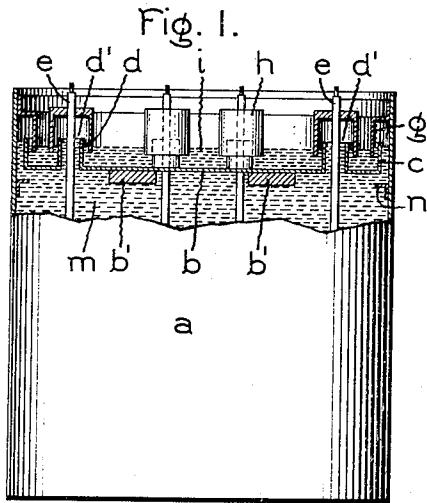
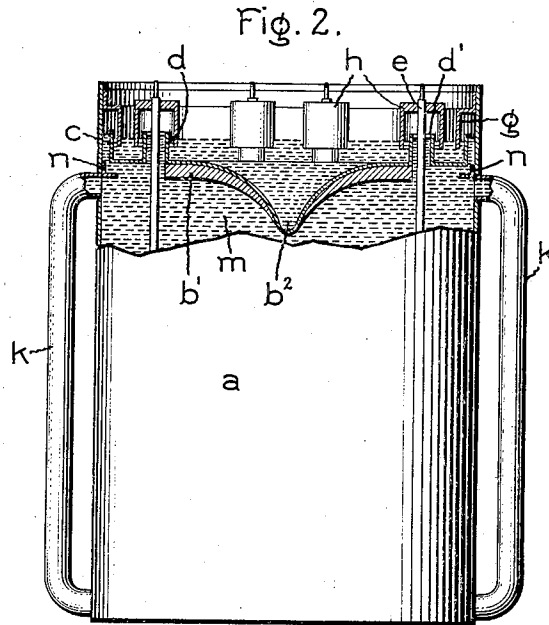
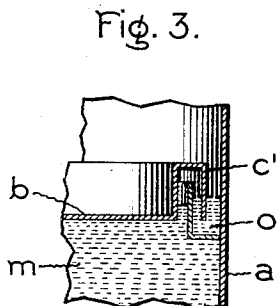
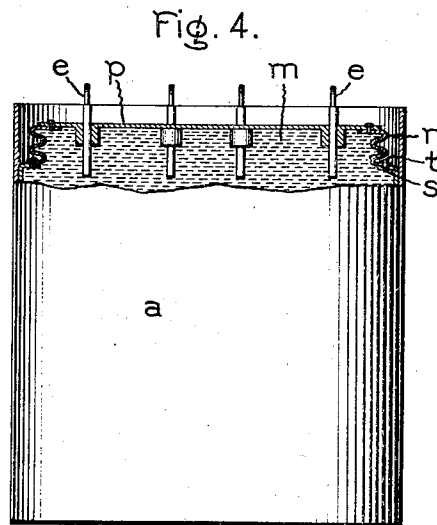


A. F. BERRY.
OIL COOLED TRANSFORMER.
APPLICATION FILED FEB. 16, 1917.

1,331,089.

Patented Feb. 17, 1920.



Inventor:
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His Attorney.

UNITED STATES PATENT OFFICE.

ARTHUR FRANCIS BERRY, OF EALING, ENGLAND, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

OIL-COOLED TRANSFORMER.

1,331,089.

Specification of Letters Patent.

Patented Feb. 17, 1920.

Application filed February 16, 1917. Serial No. 149,130.

To all whom it may concern:

Be it known that I, ARTHUR FRANCIS BERRY, a subject of the King of Great Britain and Ireland, residing at Ealing, in the county of Middlesex, England, have invented Improvements in or Relating to Oil-Cooled Transformers, of which the following is a specification.

This invention relates to oil cooled transformers.

At present such transformers cannot be said to be in all respects satisfactory notwithstanding efforts made to expose the oil as little as possible to the atmosphere. Direct oxidation of the oil by the action of air upon it is not alone the factor that determines the formation of sludge and interference with the general condition of the transformer, since the presence of moisture from the air plays a part and there may be formed nitric acid and ozone in the region of the terminals. The surroundings in which the transformers are frequently to be found also render the adoption of air tight casings objectionable as hitherto constructed, since the closing of the casings in an air tight manner is difficult to effect and maintain. Moreover, permanently closed tops render access to the transformers difficult and necessitate the employment of subsidiary sealing means that occupy extra space and may require attention to insure that they are kept in proper order. Trouble is also experienced in dealing with the terminals due to oil leakage and the like.

The object of the present invention is to effect certain improvements resulting in arrangements which in practice will be found to be devoid of the various disadvantages found singly or in combination in known apparatus.

Accordingly it is arranged that the oil container shall be provided with a cover or closure that will move with expansion and contraction of the oil and at all times entirely exclude the external atmosphere from the oil in the casing.

The said cover or closure may be a buoyant or other movable member between the edge of which and the oil casing or container, or an internal lateral extension forming part thereof, an air tight joint is made either by oil or other liquid that may be more or less exposed to the air, or by a permanent flexible connection.

Regarding the terminal conductors, these may extend loosely through the buoyant or other movable member that is borne by or bears against the oil in the transformer casing, air being prevented from gaining access to the oil through leakage in the region of the terminal conductors, by employing liquid sealing means or a permanent flexible connection for such region.

In the accompanying illustrative drawings, Figures 1 and 2 are sectional elevations showing two examples of oil cooled transformers embodying the invention. Fig. 3 is a sectional detail view showing a modification. Fig. 4 is a sectional elevation showing a further modification.

According to the example shown in Fig. 1, *a* is the casing inclosing an electric transformer and containing the oil for cooling such transformer as well understood. *b* is a float or buoyant member constituting a vertically movable cover or closure for such casing. The buoyancy of such float may, if necessary, be increased by buoyant material *b*¹, for example wood or cork, fixed to its underside. The float has a flat upper surface and is provided with an upturned outer flange *c* and with four or other suitable number of upwardly extending flanges *d* surrounding apertures *d*¹ to permit the primary and secondary terminal conductors *e*, in the form of rods, to pass freely through. A downwardly flanged ring or ledge *g* is detachably connected to the inner side of the casing *a* so that it depends over the outer flange *c* of the float. The flanged apertures *d*¹ are individually covered by caps *h* upon the respective terminal rods *e* which may be secured thereto in any convenient air-tight manner. Or a single cap common to all the terminal rods, or to some of them, may be associated with the separate flanged apertures *d*. In each case the float contains a layer of oil *i* for sealing the passages between the upwardly flanged portions of the float and the casing and terminal rods.

Assuming that the casing is circular in horizontal cross section and that external conduits *k* are provided through which oil is caused to circulate, as in the arrangement shown in Fig. 2, the underside of the float *b* may be of a more or less conical shape as shown at *b*², to divert upwardly rising oil *m* radially outward. The hollow conical portion of the float will also serve as a pocket

to hold any water that may enter or be condensed in the float.

The float may be limited as to movement in a downward direction, when necessary, 5 such as while the transformer is being transported. This may be effected in various ways. For example, there may be a supporting ledge *n* (Figs. 1 and 2) secured to the casing *a* at a suitable height upon which 10 the float *b* can rest, or the float may be connected to flexible or articulated means adapted to suspend it in the casing.

As will be obvious the details can be variously modified. Thus, the outer edge of 15 the float after being upturned may, as shown in Fig. 3, be turned over as shown at *c'*, to produce a lip adapted to dip into a sealing trough *o* provided in the casing. Such a trough will serve to support the 20 float within the casing *a* before the latter is charged with oil *m*.

Also, where preferred, flexible metal or other diaphragms may be employed to secure the required sealing against passage of 25 air to the oil within the tank.

Thus, Fig. 4 shows an arrangement of this kind, where a vertically movable plate member *p* is flexibly connected by a corrugated peripheral rim *r* to a ring *s* secured 30 to the inner side of the casing *a*. In this case the terminal conductors *e* extending through the plate member *p* may be rigidly secured thereto in an air tight manner in any convenient way. The rim *r* can be 35 secured to the ring *s* by bolts *t*. In this case the terminal conductors *e* are flexibly connected to the transformer.

What I claim is:—

1. In an oil-cooled transformer, the combination with a tank having an open upper 40 end, of a cover for said tank fitting in said open end having an upturned flange about its edge and adapted to float on the oil surface, an overhanging flange on said tank

having its lower edge submerged beneath 45 the oil surface and forming an air tight seal with the edge of said cover, and terminals for the transformer windings passing through openings formed in said cover, said cover being provided with liquid seals for 50 said terminals about said openings.

2. In an oil-cooled transformer, the combination with a tank having an open upper end, of a cover for said tank fitting in 55 said open end having an upturned flange about its edge and adapted to float on the oil surface, an overhanging flange on said tank having its lower edge submerged beneath the oil surface and forming an air tight seal with the edge of said cover, said 60 cover being provided with openings formed with upturned edges, and terminals for the transformer windings passing through the openings in said cover, a fluid in said cover, and overhanging caps mounted on said terminals having their lower edges submerged 65 beneath said last named fluid and cooperating with the edges of said opening in the cover to form air tight seals.

3. In an oil-cooled transformer, the combination with a tank having an open upper 70 end, of a movable cover for said tank fitting in said open end floating on the surface of the oil and provided with openings formed with upturned edges and with 75 means cooperating with the wall of the tank to seal the oil from the exterior atmosphere, terminals for the transformer windings passing through said openings in said cover, a fluid in said cover, and overhanging caps 80 mounted on said terminals having their lower edges submerged beneath said last named fluid and cooperating with the edges of said opening in the cover to form air tight seals. 85

Signed at London, England, this 18th day of January, 1917.

ARTHUR FRANCIS BERRY.