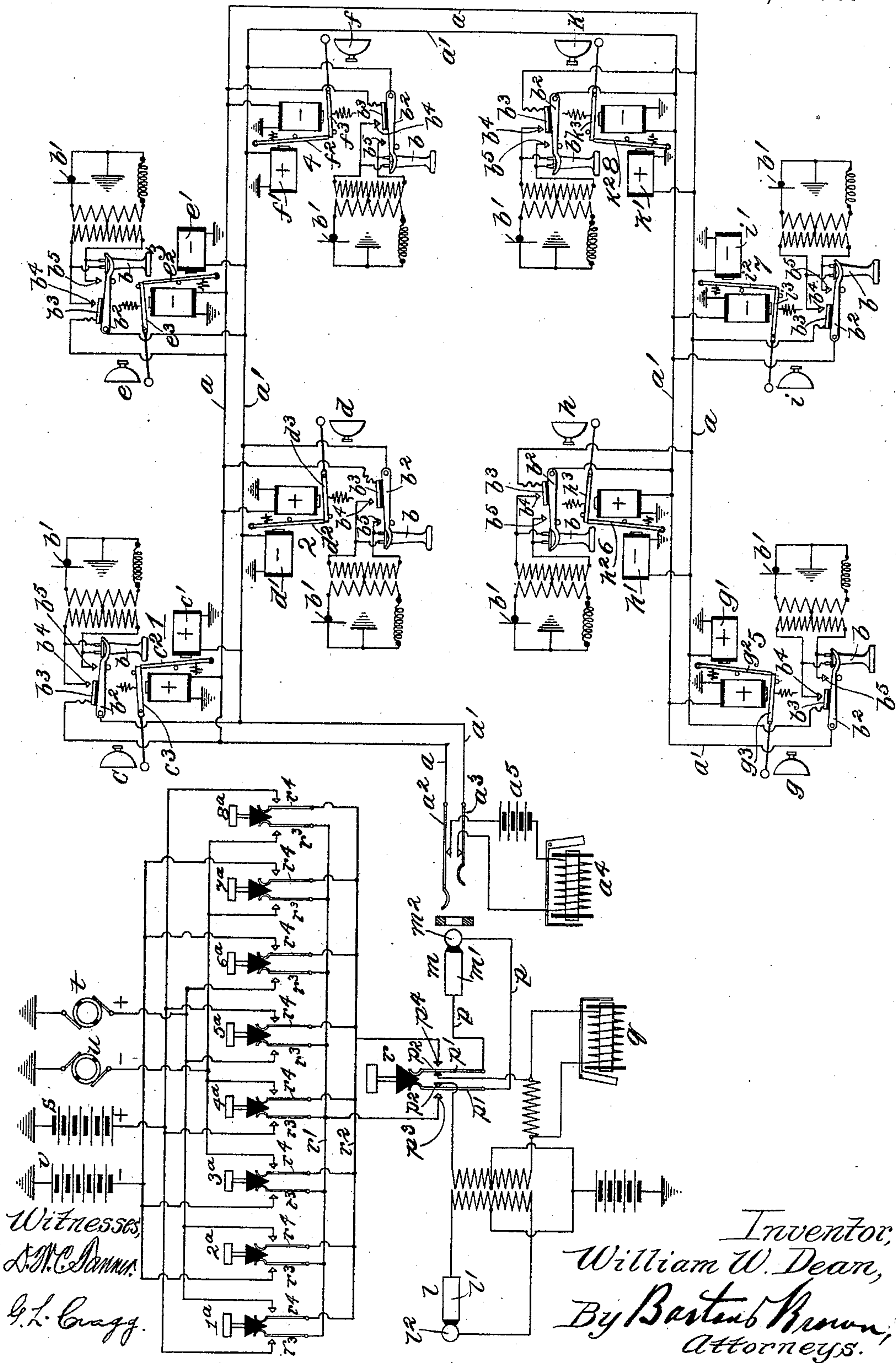


(No Model.)

W. W. DEAN.  
TELEPHONE EXCHANGE SYSTEM.

No. 606,162.

Patented June 21, 1898.





# UNITED STATES PATENT OFFICE.

WILLIAM W. DEAN, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE BELL  
TELEPHONE COMPANY OF MISSOURI, OF SAME PLACE.

## TELEPHONE-EXCHANGE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 606,162, dated June 21, 1898.

Application filed February 6, 1897. Serial No. 622,246. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM W. DEAN, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented  
5 a certain new and useful Improvement in Telephone-Exchange Systems, (Case No. 21,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a  
10 part of this specification.

In modern systems of telephony a plurality of stations are connected with one telephone-line, known as a "party-line," extending from a central exchange. Each of these sta-  
15 tions is provided with suitable signaling apparatus, and in order to call one of the stations without needlessly alarming the others selective signaling apparatus is provided, so that the particular subscriber's station  
20 wanted may alone be signaled by the signaling-current sent from the exchange over the line.

My invention has for its object to provide an improved selective signaling system for  
25 telephone-lines; and it consists, generally speaking, in providing a plurality of signal-bells, one at each subscriber's station, operated by electromagnets, in combination with relays associated with bells, said relays be-  
30 ing adapted to interpose mechanical obstructions in the path of the tongues or supports of the clappers or some other portion of the bells that will mechanically prevent the clappers from impinging upon the gongs.

35 In the preferred form of my invention the mechanical obstructions controlled by the relays are normally in a condition to prevent the operation of all the bells, and in order to signal a particular station the relay control-  
40 ling the bell at that station is operated by apparatus at the central office to remove the mechanical obstruction from its normal position, whereupon the signaling-current transmitted over the line may operate the bell.

45 Reference may be had to my copending application, Serial No. 650,441, filed September 3, 1897, which sets forth certain features herein disclosed.

50 I will explain my invention more particularly by reference to the accompanying drawing, which illustrates the application of my

invention to a metallic-circuit party-telephone line having eight substations connected therewith.

The party-telephone line extends in two  
55 limbs  $a$   $a'$  from the substations to the exchange and terminates thereat in line-springs  $a^2$   $a^3$ , normally in circuit with the individual indicator  $a^4$  and battery  $a^5$ . Each substation is provided with a telephone-receiver  $b$  and  
60 transmitter  $b'$  and telephone switch-hook  $b^2$ . Each of the switches  $b^2$  is connected with the limb  $a'$ . The limb  $a$  is connected with each of the insulated plates  $b^3$ , carried by the switch-hooks, said plates and hooks being re-  
65 moved from the contacts  $b^4$   $b^5$ , which complete a bridge between the limbs  $a$   $a'$  when the telephone-receiver is removed from its hook, whereby the annunciator  $a^4$  may be op-  
70 erated. When the telephone-receivers are upon their hooks, the limbs  $a$   $a'$  are disconnected at the subscribers' stations.

At stations 1, 2, 3, and 4 are located signaling-bells  $c$ ,  $d$ ,  $e$ , and  $f$ , whose operating-  
75 magnets are included in ground branches extending from limb  $a$ . Stations 5, 6, 7, and 8 are provided with bells  $g$ ,  $h$ ,  $i$ , and  $k$ , whose operating-magnets are included in ground branches extending from limb  $a'$ . At the  
80 stations 1, 2, 3, and 4 are provided relays  $c'$ ,  $d'$ ,  $e'$ , and  $f'$ , respectively, included in ground branches extending from the limb  $a'$ . The magnets of the bells and the relays are preferably polarized, as indicated by the signs.  
85 At the stations 5, 6, 7, and 8 are provided relays  $g'$ ,  $h'$ ,  $i'$ , and  $k'$ , respectively, included in grounded branches extending from the limb  $a$ . The operating-magnet of the signal-  
90 bell and the relay associated therewith at each station are thus included in grounded branches extending from both limbs of the metallic circuit. The relays  $c'$ ,  $d'$ ,  $e'$ ,  $f'$ ,  $g'$ ,  
 $h'$ ,  $i'$ , and  $k'$  are provided with armatures  $c^2$ ,  $d^2$ ,  $e^2$ ,  $f^2$ ,  $g^2$ ,  $h^2$ ,  $i^2$ , and  $k^2$ , respectively, which  
95 normally engage the clapper-operating armatures  $c^3$ ,  $d^3$ ,  $e^3$ ,  $f^3$ ,  $g^3$ ,  $h^3$ ,  $i^3$ , and  $k^3$  and prevent the operation thereof.

Referring, for example, to the apparatus at station 1, the armature  $c^2$  is maintained  
100 against a back-stop by a coiled spring when unattracted by the magnet  $c'$ . Armature  $c^3$  is maintained against a stop by a coiled spring



when unattracted by its magnet, the relative positions of said armatures being such that when they occupy this normally idle position armature  $c^2$  will be disposed in the path of armature  $c^3$ , so that the actuation of armature  $c^3$  is prevented when signaling-current is sent over the line unless the engagement is broken by the relay-magnets. Magnets of bells  $c$ ,  $d$ ,  $g$ , and  $h$  are preferably adapted to respond to pulsating currents of positive sign, while magnets of bells  $e$ ,  $f$ ,  $i$ , and  $k$  respond to pulsating currents of negative sign. Relays  $c'$ ,  $f'$ ,  $g'$ , and  $h'$  are preferably adapted to respond to direct current of positive sign, while relays  $d'$ ,  $e'$ ,  $h'$ , and  $i'$  are adapted to respond to direct current of negative sign. If now it is desired to signal subscriber 1, for example, a grounded source of direct current of positive sign is included in circuit with limb  $a'$ , whereby the armature  $c^2$  is withdrawn from the path of armature  $c^3$ , and a grounded source of pulsating signaling-current of positive sign is included in circuit with limb  $a$ , which finds path through the magnet of bell  $c$ , which is free to operate the same. When direct current of positive sign is sent over the limb  $a'$ , relay  $f'$  at station 4 also withdraws its armature  $f^2$  from the path of armature  $f^3$ , but since the magnet controlling armature  $f^3$  is adapted to respond solely to negative pulsating currents bell  $f$  will not be sounded. When the pulsating signaling-current of positive sign is sent over limb  $a$ , the magnet of bell  $d$  at station 2 would respond but for the engagement of the armatures  $d^2$  and  $d^3$ . The relay  $d'$ , however, fails to respond to the positive direct current sent over the limb  $a'$ , the engagement of said armatures being thus preserved. While the relay and bell-operating magnet at station 5 respond to direct and pulsating currents of positive sign, respectively, they are not operated, since they are not connected with the limbs over which currents of the character suited to their operation are being passed. The bells at stations 3, 6, 7, and 8 are not operated, since their magnets, nor the relays associated therewith, are not in circuit with current capable of operating the same. If any of the other stations are to be signaled, the currents corresponding to the relay and bell-operating magnet located thereat are included in circuit therewith, and by an inspection of the diagram it may be readily seen why the bells at the remaining stations will not be operated.

I will now describe the means which I prefer to employ for directing current of the proper character over the limbs of the telephone-line for the purpose of operating the selected bell. At the central office I have provided plugs  $l$  and  $m$ , having sleeves  $l'$  and  $m'$  and tips  $l^2$  and  $m^2$ . Plug  $l$  is the answering-plug and  $m$  the connecting-plug. Conductor  $p$  has its terminals in the sleeve  $m'$  and tip  $m^2$  of plug  $m$ . Conductor  $p$  includes clearing-out indicator  $q$  and also the springs  $p'$   $p'$  and normal contacts  $p^2$   $p^2$  of the master

ringing-key  $r$ . Upon depressing the plunger of the key  $r$  alternate contacts  $p^3$   $p^4$ , adapted to be connected with sources of pulsating and direct current, as will be presently set forth, are brought into contact with the springs  $p'$   $p'$ . Alternate contacts  $p^3$   $p^4$  are connected with bus-wires  $r'$   $r^2$ , respectively, with which are also connected the springs  $r^3$ , &c., and  $r^4$ , &c., of keys  $1^a$ ,  $2^a$ ,  $3^a$ ,  $4^a$ ,  $5^a$ ,  $6^a$ ,  $7^a$ , and  $8^a$ . When the plug  $m$  is inserted within the party-telephone-line spring-jack and the plunger of master-key  $r$  is depressed, the bus-wires  $r'$   $r^2$  are in circuit, respectively, with the limbs  $a'$   $a'$  of the telephone-line. The contact-anvils upon the left of keys  $1^a$  and  $4^a$  are connected with a source of direct current  $s$  of positive sign, while the contacts upon the right of said keys are connected, respectively, with the sources of positive pulsating current  $t$  and negative pulsating current  $u$ . The contact-anvils upon the left of keys  $2^a$  and  $3^a$  are connected with the source of direct current  $v$  of negative sign, while the anvils upon the right of said keys are connected, respectively, with sources of current  $t$  and  $u$ . The anvils upon the left of keys  $5^a$  and  $6^a$  are connected with a source  $t$  of positive pulsating current, while the anvils upon the right of said keys are connected, respectively, with the source  $s$  of positive direct current and source  $v$  of negative direct current. The anvils upon the left of keys 7 and 8 are connected with the negative source of pulsating current  $u$ , while the anvils upon the right are connected, respectively, with the source of negative direct current  $v$  and source of positive direct current  $s$ . The keys  $1^a$ ,  $2^a$ ,  $3^a$ ,  $4^a$ ,  $5^a$ ,  $6^a$ ,  $7^a$ , and  $8^a$  are adapted to throw pulsating and direct current upon the party telephone-line of a character suitable to the operation of the signals at stations 1, 2, 3, 4, 5, 6, 7, and 8, respectively—as, for example, if it is desired to signal station 4 key  $4^a$  is depressed, positive direct current  $s$  is included in circuit with limb  $a'$  to operate magnet  $f'$  to cause it to withdraw its armature  $f^2$  from the path of armature  $f^3$ . At the same time the source of pulsating negative current  $u$  is included in circuit with the limb  $a$  to operate the bell  $f$ . I make the bell-magnets and relays of high resistance to prevent annunciator  $a^4$  from being operated by the signaling-battery in circuit therewith and with the grounded branches including said relays and magnets. Sources of current of other character than that described may be employed for operating the bells and relays.

In the claims I speak of "grounded branches" in connection with a metallic-circuit telephone-line in the sense of branches forming connection with any suitable third return-conductor.

Modifications may be readily made in my invention without departing from its spirit, and I do not therefore desire to be limited to the precise arrangements shown and described.

Having, however, fully set forth one system



embodying my invention, I claim, and desire to secure by Letters Patent, together with all such modifications as may be made by mere skill and with only the limitations expressed or by law implied in view of the state of the related arts, the following:

1. In a telephone system, the combination with a telephone-line extending from an exchange to a plurality of substations, of a plurality of positively and negatively polarized bells and electromagnets connected therewith located at the substations, mechanical means controlled by said electromagnets for preventing the actuation of said bells, and means at the central office for including said electromagnets in circuit with direct current of positive or negative sign, and including said bells in circuit with ringing-current of positive or negative sign, substantially as described.

2. In a telephone system, the combination with a telephone-line extending in two limbs from an exchange to a plurality of substations, of a plurality of positively and negatively polarized bells and a plurality of positively and negatively polarized electromagnets connected with each limb of the telephone-line, each substation having a bell connected with one limb and an electromagnet connected with the other limb, mechanical means controlled by said electromagnets for preventing the operation of said bells, and means at the exchange for including said electromagnets in circuit with direct current of positive or negative sign and for including said bells in circuit with ringing-current of positive or negative sign, substantially as described.

3. In a telephone system, the combination with a telephone-line extending in two limbs from an exchange to a plurality of substations, of a plurality of positively and negatively

positively polarized bells, and a plurality of positively and negatively polarized electromagnets, two grounded branches at each substation, each limb of the telephone-line being connected thereat with one of said branches, a bell being included in one of the branches, while an electromagnet is included in the other branch, mechanical means controlled by said electromagnets for preventing the operation of said bells, a source of direct current, a source of ringing-current and switching apparatus for directing positive or negative direct current to operate the electromagnet at the selected station and for directing ringing-current of positive or negative sign over the line, whereby the bell at the selected station may alone be operated, substantially as described.

4. In a telephone system, the combination with a telephone-line extending in two limbs from an exchange to three substations, a bell at each station connected in circuit with the telephone-line thereat, two positively and negatively polarized electromagnets connected with the same limb of the telephone-line, each electromagnet being included at a substation in a grounded branch, a third electromagnet connected in circuit with the telephone-line at a third substation, mechanical means controlled by said electromagnets for preventing the operation of said bells, and means at the exchange for including said electromagnets in circuit with direct current of positive or negative sign and for including said bells in circuit with ringing-current, substantially as described.

In witness whereof I hereunto subscribe my name this 1st day of February, A. D. 1897.

WILLIAM W. DEAN.

Witnesses:

GEORGE L. CRAGG,  
JOHN W. SINCLAIR.