

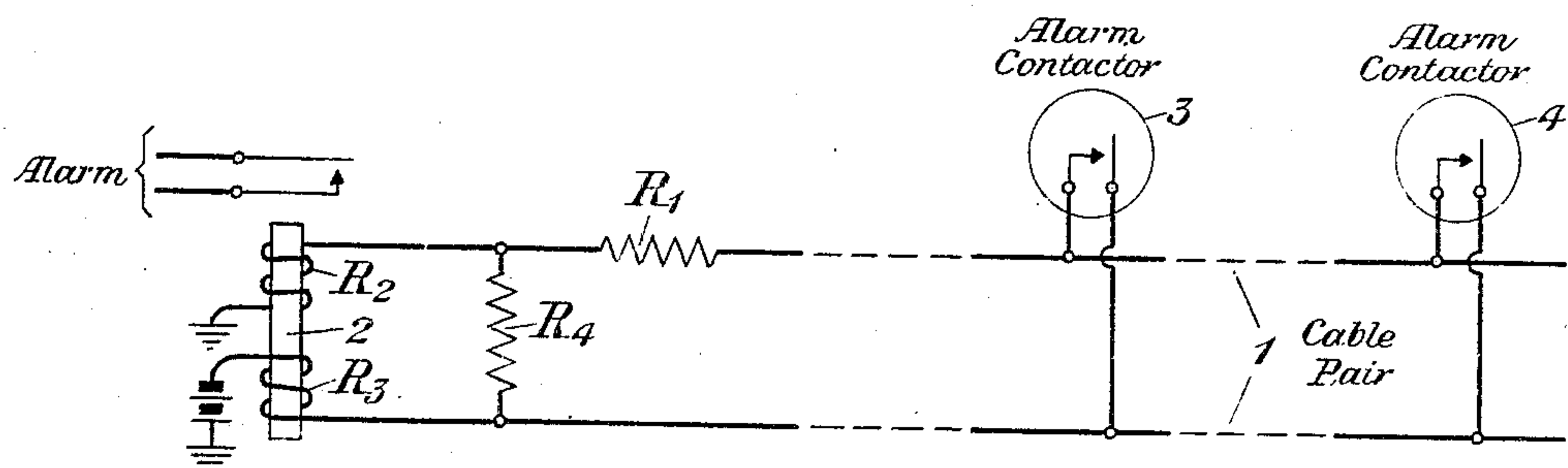
April 25, 1944.

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2,347,507

ALARM CIRCUIT

Filed Jan. 1, 1942



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2,347,507

ALARM CIRCUIT

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Application January 1, 1942, Serial No. 425,288

2 Claims. (Cl. 177—311)

This invention relates to transmission systems and more particularly to alarm circuits associated with cables used in such systems.

It has been the practice with respect to certain types of cables to have them contain a certain amount of gas under pressure. Should a hole or break develop in such a cable the gas would leak out and thus reduce the pressure at the vicinity of the hole or break. Associated with such a cable would be a plurality of devices known as alarm contactors. When the gas pressure in the vicinity of an alarm contactor decreases below normal, due to a break or hole in the cable, the contactor operates to close two contacts and thus complete an alarm circuit consisting of a pair of conductors in the cable. This will operate desirable alarm means at the end of the cable.

It has been found in practice that the resistance of the conductors of the alarm circuit may vary from time to time due, for example, to variations in temperature and it has been found that in certain instances the resistance of the conductors of the alarm circuit may become sufficiently great to prevent sufficient current to flow to operate the alarm device at the distant end. It is the primary object of the arrangements of this invention to provide an alarm circuit that will be substantially independent in its operation of variations in the resistance of the conductors thereof and thus provide an alarm circuit that will not fail to function because of resistance changes therein. Other objects and features of the invention will appear more fully from the detailed description thereof hereinafter given.

The invention may be more fully understood from the following detailed description thereof when read in connection with the accompanying drawing in which is shown a circuit diagram illustrating a preferred embodiment of the invention.

In the drawing is shown an alarm circuit 1 which may consist of a pair of conductors included in a cable which contains gas under pressure. At various points in the cable would be alarm contactors, such as 3 and 4. When the pressure of the gas in the vicinity of an alarm contactor falls below normal due to a break or leak in the cable the alarm contactor will close two contacts and complete the alarm circuit. At the end of the cable would be apparatus such as the relay 2 which will operate when the alarm circuit 1 is closed and will in turn operate a suitable alarm, not shown. The loop resistance of the alarm circuit is indicated as R_1 and a shunt resistance R_4 is connected across the alarm cir-

cuit for reasons to be pointed out hereinafter. This shunt resistance R_4 might be connected at the central office near the alarm relay 2.

The invention may be more fully understood from the following description of the manner in which it functions. The relay 2 has two windings R_2 and R_3 , one connected to ground and the line and one connected to a 24 volt battery and the line. The resistances of R_2 and R_3 are each 500 ohms. The relay 2 is adjusted to operate and release on certain arbitrarily chosen values of current, as, for example, to operate at 2.3 mils and to release at 1.4 mils. With a 24 volt battery and the combined resistance of the relay windings equaling 1000 ohms, it will be seen that a maximum desirable resistance of the loop, indicated as R_1 , should be in the order of 6000 ohms if the relay is to operate properly as adjusted. With a loop of 6000 ohms plus a relay of 1000 ohms or a total of 7000 ohms and a voltage of 24 volts from the battery, the current through the relay would theoretically be 3.43 mils which would be sufficiently greater than the 2.3 mils on which the relay was designed to operate to cause it to function properly regardless of minor variations in the voltage of the relay. As heretofore pointed out it has been found that the loop resistance R_1 may vary for various reasons, as, for example, changes in temperature. In fact it might become as high as 10,000 ohms. With a maximum external loop resistance of 10,000 ohms the current through the relay 2 might be in the order of 2.18 mils which is less than the amount on which the relay is designed to operate. Under such conditions the alarm circuit would fail to function. In accordance with the arrangements of the invention a shunt resistance R_4 is provided in parallel with the loop resistance R_1 . The value of the shunt resistance R_4 must be properly chosen and should be that resistance which, when connected in parallel with the loop resistance R_1 at its maximum value of, for example, 10,000 ohms, would give the alarm circuit external to the relay a total resistance of 6000 ohms. In other words the resistance R_4 should be adjusted so that R_4 and R_1 maximum = 6000 ohms. With such an arrangement the alarm circuit may be adjusted to operate independently of variations in resistance. The shunt resistance R_4 should be sufficiently large so that the relay 2 will not be operated when the alarm circuit is open. For the aforesaid conditions it was found that a shunt resistance in the nature of 20,000 ohms was satisfactory.

While the relay 2 has been referred to as ad-

justed to operate and release at certain specific values of current and certain specific values for resistance R_4 and R_1 have been referred to, it is understood that these were given for purposes of illustration only and that other values might be taken. While the invention has been disclosed as embodied in certain specific forms it is understood that it is capable of embodiment in many and other widely varied forms without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. An alarm system comprising a pair of appreciable resistance lines having contactors bridged across the lines at distributed points, a source of potential and a relay winding in series with the pair of lines, a first resistance in series with the relay winding and lines and a second resistance in shunt with the relay winding, said

shunting excluding both of said lines, the second resistance being of a value marginally over that required to operate the relay from said source.

2. Apparatus for determining whether or not the pressure within a cable has been reduced below a predetermined value comprising a pair of appreciable resistance lines, a contact which is closed in response to a drop in pressure within the cable below said predetermined value bridged across said lines, a source of potential and a relay winding in series with the pair of lines, a first resistance in series with the relay winding and lines and a second resistance in shunt with the relay winding, said shunt excluding both of said lines, the second resistance being of a value marginally over that required to operate the relay from said source.

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