

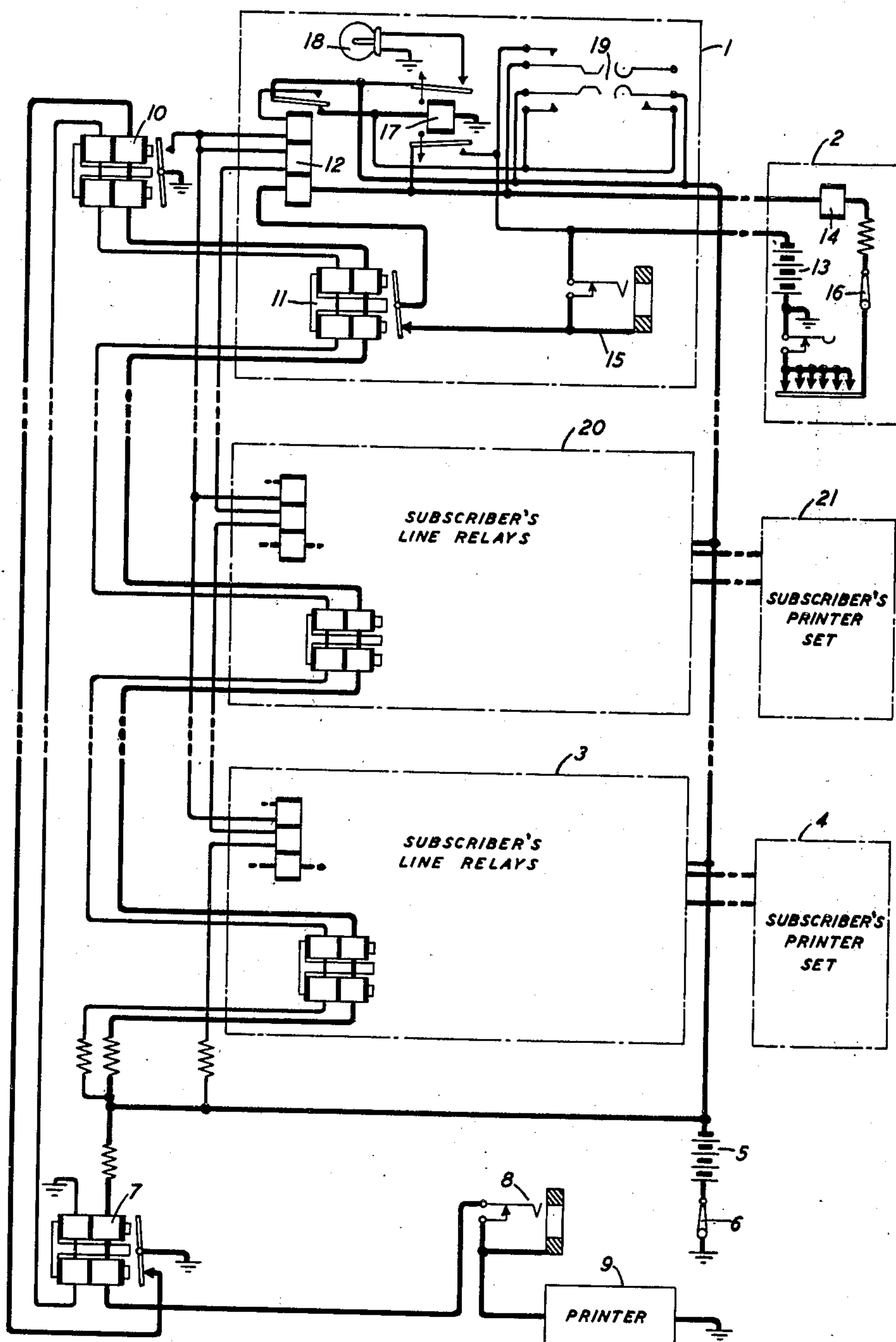
Nov. 13, 1934.

A. WEAVER

1,980,305

TELEGRAPH SWITCHING SYSTEM

Filed April 7, 1933



INVENTOR
A. WEAVER
BY *g e 70 r*
ATTORNEY

UNITED STATES PATENT OFFICE

1,980,305

TELEGRAPH SWITCHING SYSTEM

Allan Weaver, Port Washington, N. Y., assignor
to American Telephone and Telegraph Com-
pany, a corporation of New York

Application April 7, 1933, Serial No. 665,000

9 Claims. (Cl. 178—2)

This invention relates to printing telegraph switching systems of the type wherein a central station is adapted to transmit messages simultaneously to a plurality of printer stations connectible thereto. Systems of this type usually comprise a central switchboard having one or more printer transmitter sets and associated printing telegraph stations located at a distance from the switchboard and individually connectible thereto by transmission lines. The simultaneous transmission of signals to a plurality of printer stations connected to the system, commonly known as broadcasting, is usually effected by the operation of a key at the switchboard which automatically associates each printer station with a special broadcast printer set. Several such arrangements are disclosed in Patent 1,762,252 granted June 10, 1930 to G. S. Vernam, Patent 1,798,235 granted March 31, 1931 also to G. S. Vernam, and in Patent 1,642,037 granted September 13, 1927 to C. E. Lomax.

According to arrangements heretofore employed, a printing telegraph station may signal the operator at the switchboard for disassociation from the broadcast circuit while still receiving broadcast messages. The operator at the broadcasting switchboard would then effect the disassociation of that station by the actuation of one or more switching devices at the switchboard.

It has been found, however, that for certain business organizations, it is often desirable in a telegraph system provided with a broadcasting feature, that a particular station receiving the broadcast signals be able to disassociate itself from the broadcasting circuit and automatically inform the operator at the broadcasting switchboard of this action. Provided that this could be done, it would consequently be advantageous for the broadcasting switchboard operator to be able to restore the disassociated printer station to the broadcast receptive condition without the assistance of the subscriber at that station.

An arrangement for accomplishing these objects is described in Patent 1,915,366 granted June 27, 1933 to F. S. Kinkead. However, this arrangement enables a subscriber to disassociate his printing telegraph station from a broadcasting circuit only when there is a long marking impulse being transmitted to his station by the broadcasting printer. In other words, by using this arrangement, a subscriber cannot disassociate his printing telegraph station from a broadcasting circuit while alternate marking and spacing impulses are being transmitted over the

broadcasting circuit at the broadcasting station.

It is an object of the present invention to enable a subscriber at a printing telegraph station associated with a broadcasting circuit to disassociate his station from the broadcasting circuit irrespective of whether or not alternate marking and spacing impulses are being transmitted over the broadcasting circuit to his station by the broadcasting printer.

The preferred embodiment of this invention is a radial telegraph switching system comprising a broadcasting switchboard and a plurality of printing telegraph stations connectible thereto by means of communication lines. Serially connected in the transmission lines and located at the broadcasting switchboard are jacks for the insertion of a printing telegraph set when individual communication between the operator of a printing telegraph station and the operator at the broadcasting switchboard is desired.

Instrumentalities located at the broadcasting switchboard are provided to enable a subscriber at a printing telegraph station to disassociate his station from the broadcasting circuit. These instrumentalities may be operated by the subscriber at the particular station desiring to be disassociated irrespective of whether or not alternate marking and spacing impulses are being transmitted over the broadcasting circuit to that station by the broadcasting printer. When these instrumentalities are operated, they also cause the operation of an alarm device located at the broadcasting switchboard for the purpose of informing the switchboard operator of the disassociation.

The operator at the broadcasting switchboard may restore a disassociated station to the broadcast receptive condition and may stop the operation of the alarm device by means of a switch located at the broadcasting switchboard. This switch also enables the operator at the broadcasting switchboard to stop the operation of the alarm device without restoring the disassociated printer station to the broadcast receptive condition.

These and other features of the invention will be more fully described in connection with a detailed description of the invention with reference to the single figure of the drawing which represents a printing telegraph broadcasting system arranged in accordance with this invention.

The switchboard relays and apparatus shown at 1 are associated with the subscriber's printing telegraph set represented at 2. A similar ar-

5 rangement of switchboard relays and apparatus is indicated at 3 and 20 for other subscribers' printing telegraph sets indicated at 4 and 21. Any convenient number of printing telegraph sets may be associated with the broadcasting system and their respective line relays can be placed on the broadcasting switchboard between either relay groups 1 and 20 or relay groups 3 and 20.

10 For the sake of simplicity, the invention will be described as applied to the operation of the switchboard relays and apparatus shown at 1 and to the subscriber's printing telegraph set represented at 2. It is to be understood that the other groups of switchboard apparatus for the other subscribers' printing telegraph sets operate in a similar manner.

15 For the sake of clarity, the invention will first be described with reference to the normal condition of the broadcasting system which is that shown in the drawing. Secondly, the invention will be described as applied to circuit conditions when alternate marking and spacing impulses are being transmitted throughout the broadcasting system. Thirdly, the manner in which a subscriber may disassociate his printing telegraph station will be explained with reference to normal conditions in the broadcasting system. Fourthly, this disassociation will be described with reference to conditions when alternate marking and spacing impulses are being transmitted over the broadcasting circuit. Fifthly, the manner in which the switchboard operator may restore the disassociated station to the broadcast receptive condition will be made clear. Sixthly, miscellaneous features of the invention will be explained.

1. Normal conditions in the broadcasting system

40 As shown in the drawing, the broadcasting circuit is represented as being in its normal condition for the transmission of signals by the "open and close" method, that is, by interrupting continuous current of a given polarity. Under normal conditions, current from battery 5 passes through relay 7 and jack 8 (provided for the insertion of an auxiliary printing telegraph set in case broadcasting printer 9 becomes disabled) to broadcasting printer 9. Interruptions of this current by broadcasting printer 9 affect relay 7 and, since relay 7 is polarized by another winding carrying current from battery 5, cause corresponding interruptions of the marking current, also from battery 5, in the broadcasting circuit. The effect of these interruptions of marking current from battery 5 on relays 10 and 11, which are located in the broadcasting circuit and which are polarized in the same manner as relay 7, will be described hereinafter.

60 The armature of relay 11 normally closes the subscriber's loop for the subscriber's printing telegraph set represented at 2. This enables marking current from battery 13 to pass through the bottom winding of differential relay 12 to the subscriber's receiving relay 14. Since no current is normally passing through the middle and top windings of relay 12, relay 12 will be normally operated by the marking current from battery 13. Each group of subscribers' line relays, as indicated in the drawing, contains relays which correspond to relays 11 and 12 and which operate in a similar manner.

75 Jack 15 is introduced into that part of the subscriber's loop that is located at the broadcasting switchboard in order to provide for the insertion of a printing telegraph set for individual com-

munication between the broadcasting switchboard operator and the subscriber.

The armature of differential relay 12 normally closes a path which enables control current from battery 5 to pass through the armature and bottom contact of relay 12 and then through the winding of slow-release relay 17 to ground thereby operating relay 17.

During periods of non-transmission, switch 6 may be opened in order to conserve battery 5. Switch 16 may also be opened during periods of non-transmission in order to conserve battery 13.

II. Conditions in the broadcasting system when alternate marking and spacing impulses are being transmitted

When alternate marking and spacing impulses are transmitted over the broadcasting circuit, the armature of relay 11 will swing back and forth in response to the interruptions of marking current from battery 5 caused by broadcasting printer 9 in the manner described above. This action will cause corresponding interruptions in the subscriber's loop of marking current from battery 13. Since the bottom winding of differential relay 12 is located in the subscriber's loop, the interruptions of marking current from battery 13 tend to cause intermittent energization of the bottom winding of relay 12.

Likewise, the armature of relay 10 will, during the time that alternate marking and spacing impulses are being transmitted over the broadcasting circuit, swing back and forth in response to interruptions of marking current from battery 5. When the armature of relay 10 is in the opposite position to that shown in the drawing, it will close a path for current from battery 5 to pass through the middle winding of differential relay 12 and then through the contact and armature of relay 10 to ground. This action will tend to cause the intermittent energization of the middle winding of relay 12.

Since relays 10 and 11 operate in the same manner practically simultaneously, relay 12 will tend to be maintained in its operated condition irrespective of whether or not alternate marking and spacing impulses are being transmitted over the broadcasting circuit. This is due to the fact that as soon as the bottom winding of relay 12 begins to become de-energized the middle winding begins to become energized. Similarly, when the middle winding begins to become de-energized, the bottom winding starts to become energized. In order to facilitate this continuous energization of relay 12, the middle and bottom windings are so wound as to aid each other.

III. Disassociation of a subscriber's station under normal conditions

When a subscriber wishes to disassociate his printing telegraph set 2 from the broadcasting circuit, he does so by momentarily operating switch 16 to an open position. This causes a cessation in the flow of current from battery 13 through the subscriber's loop and through the bottom winding of relay 12. If, when the subscriber opens switch 16, the armature of relay 10 happens to be in the position shown in the drawing, no current will be passing through the middle winding of relay 12. Consequently, relay 12 will release and thereby cause the release of slow-release relay 17 by opening its energizing circuit. Current from battery 5 is now provided with a path through the armature and top contact of relay 12 and then through the top wind-

ing of relay 12. However, since this path contains no ground, current from battery 5 cannot follow this path and therefore relay 12 will remain non-operated.

5 When slow-release relay 17 releases, a path is closed for current from battery 5 to pass through the top armature and contact of relay 17 through the alarm device (signal lamp 18) to ground thereby lighting lamp 18. At the same time, the bottom armature of relay 17 will fall down on the bottom contact of relay 17 thus putting a short-circuit across the subscriber's loop. This short-circuit effectively prevents the transmission of broadcast signals from broadcasting printer 9 to receiving relay 14 at the subscriber's station 2 as it is tantamount to cutting relays 11 and 12 out of the subscriber's loop. From this it can be understood that the subscriber should hold switch 16 open for a length of time sufficient to allow relay 17 to release and place the short-circuit across the subscriber's loop. After this short-circuit has been completed, the subscriber may close switch 16 as current from battery 13 will have no effect on differential relay 12 as long as the short-circuit exists.

IV. Disassociation of a subscriber's station when alternate marking and spacing impulses are being transmitted

30 When alternate marking and spacing impulses are being transmitted over the broadcasting circuit, complications ensue. This is because of the fact that, when the armature of relay 10 is in the opposite position to that shown in the drawing, a path is closed for current from battery 5 through the middle winding of relay 12 and then through the contact and armature of relay 10 to ground. This action tends to energize relay 12. Therefore, if the subscriber should open switch 16 when the armature of relay 10 happens to be in the opposite position to that shown in the drawing, relay 12 will not release because its middle winding would be energized.

45 The armature of relay 10 is put into this undesirable position whenever a spacing impulse is transmitted. Fortunately, a spacing impulse is usually of relatively brief duration and as soon as it terminates the armature of relay 10 would revert to the position shown in the drawing. Then, if the subscriber still has switch 16 open, relay 12 would release and effect the desired results described above. However, since some time is consumed in waiting for the armature of relay 10 to return to its normal position, the subscriber must take this into consideration in holding switch 16 open for a length of time sufficient to allow slow-release relay 17 to release.

60 When alternate marking and spacing impulses are being transmitted over the broadcasting circuit, the armature of relay 10 will swing back and forth in response to interruptions of marking current from battery 5. As has been explained above, this action will tend to cause intermittent energization of the middle winding of relay 12. In order to prevent relay 12 from becoming operated after it has once released, a path is provided for current from battery 5 to pass through the armature and top contact of relay 12, through the top winding of relay 12, and then through the contact and armature of relay 10 to ground. However, as has been described above, a path is likewise now provided for current from battery 5 to pass through the middle winding of relay 12 and through the contact and armature of relay 10 to ground. These two currents are

equal and opposite because they both come from battery 5 in opposite directions. It can be seen from the drawing that these equal and opposite currents will meet at a point proximate to the contact of relay 10. The result is that these equal and opposite currents will oppose and compensate for each other and will have no effect on relay 12. To further insure that there will be no energization of relay 12, the top winding is so wound as to oppose the middle winding.

85 From this it can be understood that it is advisable that relay 17 be of the slow-release type as an ordinary relay might be operated by a false disconnect signal, such as that caused by a relatively long open period but which is shorter than a break signal. Also, during the transmission of alternate marking and spacing impulses, an ordinary relay might be falsely operated by that chattering of the armature of relay 12 which would occur if relays 10 and 11 should happen to be out of adjustment so that they did not operate exactly simultaneously.

Therefore, a subscriber may disassociate his printing telegraph station 2 from a broadcasting circuit irrespective of whether or not alternate marking and spacing impulses are being transmitted over the broadcasting circuit. Also, a subscriber may operate an alarm device (signal lamp 18) located at the broadcasting switchboard as an indication to the switchboard operator of the disassociation. Although the alarm device is represented in the drawing as being signal lamp 18, it is to be understood that this is for the purpose of illustration and that the invention is not to be restricted to an alarm device which is a lamp. The invention includes any sort of an alarm device, such as a bell or buzzer.

V. Reassociation of a subscriber's station

When the broadcasting switchboard operator wishes to restore a disassociated printing telegraph station to the broadcast receptive condition, the switchboard operator moves key switch 19 to the release position at the right. This closes a path for control current from battery 5 to pass through the lower right contacts of switch 19 to energize slow-release relay 17 and cause its operation. When relay 17 is operated, its bottom armature will remove the short-circuit from the subscriber's loop thereby restoring the loop to its normal condition. At the same time, the top armature of relay 17 will open the path through the alarm device (signal lamp 18) thus causing it to become non-operated.

When the subscriber's loop is restored to its normal condition, current from battery 13 will again pass through the bottom winding of relay 12 thus causing relay 12 to operate. The operation of relay 12 will pull its armature down to its bottom contact thereby closing a path to energize relay 17 as has been described above. When switch 19 is subsequently released to its normal position, relay 17 will remain operated and the circuit as a whole will be left in its normal position.

Under certain conditions, it may be desirable that the subscriber remain disconnected for a longer length of time. Accordingly, instead of moving switch 19 to its release position, it is moved to the hold position at the left. Control current from battery 5 will now pass through the lower left contacts of switch 19 and will follow practically the same path to operate relay 17 that it followed when switch 19 was in the release position. However, the upper left contacts of switch

19 will close and complete an auxiliary short-circuit across the subscriber's loop. Broadcasting to station 2 cannot now take place because relays 11 and 12 are cut out of the subscriber's loop by means of this auxiliary short-circuit.

When it is desired to return the circuit to its normal position, switch 19 is moved to its neutral position. This will open the energizing path through the bottom left contacts of switch 19 to relay 17. It will also cause the upper left contacts to open the auxiliary short-circuit and reinstate relays 11 and 12 into the subscriber's loop. Since relay 17 is of the slow-release type, it will remain in its operated position for a length of time sufficient to allow relay 12 to operate thereby providing relay 17 with its normal energizing circuit through the armature and bottom contact of relay 12. Thus, the circuit as a whole will be restored to its normal condition.

VI. Miscellaneous features

In case the switchboard operator wishes to hold individual communication with station 2, switch 19 is moved to the hold position. Control current from battery 5 is thus provided with a by-path leading to relay 17, but has no additional effect on circuit conditions. However, the upper left contact of switch 19 closes the auxiliary short-circuit across the subscriber's loop and cuts out relays 11 and 12 from the subscriber's loop as has been described. The switchboard operator can now insert another printing telegraph set into the subscriber's loop by means of jack 15 and carry on individual communication with station 2.

The arrangement shown in the drawing and described above is illustrative of the operation of the invention and will serve to assist in interpreting the claims. The claims are not to be restricted to the precise construction described above, but are intended to include all changes and modifications employing the principles and features of operation of the invention.

What is claimed is:

1. A telegraph broadcasting system having a switchboard at a broadcasting station, a plurality of stations connectible thereto, and instrumentalities at the switchboard for disassociating a station from the telegraph broadcasting system, said instrumentalities being capable of being operated by the operator at the station desiring to be disassociated regardless of whether alternate marking and spacing impulses are being transmitted over the telegraph broadcasting system.

2. In a telegraph broadcasting system, a broadcasting station having a switchboard, a plurality of stations connectible thereto, and instrumentalities at the switchboard for disassociating a station therefrom and for operating an alarm device to notify the switchboard operator of the disassociation, said instrumentalities being responsive to control means at the particular station desiring to be disassociated and being capable of operation irrespective of whether alternate marking and spacing impulses are being transmitted over the telegraph broadcasting system.

3. A communication broadcasting system having a broadcasting station from which telegraph messages are broadcast by means of a broadcasting switchboard, a plurality of stations connectible to the switchboard by means of transmission lines, some of the stations having teletypewriters for receiving broadcast messages, instrumentalities at the switchboard for disassociating a station from the broadcasting system, said instrumentalities operating in response to a

change in the condition of the transmission line leading from that station to the switchboard, said instrumentalities operating regardless of whether alternate marking and spacing impulses are being transmitted over the broadcasting system, and connecting means whereby the switchboard operator may reassociate a disassociated station with the broadcasting system.

4. In a communication system, a switchboard having a circuit for broadcasting alternate marking and spacing impulses to a plurality of stations, instrumentalities at the switchboard for disassociating a station from the broadcasting circuit and for operating an alarm device at the switchboard as an indication of the disassociation, said instrumentalities being operated in response to a disconnect signal transmitted from the particular station desiring to be disassociated irrespective of whether alternate marking and spacing impulses are being transmitted over the broadcasting circuit, and connecting means at the switchboard for restoring a disassociated station to the broadcast receptive condition without the assistance of the subscriber.

5. A communication switching system having a central switchboard, a plurality of stations connectible thereto, some of the stations having teletypewriters for receiving significant current variations transmitted from the switchboard, instrumentalities at the central switchboard for disassociating a station from the central switchboard and for operating an alarm device at the switchboard as an indication of the disassociation, said instrumentalities being operated by the attendant at the particular station desiring to be disassociated irrespective of whether alternate marking and spacing impulses are being transmitted over the broadcasting circuit, and switching means whereby the switchboard operator may discontinue the operation of the alarm device without restoring the disassociated station to the broadcast receptive condition.

6. In a telegraph broadcasting system adapted to broadcast signals from a printing telegraph broadcasting station to a plurality of subscribers' stations each having a teletypewriter for connection to the switchboard by means of telegraph lines, instrumentalities at the switchboard for the substitution of an auxiliary transmitting station for the broadcasting station, and switching means for disassociating a subscriber's station from the broadcasting system, said switching means operating in response to a cessation in the flow of current in that particular subscriber's telegraph line for a length of time longer than a spacing impulse, said switching means being capable of operation regardless of whether alternate marking and spacing signal impulses are being transmitted throughout the broadcasting system.

7. In a telegraph broadcasting system, a central station from which telegraph messages are broadcast, said central station including a central switchboard, a plurality of stations each including a teletypewriter for connection to the switchboard to receive said messages, and instrumentalities at the switchboard for disassociating a station from the broadcasting system, said instrumentalities being capable of being operated by an operator at a station desiring to be disassociated irrespective of whether alternate marking and spacing impulses are being transmitted over the broadcasting system.

8. A printing telegraph broadcasting system having a printing telegraph broadcasting station from which telegraph messages are broadcast, 150

5 said broadcasting station including a central
switchboard, a plurality of printing telegraph
stations connectible to the central switchboard
by means of telegraph lines, each printing tele-
graph station including a printing telegraph set
for receiving said messages, instrumentalities at
the switchboard for disassociating any one of
the printing telegraph stations from the broad-
casting system, said instrumentalities being op-
erated in response to a disconnect signal trans-
mitted from the particular station desiring to be
disassociated regardless of whether alternate
marking and spacing impulses are being trans-
mitted over the broadcasting circuit, and con-
necting means at the switchboard for restoring
the disassociated station to the broadcast recep-
tive condition without the assistance of the sub-
scriber at the disassociated station.

9. In a telegraph broadcasting system, a broad-
casting station from which telegraph messages
are broadcast, said broadcasting station includ-
ing a switchboard, a plurality of printing tele-
graph stations connectible to the switchboard
by transmission lines, each printing telegraph
station including a teletypewriter for receiving
said messages, and instrumentalities at the
switchboard for disassociating a printing tele-
graph station therefrom and for operating an
alarm device to notify the switchboard operator
of the disassociation, said instrumentalities being
capable of operation regardless of whether al-
ternate marking and spacing signal impulses are
being transmitted throughout the printing tele-
graph broadcasting system.

ALLAN WEAVER.

95

100

105

110

115

120

125

130

135

140

145

150