No. 608,246. Patented Aug. 2, 1898.

C. ARLDT.

ELECTRICAL SIGNALING APPARATUS FOR TRANSMITTING COMMANDS.

(Application filed Dec. 29, 1897.)

(No Model.)

Fig. 1.

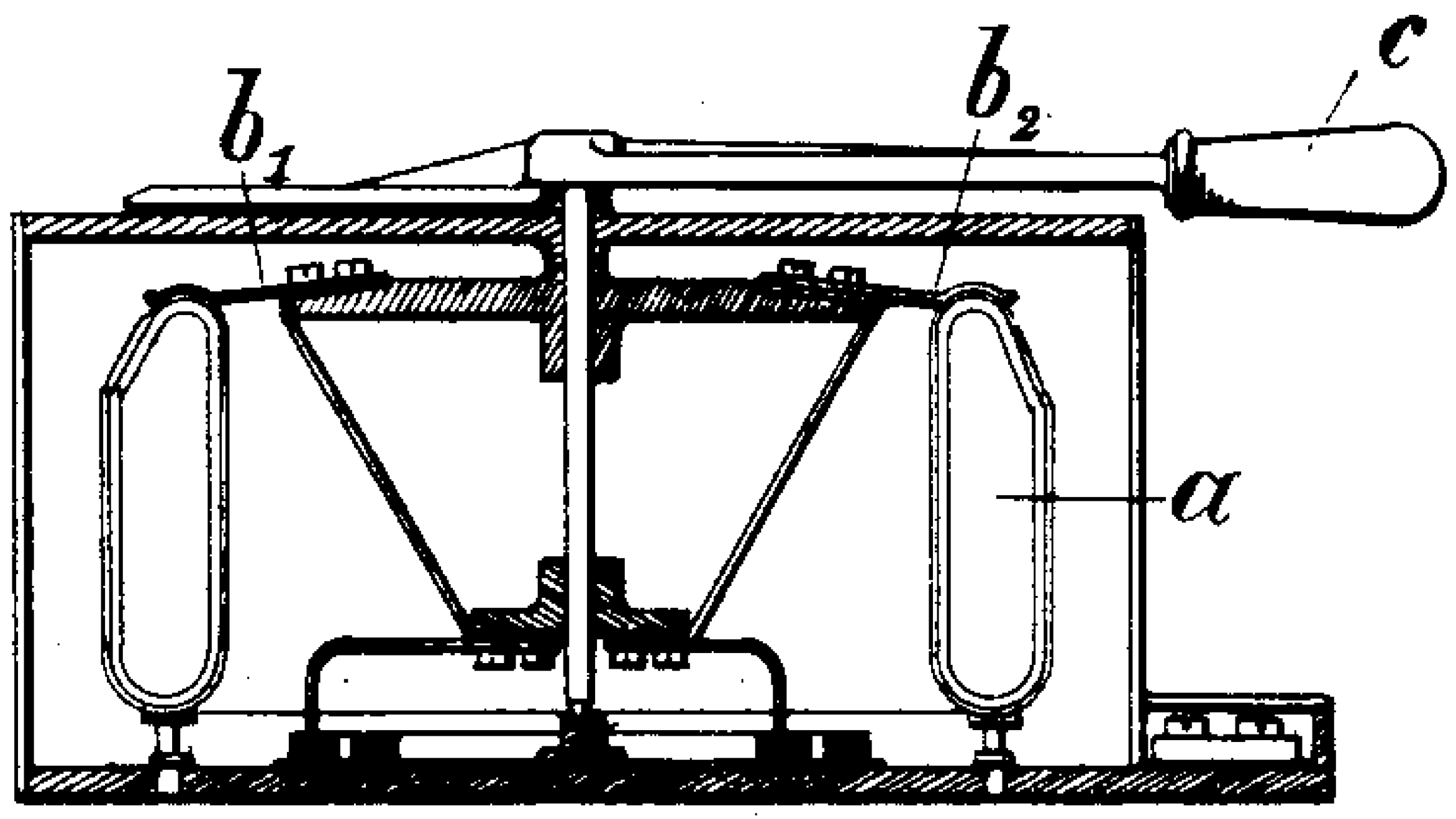


Fig. 2.

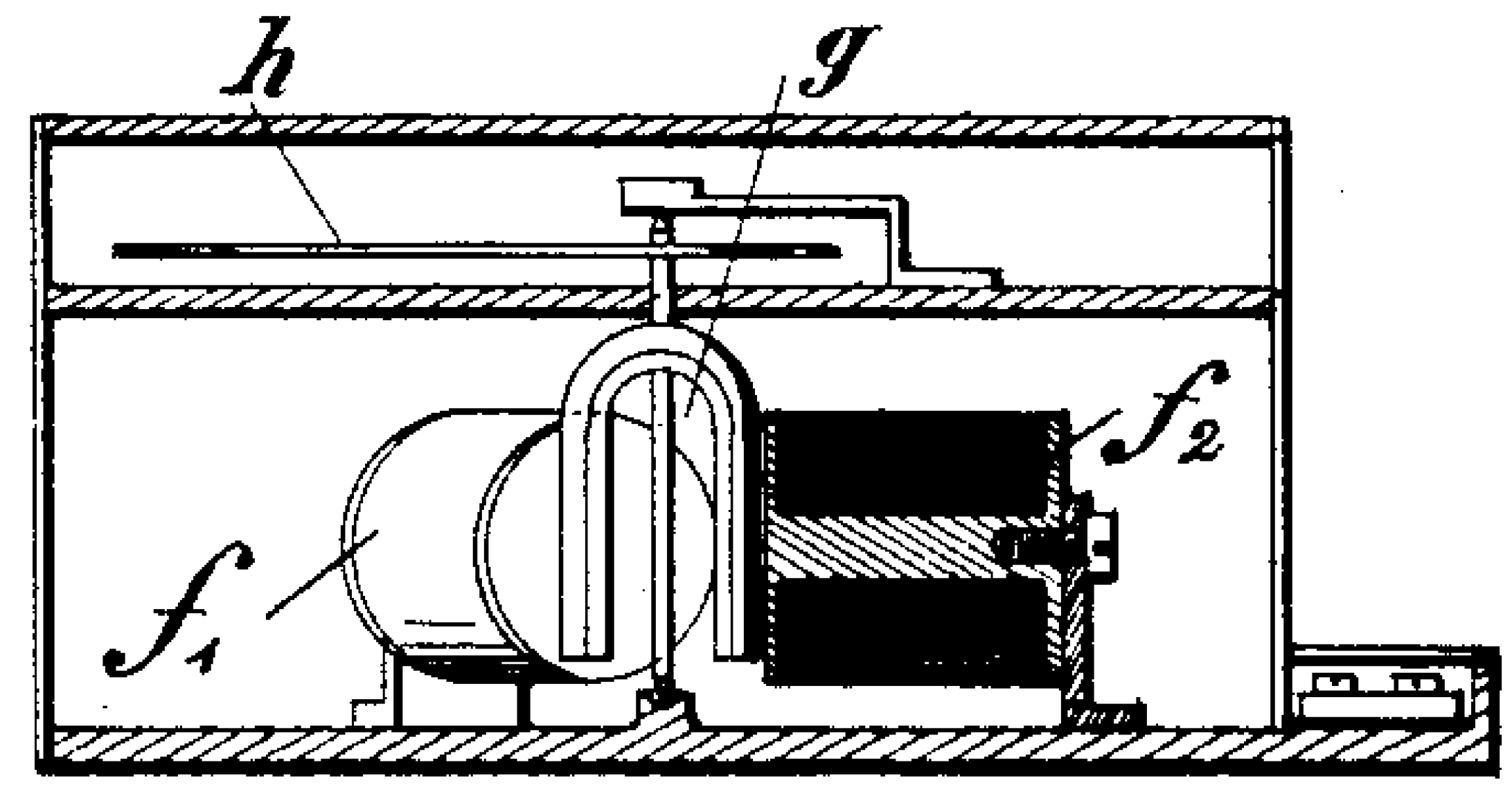


Fig. 3.

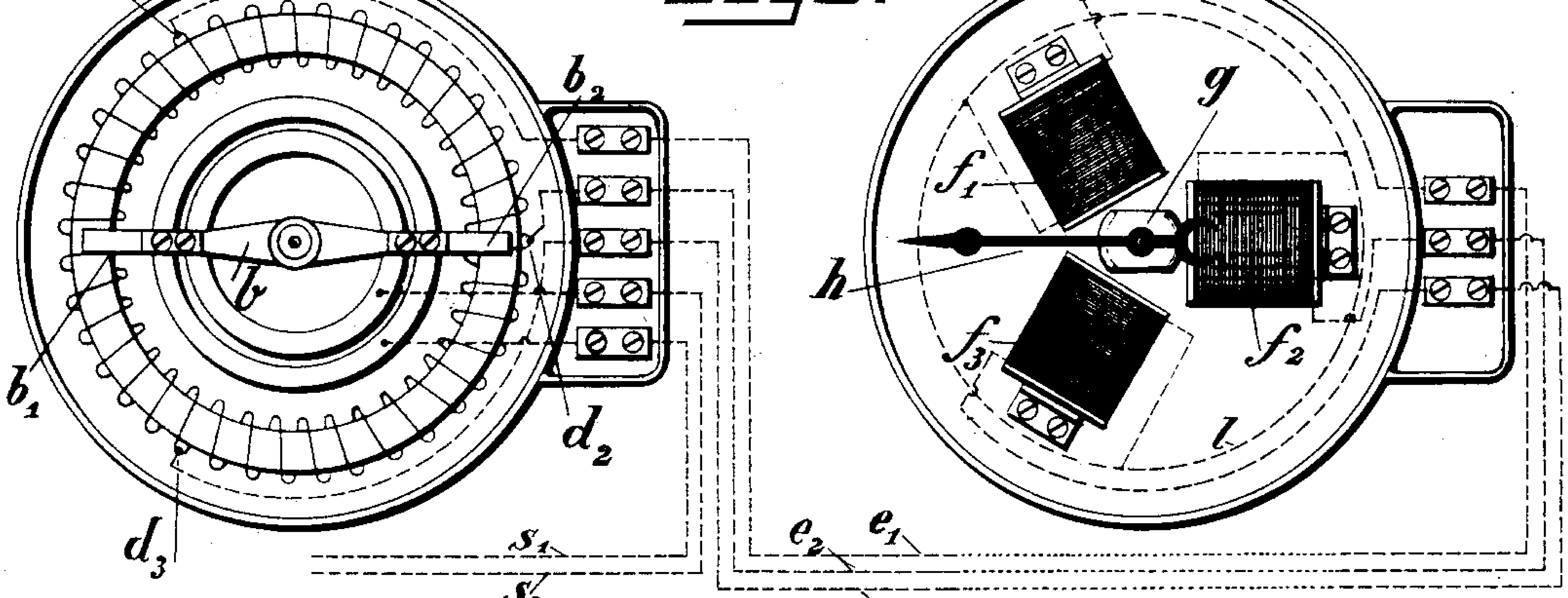


Fig. 4.

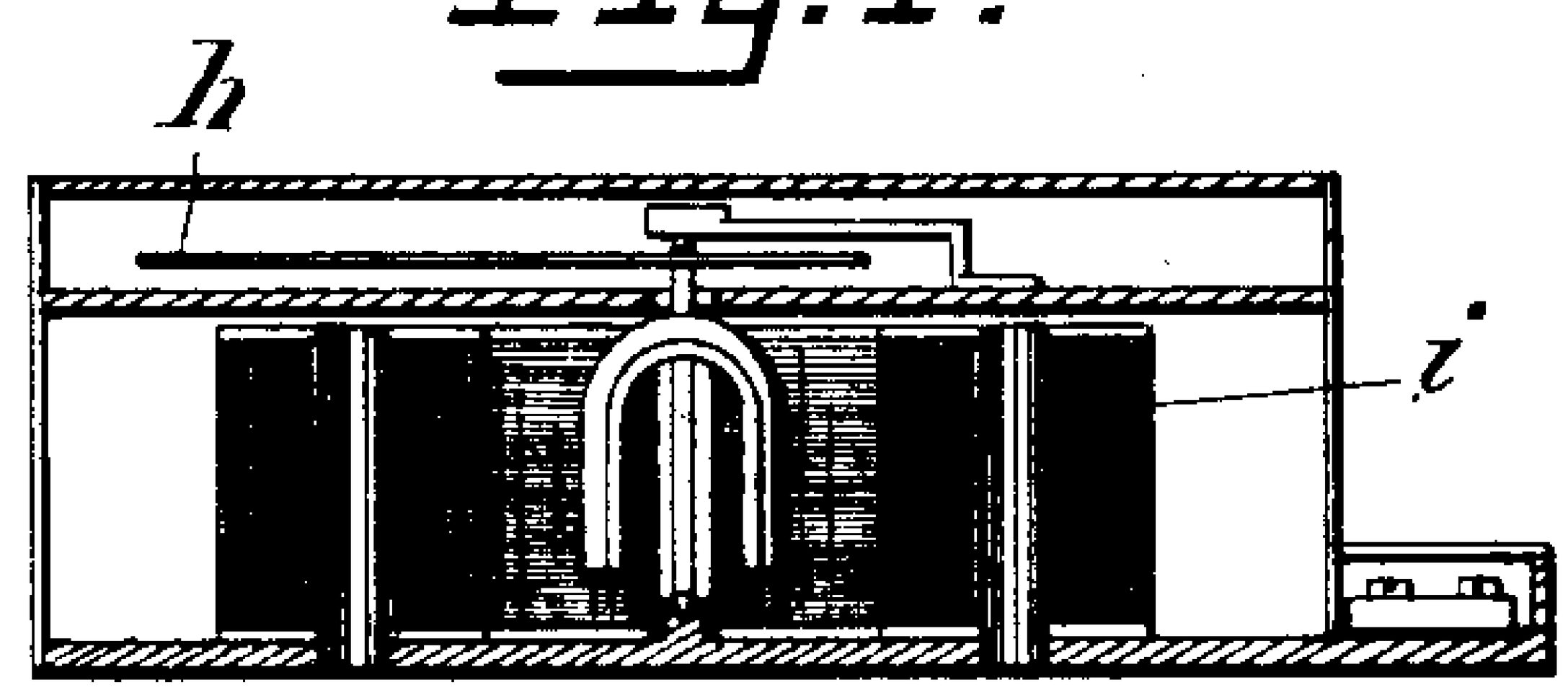
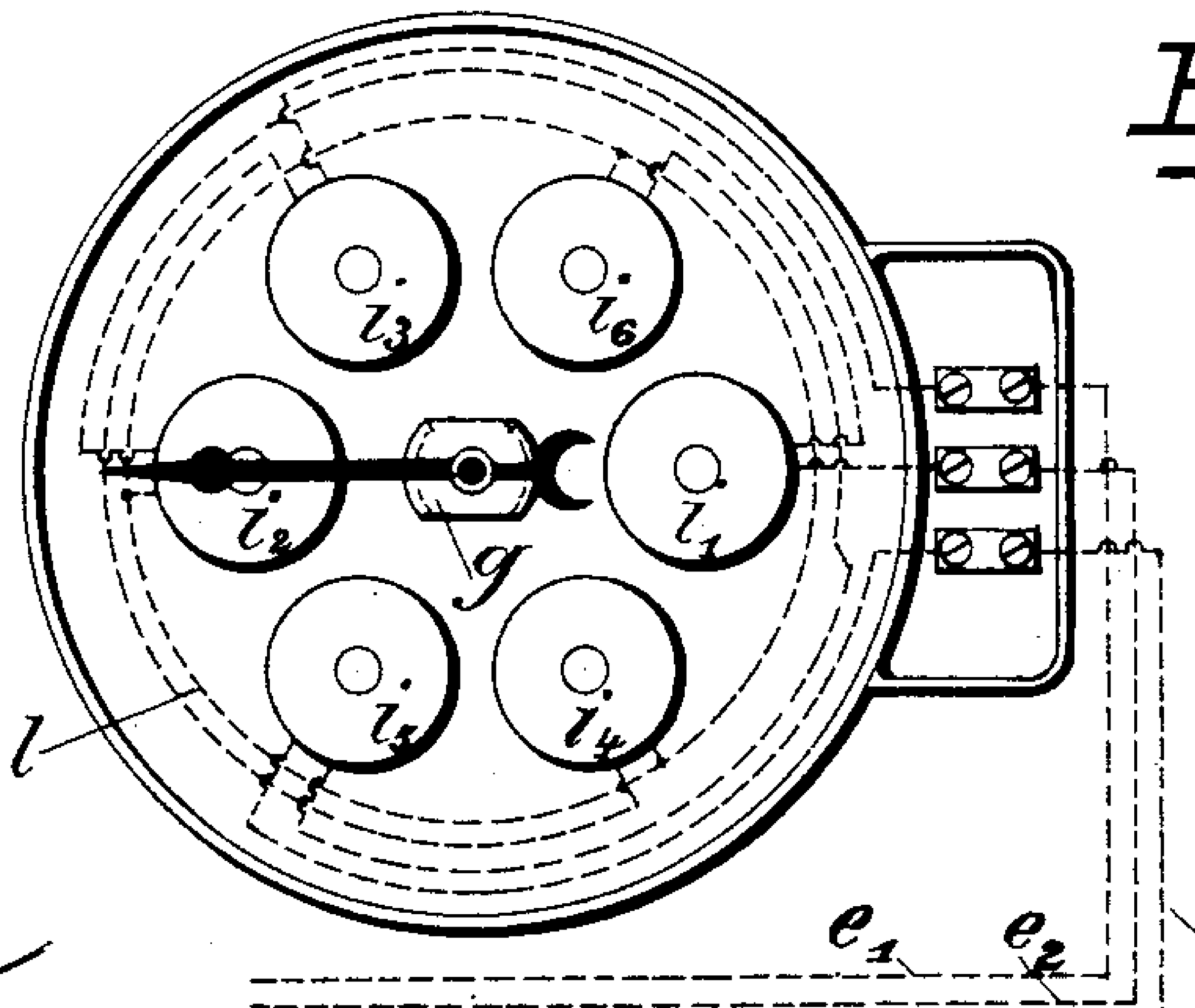


Fig. 5.



Witnesses:
Charles H. Day
Henry Hasper
[illegible]

Inventor:
Conrad Arldt
By Briesen & Knauth
his attorneys.

'THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CONRAD ARLDT, OF BERLIN, GERMANY.

ELECTRICAL SIGNALING APPARATUS FOR TRANSMITTING COMMANDS.

SPECIFICATION forming part of Letters Patent No. 608,246, dated August 2, 1898.

Application filed December 29, 1897. Serial No. 664,453. (No model.) Patented in England May 7, 1897, No. 11,413, and in France May 7, 1897, No. 254,366.

To all whom it may concern:

Be it known that I, CONRAD ARLDT, engineer, a subject of the King of Saxony, residing at Berlin, in the German Empire, have invented a certain new and useful Improvement in Electrical Signaling Apparatus for Transmitting Commands and the Like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Patents for this invention have been obtained in the following countries: Great Britain, No. 11,413, filed May 7, 1897, and France, No. 254,366, filed May 7, 1897.

Electrically-operated signaling apparatus for transmitting commands and the like as heretofore employed are more or less unreliable in their working in consequence either of the use of interpolated mechanical devices or on account of variations in the potential difference when their action depended upon changes of resistance effected in the transmitting instrument.

The present invention relates to a construction of electrical signaling apparatus whereby such unreliability is entirely obviated.

I will describe my invention with reference to the accompanying drawings, in which—

Figures 1 and 2 show vertical sections of one form of the sending and receiving instruments, and Fig. 3 a plan section. Fig. 4 shows a vertical section, and Fig. 5 a plan, of another construction of receiver in which a system of six (or it might be three or other multiple of three) coils i' i^2 i^3 i^4 i^5 i^6 are arranged with their axes parallel to the axis of rotation of the magnet.

Referring to Figs. 1, 2, and 3, the transmitter consists of a resistance-coil a, closed on itself, which is supplied with current at two diametrically opposite points by a movable sliding contact-arm b' b^2, rotated by means of a movable lever c and connected by leads s' s^2 with the source of current. At three points d' d^2 d^3, situated one hundred and twenty degrees apart, this current is taken from the resistance-coil and is conducted, by means of three leads e' e^2 e^3, to the receiving instrument. The latter consists of an arrangement of three or of a multiple of three coils f' f^2 f^3, in the magnetic field of which is a magnet g with pointer h, mounted on an axis on which it can revolve freely. The coils are here shown as arranged perpendicularly to the axis of the pointer. The connections of the circuits are such that the three leads e', e^2, and e^3 are respectively connected to coils situated at an angle of one hundred and twenty degrees to each other. The other ends of these coils are connected by leads with the entering ends of the diametrically opposite coils, the other ends of which are connected together by a ring-shaped conductor l.

Referring to Figs. 1, 2, and 3, the action of the apparatus is such that a current supplied by means of the opposite sliding contacts b' and b^2 to the resistance a is so distributed through the leads e' e^2 e^3 and the receiver-coils f' f^2 f^3 that the latter constitute a magnetic field whose direction always corresponds to that of the contact-arm b and hand-lever c of the transmitter. In the position shown at Fig. 3, for example, the positive current enters at b' and divides in such manner that one part passes through the two half-coils of a directly to the opposite negative contact b^2. This part of the current has no influence upon the action of the apparatus and by a suitable proportioning of the resistance of a can be made so small as to be negligible. The other portion of the current entering at b' divides, one portion going to the right to d' and thence to wire e', passing to the outer end of the coil f', which it traverses, and passes out to the common wire l. The winding of this coil and also that of the coils f^2 and f^3 is such that if the current flows from outside to inside a north pole is produced at the inside. Consequently in this instance a north pole will be produced at the inner end of f'. The other portion of the current passes to d^3 and thence to e^3, where it passes to the inner end of the coil f^3, thence passing through the coil and out to the common wire l, thus creating an inner north pole in the magnet f^3. The currents which pass to the common wire or ring conductor l return to the negative pole of the battery. Thus from the ring conductor l the current passes to the inner end of the coil f^2, thence through the coil to the wire e^2, thence

to the arm b^2, to the negative pole of the battery. The north poles of f' and f^3 and the south pole of f^2 now form the components of a magnetic field whose direction will be the same as that of coil f^2, so that the magnet g and index h will also assume that position, and the latter will therefore have exactly the same position as b and c of the sending instrument. If now b and c be turned until b^2 is brought to d', then the positive current entering at b' will divide into two parts, which will flow through a till they reach the branches d^2 and d^3, passing thence through the leads e^2 and e^3 to the receiver. In the latter the currents will pass through coils f^2 and f^3 in the direction from without to within, thus forming inner north poles. From f^2 f^3 the currents pass into the ring conductor l and, joining, pass thence through the coil f' from inside to outside, producing an inner south pole, and finally the current passes from f' through e' and d' to b^2, and so back to the current-generator. The poles of f' f^2 f^3 will thus form the components of a magnetic field the direction of which will correspond to the position of b c and which will bring g and h into a corresponding position. By the order of succession of the connections of the points d' d^2 d^3 with the coils f' f^2 f^3 this shifting can be made to take place in the same direction as in the transmitter or in the opposite direction, at will. On further rotation of the contact-lever b in the transmitter the respective operations and changes of the current are repeated in the coils of the receiver, so that a complete rotary field is produced, which always moves in a synchronous manner with the transmitter-lever. As only these variations of resistance affect the direction of the magnetic field, while the strength of the same—that is to say, the strength of the current introduced into the circuit—has no appreciable effect upon this direction, the accuracy of the indications of the pointer is in this invention independent of variations in the potential of the current used.

In apparatus for giving orders, with reply, the transmitter of the one apparatus is connected to the receiver of the other apparatus. It is also possible without further trouble to operate from one transmitter any desired or varying number of receivers simultaneously.

Obviously the arrangement may also be such that in the receiver there is provided a fixed permanent magnet g, while the coils f, which are then provided with a pointer, have their movement in the field of this constant magnet.

Having now particularly described my invention, what I claim is—

In an electrically-actuated signaling apparatus, the combination of a transmitting instrument comprising a closed wire coil, two diametrically opposite rotatable contacts supplying current thereto, three leads connected to the coil at points one hundred and twenty degrees apart and a receiver consisting of three coils connected to the leads and acting upon a central rotatable magnet having a pointer whereby variation of resistance in the transmitter caused by the change of position of its rotatable contacts will effect the movement of the pointer in the receiver to the corresponding position quite independent of any variations in the tension of the current supplied, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CONRAD ARLDT.

Witnesses:
CHARLES H. DAY,
HENRY HASPER.