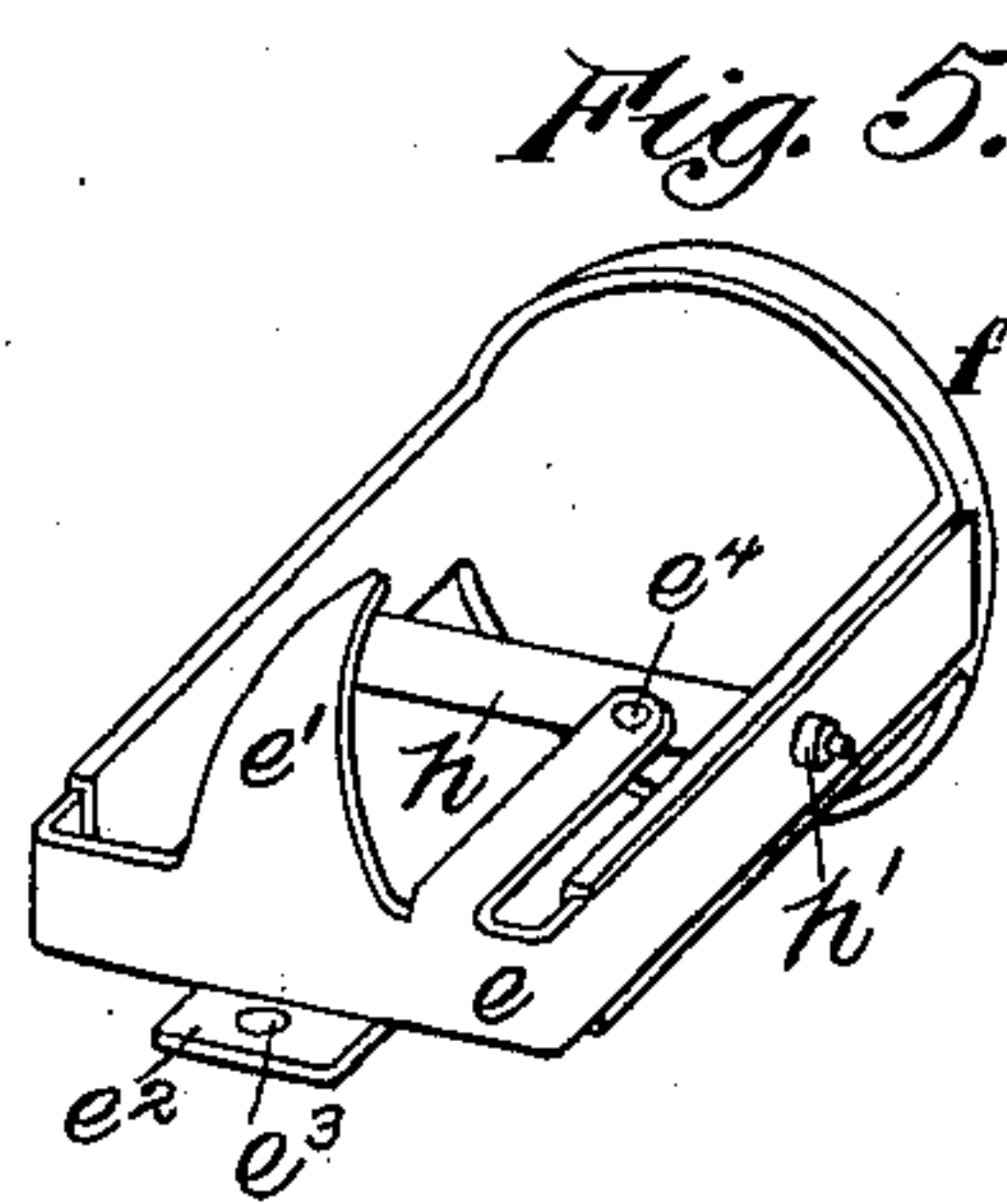
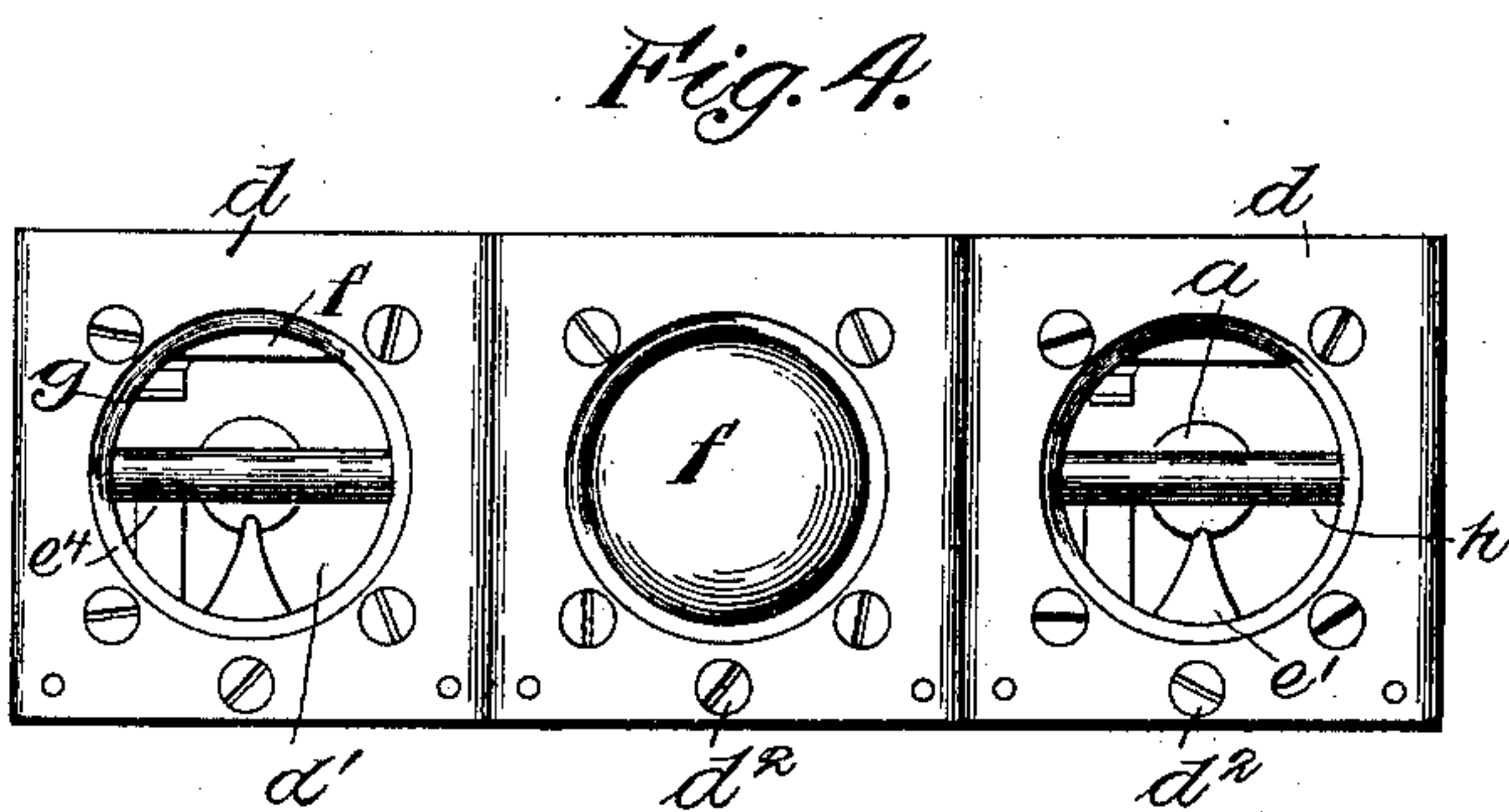
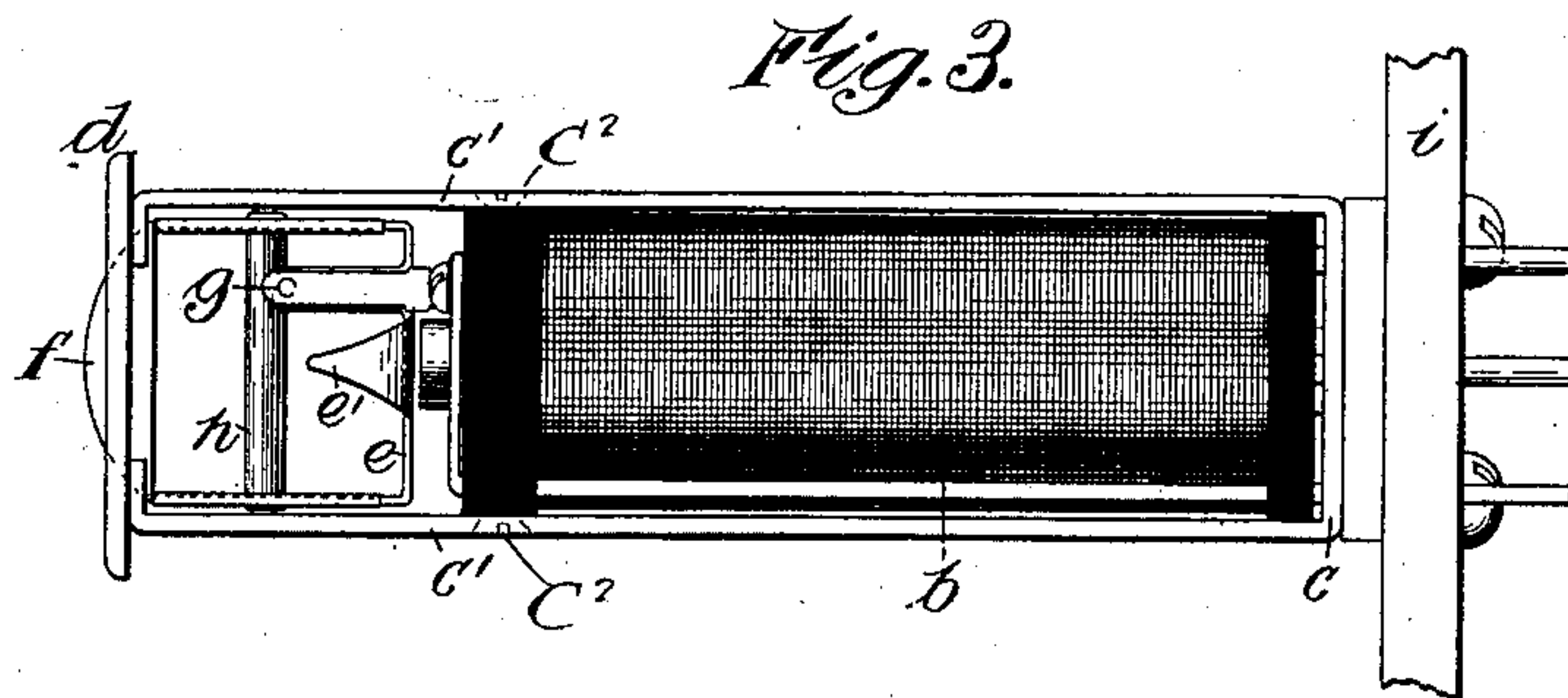
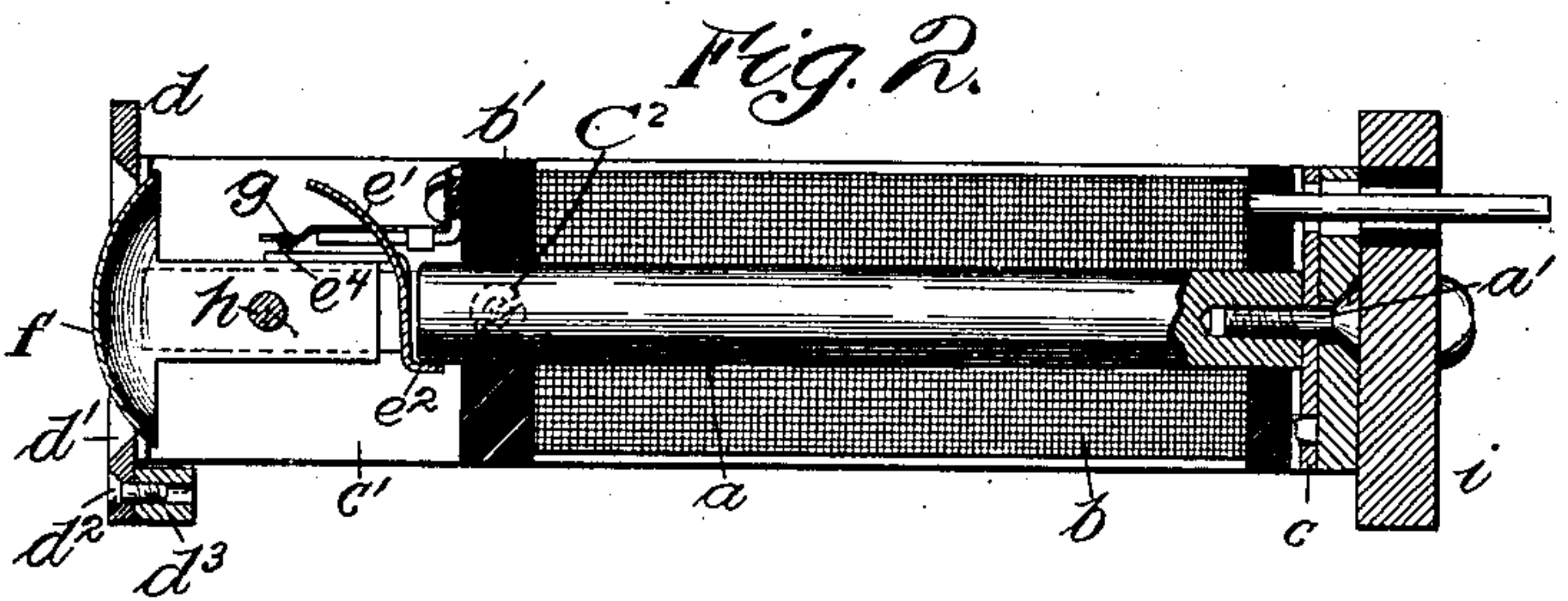
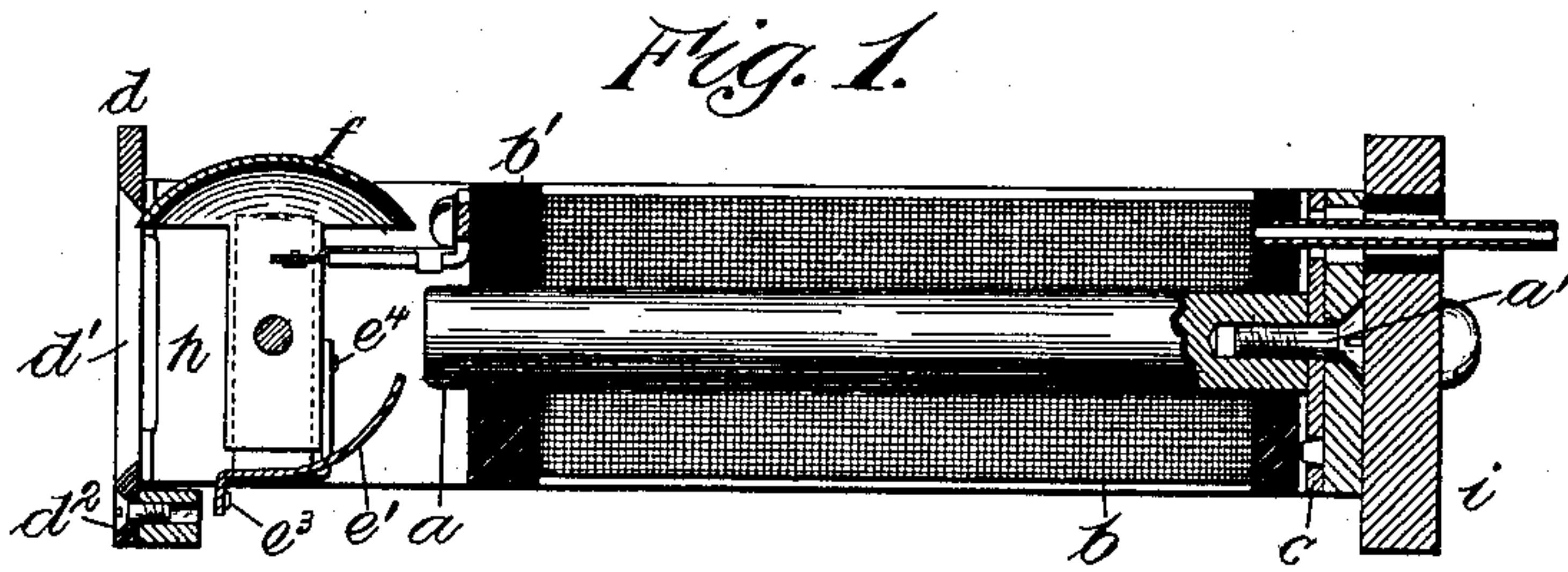


No. 735,953.

PATENTED AUG. 11, 1903.

W. W. DEAN.
ELECTROMAGNETIC SIGNAL INDICATOR.
APPLICATION FILED JAN. 14, 1902.

NO MODEL.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM W. DEAN, OF CHICAGO, ILLINOIS, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

ELECTROMAGNETIC SIGNAL-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 735,953, dated August 11, 1903.

Application filed January 14, 1902. Serial No. 89,659. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. DEAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electromagnetic Signal-Indicators, of which the following is a full, clear, concise, and exact description.

My invention relates to an electromagnetic signal-indicator, and has for its object to provide an efficient self-restoring indicator which is simple in construction, having few parts, and not liable to get out of order.

A further object is to make the signal self-contained, so that it may readily be removed as a whole from its mounting without taking apart.

My invention consists in certain details of construction hereinafter described, and particularly pointed out in the appended claims.

I will describe my invention by reference to the accompanying drawings, which illustrate the preferred embodiment thereof, wherein—

Figure 1 is a longitudinal sectional view of the indicator. Fig. 2 is a similar view showing the parts in position to display the signal. Fig. 3 is a plan view. Fig. 4 illustrates the front of a row of signals, and Fig. 5 is a detail perspective view of a portion of the mechanism.

Similar letters of reference are used to designate the same parts in whatever figures of the drawings they may appear.

The core *a* is surrounded by a magnetizing helix *b* and is secured at the right-hand end to the base of a U-shaped pole-piece *c*, the arms *c'* *c'* of which pole-piece inclose the core and its helix. This pole-piece may be formed of an iron plate one-sixteenth of an inch in thickness, an inch wide, and nine inches long, bent into a U shape, with the base square. A screw *a'* passes through the base of the U into the end of the core to hold the same in place, and two screws *c²* *c²* also pass through the arms *c'* *c'* into the insulating end piece *b'* of the electromagnet. The arms *c'* *c'* are longer than the core *a*, so that the ends project some distance beyond the end of said core, forming an inclosure in which the rotating armature *e* of the electromagnet is

mounted. The ends of the arms *c'* *c'* are joined by a non-magnetic plate *d*, having an opening *d'*, in which a target is adapted to be displayed. In practice a number of the indicators are mounted in a row, as shown in Fig. 4, the plates *d* *d* of the several indicators being each secured by a screw *d²* to a cross-bar *d³*.

A rotating armature is pivoted or trunnioned in the arms *c'* *c'* in position to be attracted by the end of the core *a*. This armature preferably consists of a stirrup-shaped iron piece *e*, pivoted in front of the magnet-pole *a* and having a tapered tongue *e'*, bent upward from the base toward the magnet-pole. This tongue is preferably curved eccentrically, so that as the armature rotates in a counter-clockwise direction it will gradually approach the magnet-pole. A projection *e²* also extends downward from the left-hand lower edge of the armature, which projection takes a position directly under the magnet-pole when the armature is rotated, as shown in Fig. 2, so that a direct upward pull is exerted upon the armature as it approaches a horizontal position. This projection also acts as a stop to limit the movement of the armature when it reaches a horizontal position. A small piece *e³* of non-magnetic metal may be provided upon the face of this projection to prevent it from sticking to the magnet-pole when current through the magnetizing-helix ceases.

A light aluminium shield *f* is carried upon the upper end of the armature-stirrup above the pivotal point thereof, which shield is normally concealed from view from the front when the armature hangs in its normal vertical position; but when the magnet is excited and attracts its armature the shield is swung down into the opening *d'* in the plate *d*, thus displaying its signal. The shield is preferably made convex, as shown, so that it may fit into the circular opening *d'*.

A contact-point *e⁴* is carried by the armature, which is adapted to strike a contact-spring *g*, mounted upon the insulating end piece *b'*, so that a local circuit, such as a night-bell circuit, may be controlled by the indicator acting as a relay.

The armature and the shield form a rectangular framework, as shown in Figs. 3 and 5, the shield or target *f* being carried at the top of this framework and the armature proper—that is, the part which is directly acted on by the magnet-pole—at the lower end. A shaft *h* is passed transversely through this framework and secured thereto, said shaft having extensions *h'* *h'* of smaller diameter which serve as trunnions upon which the framework rotates. These trunnions rest in holes provided for the purpose in the two arms *c'* *c'* of the U-shaped pole-piece *c*.

The framework of Fig. 5 constitutes in its essentials a centrally-pivoted rocking arm, one end of which carries a shield or target and the other end whereof carries an armature, said armature being adapted to be attracted by the pole of the electromagnet, which is preferably on the level with the pivot of the rocking arm, the armature being preferably formed with a tapered tongue bent into an arc eccentric to the pivot, whereby the surface of the armature gradually approaches the magnet-pole as the arm is rotated, said arm being adapted to be rotated to display the shield or target when the magnet is excited.

The signal-indicators of my invention may be used with advantage as line-signals for telephone-exchange switchboards. They may be mounted side by side upon a metal strip *i*, passing along the back of the switchboard, and it will be appreciated that each signal-indicator is self-contained and may be removed as a whole from its mounting without the necessity of taking it apart or disturbing the mechanism in any way.

A feature of my invention consists in making the shield or target *f* convex or partly spherical in form, so that it will fit closely into the circular opening *d'* in the plate *d* and will project a little beyond the surface of the plate. A target of this form will be noticed more quickly by the eye of the operator and will attract attention from the side as well as from the front. A flat target could not be seen so readily from the side.

I claim as my invention—

1. In an electromagnetic signal, the combination with an electromagnet, of a centrally-pivoted rocking arm, a curved eccentric armature carried by one end of said rocking arm in position to be attracted by the magnet-pole, whereby said arm is adapted to be rocked when the magnet is excited, and an indicator or shield carried by the opposite end of said rocking arm, as set forth.

2. In an electromagnetic signal, the combination with an electromagnet, of a centrally-pivoted rocking arm, a tapered eccentric armature *e'* carried by one end thereof in position to be attracted by the magnet-pole, whereby said arm is rocked when the magnet is excited, and a shield or target carried by the other end of the rocking arm, as set forth.

3. In an electromagnetic signal, the combi-

nation with a magnet-core, a magnetizing-helix disposed about said core and a U-shaped pole-piece for one end of the core, the core and helix lying between the arms of said pole-piece, the arms of said pole-piece being longer than the core and projecting beyond the end of the same, of a rocking arm of magnetic material pivoted in the projecting arms of the U-shaped pole-piece, an armature carried by one end of the rocking arm, an indicator or target carried by the other end thereof and a plate in front of said magnet having an opening in which the target is adapted to be displayed when the rocking arm is swung into its attracted position, as set forth.

4. In an electromagnetic signal, the combination with an electromagnet, of a pair of arms *c'* *c'* extending in front of the end of said magnet on each side thereof, a rectangular framework pivoted in said arms and normally hanging in a vertical position, a target or indicator carried at the top of the framework, a curved eccentric armature carried at the lower end thereof, said armature having a tapered tongue *e'* which is curved in an arc eccentric to the pivot, whereby the surface of the armature gradually approaches the magnet-pole as the frame is rotated, and a shield or plate having an opening in which the target is adapted to be displayed when the framework is rotated, substantially as described.

5. In an electromagnetic signal, the combination with a magnet-core, a magnetizing-helix therefor and a U-shaped pole-piece secured to the core at one end, the arms of said pole-piece being longer than the core and passing back substantially parallel therewith, a shield or plate uniting the ends of the pole-piece and having an opening therein, a rocking arm pivoted in the arms of the U-shaped pole-piece, between the said shield and the magnet-core, a target or indicator carried by one of said rocking arms, and an armature carried by the other end thereof, substantially as described.

6. The combination with an electromagnet, of a U-shaped pole-piece therefor fastened to the magnet-core at one end, the arms *c'* *c'* of said pole-piece projecting beyond the other end of the magnet, and a stirrup-shaped armature *e* pivoted in said arms *c'* *c'* and normally hanging in a vertical position, said armature having a tapering tongue *e'* curved eccentrically, as set forth.

7. In a signal-indicator, the combination with a plate having an opening *d'* therein, of a convex or rounded target *f* shaped to fit closely in and conform to the outline of said opening, the convex body portion of said target bulging outward through said opening beyond the plane of the plate, said target being pivoted to swing into or out of said opening, and a magnet for moving the target.

8. In a signal, the combination with an electromagnet, of a shield in front of said magnet, having an opening therein, a rocking arm pivoted transversely to hang substantially

5 vertical between the end of the magnet and the shield, a target carried at one end of said rocking arm and a tapered armature-tongue carried at the other end, said tongue being curved tangentially from the end face of said arm toward the end of the magnet, whereby said rocking arm is swung about its axis into substantial alinement with the magnet to dis-

play the target in the opening of the shield when the magnet is excited.

In witness whereof I hereunto subscribe my name this 5th day of October, A. D. 1900.

WILLIAM W. DEAN.

Witnesses:

ELLA EDLER,

ADELL HOCKETT.