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H. WEINER

2,427,483

MULTIPLE SWITCH

Filed July 3, 1944

Fig. 1.

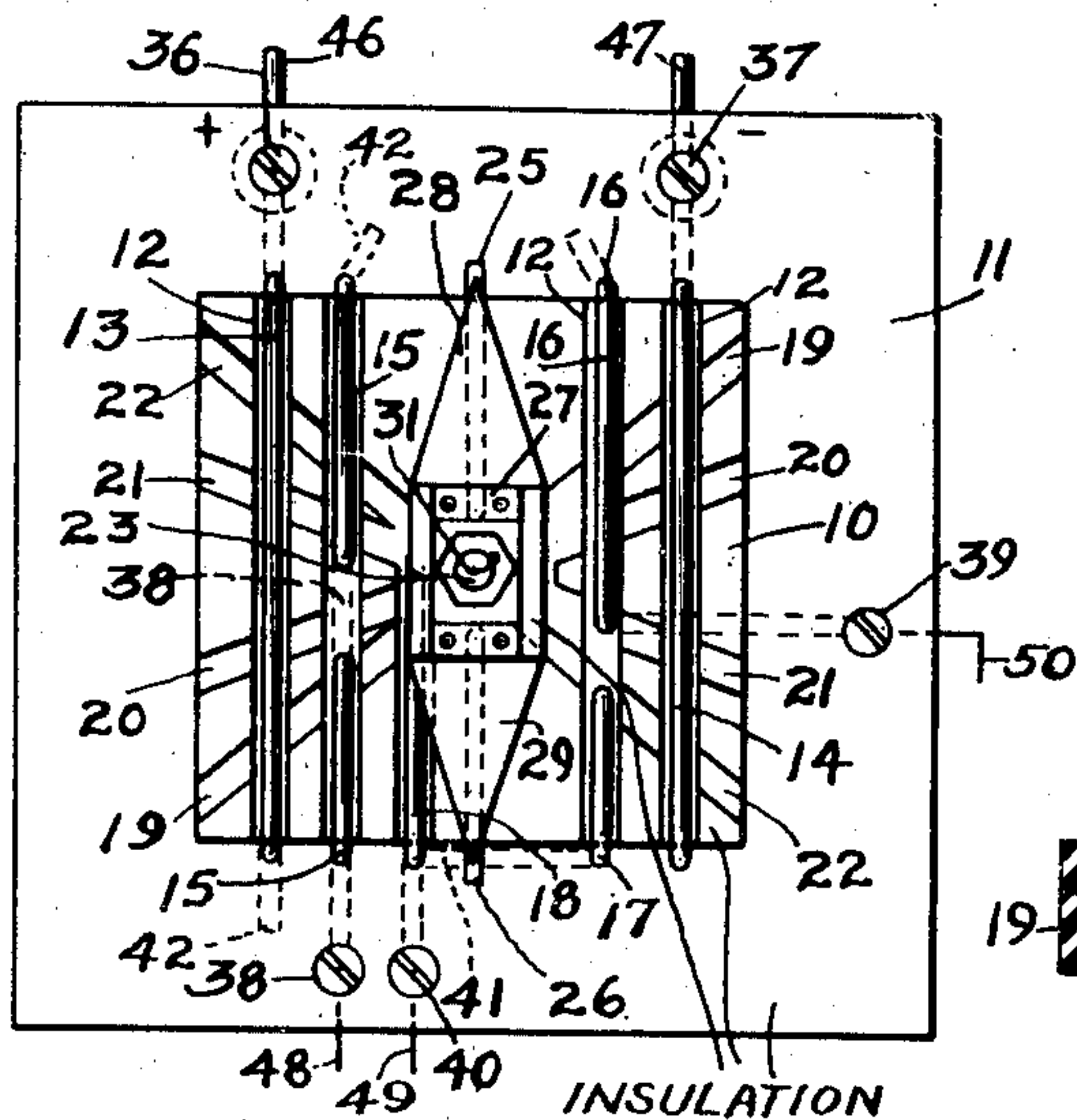


Fig. 3.

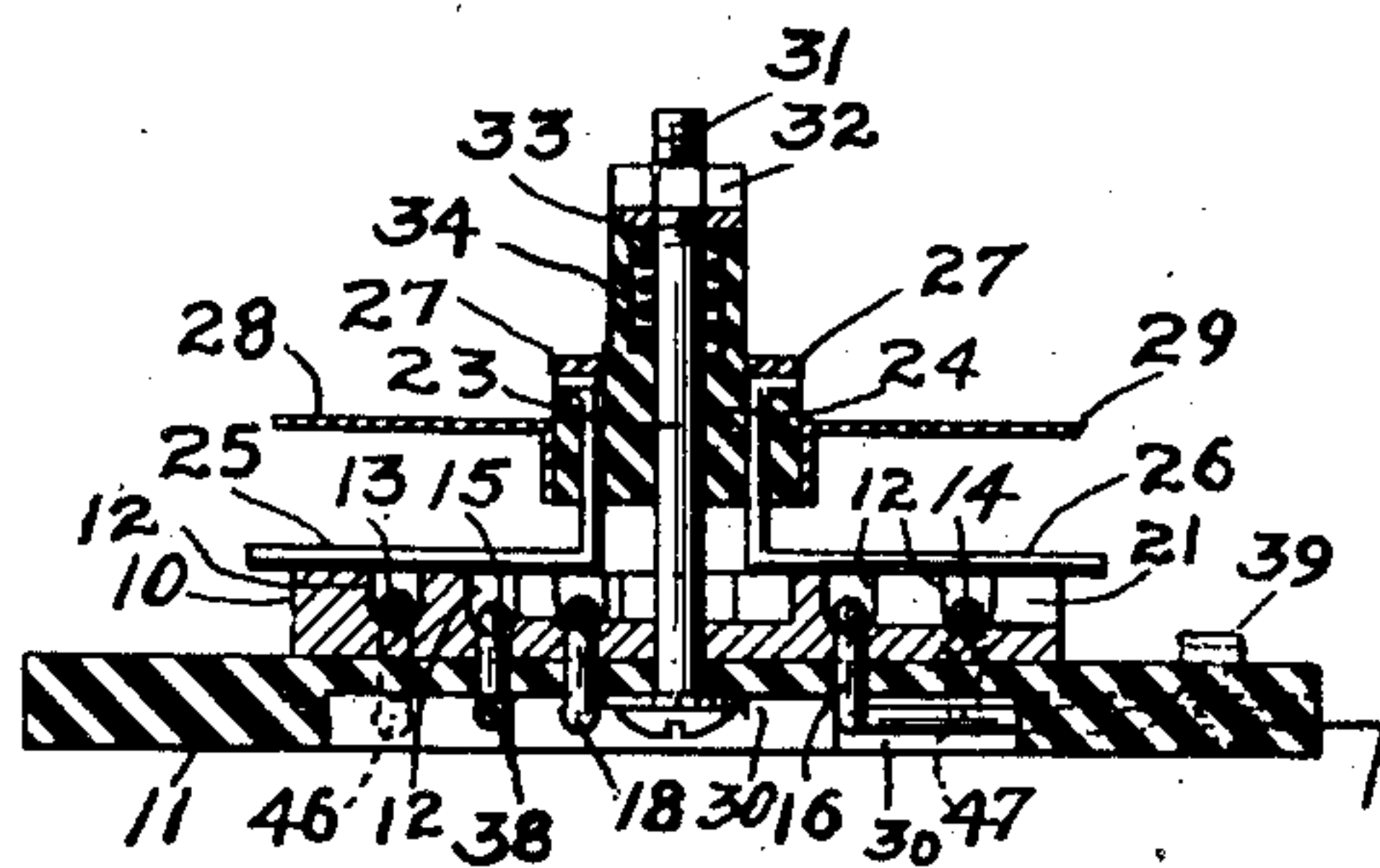


Fig. 4.

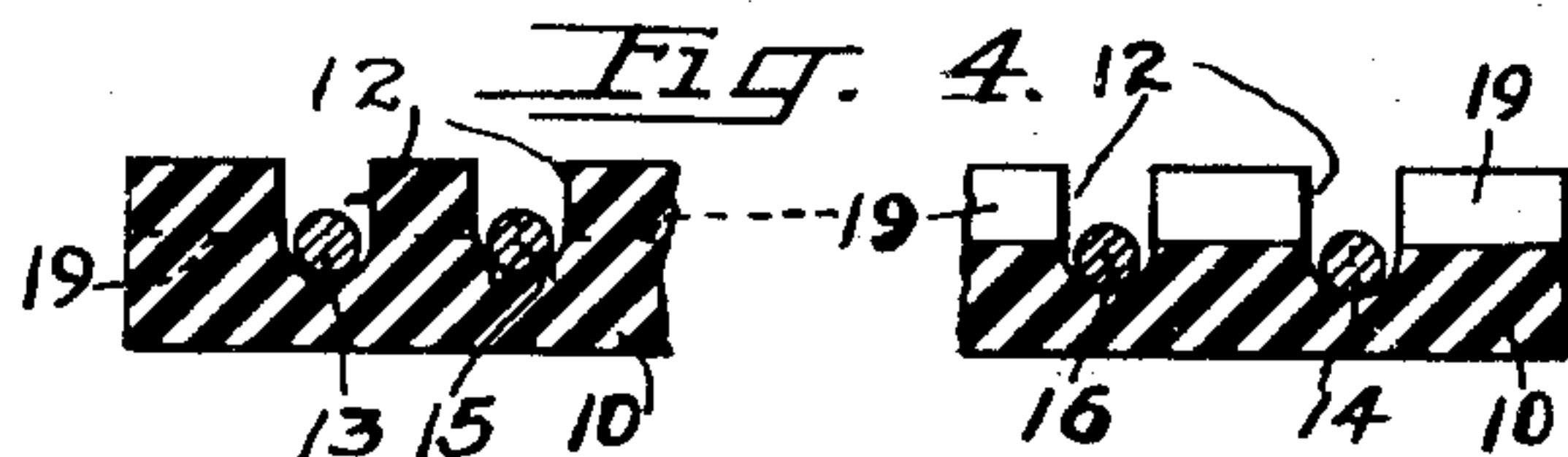


Fig. 5.

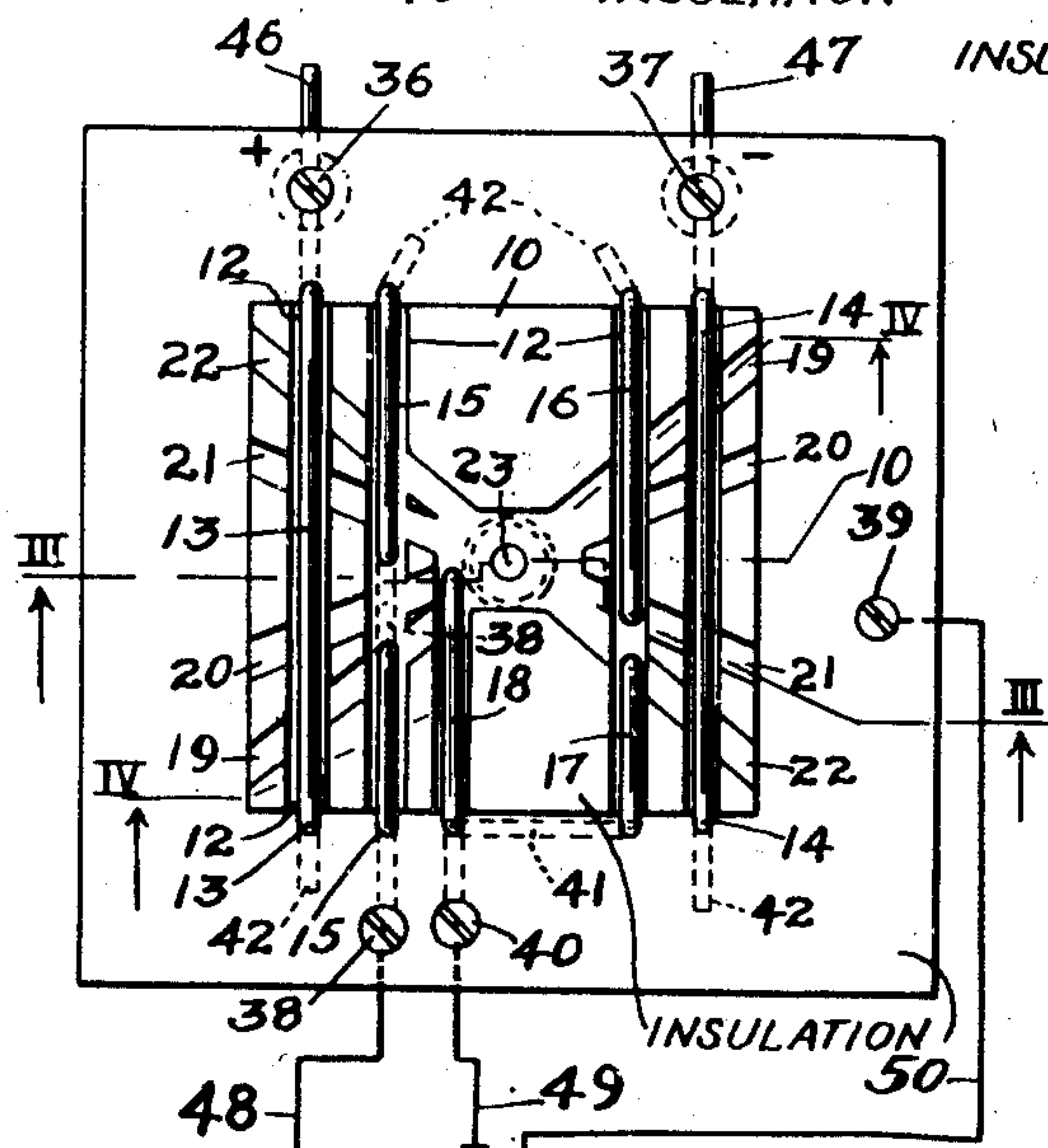
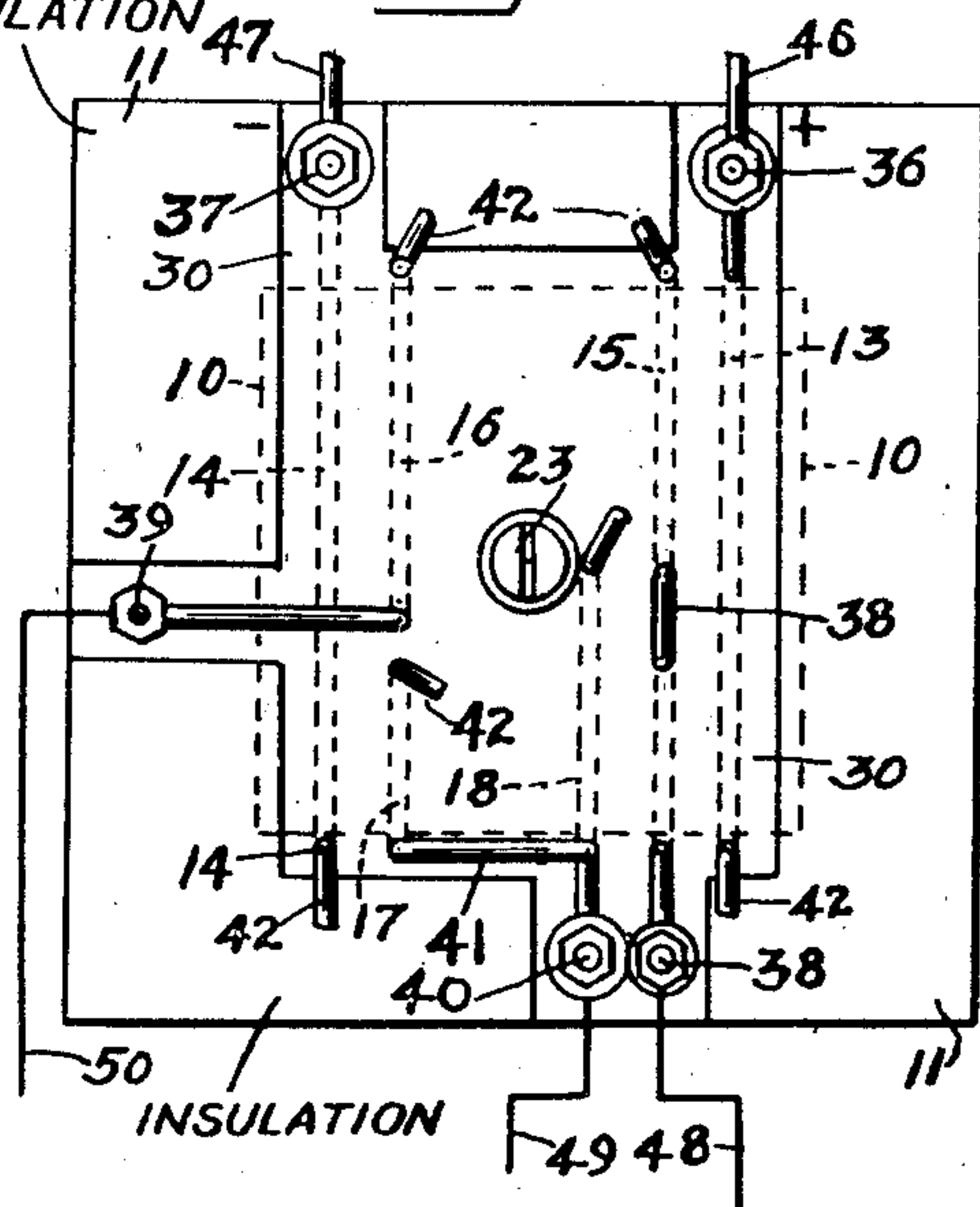
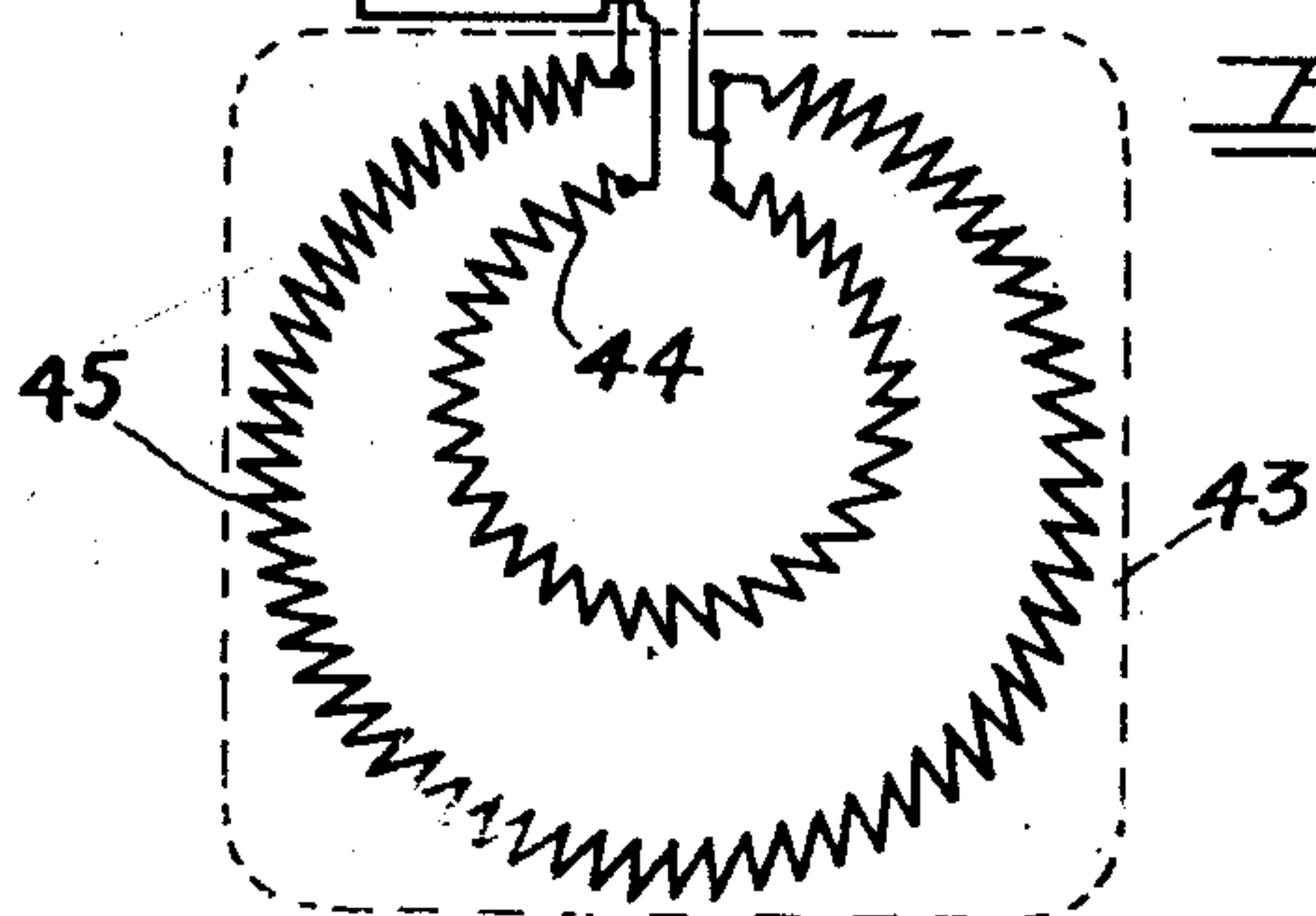


Fig. 2.



Inventor

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## UNITED STATES PATENT OFFICE

2,427,483

## MULTIPLE SWITCH

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10 Claims. (Cl. 200—6)

1

This invention relates in general to a multiple switch and is more particularly described in connection with a current using device for making a plurality of connections by which separate portions of the current using device may be connected in series, in parallel, and separately to a source of current supply.

An important object of the invention is to provide a switch for making a number of different circuit connections by the movement of a single operating member.

A further object of the invention is to provide a multiple switch having means for retaining the circuit closing member in a variety of positions.

A further object of the invention is to provide a new and improved switch structure in which the circuit closing member is movable from any one of a number of switch closing positions to any of the other positions.

A still further object of the invention is in providing a multiple switch which has a spring pressed operating member and seating grooves for retaining the operating member in any one of the different circuit closing positions.

A still further object of the invention is to provide a new and improved type of multiple switch for closing a plurality of circuit connections for domestic and industrial uses which is simple in construction and operation, easily manufactured and set up or placed in position, inexpensive in construction, and effective and efficient in operation.

Other and further objects of the invention will appear in the specification and will be apparent from the accompanying drawings in which

Fig. 1 is a plan view of a multiple switch in accordance with this invention;

Fig. 2 illustrates the switch with the movable contact member omitted and connected to a two coil heating element;

Fig. 3 is a sectional view of the switch taken on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view of the switch insulating block as taken on the line 4—4 of Fig. 2; and

Fig. 5 is a plan view of the under side of the switch.

Electrical switches for making a plurality of different circuit connections are used in the industrial field for controlling purposes and for making various electrical connections, but most of the switches for house or domestic uses are simple two-way switches. The present invention provides a multiple switch which may be used for industrial and heavy duty purposes, but also is

2

designed and intended to provide a simple and efficient means for making a variety of different connections for home and household uses.

The present invention is therefore described in connection with a heating coil for cooking and the like, the object being to provide high or low heat by variously connecting portions of the coil in series, in parallel, separately or in conjunction to the same source of current supply.

Referring now more particularly to the drawings, an insulating switch block 10 is shown as connected to or associated with an insulating mounting base 11, but the mounting base may be of different form or construction, and it may be actually dispensed with if the block is supported by some other suitable base.

The upper or outer face of the block 10 is provided with a number of conductor grooves 12 preferably extending entirely across the block from one side to the other and of a depth to seat therein a number of conductors 13, 14, 15, 16 and 17.

Extending transversely of the conductor grooves at various angles and crossing at a common center within the block are switch grooves 19, 20, 21 and 22 which may be slightly less in depth than the conductor grooves 12, but sufficiently deep so that a contactor inserted therein will engage the tops of conductors 13, 14, 15, 16, 17 and 18 in the conductor grooves.

Centrally rotatable upon a pivot 23 is a contact maker comprising an insulating block 24 having opposite contactors 25 and 26 extending below and outwardly from the block, the upper ends being turned over within recesses in the block and held in place by a fastening plate 27 to prevent the contactors from turning.

Also secured to the block and extending outwardly from the opposite sides thereof are pointers 28 and 29 which overlie the contactors 25 and 26 and provide protection for the contactors.

The pivot 23 is preferably in the form of a bolt inserted through the mounting base and insulating block from the bottom thereof with the head of the bolt seated in a recess 30 at the under side of the base. Secured to the upper threaded end 31 of the bolt is a fastening nut 32 with an underlying washer 33 engaging one end of a coil spring 34 surrounding the bolt and seated in a recess formed by a shell or extension 35 of the block 24. If desired, the bolt may be reversed with the head at the top and the fastening nut 32 in the bottom recess 30.

With this construction, the contact maker is raised against the tension of the spring 24 to



move it out of any one of the switch grooves and to rotate it and place it in contact with the upper surface of the insulating block 10. The contact maker may be rotated in either direction from any neutral position, that is, a position in which the conductors 25 and 26 are not seated in a switch groove and the arrangement is such that the contact maker will slip from one groove to the other as it is turned, the spring 34 holding the contactors 25 and 26 in engagement with any of the conductors which happen to be located in the switch grooves.

It is thus apparent that the contact maker may be moved freely in either direction as a step by step movement, or it may be bodily grasped and raised against the spring 34 and then rotated to place it in connection with any of the switch grooves or with an intermediate neutral surface.

In the present arrangement, conductors 13 and 14 are located in the two outermost conductor grooves, they extend across all of the switch grooves and the extremities are inserted through the mounting base and connected to terminals 36 and 37 which are provided for the attachment of the current supply mains. Conductor 15 is seated in a conductor groove adjacent the current supply conductor 13 and extends across switch grooves 19, 21 and 22, but has a depressed portion 38 which extends below the switch groove 20 to provide no engageable contact therein. Conductor 16 is likewise located in a conductor groove adjacent the other supply conductor 14, and extends across switch grooves 19, 20 and 21; conductor 17 is separate from conductor 16 and extends across switch groove 22; and conductor 18 extends across switch grooves 19 and 20 adjacent conductor 15 and on the same side of the block as main conductor 13.

These conductors 15, 16, 17 and 18 extend from the conductor grooves, the extremities being turned inwardly through the block 10 and through the mounting base where they are provided with connection terminals 38 for conductor 15, 39 for conductor 16, and 40 for conductors 17 and 18 which are joined together by a conductor 41 at the under side of the base 11. Since the conductors are preferably formed of relatively stiff wire, it is sufficient to bend unconnected extremities 42 thereof over against the bottom of the mounting base as shown more clearly in Fig. 5 in order to hold these conductors tightly in place. The connection terminals 38, 39 and 40 may consist of screws and nuts or any other suitable fastening and circuit connecting terminals.

To illustrate an application of this invention, it is shown in Fig. 2 as applied to an electric heater 43 of the type having an inner heating coil 44 and an outer heating coil 45 seated in suitable grooves in an insulating base. Usually the coils are connected in series or in parallel to a suitable source of current supply, and a switch is provided for making the connections. In utilizing the present invention, the main conductors 13 and 14 are connected by conductors 46 and 47 respectively with a suitable source of current supply. Conductor 15 is connected from terminal 38 by conductor 48 with one end of one of the heating coils as 44, conductors 17 and 18 are connected through terminal 40 by a conductor 49 with one end of the outer coil 45; and conductor 16 is connected through terminal 39 by a conductor 50 to the other ends of each of the coils 44 and 45. If the coils 44 and 45 are continuous, then the conductor 50 is connected to a suitable intermediate point.

With this construction, four different circuit closing connections may be made in addition to the neutral or unconnected positions of the contact maker.

When the contact maker is turned so that its contactors are seated in switch groove 19, a connection is made from main conductor 13, contactor 26, conductors 15 and 48 to one end of coil 44 and thence through the coil, conductor 50, switch conductor 16, contactor 25, and current supply conductor 14. At the same time, a circuit will be closed from main conductor 13 through contactor 26, switch conductor 18, contactor 49, coil 45 and thence through conductor 50, switch conductor 16 and contactor 25 to the other supply conductor 14. Thus the two coils 44 and 45 will be connected in parallel across the source of current supply.

With the contact maker in switch groove 20, no connection will be made with conductor 15 which does not extend into the switch groove 20 leading to one end of inner coil 44 so that it will not receive current, the outer coil 45 receiving current in the same circuit as above described.

In the next switch position engaging switch groove 21, a circuit is closed from a main conductor 13 through contactor 26, conductor 15 but not conductor 18 and from conductor 15 through conductor 48 to the one end of coil 44 thence through conductor 50 and switch conductor 16, contactor 25 to the other supply conductor 14. There being no connection for one end of coil 45, no current will flow through this coil and the inner coil 44 will be connected across the current supply mains.

In the last switch groove 22, circuits are closed from the switch supply conductor 13, contactor 26, switch conductor 15, conductor 48 to one end of inner coil 44, and since there is no engagement of the other contactor 25 with conductor 16 in this switch groove, a circuit is closed from the other end of coil 44 through the outer coil 45 and thence through conductor 49, terminal 40 and cross connector 41 to switch conductor 17 and thence through contactor 25 with the other supply conductor 14. This connects the two coils 44 and 45 in series between the source of current supply.

Thus it will be seen that with this relatively simple multiple switch, four different separate connections are made so that two coils or two electro-responsive devices may be connected in parallel or in series across the same source of current supply, or either coil or device may be connected separately to the exclusion of the other across the source of current supply.

The number of different connections which can be made by a switch of this kind can be varied as desired by changing the number of switch grooves, and also if desired, by changing the number of conductor grooves. Various other combinations and arrangements may be made for accomplishing the desired and different results without departing from the spirit and scope of the invention.

In the present exemplification of this invention, the contacts or poles 13 and 14 are connected directly with the main line or source of supply, and serve as power lines through the contacting switch element. The other contacts or poles are subsidiary contacts, and are respectively connected with the lead lines which serve the apparatus in connection with which the multiple switch is employed.



## I claim:

1. A multiple switch, comprising an insulating block with spaced grooves in one face, and other grooves crossing the spaced grooves at different angles, current supply line and circuit conductors seated in the spaced grooves, and a contact maker having contactors movable into the said other grooves to make various engagements between the line conductors and the circuit conductors depending upon the angles of the said other grooves.
2. A multiple switch, comprising an insulating block having parallel surface grooves in one face and radiating grooves across the parallel grooves, current supply line conductors extending in some of the parallel grooves, circuit conductors extending partially across the block in others of the parallel grooves, and a rotatable contact maker having contactors movable thereby into the radiating grooves to make various connections between the line and circuit conductors.
3. A multiple switch, comprising parallel current supply line and circuit conductors, a rotatable spring pressed contact maker movable at different angles to the conductors, contacting means carried by the contact maker to make different connections with the line and circuit conductors depending upon the angle of the contact maker, and grooved supporting means for holding the conductors in place and the contacting means in engagement therewith.
4. A multiple switch, comprising an insulating block with parallel grooves in one direction and with radiating grooves extending across the parallel grooves, conductors mounted in the parallel grooves, a contact maker rotatably mounted at the center of the radiating grooves, contactors extending oppositely from the contact maker for engaging in the radiating grooves, and resilient means tending to press the contact maker toward the block and to seat the contactors in the radiating grooves against the conductors in the parallel grooves.
5. A multiple switch, comprising an insulating block with parallel grooves in one direction and with radiating grooves extending across the parallel grooves, supply line conductors mounted in the outermost parallel grooves, other circuit conductors extending in the parallel grooves across some of the radiating grooves, oppositely extending contactors rotatably mounted at the center of the radiating grooves to engage the conductors in the parallel grooves, means for insulating the contactors from each other, and guards attached to said insulating means and overlying the contactors to protect them.
6. A multiple switch, comprising an insulating block and supporting base, the outer face of the block having parallel grooves in one direction and opposite radiating grooves extending across the parallel grooves, current supply line and circuit conductors, seated in the parallel grooves and the ends extending through the base to the rear face thereof, some of the conductor ends being bent over against the base to hold them in place, attachment terminals for other conductor ends, two circuit conductors having a common terminal, one circuit conductor having a depressed portion extending below its groove to the under

side of the block and bridging one of the radiating grooves, and rotatable contactor means mounted at the center of the radiating grooves and engageable therein with conductors in the parallel grooves.

7. A multiple switch for closing parallel, series, and separate connections, comprising a plurality of parallel current supply line and circuit conductors, rotatable contactor means mounted to extend at different angles across the conductors, the line conductors having two connection terminals, the circuit conductors having three terminals for attachment to a common terminal of two electro-responsive devices and to the opposite ends thereof, and means for positioning the rotatable contactor means in four positions to connect the three terminals for a series connection, a parallel connection, and to omit a connection to either one of the said two opposite end terminals.

8. A multiple switch for closing parallel, series and separate connections, comprising a plurality of current supply line and circuit conductors, a block having parallel grooves in which the conductors are mounted and having four radiating grooves crossing the parallel grooves, the line conductors extending across all the radiating grooves, one of the circuit conductors extending across three of the radiating grooves, another extending across the remaining radiating grooves, another extending across the first radiating groove only and under the second one but crossing the third and fourth, and another extending across the first and second radiating grooves only, terminal connections for all of said conductors, and rotatable contact means at the center of the radiating grooves engageable with the conductors in the parallel grooves.

9. A switch embodying an insulating base provided with grooves running parallel, conductors at the bottoms of said grooves, said base also provided with shallower grooves, and a rotatable contactor, said contactor co-operating with said shallower grooves, whereby to make contact with the conductors in the said parallel grooves.

10. A switch embodying an insulating base provided with grooves running parallel, conductors at the bottoms of said grooves, said base also provided with shallower grooves disposed at angles to and crossing said parallel grooves, and a rotatable contactor, said contactor co-operating with said shallower grooves, whereby to make contact with the conductors in the said parallel grooves.

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