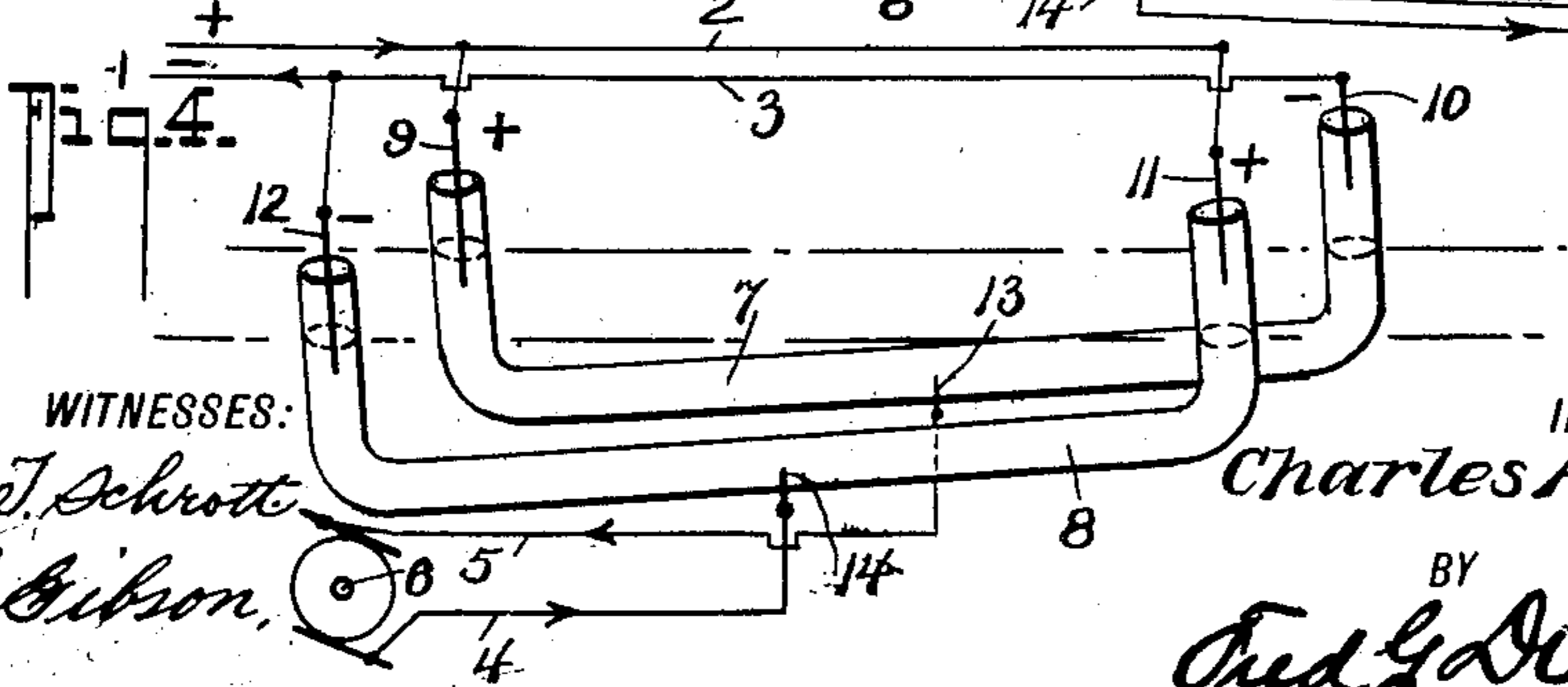
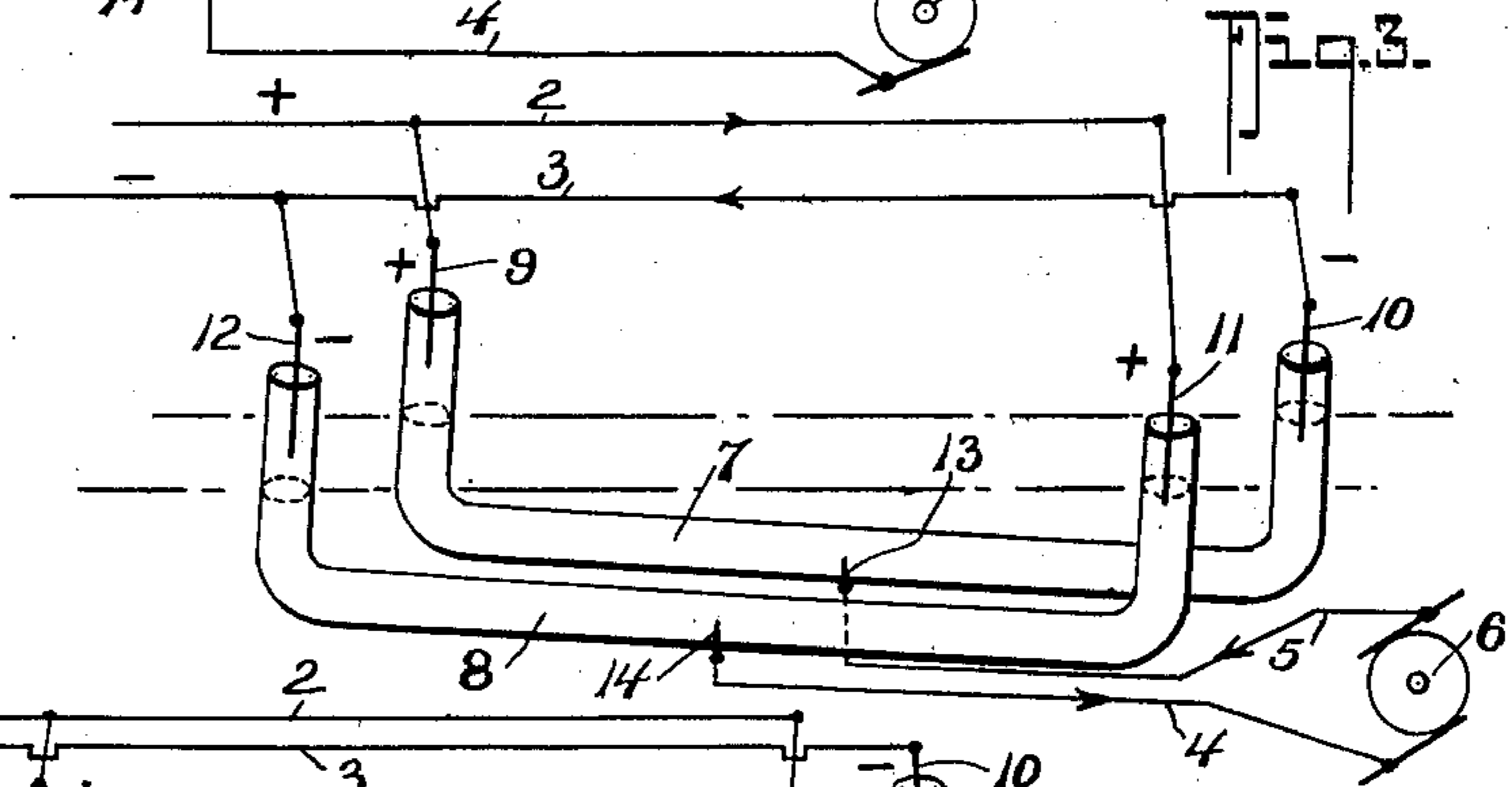
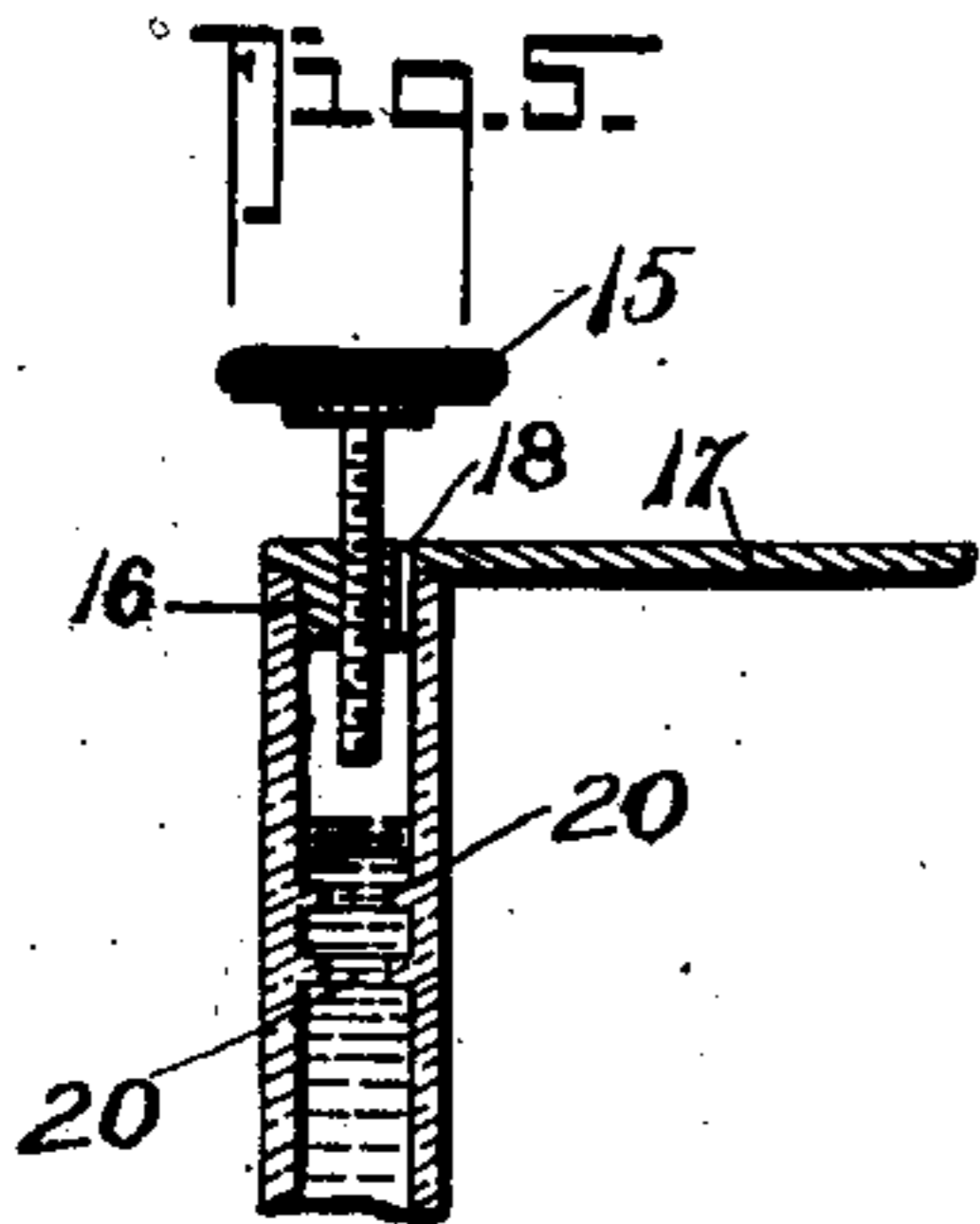
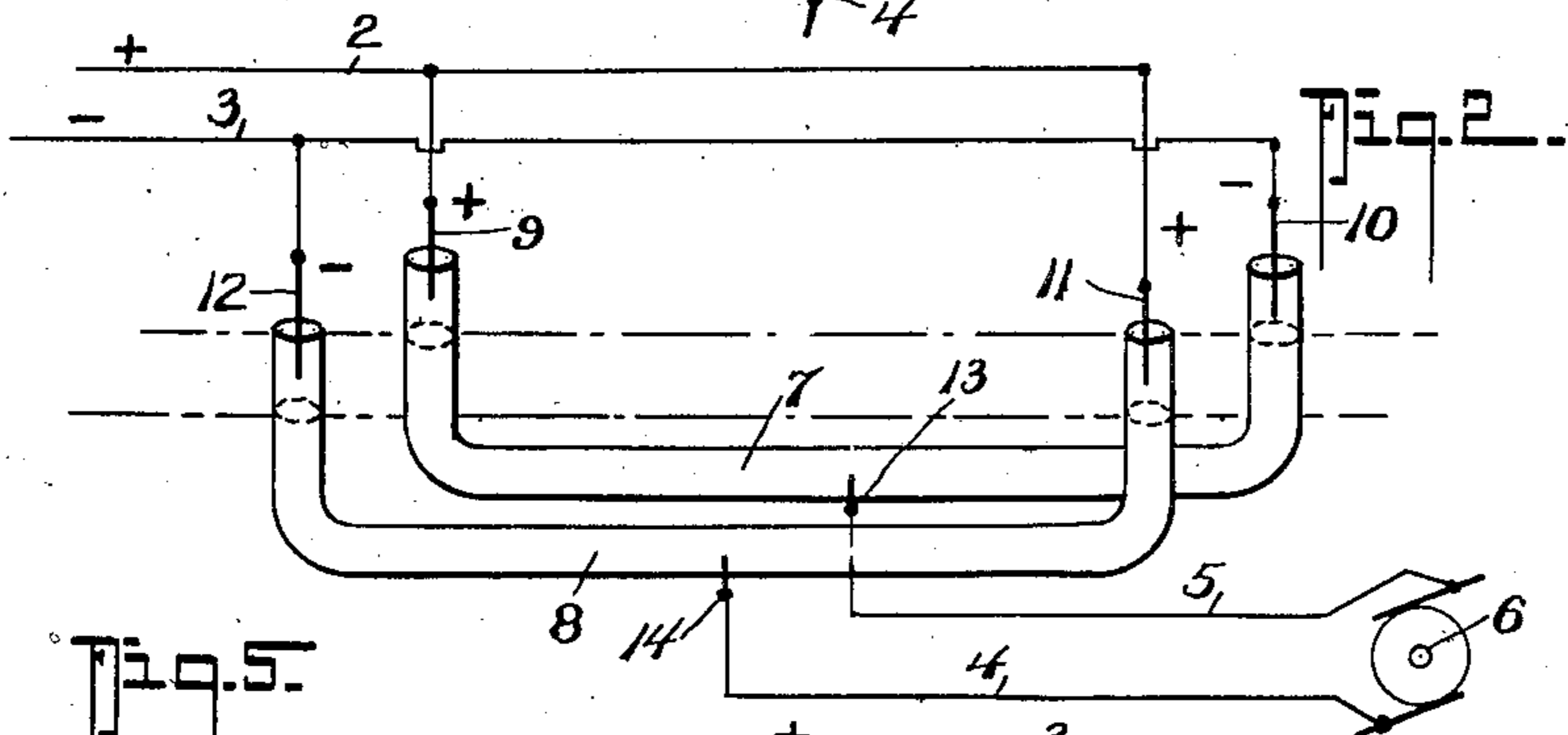
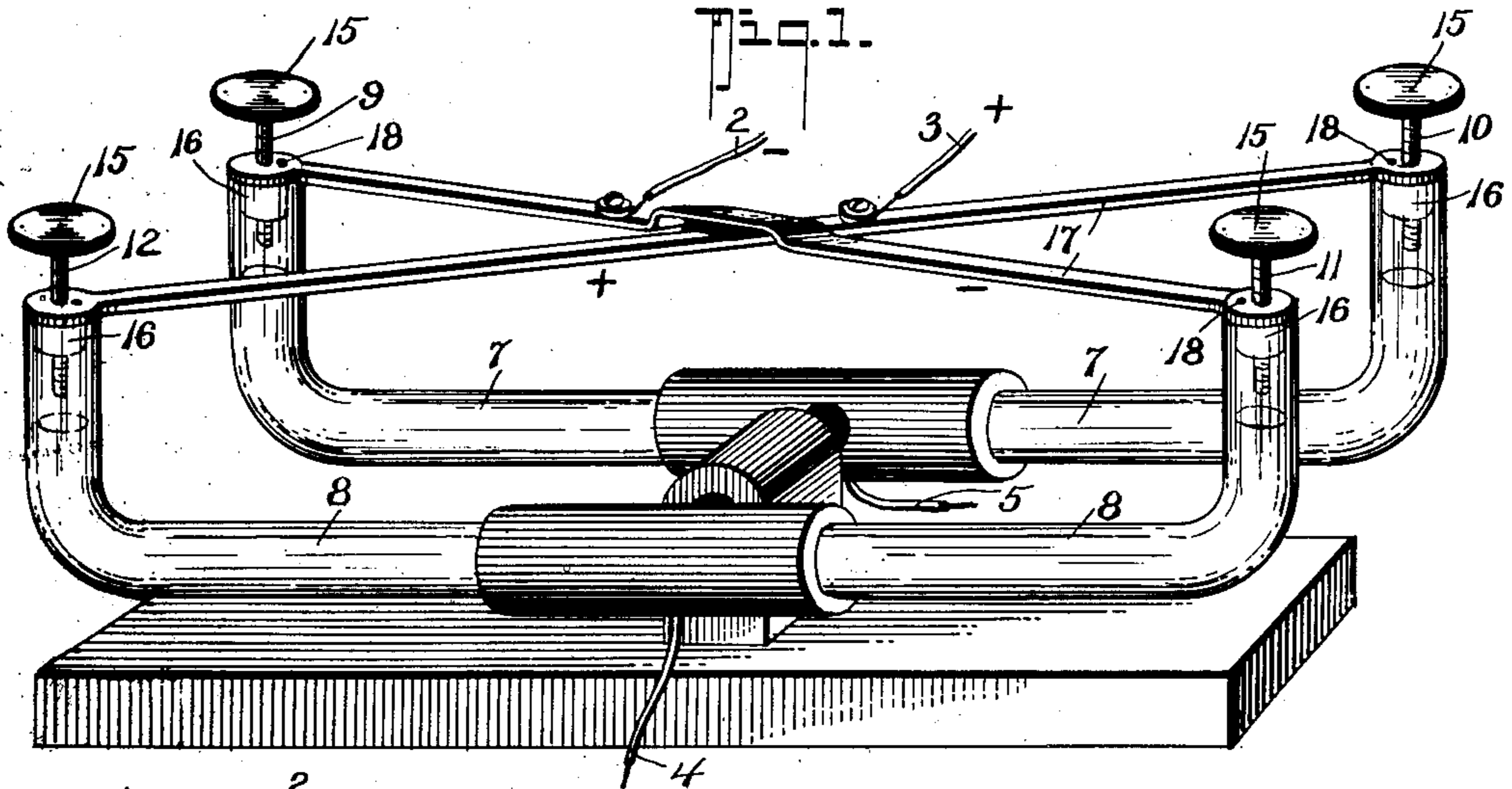


No. 855,147.

PATENTED MAY 28, 1907.

C. A. TUNSTALL.
REVERSING SWITCH.
APPLICATION FILED DEC. 18, 1905.



WITNESSES:
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CHARLES AUGUSTUS TUNSTALL, OF KAMLOOPS, BRITISH COLUMBIA,
CANADA.

REVERSING-SWITCH.

No. 855,147.

Specification of Letters Patent.

Patented May 28, 1907.

Application filed December 18, 1905. Serial No. 292,195.

To all whom it may concern:

Be it known that I, CHARLES AUGUSTUS TUNSTALL, a citizen of the Dominion of Canada, residing at the city of Kamloops, in the Province of British Columbia, Canada, have invented a new and useful Improvement in Reversing-Switches, of which the following is a specification.

This invention relates to a device designed to effect a contact to close an electric circuit so as to direct the current through that circuit in either direction.

Although particularly designed to start an electric motor and to direct the current through it so as to cause it to rotate in either direction, the device is applicable to other purposes where it requires to reverse at will the direction of an electric current.

The invention is fully explained in the following specification and illustrated in the drawings which accompany it.

Figure 1, is a perspective view of my invention. Fig. 2, being a diagrammatic perspective showing the device in the normal position, in which the current is cut off entirely from circuit with the motor, Fig. 3, a similar view showing the current as flowing to run the motor in one direction, Fig. 4, showing the direction of the current reversed, and, Fig. 5, an enlarged detail showing a manner of adjustment of the contact stems.

In these drawings 2 and 3 indicate respectively the positive and negative wires of an electric circuit the application of which it is designed to control and direct through a motor circuit 4 and 5, the commutator of the motor being represented by 6. To effect this control and direction of the current through the motor I provide two similar tubes 7 and 8 which may be of glass or other electrical non-conducting material as drawn, or of metal where found desirable. The ends of these tubes are upwardly turned as represented in the drawing and the tubes are fixed together so as to be susceptible of being simultaneously endwise inclined to either side and are charged with quicksilver to a sensible distance from their upper ends.

About the midlength of each tube 7 and 8 and in electrical connection with the quicksilver within are attached at 13 and 14 the ends of the motor circuit wires 4 and 5, and into the upwardly turned ends of the tubes 7

and 8 are adjustably secured the contact stems 9, 10, 11 and 12 projecting downward into the bore of the tubes to such a distance that when the tubes are in a horizontal position the lower ends of the stems are normally out of contact with the quicksilver within, but when the tubes are inclined to one side or the other as illustrated in Figs. 3 and 4 the ends of the stems on the lower side will dip into the quicksilver, which will maintain its level.

The negative wire 2 of the external circuit is connected to a contact stem 9 at one end of one tube 7 and to a contact stem 11 at the opposite end of the other tube 8 and similarly the positive wire 3 is connected to a stem 12 at the other end of the tube 8 and to a stem 10 at the other end of the tube 7. Each tube has thus a positive and a negative wire connected to its contact stems, one at each end and the connections are reversed so that a positive and negative connection are at each pair of ends of the combined tubes.

If the tubes are in the horizontal position, as indicated in Fig. 2, there is no contact between any of the stems 9, 10, 11 and 12 and the mercury in the tubes and current cannot pass to the motor circuit but if the combined tubes are inclined to one side as represented in Fig. 3, the contact stems 10 and 11 at the lower side will be immersed in the quicksilver and the current may flow through in the direction of the arrow head, viz., from the stem 11 through the quicksilver in the tube 8 to the mid-connection 14 through the wire 4 to the motor returning through the wire 5 to the mid-connection 13 and through the quicksilver in the tube 7 to the contact stem 10 which is connected to the negative wire of the circuit. Again if the combined tubes be inclined as shown in Fig. 4 the stems 10 and 11 will be lifted out of the quicksilver and those 9 and 12 at the opposite side will be immersed. The positive current will then flow from the stem 9 through the quicksilver in the tube 7 to the mid-connection 13, through the wire 5 to the motor, returning through the wire 4 to the mid-connection 14 of the tube 8 and through the quicksilver in that tube to the stem 12 which is connected to the negative wire of the external circuit. Accordingly therefore as the combined tubes 7 and 8 are inclined to one side or the other

the current will flow one way or the other through the motor and the direction of its rotation may be reversed.

The tubes may be of glass or other non-conducting material and the stems, see Fig. 5, be provided with insulated heads 15 and threaded to screw through caps 16, at the ends of yokes 17 which may extend diagonally across from one tube end to the opposite end of the other, and to the mid-portion of these yokes the wires 2 and 3 of the external circuit may be connected. But it is not essential that the tubes be of insulating material so long as they are insulated from one another and the contact stems insulated from the tubes if the latter be made of metal.

To permit of the discharge of air from or its admission to the ends of the tubes above the quicksilver, as the quicksilver flows to or recedes from the caps which close the ends, a small aperture or apertures 18 may be provided in the caps, and the closure of these apertures may afford a means for checking the oscillation of the quicksilver when in use or the momentum of it where the tubes are suddenly tilted to reverse the current. Or to check this oscillation and momentum the tube may be provided at intervals with obstructions 20 preferably annular as is illustrated in Fig. 5.

The details of construction attachment or mounting are however not material to this application which is made for protection on the method hereinbefore described of closing a circuit and of alternating the direction of a current through it; but it will be obvious that the alternation alone may be applied if the stems are adjusted so that at one end of the combined tubes they are normally immersed in the quicksilver.

I am aware that prior to my invention quicksilver has been used as a medium through which to effect an electric contact but not with the object of obtaining a reversal of the direction of a current.

What I therefore claim and desire to be protected in by Letters Patent is.

1. As a means for closing an electric circuit and directing a current in either direction through it, two similar tubes having upwardly turned ends to be partially filled with quicksilver, said tubes being insulated from one another and susceptible of being inclined endwise to one side or the other, means for connecting the positive terminal of an external electric circuit to one of the upwardly turned ends of one tube and to the opposite end of the other tube, means for connecting the negative terminal of the external circuit to the other end of the tubes, and means for connecting the opposite terminals of the circuit through which the current is designed to be passed to the mid-portion of each tube so that such terminals are in electrical contact with the quicksilver within them.

2. As a means for directing an electric current in either direction through a circuit, two similar tubes having upwardly turned ends partially filled with quicksilver such tubes being secured to and insulated from one another and susceptible of being inclined endwise to one side or the other, a contact stem secured to and projecting into the end of each upwardly turned end of the tubes, the stems being insulated from the quicksilver in the tubes except when immersed within it, means for connecting the positive wire of an exterior electric circuit to the contact stem at one end of one tube and to the contact stem at the opposite end of the other tube, means for connecting the negative wire of the external circuit to the contact stems in the other ends of each of the tubes and means for connecting the wires of the circuit through which the current is designed to be sent to the mid-portion of each of the tubes so as to be in electrical contact with the quicksilver within them.

3. As a means for directing an electric current in either direction through a circuit, two similar tubes having upwardly turned ends and partially filled with quicksilver such tubes being secured to and insulated from one another and susceptible of being inclined endwise to one side or the other, a contact stem secured to and endwise adjustable in each upwardly turned end of the tubes the stems being insulated from the quicksilver except when immersed within it, means for connecting the positive wire of an exterior electric circuit to the contact stem in one end of one tube and to the stem in the opposite end of the other tube, means for connecting the negative wire of the external circuit to the other end of each of the tubes, and means for connecting the opposite end of the circuit through which the current is designed to be sent to the horizontal portions of each tube so as to be in electrical contact with the quicksilver within them.

4. In a device of the class described, two similar tubes of electrical insulating material having upwardly turned ends and partially filled with quicksilver, means for securing said tubes together to be susceptible of being inclined to one side or the other, means for connecting the terminals of the circuit through which the current is desired to be sent, one to the mid-length of each tube so that said terminals are in electrical contact with the quicksilver within them, and means for connecting the positive terminals of the external circuit to one end of one tube and to the opposite end of the other tube, and means for connecting the negative terminal of the external circuit to the other ends of the tubes, all being so arranged that as the tubes are inclined to one side or the other, the quicksilver within the tubes will effect contact at the lower ends of the tubes and break

contact with the terminals on the opposite ends, substantially as shown and described.

5 5. A device of the class described, comprising a pair of parallelly disposed U-shaped tubes, means for connecting said tubes together to move in unison, means for pivotally mounting said tubes for oscillatory movement, a fluid within said tubes, adjustable contacts projecting through the mouths
10 of said tubes and adapted to engage said fluids at times, and other contacts projecting into the tubes in alinement with their pivot points, and means for cross connecting the contacts of the U tubes substantially as
15 shown and described.

6. A device of the class described, comprising a pair of parallelly disposed U-shaped tubes, means for pivotally mounting said tubes to be oscillatable in unison, closure
20 caps for the ends of said tubes, liquid conductors within said tubes, leading in wires through the tubes for said liquid conductors in a plane with the pivot axis of the tubes, and leading in members passing through the
25 closure caps of said tube ends adapted to contact with the liquid conductors at times, and bridge connections between diagonally opposite closure caps substantially as shown and described.

30 7. A device of the class described, comprising a pair of parallelly disposed U-shaped

tubes, means for connecting said tubes together to move in unison, means for pivotally mounting said tubes for oscillatory movement, a fluid within said tubes, adjustable contacts projecting through the mouths
35 of said tubes and adapted to engage said fluids at times, other contacts projecting into the tubes in alinement with their pivot points, and means for retarding surging of
40 the liquids within the tubes.

8. A device of the class described, comprising a pair of parallelly disposed U-shaped tubes, means for pivotally mounting said tubes to be oscillatable in unison, closure
45 caps for the ends of said tubes, liquid conductors within said tubes, leading in wires through the tubes for said liquid conductors in a plane with the pivot axis of the tubes, and leading in members passing through the
50 closure caps of said tube ends adapted to contact with the liquid conductors at times, bridge connections between diagonally opposite closure caps, and means for retarding
55 surging of the liquids within the tubes.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES AUGUSTUS TUNSTALL.

Witnesses:

ARTHUR HERBERT SNEY,
GEORGE GIBSON COOTE.