

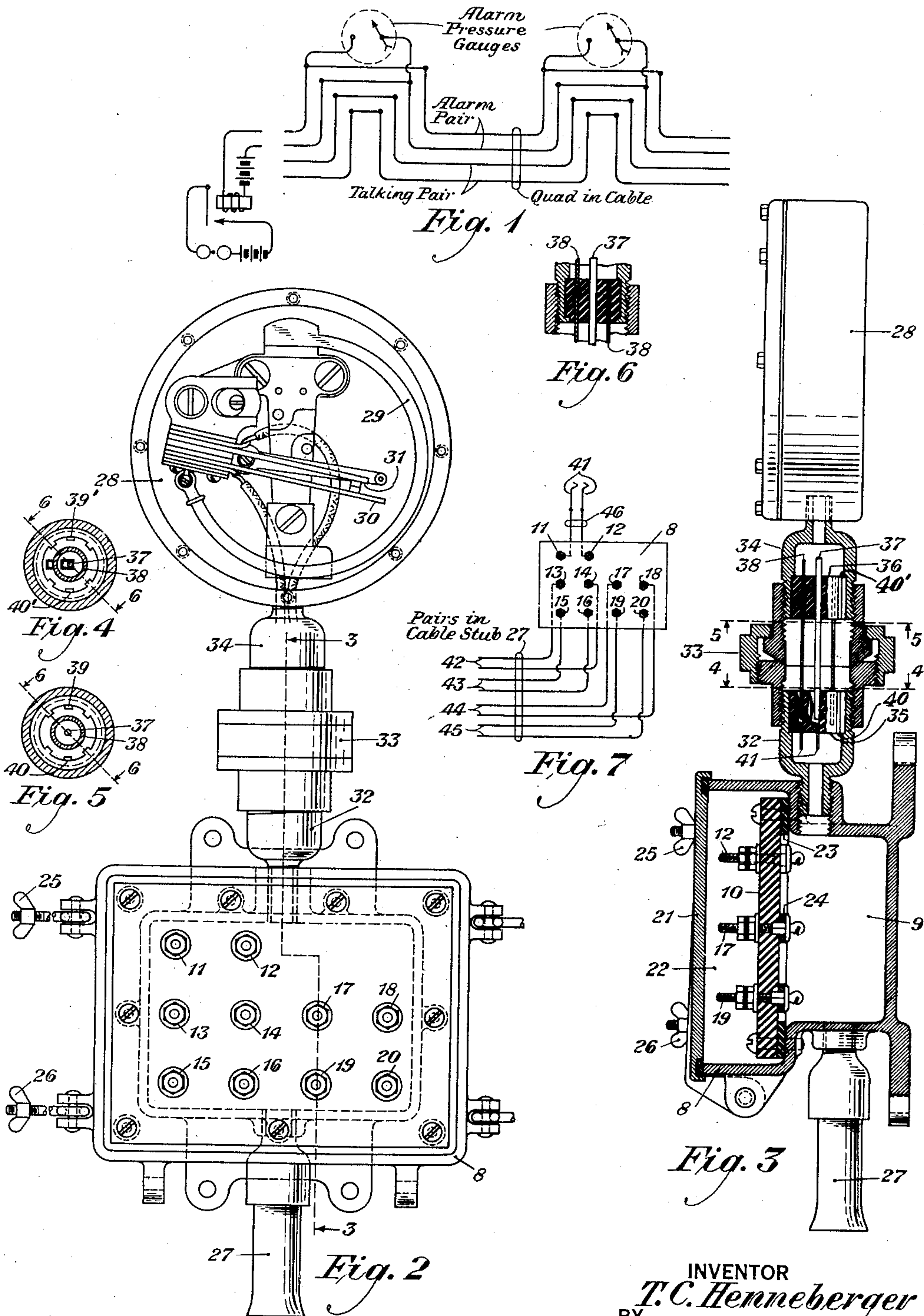
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CABLE MAINTENANCE APPARATUS

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CABLE MAINTENANCE APPARATUS

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This invention relates to apparatus for use in connection with the maintenance of cables, and more particularly to apparatus for use with cables which are held continuously under gas pressure.

The purposes of maintaining cables under pressure are to prevent the entrance of moisture into the cable and to permit the locating of sheath openings before the occurrence of insulation trouble. To provide means for detecting loss of pressure, the cable may be isolated into sections of convenient length by gas-tight plugs, and pressure gauges, associated with an electric alarm circuit, may be installed at one or more points along each isolated section. The two pairs of a spare quad in the cable are ordinarily used to form the wires of the alarm circuit and the wires of a talking circuit for the use of field men. The pressure gauges are adapted to be connected in parallel across the alarm pair. At each of the points where the alarm pair is brought out of the cable for connection to a gauge, terminal facilities are usually provided through which the desired connections can be made for the talking pair, the alarm pair and the pressure gauge.

One object of the present invention is the provision of terminal facilities suited to the above-stated use. Another object of the invention is the provision of a suitable combination of cable terminal and low pressure alarm contactor for use with a cable maintained under pressure. A further object of the invention is the provision of terminal apparatus adapted not only for suitable combination with a low pressure alarm contactor but also for use with the contactor removed, as in the case in which it is desired to bring out from the cable only the talking pair.

In general, the invention takes the form of an arrangement of a gas-tight chamber adapted for connection with a cable sleeve or the like, binding posts and suitable means for effecting the desired connection between the chamber and the binding posts and a low pressure alarm contactor.

The invention will be clearly understood when the following detailed description of

one desirable embodiment thereof is read with reference to the accompanying drawing.

Figure 1 of the drawing indicates in diagrammatic form the functions and arrangements of an alarm pair, a talking pair and the alarm pressure gauge, in connection with a cable maintained under pressure;

Fig. 2 shows a front view of the terminal and the contactor combined, with the covers removed;

Fig. 3 shows the combined apparatus, for the most part in section on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view of the apparatus intermediate to the terminal and the contactor, taken on the line 4—4 of Fig. 3;

Fig. 5 is a similar view taken on line 5—5 of Fig. 3;

Fig. 6 is a sectional view taken approximately on the line 6—6 of Fig. 4 or on the line 6—6 of Fig. 5; and

Fig. 7 is a diagram indicating the circuit connections made through the terminal.

Like numerals of reference in the several figures of the drawing designate corresponding parts.

With reference, first, to Fig. 1 of the drawing, two gauges are indicated connected in parallel across the alarm pair, which terminates in suitable apparatus, such as the relay and bell indicated, at a repeater station, for instance. At each of the gauge points, the diagram indicates that the talking pair and the alarm pair are brought out for connection or looping through a terminal.

With reference, now, to the other figures of the drawing, the terminal 8 consists essentially of a gas-tight metal chamber 9 with a bolted face plate 10 through which extend insulated binding posts 11, 12, 13, 14, 15, 16, 17, 18, 19 and 20. A gasketed cover 21, which should be water-tight but is not necessarily gas-tight, may be added to protect the binding posts, which project into the water-tight chamber 22. The chamber 9 should be made gas-tight by the use of a gasket 23 for the face-plate 10 and the use of gaskets such as 24 for the binding posts. The cover 21 may be securely closed by the use of wing nuts such as 25 and 26.

At its lower end, the terminal is provided with a nipple and with a sleeve 27, into which a stub cable of suitable length may be fastened to form a gas-tight connection. This arrangement, it will be understood, is designed for connection by suitable means with a cable sleeve or the like; it serves to admit the gas from the cable to the terminal chamber 9 and also to carry the alarm and talking wires to the binding posts.

The low pressure alarm contactor 28 operates on the principle of the Bourdon tube, but differs from the ordinary arrangements based on this principle in that the inside of the Bourdon tube 29 is at atmospheric pressure, and this tube, when curled by sufficient pressure in the device 28, holds contact springs 30 and 31 open. When the pressure introduced through the housing decreases, the tube 29 tends to straighten and closes the contact of springs 30 and 31. It will be understood that any suitable low pressure alarm contactor which operates in substantially this manner, may be employed in place of that specifically shown in Fig. 2.

The terminal is provided, at the opposite end of the chamber 9 to that to which is attached the sleeve 27, with a reducing nipple 32, and the connection is made to the contactor 28 through the pipe union 33 and the reducing nipple 34. Jack apparatus is mounted in the insulating member 35 of the reducing nipple 32, and plug apparatus is mounted in the insulating member 36 of reducing nipple 34. One plug takes the form of a central metal pin 37, and the other plug takes the form of a metal tubing 38 molded in the insulating material concentrically with the pin 37. The jack springs 41 are mounted in the insulating member 35, and suitable receptacles are provided for the engagement of these springs with the pin 37 and the tubing 38. The plug and jack assemblies are, of course, tightly secured in their respective reducing nipples 34 and 32, and holes 39 and 40 and 39' and 40' (see Figs. 4 and 5 and indication of 40 and 40' in Fig. 3) are provided to permit the gas to pass from the chamber 9 of the terminal into the contactor 28.

It will be understood that in Fig. 3 the right portions of the members 35 and 36 are shown without full regard for the sectional view on line 3—3 of Fig. 2 in order to indicate the positions of the openings 40 and 40'. It will be understood further that openings 39 and 39', not shown in this figure, correspond to the openings 40 and 40' respectively. The locations of the openings 39, 40, 39' and 40' are accurately indicated in Figs. 4 and 5.

As has been stated above, the wires from the cable are carried through the sleeve 27 to the terminal chamber 9, and the gas from the cable is admitted to the chamber 9. If the terminal but not the contactor is to be

used, the reducing nipple 32 can be capped, and the terminal 8 will function suitably for a point at which it is desired to bring out only a talking pair. The terminal, of course, provides facilities for looping the alarm and talking pairs. If, on the other hand, the low pressure alarm contactor is to be combined with the terminal 8, the connecting arrangement shown is most advantageous. The contactor is free to rotate with respect to the terminal before the pipe union is tightened. Accordingly, the contactor and the terminal can be lined up in any desired position with relation to each other without breaking the electrical connection through the plug and jack apparatus, and the plugs and jacks are not subjected to strain while the pipe union is being tightened or loosened. Also there is no difficulty in removing the contactor—when it is desired to use only the terminal, for instance.

In Fig. 7, the wires 42 form the section of the alarm pair passing into the terminal, and wires 43 form the section of the alarm pair passing out of the terminal. These pairs are connected to binding posts 13 and 14, and 15 and 16, respectively. The wires 44 form the section of the talking pair passing into the cable to binding posts 17 and 18, while wires 45 form the section of the talking pair passing out of the terminal from binding posts 19 and 20. The wires 46 connect binding posts 11 and 12 to the jack springs 41 in the reducing nipple 32.

As indicated above, when the pressure in the cable is normal, the tube 29 of the contactor operates to hold the springs 30 and 31 apart, and the alarm circuit (Fig. 1) is open. If, however, the cable pressure falls below the normal value, or below a predetermined value, the decrease of pressure operates to cause the straightening tendency of the tube 29, and the making of contact between springs 30 and 31, and the alarm circuit is closed to operate the alarm bell or other device at the repeater station.

What is claimed is:

1. A cable terminal device, comprising a gas-tight chamber and a plurality of binding posts extending through a wall thereof, means associated with one end of said chamber for connecting the same to a cable sleeve or the like, a low pressure alarm contactor of the Bourdon tube type but having the inside of the pressure responsive element at atmospheric pressure, and a connector between the other end of said chamber and said contactor including means for effecting electrical connections between certain of said binding posts and the contacts of the contactor, said connector being perforated to admit gas from said chamber to the interior of the contactor.

2. A cable terminal device, comprising a gas-tight chamber and a plurality of binding posts extending through a wall thereof,

means associated with one end of said chamber for connecting the same to a cable sleeve or the like, a low pressure alarm contactor of the Bourdon tube type but having the inside of the pressure-responsive element at atmospheric pressure, and a concentric connector between the other end of said chamber and said contactor including means for effecting electrical connections between certain of said binding posts and the contacts of the contactor, said connector being perforated to admit gas from said chamber to the interior of the contactor.

3. A cable terminal device, comprising a gas-tight chamber and a plurality of binding posts, extending through a wall thereof, means associated with one end of said chamber for connecting the same to a cable sleeve or the like, a low pressure alarm contactor of the Bourdon tube type but having the inside of the pressure-responsive element at atmospheric pressure, and a connector for connecting the other end of said chamber and said contactor to admit gas to the interior of the contactor, said connector including means to effect electrical connections between certain of said binding posts and the contacts of the contactor, said electrical connections being independent of rotation of said contactor with respect to the gas-tight chamber.

In testimony whereof, I have signed my name to this specification this 31st day of December 1929.

THOMAS C. HENNEBERGER.