S. MARCUS.

Telegraphic-Relay Magnet.

No. 33,254. Patented Sept. 10, 1861.

Fig. 1.

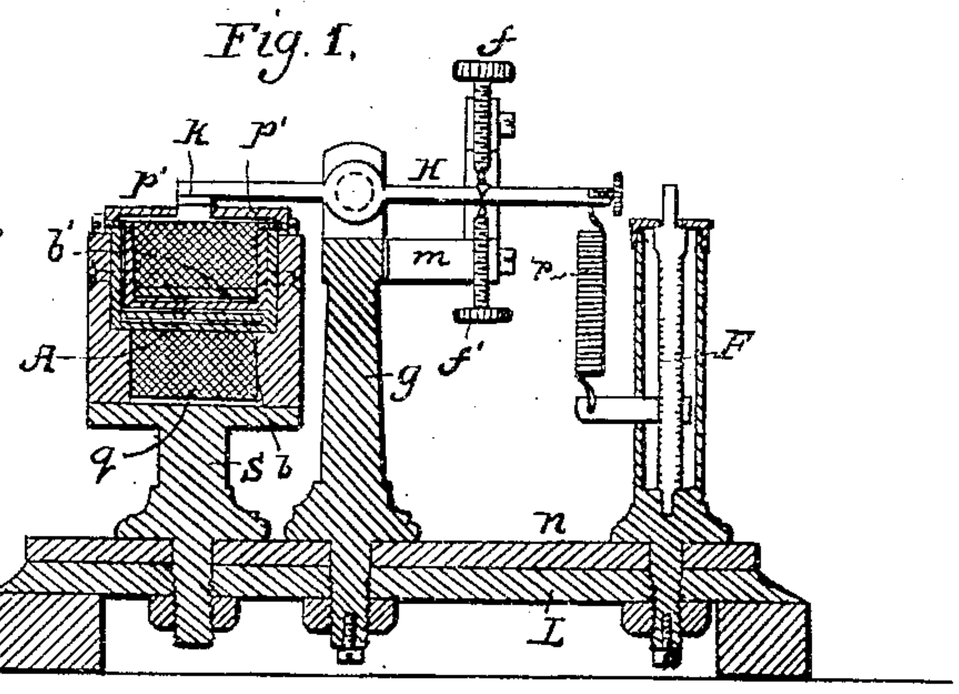


Fig. 3.

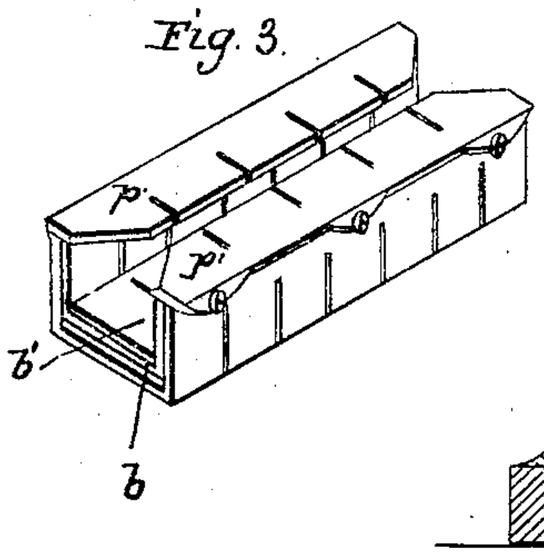
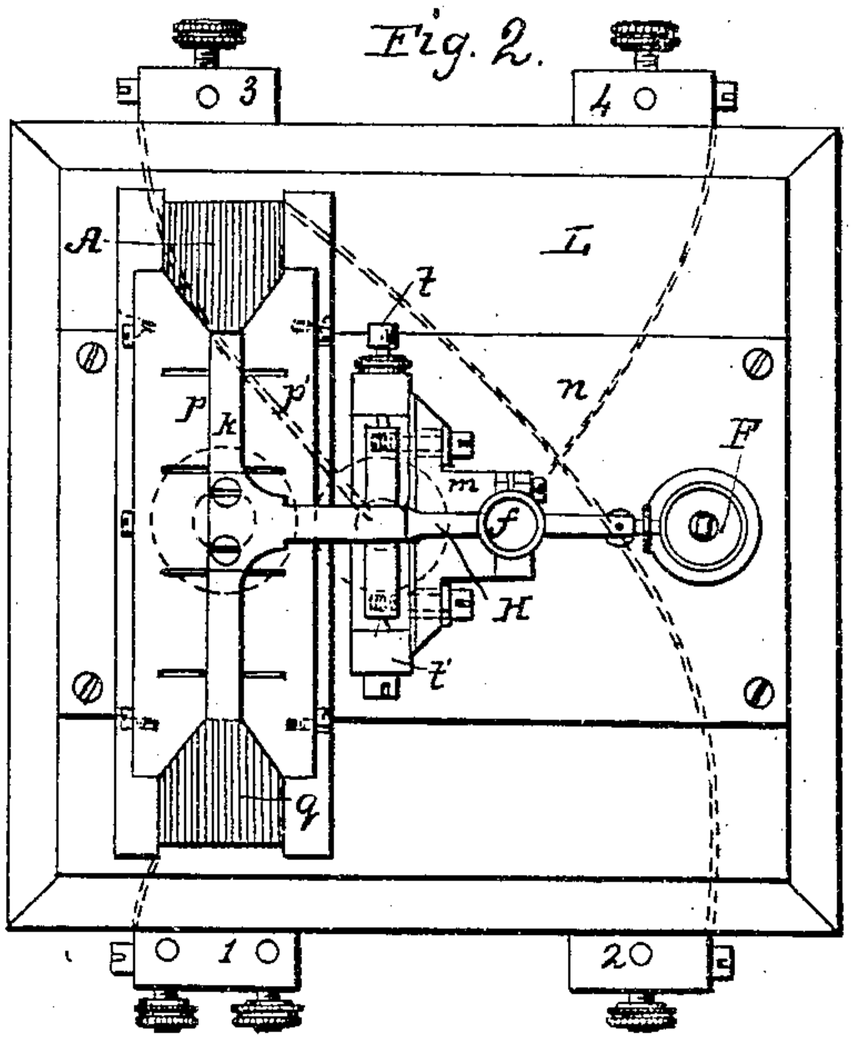


Fig. 2.



Witnesses:

Otto Hoyoys

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UNITED STATES PATENT OFFICE.

SIEGFRIED MARCUS, OF VIENNA, AUSTRIA.

IMPROVEMENT IN RELAY-MAGNETS.

Specification forming part of Letters Patent No. **33,254**, dated September 10, 1861.

To all whom it may concern:

Be it known that I, SIEGFRIED MARCUS, of Vienna, Austria, have invented a new and useful Improvement in Telegraphic Relays for the purpose of telegraphing reliably, regardless of the variations of the intensity of the electric current, (as they constantly occur in practice,) without the operator's regulating or adjusting the action of the contact-arm by the spring-stretcher; and I do hereby declare that the following is a clear, full, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Fig. I is a transverse section; Fig. II, an upper view, and Fig. III a perspective view, of angles.

It is an acknowledged defect in the relays now generably used that they operate reliably only if the spring which causes the retraction of the contact-arm be adjusted in accordance with the intensity of the electric current employed. This fault arises from the fact that the electro-magnet retains a part of its magnetic power even after the electric current is interrupted. This happens more or less in proportion as the electric current employed is either strong or weak.

In the construction of a relay which should be free from that defect, I directed my attention to those natural causes which, under these circumstances, oppose the disappearance of magnetism, and I found by experiments that an almost complete demagnetization is obtained on the following conditions:

First. If the distance from one pole to the other in the metal space of the electro-magnet itself is as small as possible relative to its transverse measure. For the nearer the poles approximate the more decidedly they act one upon the other and find, after the interruption of the electric stream, their neutralization, as it were, in the electric magnet itself. In proof of the correctness of this statement, I refer to the fact that bars of steel very readily assume magnetic power even if the steel is bad and soft, provided the bars are proportionately long. A short piece of steel, however, assumes hardly any magnetism whatever. This is proved beyond the possibility of doubt by a magnet whose distance from one pole to the other—*i. e.*, length—is less than its breadth. Influences, however, which are hostile to the magnetization of a steel magnet are, of course, favorable for the demagnetization of the electro-magnet.

Second. For the same reasons, if the poles of the magnetically-affected anchor lie as near as possible to each other.

Third. If the electro-magnet consists of several pieces insulated from each other, each having a number of incisions made rectangularly to the magnetic stream as it circulates around the iron kernel of the electro-magnet according to Ampère's theory. Upon the interruption of the electric current these incisions interrupt the magnetic stream, and thereby effect the demagnetization of the electro-magnet, while at the same time the insulated pieces mutually weaken each other by having equal poles (poles of the same denominations) close to each other.

Another essential defect of the relays now in use consists in the fact that the attractive power of the electro-magnet in relation to the contact-points (which establish the transition of the electric stream from the local battery) is not made sufficiently available, inasmuch as the contact lies at the extreme end of a small lever-arm, while the electro-magnet makes the attack in the middle of the same where the anchor is fastened. Hence at the place where the power of the electro-magnet is brought to bear its attractive force is reduced one-half by the length of the lever. A consequence of this is the known vibrating motion of Morse's writing apparatus when the currents are weak, or, in fine, the insensibility of the relays. In the relays of my construction, as illustrated in the drawings annexed, all the defects mentioned are completely removed.

Figs. I and II, A represents the electro-magnet. It consists of two or more angles of sheet-iron, Fig. III, which fit into each other, and are separated by paper or some other non-conductor. Between the two angles lies a plate of sheet-iron, *b*, with incisions; also, a plate, *b'*, in the interior angle. Both angles have also incisions, which are carried in the longitudinal direction of the electro-magnet—*i. e.*, from one pole to the other—in the same manner as in the sheet-iron plates. Around this system of angles and

plates are wound the coils of silk-covered copper wire *q* in regular layers. Two small sheet-iron plates, *p p'*, which are screwed to the extreme ends of the sheet-iron angles, at a distance from each other of about two lines, form the continuation of the angles, and at the same time the poles of the electro-magnet.

It is to be remarked that the electric stream magnetizes the plates *p p'*. This, then, is the construction of the electro-magnet. It rests on the column S. The column *g* serves, first, as support of the metal piece *m*, which is insulated from the column and conducts to the contact-screw *f;* and, secondly, as support of the lever H, which turns round the pointed screws *t t'*, and bears the anchor R. The screw *f*, provided with a point of ivory, regulates the distance of movement of the lever-arm.

F is a spring-stretcher serving to extend the spiral spring *r*, which is connected with H. All three—the electro-magnet, the supporter of the contact-screw, and the spring-stretcher—are fixed to the brass plate *n*, the latter being screwed to the wooden base L. The wire presses 1 and 2 serve for the introduction of the current for the line, 3 and 4 for the establishment of connection with the local battery. The punctuated lines signify the connection of the wire presses with the particular parts of the apparatus.

If the anchor is attracted by the electro-magnet, the lever-arm H touches the contact-screw *f*, and the course of the local current is established. If the magnetism disappears from the electro-magnet, the spiral spring draws the anchor back to its normal position, whereby the contact is suspended and the current again interrupted.

What I claim is—

Constructing the relay-magnet of several plates of angle-iron, substantially in the form herein set forth.

SIEGFRIED MARCUS.

Witnesses:

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