Feb. 28, 1950 V. R. HOLMGREN 2,499,190

DEVICE FOR COVERING OPENINGS IN ENCLOSED MACHINES

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Fig. 1.

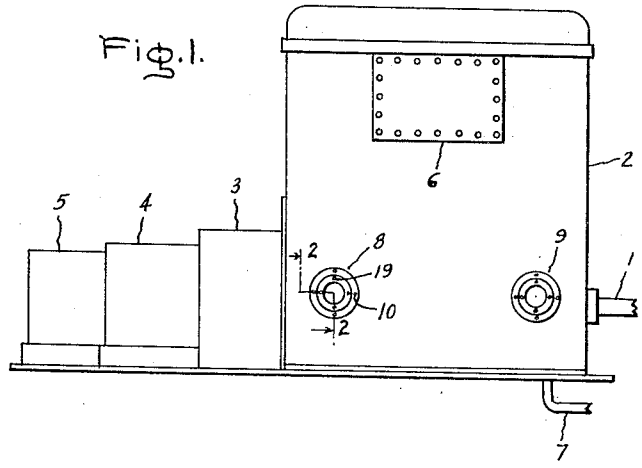
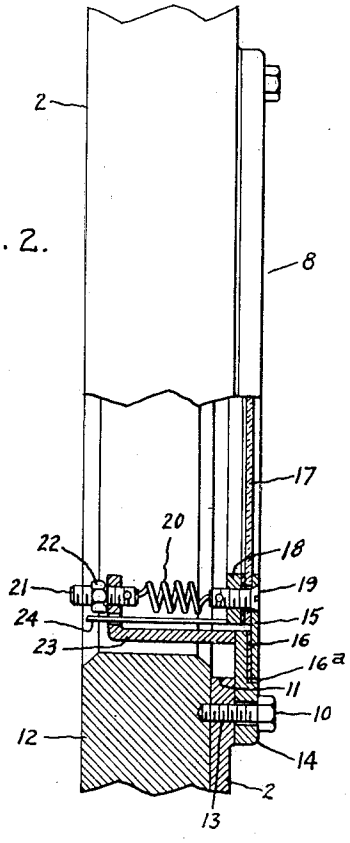


Fig. 2.



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DEVICE FOR COVERING OPENINGS IN ENCLOSED MACHINES

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5 Claims. (Cl. 171—252)

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My invention relates to a device used as a cover for an opening provided in an otherwise totally enclosed machine.

It is generally found that in the construction of large enclosed machines, such as those adapted to be used as large high speed turboelectric generators, one or more holes must be provided for functional purposes such as to provide a lift hole or to provide an opening to facilitate repairs and adjustments. Conventionally such a hole is covered by a blank cover plate, but such a covering is generally found expensive and unsightly and serves no useful purpose other than to cover the hole itself. In addition, removing such a blank cover plate, in order to make a visual inspection of the interior of the machine, is a time consuming process attended with the possibility of allowing the admission of dirt laden air to the interior of the machine. It is, therefore, advantageous to have such large machines provided with a transparent inspection window so that at periodic intervals a quick inspection may be made to look for possible trouble in such form as water leakage, dirt accumulation and the like.

Conventionally, such large machines are apt to have destructive pressures built-in therein, such as those caused by the introduction of high pressure steam to extinguish fires. Some means, such as a valve, must be provided for the relief of such pressures.

It is an object of my invention to eliminate needless and expensive multiplicity of elements by combining in one device a cover, an inspection window, and a pressure relieving means.

Broadly, the means employed in the embodiment herein illustrated and described comprises a lift hole cover for a turbogenerator housing, said cover including a transparent window for inspection purposes, and said cover being so mounted relative to the main housing that it automatically serves as a pressure relief device whenever the need for such relief arises.

Other aspects of the invention will appear from consideration of the following description taken in connection with the accompanying drawing. In the drawing, Fig. 1 is a side elevational view of an enclosed top cooled turbogenerator suitably embodying my invention and including the identical lift hole cover assemblies 8 and 9. Fig. 2 is a view taken on the line 2—2 of Fig. 1, and showing, in greater detail, the assembly of lift hole cover 8.

In Fig. 1, I have shown a large top cooled electrical generator adapted to be driven by a steam turbine (not shown) through the rotatable shaft 1 of the generator. The generator is covered by a main housing 2 to which is attached, at the end opposite the drive end, the assembly of collector housing 3, exciter housing 4, and end bearing housing 5. Housing 2 is provided with a removable cover plate 6 behind which is located a top mounted cooler used in a conventional manner to cool ventilating medium circulated within the machine. A high pressure steam pipe 7 is used in conjunction with a thermostatic regulating device (not shown) to admit steam under pressure to the generator in case of a fire therein.

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Four identical lift hole covers are provided, two on each side of generator housing 2, the two located on the side of the housing viewed in Fig. 1 being shown at 8 and 9.

I have shown in Fig. 2 the assembly of lift hole cover 8 which, when fastened in place by a plurality of bolts 10, suitably encloses lift hole 11 in housing 2. Lift hole 11 is one of four lift holes which, when the lift hole covers are removed, are adapted to receive hoisting means, such as hooks or slings, for lifting the entire machine, and for this purpose heavy structural support members, such as that shown at 12, are provided. These members bear the weight of the machine when it is being lifted, presumably extending to the base or framework of the machine which is not shown.

Bolts 10 threadedly engage bolt holes 13 which extend through housing 2 to hold the cover assembly 8 in place therein and optionally extend into support member 12 as well.

Lift hole cover assembly 8 includes an outer ring 14 provided with an annular recess adapted to receive an inner ring 15. Rings 14 and 15 are separated by a back gasket 16 and an edge gasket 16a. Said gaskets are fastened to only one of said members so that inner ring 15 may move axially outward away from outer ring 14.

A transparent window 17 is provided at the center of the assembly and is held in place against the back side of inner ring 15 by a back ring 18, a plurality of flat headed machine screws, one of which is shown at 19, threadedly engaging said back ring to hold these members together.

I prefer making the window of a flexible transparent material for example, a transparent synthetic plastic, such as methyl methacrylate, since such material may be made structurally stronger and less subject to vibrational fatigue than ordinary window glass.

Screw 19 not only holds members 15 and 18 in contact with window 17 but said screw projects through the back of back ring 18 and is holed to engage one end of a spring 20, the other end of which engages a holed end of a stud 21 which, by means of a nut 22, is mounted on a back arm 23 which is solidly attached to outer ring 14. A guide pin 24 solidly attached to back ring 18 and slidable through a hole in arm 23, is also provided. The construction is identical at the

back of each of the four machine screws 19 provided for each cover and the construction is identical for each of the four lift hole covers assumed used in the embodiment illustrated and described.

It is obvious, that, in order to insert lifting means, the covers may be readily removed by removing the four bolts 10 and that the cover assembly will still be complete and easy to replace.

It is also apparent that an attractive cover is provided which allows visual inspection at any time without removing the cover.

The construction of the cover is such that under normal conditions it hermetically seals the lift hole, springs such as 20 exerting a constant pressure to seal the window frame ring 15 at the gasketing. Yet the construction is such as to provide the required pressure relief feature since an excessive pressure within the housing, such as that caused in the event of fire by the admission of high pressure steam through pipe, will overcome the restraining action of the springs 20 and force the assembly of rings 15 and 18 and window 17 axially outward to allow the pressure to escape.

The tension exerted by each spring 20 is manually adjustable, being controlled by screwing nut 22 in one direction or the other and thereby determining the pressure at which the window will open. When the window has opened and excessive pressure dissipated, it will automatically reseal due to the action of the springs and of the guide pins such as 24 which guide the movable part of the cover assembly so as to keep it always in proper diametrical relationship with outer ring 14.

There is thus provided a device of the character described which not only improves the appearance of the generator, and allows for rapid functional use of the hole to be covered, but which affords means for quickly inspecting the interior of the machine, affords means for relieving destructive pressures within the housing of the machine and hermetically seals the opening during normal operation, thus meeting the objects of the invention as hereinabove set forth.

While I have illustrated and described a particular embodiment of my invention, modifications thereof will occur to those skilled in the art. I desire it to be understood, therefore, that my invention is not to be limited to the particular arrangement disclosed, and I intend in the appended claims to cover all modifications which do not depart from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A device adapted to cover a lift hole in the housing of an enclosed turboelectric generator, said device comprising a cover for said hole, including an outer ring provided with a plurality of bolt holes and bolts attaching said ring to said housing, an inner ring, said outer ring being adapted to receive said inner ring, tension spring means attaching said inner ring to said outer ring, a window of transparent material, means including a back-up ring for mounting said window on said inner ring, means including a threaded connection for varying the tension of said tension spring means, and means including guide pins for assuring proper diametrical relationship between said inner ring and said outer ring.

2. The combination of a substantially totally enclosed machine provided with lift holes and a device adapted to cover one of said lift holes, said device comprising an outer frame adapted to be secured to the outside of said machine to be manually removable from the outside thereof, an inner frame resiliently secured to said outer frame by spring means arranged to bias said inner frame inwardly against said outer frame, and a transparent window located within said inner frame, whereby there is provided a combination inspection window and pressure relief means covering said lift hole.

3. The combination of a substantially totally enclosed dynamoelectric machine provided with lift holes on opposite sides thereof, and a plurality of similar devices each adapted to cover one of said lift holes, each of said devices comprising an outer frame adapted to be bolted to the outside of said dynamoelectric machine, an inner frame concentric with said outer frame and arranged to be resiliently held against the outside thereof by a plurality of spring members, and a transparent window located within said inner frame.

4. An encased dynamoelectric machine having a plurality of lift holes in the casing thereof and having a steam connection thereto adapted to admit steam under pressure to extinguish a fire in said machine, with means for closing said lift holes including a plurality of devices each having an outer frame adapted to be bolted to said casing around one of said lift holes and each having a transparent inspection window located within said outer frame and resiliently secured against the outside thereof by inwardly acting springs to provide for the emergency relief of excessive pressure within said casing when caused by the admission of steam through said steam connection, and manually adjustable means for selectively adjusting said springs to cause said transparent window to close against said outer frame at a predetermined safe operating pressure within said casing.

5. An electric machine housing provided with a lift hole and a device adapted to cover said lift hole, said device including a window of transparent plastic material, a mounting ring surrounding and secured to said window, an outer ring adapted to surround and seat said mounting ring and adapted to be demountably attached to the outside of said housing, spring members arranged to draw said window mounting ring inwardly against said outer frame to seal said hole, and means for manually adjusting the tension of said springs to allow said window mounting ring to move outwardly with respect to said outer ring and said housing upon the occurrence of a predetermined maximum allowable pressure within said housing.

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