

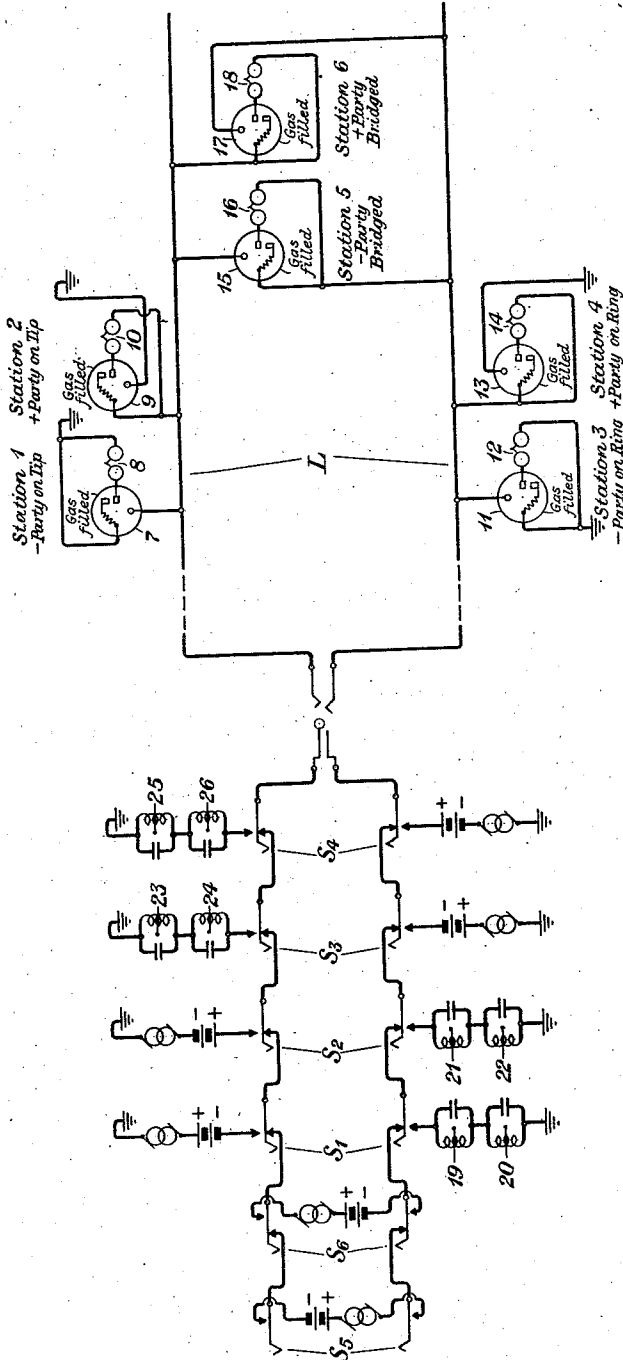
Sept. 24, 1946.

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2,408,299

SELECTIVE SIGNALING SYSTEM

Filed Nov. 18, 1944



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2,408,299

SELECTIVE SIGNALING SYSTEM

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Application November 18, 1944, Serial No. 564,127

4 Claims. (Cl. 179—86)

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This invention relates to selective systems and more particularly to arrangements for causing the selective operation of electro-responsive devices such, for example, as telephone ringers on a multi-party telephone line.

One of the systems utilized in the past to accomplish selective signaling on multi-party telephone lines has utilized two stations connected between the tip side of the line and ground and two stations connected between the ring side of the line and ground. The stations connected to the tip side of the line would be oppositely poled and one would operate when negative pulsating current was applied to the tip and the other would operate when positive pulsating current was applied to the tip. In like manner the two stations connected to the ring side of the line would be oppositely poled and one would operate when negative pulsating current was applied to the ring and the other would operate when positive pulsating current was applied to the ring. Such a system provides means for selectively signaling four stations. The arrangements of the invention provide means whereby additional stations may be added to such a system and these additional stations may also be selectively signaled without interference to or from the previously mentioned stations. In one embodiment of the invention this is accomplished by bridging oppositely poled stations across the line and providing means at the central office for preventing the signaling currents normally used for operating the original four stations from affecting the bridged stations. Also the bridged stations are so connected that the signaling currents applied to selectively operate them will not affect the original four stations. 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 illustrating a preferred embodiment of the invention.

In the drawing is shown a line L which might be a multi-party telephone line. Connected to the line L are a plurality of stations such as 1, 2, 3, 4, 5 and 6. Only the signal responsive arrangements of these stations are illustrated. Stations 1 and 2 are connected to the tip of line L and each includes a ringer such as the ringers 8 and 10. These ringers are connected to the tip side of the line by means of the gas-filled tubes 7 and 9. The connections of these tubes are such that the stations 1 and 2 are oppositely poled. Connected between the ring side of the line and ground would be the signal responsive arrangements of stations 3 and 4. These each include the ringers such as 12 and 14 connected to the ring side of the line through the gas-filled tubes 11 and 13.

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The connections of the gas-filled tubes are such that the ringers are oppositely poled. Bridged across the line are shown the signal responsive means of stations 5 and 6. Each of these includes a ringer such as the ringers 16 and 18. These ringers are bridged across the line by means of the gas-filled tubes 15 and 17 in such a manner that they are oppositely poled. At the central office would be provided a plurality of switches such as S₁, S₂, S₃, S₄, S₅ and S₆ for selectively signaling the respective stations 1, 2, 3, 4, 5 and 6.

To signal station 1, switch S₁ would be operated. This would apply negative pulsating current to the tip side of the line. This negative pulsating current, in a manner well-known in the art, would cause the gas-filled tube 7 to break down and operate the ringer 8. The negative pulsating current applied to the tip side of the line, however, would not operate the ringer 10, as the arrangements at station 2 are oppositely poled with respect to those of station 1. In arrangements used in the past, the operation of the switch S₁ would apply ground to the ring side of the line during the ringing period to avoid excessive noise on other cable pairs due to cross induction. However, in accordance with the arrangements of this invention the switch S₁ will connect to the ring side of the line one or more anti-resonant circuits such as 19 and 20. The anti-resonant circuit 20 would present a high impedance at, for example, 20 cycles, which might be the frequency of the pulsating current applied to the tip side of the line. The introduction of this impedance by the anti-resonant circuit 20 would prevent the operation of the tubes and ringers at stations 5 and 6. Because of the unsymmetrical wave shape of the pulsating current applied to the tip of the line, it might be desirable to provide an additional anti-resonant circuit such as 19 to introduce sufficient impedance to the second harmonic of the pulsating current which might be transmitted over the line, so that this second harmonic would not operate the gas-filled tubes 15 and 17 of stations 5 and 6. It is pointed out that as the circuits 19 and 20 are not anti-resonant at the higher noise frequencies they effectively ground the ring side of the line with respect to these frequencies and hence prevent excessive noise on other cable pairs due to cross induction. To operate the signal responsive means at station 2 the switch S₂ would be operated. This would apply positive pulsating current to the tip side of the line and, in a manner well-known in the art, would cause the gas-filled tube 9 to operate and cause the ringer 10 to operate, but it would have no effect on the gas-filled tube 7 and ringer 8. In like manner, the operation of the switch S₂ would connect the anti-resonant circuits 21 and 22 similar to 19 and 20 to the ring side of the line, so that the positive

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pulsating current or harmonics thereof would not operate the signal responsive apparatus at stations 5 and 6. In a similar manner the operation of either the switch S_3 or S_4 would cause the signal responsive apparatus at station 3 or station 4 to operate by applying either negative pulsating current or positive pulsating current to the ring side of the line. When switch S_3 is operated, the anti-resonant circuits 23 and 24 would be connected to the tip side of the line, and when switch S_4 is operated the anti-resonant circuits 25 and 26 would be connected to the tip side of the line to prevent the operation of the signal responsive apparatus at stations 5 and 6. To operate the signal responsive apparatus at station 5, the switch S_5 would be operated. This would apply negative pulsating current out over the tip side of the line and back over the ring side of the line, and would cause the gas-filled tube 15 to break down and operate the ringer 16. The gas-filled tubes utilized have a definite break-down voltage as, for example, of between 65 and 70 volts. The voltage connected to both sides of the line by the operation of switch S_5 is sufficient to operate the gas-filled tube 15. However, this voltage will not operate the tubes 7 and 13 because they would be connected in series with each other and the resulting voltage applied thereto would be too low. In like manner, the voltage applied to both sides of the line would not operate the gas-filled tubes 9 and 11, as they would be connected in series with each other and the resultant voltage would be too low to cause them to operate. In like manner, the operation of switch S_6 would apply a positive pulsating current to both sides of the line of sufficient voltage to cause the tube 17 to break down and operate the ringer 18 at station 6. As this voltage would be applied to tubes 7 and 13 in series and to tubes 9 and 11 in series, the resultant voltage would not be sufficient to break these tubes down.

While this 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 line having a plurality of signal responsive devices connected thereto, certain of said devices being oppositely poled with respect to each other and operatively connected between one side of said line and ground, certain of said devices being oppositely poled with respect to each other and operatively connected between the other side of said line and ground, certain of said devices being oppositely poled with respect to each other and operatively bridged across said line, switching mechanism for connecting positive or negative pulsating current between one side of said line and ground to selectively operate any of the signal responsive devices connected to said side of the line and means connected by said switching mechanism between the other side of the line and ground for presenting sufficient impedance to said pulsating current to prevent its operation of said devices bridged across said line.

2. A line having a plurality of signal responsive devices connected thereto, certain of said devices being oppositely poled with respect to each other and operatively connected between one side of said line and ground, certain of said devices being oppositely poled with respect to

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each other and operatively connected between the other side of said line and ground, certain of said devices being oppositely poled with respect to each other and operatively bridged across said line, switching mechanism for connecting positive or negative pulsating current between one side of said line and ground to selectively operate any of the signal responsive devices connected to said side of the line, means connected by said switching mechanism between the other side of the line and ground for presenting sufficient impedance to said pulsating current to prevent its operation of said devices bridged across said line, and additional switching means for connecting positive or negative pulsating current across said line to selectively operate any of said signal responsive devices bridged across said line.

3. A line having a plurality of signal responsive devices connected thereto, two of said devices being oppositely poled with respect to each other and connected between one side of said line and ground, another two of said devices being oppositely poled with respect to each other and connected between the other side of said line and ground, another two of said devices being oppositely poled with respect to each other and bridged across said line, switching mechanism for connecting positive or negative pulsating current between one side of said line and ground to selectively operate either of the signal responsive devices connected to said side of the line, circuits anti-resonant at the frequency of the pulsating current and harmonics thereof, and means controlled by said switching means for connecting said anti-resonant circuits between the other side of the line and ground to prevent the pulsating current or harmonics thereof from operating said devices bridged across said line.

4. A line having a plurality of signal responsive devices connected thereto, two of said devices being oppositely poled with respect to each other and operatively connected between one side of said line and ground, another two of said devices being oppositely poled with respect to each other and operatively connected between the other side of said line and ground, another two of said devices being oppositely poled with respect to each other and operatively bridged across said line, switching mechanism for connecting positive or negative pulsating current between one side of said line and ground to selectively operate either of the signal responsive devices connected to said side of the line, means connected by said switching mechanism between the other side of the line and ground for presenting sufficient impedance to said pulsating current to prevent its operation of said devices bridged across said line, and additional switching means for connecting positive or negative pulsating current across said line to selectively operate either of said signal responsive devices bridged across said line, each of said signal responsive devices including a gas-filled discharge tube and a ringer connected to said line through its associated tube, the break-down voltage of each tube and the voltage of the pulsating current utilized being such that the application to a single tube of the voltage of the pulsating current will cause it to operate but the application of the voltage of the pulsating current to two of said tubes connected in series will not cause them to operate.

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