

UNITED STATES PATENT OFFICE

2,556,906

COMPRESSION CABLE SYSTEM

William A. Del Mar, Greenwich, Conn., assignor
to Phelps Dodge Copper Products Corporation,
Dover, Del., a corporation of Delaware

Application June 30, 1949, Serial No. 102,258

3 Claims. (Cl. 174-12)

1

My invention relates to a system of electric cables wherein the cable is maintained under pressure of a gas and wherein the cable is terminated in a pothead or terminal, the interior of which contains oil which is, likewise, maintained under pressure.

In such a system it is customary to equalize the gas pressure under which the cable is maintained and the pressure on the terminal oil, by means of a pressure equalizer having a movable diaphragm, one face of which is in contact with the gas and the other in contact with the oil. It is obvious that with such an arrangement the volume of the oil space will increase when the gas pressure drops and, as the volume of oil is constant, the level of the oil in the terminal will fall, thereby exposing the terminal to electrical failure.

It is, therefore, very desirable to modify the equalizer system to prevent such happening and it is the object of the present invention to accomplish this.

The importance of the invention is due to the fact that compression cables are able to operate, without detriment, for limited periods, with quite low gas pressure in the pipe, whereas oil-filled terminals will not operate without being filled with oil. Such low pressure in the pipe may be the result of a leak and it is important to be able to keep the cable in operation until the leak has been located and repaired.

The present invention overcomes these defects and provides a means whereby a cable may be kept in temporary operation.

The foregoing and other features of my invention will now be described in connection with the accompanying drawing forming part of this specification in which I have illustrated my cable system in its preferred form, after which I shall point out in the claims those features which I believe to be new and of my own invention.

In the drawings:

Figure 1 is a diagrammatic sketch of my preferred cable system.

Figure 2 is a diagrammatic sketch showing a solenoid operated pressure relief valve.

Figure 3 is a modification of my equalizer which I may employ.

Referring to Figure 1, 11 is a pipe containing gas under high pressure, normally about two hundred pounds per square inch; 12 is a terminal or pothead containing oil; 13 is a cable; 14 is a gland surrounding the cable 13 and separating the oil in 12 and the gas in 11. 15 and 16 are pressure equalizers consisting of a flexible mem-

2

ber 17 and 18 and rigid containers 19 and 20 respectively. 21 is a pipe connecting the collapsible member 17 with the pipe 11 containing the cable 13. 22 is a valve in the pipe 21 which may be held open by the gas pressure in the pipe 11 when that pressure is in excess of a predetermined value, such as 100 pounds per square inch above atmosphere, and closes when the pressure in the pipe falls below that predetermined value.

In Figure 1, I show a valve 22 in pipe 21 which is connected to the valve by pipe 31. A spring 32 moves the piston 33. As will be readily understood, the piston 33 is normally held by the gas pressure in the system so that the opening 34 maintains clear passage from pipe 11 to pressure equalizer 15 through passage 21. When the pressure in pipe 11 drops to a predetermined value, the piston 33 moves under pressure of spring 32 and closes the valve 22 and the passage 21.

In the modification illustrated in Figure 2, I show an electrically operated valve 22 having a moving piston 33 with opening 34 therein permitting gas from 11 to flow to pressure equalizer 15. The piston 32 is provided with a solenoid 44 which is energized from source of power 41 when switch 42 is closed. This switch 42 is operated by a spring 43 when the pressure in pipe 11 drops below a predetermined level.

In the diagram Figure 1, I illustrate pressure equalizers having flexible membranes 17 and 18 made of rubber or other suitable flexible material. In Figure 3, I show a collapsible metal bellows 51 within a container 52. The bellows is connected to pipe 11 through pipe 21 and the container 52 is connected to the other container by pipe 23, all as shown in Figure 1.

Under normal operating conditions there will be minor variations of pressure in the pipe 11 due to changes in temperature of the cable and of the ambient medium around the pipe, be it air or earth. These variations of pressure will be communicated from the interior of the member 17 to the oil in 19 and 20 and thence through the member 18 to the oil in the pothead 12, through the pipe 24. Thus, the pressures in pipe 11 and pothead 12 will, at all times, be substantially equal as long as the pressure of the pipe gas above atmospheric pressure is sufficiently high to keep open the valve 22.

In the event of the pressure in the pipe 11 falling below, say 100 pounds per square inch above atmosphere, the valve 22 will close and equalization of pressure will stop. If the cable is continued in operation at low pressure, there