Nov. 25, 1941. K. G. COMPTON 2,264,130

PROTECTIVE DEVICE

Filed Oct. 19, 1940

FIG. 1

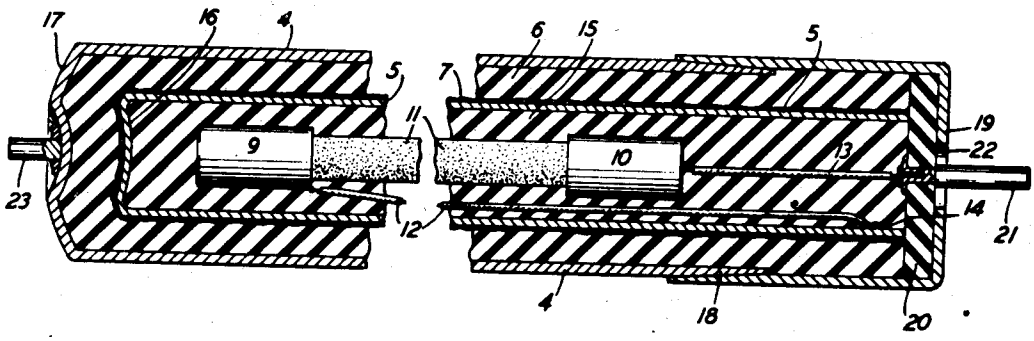



FIG. 2

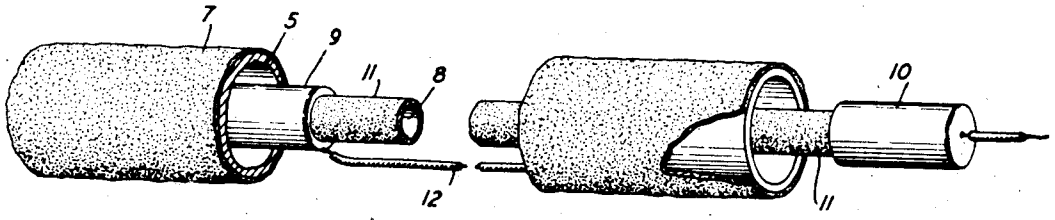
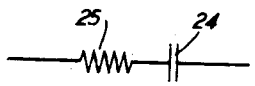



FIG. 3




EQUIVALENT CIRCUIT

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# UNITED STATES PATENT OFFICE

2,264,130

## PROTECTIVE DEVICE

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Application October 19, 1940, Serial No. 361,877

1 Claim. (Cl. 175—315)

This invention relates to a protective device for relay contacts and the like.

It is customary in the art for reducing sparking in the make and break of electrical relay contacts to provide in a shunt path around the contacts a condenser in series with a resistance of appropriate values. In many instances such as in the telephone plant where a large number of relays may be mounted in a restricted space in close proximity to each other the additional space required for the condensers and resistances is a serious factor.

In accordance with this invention the space requirement for each resistance-condenser combination is considerably reduced by employing an electrolytic condenser of cylindrical construction and by placing the resistance element within the inner cylinder of the condenser so that the space requirement for the combination is no greater than that for the condenser element alone.

Referring to the drawing:

Fig. 1 is a view partly in section of the condenser-resistance unit of this invention;

Fig. 2 is a view in perspective of the resistance element and the inner cylinder of the condenser; and

Fig. 3 shows the electrical circuit of the combination.

The condenser element of this invention is composed of two concentric cylinders 4 and 5 preferably of aluminum separated by a paper cylinder 6 impregnated with a suitable electrolyte such as is commonly used in dry type electrolytic condenser as, for example, a compound or mixture of boric acid, or its derivatives with ethylene glycol or other polyhydric alcohol. Prior to assembly, the external surface of the inner cylinder 5 is formed to the desired voltage in an electrolytic bath to produce on its external surface a film 7 of aluminum oxide (which film is shown with an exaggerated thickness in both Figs. 1 and 2) whereupon the cylinder 5 is washed to remove all traces of the forming electrolyte. The inner cylinder 5 is then ready to be assembled within the outer cylinder 4 along with the porous paper spacer cylinder 6 after which the spacer cylinder 6 may be impregnated with a viscous electrolyte. After impregnation, the electrolyte is flushed out of the interior of the inner cylinder 5.

The resistance element is preferably of the sprayed carbon type of a length and diameter substantially less than the corresponding dimensions of the inner cylinder 5. As shown, the resistance element comprises a tubular member 8 of a suitable dielectric material such as glass having conductive members 9 and 10 at either end with the carbon granules 11 sprayed on the outer surface of the glass cylinder 8 in an amount sufficient to give the desired resistance value between terminals 9 and 10.

After connecting lead wires 12 and 13 to the resistor terminals 9 and 10 the resistor is inserted in the open end of inner cylinder 5 with one end of wire 12 connected to the inner wall of cylinder 5, for example, at the point 14. The resistor 8 is preferably held concentrically in place within cylinder 5 and spaced from the inner walls and the closed end of cylinder 5 by means of insulating material 15 such as an asphaltic sealing compound.

The paper cylinder 6 preferably has a closed end spacing, the closed end 16 of the inner aluminum cylinder from the closed end 17 of the outer aluminum cylinder a distance substantially the same as the distance between cylinders 4 and 5; and the inner cylinder 5 is preferably somewhat longer than the outer cylinder as is evident from Fig. 1.

The outer cylinder 4 is preferably slightly tapered at its open end 18 over which is forced a tightly fitting metal cap 19. Between the end of cap 19 and the open end of inner cylinder 5 is a fibre washer 20 which centrally supports a suitable terminal 21 connected to wire 13, which terminal passes through an aperture 22 in the end of metal cap 19. As shown in Fig. 1 the asphaltic compound 15 completely fills the inner cylinder 5 and also fills the space between cylinder 5 and cap 19.

In connecting the resistance-condenser device of Fig. 1 into the desired circuit, conductor 21 may serve as one terminal and conductor 23 as the other terminal to provide in series a condenser 24 and a resistance 25 as shown in Fig. 3 where condenser 24 represents the capacity between the aluminum cylinders 4 and 5 and resistance 25 is the resistance of the sprayed carbon coating 11 on tube 8.

What is claimed is:

In combination, an electrolytic condenser comprising a cylindrical container forming the cathode, an anode comprising a cylinder of film forming metal within said container and spaced from the inner wall of said container, an electrolyte between said anode and said container, an elongated electrical resistance element within said anode and substantially aligned with the axis of said anode, and a packing of insulating material substantially filling the space between said element and the inner surface of said anode for supporting said element in spaced relation to said anode.

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