

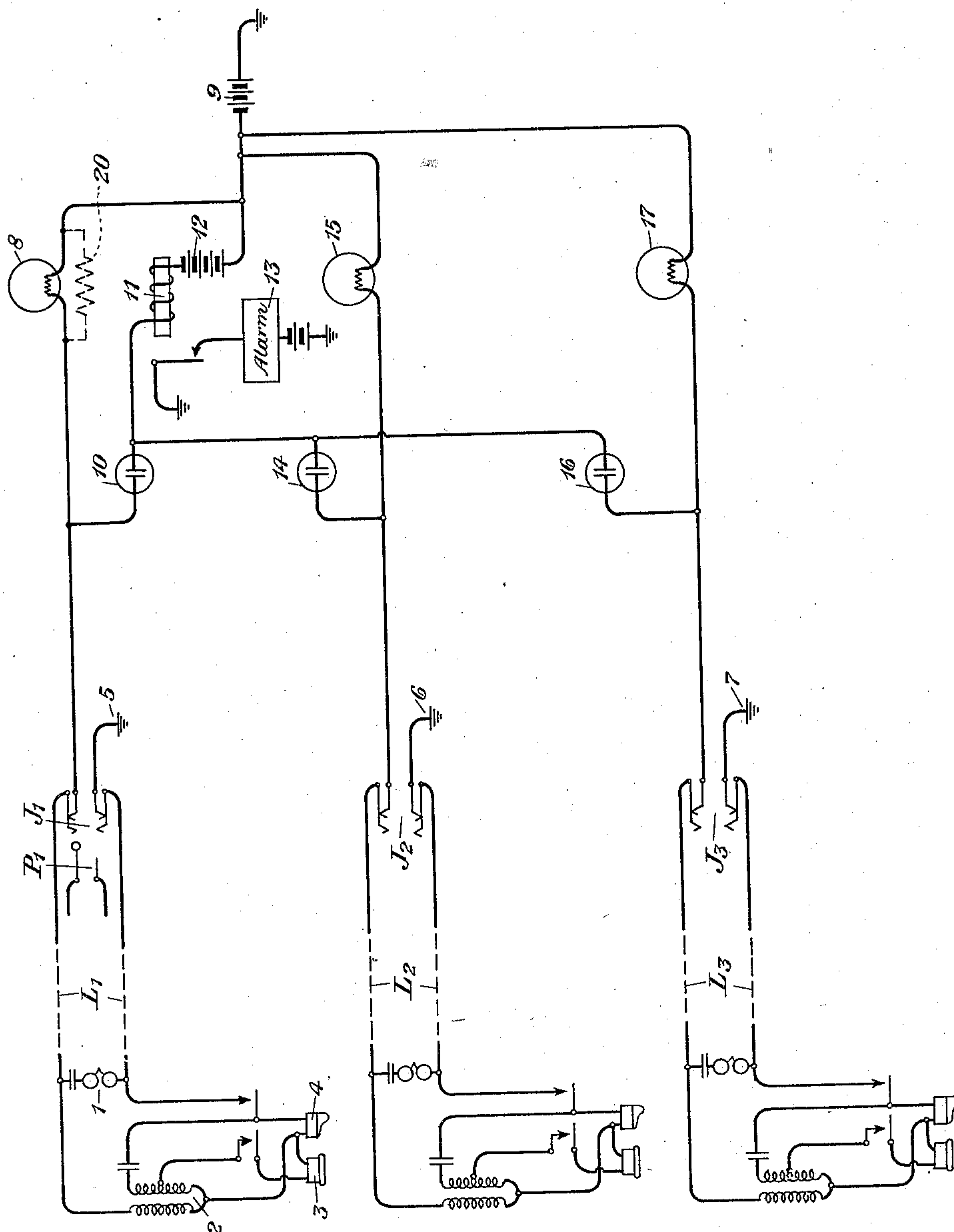
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TELEPHONE OFFICE ALARM CIRCUIT

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UNITED STATES PATENT OFFICE

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TELEPHONE OFFICE ALARM CIRCUIT

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This invention relates to telephone systems and more particularly to improvements in signaling arrangements at central offices associated with the lines of such systems.

The signaling arrangements of the invention are particularly adapted for use in central offices of the common battery manual type in which the subscriber's line lamp is connected in series with the subscriber's line and hence, operated without the use of individual line relays. One of the primary objects of the invention consists in providing for central office equipment of this type an alarm circuit common to a plurality of lines and suitable for giving an indication whenever any of the line lamps are operated. The arrangements of the invention would be particularly suitable for night alarm purposes.

Arrangements heretofore provided for giving a night alarm at central offices of the above type have comprised a common relay inserted in series with the line lamps. Where the line lamps are connected directly to the lines such arrangements may not be desirable because the cumulative effect of the leakage currents on a large number of lines might cause false operation of the common relay and the alarm controlled thereby when the lines were not in use. In the arrangements of the invention, any tendency for false operation of the alarm due to excessive leakage current is eliminated by connecting a cold cathode discharge tube, such as a neon lamp, between each line and the common relay controlling the alarm. A separate battery will also be provided to operate the relay and the discharge tubes as hereinafter pointed out. 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 embodying a preferred form of the invention.

In the drawing are shown a plurality of telephone lines L_1 , L_2 , and L_3 interconnect-

ing subscribers' stations with central office equipment. The subscribers' station connected to line L_1 would comprise the usual equipment such as the ringer 1, induction coil 2, receiver 3, and transmitter 4. The stations connected to lines L_2 and L_3 would comprise similar equipment. The lines would terminate at the central office in the jacks J_1 , J_2 and J_3 . At these jacks the tip sides of the lines would be extended to signaling equipment and the ring sides of the lines would be grounded as shown at 5, 6 and 7. An operator's cord terminating in the plug P_1 might be provided for establishing connections with the lines. Connected in series with each line at the central office would be the subscribers' line lamps 8, 15 and 17. These would be connected to the common central office battery 9. The relay 11 and battery 12, which is common to all of the lines, is provided at the central office for controlling an alarm device 13. A cold cathode discharge tube, such as the neon lamps 10, 14, and 16, is provided, connected between each line and the common alarm relay 11.

The arrangements of the invention operate in the following manner:

The regular line lamp 8 forms a shunt around the neon lamp 10, the relay 11, and the alarm battery 12, and serves to prevent the breakdown of the neon lamp 10 until the line L_1 is closed by the subscriber. During the time the line L_1 is idle, leakage current flows from the central office battery 9 through the line lamp 8 to leakage ground and produces a potential drop across the line lamp 8. This drop is negligible and, when added to the voltage of the alarm battery 12, the total voltage will not be enough to break down the neon lamp 10. It is pointed out that without this shunt the total voltage of the central office battery 9 and alarm battery 12 would be applied across the neon lamp 10 to leakage ground and might cause false operation of the arrangements.

When the line L_1 is closed by the subscriber originating a call, the leakage path to ground is shunted by the loop resistance at the line and the line lamp 8 lights from the central

office battery 9. The increased current produces an increased potential across the lamp 8 which is of sufficient magnitude so that when added to the voltage of the alarm battery 12 it will break down the neon lamp 10. The internal resistance of the neon lamp is greatly reduced after break-down and passes through current to operate a common relay 11 which in turn will operate the alarm device 13.

When the operator answers, by inserting her cord circuit into the jack J_1 the circuit through which the line lamp 8 is operated is opened at the jack J_1 . The circuit conditions are then changed so that the line lamp 8 and the neon lamp 10 are in series with the alarm battery 12 only. The resulting voltage across the neon lamp 10 under these conditions will be so low that the lamp 10 will be extinguished. This will cause the common relay 11 to release and stop the alarm.

The operation of the signaling arrangements with respect to other lines such as the lines L_2 and L_3 is similar to that heretofore described. The line lamps such as 8, 15, and 17, might each be replaced by an equivalent resistance such as that shown in dotted lines at 20. Under these conditions the neon lamps might be used to indicate the calling line without changing the operation of the above arrangements.

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

What is claimed is:

1. A telephone system comprising a plurality of subscribers' telephone lines terminating at a central office, subscribers' line lamps connected in series with each line to a common battery at said office, and an alarm relay at said office common to all of said lines, said relay being connected through an auxiliary battery to said common battery and through individual cold cathode discharge tubes to each of said lines.

2. A telephone system comprising a plurality of subscribers' telephone lines terminating at a central office, subscribers' line lamps connected in series with each line to a common battery at said office, and an alarm relay at said office common to all of said lines, said relay being connected through an auxiliary battery to said common battery and through individual gas filled discharge lamps to each of said lines, the voltage of said auxiliary battery alone being insufficient to break down or maintain said discharge lamps in operation.

3. A telephone system comprising a plurality of subscribers' telephone lines terminating at a central office, subscribers' line

lamps connected one in series with each of said lines to a common battery at said central office, a circuit connected in parallel with one of said subscribers' line lamps, said circuit including a discharge tube and an alarm relay and an auxiliary battery, and another circuit in parallel with another of said subscribers' line lamps, said last mentioned circuit including another discharge tube and said alarm relay and said auxiliary battery.

4. A telephone system comprising a plurality of subscribers' telephone lines terminating at a central office, a plurality of resistance elements connected one in series with each of said lines to a common battery at said central office, and an alarm relay at said central office common to all of said lines, said relay being connected through an auxiliary battery to said common battery and through individual discharge tubes to each of said lines, the voltage of said auxiliary battery alone being insufficient to break down or maintain said discharge tubes in operation and the voltage drop across each of said resistance elements due to leakage currents from said common battery to ground being insufficient when added to the voltage of said auxiliary battery to break down or maintain said discharge tubes in operation.

In testimony whereof, I have signed my name to this specification this 6th day of July, 1931.

HENRY M. BASCOM.