

No. 692,318.

Patented Feb. 4, 1902.

F. E. J. LITOT & A. MAYER.
COIN OR METAL DETECTOR.

(Application filed July 5, 1895.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

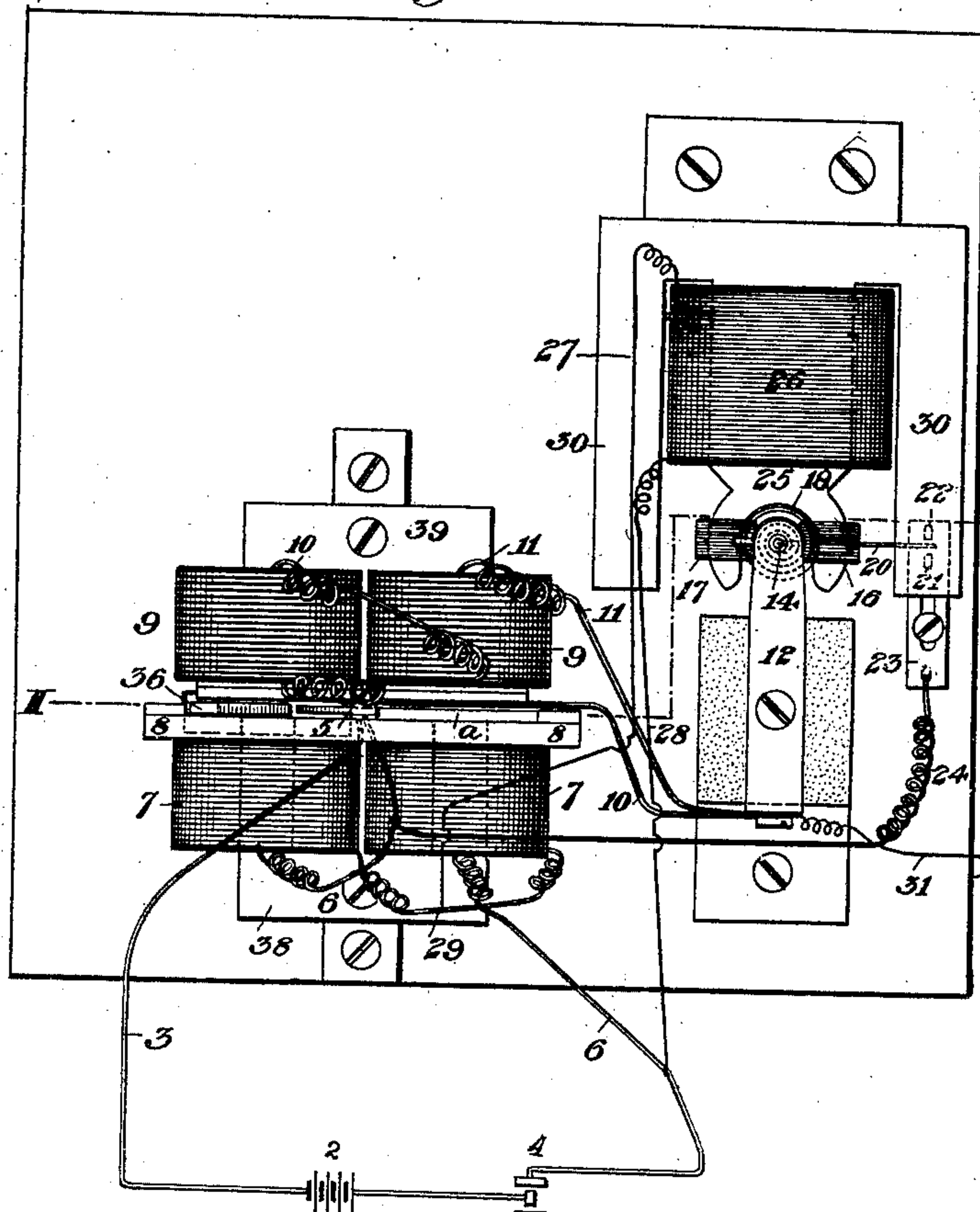


Fig. 2.

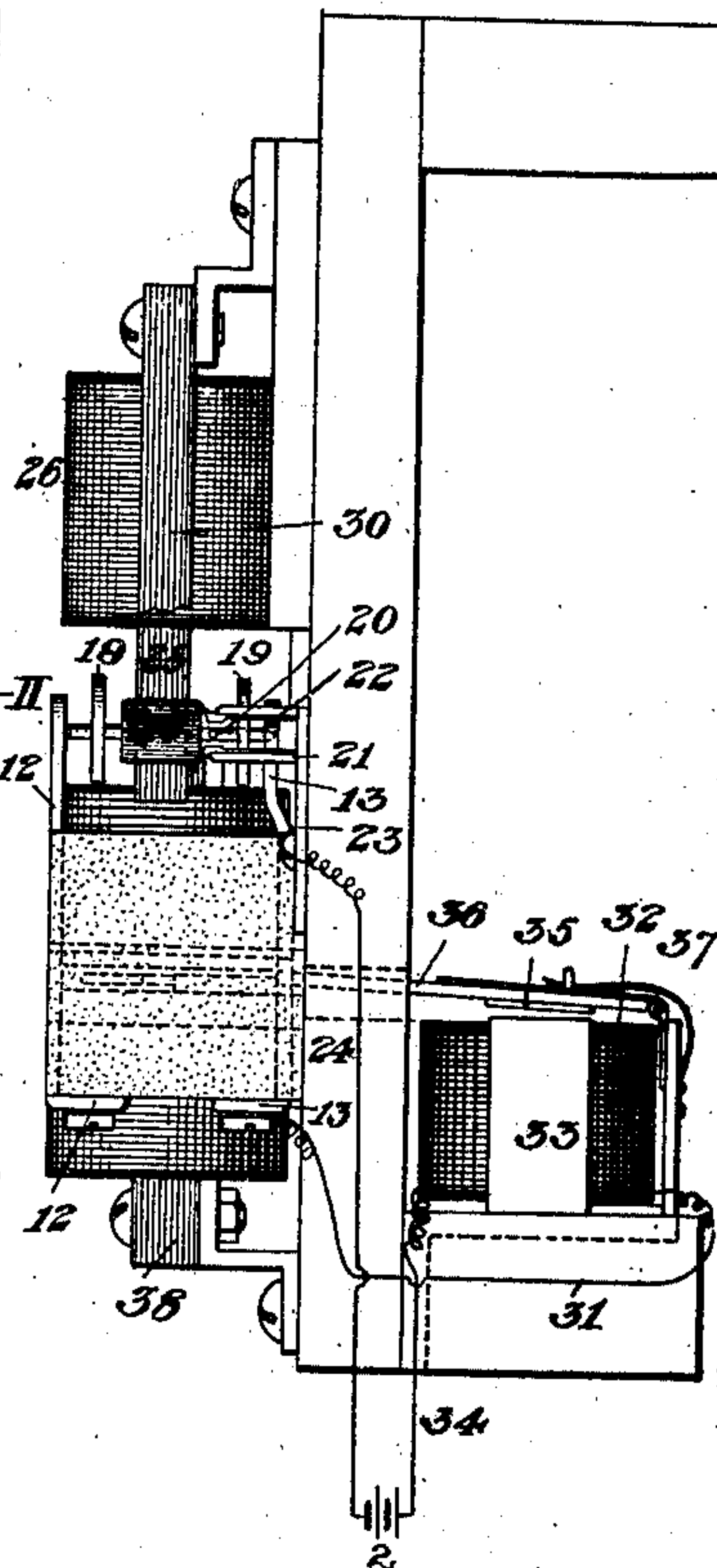
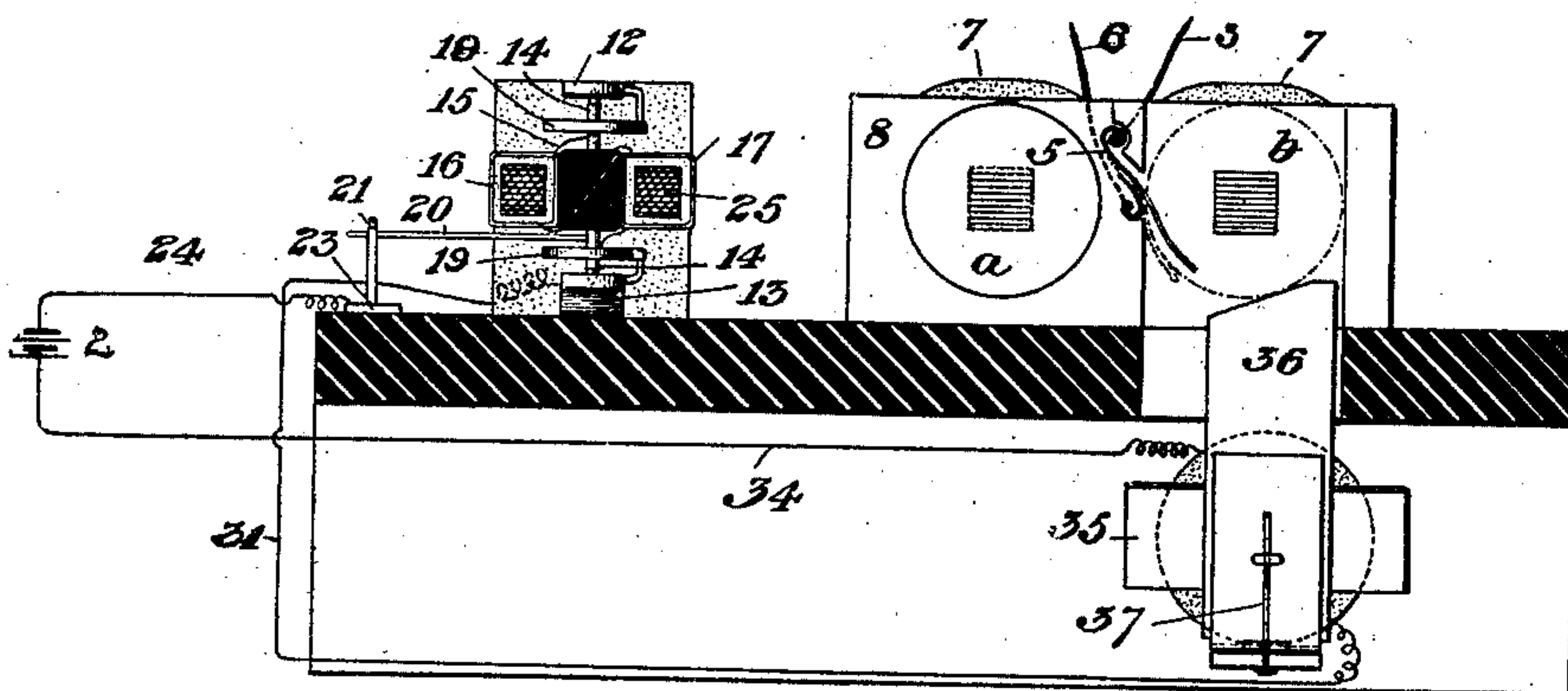


Fig. 3.



WITNESSES

James K. Bakewell
Lindell A. Comer

INVENTORS

F. E. J. Litot
Adolphus Mayer

No. 692,318.

Patented Feb. 4, 1902.

F. E. J. LITOT & A. MAYER.
COIN OR METAL DETECTOR.

(Application filed July 5, 1895.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 4.

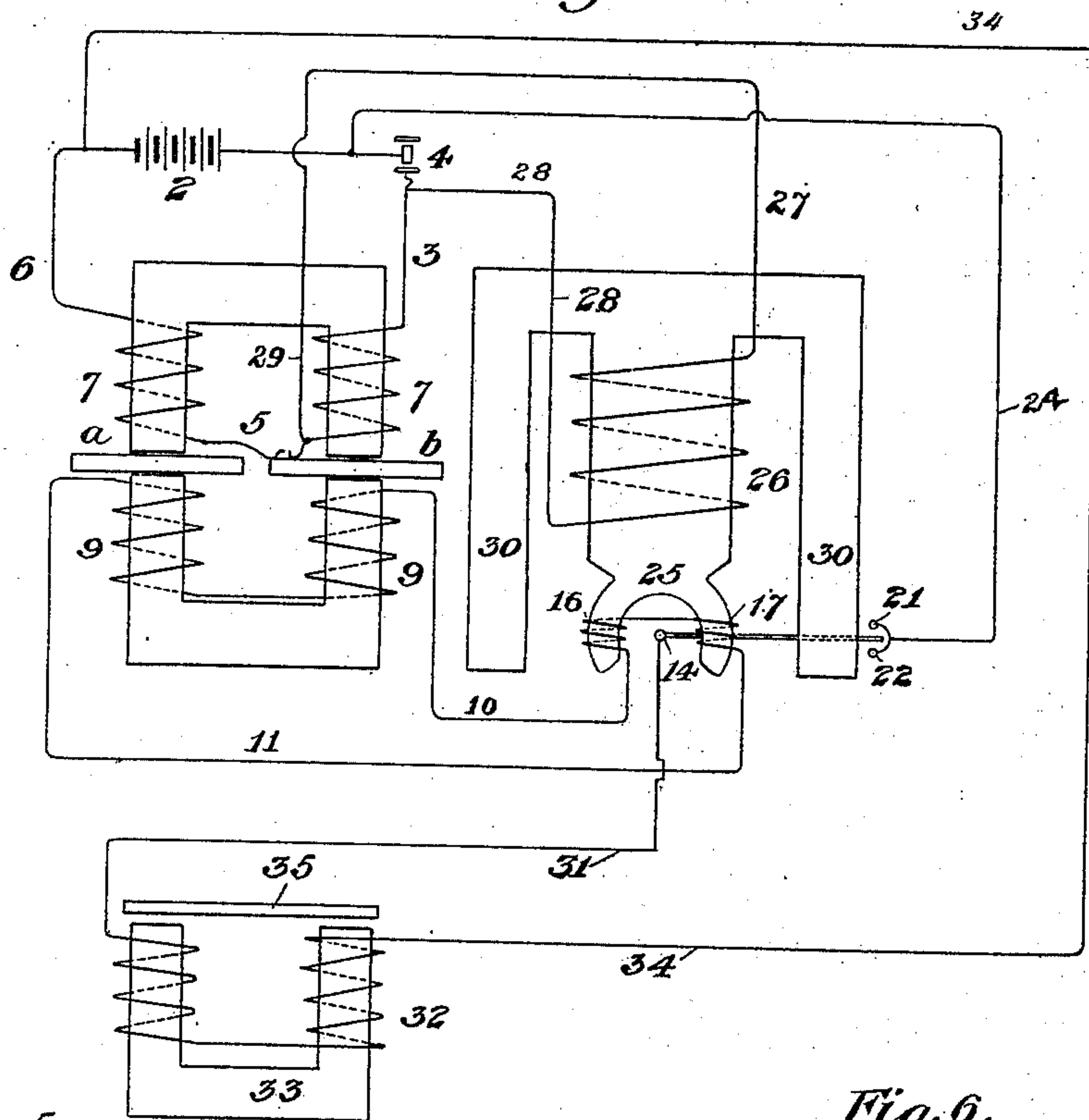


Fig. 5.

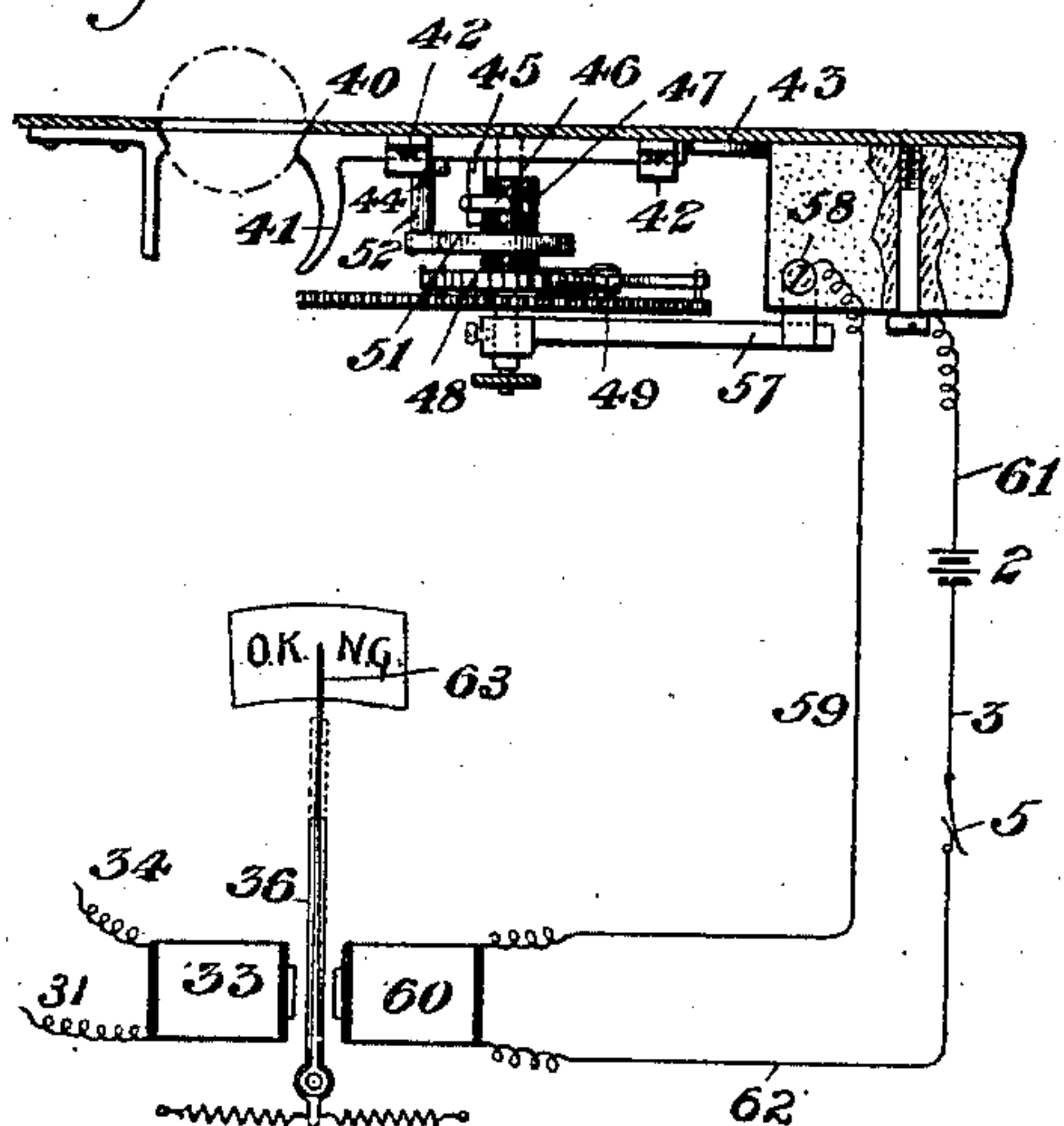
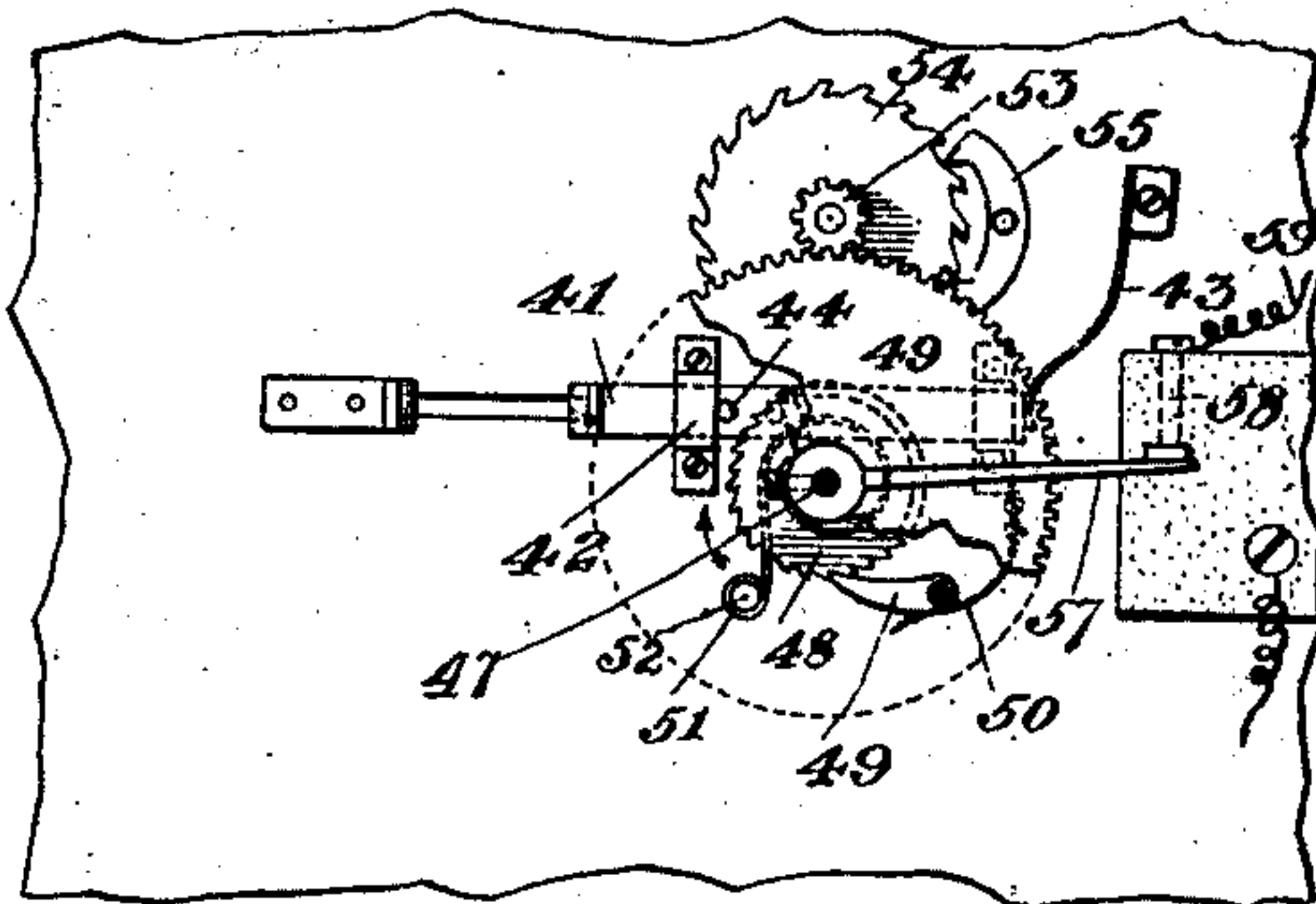


Fig. 6.



WITNESSES

James K. Baker
Lendell A. Comer

INVENTORS

F. E. J. Litot
Adolphus Mayer

UNITED STATES PATENT OFFICE.

FRANCIS E. J. LITOT AND ADOLPHUS MAYER, OF PITTSBURG, PENNSYLVANIA.

COIN OR METAL DETECTOR.

SPECIFICATION forming part of Letters Patent No. 692,318, dated February 4, 1902.

Application filed July 5, 1895. Serial No. 554,957. (No model.)

To all whom it may concern:

Be it known that we, FRANCIS E. J. LITOT and ADOLPHUS MAYER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Coin or Metal Detectors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure I is a plan view of our improved apparatus. Fig. II is a side elevation. Fig. III is a vertical sectional view on the line II II of Fig. I. Fig. IV is a diagram showing the electric circuits. Fig. V is a detached view, partially in section, showing a modified attachment; and Fig. VI is a vertical sectional view of said modified attachment.

Like symbols of reference indicate like parts wherever they occur.

Our invention relates to an apparatus for automatically detecting the difference in quantity or quality of metals; and it is especially adapted for use as a coin-detector, automatically separating the good and bad coins from each other; and it consists in the combination of primary and secondary electric coils, a relay, and operating mechanism designed to be set in operation by the relay, as is hereinafter more specifically described.

The principle of the operation of our device consists in the use, first, of a primary coil or coils or field, and secondary coils or fields placed in inductive relation to the primary coils, thereby producing electromotive forces in the secondary coils which are equal and opposing each other, the inductive force of the primary coils on the secondary coils being varied by the insertion of substances between them having different specific inductive effects. This variation of the electromotive forces in the secondary coils sets up a current in the relay, producing motion which closes the circuit of the magnet which controls the operating mechanism.

We will now describe our invention, so that others skilled in the art may manufacture and use the same.

In the drawings, 2 represents the battery or electric generator. Any source whatever of

electricity may be employed. From the battery 2 the conductor 3 leads to one side of a switch 5, and in this circuit we place an interrupter 4, which, it will be understood, is necessary only when a variable current is unobtainable. From the other side of the switch 5 a conductor 6 leads to electromagnets 7 and from said magnets to battery 2.

In the diagram shown in Fig. IV the position of the electromagnets 7 and 9, also the standard and test pieces *a b*, are reversed from that shown in the other figures in order to prevent confusion in illustrating the circuits. The switch 5 is shown between the magnets 7 7 in this figure for the purpose of illustrating the fact that the test-pieces make the contact between the two members of the switch 5. The switch 5 is mounted on an insulating-piece 8. Situated adjacent to the primary coils 7 are the secondary coils 9, a suitable space for the coin or metal to be tested existing between the two sets of coils 6 and 9. These secondary coils 9 are composed of conductors or wires 10 11, which are so connected that the electromotive forces set up in each oppose the other, and they lead to two stationary plates 12 13, respectively, said plates being supported by insulating material. Extending between the two plates 12 and 13 and pivoted thereto is the separated shaft 14, the two parts of the shaft being united by a block of insulating material 15, on each side of which block and secured thereto are the coils 16 and 17, the end of the coil 16 being connected with the one half of the shaft 14, and the one end of the coil 17 being connected with the other half of the shaft 14, the other two ends of the coils being connected to each other. On the two parts of the shaft 14, on opposite sides of the block 15, are two springs 18 and 19, which are secured to the shaft and to the plates 12 and 13, carrying the current from and to these plates. Rigidly secured to the shaft 14 is an arm 20, arranged to vibrate with the oscillation of the shaft. Within the line of vibration of the arm 20 is a pair of contact-posts 21 22, which contact-posts are secured to a metallic plate 23. From the plate 23 leads a conductor 24 to one pole of the bat-

tery, so that when the arm 20 is brought into
 contact with either of the pins 21 or 22 a cir-
 cuit will be completed to energize the magnet
 33, as hereinafter described. Within the coils
 5 16 and 17 is the bifurcated leg of an E-shaped
 magnet 25, so arranged that the bifurcated
 leg of the magnet shall not interfere with the
 free movement of the coils 16 and 17 on the
 shaft 14. The magnet 25 may be a permanent
 10 magnet, but, preferably, as shown in the draw-
 ing, is an electromagnet having a coil 26 and
 conductors 27 and 28. The conductor 27 leads
 to the conductor 29, between the coils 7, while
 the conductor 28 leads directly to the con-
 15 ductor 3, whereby an intermittent current is
 established in the coil 26, thereby establish-
 ing the magnet 25, the middle bifurcated leg
 forming one pole and the two outer legs 30 the
 other pole. Leading from the plate 13 of the
 20 relay is a conductor 31, which extends to the
 coil 32 of the magnet 33, the outer end of the
 coil leading by conductor 34 to the battery 2.
 Connecting with the magnet 33 is an armature
 35, provided with a spring 37, secured to which
 25 armature is a leaf or support 36, which sup-
 ports the coin or metal to be tested, which
 support extends up between one of the coils
 7 and 9. Within the coils 7 and 9 are U-shaped
 laminated iron cores 38 and 39. It will be
 30 noticed that the support 36 extends up be-
 tween one of the coils 7 and one of the coils 9.
 Between the other two coils is a fixed sup-
 port for the support of the standard coin or
 piece of metal. The whole of this apparatus
 35 may be mounted upon a suitable base or
 frame, and it may be used in connection with
 suitable machinery, in a slot-machine, or on
 a stand for use as a coin-detector in banks or
 offices, or by suitable modifications and en-
 40 largements the apparatus may be adapted to
 test sheets, plates, or rods of metal, or it may
 be adapted to any device where it is desir-
 able to distinguish between a certain given
 standard of metal and a piece of metal to be
 45 tested in comparison therewith.

The device which we have just described is
 adapted to be employed as a coin-detector
 and is arranged to allow counterfeit coins or
 metal blanks to be dropped from the appa-
 50 ratus upon being placed therein.

The operation of this device is as follows:
 A standard coin being placed upon its sup-
 port at *a* between one of the coils 7 and one
 of the coils 9, the switch 5 being normally
 55 open, the coin *b* to be tested is placed in the
 space between the other coils 7 and 9, so as
 to rest on the coin-support 36, thereby as the
 coin passes down in the space striking against
 and closing the switch 5. The upper piece
 60 of the coin-support 36 may be inclined, so as
 to insure the closing of the switch by the coin
 pressing against the same. Should the coin
 to be tested be of standard quality and equal
 in all respects to the standard coin between
 65 the other two coils 7 and 9, the induction be-
 tween the coils 9 and 7 will be the same, and

as the coils 9 9 are connected so that their
 electromotive forces oppose each other there
 will be an equilibrium established between
 the two coils 9, and no current, therefore, will
 70 flow through them to the small coils of the
 relay 16 and 17 and no movement will be im-
 parted to the coin-support 36 through the
 magnet 33. Should, however, the coin to be
 tested be counterfeit—of different kind or
 75 quantity of metal—or be a blank of metal,
 such as is sometimes inserted in slot-ma-
 chines, or have any specific inductive ef-
 fect different from the standard, then a dif-
 ference of induction will take place between
 80 the two coils 9 9, disturbing thereby the equi-
 librium, which disturbance of equilibrium
 will cause a secondary current to flow through
 the coils 9 and the conductors 10 and 11 to the
 movable coils of relay 16 and 17, which coils
 85 form a closed circuit for the two secondary
 coils 9. At the time the coin to be tested is
 placed on the support 36 and the switch 5 is
 closed the E-shaped magnet 25 is energized,
 so that when the secondary current passes
 90 through the coils 16 and 17 a field of force is
 set up at right angles to the field of the mag-
 net 25, thereby producing a resultant which
 will tend to move the coils 16 and 17 on their
 pivotal shaft 14. The movement of the coils
 95 16 and 17 may be either to the right or left,
 depending on whether the test piece or coin
 will have a greater or less specific inductive
 effect than the standard coin. Be the motion
 either to the right or the left the arm 20 comes
 100 in contact with one of the posts 21 22, thereby
 allowing the current to pass from the shaft
 14 to the coil 32 around the magnet 33, ener-
 gizing the magnet and drawing the armature
 and the coin-support 36 toward the magnet,
 105 removing the support from the coin and al-
 lowing it to drop from the apparatus, the cur-
 rent in the shaft 14 being completed through
 the plate 13 and spring 18.

The circuits of the apparatus just de- 110
 scribed are shown clearly in the diagram in
 Fig. IV.

In the apparatus just described, which, as
 already stated, may be employed for a coin-
 detector, only the spurious coins are auto- 115
 matically ejected from the apparatus. In
 Fig. V and Fig. VI we show mechanical means
 by which good coins are deposited in one re-
 ceptacle and the spurious coins in another,
 as is desirable where the apparatus is to be em- 120
 ployed in connection with what are known as
 "slot-machines." In these figures 40 repre-
 sents the slot through which the coin or blank
 to be tested is dropped between the coils 7 and
 9. Extending in the path of the coin is a 125
 sliding rod 41, supported by guides 42. In
 the rear of this rod is a spring 43, which nor-
 mally keeps the rod within the path of the
 coin, a stop-pin 44 preventing the rod 41 from
 being pushed too far forward. Extending 130
 from the rod is a pin 45, which when the rod
 is pushed back engages with a pin 46, which

extends from the shaft 47, on which shaft is keyed a ratchet 48, and on which shaft, loosely mounted thereon, is a gear-wheel 49, carrying a pawl 50, which engages with the teeth of the ratchet 48 and prevents backward movement thereof. On and secured to the shaft 47 is a spiral spring 51, the other end of which is secured to a fixed stud 52. Meshing with the teeth of the gear-wheel 49 is a pinion 53, on the shaft of which is keyed an escapement-wheel 54, engaging with an escapement 55. The shafts on which these wheels, ratchets, pinion, and escapement are mounted may be supported by the top plate of the apparatus and by any suitable bracket or framework situate below the same. Extending from the shaft 47 at right angles thereto is a contact-arm 57, which extends and rests against a contact-piece 58, which is mounted on a block of insulating material, from which contact-piece a conductor 59 leads to a magnet 60, which is similar to the magnet 33, already described, the magnet 60 being electrically connected by the conductors 62 and 3 and switch 5 with the battery 2, the circuit being completed by the conductor 61 and the metal of the mechanism. The magnet 33 (shown in Fig. V) is provided with the conductors 31 34, connected as previously described. The operation of this device is as follows: Upon the insertion of a coin in the slot 40 the rod 41 is pushed back, thereby winding the spring 51 and turning the ratchet 48, the pawl 50 engaging with the ratchet and removing the contact-arm from its contact-point 58. After the coin has dropped past the arm 41 onto the coin-support 36 the rod 41 being released is pushed forward again by the spring 43, and the spring 51, exerting power on the shaft 47, so as to revolve the same, the ratchet engaging with the pawl, which is mounted on the wheel 49, the wheel is set in motion, imparting movement to the pinion 53, escapement-wheel 54, and escapement 55, and the contact-arm is brought slowly back against the contact-piece 58, closing the circuit through the conductor 59, magnet 60, conductor 62, switch 5, and conductor 3. As the switch 5 is closed on the insertion of the coin the magnet 60 becomes energized, the circuit being completed by the conductor 61, the mechanism, and the top plate of the apparatus. The magnet 60 being energized, the coin-support 36 is attracted thereby toward the right, and the coin drops into a receptacle at the left, which is for coins that are of standard value. In case the coin is a spurious one or a metal blank before the comparatively slow working mechanism for moving the contact-arm 57 can complete its operation the spurious coin or metal blank will have been dropped on the right of the coin-support 36 by the action of the magnet 33 in the manner already described, thereby opening the switch 5 and preventing any current passing through the magnet 60. In this way the good and bad

coins are automatically separated from each other.

As will be noticed in the drawings, extending from the coin-support is an indicator 63, which may be in open view, so that as it moves to the right or left it will indicate the character of the coin put in the machine. This indicator may be connected with a system of electric bells, whereby as it moves to the right it will ring one bell having a peculiar sound or single stroke, and as it moves to the left it will ring a bell of another tone or having a vibratory stroke. This being a matter of mere electrical skill, no particular devices are shown in the drawings.

This device may be used in connection with slot-machines; but the application thereto is not herein illustrated.

Our invention may be applied to many uses where it is desirable to determine whether a coin or sample of metal is of standard quality. It may be used as a detector of counterfeit coin in banks and offices, and it may be employed in connection with all kinds of slot-machines.

The advantages of our invention will be apparent to those skilled in the art, as it fully supplies a want which has long existed and has been recognized and for which no adequate means have been devised prior to our invention.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an apparatus for testing metals the combination with a device for producing a primary field and a device for producing a secondary field of a relay adapted to be set in operation by the variation of electromotive forces in the secondary field, and suitable operating mechanism between the relay and the support for the article to be tested whereby said support may be operated to release the metal; substantially as described.

2. In an apparatus for testing metals or coins a movable support for the metal or coin, a device for producing a primary field, a device for producing a secondary field, a relay adapted to be operated by variations of electromotive forces in the secondary field and operative connections between the relay and the movable support whereby the latter may be operated; substantially as described.

3. In an apparatus for testing metals, the combination with a support for the metal to be tested, of a device for producing a primary field, of a device for producing a secondary field, and electromechanical devices adapted to be set in operation by variation of electromotive forces in the secondary field, said electromechanical devices being operatively connected with the support for the metal to be tested; substantially as described.

4. In apparatus for testing metal, the combination of a primary coil, a secondary coil, a relay consisting of coils mounted on a

pivot, a contact-arm connected with the pivoted coils, a contact-post, a conductor leading from the post to a magnet, and a blank or coin support connected with the armature of the magnet and adapted to be moved thereby; substantially as specified.

5. In apparatus for testing metal, the combination of primary coils, secondary coils placed in inductive relation thereto, a blank or coin support, a switch adapted to be closed by the insertion of a coin or blank, a relay, and a magnet, the armature of which is connected with the coin-support; substantially as specified.

6. In apparatus for testing metal, the combination of a primary coil, secondary coils in inductive relation thereto, a coin or blank support, a switch adapted to be closed by the insertion of a blank or coin, a relay, a magnet adapted to be energized on the disturbance of the secondary field, a magnet adapted to be energized by the insertion of the coin or blank, intermediate mechanism, an arma-

ture situate between the two magnets, and a blank or coin support connected with the armature; substantially as specified.

7. In an apparatus for testing metals or coins, a movable support for the said metal or coin, a device for producing a primary field, a device for producing a secondary field, electromechanical devices adapted to be set in operation by variation of electromotive forces in said secondary field and operative connections between said electromechanical devices and the movable support whereby the latter is operated to automatically eject the metal being tested; substantially as described.

In testimony whereof we have hereunto set our hands.

F. E. J. LITOT.
ADOLPHUS MAYER.

Witnesses:

W. A. SCHMIDT,
JAMES K. BAKEWELL.