

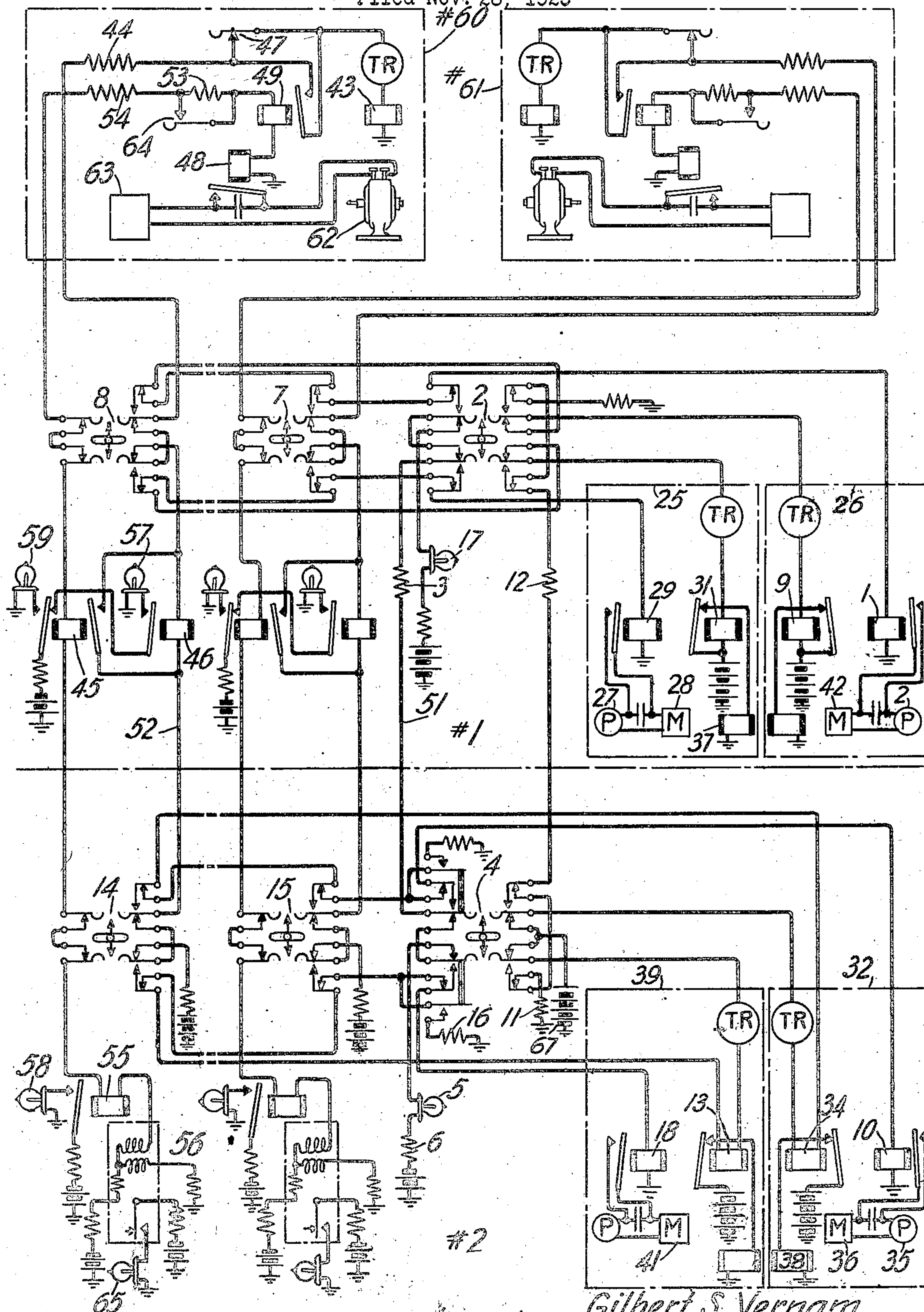
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PRINTING TELEGRAPH SYSTEM

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UNITED STATES PATENT OFFICE.

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PRINTING TELEGRAPH SYSTEM.

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This invention relates to printing telegraph exchange systems and more especially to such systems wherein switching means are employed for establishing and controlling communication circuits between separated stations.

An object of the invention is to improve printing telegraph systems by incorporating therein efficient and reliable switching and power control apparatus.

A feature of the invention contemplates a printing telegraph system wherein there are a plurality of central or main stations and a plurality of substations.

A further feature of the invention relates to a printing telegraph system wherein a communication circuit is established and printer driving motors are controlled by means of a manually operated switch.

Other features and advantages inherent in the invention, while not specifically enumerated, will become apparent upon a consideration of the following description and upon consideration of the appended claims.

The invention is disclosed as applied to a printing telegraph system wherein a power source is provided at each station for driving the sending and receiving apparatus thereat. The power source is arranged to be normally disconnected from the printing apparatus and is adapted to be rendered effective by remote control, i. e., as a result of a switching operation at a distant point. This switching operation is effective not only to control the power source but also to selectively establish a printing communication circuit as will be described hereinafter.

The drawing illustrates the invention in connection with a center "radial" switching system with a plurality of outlying stations. The central stations may call and communicate with each other and with any of the outlying stations. Any out station may signal either of the central stations to notify said station that communication is desired. Busy signals for the substation are provided at the central stations for notification when such substations are in communication with the other central stations.

Referring to the drawing there are shown in the upper portion of the figure within the dotted rectangles two substations. The central portion of this figure discloses a first central station, and the lower portion dis-

closes a second central station. Each of the substations is provided with the usual transmitting and receiving telegraph printing apparatus and in addition there are provided a number of manually operable keys by means of which the substations may signal either of the central stations. The power source for the printer, shown schematically, is normally disconnected from the printing apparatus by means of the contacts of a special control relay which is normally operated, and is released upon the establishment of a printing telegraph circuit. There are provided a number of keys at the central station one for each central station and one for each substation. Each central station may be provided with a plurality of printer sets 25 and 26. It will be noted that each substation is connected with the central station by means of a two conductor loop. One of the conductors of this loop is used for controlling the signal and power circuit while the other conductor is used for the printing telegraph communication circuit.

It is believed that a better understanding of the preferred form of carrying out the invention may be had from a detailed description of the manner in which the circuits are established, first between central stations, and second between central stations and substations.

Communication between central stations.

Assuming that the operator at central station No. 1 desires to send a printed message to the central station No. 2. It will be noted that relay 29, which controls the association of the power source 27 with the driving motor 28, is held normally energized over a circuit traceable from ground through the winding of said relay, lower left make-before-break contacts of key 2, lower make-before-break contacts of keys 7 and 8, lower right normally closed contacts of key 2, to battery through the winding of line relay 31 associated with printer set 25. In like manner a circuit may be traced for maintaining energized control relay 1 associated with printer 26 over a circuit comprising corresponding upper contacts of keys 2, 7 and 8, and the winding of line relay 9. Let it be assumed that the operator at station No. 1 desires to use the printer set shown within the dotted rectangle 25. The operator manip-

ulates key to its downward position whereupon a circuit may be traced from ground through the winding of relay 29, lower left make-before-break contacts of key 2, resistance 3, upper left normally closed contacts of key 4 at central station No. 2, lower left normally closed contacts of key 4, lamp 5, resistance 6, to grounded battery. By means of the make-before-break arrangement of the left hand contacts of key 2, this latter traced circuit is closed before the original circuit for energizing relay 29 is broken, consequently relay 29 remains energized and lamp 5 is lighted. The lighting of lamp 5 attracts the attention of the operator at station No. 2. Assuming that the operator at this station desires to use the printer shown within the dotted rectangle 32, the key 4 is operated to its upper position thus opening the circuit for lamp 5 which is thereby extinguished. The control relay 10 associated with printer set 32 was normally energized over a circuit traceable from ground through the winding of said relay, upper left make-before-break contact of key 4, upper make-before-break contacts of keys 15 and 14, winding of relay 34 to battery 67 through upper right contacts of key 4. When the operator at station No. 2 manipulates key 4 as above described, the circuit for energizing relay 10 is transferred to conductor 51 whereby relay 10 is connected in series with relay 29 and both of these relays thereupon release. Relay 29 upon releasing operatively connects, by means of its back contacts, the power source 27 with the printer driving motor 28. In a similar manner relay 10 completes the circuit from the power source 35 to the motor 36. The printing communication circuit may now be traced from battery through the winding of line relay 31, transmitting device TR, lower right make contacts of key 2, resistance 12, upper right make-before-break contacts of key 4, transmitter TR, winding of line relay 34, make-before-break contacts of keys 14 and 15, to ground through upper left make contacts of key 4. Relays 31 and 34 respond to the transmission of the telegraph impulses and correspondingly control the respective printer magnets 37 and 38 whereby the printer impulses are translated and recorded on the receiving printers. When communication is completed, the keys 2 and 4 are restored to normal resulting in the closure of the circuits for relays 29 and 10 as hereinbefore described, causing the motors 28 and 36 to come to rest. Should the call originate from central station No. 2, key 4 is operated causing the lighting of call lamp 17 at central station No. 1 over a circuit traceable from battery through said lamp, upper left normally closed contacts of key 2, lower left normally closed contacts of said key, resistance 3, upper left

normally closed contacts of key 4, lower left make-before-break contacts of key 4 (assuming printer set 39 to be used) to ground through the winding of control relay 18. The operator at station 2 upon noticing the lamp 17 operates key 2 to one position or the other depending upon which of the printers 25 or 26 is to be used. The starting of the motors 41 and 42 and the establishment of the printing communication circuits are effected in a manner identical with that already described.

Communication between a substation and the first central station.

It will now be assumed that the subscriber at the substation 60 desires to communicate with central office No. 1. This is effected by operating key 47. It will be noted that normally a circuit may be traced from ground through the winding of printer magnet 43, contacts of the associated transmitter TR, contacts of key 47, resistance 44, right normally closed contacts of key 8, winding of relay 46, right normally closed contacts of key 14 to grounded battery. Relay 46 is maintained energized in this circuit. Another circuit is normally closed for holding operated control relay 48. This circuit may be traced from ground through the winding of control relay 48, winding of relay 49, resistances 53 and 54, left normally closed contacts of key 8, winding of relay 45, left normally closed contacts of key 14, winding of relay 55, upper or operating winding of polarized relay 56 to grounded battery. The current in this circuit is insufficient to overcome the lower or biasing winding and operate relay 56. The operation of key 47 as above mentioned opens the circuit for relay 46 but relay 45 remains energized. Consequently, the release of relay 46 completes an obvious circuit for lighting call lamp 57. Assuming that printer 25 at central station No. 1 is to be used, the operator upon noticing the lighting of lamp 57 operates key 8 to close the lower set of contacts. The opening of the lower left hand contacts of key 8 breaks the circuit including the windings of relays 48, 49, 45 55 and 56. Relays 48, 49, 45 and 55 therefore release at this time. Relay 55 in releasing completes an obvious circuit for lighting busy lamp 58 to notify the operator at central station No. 2 that the substation #60 is in communication with central station No. 1. Relay 45 in releasing opens the circuit for line lamp 57 and closes the circuit for lighting busy lamp 59 at central office No. 1. At its right hand contacts relay 45 also shunts relay 46 to reduce the resistance of the printing circuit. By means of the opening of the right hand contacts of key 8, the circuit for normally maintaining control relay 29 energized is broken and this relay releases resulting in the starting of the

motor 28. The motor 62 at station 60 is operatively connected with power source 63 by means of the back contact of relay 48, when this relay releases as described herein-
 5 above. Both the motor at the substation and at the central station are thus in operation. The printing communication circuit may therefore be traced from battery through the winding of line relay 31, contacts of asso-
 10 ciated transmitter TR, right lower normally closed contacts of key 2, right lower make-before-break contacts of key 8, right upper normally closed contacts of key 8; resistance 44, back contacts of relay 49, transmitter TR
 15 to ground through the winding of the printer magnet 43. When the communication is completed the operator at central station No. 1 restores key 8 to normal thus operating control relays 48 and 29 whereby motors 28
 20 and 62 are stopped. The call key 47 at the substation, if not already restored, may be restored at this time.

Communication between a substation and the second central station.

Should the subscriber of station 60 desire to communicate with central station No. 2 key 64 is operated. When key 64 is operated, resistance 53 is short-circuited resulting in
 30 an increase of current through the circuit comprising the windings of relays 48, 49, 45, 55 and 56 as hereinbefore described. This increase of current is sufficient to cause the armature of polar relay 56 to move to its
 35 front marking contact resulting in the lighting of call lamp 65 over an obvious circuit. Should the operator at central station No. 2 desire to use printer 32, key 14 is operated to close its upper contacts. The opening of the
 40 upper contacts of key 14 causes the release of relays 48, 49, 45, 55 and 56 as hereinbefore described. Relay 45 by means of its right contacts short-circuits the winding of relay 46 to prevent this relay from following the
 45 printing impulses, and by means of its left contacts opens the circuit of line lamp 57 and lights busy lamp 59. The closure of the power circuits at the substation and at the central office is controlled in a manner iden-
 50 tical with that already described in connection with central station No. 1. The printing circuit may therefore be traced from battery 67, upper right normally closed contacts of key 4, transmitter TR winding of line relay
 55 34, upper right make-before-break contacts of key 14, back contact of relay 45, right normally closed contacts of key 8, resistance 44, back contacts of relay 49, to ground through the transmitter TR and the printer magnet 43. When communication is com-
 60 pleted, disestablishment of communication is under control of the central office operator by means of the release of key 14.

When the operator at a central station, for example, station #2, desires to com-

municate with a substation as substation #60, the corresponding key 14 is operated. This breaks the normally closed circuit including the windings of relays 48, 49, 45, 55 and 56. Relay 55 in releasing causes the
 70 busy lamp 58 to be lighted, and similarly relay 45 closes a circuit for busy lamp 59. If key 14 is operated to close the upper set of contacts, the control relay 10 for printer set 32 is released. With relays 48 and 10
 75 released, the corresponding motors 62 and 36 are started in operation, and the printer circuits are completed in the manner hereinabove described.

While in the foregoing description two
 80 substations have been shown, it will be understood that others may be provided as required. In this case corresponding switching keys similar to keys 7 and 8 are pro-
 85 vided at the respective central offices. Likewise the circuits for the motor control relays may be normally opened and the association of the power sources with the
 90 respective motors may be accomplished by front contacts of the control relays without departing from the spirit of the invention.

What is claimed is:

1. In a printing telegraph system, a plu-
 95 rality of central stations, a plurality of substations, printing telegraph receiving and transmitting equipment at each station, and switching means at each substation for
 100 selectively establishing a printing telegraph communication circuit with any of said central stations.

2. In a printing telegraph system a plu-
 105 rality of central stations, a plurality of substations, printing telegraph receiving and transmitting equipment at each station, switching means at each central station for
 110 completing a communication circuit to any of the other central stations, and other switching means at each central station for completing a communication circuit with
 115 any of said substations.

3. In a printing telegraph system, a plu-
 120 rality of central stations, a plurality of substations, printing telegraph receiving and transmitting equipment at each station, a plurality of calling keys at each substa-
 125 tion one key for each central station, and switches at each central station adapted to be operated in response to the operation of one of said calling keys to complete a print-
 130 ing telegraph communication circuit between a central office and the substation wherein said one of said calling keys is actuated.

4. In a printing telegraph system, the
 135 combination of a plurality of central stations, a plurality of substations, a plurality of keys at each central station adapted to call any substation and to complete a com-
 140 munication circuit therewith, and another plurality of keys at each central station

adapted when operated to call any other central station and to complete a communication circuit therewith.

5 In a printing telegraph system, a plurality of central stations, a plurality of substations, printing telegraph receiving and transmitting equipment and motor driving means therefor at each station said driving means being normally inert, and two conductor loops extending between each sub-
10 station and said central stations, one of said conductors being used to control the operation of the motors at the central station and the substations, the other of said conductors
15 being used for the printing telegraph communication circuit.

6. In a printing telegraph system, central stations, a plurality of substations, a printing telegraph receiving and transmitting set
20 at each substation, a plurality of printing telegraph receiving and transmitting sets at each central station, a plurality of answering keys at each central station, one
25 for each substation and adapted when operated to associate any of the transmitting and receiving sets at the central station with a calling substation.

7. In a printing telegraph system, a sub-

station, a plurality of central stations, a signal and motor control wire extending
30 from said substation through one of said central stations to another of said central stations, a calling key at each substation associated with said wire, and means oper-
35 ative when said key is actuated to effect a calling signal at one central office and to effect a busy signal at the other central office.

8. In a printing telegraph system, a plurality of substations, printing telegraph
40 transmitting and receiving equipment and a driving motor therefor at each substation, a plurality of central stations, an operator's position at each central station, and a plu-
45 rality of switches at each operator's position for controlling the operation of the printer driving motors at the central stations and the substations and for controlling
50 the establishment of printing communication circuits.

In testimony whereof, we have signed our names to this specification this 27th day of November, 1925.

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