

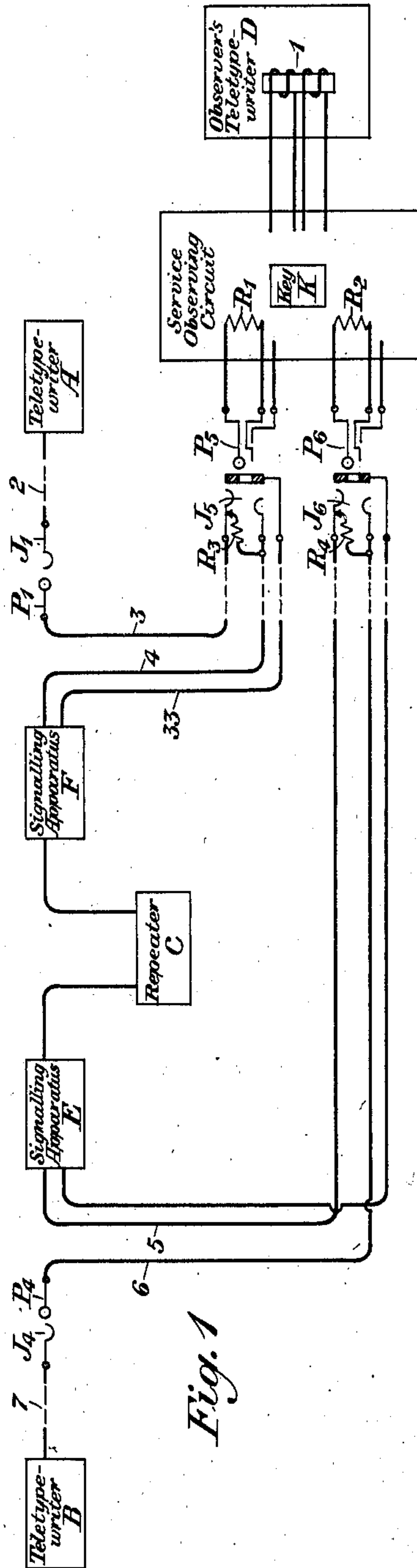
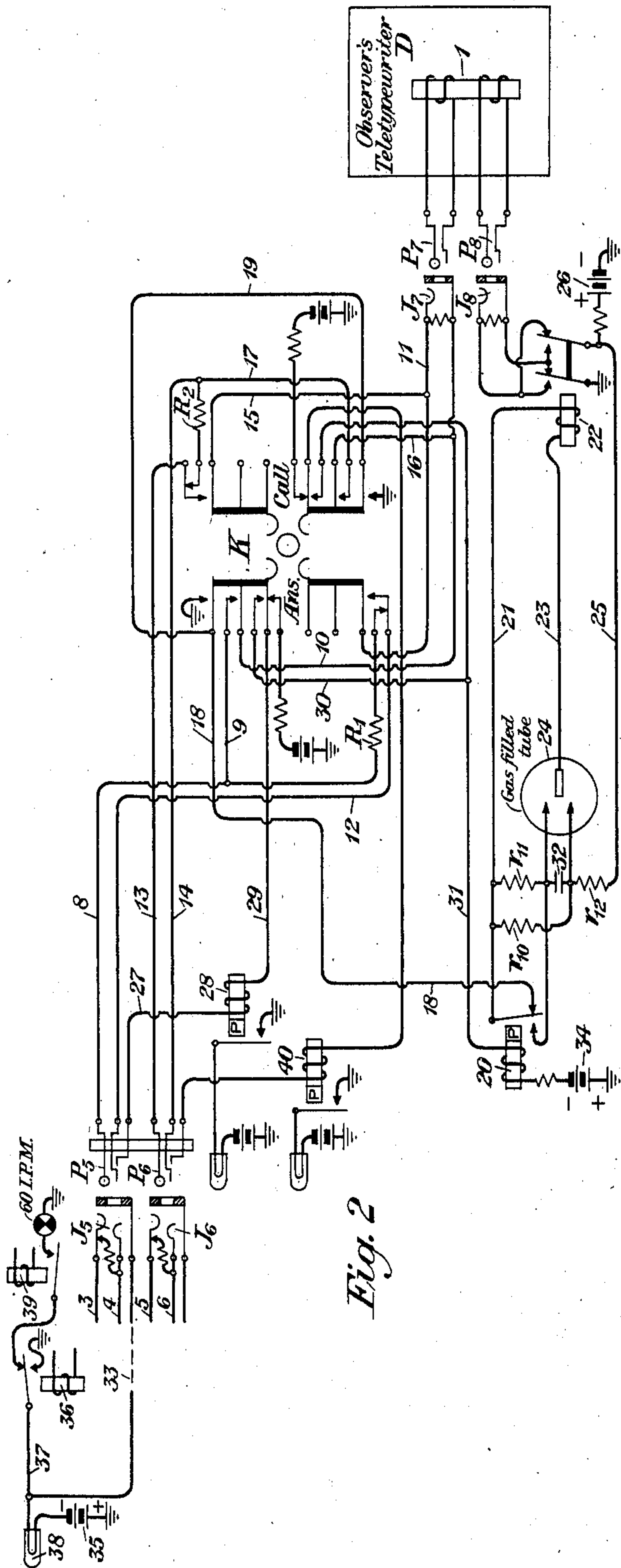
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TELEGRAPH SYSTEM

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TELEGRAPH SYSTEM

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This invention relates to telegraph systems and more particularly to improved means for observing the service rendered on such systems.

In certain types of telegraph systems, such for example as teletypewriter systems, it has been the practice to connect individual stations through cord circuits to jacks at a service observing station. The service observing operator may through these jacks connect apparatus to any one of the individual stations and observe the types of signals being transmitted by or to said station. The service observer's apparatus has usually consisted of circuit arrangements including a key adapted to be moved from a neutral position to either a calling position or an answering position and connections to a teletypewriter set used to observe the signals or service rendered by the individual station under consideration. When the service observer's teletypewriter is not connected to a station for observation purposes, it is desirable that it be kept in an inactive or closed condition in order that it may be kept quiet and not give out undesired chatter or noise. Accordingly it has been the practice to provide a holding circuit for the service observer's teletypewriter completed through the operating winding of the line relay in the service observer's teletypewriter and over the contacts of the key in the service observer's equipment when said key is in its neutral position to keep the service observer's teletypewriter in an inactive or closed condition. Every time the service observer's equipment is connected to a line this key must be thrown either to the answering or calling position to connect the observer's teletypewriter to the line and to open this holding circuit so that signals from the station under observation may be received. After a call is completed and the service observation finished the operator must restore the key to its neutral position to again close the holding circuit in order to keep her teletypewriter quiet. This obviously results in a great many operations of the key and, as the service observer has many duties, is undesirable. After the station under observation completes its call, it will disconnect and send a disconnect signal to the central office. There will then ensue an interval, sometimes as much as two minutes, during which the operator ascertains the time of the call and the charges thereon. The operator may then recall the station and make the report. It is pointed out that in prior service observing equipment the key, during this interval must not be returned to its neutral position because the service observing operator still wants to observe the operator's report on the time and

charge for the call. Hence during this interval, when there are no signals on the line, the service observing operator's teletypewriter will remain in its active or open condition and may cause undesired noise and chatter. This too is undesirable.

It is one of the objects of this invention to provide service observer's equipment in which the key may be moved from its neutral position and left either in the calling or answering position and have the service observer's teletypewriter remain in its inactive or closed position when the equipment is not connected to a line for observation. When the equipment is connected to a line for observation the service observer's teletypewriter will automatically be changed from its inactive or closed condition to its active or open position so that it may record the signals to be observed. Means are also provided operative when the line under observation sends a disconnect signal to change the service observer's teletypewriter back to its inactive or closed state during the interval while the operator is figuring out the time and charge for the call. This will prevent noise from the teletypewriter during said interval. Means are also provided to automatically change the service observer's teletypewriter back to its active or open condition when the operator signals the station and the station answers to receive her report on time and charges. The foregoing is accomplished by not utilizing the operating winding of the line relay for a holding circuit, but by utilizing an additional winding on said relay for controlling the condition of the service observer's teletypewriter and changing the direction of current flow through said additional winding at desired times. With such arrangements many movements of the key are eliminated and disturbing noises are avoided at the service observer's position. A further object of the invention is to provide arrangements whereby the service observer's teletypewriter may remain in its active or open condition when the subscriber sends a recall signal but will not be operated by said recall signal. 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 Figures 1 and 2 of which the invention is illustrated. Similar reference characters have been used to designate like parts in both of the figures. Figure 1 is a circuit diagram showing schematically arrangements for observing the service between the teletypewriter station A and the teletypewriter station B. Fig.

2 is a circuit diagram showing in more detail the arrangements of the service observing set.

In Fig. 1 the teletypewriter station A is shown connected through the service observing equipment G to a teletypewriter B. The teletypewriter station A is connected to the contacts of a jack J₅ at the service observing station and the teletypewriter station B is connected to jack J₆ at the service observing station. The connection between A and B will be established through a cord circuit comprising the repeater C, supervisory signaling apparatus E and supervisory signaling apparatus F. The service observing circuit includes a key K which may be thrown from a neutral position either to an answering position or a calling position. Connected to the service observing circuit G is the observer's teletypewriter D. Only the line relay 1 of teletypewriter D is shown. The upper winding of this relay is its operating winding and the lower winding may be termed a biasing winding for controlling the condition of the teletypewriter under various conditions. If it is desired to observe the service from teletypewriter A to teletypewriter B, plugs P₅ and P₆ will be inserted in the jacks J₅ and J₆. Plug P₁ will be inserted in jack J₁ and plug P₄ will be inserted in jack J₄. The key K will be thrown to its answering position and thus connect the conductors of the operating winding of relay 1 in place of resistance R₁. A call from A to B will then be completed over the following path. From teletypewriter A, conductor 2, contacts of jack J₁ and plug P₁, conductor 3, tip contacts of jack J₅ and plug P₅, upper winding of relay 1, ring contacts of plug P₅ and jack J₅, conductor 4, through repeater C, conductor 5, tip contacts of jack J₆ and plug P₆, resistance R₂, ring contacts of plug P₆ and jack J₆, conductor 6, contacts of plug P₄ and jack J₄, conductor 7 to the teletypewriter B. If the key K were thrown to the calling position the upper winding of relay 1 would be connected in place of resistance R₂. The connection would then be established substantially as heretofore described except that it would be completed through resistance R₁ instead of through resistance R₂. The signals between A and B would be repeated on the observer's teletypewriter D and thus an indication of the service could be had. When the service observing circuit is not connected to the telegraph system the connection between A and B would be completed over resistances R₃ and R₄ instead of through the service observing circuit G.

In Fig. 2 the circuit arrangements of the service observing circuit G are shown in detail. As heretofore pointed out, to observe the service to and from teletypewriter A, plugs P₅ and P₆ will be inserted in jacks J₅ and J₆ and the key K will be thrown to the left or answering position. Under these conditions the signaling circuit from A to B will be completed as follows: From conductor 3, tip contacts of jack J₅ and plug P₅, conductor 8, conductor 9, make contact of key K, conductor 10, sleeve contacts of jack J₇ and plug P₇, operating winding of the line relay 1 of the observer's teletypewriter D, tip contacts of plug P₇ and jack J₇, conductor 11, lower make contact of key K, conductor 12, ring contacts of plug P₅ and jack J₅ to conductor 4. The circuit will then be extended, as pointed out heretofore, through the repeater C to conductor 5. The circuit will then be further extended as follows: From conductor 5, tip contacts of jack J₆ and plug P₆, conductor 13, upper break contact of key K, resistance R₂, conductor 14, ring contacts of plug P₆ and jack J₆ to conductor 6 and thence to the teletypewriter B. On

the other hand, if the key K is thrown to the right or calling position a connection will be established through the service observing circuit G as follows: From conductor 3, tip contacts of jack J₅ and plug P₅, conductor 8, resistance R₁, lower break contact of key K, conductor 12, ring contacts of plug P₅ and jack J₅ to conductor 4. The circuit will then be extended from conductor 4 through repeater C to conductor 5. From thence the circuit will be extended as follows: From conductor 5, tip contacts of jack J₆ and plug P₆, conductor 13, upper make contact of key K, conductor 15, tip contacts of jack J₇ and plug P₇, operating winding of the observer's teletypewriter D, sleeve contacts of plug P₇ and jack J₇, conductor 16, make contact of key K, conductor 17, conductor 18, ring contacts of plug P₆ and jack J₆ to conductor 6 and thence to teletypewriter B. The foregoing illustrates how circuit arrangements may be completed through the service observing circuit G for a connection between the teletypewriters A and B.

At night when the apparatus is not in use key K is left in its neutral position. When the key K is in its neutral position ground connected to the upper left-hand make contact and lower right-hand make contact of key K is disconnected from conductors 18 and 19. Thus ground is disconnected from a circuit extending from conductors 19 and 18 over the following path; right-hand contact and armature of relay 20, conductor 21, winding of relay 22, conductor 23, electrodes of gas-filled tube 24, conductor 25, battery 26 to ground. The removal of this ground will prevent the operation of the gas-filled tube 24 and also prevent it from being continuously operated at night which is unnecessary. When the relay 22 is unoperated, as shown, the positive pole of battery 26 is connected to the tip contacts of jack J₈ and plug P₈ and ground is connected to the sleeve contacts of jack J₈ and plug P₈. This results in a flow of current through the lower or biasing winding of the printer relay 1 in such a direction as to maintain the teletypewriter D in its active or open position. However, at night, the source of power supply for the teletypewriter D is shut off and then, though it remains in its active or open condition, it cannot operate and cause any noise.

When the service observing operator reaches her position in the morning, she will first throw her key K either to the answering or calling position. Let it be assumed that she throws the key to the left or answering position. Ground from the upper left-hand make contact of key K will then be applied to conductor 18 and thence to the previously traced circuit through the gas-filled tube 24. The gas-filled tube 24 will break down and discharge and operate relay 22 due to the potential built up across condenser 32. The operation of relay 22 will now connect ground to the tip contacts of jack J₈ and plug P₈ and the positive pole of battery 26 to the sleeve contacts of jack J₈ and plug P₈. This will reverse the direction of current flow through the biasing winding line relay 1 of the teletypewriter D. The current in this biasing winding will now be in a direction to maintain the teletypewriter D in its inactive or closed condition. Under such a condition it will remain quiet and not cause any disturbing noise while plugs P₅ and P₆ are not connected to jacks J₅ and J₆. Let it be assumed that in response to signaling means, not shown, at jacks J₅ and J₆, it is desired to observe the service between the teletypewriters A and B. As heretofore pointed out, plugs P₅ and P₆ will be

inserted in jacks J₅ and J₆, and as the key K has already been thrown to its answering position, one of the previously traced circuits will be completed through the service observing circuit G and the observer's teletypewriter D between teletypewriters A and B. The following circuit will also be completed over the sleeve circuits of jack J₅ and plug P₅; from sleeve contacts of jack J₅ and plug P₅, conductor 27, winding of relay 28, conductor 29, make contact of key K, conductor 30, conductor 31, winding of polar relay 20 to battery 34 and ground. Battery 34 has a voltage of 24 volts, and has its negative pole connected to the winding of relay 20. The foregoing circuit will also be completed from the sleeve contact of jack J₅, conductor 33, filament of lamp 38 to battery 35 and ground. Battery 35 has a voltage of 48 volts and has its negative pole connected to the filament of lamp 38. Due to the difference in voltage between batteries 35 and 34, the current through the winding of polar relay 20 will be sufficient to operate it. This current, however, will not operate polar relay 28 because its winding is so arranged that the current will be in the wrong direction. The operation of relay 20 will at its right-hand armature and contact break the previously traced circuit through gas-filled tube 24 and cause relay 22 to release. The release of relay 22 will again connect positive battery to the tip contacts of jack J₈ and plug P₈ and ground to the sleeve contacts of jack J₈ and plug P₈. Accordingly, the direction of current flow through the biasing winding of line relay 1 will now be in a direction to cause the teletypewriter D to be in its active or open condition, and hence it will repeat the signals transmitted through its operating winding. After the subscriber at teletypewriter A finishes his message, he will transmit to the supervisory signaling apparatus at F over circuit arrangements not shown, a disconnect signal. This disconnect signal will operate the relay 36. Ground will now be connected from the lower contact and armature of relay 36 to conductor 37 and conductor 33, and thence to the previously traced circuit for relays 28 and 20. This connection of ground to conductor 37 will short-circuit battery 35, and the operating current for relays 28 and 20 will now be received from battery 34. The direction of current flow will now be reversed and will be such that relay 20 will release and relay 28 will operate. The release of relay 20 will again close at its right-hand contact and armature the previously traced circuit for the gas-filled tube 24 and will cause relay 22 to reoperate. This in turn will reverse the connections from ground and battery 26 to the contacts of jack J₈ and plug P₈, and will reverse the direction of current flow through the biasing winding of line relay 1. The direction of current flow through the biasing winding 1 will again be such that it will be in its inactive or closed condition. It will remain in this condition during the interval when the operator is figuring out the time and charges on the call. The operator will then signal station A and station A will be reconnected to the line. When station A is reconnected to the line, relay 36 will, in a well-known manner, be released. This will remove ground from conductors 37 and 33 and allow battery 35 to be effectively connected to conductor 33 and the previously traced circuit for relays 28 and 20. The condition of current flow now, through relays 28 and 20, will be such that relay 28 will be released and relay 20 will

again be operated. As heretofore pointed out, the operation of relay 20 will result in the release of relay 22, and the ground and battery connected to the contacts of jack J₈ and plug P₈ will again be as shown in the drawing. This will result in a current flow through the biasing winding of line relay 1 in such a direction that it will again return to its active or open condition so that teletypewriter D may repeat the ensuing signals. The constants of resistances R₁₀, R₁₁, R₁₂ and condenser 32 are such that the circuit including the gas-filled discharge tube 24 will have a certain time lag say, for example, at least three-quarters of a second in its operation for the following reason. Recall signals from the subscriber at A will, in turn, in a well-known manner, operate relay 39. The operation of relay 39 will apply intermittent ground at the rate of sixty times per minute to the previously traced circuit including relay 20. However, due to the time lag in the circuit including the gas-filled tube 24, these signals will not cause the tube to break down and operate even though the relay 20 may be intermittently released. Hence, such signals will have no effect on relay 22 or the biasing winding of the line relay 1.

The operation of the arrangements when the key K is thrown to the right or calling position is substantially the same as heretofore, except that the circuit for relay 20 is now completed through the winding of relay 40 in place of the relay 28. It is pointed out that there would be provided at E circuit arrangements similar to those including lamp 38 and relays 36 and 39 and these would be connected to the sleeve of jack J₆.

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. A telegraph system including two stations interconnected by a transmission line, and means for observing the service between said stations comprising service observing equipment adapted to be connected to said line, signal receiving apparatus connected to said equipment, said signal receiving apparatus including a line relay having an operating winding and a biasing winding, said service observing equipment including switching mechanism adapted to be thrown from a neutral position to a first or a second position, a circuit including said biasing winding, and means controlled by the operation of said switching mechanism for reversing the direction of current flow in the circuit including said biasing winding.

2. A telegraph system including two stations interconnected by a transmission line, and means for observing the service between said stations comprising service observing equipment adapted to be connected to said line, signal receiving apparatus connected to said equipment, said signal receiving apparatus including a line relay having an operating winding and a biasing winding, said service observing equipment including switching mechanism adapted to be thrown from a neutral position to a first or a second position, a circuit including said biasing winding and so arranged that when said switching mechanism is in its neutral position the direction of current flow in said circuit and biasing winding will be such that said signal receiving apparatus will be in an active or open condition, and means controlled by

the operation of said switching mechanism for reversing the direction of current flow in said circuit so that said signal receiving apparatus will be in an inactive or closed condition.

3. A telegraph system including two stations interconnected by a transmission line, and means for observing the service between said stations comprising service observing equipment adapted to be connected to said line, signal receiving apparatus connected to said equipment, said signal receiving apparatus including a line relay having an operating winding and a biasing winding, said service observing equipment including switching mechanism adapted to be thrown from a neutral position to a first or a second position, a circuit including said biasing winding and so arranged that when said switching mechanism is in its neutral position the direction of current flow in said circuit and biasing winding will be such that said signal receiving apparatus will be in an active or open condition, means controlled by the operation of said switching mechanism for reversing the direction of current flow in said circuit so that said signal receiving apparatus will be in an inactive or closed condition, and means operative after said switching mechanism is operated and said service observing equipment is connected to said line for reversing the direction of current flow in said circuit from its last mentioned direction whereby said signal receiving apparatus will be restored to its active or open condition.

4. A telegraph system including two stations interconnected by a transmission line, and means for observing the service between said stations comprising service observing equipment adapted to be connected to said line, signal receiving apparatus connected to said equipment, said signal receiving apparatus including a line relay having an operating winding and a biasing winding, said service observing equipment including switching mechanism adapted to be thrown from a neutral position to a first or a second position, a circuit including said biasing winding and so arranged that when said switching mechanism is in its neutral position the direction of current flow in said circuit and biasing winding will be such that said signal receiving apparatus will be in an active or open condition, means controlled by the operation of said switching mechanism for re-

versing the direction of current flow in said circuit so that said signal receiving apparatus will be in an inactive or closed condition, means operative after said switching mechanism is operated and said service observing equipment is connected to said line for reversing the direction of current flow in said circuit from its last mentioned direction whereby said signal receiving apparatus will be restored to its active or open condition and means operative after the foregoing chain of events takes place and when one of said stations sends a disconnect signal and disconnects from said line for reversing the direction of current flow in said circuit from its last mentioned direction whereby said signal receiving apparatus will be again restored to its inactive or closed condition.

5. A telegraph system including two teletypewriter stations interconnected by a transmission line, and means for observing the service between said stations comprising service observing equipment adapted to be connected to said line, an observer's teletypewriter connected to said equipment, said observer's teletypewriter including a line relay having an operating winding adapted to be included by said service observing equipment in said transmission line and a biasing winding, said service observing equipment including a key adapted to be thrown from a neutral position to either an answering or calling position, a circuit including said biasing winding, the current flow in said circuit when said key is open being in such a direction as to maintain said service observer's teletypewriter in an active or open condition, a second circuit completed over the contacts of said key when operated for changing the direction of current flow in said first circuit whereby said service observer's teletypewriter will be in an inactive or closed condition, means operative when said key is operated and said service observer's equipment is connected to said line for opening said second circuit whereby the direction of current flow in said first circuit will be reversed from its last mentioned direction so as to maintain said service observer's teletypewriter in an active or open condition, and means to introduce a time lag in the operation of said second circuit.

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