

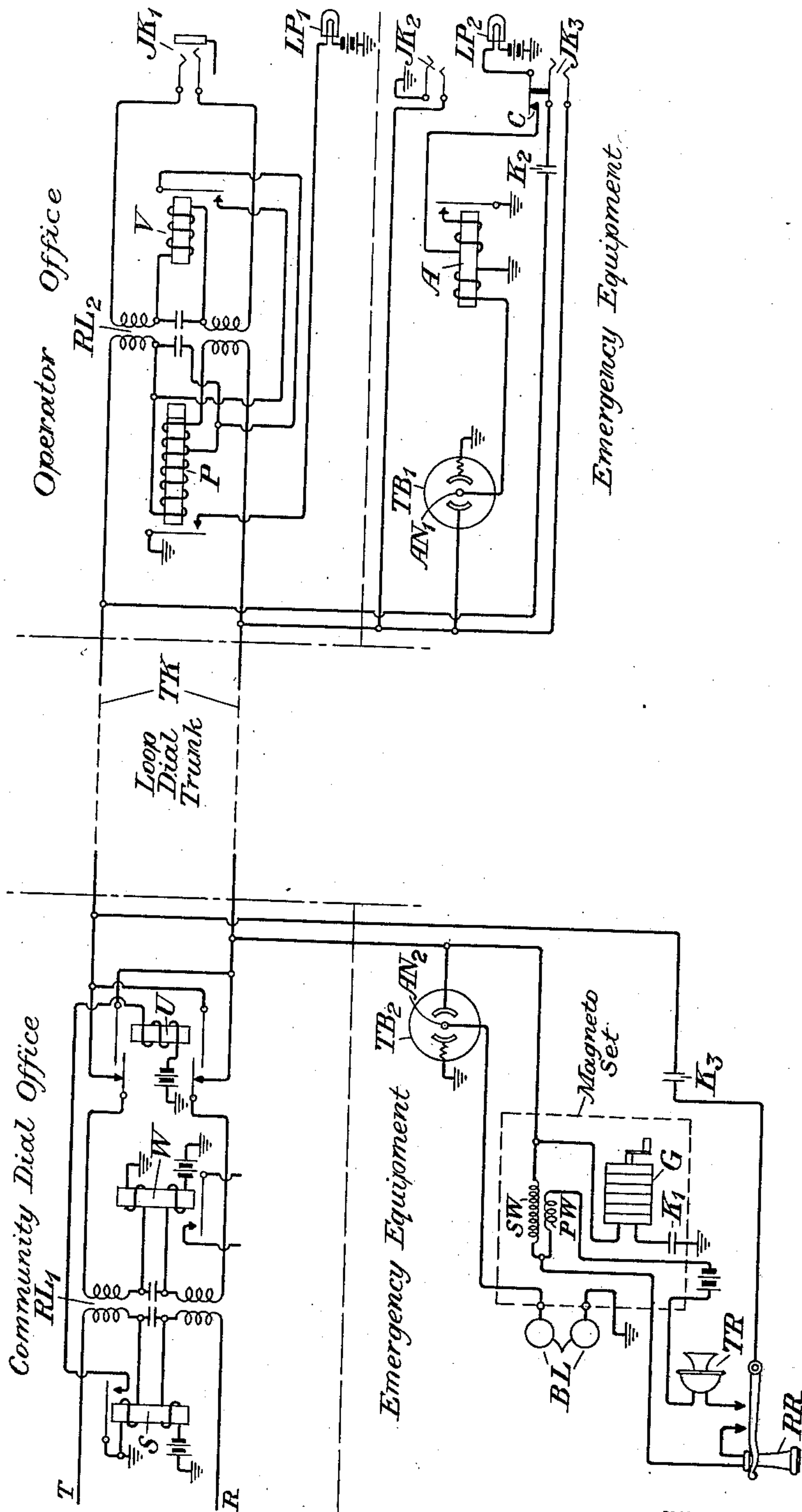
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AUXILIARY TELEPHONE APPARATUS

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AUXILIARY TELEPHONE APPARATUS

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This invention relates generally to telephone systems. More particularly, this invention relates to apparatus for signaling between two telephone offices over trunk or other lines. Still more particularly, this invention relates to auxiliary or emergency equipment for use at telephone offices to provide facilities for signaling between the offices under abnormal conditions.

It sometimes happens that a community or hamlet too small to justify an ordinary manual exchange is located near a city provided with a regular telephone exchange or exchanges. Such an outlying hamlet may be provided with telephone service by means of a community dial office which may be equipped with relatively simple automatic switching machinery to enable the local subscribers to dial each other. An operator in the city may establish a direct connection over one of a group of trunks extending to the community dial office to any desired subscriber coming into the community dial office, and any local subscriber who desires a connection to the city may by dialing be connected over one of these trunks to any of the city subscribers. Such community dial offices are usually unattended, except at such time as maintenance or inspection employees make temporary visits to inspect or test the apparatus at the office.

It may happen that when an employee has been dispatched to the community dial office to test or inspect the equipment he may find that the equipment has been partially or totally destroyed, or that the power supply has been rendered ineffective. In that case he will be unable to communicate with the operator at the manual or operator office. As the community office may be several miles distant from the main office, it will be necessary for the telephone employee to return to the operator office to deliver his message. This is, of course, time consuming and expensive.

Accordingly it is proposed to equip telephone offices such as community dial offices and manual or operator offices and the like, with auxiliary or emergency equipment to enable signals to be transmitted between these offices whenever the regular equipment has been disabled. The apparatus of this invention involves the employment of equipment at the various offices which will not consume current under normal conditions, although at the same time the equipment will always be connected to the telephone line or trunk for use in emergencies, and will

not affect normal telephone transmission over the line or trunk.

In general, the apparatus of this invention will comprise a gas tube at each office which is connected to but one of the conductors of the telephone line or trunk so that it may be fired only at times when a ringing generator is connected to that particular conductor of the line or trunk. When the gas tube at the station is fired in response to the application of the ringing generator voltage to the particular conductor, it will be employed to provide a signal to attract the operator's attention at the time. The ringing generator voltage for firing the gas tube may be supplied by a magneto generator set of well known type. The magneto generator set can produce an alternating voltage of sufficient magnitude to cause the gas in the tube to become ionized. The apparatus at each office may also include, in addition to a visual or audible indicating device, the usual form of telephone transmitter and receiver to permit the parties to speak to each other. Whatever sources of D. C. potential may be required may be supplied by dry cells. In accordance with this invention all of the auxiliary emergency equipment at the stations will be effectively dissociated from the telephone line or trunk and will not interfere with normal signaling and communication over the telephone line or trunk. Moreover, the auxiliary or emergency equipment, although connected to the telephone line or trunk, may be located at a point different from the telephone office or exchange.

This invention will be better understood from the more detailed description hereinafter following when read in connection with the accompanying drawing showing one embodiment of the invention merely for illustrative purposes.

In the drawing a loop dialing trunk TK is shown interconnecting a community dial office and an operator office or manual exchange. Telephone calls may be transmitted in both directions in the usual way over the trunk TK to connect a subscriber in the community dial area to a subscriber in the area of the operator office. The regular office equipment so far as it may relate to this invention is shown above the dotted line. Below the dotted line will be found the auxiliary or emergency equipment which is additional equipment different from that heretofore used in such offices and may be employed only in emergencies.

The regular equipment of the two offices will now be only briefly described. The windings of

relays W and P at the community dial office and at the operator office, respectively, are connected in a series circuit which includes the upper winding of relay W, the upper secondary winding of the repeating coil RL₁, the upper armature and normal contact of relay U, the upper conductor of trunk TK, the upper primary winding of repeating coil RL₂, the windings of relay P, the lower primary winding of repeating coil RL₂, the lower conductor of trunk TK, the lower armature and normal contact of relay U, the lower secondary winding of the repeating coil RL₁, the lower winding of relay W, battery to ground. The current that traverses the windings of the relays W and P will be insufficient to operate these relays, but they may be operated as will be described hereinafter whenever a call is made from, for example, the subscriber connected to the community dial office to a subscriber connected to the operator office.

When a call is being made by a subscriber of the community dial office to a subscriber connected to the distant operator office, then in response to a predetermined dialed number, battery will be connected to the conductors T and R, causing relay S to operate. Positive battery will be connected to the tip conductor T to energize the upper winding of relay S while ground will be connected to the ring conductor R to energize the lower winding of relay S. The operation of relay S will cause relay U to operate over an obvious circuit established by the armature and make contact of relay S. When relay U operates, it will reverse the direction of current flow from the battery connected to the lower winding of relay W through the windings of relay P. This reversal is established by the upper armature of relay U which connects the grounded upper winding of relay W to the lower conductor of trunk TK and by the lower armature of relay U which connects at the lower winding of relay W to the upper conductor of trunk TK. Upon the reversal of current through the windings of relay P, relay P will be operated. The operation of relay P will cause the lamp LP₁ to light, thereby attracting the attention of the operator at the operator office.

In response to the visual signal provided by lamp LP₁ the operator at the operator office may answer the call by inserting her plug into the jack JK₁ in the usual way. This will connect battery to the tip and ring terminals of the jack JK₁ to establish a flow of current through the secondary windings of the repeating coil RL₂ and the winding of relay V, and hence relay V will be operated. The closure of the contact of relay V will provide a shunt path across the left-hand portion of the winding of relay P, thereby materially reducing the resistance in the circuit of the remaining winding of relay P. This substantial reduction in resistance will allow a greater current to flow through the windings of relay W over the circuit previously traced, and hence relay W will be operated. The relay W may be used to control coin collector apparatus and for other purposes.

Suppose that in an emergency a repairman or other authorized person has been dispatched to the community dial office, and upon arriving at the office, finds some of the regular equipment out of order or the battery supply disabled so that he is unable to use the regular equipment to communicate with the operator office operator. He will find at that office auxiliary equipment which

will enable him to signal and converse with the operator at the operator office.

To signal the operator office the party at the community dial office will operate the magneto generator G of the magneto set located at that office while the receiver RR is held on its switch-hook. This will cause an alternating voltage to be generated and transmitted over a circuit which includes the condenser K₁, the magneto generator G, the lower conductor of trunk TK, the control gap of the gas tube TB₁ at the operator office and ground. The anode AN₁ of the tube TB₁ is shown connected to the left-hand winding of relay A, and hence this winding of relay A will receive current supplied by the magneto generator G after the tube TB₁ becomes ionized. It will be noted also that the gas tube TB₂ at the community dial office is connected to the generator G, and hence this tube will likewise be fired. Inasmuch as the anode AN₂ of tube TB₂ is connected to ground through a ringer or bell BL, the ringer or bell will be operated in response to the generated alternating voltage.

As relay A becomes operated in response to the alternating voltage emanating from generator G, it will be locked in its operated position over a locking circuit which includes the armature and make contact of relay A, its right-hand winding, the contact C of the jack JK₃, the lamp LP₂, battery and ground. As the lamp LP₂ is included in the locking circuit, the lamp LP₂ will be illuminated and maintained in that condition to continuously indicate to the operator at the operator office that an emergency call is being made to that office. The relay A will remain locked and the lamp LP₂ will remain illuminated until the operator at that office answers the call.

The emergency call may be answered by the operator by inserting the plug of her talking set into the jack JK₃. The lamp LP₂ will then be extinguished by the opening of contact C. This will connect her talking set through condenser K₂ across the trunk TK. Upon the removal of the receiver RR from the hook at the community dial office, the receiver RR will be connected across the trunk TK by two conductors, one of which includes the secondary winding SW of the magneto coil, the other conductor including the condenser K₃. As the transmitter TR of the telephone set is connected to the circuit of the primary winding PW of the induction coil of the magneto set, it will also be rendered effective so that the party at the community office may talk with the operator office operator.

Should the party at the community dial office hang up before the operator has completed her conversation with him, or if the operator should desire to recall that party, the operator will connect the plug of her ringing generator set with the jack JK₂. This will cause the gas tube TB₂ of the community dial office to receive ringing current over a circuit which includes the tip and ring contacts of jack JK₂, the lower conductor of trunk TK and the control gap of tube TB₂ and ground. In response to this ringing current the gas tube TB₂ will become ionized and the bell BL will be sounded. In answer to this signal the party at the community dial office may then remove his receiver RR from the switch-hook and receive the message from the operator at the distant office.

It will be observed that the additional auxiliary equipment at the two offices is simple and inexpensive and that, although permanently connected to the trunk TK, it will have prac-

tically no effect upon the transmission characteristic of the trunk TK. Hence the auxiliary equipment will not interfere in any way with the normal transmission of signals over the trunk TK. Moreover, normal transmission over trunk TK will not operate any of the auxiliary equipment. Whatever batteries are used in the auxiliary equipment may be dry cells, and they will have a long life due to the small drain of current required to provide this occasional service. The tubes TB₁ and TB₂ may be any type of gas tubes well known in the art, although tubes of the 333A type have been used successfully for this purpose.

While the emergency equipment has been shown connected to a community dial office and to an operator or manual office which is attended by an operator, it will be understood that this emergency equipment may be provided for any telephone offices whatever. Moreover, the emergency or auxiliary equipment may be located at places different from and outside of the central offices, if so desired. It will also be understood that the arrangement shown and described in the drawing may also be used as regular telephone equipment, if so desired.

While this invention has been shown and described in certain particular embodiments merely for the purpose of illustration, it will be understood that the general principles of this invention may be applied to other and widely varied organizations without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. In a telephone system, the combination of two telephone offices having telephone and signaling apparatus and interconnected by a telephone line so that signals may be transmitted normally over said line, apparatus for providing emergency service over said telephone line, said apparatus including a gas tube at each telephone office connected to but one of the conductors of the telephone line, means for applying ringing

current to the same conductor of the telephone line for firing said gas tube, a ringing device at each office which responds to the firing of the associated gas tube, and means including a telephone set for connection across the telephone line to permit talking currents to be transmitted over the line.

2. The combination of two telephone offices, a two-wire line interconnecting said telephone offices, said telephone offices including apparatus for normally signaling over said line, auxiliary apparatus for signaling over said line without disturbing normal signaling between said telephone offices, said auxiliary apparatus including two gas tubes, one located at each office and connected to but one of the wires of said line, an indicating device at each office controlled by the gas tube at that office, a magneto generator at each office which may be connected to one wire of the line for ionizing the gas of the tubes at said offices, and means for transmitting and receiving telephone currents over said line.

3. In a telephone system, the combination of a main office which is attended by an operator, a community dial office which is usually unattended, a trunk interconnecting said offices, said offices including apparatus suitable for normally signaling each other over said trunk, emergency signaling equipment at each office, the emergency signaling equipment at the community dial office including a first gas tube connected to but one of the conductors of said trunk and a magneto set which may be operated after the first gas tube has been fired, the emergency signaling equipment at the main office including a second gas tube connected to the same conductor of said trunk, a relay controlled by said gas tube, and an indicating device controlled by said relay, said emergency signaling equipment at both offices being continuously connected to said same conductor of the trunk and having substantially no effect upon normal transmission between said offices over said trunk.

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