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TRANSFORMER TILT OUT TRUNNION ARRANGEMENT FOR ENCLOSED CUBICLE USE

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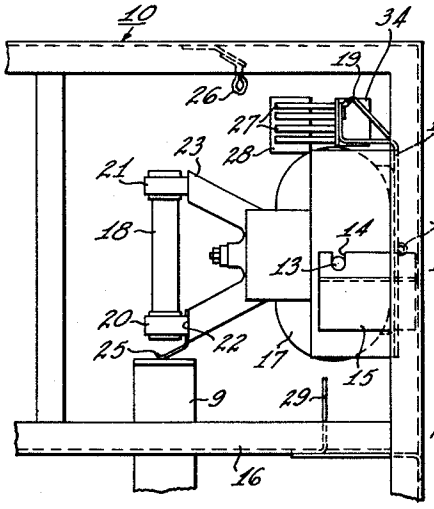


Fig. 1

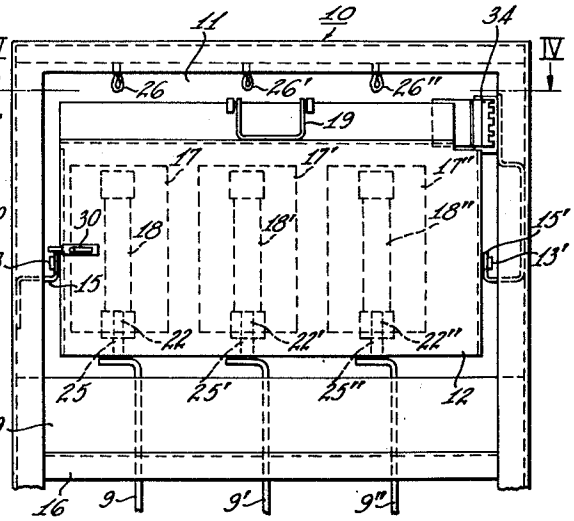


Fig. 2

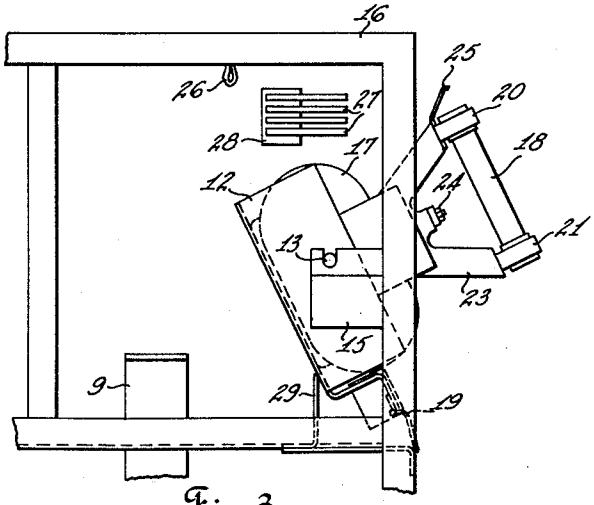


Fig. 3

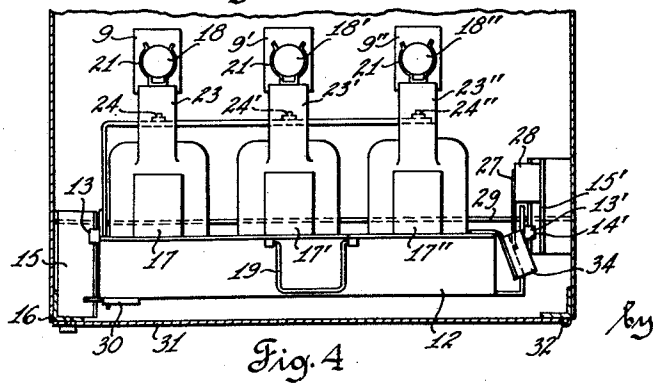


Fig. 4

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TRANSFORMER TILT OUT TRUNNION ARRANGEMENT FOR ENCLOSED CUBICLE USE

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This invention relates to enclosed switchboard structures and more particularly to a transformer tilt out trunnion arrangement wherein the electrical connection to the primary circuit of the transformer is disconnected from the electric source before access can be obtained to either the transformer or its primary fuse.

Heretofore potential transformers and fuse arrangements have been disconnected from their electric source of power by a linkage arrangement actuated by the opening of the door of their compartment or by physically moving the transformer and fuse away from their power source. The latter arrangement requires mounting the transformer and fuse on a carriage which would be rolled or slid out of its switchboard compartment. Each of these prior art systems require greater production cost with the possibilities of jamming and fouling. Further, the carriage mounted transformer and fuse arrangement used heretofore requires a considerable amount of drawout space.

In accordance with the invention claimed a new and improved transformer tilt out trunnion arrangement is provided which comprises a pair of electrical contact terminals disposed inwardly of an access opening of a compartment or enclosure within a switchboard structure. A tilt out carrier having a base is mounted to rotate within the opening from a first position to a second position. The base is arranged to form a barrier between the electrical contact terminals and the access opening in either of its two positions. A transformer having a contact terminal is mounted on the base for rotation therewith and when the base is in the first position makes contact with an electric circuit and when rotated to the second position becomes disconnected from the electric circuit. Means are provided for grounding the transformer at some time when the carrier is rotated from the first position to the second position.

It is, therefore, one object of this invention to provide a new and improved potential transformer arrangement within an enclosed switchboard structure.

Another object of this invention is to provide a new and improved tilt out trunnion arrangement for transformers mounted within an enclosed switchboard structure.

A further object of this invention is to provide a new and improved potential transformer arrangement for enclosed switchboard structures which requires a space slightly larger than the transformer for physical movement from energized to deenergized positions.

A still further object of this invention is to provide a new and improved tilt out trunnion mounting for potential transformers within an enclosed switchboard structure which mounting is provided with an offset center of gravity to insure a firm, positive contact between the transformer and its bus bar connection and when rotated to disconnect position to insure that the transformer remains in its disconnected position.

Objects and advantages other than those above set forth will be apparent from the following description when read in connection with the accompanying drawing, in which:

FIG. 1 is a side sectional elevational view of a switchboard enclosure with a potential transformer and fuse arrangement in energized position and embodying the invention;

FIG. 2 is a right end elevational view of the switchboard enclosure and apparatus shown in FIG. 1;

FIG. 3 is a side sectional elevational view similar to FIG. 1 with the potential transformer and fuse arrangement in tilt out position; and

FIG. 4 is a cross sectional view of the structure shown in FIG. 2 taken along the line IV—IV.

Referring more particularly to the drawing by characters of reference FIGS. 1–4 illustrate a compartment or enclosure **10** of a control apparatus such as, for example, a switchboard structure. Enclosure **10** is provided with an opening **11** through which access to the inside of the enclosure is obtained. A control panel or base **12** is pivotally mounted by trunnions **13**, **13'** for rotation within opening **11** and forms a barrier to enclosure **10** in either one of two predetermined positions. Trunnions **13**, **13'** are supported within notches **14**, **14'** of mounting brackets **15**, **15'** which are welded to frame **16** of the switchboard structure forming enclosure **10**.

One or more potential transformers and their associated fuses may be mounted on base **12**. As shown in the drawing, base **12** has three potential transformers **17**, **17'** and **17''** and electrically associated fuses **18**, **18'** and **18''** mounted thereon in such a manner that when base **12** is in a first predetermined position the transformers and fuses are energized in enclosure **10** and when rotated to a second predetermined position the transformers and fuses are in a deenergized position. Transformers **17**, **17'** and **17''** are so mounted that they have an offset center of gravity, i.e., the transformer assembly is unbalanced. Its center of gravity does not lie in the same vertical plane as do the trunnions **13**, **13'** of base **12**. This type of mounting insures a firm, positive contact between each of the transformers and their associated bus bars **9**, **9'** and **9''** when energized within enclosures **10** and when deenergized from the bus bars by rotation of base **12** to its second position shown in FIG. 3 insures by means of the shifting of the center of gravity of the assembly that the transformers remain in their disconnected positions. A folding handle **19** is loosely attached to an extension of base **12** so that an operator can tilt the base and transformer assembly.

As illustrated in the drawing, transformers **17**, **17'** and **17''** are each provided with clips **20** and **21** which serve as holders for fuses **18**, **18'** and **18''**. Clips **21** are arranged at one of the terminal ends **23**, **23'** and **23''** of the primary windings of the transformers and in electrical contact therewith while clips **20** are mounted on insulating supports **22**, **22'** and **22''** of these transformers. The other end of the primary winding of these transformers terminate at **24**, **24'** and **24''**. Terminal elements **25**, **25'** and **25''** connected to terminal clips **20** and insulating supports **22**, **22'** and **22''** of transformers **17**, **17'** and **17''** form electrical contact with the bus bars **9**, **9'** and **9''**, respectively.

At some time when pivoted from the energized position shown in FIG. 1 to the deenergized position shown in FIG. 3 the primary windings of the transformers and their transformer mounted current limiting fuses **18**, **18'** and **18''** are automatically grounded to remove any charge from the windings by metallic clips **20** and **21** at both ends of the fuses and terminal elements **25**, **25'** and **25''** engaging grounding terminals **26**, **26'** and **26''**, respectively, which are conductively connected to the frame of the switchboard enclosure.

The terminals of the secondary windings of the transformers are arranged for connection to a terminal block **34** fixedly mounted on base **12** of the switchboard structure. The stationary wiring is arranged for connection to a plurality of terminal elements **28** which form sliding finger contacts **27** for engaging while in transformer

energized position in enclosure 10 with terminal block 34 mounted on base 12.

Rotation of base 12 and the transformers and fuses mounted thereon are limited by barrier wall 29 which engages base 12 in its tilt out position. This wall in addition to forming a limit stop also cooperates with base 12 to form a barrier to opening 11 of the enclosure. If vibrations should occur a bolt connection 30 may be provided for more firmly holding and locking the transformers in energized position. An outer door 31 hingedly mounted at 32 on frame 16 completes the switchboard assembly.

With the claimed structure in racked in position operation thereof is as follows:

Door 31 is opened and it pivots at the hinge point 32 exposing the opening 11 of enclosure 10. Opening 11 is blocked by base 12 and barrier wall 29. The operator then takes hold of handle 19 and pulls the transformer assembly out and down. The transformer assembly pivots on its trunnions 13, 13' in notches 14, 14' of brackets 15, 15' through an angle of approximately 180 degrees or at least more than 90 degrees. At this point the transformer assembly is disconnected, deenergized by grounding and rests against barrier wall 29. Fuses can now be removed easily by taking hold of the fuse in one hand and pulling it out of the fuse clips. Because the transformer is disconnected this operation is completely safe. To remove the transformer assembly including base 12 from the enclosure the operator merely lifts the unit upward a short distance, about an inch, to lift the trunnions 13, 13' out of grooves 14, 14' in brackets 15, 15'.

To connect and reenergize the transformer assembly, the operator merely takes hold of the collapsible handle and pulls up and out. The base 12 and the transformer assembly pivots through substantially 180 degrees or at least more than 90 degrees into energized position. During this racking in operation the center of gravity shifts to insure a firm electrical contact between the transformer assembly and the bus bars. The operator now has the inner steel barrier formed by base 12 and barrier wall 29 in front of him and between him and the transformer and fuse assembly. Closing the outer door 31 of the enclosure completes the operation.

Thus, in accordance with the invention claimed a new and improved tilt out trunnion transformer assembly is provided for enclosed switchboard structures which reduces the number of moving parts thereby greatly reducing or eliminating sticking and binding, utilizes the minimum amount of drawout space, continually keeps one or more barriers between the operator and the bus bar at all times, makes inspection and testing of the transformers and fuses safe and easy and eliminates all linkage arrangements.

Although but one embodiment of the present invention has been illustrated and described it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

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

1. In combination, an enclosure having an access opening therein, an electrical contact terminal disposed within said enclosure inwardly of said opening, a tilt out carrier comprising a base mounted intermediate the ends of said opening to rotate within said opening from a first position to a second position, said base substantially filling said opening in either of said positions to form a barrier between said electrical contact terminal and said opening in either of said positions, a transformer comprising a coil having a contact terminal, said transformer being mounted on said base for rotation therewith, said contact terminals of said transformer engaging said electrical contact terminal when in said one position and becoming disconnected from said electrical contact terminal when said carrier is rotated to said second position.

2. In combination, an enclosure having an access opening therein, an electrical contact terminal disposed within said enclosure inwardly of said opening, a tilt out carrier comprising a base mounted intermediate the ends of said opening to rotate within said opening from a first position to a second position, said base substantially filling said opening in either of said positions to form a barrier between said electrical contact terminal and said opening in either of said positions, a transformer comprising a coil having a contact terminal, a fuse electrically connected with said transformer and having a contact terminal, said transformer and said fuse being mounted on said base for rotation therewith, said contact terminals of said transformer and said fuse engaging said electrical contact terminal when in said one position and becoming disconnected from said electrical contact terminals when said carrier is rotated to said second position, and means for grounding said transformer and said fuse at some time when said carrier is rotating from said first position to said second position.

3. In combination, an enclosure having an access opening therein, a pair of electrical contact terminals disposed within said enclosure inwardly of said opening, a tilt out carrier comprising a base mounted intermediate the ends of said opening to rotate within said opening from a first position to a second position, said base substantially filling said opening in either of said positions to form a barrier between said electrical contact terminals and said opening in either of said positions, a transformer comprising a coil having a contact terminal, a fuse electrically connected with said transformer and having a contact terminal, said transformer and said fuse being mounted on said base for rotation therewith, said contact terminals of said transformer and said fuse engaging said electrical contact terminals when in said one position and becoming disconnected from said electrical contact terminals when said carrier is rotated to said second position, said fuse extending outside of said enclosure through said access opening when said carrier is in said second position and means for grounding said transformer a part of the time while said carrier is rotating from said first position to said second position.

4. In combination, an enclosure having an access opening therein, a pair of electrical contact terminals disposed within said enclosure inwardly of said opening, a tilt out carrier comprising a base mounted intermediate the ends of said opening to rotate within said opening from a first position to a second position, said base substantially filling said opening in either of said positions to form a barrier between said electrical contact terminals and said opening in either of said positions, a transformer comprising a coil having a contact terminal, a fuse electrically connected with said transformer and having a contact terminal, said transformer and said fuse being mounted on said base for rotation therewith such that the center of gravity lies in a vertical plane other than the vertical plane passing through said pivotal mounting of said carrier, said contact terminals of said transformer and said fuse engaging said electrical contact terminals when in said one position and becoming disconnected from said electrical contact terminals when said carrier is rotated to said second position, said fuse extending outside of said enclosure through said access opening when said carrier is in said second position and means for grounding said transformer a part of the time while said carrier is rotating from said first position to said second position.

5. In combination, an enclosure having an access opening therein, a pair of electrical contact terminals disposed within said enclosure inwardly of said opening, a tilt out carrier comprising a base mounted intermediate

the ends of said opening to rotate within said opening from a first position to a second position, said base substantially filling said opening in either of said positions to form a barrier between said electrical contact terminals and said opening in either of said positions, a transformer comprising a coil having a contact terminal, and a fuse electrically connected with said transformer and having a contact terminal, said transformer and said fuse being mounted on said base for rotation therewith and in a position such that the center of gravity of said carrier and said transformer lies between said electrical contact terminals and said pivotal mounting of said carrier, said contact terminals of said transformer and said fuse firmly engaging said electrical contact terminals by means of gravity when in said one position and becoming disconnected from said electrical contact terminals and remaining disengaged from said electrical contact terminals by means of gravity when said carrier is rotated to said second position, said fuse extending outside of said enclosure through said access opening when said carrier is in said second position.

6. In combination, an enclosure having an access opening therein, a pair of electrical contact terminals disposed within said enclosure inwardly of said opening, a tilt out carrier comprising a base mounted intermediate the ends of said opening to rotate within said opening from a first position to a second position, said base substantially filling said opening in either of said positions to form a barrier between said electrical contact terminals and said opening in either of said positions, a transformer comprising a coil having a contact terminal, a fuse electrically connected with said transformer and having a contact terminal, said transformer and said fuse being mounted on said base for rotation therewith in a position such that the center of gravity of said carrier and said transformer lies between said electrical contact terminals and said pivotal mounting of said carrier, said contact terminals of said transformer and said fuse firmly engaging said electrical contact terminals by means of gravity when in said one position and becoming disconnected from said electrical contact terminals and remaining disengaged from said electrical contact terminals by means of gravity when said carrier is rotated to said second position, said fuse extending outside of said enclosure through said access opening when said carrier is in said second position, and means for grounding said transformer at some time when said carrier is rotating from said first position to said second position.

7. In combination, an enclosure having an access opening therein, a pair of electrical contact terminals disposed within said enclosure inwardly of said opening, a tilt out carrier comprising a base mounted intermediate the ends of said opening to rotate within said opening from a first position to a second position, said base substantially filling said opening in either of said positions

to form a barrier between said electrical contact terminals and said opening in either of said positions, a transformer comprising a coil having a contact terminal, said transformer being mounted on said base in a position such that the center of gravity lies between said electrical contact terminals and said pivotal mounting of said carrier, said contact terminals of said transformer firmly engaging said electrical contact terminals by means of gravity when in said one position and becoming disconnected from said electrical contact terminals and remaining disengaged from said electrical contact terminals by means of gravity when said carrier is rotated to said second position, said fuse extending outside of said enclosure through said access opening when said carrier is in said second position, and means for grounding said transformer at some time when said carrier is rotating from said first position to said second position.

8. In combination, an enclosure having an access opening therein, a pair of electrical contact terminals disposed within said enclosure inwardly of said opening, a tilt out carrier comprising a base mounted intermediate the ends of said opening to rotate within said opening from a first position to a second position, said base substantially filling said opening in either of said positions to form a barrier between said enclosure and outside thereof in either of said positions, a transformer comprising a coil having a contact terminal, a fuse electrically connected within said transformer and having a contact terminal, said transformer and said fuse being mounted on said base for rotation therewith such that the center of gravity lies in a vertical plane other than the vertical plane passing through said pivotal mounting of said carrier, said contact terminals of said transformer and said fuse engaging said electrical contact terminals when in said one position and becoming disconnected from said electrical contact terminals when said carrier is rotated to said second position, said fuse extending outside of said enclosure through said access opening when said carrier is in said second position and means for grounding said transformer at some time when said carrier is rotating from said first position to said second position.

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