

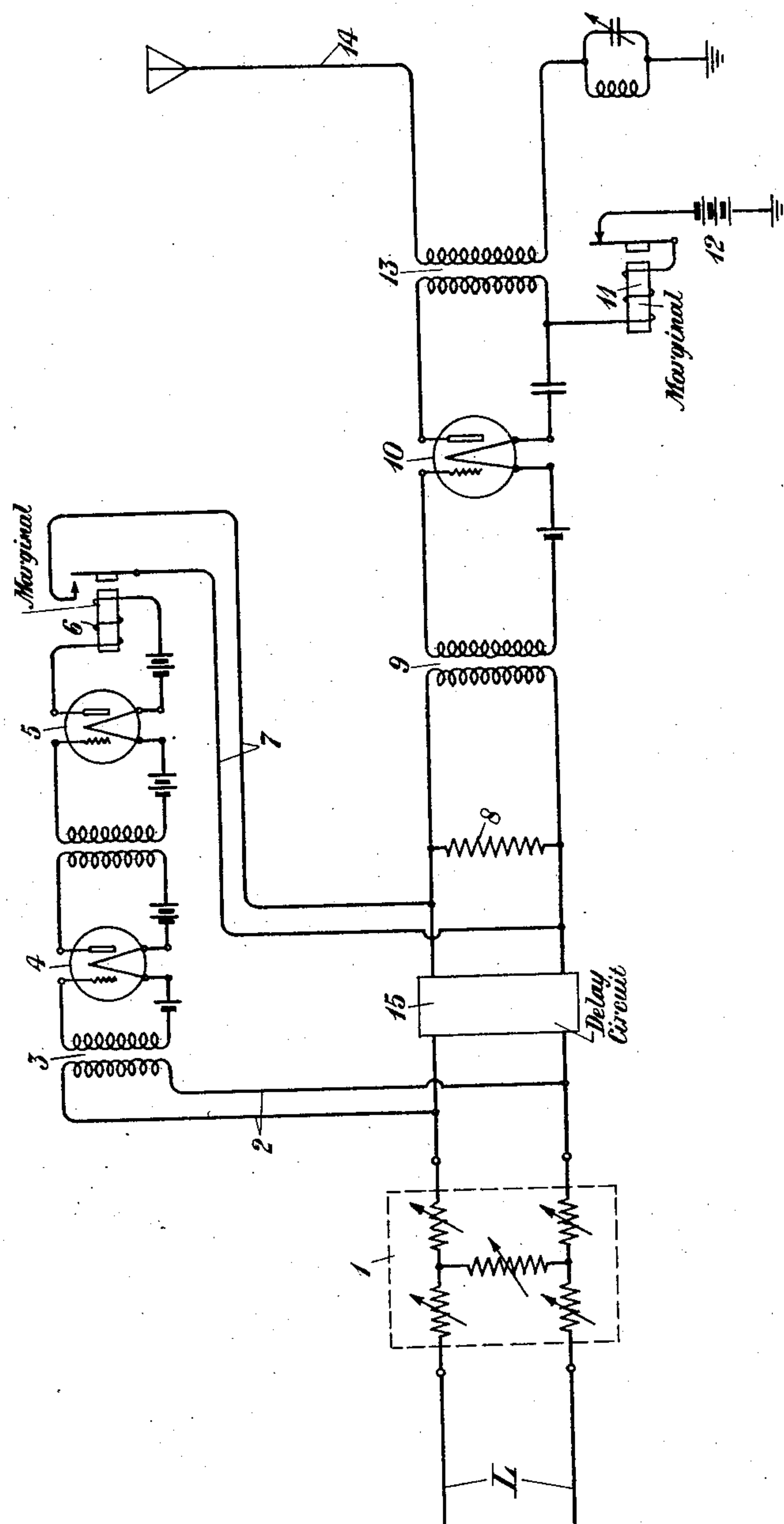
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PROTECTIVE CIRCUITS

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PROTECTIVE CIRCUITS.

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This invention relates to improvements in protective arrangements for use in circuits on which high voltages may be momentarily impressed, which high or peak voltages might be detrimental to apparatus associated with the circuit.

The protective arrangements of the invention consist of an amplifier-detector-relay combination associated with the transmission circuit which will operate to disable the circuit when the peak values of the impressed voltage exceed a certain predetermined amount. By means of such an arrangement it is possible to materially reduce the operation of other protective devices, such as circuit breakers usually associated with vacuum tubes in the circuit, or fuses or similar devices.

It is usually the practice to associate some form of circuit breaker device with the vacuum tube apparatus in a circuit, the purpose of such device being to prevent the blowing out of the tubes due to local disturbances therein or to disturbances caused by incoming voltages that are above desired limits. The operation of a device of this type causes considerable loss of circuit time as several minutes may be needed to readjust and restore the tube apparatus to normal. In the ordinary voice current there may exist peak voltages or momentary impulses that are high enough when subjected to the normal amplification of the system to cause these circuit breaker devices to operate. Such peaks might be caused by the talker coughing or other unusual vocal disturbance. Peak voltages caused in this manner would only be momentary, or of very short duration, but if they were allowed to reach the vacuum tube apparatus they would nevertheless operate the circuit breaker thereat and cause the loss of much circuit time. Hence the protective device of this invention is provided on the input side of the vacuum tube apparatus to cut out and eliminate or reduce all of these peak voltages before they reach the vacuum tube apparatus thus saving considerable circuit time and inconvenience. Other features and objects of the invention will appear more fully from the following detailed description of its operation.

The invention may be more fully understood from the following description together with the accompanying drawing in

the figure of which is illustrated a circuit diagram of a preferred form of the invention.

In the drawing the protective device of the invention is illustrated as applied to a radio transmitter circuit. An antenna 14 is shown connected through a transformer 13 to a circuit including a vacuum tube amplifier 10. The plate circuit of the amplifier 10 is connected through the winding of a marginal relay 11 and thence over its contact to the source of supply of the plate, or B voltage 12. The marginal relay 11 will operate as a circuit breaker when the impressed voltages exceed a desired limit or when local currents in the tube apparatus become too great and will break the plate current circuit and stop the operation of the vacuum tube by cutting off the B voltage. The input of the vacuum tube 10 is connected by a transformer 9 to a line L. Included in the line L is a variable artificial line 1, or any suitable device for controlling the volume of the energy applied to the tube 10. Associated with line L between device 1 and the input of the vacuum tube apparatus is the protective circuit of this invention.

The voice energy coming in over line L is transmitted through the device 1 which is controlled by an operator who endeavors to maintain a uniform level of energy at the output of device 1. It is obviously impossible, however, for the operator to so regulate the device 1 as to prevent the transmission therethrough of sudden bursts of energy coming in over the line. These sudden bursts of energy give rise to peak voltages of short duration and are transmitted through the device 1. These peak voltages will then be transmitted over circuit 2, through the transformer 3 to the amplifier 4, and thence to the detector 5 and thence to the marginal relay 6. The sensitivity of this protective circuit will be adjusted so that relay 6 will not operate on the ordinary energy of the voice current transmitted but will operate on energy above that, such as would be encountered from these peak voltages. These peak voltages accordingly will cause operation of relay 6 which will thereupon close the normally open circuit 7 and thus disable the transmission circuit L so that these peak voltages will not be transmitted to the amplifier apparatus 10 and will not affect the circuit breaker 11. Obvi-

ously these peaks of voltage or bursts of energy are of very short duration and hence the relay 6 will be operated and the line L disabled only momentarily rather than the much longer period which would ensue if the circuit breaker 11 were operated. As soon as these peak voltages die out the line is restored to normal again.

The contacts of the relay 6 are shown in the drawing as normally open and the disabling process is accomplished by applying a short circuit to the transmission line L. Normally closed contacts which interrupt transmission by breaking the transmission circuit might, however, be utilized equally well. The relay 6 might also be utilized to introduce a loss in the transmission line to counteract these peak voltages if desired rather than to control a complete disabling action such as the short circuit arrangement shown. The relay 6 should be adjusted to operate faster than the circuit breaker 11 for the device to be effective in saving the operation of the circuit breaker and thereby preventing loss of circuit time. Of course, there will be a short period corresponding to the time of operation of relay 6, during which the peak value will exist beyond the protective circuit. In order to eliminate this period and thereby even more completely protect the vacuum tube apparatus from the effects of these peak voltages a delay circuit 15 of any well known type might be inserted in the line L as shown between circuit 2 and circuit 7. If a delay circuit were used as shown and the delay was equal to or greater than the time of operation of relay 6, then absolutely no energy greater than the predetermined value could get into the vacuum tube apparatus.

While the invention has been illustrated as associated with a radio transmitter its use is not so limited but it may be utilized

in any type of transmission circuit utilizing arrangements of which a circuit breaker might be a part. Accordingly, while the invention has been disclosed in certain specific arrangements which are deemed desirable, it is understood that it is capable of embodiment in many and widely varied form without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. A transmission line over which voice currents are transmitted, a translating device in said line, a protective device associated with said translating device, a protective circuit associated with said line on the input side of said translating device, said protective circuit including an amplifier, a detector, and a relay adjusted to operate on voltages other than those usually encountered in the voice range, and means controlled by said relay for disabling said transmission circuit.

2. A transmission line over which currents within a certain voltage range are being transmitted, amplifying apparatus in said line, a circuit breaker associated with said amplifying apparatus to protect said apparatus from voltages outside of said range, a protective device associated with said line on the input side of said amplifying apparatus, said protective device comprising an input circuit and an output circuit bridged across said line, a delay circuit included in said line between said input and output circuits, and means in said protective device responsive to voltages outside of said range for preventing said last mentioned voltages from being transmitted to said amplifying apparatus.

In testimony whereof, I have signed my name to this specification this 25th day of September, 1924.

SUMNER B. WRIGHT.