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W. A. DEL MAR
COMPRESSION CABLE SYSTEM

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Fig. 1.

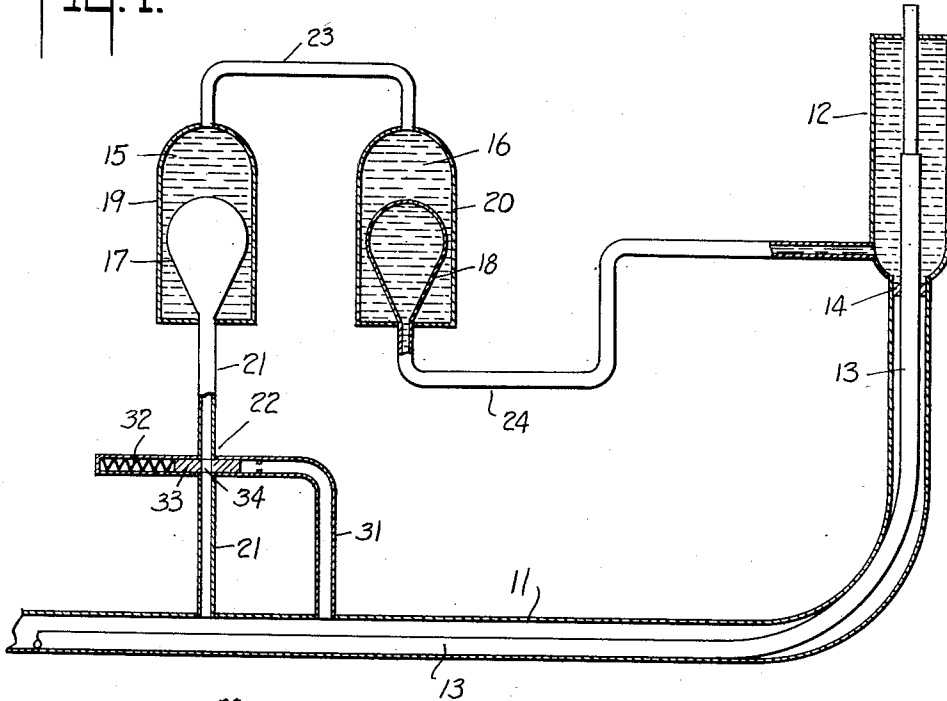


Fig. 2

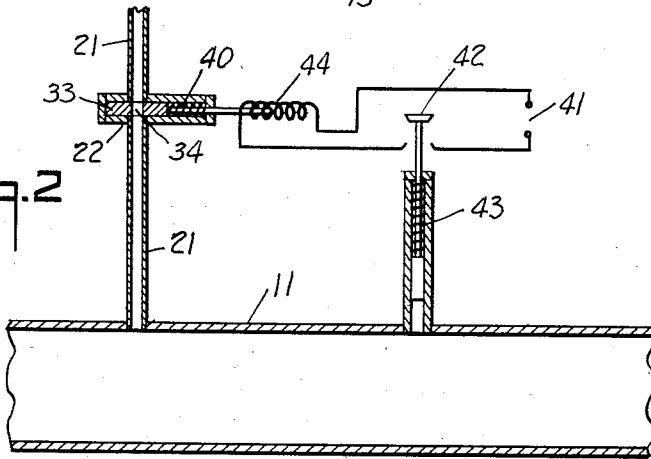
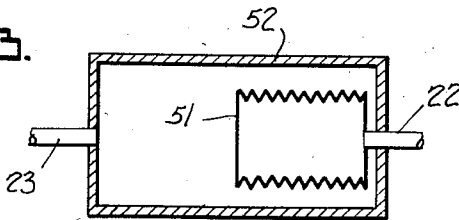


Fig. 3.



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COMPRESSION CABLE SYSTEM

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3 Claims. (Cl. 174-12)

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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-

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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

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will be variations in pressure of the oil in the pot-head 12, due to changing load or changing ambient temperature. If the pressure in 12 should rise, oil will be forced out through 24 to 13 and pressure will be applied to the oil in 26 through 23 to 19 whereby the gas in the chamber 17 will be put in compression. This will act as a cushion to prevent the building up of excess pressures which might endanger the pothead. If the pressure in 12 should drop while 22 is closed, the gas in chamber 17 will expand and keep up the level of the oil in 12.

The reason for using two equalizers rather than one, is that if the equalizer 16 were omitted, there would be only one thin wall between the gas and terminal oil. A rupture of this wall would result in filling the potheads with gas. With two equalizers, if either should fail, there will remain a separating wall between oil and gas.

I wish it distinctly understood that my cable system, herein illustrated and described is in the form which I desire to make and use it and that changes or variations may be made as may be desirable or convenient without departing from the salient features of my invention and I therefore intend the following claims to cover such modifications as naturally fall within the lines of invention.

I claim:

1. A compression cable system of the class described comprising a pipe containing one or more cables and including gas under pressure of normally not less than 100 pounds per square inch, a terminal containing oil under pressure at the end of the cable, a gland around the cable separating the gas in the pipe from the oil in the terminal, a pair of equalizers disposed in series connected to the terminal and pipe, whereby the oil in the terminals is normally maintained at

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substantially the same pressure as the gas in the pipe, and an automatic valve between the pipe and the equalizer, which valve automatically closes when the pressure in the pipe falls to a predetermined value in relation to atmospheric pressure.

2. A compression cable system of the class described, comprising a pipe containing an electrical cable and including gas within the pipe under pressure of normally more than one hundred pounds per square inch, a terminal containing oil under pressure at the end of the cable, a gland around the cable separating the gas in the pipe from the oil in the terminal, a pair of equalizers disposed in series connected to the terminal and pipe, whereby the oil in the terminal is maintained at substantially the same pressure as the gas in the pipe, a valve located between the pipe and equalizer normally inoperative and open at the working pressure, set in operation by the drop in gas pressure in the pipe to close the valve.

3. The cable system as disclosed in claim 1 in addition, the valve being operated by a solenoid connected to a source of electrical power, said solenoid being operated by electric power controlled by a switch adapted to be closed by any drop in pressure in the pipe.

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