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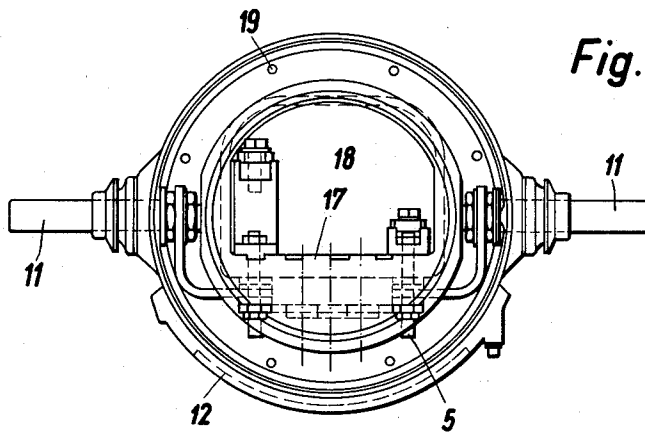
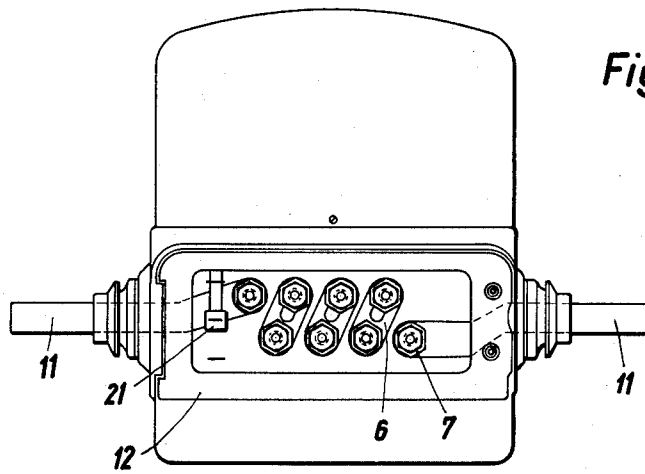
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HIGH-VOLTAGE INSTRUMENT TRANSFORMERS

Filed Feb. 13, 1962

2 Sheets-Sheet 1



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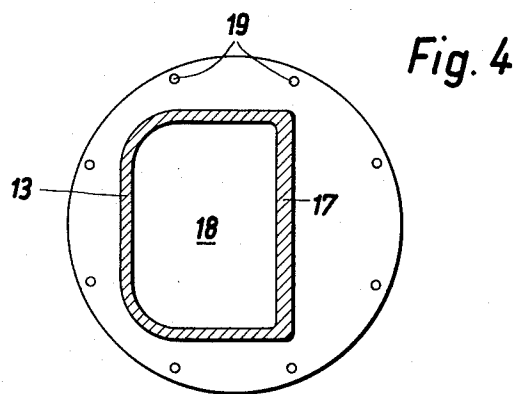
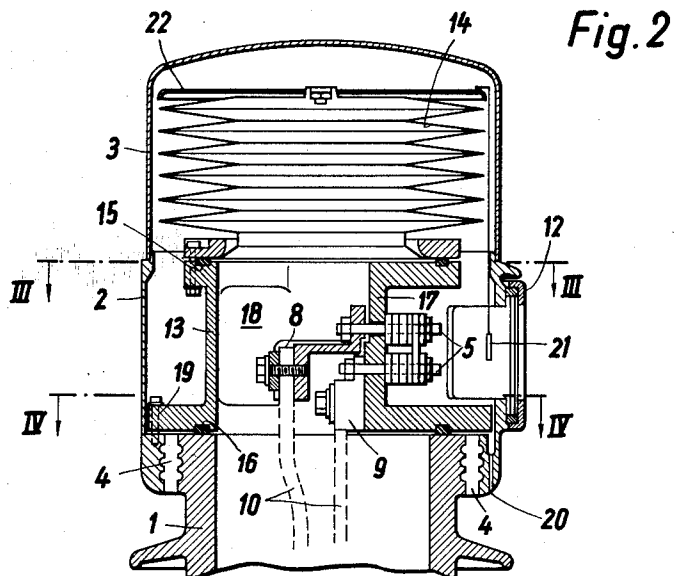
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HIGH-VOLTAGE INSTRUMENT TRANSFORMERS

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Filed Feb. 13, 1962, Ser. No. 173,049

4 Claims. (Cl. 336—58)

The invention relates to improvements in a high-voltage instrument transformer having a tubular insulator containing a liquid insulating medium, more especially oil. The tubular insulator alone may substantially form the transformer housing (bushing transformer), or it may be mounted on a metal housing substantially in the form of a shell as a high-voltage lead out.

High-voltage instrument transformers are known in which a tubular insulator, generally a porcelain insulator, supports at its upper end a head portion, the so-called transformer head, in which are provided devices for connecting portions of the primary winding of a current transformer to produce different transformation ratios. The devices include screwthreaded pins which are connected to those portions of the primary winding as well as change-over straps and nuts. Such high-voltage instrument transformers are in addition usually provided at their upper ends with an expansion vessel for liquid insulating medium, which is preferably hermetically sealed from the atmosphere. The expansion vessel serves to enable the volume of the liquid insulating medium to change under the influence of temperature.

It is also known to provide arrangements in which the screwthreaded pins of the change-over devices are vertically disposed on a plate provided at the upper end of the tubular insulator inside or below the transformer head, which plate supports the expansion vessel. The change-over straps then lie horizontally above the plate in the transformer head and are visible and accessible from above only after removal of a removable part of the transformer head. If the expansion vessel is disposed above the plate, a connecting tube is provided between the tubular insulator and the expansion vessel. Since the space available for the cross-section of this connecting tube is relatively limited, pressure equalisation between the transformer and the expansion vessel is impeded in the event of a sudden pressure rise in the transformer.

According to the present invention there is provided a high-voltage instrument transformer, comprising a tubular insulator, a quantity of liquid insulating medium in the tubular insulator, an integrally formed hollow body in the form of a tubular shell having one end connected to one end of the tubular insulator, a side wall of said hollow body having a plane external surface, an expansion vessel which has a mouth that is connected to the other end of the hollow body but which is otherwise closed and which communicates with the interior of the said insulator by way of said hollow body. Screwthreaded pins pass through the side wall for connection at their inner ends to parts of the transformer primary winding. Straps outside the said hollow body interconnect at least some of the said pins and thereby determining the transformation ratio of the transformer. Nuts outside the hollow body are screwed on the said pins and fix the straps thereto. An outer wall encloses the expansion vessel and the hollow body. The outer wall has a transparent part opposite the straps and through which the latter can be seen. And means connect the transparent part of the outer wall to the remainder of the wall but also permit movement of the transparent part to afford access to the nuts and straps.

For a better understanding of the invention, and to show by example, how the same may be carried into

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effect, reference will now be made to the accompanying drawings in which:

FIGURE 1 is a front elevation of a transformer head of a high-voltage instrument transformer,

5 FIGURE 2 is a side sectional view of the transformer head shown in FIGURE 1 at the upper end of a tubular insulating housing,

10 FIGURE 3 is a sectional view from above of the transformer head shown in FIGURE 2 in the direction of the arrows III—III, and

FIGURE 4 is a sectional view of an integrally formed hollow body within the head shown in FIGURE 2, as seen in the direction of the arrows IV—IV.

1 is a tubular insulator of a high-voltage instrument transformer. 2 is a lower portion and 3 a removable upper portion of an outer enclosing wall of the transformer head. The lower portion 2 of the transformer head is secured to the upper end of the tubular insulator 1 by a resin insulator or sealant 4. 5 are screwthreaded pins of a change-over device for parts of the primary winding, which can be connected up as required by means of connecting and change-over straps 6 and nuts 7 to produce different transformation ratios of the transformer. Internal terminals 8 and 9 are connected to conductor ends 10 (shown in chain lines) of parts of the primary winding (not shown). For the sake of simplicity, only two such conductor ends 10 are shown. 11 are outer connections of the transformer on the primary side. Flange 12 is adapted to be downwardly hinged from the outer enclosing wall 2 of the transformer head and a window provided with a transparent insert. Behind the window the change-over device is visible from the side, and is also readily accessible, after opening the window. Mounted on the tubular insulator 1 is an integrally formed hollow body 13 consisting of a tubular shell portion having at each end an outwardly projecting flange. Its upper flange is sealed in air-tight and moisture-tight fashion by means of a packing 15 to the mouth of a resilient expansion vessel 14 constructed as a bellows. 40 Its lower flange is sealed in similar fashion, by means of a packing 16, to the tubular insulator 1. The vessel 14 is completely closed, the only inlet being the mouth thereof. The hollow body 13 is formed of cast resin, and directly supports the screwthreaded pins 5 with the parts secured thereto.

The interior of the transformer housing, including the insulator 1, the hollow body 13 and the expansion vessel 14, is completely filled with a liquid insulating medium. Alternatively, a resilient gas cushion may be provided above the insulating liquid, if desired in communication with a rigid expansion vessel. The hollow body 13 supports the horizontally disposed screwthreaded pins on a plane portion 17 of its outer wall and forms with its interior 18 a passage of large cross-section which connects the insulator 1 with the expansion vessel 14. This tends to produce pressure equalisation between the insulator 1 and the vessel 14 in the event of a sudden pressure increase within the transformer and thus increases the safety of the transformer. In the extreme case of the expansion vessel 14 being burst by internal pressure the actual housing or the insulator 1 would not burst, and this would constitute a much smaller economic loss and danger to the surroundings. The hollow body 13 is a component element of relatively simple form. Owing to the fact that the outer boundary of its upper flange embraces a smaller area than that of the lower flange, screw connections 19 of the hollow body 13 and of the head are readily accessible from above when the upper removable portion 3 of the outer enclosing wall is open. The hollow body 13 may be given a particularly large internal cross-section 18 by making its tubular shell portion of substantially rectangu-

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lar form with rounded corners, as illustrated in FIGURE 4. 20 is an outlet for water of condensation, and 21 is an indicating device connected to the resilient expansion vessel 14 through a plate 22. The device 21 serves to indicate the level of the upper end of the expandible expansion vessel 14 and thus of the volume of any insulating medium in the expansion vessel.

The hollow body 13 may consist of any insulating material, or may instead consist of metal. In the latter case the screwthreaded pins would have to be supported in insulated bushings or bushing insulators.

I claim:

1. Improvements in a high-voltage transformer which includes a tubular insulator containing the transformer windings and a fluid insulating medium and wherein said tubular insulator has at least one open end, said improvements comprising a hollow head chamber connected to said tubular insulator about said open end, a hinged window in the wall of said head chamber, a tubular body disposed in said head chamber, said tubular body including first and second flanged ends and a plane wall portion intermediate said flanged ends and disposed opposite said window, an expansion vessel in said head chamber, means for sealably connecting said expansion vessel to the first flanged end of said tubular body, means for sealably connecting the open end of said tubular insulator to the second flanged end of said tubular body, the cross-sectional area of said tubular body being sufficiently large whereby an unconstrained fluid path is established between said expansion vessels and said tubular insulator to provide momentary pressure equalization therebetween in the event of sudden rises in pressure, a plurality of threaded feedthroughs disposed in and passing through the plane portion of said tubular body, whereby a first portion of each feedthrough is within said tubular body and a second portion is external to said tubular body and

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opposite said window, means for connecting said first portions to said transformer windings and means for selectively connecting said second portions in accordance with given transformer ratios.

2. The apparatus of claim 1 wherein said expansion chamber is capable of changing one dimension in response to pressure changes and having extending therefrom an indicator for indicating changes in said dimension which is viewable through said hinged window.

3. The apparatus of claim 1 wherein said second flanged end is connected to said tubular insulator by means of screws and said screws are disposed on the periphery of said second flanged end which radially extends beyond the periphery of said first flanged end.

4. The apparatus of claim 1 wherein the cross-section of the portion of said tubular body which supports said feedthrough is substantially rectangular with rounded corners to provide the greatest cross-sectional passage for fluid between said tubular insulator and said expansion vessel.

References Cited in the file of this patent

UNITED STATES PATENTS

1,731,890	Eby	Oct. 15, 1929
1,983,336	Austin	Dec. 4, 1934
2,515,782	Logan	July 18, 1950
2,529,135	Camilli	Nov. 7, 1950
2,601,042	Marks	June 17, 1952

FOREIGN PATENTS

369,279	Great Britain	Mar. 18, 1932
484,271	Great Britain	May 3, 1938
164,947	Germany	Oct. 31, 1933
714,480	Germany	Nov. 6, 1941
784,174	Germany	Mar. 23, 1944
1,147,764	France	Nov. 29, 1957