

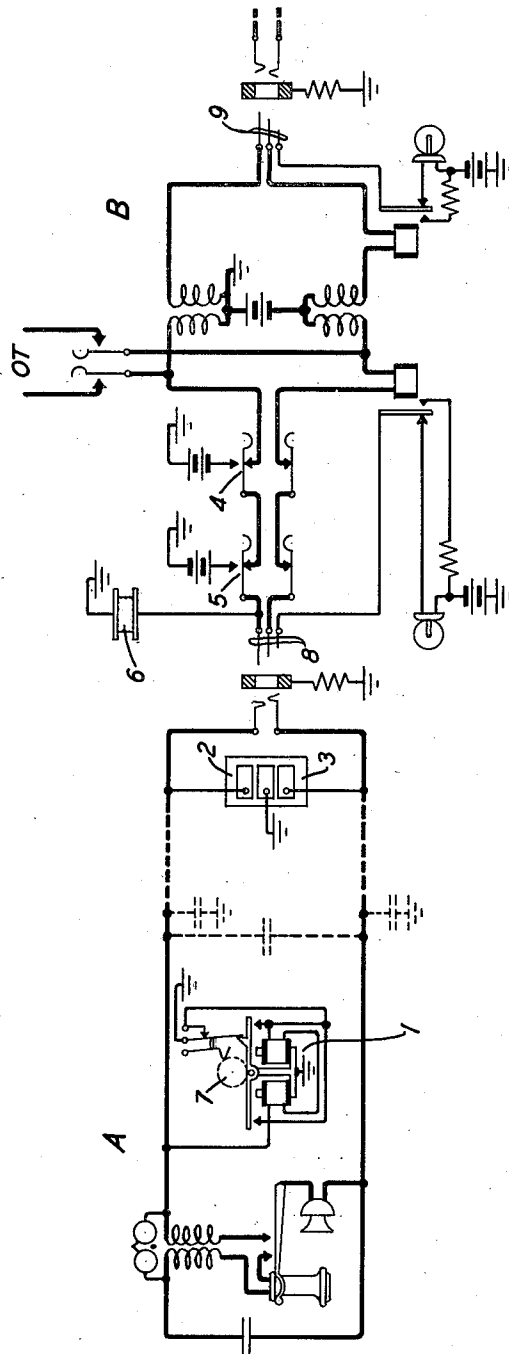
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PROTECTIVE SYSTEM

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PROTECTIVE SYSTEM

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10 Claims. (Cl. 179-6.3)

This invention relates to protective circuits and more particularly to means for protecting telephones from excessive electrical effects.

An object of the invention is to prevent excessive electrical effects in a telephone connected to a line when other electrically responsive apparatus associated with the same line is operated.

A feature of the present invention, whereby the above stated object is attained, resides in connecting a resistance element having the characteristic of decreasing in resistance with an increase of applied potential to one of the talking conductors of a cord circuit adapted to be connected to the telephone line.

The invention will be understood from the following description together with the accompanying drawing in which the invention is illustrated. The drawing shows a telephone pay station line with the usual associated coin collecting and refunding device connected to a talking conductor thereof and it also shows an operator's coin controlling cord circuit adapted to be connected thereto and to extend the talking circuit thereof to a second telephone line.

The coin device 1 is connected to the tip talking conductor at the pay station A. At the central office lightning protector blocks 2 and 3, respectively, are connected from the tip and the ring talking conductors of the line to ground. In the cord circuit B coin collect key 4 when operated connects negative battery to the tip conductor of the cord and the connected line to operate coin device 1 and collect a coin which has been deposited therein. Coin return key 5 is correspondingly adapted to apply positive battery and return the coin to the telephone user.

According to the invention an element 6 having the characteristics of decreasing its resistance to the flow of electric current when an increase of potential difference is applied across its terminals is connected between the tip talking conductor of the cord circuit and ground. This element is connected to the tip conductor at a point between the tip of the answering plug and the contacts of the first coin control key.

The operation of the system and the function of the element 6 are as follows: When a person at station A initiates a call he deposits coin 7 in his coin box thus closing a circuit to operate a line signal (not shown) at the central office switchboard. The operator in response to the signal inserts the answering plug

8 of her cord circuit into the line jack and after ascertaining the number of the station desired by the calling party she inserts the calling plug 9 of her cord into the jack of the called line and actuates the ringing key (not shown).

When the called subscriber answers the talking circuit is completed between calling and called stations. At this time a timing device starts operating to indicate to the operator when the initial unit period of conversation is completed. Should the parties still be in conversation at the end of this period the operator actuates coin collect key 4 thus connecting negative battery to the tip conductor of the calling line to operate the polarized magnet of coin device 1 in such a direction as to collect coin 7 by depositing it in the proper receptacle. The operator then releases the coin collect key, operates her talking key and requests the deposit of another coin for a second period of conversation.

At the time of removal of coin collect battery there is a tendency for the magnet windings of coin device 1 to discharge. In the absence of a resistance element 6 connected according to my invention this discharge will ordinarily find two paths to earth, one by passing over the tip of the line and breaking down protector block 2 and the other by passing through the telephone set A and over the ring conductor of the line breaking down protector block 3. A discharge may occur over either or both of these channels. Due to the distributed capacity between the talking conductors and ground and between each other the discharge is liable to be of an oscillatory nature persisting for a short period of time.

Since the party at station A ordinarily has the receiver off the switchhook and close to his ear at the time the coin is collected, discharges through the telephone will cause sizable disturbances in the receiver and are liable to give the user a severe acoustic shock.

The resistance element 6, which may be an element of thyrite, for example, effectively prevents a discharge through the telephone set and protector blocks by decreasing in resistance in response to the potential generated by the discharge of the magnet coils. Thus the discharge will safely pass to ground through element 6 and protector blocks 2 and 3 will not break down.

By connecting element 6 to the cord circuits, as shown, instead of to each line circuit only a few protective devices are necessary to provide protection for a large number of lines.

What is claimed is:

1. In a telephone system, a plurality of lines, a telephone and other electrical apparatus on each of said lines, a link circuit adapted to be connected to any one of said lines, means associated with said link circuit to apply electric current to the connected line to operate said other electrical apparatus thereon, and a resistance element having the characteristic of decreasing in resistance substantially instantaneously with increases in applied potential connected between one side of said link circuit and ground to prevent excessive electrical effects in the telephone on said connected line.
2. In a telephone system, a plurality of telephone lines terminating in a central office, a responsive device connected to each of said lines, a link circuit at the central office adapted to be connected to any of said lines, means in said link circuit to apply electric currents to the connected line to operate said associated responsive device, and a resistance element having the characteristic of decreasing in resistance substantially instantaneously with increases in applied potential connected between one side of said link circuit and ground to prevent excessive electrical effects in the telephone line.
3. In a telephone system, a line, a telephone and a coin collector device on said line, a connecting circuit adapted to extend said line, means in said connecting circuit to energize said coin collector device and a resistance element having the characteristic of decreasing in resistance substantially instantaneously with an increase of applied potential connected between one side of said circuit and ground to prevent excessive electrical effects in said telephone.
4. In a telephone system, a telephone line, terminating in a central office, an auxiliary responsive device connected to said line, a link circuit at the central office, means in said link circuit to apply electric currents to the line to operate said responsive device, and a resistance element having the characteristic of decreasing in resistance substantially instantaneously with an increase of applied potential connected between one side of said link circuit and ground to prevent excessive electrical effects in the telephone line.
5. In a telephone system, a line, a telephone and a coin collector device on said line, a connecting circuit adapted to extend said line, means in said connecting circuit to energize said coin collector device and a resistance element having the characteristic of decreasing in resistance substantially instantaneously with an increase of applied potential connected between

one side of said circuit and ground to prevent excessive electrical effects in said telephone.

6. In a telephone system, a line, a telephone on said line, other electrical apparatus on said line, a link circuit adapted to be connected to said line, means associated with said circuit to apply electric currents to the line to operate said other electrical apparatus and a resistance element having the characteristic of decreasing in resistance substantially instantaneously with an increase in applied potential connected between one side of said circuit and ground to prevent excessive electrical effects in said telephone.

7. In a telephone system, a telephone line terminating in a central office, a responsive device connected to said line, a link circuit at the central office, means in said link circuit to apply electric currents to the line to operate said responsive device, and a resistance element having the characteristic of decreasing in resistance substantially instantaneously with an increase in applied potential connected between one side of said link circuit and ground to prevent excessive electrical effects in the telephone line.

8. In a telephone system, a line, a telephone and a coin collector device on said line, a connecting circuit adapted to extend said line, means in said connecting circuit to energize said coin collector device and a resistance element having the characteristic of decreasing in resistance substantially instantaneously with an increase in applied potential connected between one side of said circuit and ground to prevent excessive electrical effects in said telephone.

9. In a telephone system, a telephone line, a telephone on said line, an electrically operated device on said line, a cord circuit adapted to make connection with said line, means in said cord circuit to apply current to the line to actuate said electrically operated device, and a resistance element having the characteristic of decreasing in resistance substantially instantaneously with an increase of applied potential connected between one of the talking conductors of said cord circuit and ground.

10. In a telephone system, a telephone line, a coin collector device on said line, a cord circuit adapted to make connection with said line, a key in the cord circuit for applying current to the line to actuate said coin collector device, and a resistance element having the characteristic of decreasing in resistance substantially instantaneously with an increase in applied potential connected between one of the talking conductors of said cord circuit and ground.

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