July 24, 1928. 1,678,129

G. H. TUTTLE

TAP CHANGER

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Fig. 1.

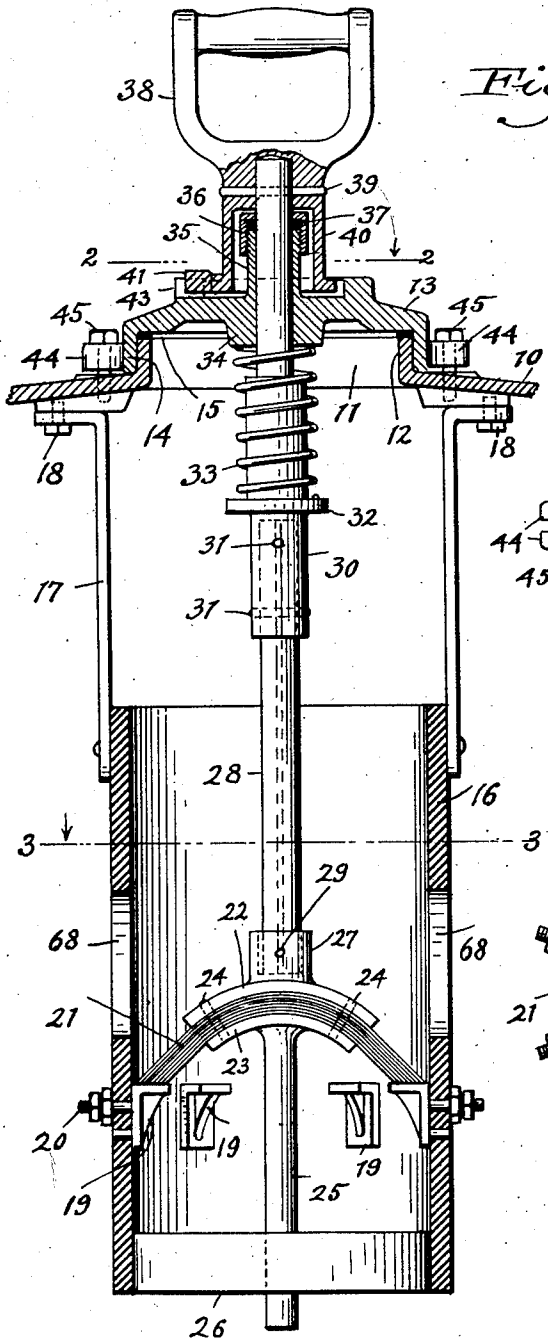


Fig. 2.

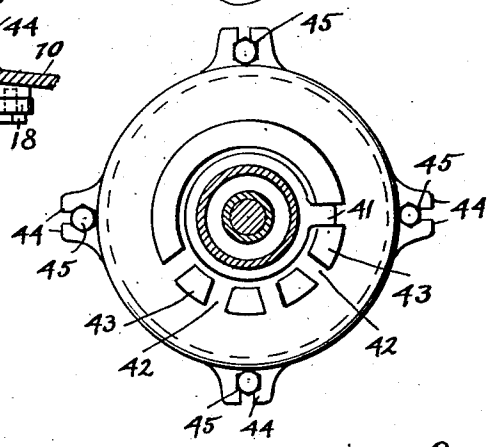
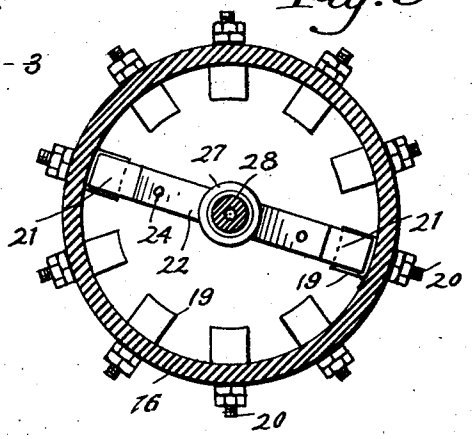


Fig. 3



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Fig. 4.

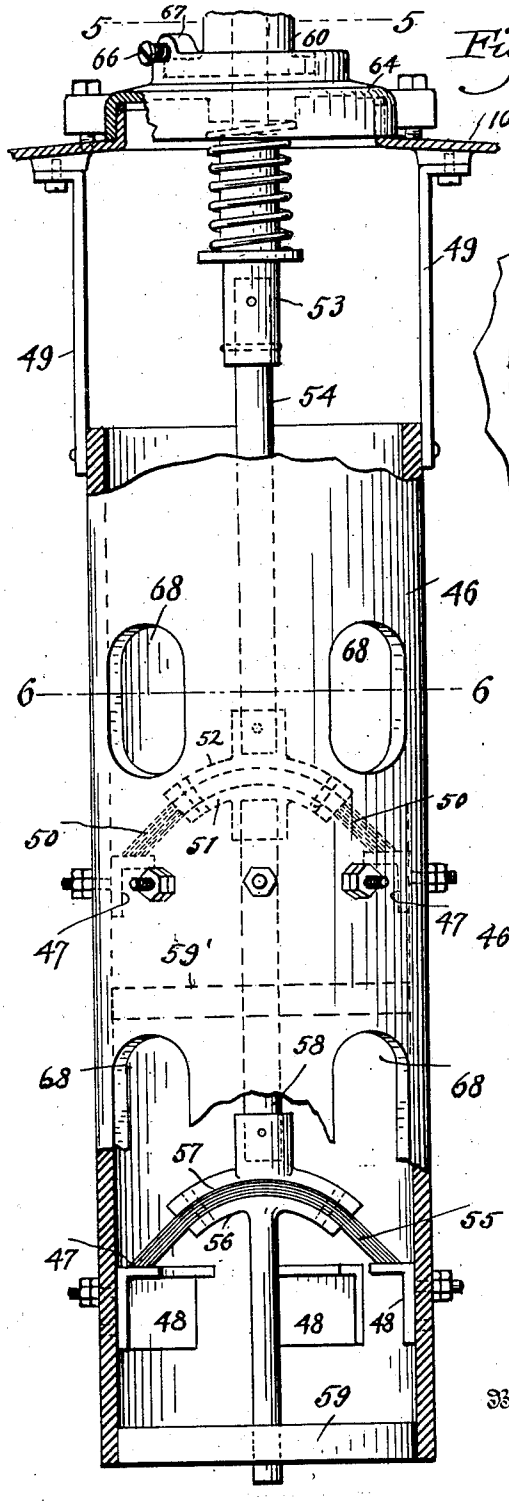
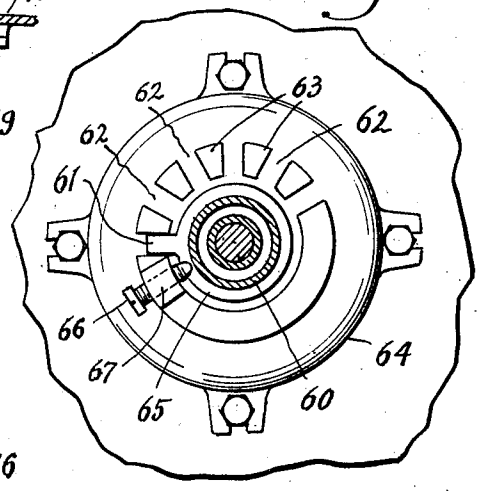


Fig. 5.



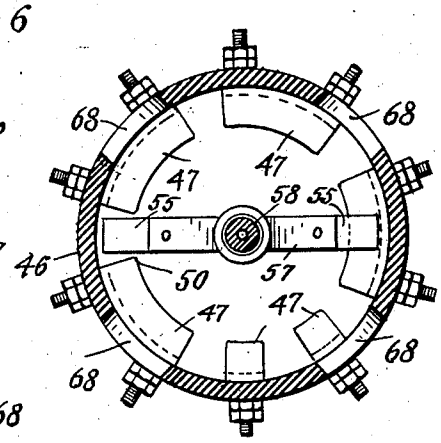


Fig. 6.

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UNITED STATES PATENT OFFICE.

GEORGE H. TUTTLE, OF WARREN, OHIO, ASSIGNOR TO THE PACKARD ELECTRIC COMPANY, OF WARREN, OHIO, A CORPORATION OF OHIO.

TAP CHANGER.

Application filed April 13, 1927. Serial No. 183,324.

This invention relates to tap-changers for transformers and more particularly to that type of tap-changer that is located within the transformer tank and operable from the exterior thereof.

It is one of the objects of the invention to provide an improved form of tap-changer that will permit the use of a laminated switch member for the purpose of connecting the different contacts so as to insure a proper engagement.

A further object of the invention is to provide an improved form of tap-changer that will insure proper insulation of the different contacts and be less expensive to manufacture than prior devices of this kind and also be of a durable construction and not liable to get out of order.

Other objects of the invention and the features of novelty will be apparent from the following description, taken in connection with the accompanying drawings, of which:

Fig. 1 is an axial section through a tap-changer embodying my invention, shown in connection with a portion of the transformer tank;

Fig. 2 is a transverse section on the line 2—2 of Fig. 1;

Fig. 3 is a transverse section on the line 3—3 of Fig. 1;

Fig. 4 is an elevation of another form of tap-changer embodying my invention, certain parts being shown in section;

Fig. 5 is a section on the line 5—5 of Fig. 4; and

Fig. 6 is a section on the line 6—6 of Fig. 4.

Referring to Figs. 1 to 3, 10 indicates the top of a transformer tank which is provided with an opening 11 surrounded by an upstanding flange 12. A cover 13 closes the opening 11 and has a depending flange 14 surrounding the flange 12. For the purpose of sealing the joint between the cover 13 and the top 10, a gasket 15 may be provided at the top of the flange 12. A relatively large tube 16, of insulating material, is suspended within the tank by means of a plurality of hangers 17 which are secured to the inner side of the top 10 by bolts 18. I prefer to employ four of the hangers 17 in order to rigidly support the tube 16.

A series of contact members 19 are arranged with their upper surfaces in the same plane, within the tube 16, being secured to the tube by bolts 20 which may also serve as binding posts for the wires leading to the taps of the transformer windings. An arcuate laminated brush, or switch member 21, is arranged within the tube 16 so that its ends may engage with the upper surfaces of the contact members 19. This brush is secured between the arcuate members 22 and 23 which may be secured together by rivets 24. The member 23 has an extension 25 which is adapted to slide and rotate in a guide 26, at the lower end of the tube 16. The member 22 has a hollow boss 27 in which a rod 28, of insulating material, is secured by a pin 29. The upper end of the rod 28 extends into a shaft 30 and is secured therein by rivets 31. The shaft 30 has a flange 32 thereon and a spring 33 surrounds the shaft between the flange 32 and a boss 34 on the inner side of the cover 13. The spring 33 serves to press the bush 21 into engagement with the contact members 19.

The cover 13 has a tubular extension 35 on which there is a stuffing-box nut 36 for compressing the packing 37 against the shaft 30 to keep out moisture. A handle 38 is secured to the outer end of the shaft 30 by means of a rivet 39 and this handle has a sleeve 40 surrounding the stuffing-box and provided with a laterally extending lug 41 which is adapted to engage with a series of notches 42 between lugs 43 on the cover 13, for the purpose of locating the brush 20 in its different positions.

The cover 13 is provided with laterally projecting lugs 44 with which bolts 45 cooperate for the purpose of clamping the cover in position.

When the lug 41 is in engagement with one of the notches 42, the handle 38 is held against rotation and, therefore, the brush 21 cannot be moved from one pair of contacts to another, without lifting the handle 38 so as to disengage the lug 41 from the notch 42. Such disengagement also disengages the brush 21 from the contacts and the handle 38 may then be rotated until the lug 41 is in alignment with the desired notch 42, whereupon the release of the handle 38 will permit the spring 33 to operate and move the brush 21 into engagement with the contact members.

Referring to Figs. 4 to 6, the construction

therein illustrated comprises a tube 46, of insulating material within which there are two series of contact members 47 and 48, which may be similar to the contact members 19. The tube 46 is supported within the tank 10 by hangers 49, similar to the hangers 17, and a brush 50 is provided for cooperation with the contact members 47, this brush being similar to the brush 21 and being secured between the arcuate members 51 and 52. The shaft 53 is similar to the shaft 30 and is connected with the member 52 by the insulating rod 54. Another brush 55 cooperates with the contact members 48 and is secured between the arcuate members 56 and 57. The member 57 is connected with the member 51 by a rod of insulating material 58 which may be pinned to both of these members. The member 56 may be similar to the member 25 and has its lower end projecting through a guide 59. An additional guide 59′ of insulating material may be provided for the rod 58.

The handle is indicated at 60 and has a laterally projecting lug 61 which cooperates with notches 62 between lugs 63 on the cover 64, the latter being generally similar to the cover 13 and secured to the tank 10 in the manner previously described. At the lower end of the handle 60, there is a circumferential flange 65 with which a screw 66 is adapted to engage, when the lug 61 is in one of the notches 62. The screw 66 is mounted in a lug 67 on the cover 64 and serves to lock the shaft 53, as well as the brushes 50 and 55, in position, so that any surges on the line to which the transformer is connected will not disengage the brushes 50 and 55 from the members with which they are in contact.

Under some conditions, it may be desirable to employ a continuous ring instead of the series of separate contact members 48 and to have the brushes 50 and 55 electrically connected. In such case, the rod 58 will be made of a suitable conducting material.

It is usually preferable to provide openings 68 in the tubes 16 and 46 for the purpose of permitting access to the brushes and also to permit inspection of the brushes and the contact members with which they cooperate.

Having thus described my invention, I claim:

1. In tap-changers for transformers, the combination of a tank, a removable cover secured thereon, a tube of insulating material supported within said tank, a plurality of contacts individually secured on the interior of said tube, an axially movable and rotatable rod arranged within said tube and projecting through said cover, an arcuate laminated brush carried by said rod and arranged to engage said contacts, a handle secured to said rod on the exterior of said tank, and cooperating means on said cover and said handle for locating said brush in its different positions.

2. In tap-changers for transformers, the combination of a tank, a removable cover secured thereon, a tube of insulating material supported within said tank, a plurality of contacts individually secured on the interior of said tube, an axially movable and rotatable rod arranged within said tube and projecting through said cover, an arcuate laminated brush carried by said rod and arranged to engage said contacts, a handle secured to said rod on the exterior of said tank, and cooperating means on said cover and said handle comprising a lug on one and a plurality of notches on the other to receive said lug to locate said brush in its different positions.

3. In tap-changers for transformers, the combination of a tank, a removable cover secured thereon, a tube of insulating material supported within said tank, a plurality of contacts secured on the interior of said tube, an axially movable and rotatable rod arranged within said tube and projecting through said cover, an arcuate laminated brush carried by said rod and arranged to engage said contacts, a handle secured to said rod on the exterior of said tank, a spring engaging said rod and the inner side of said cover for pressing said brush against said contacts, and cooperating means on said cover and said handle comprising a lug on one and a plurality of notches on the other to receive said lug to locate said brush in its different positions.

4. In tap-changers for transformers, the combination of a tank, a removable cover secured thereon, a tube of insulating material supported within said tank, a plurality of contacts secured on the interior of said tube, an axially movable and rotatable rod arranged within said tube, a stuffing-box on the outer side of said cover through which said rod projects, a switch carried by said rod and adapted to engage said contacts, a handle secured to said rod on the exterior of said tank and having an extension toward said cover provided with a lug, said cover having a plurality of circularly arranged notches with which said lug is adapted to engage to locate said switch in its different positions, and a spring cooperating with said rod to press said switch into engagement with said contacts.

5. In tap-changers for transformers, the combination of a tank, a removable cover secured thereon, a tube of insulating material supported within said tank, a plurality of contacts secured on the interior of said tube, an axially movable and rotatable rod arranged within said tube, a stuffing-box on the outer side of said cover through which said rod projects, a switch carried by said rod and adapted to engage said contacts, a han-

dle secured to said rod on the exterior of said tank and having an extension toward said cover provided with a lug, said cover having a plurality of circularly arranged notches with which said lug is adapted to engage to locate said switch in its different positions, a spring cooperating with said rod to press said switch into engagement with said contacts, and means on the exterior of said cover for positively securing said rod against axial movement.

6. In tap-changers for transformers, the combination of a tank, a removable cover secured thereon, a tube of insulating material supported within said tank, a plurality of series of contacts secured on the interior of said tube, the contacts of one series being spaced axially of the tube from those of the other series, an axially movable and rotatable rod arranged within said tube and projecting through said cover, a plurality of arcuate laminated brushes carried by said rod and each of which cooperates with one of said series of contacts, a handle secured on said rod on the exterior of said tank, and cooperating means on said cover and said handle comprising a lug on one and a plurality of notches on the other to receive said lug to locate said brushes in their different positions.

7. In tap-changers for transformers, the combination of a tank, a removable cover secured thereon, a tube of insulating material supported within said tank, a plurality of series of contacts secured on the interior of said tube, the contacts of one series being spaced axially of the tube from those of the other series, an axially movable and rotatable rod arranged within said tube and projecting through said cover, a plurality of arcuate laminated brushes carried by said rod and each of which cooperates with one of said series of contacts, a handle secured on said rod on the exterior of said tank, cooperating means on said cover and said handle comprising a lug on one and a plurality of notches on the other to receive said lug to locate said brushes in their different positions, and means for positively securing said rod against axial movement.

8. In tap-changers for transformers, the combination of a tank, a removable cover secured thereon, a tube of insulating material supported within said tank, a plurality of contacts individually mounted on the interior of said tube, each of said contacts being provided with a bolt extending through the wall of the tube for securing the contact to the tube, an axially movable and rotatable rod arranged within said tube, a switch carried by said rod and adapted to engage said contacts, a handle on said rod, a fixed sector, and means fixed to said rod and cooperating with said sector to locate said switch in its different positions.

In testimony whereof, I hereunto affix my signature.

GEORGE H. TUTTLE.