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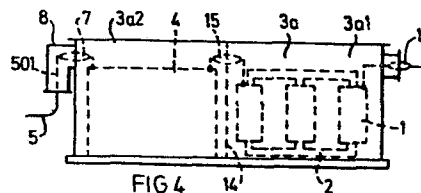
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54 Gas insulated electrical apparatus.

57 A gas insulated electrical apparatus wherein a power transformer and switchgear (4) are contained in a single sealed housing filled with a gas insulator, and the two are electrically connected inside the housing. The interior of the sealed housing may be divided by a partition wall (14), so as to define separate chambers for containing the respective devices.



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GAS INSULATED ELECTRICAL APPARATUS

This invention relates to a gas insulated electrical apparatus.

A gas insulated electrical apparatus is known having a power transformer and switchgear, the latter comprising a circuit breaker, a disconnecting switch, an instrument current transformer, an instrument voltage transformer, a ground switch and the like disposed in separate housings, and with the two devices connected externally via bushings.

According to the present invention, there is provided a gas insulated electrical apparatus which comprises a transformer and switchgear for connection between said transformer and electrically conductive supply lines, wherein the transformer and the switchgear are contained within a common sealed housing filled with an electrically insulating gas.

An advantage of the invention is that it leads to a more compact and less expensive construction.

Further objects and features of the present invention will now be described, reference being made to the attached drawings in which:

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Figure 1 is a side view showing a prior-art gas insulated electrical apparatus;

Figure 2 is a schematic circuit diagram of the electrical apparatus shown in Figure 1;

Figure 3 is a side view showing an embodiment of a gas insulated electrical apparatus according to this invention; and

Figure 4 is a side view showing another embodiment of the gas insulated electrical apparatus according to this invention.

Referring to Figures 1 and 2, transformer coils 1 are wound on a magnetic core 2. A sealed housing 3 contains the transformer coils 1, and is filled with an insulating gas such as SF_6 gas. Switchgear 4 is connected between the transformer coil 1 and a power cable 5. The switchgear 4 comprises a circuit breaker 401 and a disconnecting switch 402 which function to connect or disconnect the transformer coil 1 and the power cable 5, an instrument current transformer 403 which detects the current flowing through the transformer coil 1, an instrument voltage transformer 404 which detects the voltage applied to the transformer coil 1, and a ground switch 405 which earths the transformer coil 1. A second sealed housing 6 contains the switchgear 4, and is filled with an insulating gas such as SF_6 gas. A bushing 7 is mounted on the second sealed housing 6 so as to pass through a wall thereof, and functions to connect an end 501 of the power cable 5 to the switchgear 4. A cable box 8 constructed of a metal material such as sheet iron, is mounted on the second sealed housing 6. The cable box 8 functions to protect the cable end 501 from dust etc., and also to prevent live parts such as the cable end 501 from being physically

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exposed, thereby to prevent electric shock accidents.

A bushing 9 is mounted on the second sealed housing 6 so as to pass through a wall thereof, while a primary bushing 10 is mounted on the first sealed housing 3 so as to pass through a wall thereof. A conductor 11 is connected between the bushing 9 and the primary bushing 10, and functions to connect the switchgear 4 to the transformer coils 1. A conduit or duct 12 constructed of a metal material such as sheet iron, contains the conductor 11 therein. In addition, the duct 12 has its two end parts mounted on the first and second sealed vessels 3 and 6, to protect the conductor 11 etc. from dust etc. and also to prevent live parts such as the conductor 11 from being physically exposed, thereby to prevent electric shock accidents. A secondary bushing 13 is mounted on the first sealed housing 3 so as to pass through a wall thereof, and functions to pass electric power transformed by the transformer coils 1.

Electric power supplied by the power cable 5 is applied to the transformer coils 1 through the switchgear 4, and is transformed by these transformer coils 1. Thereafter, the transformed power is passed via the secondary bushings 13.

The conventional gas insulated electrical apparatus thus constructed requires there to be the duct 12 which contains the conductor 11, that is to say the connection 2 between the transformer coil 1 and the switchgear 4, and the primary bushing 10 and the bushing 9 which are respectively mounted on the first and second sealed housings 3 and 6 so as to pass through the walls thereof. This has led to



the disadvantage that the overall dimensions of the apparatus become large.

This invention has been made in order to eliminate the disadvantages of the prior art as stated above, and provides a gas insulated electrical apparatus in which the switchgear 4 and the transformer coils 1 are contained in a single sealed housing, whereby the apparatus is rendered small in size as compared with the prior art apparatus.

Figure 3 is a side view showing an embodiment of a gas insulated electrical apparatus according to this invention. In the figure, portions corresponding to those in Figure 1 are respectively assigned the same reference numerals. This applies also to Figure 4. Referring to Figure 3, a sealed housing 3a contains both the transformer coils 1 and the switchgear 4, and is filled with an insulating gas such as SF_6 gas.

More specifically, the transformer coils 1 and the switchgear 4 are contained in the single sealed housing 3a, and the transformer coil 1 and the switchgear 4 are connected directly by means of the conductor 11. Accordingly, the duct 12 and the primary bushing 10 as well as the bushing 9 in the conventional apparatus shown in Figure 1 are not required, and the apparatus can be made relatively small in size.

Figure 4 is a side view showing another embodiment of the gas insulated electrical apparatus according to this invention. Referring to Figure 4, a partition wall 14 is mounted inside the sealed housing 3a and divides the interior of this sealed

housing into a first chamber 3a1 on the side of the transformer coils 1 and a second chamber 3a2 on the side of the switchgear 4. A bushing 15 is mounted on the partition wall 14, and functions to connect the switchgear 4 to the transformer coil 1.

More specifically, the division of the sealed housing 3a into a first and second chambers 3a1 and 3a2 by the partition wall 14 makes it possible to inspect the transformer coils 1 and the switchgear 4 separately. Moreover, the inspection of the switchgear 4 can be further facilitated by filling only the first chamber 3a1 with an insulating gas such as SF₆ gas and insulating the second chamber 3a2 with atmospheric air.

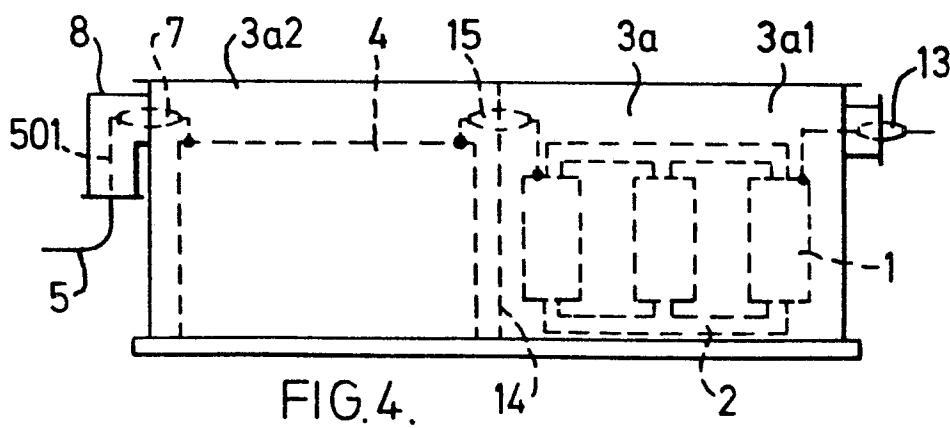
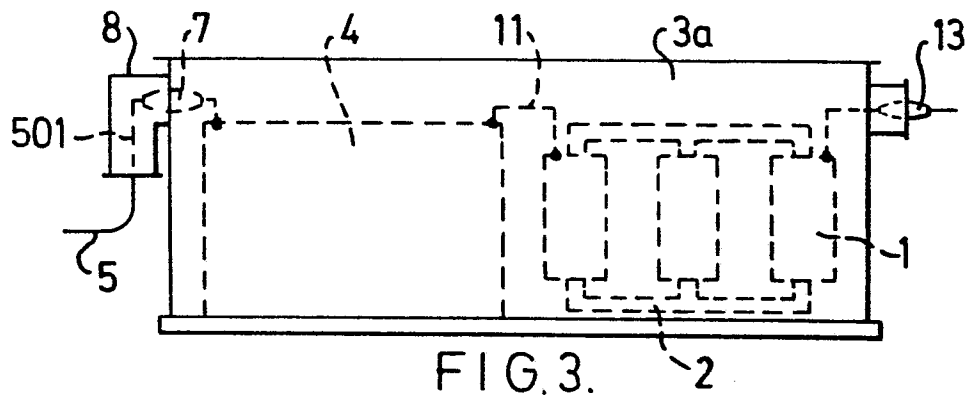
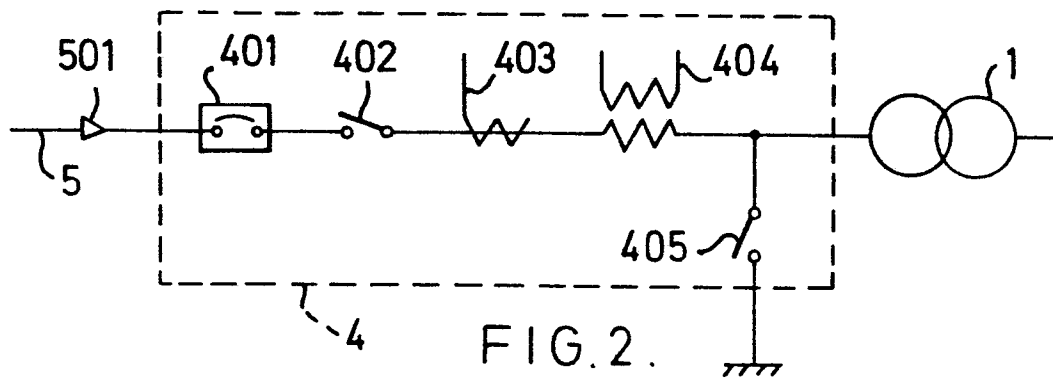
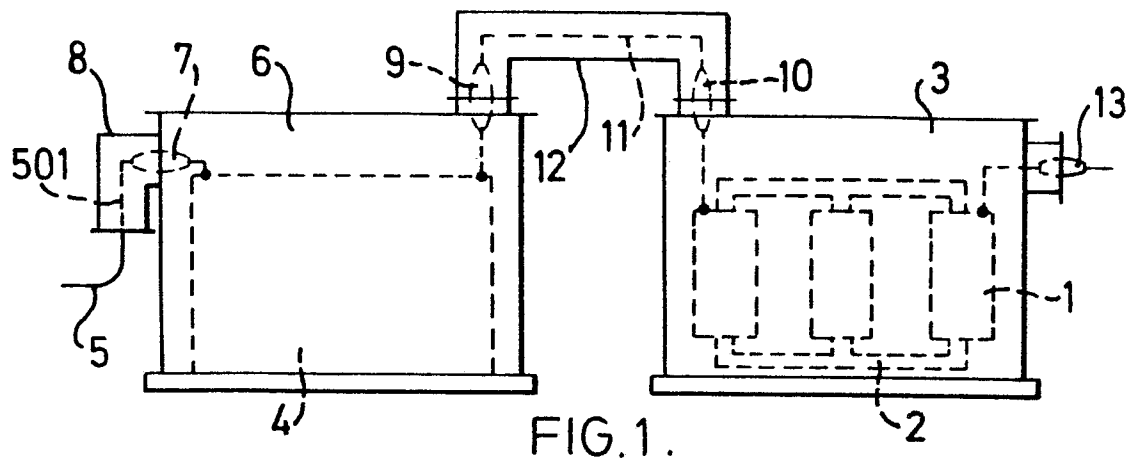
As set forth above, according to this invention, the transformer coils and the switchgear are contained in a single sealed housing, so the apparatus can be made relatively small in size and the bus ducts in the conventional apparatus can be dispensed with, thereby reducing the overall cost of the apparatus.

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CLAIMS

1. A gas insulated electrical apparatus which comprises a transformer and switchgear for connection between said transformer and electrically conductive supply lines, wherein the transformer and the switchgear are contained within a common sealed housing filled with an electrically insulating gas.
2. A gas insulated electrical apparatus as claimed in claim 1, wherein said sealed housing is provided with a partition wall which divides the interior thereof into a first chamber containing the transformer and a second chamber containing the switchgear.
3. A gas insulated electrical apparatus as claimed in claim 2, wherein bushings are mounted on said partition wall, to connect said transformer to said switchgear.
4. A gas insulated electrical apparatus as claimed in claim 2 or 3, wherein said first chamber is filled with said insulating gas so as to insulate said transformer, while said second chamber is filled with atmospheric air so as to insulate said switchgear.

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European Patent
Office

EUROPEAN SEARCH REPORT

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Application number

EP 81 30 4666

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<p><u>GB - A - 1 036 101</u> (BRUSH)</p> <p>* page 1, lines 15-20 and 58-63 *</p> <p>---</p> <p><u>US - A - 2 246 318</u> (PUTMAN)</p> <p>* page 2, left-hand column, lines 45-65; right-hand column, lines 14-26; figures 1-4 *</p> <p>---</p> <p><u>US - A - 3 668 351</u> (WALBRUN)</p> <p>* column 4, lines 50-72 *</p> <p>---</p> <p><u>US - A - 3 259 808</u> (GRAMLICH)</p> <p>* column 4, lines 16-57; column 3, lines 64-71; column 7, lines 14-17 *</p> <p>---</p> <p><u>GB - A - 947 125</u> (A.P.E.C.)</p> <p>* page 1, lines 54-58 *</p> <p>---</p>	<p>1</p> <p>1-4</p> <p>1-3</p> <p>1-3</p> <p>1</p>	<p>H 01 F 27/06</p> <p>H 01 F 27/40</p>
A	<u>FR - A - 1 097 411</u> (PIERREFITTE)		<p>TECHNICAL FIELDS SEARCHED (Int. Cl. 3)</p> <p>H 01 F 27/06</p> <p>H 01 F 27/40</p>
A	<u>US - A - 3 273 053</u> (ALLEN)		
A	<u>FR - A - 1 428 544</u> (E.G.I.E.)		<p>CATEGORY OF CITED DOCUMENTS</p> <p>X: particularly relevant</p> <p>A: technological background</p> <p>O: non-written disclosure</p> <p>P: intermediate document</p> <p>T: theory or principle underlying the invention</p> <p>E: conflicting application</p> <p>D: document cited in the application</p> <p>L: citation for other reasons</p>
A	<u>US - A - 3 389 302</u> (MILLER)		
A	<u>US - A - 3 388 200</u> (BRIDEWESER)		<p>&: member of the same patent family, corresponding document</p>

<p>The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search	Examiner	
The Hague	18.12.1981	STEINMETZ	