dated November 28, 1899.

Application filed April 7, 1899. Serial No. 712,187. (No model.)

To all whom it may concern:

Be it known that I, JAMES L. CUTLER, a citizen of the United States, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Telegraph Instruments and the Like, of which the following is a specification.

This invention relates to certain improvements in magnetic telegraph instruments and the like, and has for its object to provide an instrument of a simple and inexpensive character, which shall be strong and durable and wherein the electromagnetic devices are so constructed and arranged as to permit of operating the instrument with a minimum of electromotive force, so that an economy in current is permitted.

The invention is also intended to reduce the self-induction of the magnet to a minimum, and therefore to produce in less time a constant or more rapid and lighter acting instrument than those generally in use, and also to make it practicable to use instruments of less resistance, thus giving more working margin, and consequently bettering the service, especially in heavy or stormy weather, and also requiring but little adjustment under varying atmospheric conditions.

The invention consists in certain novel features of the construction, combination, and arrangement of the various parts of the improved instrument whereby important advantages are obtained and the device is simplified, cheapened, and otherwise better adapted for use, all as will be hereinafter fully set forth.

In order that my invention may be the better understood, I have shown in the accompanying drawings a telegraph relay or receiver embodying my improvements, of which drawings—

Figure 1 is a side elevation. Fig. 2 is a plan view. Fig. 3 is a plan view of the armature, showing the construction.

In the drawings, 1 indicates a base, usually made of wood and iron and carrying binding-screws 2 2 and 2^A 2^A, from which lead wires to the ends of the coil and also to the armature-lever and frame in the usual manner, and, being well known, need not be herein more definitely described. 3 indicates a frame, of brass or other suitable material, usually termed in description of relays as the "spectacles," but here, on account of variation in shape shown in the drawings, we may term it a "monocle." This monocle carries near its top a slotted piece 4, through which project the armature-lever and the usual limiting and contact screws 5 and 5^a. The base 1 also carries the usual adjusting devices for the armature-lever and also a post 6 at the rear part and the usual adjusting devices for carrying the magnet and moving it toward or from the armature and need not be more fully described.

The post 6 supports the electromagnet, which comprises a core 7, on which is wound a magnet-coil 8. At one end of core 7 is a transverse bar of soft iron 9, attached thereto by a screw 10, made of brass or other diamagnetic material and separated from the core by means of a thin paper or other means, so as to produce an air gap or space between the core 7 and bar 9, hereinafter more fully described.

The bar 9 has its extremities 11 and 12 bent at right angles and on opposite sides of the coil 8, substantially in line therewith and having its ends in line with the end of the core.

The armature-lever 13 is of the usual construction and has attached to it, by means of a screw or otherwise, an armature 14, comprised of a thin piece of brass 15 or other diamagnetic material of such length and width as to cover the rectangular space embraced from outside to outside of bar ends 11 and 12. This brass piece 15 carries the soft-iron parts 16, 16^a, and 16^b of the armature, which are riveted to the brass plate 15 and separated from each other by a narrow air gap or space, as shown in Fig. 3, the purpose therefor being hereinafter described. The lever 13, carrying the armature, is pivoted in the usual manner and, being adjusted and controlled by the usual screws and springs as those in universal use, need not be more specifically described.

In operation the improved relay is adjusted and controlled practically the same as those now in use, and I have not deemed it necessary to go into detail; but there are some very essential points in its construction that I will now state.

The extremities 11 and 12 of the yoke 9 are practically a continuance of the core 7, and

both 11 and 12 are of the same polarity and consequently of opposite polarity to the free end of core 7. As the opposite ends of yoke 9 traverse both sides of the coil 8 they must necessarily be magnetized by the electromotive force of the coil, and as core 7 is also magnetized by the same current it follows that a very powerful magnet is the result. If the bar or yoke 9 were closely attached to core 7 by a soft-iron screw and an armature consisting of a single piece of soft iron were used, it would probably make one of the strongest magnets known, but would have so much self-induction that it would be slow-acting, and thus objectionable for relay purposes. In order to destroy this self-induction, I attach the yoke 9 to core 7 by means of a brass screw and separate core and yoke by an air-space, so that there is no direct magnetic contact. This, with the air-gap in the armature, renders the magnetic circuit very imperfect, and consequently reduces the self-induction to a minimum. These air-gaps, owing to the resistance in the magnetic circuit while destroying the self-induction, will also destroy a relative amount of the magnetism; but as these two forces are directly opposite nothing is practically lost, while we gain the building up of a rapid magnetization, and thereby quick action. It is also known that a less current will more effectually magnetize and work a non-self-inductive magnet than a strong current will a magnet having strong self-inductive properties.

Another advantage claimed in this invention is that owing to the shape or plan of the magnet and the air-gaps it is far less susceptible to change of current brought about by atmospheric conditions, and therefore more constant in action, consequently requiring but little adjusting and being both light and rapid in action. It is also claimed that the improved relay can be constructed with much less resistance in its coil, and will thus allow a far greater working margin for use in heavy weather.

From the above description it will be seen that the instrument constructed according to my invention is of a simple and inexpensive nature and is especially well adapted for telegraphy and like purposes, and it will also be obvious that the device is capable of considerable change without material departure from the principles and spirit of the invention, and for this reason I do not wish to be understood as limiting myself to the precise form and arrangement of the several parts herein set forth.

Having thus described my invention, I claim—

1. In a relay or the like, a magnet comprising a core with a coil wound thereon, in combination with a soft-iron bar bent as described and attached to one end of the core by means of a brass or other diamagnetic metal screw and magnetically separated from the core by a thin paper or other diamagnetic material placed between said bar and the core, together with an armature pivoted as described, all substantially as set forth and described.

2. In a telegraph instrument, a magnet composed of a coil, core and bent bar arranged as set forth and described, in combination with an armature of iron cut in two or more pieces and riveted to a brass or other diamagnetic back piece, substantially as described.

3. In a relay or the like, a magnet having the bent bar attached to the core by means of a brass or other diamagnetic screw, in combination with an armature composed of iron and brass having the iron divided into three parts with air-spaces between said parts, with lever pivoted as described.

4. In a relay or the like, the combination of a magnet having its core connected to a yoke or iron bar by means of a diamagnetic screw and separated from said yoke by a diamagnetic substance or air-space, substantially as described.

5. In a telegraph-relay or the like, a magnet comprising a core, a coil wound thereon and a soft-iron bar connected at its central part to one end of the core by a diamagnetic connector, and having direct magnetic contact with the core broken by means of an air-gap, and having its ends bent to form arms traversing opposite sides of the coil with their extremities in line with the free end of the core, in combination with an armature carried by a lever pivoted in the usual manner, and arranged to move in line with the arms and core, the monocle-frame, stops carried by said frame to limit the movement of the armature and a retractile spring and means for adjusting the relay, substantially as described.

6. In a telegraph-relay or the like, a magnet comprising a core, a coil wound thereon and a soft-iron bar connected at its central part to one end of the core by a diamagnetic connector, and having direct magnetic contact with the core broken by means of an air-gap, and having its ends bent to form arms traversing opposite sides of the coil with their extremities in line with the free end of the core, in combination with an armature consisting of brass and iron having the iron divided in three pieces with air-gaps between and carried by a lever, pivoted in the usual manner, and arranged to move in line with the arms and core, the monocle-frame, stops carried by said frame to limit the movement of the armature and a retractile spring and means for adjusting the relay substantially as described.

Signed at New York, in the county of New York and State of New York, this 3d day of April, A. D. 1899.

JAMES L. CUTLER.

Witnesses:
ALBERT SCHIFFERS,
OTTO W. SCHIFFERS.