

PATENT SPECIFICATION



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433,296

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Complete Specification Accepted : Aug. 13, 1935.

PROVISIONAL SPECIFICATION

**Improvements in and relating to Valve and Circuit Testing Instruments
and in Adaptors for Use therewith**

We, HUGH SUTHERLAND MACADIE, a British Subject, and THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT COMPANY LIMITED, a British Company, both of Winder House, Douglas Street, Westminster, London, S.W. 1, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in valve and circuit testing instruments and in adaptors for use therewith. In Patent No. 399,193 there has already been described a valve testing instrument which comprises a valve holder carried by a suitable base which is provided with terminals and a switch by means of which a measuring instrument connected to certain terminals on the base can be included in a given circuit in which it is desired to measure the current flowing, the other terminals on the base enabling an indication of voltage across any of the two points to be obtained by connecting a voltmeter across the same. This base is connected through a multiple way cord to an adaptor which is intended to be plugged into a valve holder in the set, the valve removed from the set being plugged into the holder on the base.

Now the adaptor claimed in the said patent is provided with one or more sets of pins so disposed and arranged that the same may be plugged into two or more different types of valve holder. In the principal form, the adaptor comprised a set of four fixed pins and a slidable fifth pin, and the valve holder on the base had five sockets so that four or five pin valves could be tested.

Now it is the chief object of the present invention to extend the usefulness of such a device and, according to the present invention, the valve holder on the base is provided with a number of sockets greater or less than the number of pins (slidable and fixed) of any one set on the adaptor, a secondary adaptor or coupling member being provided, as hereinafter described.

Describing now by way of example one convenient form of this invention, the base hereinbefore referred to is provided with a valve holder having seven sockets

so arranged that a valve having a seven pin base can be plugged therein. The base is provided with the appropriate number of terminals and switch contact points in the manner described in Patent No. 399,193 to enable current and/or voltage measurements to be taken in the various circuits. From the base a multiple way connecting cable (8 way) extends, and at the end of the same is mounted an adaptor having four fixed pins and a slidably arranged fifth pin, in accordance with the Patent above referred to. In addition to these pins, the adaptor is provided on its outer surface with a pair of spaced contact members to which two of the leads in the multiple way cable are connected, the remaining lead being connected at each end to a crocodile or like clip as and for the purpose explained in the said Patent.

In addition to this apparatus, a secondary adaptor or coupling member (hereinafter termed the "coupling member") may be provided, this coupling member having on its underside seven pins adapted to fit into the seven socket valve holder on the base and on its top five spaced sockets adapted to receive a five pin valve. The sockets are appropriately connected to the pins to maintain the desired circuit connections, and the remaining two pins are connected to a pair of spaced spring contact strips mounted on the side of the coupling and projecting upwardly from the top of the same. These spring contact strips are so spaced and positioned that, when the adaptor is plugged into the coupling member, the contacts on the side of the adaptor are engaged by the springs and the circuit from the appropriate pins to the leads in the multiple way cable are thereby completed.

Dealing now with the use of the device, when it is desired to test four or five pin valves, or the circuits associated therewith, the coupling member is plugged into the valve holder on the base, thereby converting the same effectively into the apparatus described in Patent No. 399,193, the fifth pin being slid in and out to adapt the device for four or five

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pin valves in the manner described in the said specification.

Also, by breaking the circuit between the two spring blades and the two contacts, and by completing the circuit through a measuring instrument, the current flowing in either of these extra circuits may be measured.

When used for seven pin valves, the adaptor is plugged into the coupling member and these two parts are then used as the adaptor, the valve being plugged into the socket on the base and the two-part adaptor being plugged into the set.

Instead of having a five pin plug and a seven socket holder, a seven pin plug and a five socket holder may be provided, the coupling member being suitably con-

structed to enable the desired tests to be made.

Of course, the valve holder on the base and the coupling member may be adapted for use in connection with valves having more than seven pins and also, instead of utilizing that form of adaptor having a sliding fifth pin, any of the other forms of adaptor described in Patent No. 399,193 may be used without departing from the scope of the present invention.

Dated this 2nd day of January, 1934.

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COMPLETE SPECIFICATION

Improvements in and relating to Valve and Circuit Testing Instruments and in Adaptors for Use therewith

We, HUGH SUTHERLAND MACADIE, a British Subject, and THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT COMPANY LIMITED, a British Company, both of Winder House, Douglas Street, Westminster, London, S.W.1, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in valve and circuit testing instruments and in adaptors for use therewith. In the Specification of Patent No. 399,193 there has already been described a valve testing instrument which comprises a valve holder carried by a suitable base which is provided with terminals and a switch by means of which a measuring instrument connected to certain terminals on the base can be included in a given circuit in which it is desired to measure the current flowing, the other terminals on the base enabling an indication of voltage across any of the two points to be obtained by connecting a voltmeter across the same. This base is connected through a multiple way cable to an adaptor which is intended to be plugged into a valve holder in the set, the valve removed from the set being plugged into the holder on the base.

Now the adaptor claimed in the said Patent is provided with one or more sets of pins so disposed and arranged that the same may be plugged into two or more different types of valve holder. In the principal form, the adaptor comprised a set of four fixed pins and a slidable fifth pin, and the valve holder on the base had

five sockets so that four or five pin valves could be tested.

It is also known to provide testing apparatus with a coupling member having pins and sockets so arranged that an adaptor having five pins may be employed in the testing of four pin valves or an adaptor having four pins for testing a five pin valve. Modern radio valves, however, often have a greater number of pins than five and it is not practical, owing to the arrangement of the pins, to provide a coupling member with sockets to receive a valve having five or more than five pins.

The chief object of this invention is to extend the usefulness of testing instruments of the kind set forth in the Specification of Patent No. 399,193 and a further object is to provide a coupling member for the improved testing instrument to enable it to be employed for testing valves having any number of pins.

According to the present invention the valve holder on the base of the testing apparatus is provided with a number of sockets greater than the number of pins (slidable and fixed) on the adaptor, said adaptor being provided with side contacts corresponding in number to the number of sockets in the valve holder in excess of the number of pins on the adaptor.

According to a further feature of the invention, a coupling member is provided having on its under surface pins corresponding to the sockets in the valve holder, on its upper surface sockets corresponding to the pins on the adaptor, and on its side contacts adapted to engage with and corresponding in number to the side contacts on the adaptor; the coupling

member being capable of being plugged into the valve holder on the testing apparatus or on the set according to the number of pins of the valve being tested.

5 When it is desired to test a valve having more pins than there are sockets in the valve holder of the testing apparatus, complementary coupling members are provided, one of which has on its
10 under surface pins corresponding to the sockets on the valve holder of the testing apparatus and on its upper surface sockets corresponding to the pins of the valve, and the other of which is similar
15 to the coupling member described in the preceding paragraph, except that the number of pins on its under surface corresponds to the pins of the valve; each of these coupling members being provided
20 with side contacts and connecting leads corresponding in number to the number by which the pins of the valve exceed the number of sockets in the valve holder of the testing apparatus.

25 In order that this invention may be the more clearly understood and readily carried into effect, we will proceed to describe the same with reference to the accompanying drawings, which illustrate
30 by way of example and not of limitation convenient embodiments of this invention.

In these drawings:—

Figure 1 is a perspective view of the complete testing device and the adaptor;

35 Figure 2 is a perspective view of the secondary adaptor or coupling member;

Figure 3 shows the underside of the member shown in Figure 2;

40 Figure 4 is a perspective view of the complementary adaptors or coupling members used for valves with more than seven pins; and

45 Figure 5 shows the underside of the member seen on the left-hand side of Figure 4.

Referring now to Figure 1 of the drawings, the testing apparatus shown therein comprises a valve holder *a* having seven sockets, $a^1, a^2, a^3, a^4, a^5, a^{10}, a^{11}$, carried
50 by a suitable base *b* which is provided with terminals $b^1, b^2, b^3, b^4, b^5, b^6, b^{10}, b^{11}, b^{12}$ and b^{13} , and a four-way switch *c*. The underside of the base *b* is hollow, and the terminals b^1 to b^6 and b^{10} to b^{13} are
55 connected within the hollow underside of the base as follows: the terminal b^1 to the socket a^1 of the valve holder *a*, the terminal b^2 to the socket a^2 of the valve holder *a*, the terminal b^3 to the socket
60 a^3 , the terminal b^4 to the socket a^4 , the terminal b^5 to the socket a^5 , the terminal b^{10} to the heater socket a^{10} , the terminal b^{11} to the other heater socket a^{11} , and the terminal b^6 to a flexible lead *d*. The two
65 terminals b^{12} and b^{13} are connected to

insulated moving contacts or arms (not shown) on the switch *c*, and this switch, as above explained, is provided with four definite effective positions, each separated
70 by an off position. The fixed contacts of the switch *c* comprise four pairs of contacts which are normally in contact with one another but which are separated by
75 the arms of the switch *c* when in the appropriate position to insert across the pair of contacts in question anything connected to the terminals b^{12} and b^{13} . The terminals b^{12} and b^{13} are intended for
80 connection to a current measuring instrument. The testing apparatus corresponds to that described in the Specification of Patent No. 399,193 and enables current and/or voltage measurements to be taken
85 in the various circuits, as therein described. From the base *b* an eight-way connecting cable *e* extends, and at the end of the same is mounted an adaptor
90 *f* having four fixed pins f^1, f^5, f^{10} and f^{11} and a slidably arranged fifth pin f^2 , in accordance with the Patent above referred to. In addition to these pins, the adaptor
95 *f* is provided on its outer surface with a pair of spaced contact members f^4 and f^3 to which two of the leads in the multiple way cable *e* are connected, the other five
100 leads being connected to the five pins and the remaining lead *d* being connected at each end to a crocodile or like clip d^1 and d^2 respectively as and for the purpose explained in the Specification of said
105 Patent.

Referring now to Figures 2 and 3, in addition to the apparatus just described, a secondary adaptor or coupling member
110 *n*, (hereinafter termed the "coupling member") is provided, this coupling member having on its underside seven pins $o^1, o^2, o^3, o^4, o^5, o^{10}$ and o^{11} adapted to fit into seven sockets $a^1, a^2, a^3, a^4, a^5, a^{10}$ and a^{11} of the valve holder *a* on the
115 base *b*, and on its top five spaced sockets, $p^1, p^2, p^5, p^{10}, p^{11}$ adapted to receive a five pin valve. The sockets $p^1, p^2, p^5, p^{10}, p^{11}$ are appropriately connected to the pins $o^1, o^2, o^5, o^{10}, o^{11}$ respectively to
120 maintain the desired circuit connections, and the remaining two pins o^3, o^4 are connected to a pair of spaced spring contact strips p^3, p^4 mounted on the side of the coupling member *n* and projecting
125 upwardly from the top of the same. These spring contact strips p^3, p^4 are so spaced and positioned that when the adaptor *f* is plugged into the coupling member *n*, the contacts f^3, f^4 on the side
130 of the adaptor are engaged by the springs p^3, p^4 respectively and the circuit from the appropriate pins to the leads in the eight-way cable *e* are thereby completed. Insulated capped screws x^3, x^4 are pro-
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vided, which may be loosened for the purpose hereinafter described.

When it is desired to test a valve having more than seven pins, a pair of complementary adaptors (hereinafter referred to as complementary coupling members) are provided, adapted to be connected to the adaptor and to the valve holder of the testing apparatus respectively. Such complementary coupling members are shown in Figure 4 and comprise a member n^1 adapted to be connected to the adaptor f and a member n^2 adapted to be plugged into the valve holder a of the testing apparatus. The member n^1 has on its underside nine pins $s^1, s^2, s^3, s^4, s^5, s^7, s^8, s^{10}$ and s^{11} (Figure 5) so arranged as to fit into a nine socket valve holder, and on its top five sockets $t^1, t^2, t^5, t^{10}, t^{11}$ arranged to receive the pins $f^1, f^2, f^5, f^{10}, f^{11}$ of the adaptor f . Two spring contacts t^3, t^4 are arranged on the side of the member n^1 and so positioned as to make contact with the contacts f^3, f^4 respectively in the same manner as has already been described. The pins $s^1, s^2, s^3, s^4, s^5, s^{10}$ and s^{11} are appropriately connected to the elements $t^1, t^2, t^3, t^4, t^5, t^{10}$ and t^{11} , and the remaining two pins s^7 and s^8 are connected to contacts t^7 and t^8 arranged diametrically opposite on the side of the member n^1 . The spring contacts t^3, t^4 and the contacts t^7, t^8 are also provided with insulated capped screws y^3, y^4, y^7, y^8 . The member n^2 has on its upper surface nine sockets $u^1, u^2, u^3, u^4, u^5, u^7, u^8, u^{10}$ and u^{11} arranged to receive the pins of a nine pin valve, and on its underside seven pins $v^1, v^2, v^3, v^4, v^5, v^{10}$ and v^{11} arranged to fit the sockets $a^1, a^2, a^3, a^4, a^5, a^{10}$ and a^{11} of the valve holder a . The sockets $u^1, u^2, u^3, u^4, u^5, u^{10}, u^{11}$ are appropriately connected to the pins $v^1, v^2, v^3, v^4, v^5, v^{10}, v^{11}$ respectively and the remaining sockets u^7, u^8 are connected to side contacts v^7 and v^8 , of the member n^2 . The contacts t^7 and t^8 are connected to the contacts v^7 and v^8 by means of a twin core cable w . The contacts v^7, v^8 may also be provided with insulated capped screws z^7, z^8 which serve to retain the ends of the cable w and enable the circuits to be broken.

Dealing now with the use of the device, when it is desired to test four or five pin valves, or the circuits associated therewith, the coupling member n is plugged into the valve holder a on the base b , thereby converting the same effectively into the apparatus described in the Specification of Patent No. 399,193, the fifth pin f^2 being slid in and out to adapt the device for four or five pin valves in the manner described in the said specification.

When used for seven pin valves, the adaptor f is plugged into the coupling member n and these two parts are then used as the adaptor, the valve being plugged into the valve holder a on the base b and the two-part adaptor ($f+n$) being plugged into the set.

Also, after loosening the screws x^3, x^4 , either of the circuits between the two spring blades p^3, p^4 and the two contacts f^3, f^4 may be broken as by inserting a spade terminal or the like between the member n and the respective spring. By completing the broken circuit through a measuring instrument, the current flowing in that circuit may be measured.

When used for nine pin valves such as double pentode Q.P.P. valves, the adaptor f is plugged into the complementary coupling member n^1 and these two parts are then used as the adaptor which is plugged into the valve holder in the set. The complementary coupling member n^2 is plugged into the valve holder a , and the valve is plugged into the member n^2 . Tests may be carried out exactly as with seven pin valves.

The complementary coupling members may be arranged for use with valves having more than nine pins, it sufficing to provide additional pins on the one member and additional sockets on the other, the additional elements being connected by a suitable cable as described with reference to Figure 4.

Instead of utilizing that form of adaptor having a sliding fifth pin, any of the other forms of adaptor described in the Specification of Patent No. 399,193 may be used, and modifications and alterations of the constructional features of the forms described above may be made without departing from the scope of the present invention.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Valve testing instruments of the kind set forth in the Specification of Patent No. 399,193, characterised in that the valve holder on the base thereof is provided with a number of sockets greater than the number of pins (slidable and fixed) on the adaptor, and in that the adaptor is provided with side contacts corresponding in number to the number of sockets in the valve holder in excess of the number of pins on the adaptor.

2. Valve testing apparatus as claimed in Claim 1, characterised in that the valve holder has seven sockets and in that the adaptor is provided with four fixed pins,

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one slidable pin and two fixed contacts on the side thereof.

3. When used in valve testing instruments, as claimed in Claim 1, a coupling member having on its under surface pins corresponding to the sockets in the valve holder, on its upper surface sockets corresponding to the pins on the adaptor, and on its side contacts adapted to engage with and corresponding in number to the side contacts on the adaptor.

4. When used in valve testing instruments as claimed in claim 1, a coupling member as claimed in Claim 3, characterised in that it has seven pins on its under surface and five sockets on its top and two spring contacts on its side, the pins being appropriately connected to the sockets and contacts.

5. When used in valve testing instruments as claimed in Claim 1, complementary coupling members, one of which has on its under surface pins corresponding to the sockets on the valve holder of the testing apparatus and on its upper surface sockets corresponding to the pins of the valve, on its upper surface sockets corresponding to the pins on the adaptor, and on its side contacts adapted to engage with and corresponding in number to the side contacts on the adaptor; each of these coupling members being provided with side contacts and connecting leads corresponding in number to the number by which the pins of the

valve exceed the number of sockets in the valve holder of the testing apparatus.

6. When used in valve testing instruments as claimed in claim 1, complementary coupling members as claimed in Claim 5, characterised in that the coupling member to be plugged into the valve holder of the testing apparatus has on its under surface seven pins and on its top nine sockets, seven of the sockets being appropriately connected to the seven pins and the remaining two sockets being connected to two contacts on the side thereof, and in that the coupling member into which the adaptor is plugged, has on its under surface nine pins, and on its top five sockets, and on its side two spring contacts are provided and two further contacts to which are secured the ends of a cable connecting the latter to corresponding contacts on the side of the other coupling member, the sockets and contacts being appropriately connected to the pins.

7. The improved adaptor with or without coupling members when used in valve testing instruments, substantially as hereinbefore described.

8. The improved valve testing apparatus, substantially as described and illustrated by the accompanying drawings.

Dated the 10th day of January, 1935.

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London, W.C.2,

Agents for the Applicants.

[This Drawing is a reproduction of the Original on a reduced scale.]

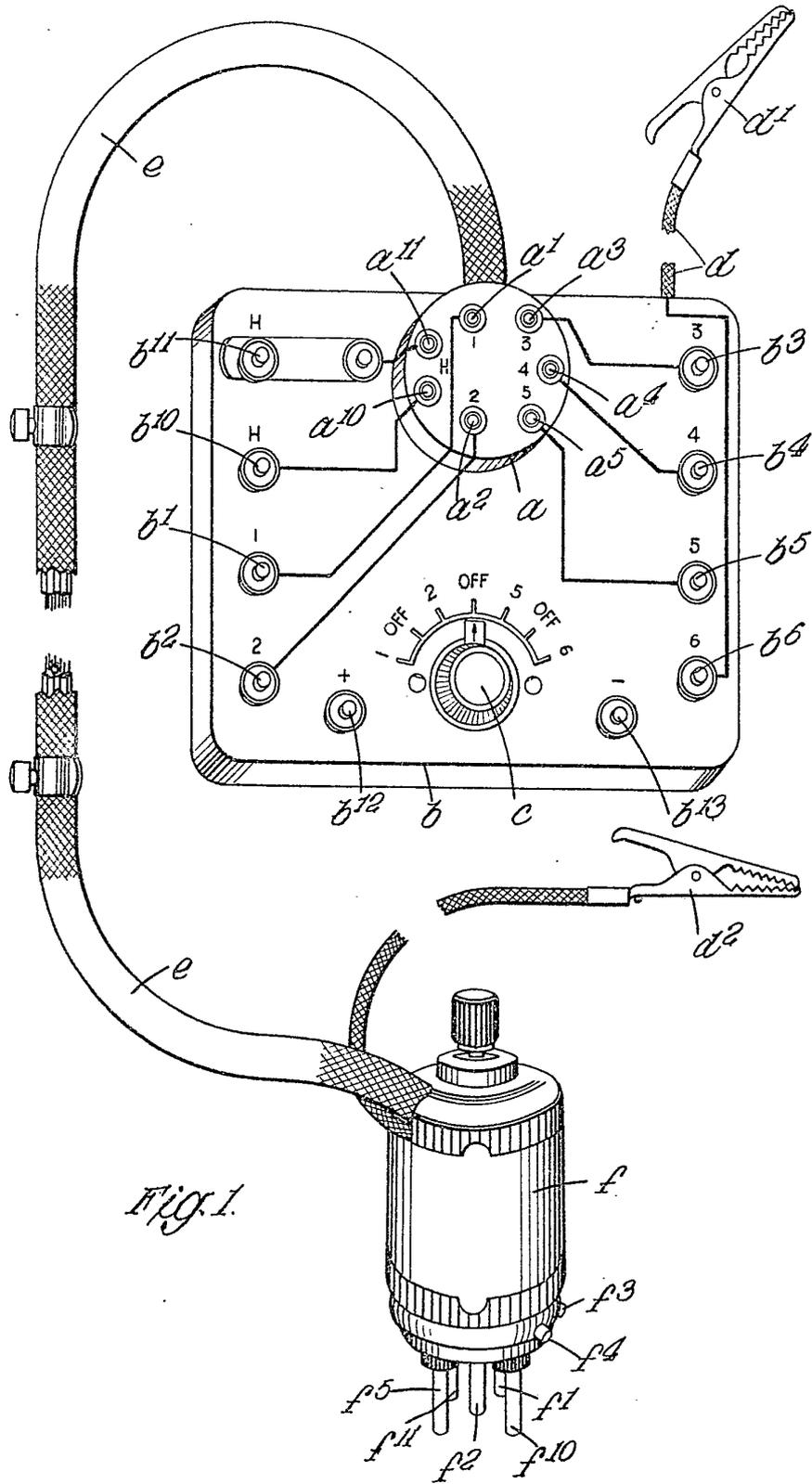
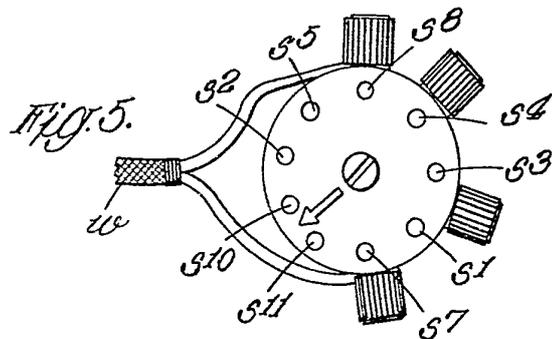
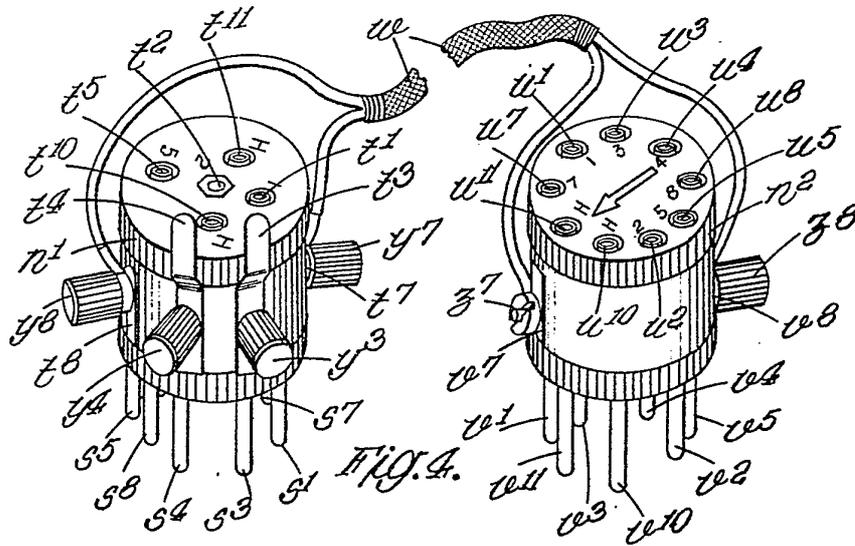
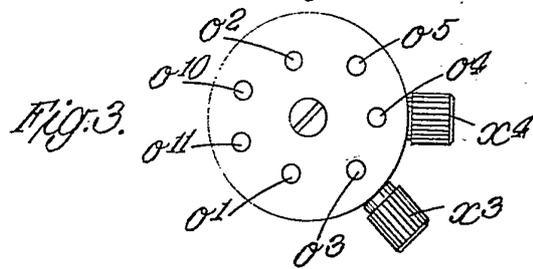
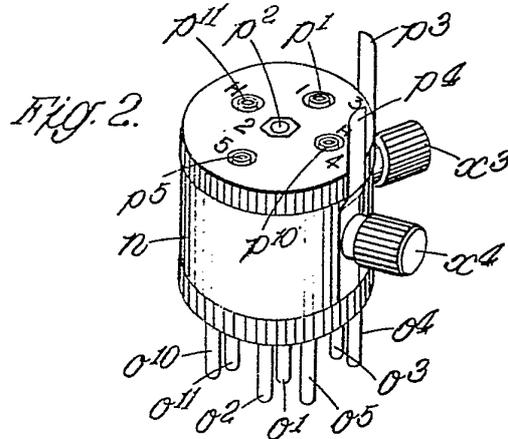


FIG. 1.



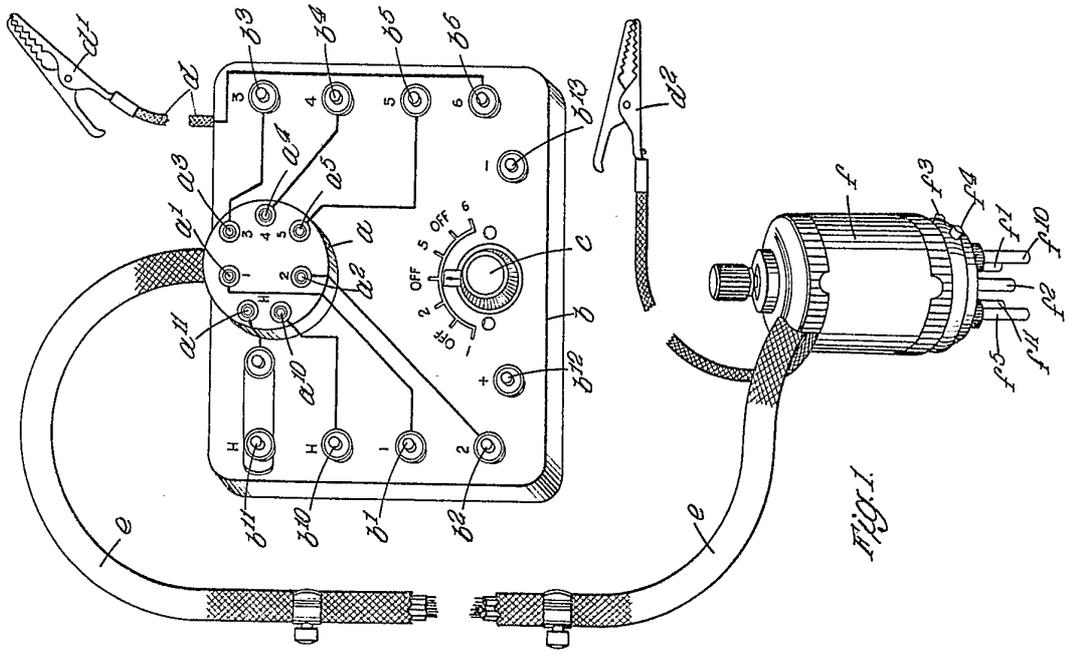


FIG. 1.

[This Drawing is a reproduction of the Original on a reduced scale.]

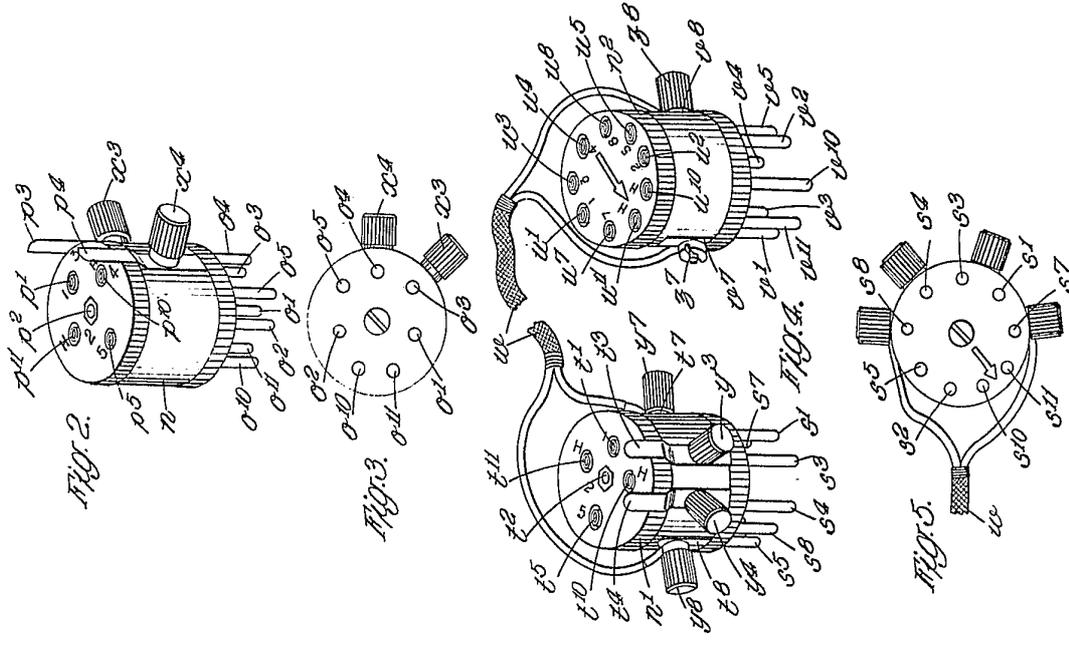


FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.