

No. 762,430.

PATENTED JUNE 14, 1904.

F. R. MCBERTY & F. H. LOVERIDGE.
ELECTROMAGNETIC SIGNAL.

APPLICATION FILED MAY 9, 1902.

NO MODEL.

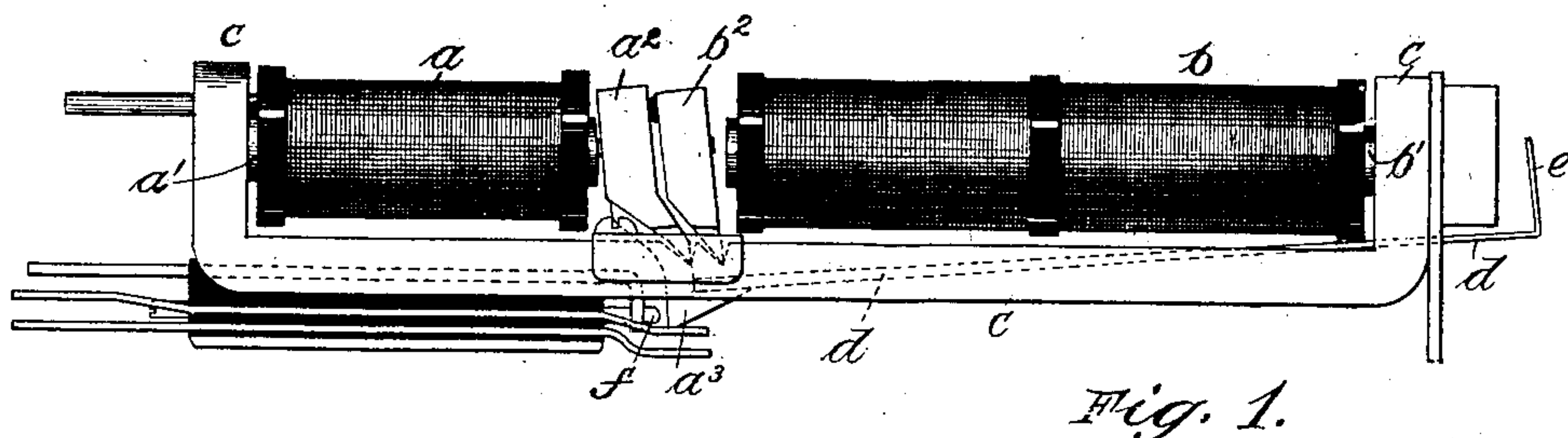


Fig. 1.

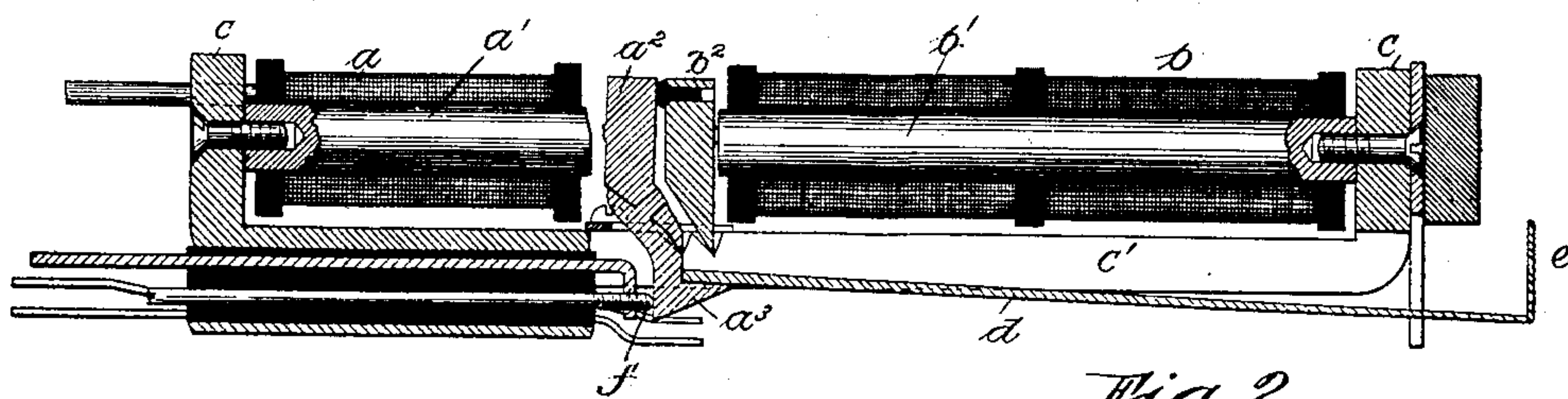


Fig. 2.

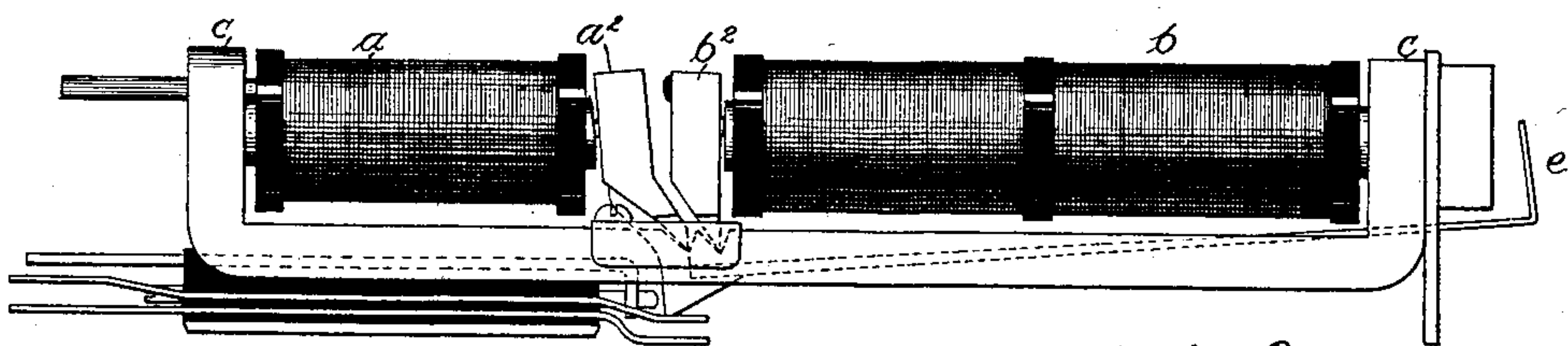


Fig. 3.

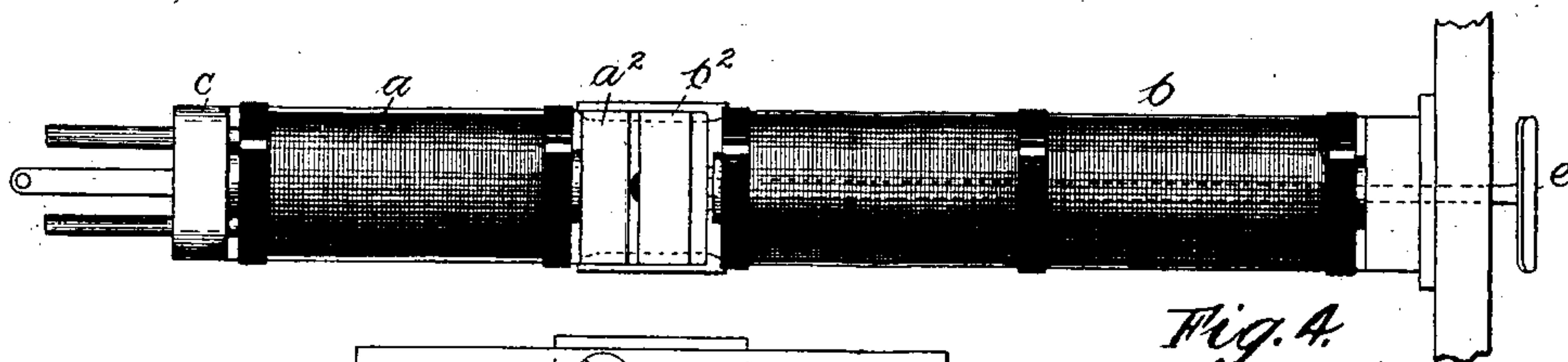


Fig. 4.

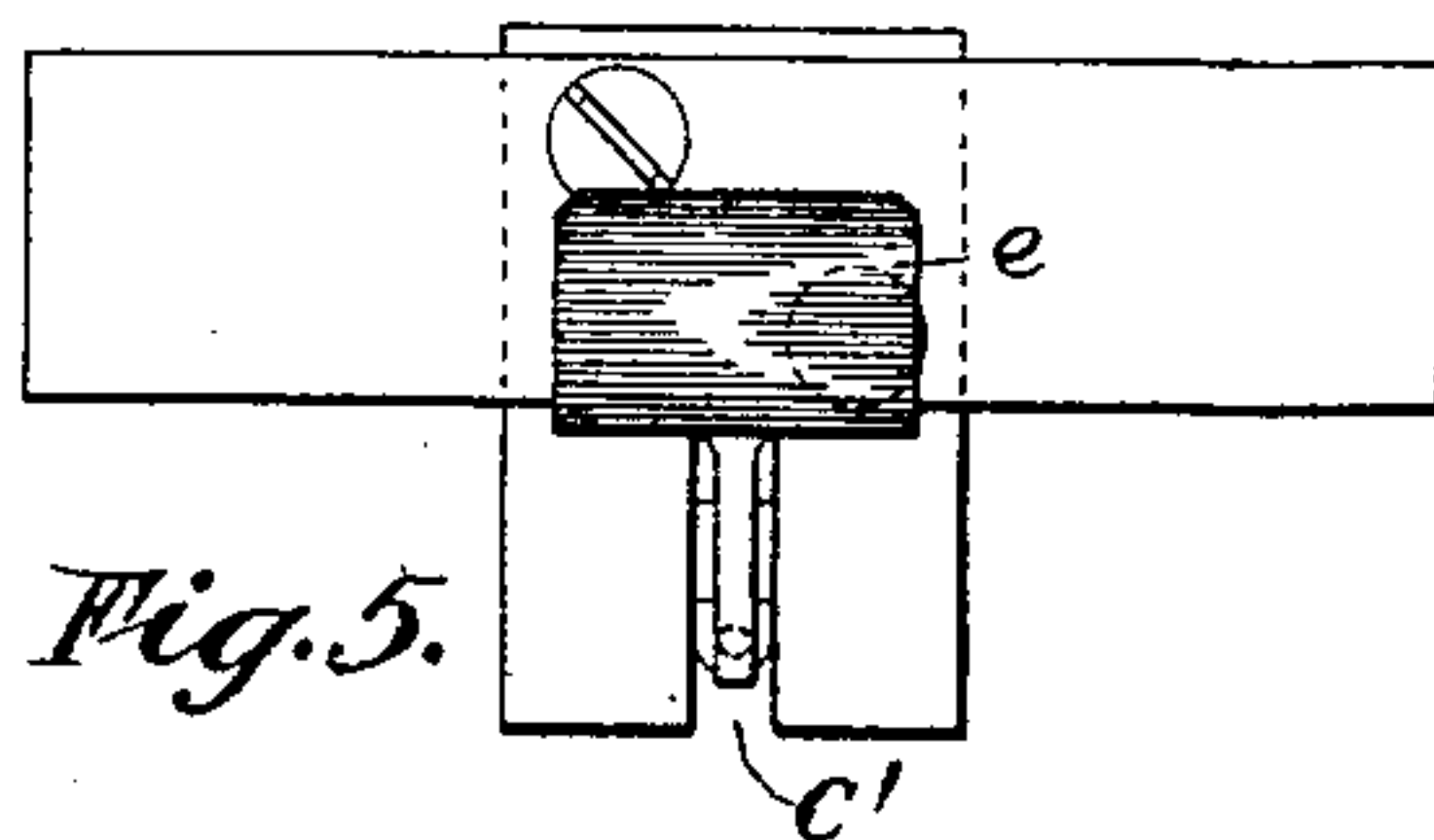


Fig. 5.

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UNITED STATES PATENT OFFICE.

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ELECTROMAGNETIC SIGNAL.

SPECIFICATION forming part of Letters Patent No. 762,430, dated June 14, 1904.

Application filed May 9, 1902. Serial No. 106,543. (No model.)

To all whom it may concern:

Be it known that we, FRANK R. McBERTY, residing at Evanston, and FREDERICK H. LOVERIDGE, residing at Chicago, in the county of Cook and State of Illinois, citizens of the United States, have invented a certain new and useful Improvement in Electromagnetic Signals, of which the following is a full, clear, concise, and exact description.

Our invention relates to an electromagnetic signal; and our object has been particularly to produce an improved signal suitable for telephone-switchboards—that is to say, one which will be extremely sensitive and capable of responding to the influence of two or more actuating agencies which are correlated and may act either jointly or independently.

Generally speaking, our invention contemplates an electromagnet whose armature controls a responsive device or signal—such, for example, as a movable shield or target—and a second electromagnet associated with the first and serving to operate mechanism which normally prevents the actuation or display of the signal, but which is actuated by said second magnet when excited to leave the signal or responsive device under the complete control of the first-mentioned magnet.

The preferred form of our invention is illustrated in the accompanying drawings, and we will proceed to describe the structure there shown, subsequently pointing out in the appended claims those features or combinations which we regard as novel.

Figure 1 is a view of our improved signal in side elevation. Fig. 2 is a view in vertical section, showing the position of the parts when the right-hand magnet is excited. Fig. 3 is a view similar to Fig. 1, but showing the parts in the positions they would occupy when both magnets are excited. Fig. 4 is a plan view with the parts in the positions illustrated in Fig. 1, and Fig. 5 is a front view.

Similar letters of reference are used to designate the same parts wherever they are shown.

The two magnet-cores a' b' are surrounded by coils or helices a b , respectively, and are mounted in alinement, facing one another,

with their outer ends secured to the vertical projections of a U-shaped iron yoke c . The armatures a^2 b^2 are pivoted back to back between the opposed inner ends of the magnet-cores, resting in knife-edge bearings in the upper surface of the central portion of the yoke-piece c .

The armature a^2 carries a horizontal arm or extension d , which projects forward underneath the magnet b in a central slot c' , which is cut in the yoke-piece. The forward extremity of the arm d carries a shield or target e , which constitutes a signal-indicator. As the armature a^2 rocks back and forth then the target e is moved down or up, the normal position being as shown in Figs. 1 and 5. The armature a^2 and the parts carried thereby are so balanced that the armature when free tends to fall away from the end of the magnet-core a' , to assume the position illustrated in Fig. 2. The armature b^2 , however, is balanced against the armature a^2 , and its weight or retractile force is sufficient to overcome the retractile force of armature a^2 and force the latter into an attracted position, as shown in Fig. 1, this being the normal condition. An insulating-stud carried upon one of the armatures and interposed between them prevents them from sticking together.

The armature a^2 carries a metallic extension a^3 , which is adapted to be engaged by a metallic stop or screw-point f when the said armature is retracted. The parts a^3 and f may, if desired, be insulated from one another, as shown, and serve to control an electric circuit.

The armature b^2 normally serves as a blocking device to prevent the display of the target e by overbalancing the armature a^2 and preventing the latter from retracting. When, however, the magnet b is excited, the armature a^2 is freed and the signal is displayed or not, according to whether magnet a is inert or excited. When magnet b alone is excited, the signal is displayed, as indicated in Fig. 2; but when both magnets are excited, as shown in Fig. 3, or when both are inert, as in Fig. 1, the signal e occupies its upper or normal position. The parts of this signal being deli-

cately balanced, it is extremely sensitive and efficient and requires very little energy for its operation.

When our electromagnetic device is used as a line-signal, it is desirable that the magnet *a* contain two coils, as shown, in order that the line may be balanced by connecting one coil in one limb and the other coil in the other limb. When used as a clearing-out signal in connection with the cord-circuit of a telephone-exchange, there is no advantage in providing more than one coil upon the magnet *b*, this coil being placed in a local circuit adapted to be closed when its corresponding plug is inserted in the jack of a line.

It will be understood that the armatures *a*² and *b*², in combination with their respective magnets *a* and *b*, may be employed for any of the various purposes to which they may be adapted. The two armatures are so mounted that when unattracted the armature *b*² rests by the action of gravity against the armature *a*² to hold the same in the position indicated in Fig. 1. When, however, the weight of armature *b*² is removed from armature *a*², said armature *a*² will, by reason of its own mounting and weight, assume the position indicated in Fig. 2.

Having thus described our invention, we claim as new, and desire to secure by Letters Patent, the following:

1. In an electromagnetic signal, the combination with an electromagnet, an armature therefor, and a shield or target moved by said armature, of a second electromagnet and mechanism controlled thereby adapted when the first-mentioned magnet is inert to effect the display or concealment of said target, said mechanism being actuated when the second electromagnet is excited, to leave the target to be displayed or concealed according to the inert or excited condition of the first-mentioned magnet.

2. The combination with two electromagnets, of a movable armature for each magnet, normally tending to occupy an unattracted position, said armatures being arranged to mechanically oppose one another in retracting but being free to be independently attracted each by its respective magnet, the retractile force of one of said armatures being normally overbalanced by that of the other, and a device responsive to the movement of the armature so overbalanced.

3. The combination with two electromagnets having opposing pole-pieces, of a movable armature for each magnet, each armature normally tending to occupy an unattracted position, said armatures being mounted back to back between the opposed magnet-poles and arranged to oppose one another as described, one of said armatures normally overbalancing the other and forcing it into an attracted position.

4. The combination with an electromagnet,

a movable armature therefor and a signal controlled by said armature, of a second electromagnet having an armature mechanically balanced against the armature of the first magnet and normally holding the same in its attracted position, said first-mentioned armature being moved to its unattracted position when the armature of the second magnet is attracted, whereby the signal is responsive to the first magnet only when the second magnet is excited, and is responsive to the second magnet when the first magnet is inert.

5. In an electromagnetic signal, the combination with two electromagnets having opposing pole-pieces, of a movable armature for each magnet, each armature normally tending to occupy an unattracted position, said armatures being mounted back to back between the opposed magnet-poles and arranged to oppose one another as described, one of said armatures normally overbalancing the other and forcing it into an attracted position, and a shield or target moved by the armature so overbalanced.

6. The combination with two electromagnets having opposing pole-pieces, of a movable armature for each magnet, each armature normally tending to occupy an unattracted position, said armatures being mounted back to back between the opposed magnet-poles and arranged to oppose one another as described, one of said armatures normally overbalancing the other and forcing it into an attracted position, and a switch-contact operated by the movement of the armature so overbalanced.

7. In an electromagnetic signal, the combination with two magnet-cores in substantial alinement, and a magnetizing-helix for each core, of a U-shaped iron yoke uniting the outer ends of the magnet-cores, said yoke being longitudinally slotted as described, two armature-levers pivoted back to back in knife-edge bearings in the central portion of the yoke, between the opposed inner ends of the magnet-cores, said armatures being arranged to oppose one another when unattracted, one of said armatures normally overbalancing the other, and an arm carried by the armature so overbalanced, said arm projecting through the slot in the yoke-piece, and carrying a shield or target.

8. In an electromagnetic device, the combination with two armatures adjusted normally to stand away from the poles of their magnets, one of said armatures being adapted normally to rest against the other armature to hold the same in the position it would assume if attracted, said last-mentioned armature being weighted to recede from its attracted position when the weight of its companion armature is removed therefrom.

9. In a visual signal, the combination with an indicator-carrying part and means for moving it into a position to display the indicator,

of a weighted armature adapted to bear upon said indicator-carrying part to move the indicator into a position of concealment, and a magnet adapted to raise said weighted armature to release the indicator, as described.

10. In a visual signal, the combination with an indicator, a magnet, an armature therefor adapted when unattracted to move said indicator into a position of display, of a weighted armature bearing upon said first-mentioned armature to maintain the indicator concealed, and a magnet adapted to raise the said weighted armature to release the indicator, as described.

11. The combination with a pivoted arma-

ture and an indicator-carrier, said armature being adapted to display the indicator when unattracted, of a weighted armature bearing on said indicator-carrier to overbalance the force tending to display the indicator, and a magnet controlling each of said armatures, as described.

In witness whereof we hereunto subscribe our names this 30th day of December, A. D. 1901.

FRANK R. McBERTY.

FREDERICK H. LOVERIDGE.

Witnesses:

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FREDERICK A. WATKINS.