

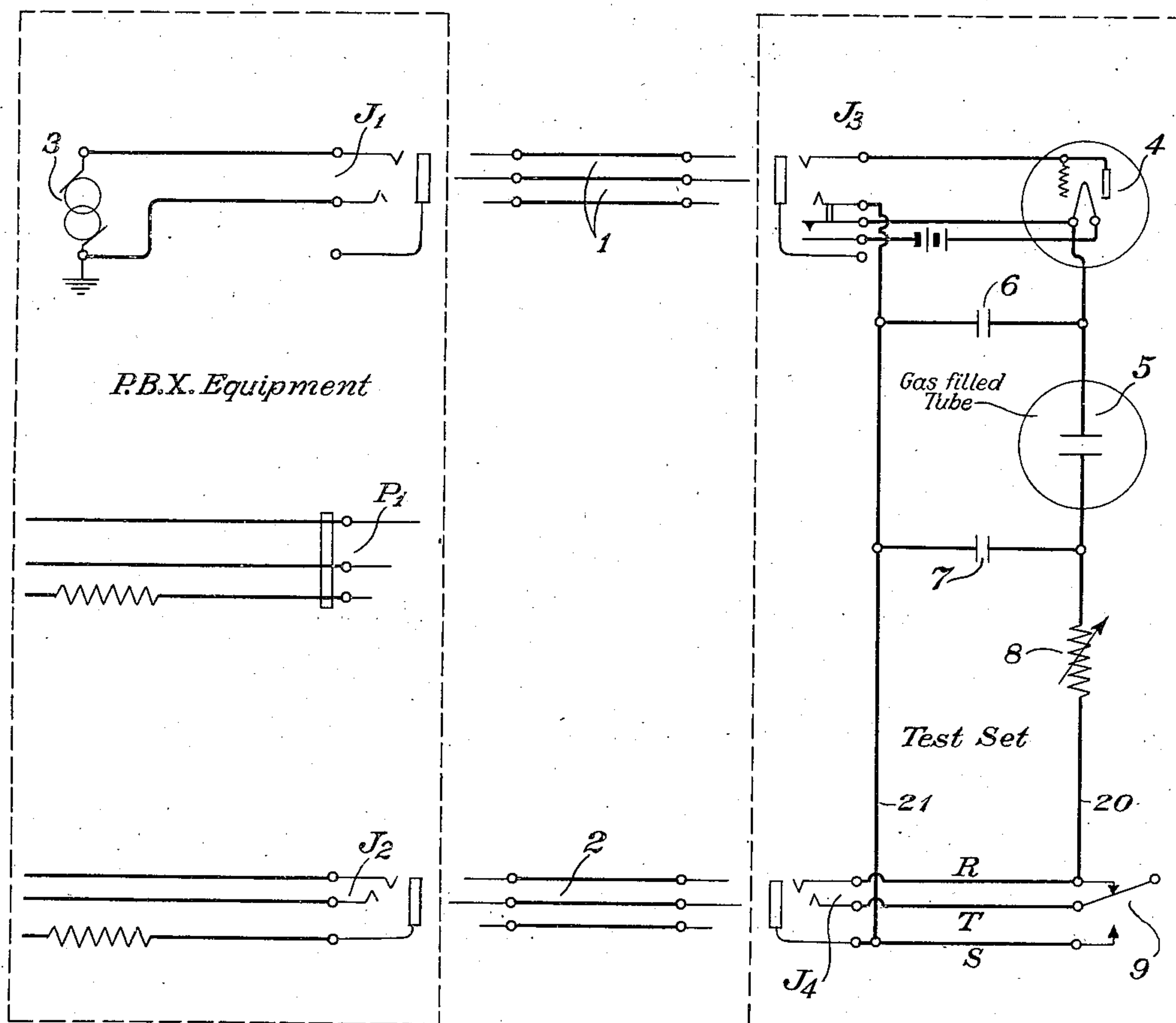
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TESTING DEVICE

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TESTING DEVICE

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1. Claim. (Cl. 175—183)

This invention relates to testing apparatus and more particularly to apparatus for detecting faulty insulation or leakage conditions on certain types of electrical conductors.

The arrangements of the invention are particularly adapted for testing electrical conductors at a telephone switchboard, such for example as a private branch exchange. The types of lines which may be tested for faulty insulation conditions at the switchboard might be cords, trunks or station lines. One of the features of the test set of this invention consists in utilizing a power supply source at the switchboard to produce the testing current. Another feature of the invention consists in providing a visual signal in the test set for indicating the presence of faulty insulation conditions on a line. For example, a gas-filled discharge tube might be provided which would either glow steadily or flash intermittently to indicate not only the presence of faulty insulation on the line being tested but also to indicate the type of the fault. Another feature of the invention consists in providing means in the test set whereby it will cause no interference with a station connected to the line being tested. 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 description together with the accompanying drawing in the figure of which is shown a circuit diagram illustrating a preferred form of the invention.

In the drawing there is shown enclosed in dotted lines at the left certain equipment found in a switchboard, such for example as a private branch exchange. A jack J₁ is shown connected to a source 3 of alternating current, which might be a source of ringing current. A plug P₁ is shown which might be connected to an operator's cord circuit. A jack J₂ is shown which might be connected to a trunk or a station line. It is not believed necessary to illustrate other apparatus at the switchboard in explaining the arrangements of the invention. At the right of the drawing there is shown enclosed in dotted lines the test set of this invention. It comprises a jack J₃ which may be connected by the patch cord 1 to jack J₁. The jack J₃ is connected to the vacuum tube rectifier 4. Connected to the rectifier is a gas-filled discharge tube 5. The alternating current from source 3 is rectified by tube 4 and applied to the gas-filled tube 5. Its operation is controlled by the condenser 7 and the presence or absence on the line being tested

of a faulty insulation condition as hereinafter pointed out. Condenser 7 might, for purposes of illustration have a value of two microfarads. A resistance 8 is provided to prevent the connection of the test set to a line from causing any interference with apparatus, such as a bell, at a station connected to the line. A jack J₄ is provided which may be connected by patch cord 2 to the jack J₂ of a line to be tested. The plug P₁ might be connected to jack J₄ if the operator's cord circuit was to be tested. A switch 9 is provided for reasons to be pointed out hereinafter.

The test set of the invention operates in the following manner. In order to obtain test current the patch cord 1 is inserted in jacks J₁ and J₃. This will connect the generator 3 to the tip and ring conductors of jack J₃. This current will be rectified by the tube 4 and applied to the electrodes of the gas-filled tube 5. The voltage of this rectified current will be sufficient to break down the gas-filled tube and it will glow. Condenser 7 is in the path of current flowing through the gas-filled tube 5 and it will commence to charge up. When the condenser becomes charged the potential on the plate of the condenser connected to one of the electrodes of tube 5 will be equal and opposite to the potential applied to the other electrode of the tube 5 and it will be extinguished. The patch cord 2 will now be inserted in jack J₄ and jack J₂ if the line connected to jack J₂ is to be tested. If the operator's cord circuit is to be tested instead of a line the plug P₁ would be directly inserted into jack J₄.

After the jack J₂ is connected to the jack J₄ the test man will operate the key 9 to either one of its two positions. If the key 9 is thrown in the upward position, as shown, a test may be made to determine whether there is any leakage to ground from the tip and ring conductors. With the key 9 in the upward position the tip and ring conductors are connected together to line 20 and thence to the right hand side of charged condenser 7. Ground at generator 3 is connected to the other side of condenser 7 over conductor 21. Accordingly if there is a leakage to ground from either the tip or ring conductor under test a circuit will be completed thereover to discharge the condenser 7. If this leakage is large the condenser discharges immediately and will not accumulate a new charge from tube 5 and tube 5 will be operated and glow steadily. If this leakage is comparatively small the condenser will discharge more slowly and eventually the charge thereon will become small enough so that the

tube 5 will be unblocked and flash. This operation of the tube will again start to build up a charge on the condenser until it is large enough to again block the tube 5 to cause it to go out. Hence if the leakage is comparatively small the tube will flash intermittently. Obviously if the insulation is perfect and no leakage to ground exists the charge will remain on condenser 7 and the tube 5 will remain dark.

If the key 9 is thrown to its downward position a test may be made to determine whether any leakage exists between the tip and ring conductors. If any leakage exists between the tip and ring conductors a circuit for discharging the condenser 7 will be established as follows: from the right hand side of condenser 7, conductor 20, ring conductor, leakage path between ring and tip conductors, tip conductor, lower contact of switch 9, sleeve conductor and over conductor 21 to the left hand side of condenser 7. Obviously if this leakage is large, such as a short circuit, the condenser will discharge at once and will not accumulate a new charge and the tube 5 will glow steadily. On the other hand if the leakage is small, the tube 5 will flash intermittently. Obviously if there were perfect insulation between the tip and ring conductors the tube 5 would remain out.

Thus with the test set of the invention tests for various types of insulation or leakage trouble may be readily made. While the invention has

been disclosed as embodied in certain specific forms which are deemed advisable, it is understood that it is capable of embodiment in many other and widely varied forms without departing from the spirit of the invention as defined by the appended claim.

What is claimed is:

Arrangements for testing faulty insulation conditions in a line including a source of alternating current, a circuit having conductors connected to the terminals of said source, a ground connected to one of the terminals of said source, a rectifier and a gas filled discharge tube and a condenser connected in series with each other in said circuit, and switching means for so connecting one side of said condenser to the tip and ring side of the line to be tested that if a ground exists on either said tip or ring a circuit for discharging said condenser will exist between said last mentioned ground and said first mentioned ground and the operating condition of said gas filled discharge tube will be changed and for alternatively so connecting said condenser across the tip and ring of the line to be tested that if a leakage path exists between said tip and ring a circuit will be completed for discharging said condenser across said leakage path and the operating condition of said gas filled discharge tube will be changed.

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