July 31, 1923. 1,463,304

R. V. BINGAY

TRANSFORMER CONTROLLING MEANS

Filed Feb. 20, 1922

Fig: 1.

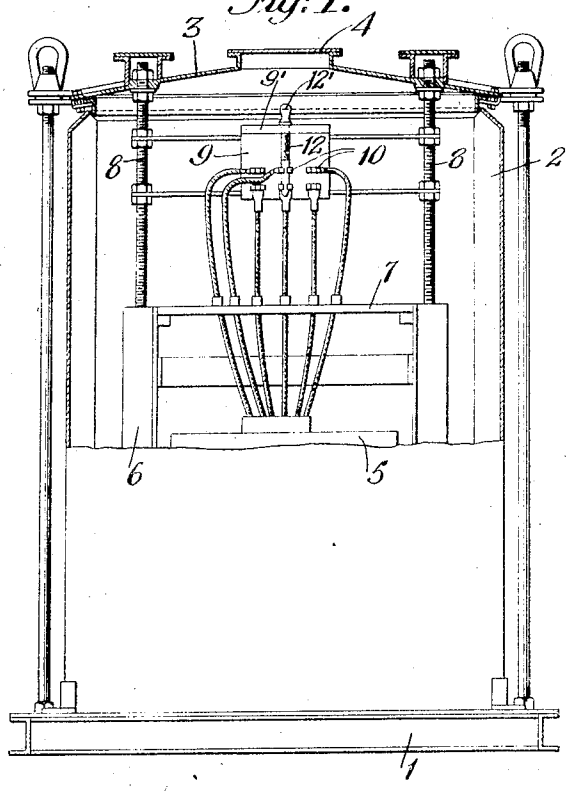


Fig: 2.

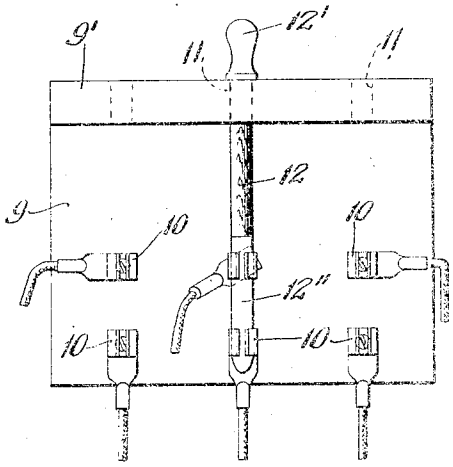


Fig: 3.

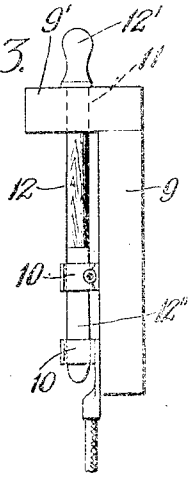


Fig: 5.

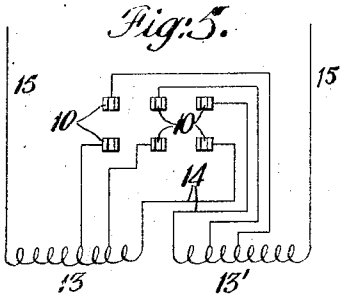


Fig: 4.

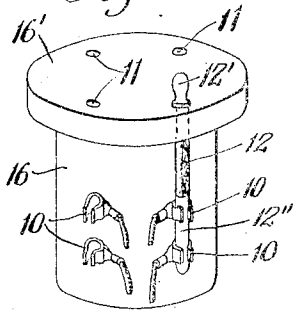


Fig: 6.

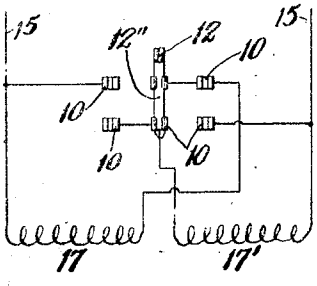
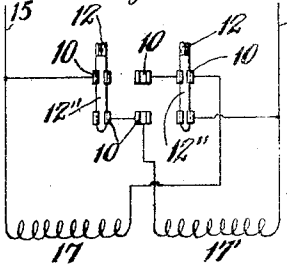


Fig: 7.



INVENTOR

Robert V. Bingay

BY

Edwards, Sager & Bower

his ATTORNEYS

Patented July 31, 1923. 1,463,304

UNITED STATES PATENT OFFICE.

ROBERT V. BINGAY, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO PITTSBURGH TRANSFORMER COMPANY, A CORPORATION OF PENNSYLVANIA.

TRANSFORMER-CONTROLLING MEANS.

Application filed February 20, 1923. Serial No. 619,748.

To all whom it may concern:

Be it known that I, ROBERT V. BINGAY, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Transformer-Controlling Means, of which the following is a specification.

This invention relates particularly to means for making and changing as desired, the internal connections of electric transformers. The invention is particularly useful in making connections of taps and changing their connections as may be desired from time to time and in changing the relationship of the transformer windings.

One object of the invention is to provide a simple and convenient means for making and changing the internal connections as may be desired from time to time; another object is to provide a construction which will be reliable and insure a proper connection of the contacts. Other objects and advantages will be understood from the following description and accompanying drawings illustrating a preferred embodiment of my invention.

Fig. 1 is a side view of a transformer embodying my invention, the transformer tank being partly broken away. Fig. 2 is a side view of the controlling means somewhat enlarged. Fig. 3 is an end view thereof. Fig. 4 is a perspective view showing a modified form of construction, and Figs. 5, 6 and 7 are diagrams of connections.

The transformer shown in Fig. 1 shows a base 1 supporting the tank 2, a cover 3 and a manhole having a cover 4. The transformer windings are indicated generally at 5 which are of course associated with the laminated core held by a frame 6. The cross piece 7 of insulating material is supported by the frame 6 and the usual leads from the transformer windings and also tap leads extend upward and are shown supported and suitably spaced by the cross piece 7. Certain of these leads forming the main primary and secondary leads will extend upward to and through the usual insulating bushings in the cover of the transformer, but as these form no part of my present invention, they are not shown in the drawings. From the frame 6 are shown two upwardly extending bolts 8, which engage the transformer cover and in this instance are shown as forming the support for the controlling means. The bolts 8 are shown as supporting by suitable means a controlling panel 9. This panel is supported in a vertical position and on the face thereof is shown in this instance six contacts 10 of the usual circular spring clip type adapted to have transformer leads suitably connected thereto either on the face of the panel or through the rear thereof. The panel 9 of insulating material carries an over-hanging front top portion 9'.

The contacts 10 are associated in pairs one vertically above the other; and above each pair of contacts and in alignment therewith is a hole 11 in the over-hanging portion 9' of the supporting panel. These three holes 11 serve as guides for the connecting means. The connecting means consists of a rod 12 having a handle 12' and on the lower end of the rod is carried a conductor 12''. In the form shown the rod 12 is of wood or other suitable insulating material and the connecting portion 12'' is a metal tube having its lower end closed and rounded. This tube sets over and is securely held in position on the rod 12. When the connecting rod is moved downwardly through one of the holes 11, it is thereby guided so that its lower end makes engagement with the upper circularly formed contact clip 10; and continued movement will guide the connecting tube 12'' in engagement with the corresponding lower contact 10. This arrangement insures a good electrical connection between any pair of contacts 10 and also insures correct guiding and movement of the connecting rod so that the contacts are not bent out of place or otherwise damaged by improper movement of the connecting rod. When it is desired to change a connection, the rod 12 is withdrawn and inserted in one of the other holes 11 and moved downwardly so as to engage another pair of contacts. Only one connecting rod is provided for the panel for adjusting tap connections so that the possi-

bility of a short circuit or burning out of the windings of the transformer is avoided, it being required in application of my invention to adjusting taps that only one pair of contacts 10 be connected at a time, as will be understood from the diagram of connections in Fig. 5.

In Fig. 5, two portions 13, 13′ of transformer windings are indicated, which may be either secondary or primary windings of the transformer. These windings are provided with taps 14, the leads of which extend to and are connected with the contacts 10 already described and which are diagrammatically indicated in Fig. 5. These taps are often provided in transformer windings for the purpose of giving a range of control in the voltage and may be comparatively few in some cases and more numerous in others where a greater range of adjustment of the voltage, or more refinement is desired. In this instance, it may be desired to connect all the turns of the windings 13, 13′ in series with each other, or it may be desired to omit a few of the turns from the series connection, or to omit a greater number. Three adjustments are shown obtainable. As will be seen from tracing the connections, when the connecting rod is inserted as above described to connect the right-hand pair of contacts, all of the turns of the portions 13, 13′ will be connected in series. When the connecting rod is removed and inserted to connect the middle pair of contacts, it will be seen, by tracing the connections, that some of the turns are omitted from circuit; and when the rod is removed from the middle contacts and inserted to connect the two left-hand contacts, a greater number of turns is omitted from the circuit of the two portions of the windings. The leads 15 which extend from the outer ends of the windings 13, 13′ will be the main leads of the windings and pass as usual through insulating bushings in the tank cover.

It will be seen from the above that a balanced relationship of the transformer windings is preserved at all times when any pair of contacts 10 is connected together, and inasmuch as only one connecting rod is used, it is necessary to withdraw the same from one pair of contacts before connecting another pair and thus the danger of making a short-circuit is avoided.

The controlling means is located opposite and just below the manhole in the transformer cover so that a desired change of connections may be made by merely removing the manhole cover, or a specially provided hand-hole cover and after the change is made the cover is replaced. Unauthorized tampering with, or change of connections, is by this means quite fully avoided and the construction is simple and convenient and the movable parts are reduced to a minimum.

When the transformer casing is filled or nearly filled with oil, the contacts 10 will be below the surface of the oil. The guide for the rod will be located near the surface of the oil, either above or below the surface a short distance so as to be visible in making or changing the circuit connections.

Instead of providing the controlling means with a supporting panel, the support may be of other form such, for example, as shown in Fig. 4, in which the contacts 10 are supported on the outside of a cylinder 16 of insulating material having a circular overhanging portion 16′ at its upper end. This overhanging portion 16′ will be provided with the guiding holes 11 for receiving the rod 12. In this case four guiding holes 11 having four corresponding contacts are shown and obviously any required number of holes and pairs of contacts may be provided to suit the particular requirements, either in the form shown in Fig. 4 or in that of Figs. 1 to 3, or in any other form which the support for the contacts and guide for the rod may assume. The supports for the contacts and the guides may be of moulded insulation and the contacts moulded in place.

In Figs. 6 and 7 my invention is indicated applied to transformer windings for connecting them in series or parallel. The windings 17, 17′ have their terminals connected to three pair of contacts 10 as shown. When the connecting rod is in position connecting the middle set of contacts, as shown in Fig. 6, a series connection of the windings is obtained. The change to the parallel connection is made by removing the connection from the middle pair of contacts and connecting the outer sets respectively by two connecting rods, as shown in Fig. 7.

My invention is also applicable to making various other changes in the connections of the windings or portions thereof and although I have described certain embodiments of my invention and application thereof, it will be understood that various modifications may be made without departing from the scope of my invention and that any number of contact sets and rods may be used to suit the particular requirements.

I claim:—

1. The combination of a transformer, an enclosing casing, leads from the windings of said transformer, sets of contacts within said casing in alinement with each other to which said leads are connected, a support having guiding means in alinement with each set of contacts, and a rod or rods adapted to engage said guiding means and engage said contacts.

2. The combination of a transformer, an enclosing casing, leads from the windings of said transformer, contacts within said casing and certain of said contacts being in alinement with each other, a support having guid-

ing means in alinement with each set of alined contacts, and an endwise movable rod or rods adapted to engage said guiding means and contacts.

3. The combination of a transformer, an enclosing casing having a cover, leads from the windings of said transformer, insulating supporting means in said casing below said cover, contacts carried by said means and connected to said leads, certain of said contacts being in vertical alinement with other of said contacts, a vertically movable connector or connectors for connecting said contacts in alinement, and supporting means having means for guiding said connectors.

ROBERT V. BINGAY.