No. 847,851. PATENTED MAR. 19, 1907.

F. M. C. USHER & C. A. SEOANE.

REVOLVING MERCURY DIP CURRENT INTERRUPTER.

APPLICATION FILED SEPT. 19, 1905.

2 SHEETS—SHEET 1.

Fig. 1

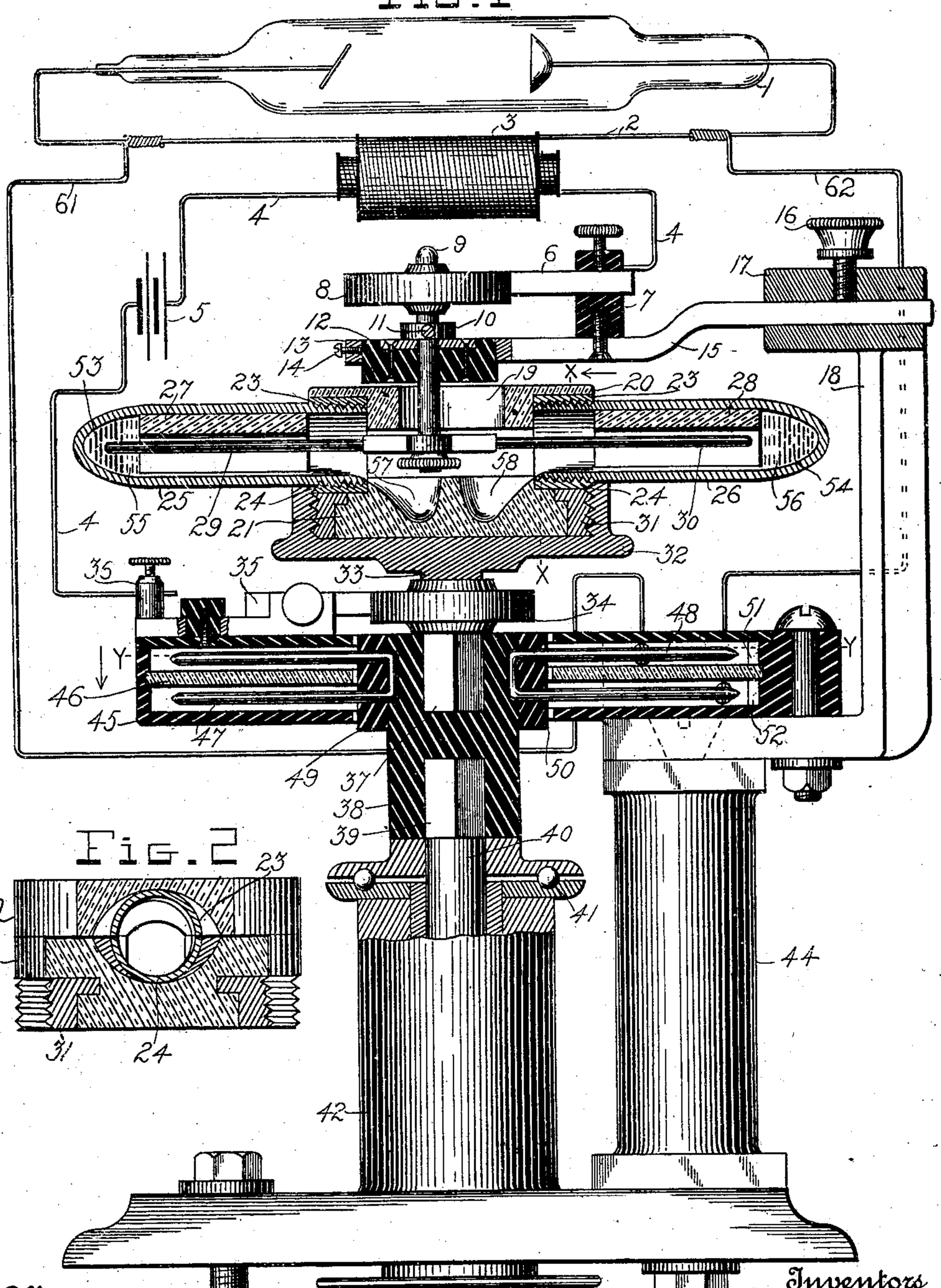

Fig. 2

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Fig. 3

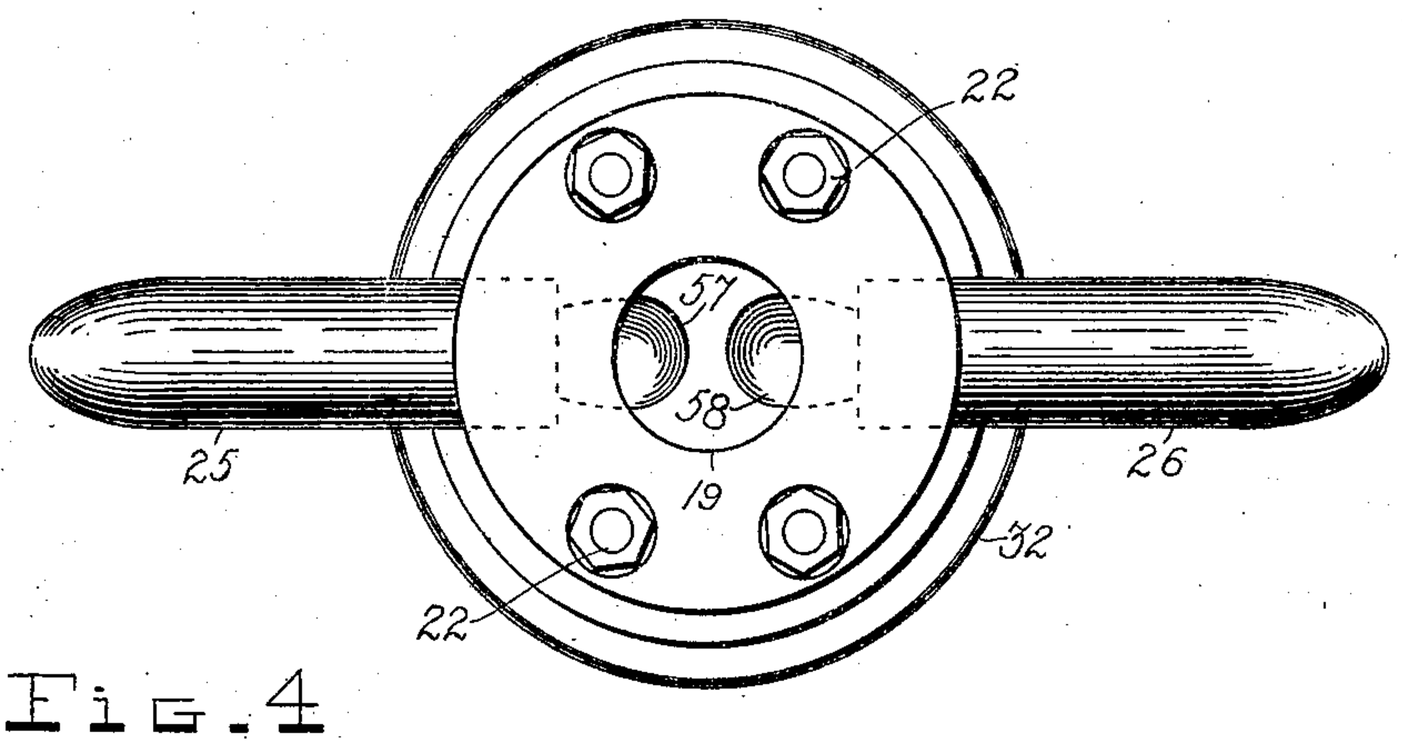


Fig. 4

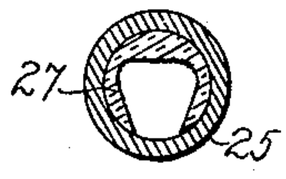
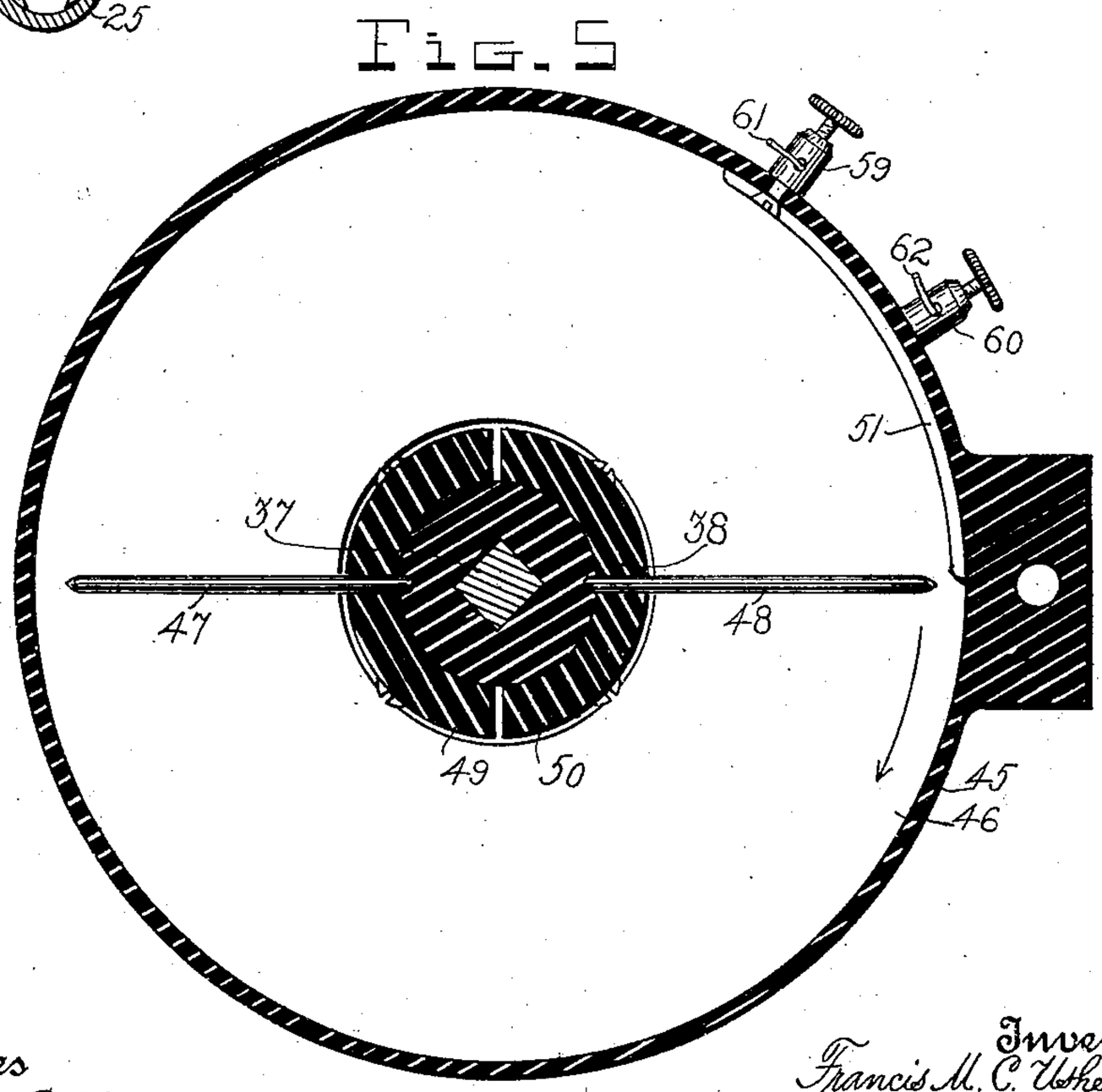


Fig. 5



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UNITED STATES PATENT OFFICE.

FRANCIS M. C. USHER, OF FULTON, KENTUCKY, AND CONSUELO A. SEOANE, OF MERRIFIELD, VIRGINIA.

REVOLVING MERCURY-DIP CURRENT-INTERRUPTER.

No. 847,851. Specification of Letters Patent. Patented March 19, 1907.

Application filed September 19, 1905. Serial No. 279,198.

To all whom it may concern:

Be it known that we, FRANCIS M. C. USHER and CONSUELO A. SEOANE, citizens of the United States, residing, respectively, at Fulton and Merrifield, in the counties of Fulton and Fairfax, and States of Kentucky and Virginia, have invented certain new and useful Improvements in Revolving Mercury-Dip Current-Interrupters, of which the following is a specification.

Our invention relates to revolving mercury-dip current-interrupters, and belongs to that class of devices constructed to make and break an electric circuit repeatedly and usually at very short intervals of time by plunging a conducting-body into and withdrawing it from a quantity of mercury covered with oil, the revolution of the apparatus serving by centrifugal action to constantly separate the oil and mercury disturbed by the plunging body.

One object of our invention is the production of an interrupter having parts of special nature, form, and arrangement with the view of cheapness in manufacture, durability, and certainty of operation at high speeds and upon currents of considerable strength and voltage.

Another object of our invention is the provision of an additional contrivance by which a high-tension current induced in a suitable coil in a certain direction, for example, when a primary current is made by our invention, may be neutralized by "short-circuiting," while the current arising in the coil at the break of the primary is unaffected.

We accomplish the stated objects by fashioning and associating the mechanical details illustrated in the accompanying drawings, of which—

Figure 1 is to be taken as a side view, partly in vertical section, together with diagrammatic representations of the arrangement of a battery, coil, and a vacuum-tube as they may be connected with our invention. Fig. 2 is a section of the porcelain or glass cylindrical center block on indirect line X X of Fig. 1. Fig. 3 is a top view of the center block and projecting tubes. Fig. 4 is a cross-section of one of the tubes and the glass needle-guard therein. Fig. 5 is a horizontal section on line Y Y of Fig. 1.

Like numerals are used to refer to the same part throughout.

To create electrical disturbances of a certain character for medical or other uses, it is found that the greater result follows the discharge, for example, in tube 1, of the current induced in the secondary circuit 2 of the coil 3 by the breaking of the primary circuit 4 from the battery 5 when such induced current is free from any retarding effect due to the current induced by making the primary circuit 4.

We will first describe our invention for making and breaking the primary circuit.

In continuation of circuit 4 a brush 6 is held in an insulating binding-post 7 or by any chosen clamping means against the contact-wheel 8. The shaft 9 of that wheel passes downwardly through the supporting-collar 10, secured to it by set-screw 11, and through the insulating-block 12, held in the end frame 13 by set-screw 14. The end frame terminates the bracket-arm 15, that is adjustably secured by thumb-screw 16 in the head-block 17 at the top of the main frame 18. Shaft 9 continues downwardly through the opening 19 of the center block of our invention. This center block is formed of an upper portion 20 and lower portion 21, joined into a single block by bolts 22. (Shown in Fig. 3.) At diametrical points the center block thus constructed is provided with threaded sleeves composed of upper halves 23 and lower halves 24 inserted in the component portions of the block, as shown in Figs. 1 and 2. We do not limit ourselves to this division of the sleeves, which, it is thought, may obviously be made each sleeve in a single piece. Into the threaded sleeves are screwed the correspondingly-threaded ends of the metal tubes 25 and 26, each of which has its outer end closed and its inner end open, as illustrated.

Numbers 27 and 28 mark glass needle-guards channeled lengthwise and placed within the tubes, as shown also in Fig. 4 and which will be again referred to. Their office is to prevent contact between the plunger-needles and the tubes.

The plunger-needles 29 and 30 are secured to the lower end of shaft 9 and are located within the glass guards in the tubes. It is now thought to be discernible that if the center block and tubes revolve the needles must be carried with them in a horizontal circular path.

Around the lower portion 21 of the center block is formed a threaded metal ring 31, and engaging this ring is the screw cup or bowl 32. Here it will be observed that cup 32 is screwed up into contact with both tubes 25 and 26 and a sufficient electrical contact is permanently maintained. The stem 33 of the cup 32 is formed integrally with it and extends downwardly through an attached contact-wheel 34. The brush 35 bears against the wheel and is connected with a binding-post 36, from which a portion of the primary circuit 4 continues to the battery, as shown in Fig. 1.

The lower end 37 of stem 33 just described is squared and engages a corresponding seat in the shaft-insulator 38, which may have any selected form, but is usually cylindrical, as indicated in Figs. 1 and 5. The lower end of the shaft-insulator engages the squared upper extremity 39 of the vertical driving-shaft 40, that rotates the center block and tubes. The weight of those details, as well as of other attached elements to be mentioned, is borne by the balls 41, introduced to lessen friction. Shaft 40 continues downwardly through the main pillar 42 and is provided at its lower end with a suitable pulley 43, by which power is applied.

At the side of the main pillar 42 and usually on the same base is the smaller pillar 44, which serves to support, first, the main frame 18, and, secondly, the insulating-box 45. Box 45 is a covered receptacle and is provided with a glass partition 46. The box is held in a horizontal position and the partition divides it into upper and lower circular compartments, within which the discharge double needles 47 and 48 move in circular paths insulated from external objects and held in their diametrically-projecting positions by the half-cylindrical clamping-pieces 49 and 50. The clamping-pieces are ordinarily secured to shaft-insulator 38 by screws, as shown in Fig. 5. At one side of the box 45 the discharge-needles 47 and 48 approach conducting-strips 51 and 52, that are secured one in each compartment of the box and one above the other, as shown in Fig. 1, their position being also shown in Fig. 5.

Inspecting now the outer ends of tubes 25 and 26 in Fig. 1, they will be understood to contain equal quantities of mercury 53 and 54, covered with bodies of oil 55 and 56. The situation of the oil and mercury is that taken up by those fluids when the apparatus is in a state of revolution and their relative positions with regard to each other are maintained during the revolution. If disturbed from any cause, they quickly separate, with the mercury always in contact with the metal of the tubes, and therefore in metallic connection with battery 5. When the invention is brought to rest, the fluids return to the vitreous center block and are caught in the pockets 57 and 58, provided for the purpose.

In Fig. 5 it is shown that conducting-strip 51 in box 45 is connected with the external post 59, and in a like manner (not shown) strip 52 is connected with post 60 on the outside of the box. The wires referred to by numbers 61 and 62, leading from those posts, constitute the shunt or short-circuiting path for the undesired induced current from the coil, as explained below.

The following is a statement of the operation of our invention: By means of arm 15 shaft 9 may be alined with the driving-shaft 40 or moved out of line, as illustrated. The vertical adjustment of shaft 9 is provided for by means of collar 10. With the parts assembled in the positions shown in Fig. 1, the axis of shaft 9 being to the left of that of shaft 40, the plunger-needle 29 extends through the oil into the mercury. In other words, the primary circuit has been made and its inductive effect exhausted. As the tubes are revolved, carrying with them the plunger-needles, there is approached a position wherein both needles are out of the mercury. When, however, the needle 29 leaves the mercury and breaks the circuit 4, the discharge-needle has passed some distance from the discharge-strips 51 and 52 and the current induced in the coil passes through the tube 1. When in turn plunger-needle 30 is swept around to the left and is inserted into the mercury, the discharge double needle 47 has presented its points to the discharge-strips, and the induced current created by making the primary circuit jumps the short interval as the path of least resistance and is wholly dissipated and rendered of no effect upon the current subsequently induced by breaking the primary as the parts revolve.

Having thus described our invention and explained the mode of its operation, what we claim is—

1. In a current-interrupter for interrupting the primary and secondary currents of an induction-coil, the combination with sets of revolving needles arranged in the paths of said currents and having different centers of revolution, of means for revolving the said sets of needles, and devices arranged with relation to the paths of the said revolving needles and constructed to enable the said currents to flow by way of the needles of each of said sets of needles during a portion of their revolution.

2. In a current-interrupter for interrupting the primary and secondary currents of an induction-coil, the combination with sets of revolving needles arranged in the paths of said currents and having different centers of revolution, of means for revolving the said sets of needles, revolving, hollow, conducting devices and movable, conducting, fluid

bodies contained by said devices permitting intermittent current discharges by way of one of the said sets of needles, and means permitting intermittent current discharges by way of another of the said sets of needles.

3. In a current-interrupter, the combination with revolving tubes, of needles arranged within the tubes and moved thereby, insulating needle-guards arranged about the needles to prevent lateral contact with the tubes, the said needles and tubes having different centers of revolution whereby the needles are reciprocated in the tubes, and means adapted to conductively connect the ends of the needles alternately with the tubes.

4. In a current-interrupter, the combination with revolving tubes, of needles arranged within the tubes and moved thereby, insulating needle-guards arranged about the needles to prevent lateral contact with the tubes, the said needles and tubes having different centers of revolution whereby the needles are reciprocated in the tubes and bodies of mercury in the tubes adapted to conductively connect the ends of the needles alternately with the tubes.

5. In a current-interrupter, the combination with revolving tubes, of needles arranged within the tubes and moved thereby, insulating needle-guards arranged about the needles to prevent lateral contact with the tubes, the said needles and tubes having different centers of revolution whereby the needles are reciprocated in the tubes, quantities of oil within the tubes, and bodies of mercury in the tubes adapted to conductively connect the ends of the needles alternately with the tubes.

6. In a current-interrupter, the combination with revolving contact-needles, of conducting devices having a different center of revolution from that of the needles whereby said needles are revolved, and means borne by said devices and arranged to conductively and alternately connect the ends of the needles and said conducting devices.

7. In a current-interrupter, the combination with revolving contact-needles, of conducting devices having a different center of revolution from that of the needles, the revolution of either of said elements causing the revolution of the other, and means borne by the conducting devices and arranged to conductively and alternately connect the ends of the needles and said conducting devices.

8. In a current-interrupter, the combination with revolving contact-needles, of conducting devices haivng a different center of revolution from that of the needles, the revolution of either of said elements causing the revolution of the other, one of said elements being adjustable toward or from the other, and means borne by the conducting devices and arranged to conductively and alternately connect the ends of the needles and said devices.

In testimony whereof we affix our signatures each in presence of two witnesses.

FRANCIS M. C. USHER.
CONSUELO A. SEOANE.

Witnesses as to signature of Francis M. C. Usher:

JOHN ANDERSON,
MARION W. MOSS.

Witnesses as to signature of Consuelo A. Seoane:

HORACE D. MUNRO,
A. R. JONES.