Diaphragm Relief Device

for

Inertaire Transformers

INSTRUCTIONS

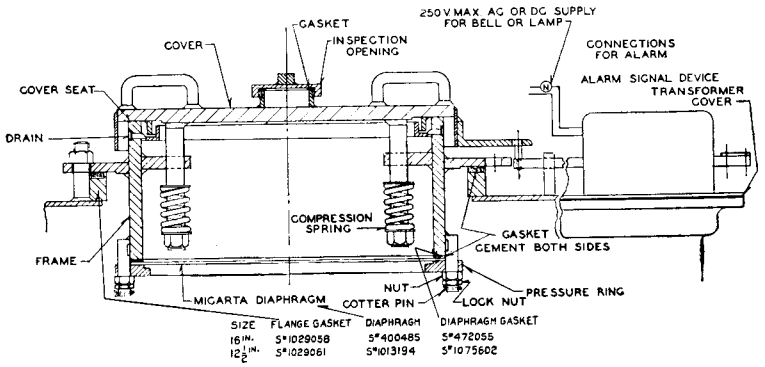

FIG. 1—SHOWING CONSTRUCTION OF MANHOLE RELIEF AND ALARM DEVICE

GENERAL

The Westinghouse diaphragm relief device with alarm for inertaire transformers, consists of a thin sheet of Micarta mounted in a special manhole cover on the top of the transformer case. The diaphragm ruptures at dangerous pressures, which are relieved by the opening of a weatherproof cover above the diaphragm, the cover being reclosed by springs after the pressure has been reduced. An alarm device operated by the upward movement of the cover calls the attention of the operator to the ruptured diaphragm which should be replaced as soon as possible. Except for the replacing of a ruptured diaphragm it is only necessary to inspect the diaphragm occasionally through an inspection opening in the relief device cover.

The inert gas body above the oil level of an Inertaire transformer makes explosion in that space impossible. It is always possible, although fortunately very unusual, that some fault under the oil level may result in a primary explosion. While the wave-front of pressure created in this way is not so steep as that of a secondary explosion of hydrogen or acetylene and air above the oil level and the results are not so violent, the abnormal pressure following an arc is often great enough to disrupt the tank at its weakest point if no effective relief means is provided.

CONSTRUCTION

The relief device is of all welded construction. The cover, which is provided with protecting flanges and barriers, rests upon smoothly machined surfaces to prevent the entrance of rain. An annular channel directly below these surfaces on the inside of the device is provided for catching and draining to the outside any moisture that might possibly enter. Rain tests have shown conclusively that this device is virtually rain proof. In the center of the relief cover, a two inch pipe opening with a screw cap is provided for inspecting the condition of the relief diaphragm.

The selection of a suitable material for the diaphragm is a matter of some importance. In order to be reliable it must have a uniform rupturing characteristic, under the conditions presented, in relieving abnormal pressures. It must, at the same time, be a material of sufficiently substantial nature to be handled easily without danger of accidental breakage. Of the three principal materials available for the purpose—sheet Micarta, glass and thin metals—sheet Micarta has been proven to be the most satisfactory. It is a laminated fibrous material which is bonded with cement under heat and pressure. It is unaffected by oil, gas or water. It has strength, toughness and flexibility and yet when subjected to a shock, in the form of a thin sheet securely clamped around its edges, it has an almost brittle characteristic not unlike glass, which causes it to shatter with a very fair degree of uniformity in its performance. The Micarta diaphragms used in the Inertaire relief device have a reinforced rim. This heavier rim section acts to prevent buckling of the thin Micarta sheet when it is clamped into place. The diaphragm ruptures at 10 to 14 lbs./sq. in. pressure.

An alarm mechanism is provided as part of the Inertaire relief device, which gives a visual semaphore indication at the transformer and a distant alarm signal when the diaphragm is ruptured. See Fig. 1. When the manhole cover rises, a rod which is hooked in the lug on the cover, is released. A spring causes it to project a semaphore over the edge of the cover and to close a set of alarm contacts.

The alarm contacts are ungrounded

Diaphragm Relief Device for Inertaire Transformers—Continued

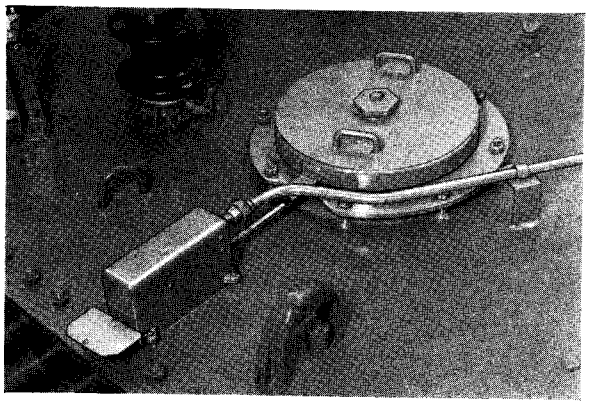

FIG. 2—DIAPHRAGM RELIEF DEVICE

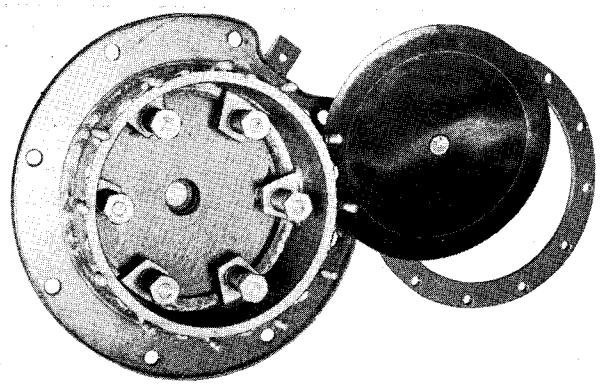

FIG. 3—THE ALARM AND RELIEF DEVICE AS MOUNTED ON THE COVER

and may be used on an open circuit system for any voltage up to 250 volts, d-c. or a-c.

The patented relief devices shown in Figs. 1 and 2 fit into the manhole opening in the cover, acting both as relief device and manhole cover.

INSTALLATION

The alarm and relief device, mounted on a transformer, are shown in Fig. 3.

The large diaphragm is located just below the tank cover near the seat of any internal disturbance.

OPERATION

When the pressure in the tank rises above normal the diaphragm bursts and the manhole cover rises, thereby relieving the pressure. The spring assembly is provided for arresting the motion of the cover after such an occurrence. After the pressure is relieved the spring tension and gravity act to return the cover to the closed position, preventing the entrance of dirt or rain.

When the manhole opening is to be used for entrance into the transformer case, the outer row of bolts is removed and the complete assembly withdrawn, leaving a full-size opening in the cover.

MAINTENANCE

The diaphragm can be inspected by removing the screw cap over the inspection opening. If for any reason the diaphragm ruptures it should be replaced at once.

In replacing Micarta diaphragms, place the side of the diaphragm with the reinforcing rim toward the atmospheric pressure, i.e., place the reinforcing rim against the gasket. See Fig. 1. Both sides and the outside edges of the gasket should be coated with red lead gasket cement #7386 and let dry 15 minutes. Apply second coat and assemble, wiping excess cement off the edges of the gasket. Excess cement should be kept off the diaphragms as it will affect their breaking strength. Tighten nuts on the clamping ring uniformly against the gasket stop.

RENEWAL PARTS

Spare diaphragms, gaskets and cement should be kept on hand. A limited supply is furnished with the transformer. For additional parts, order from the nearest Sales office or the Sharon Works, giving serial and stock order number of the complete transformer as stamped on the name plate.

Westinghouse Press
Printed in U.S.A.

Westinghouse Electric & Manufacturing Company
Sharon, Pa.