

No. 656,333.

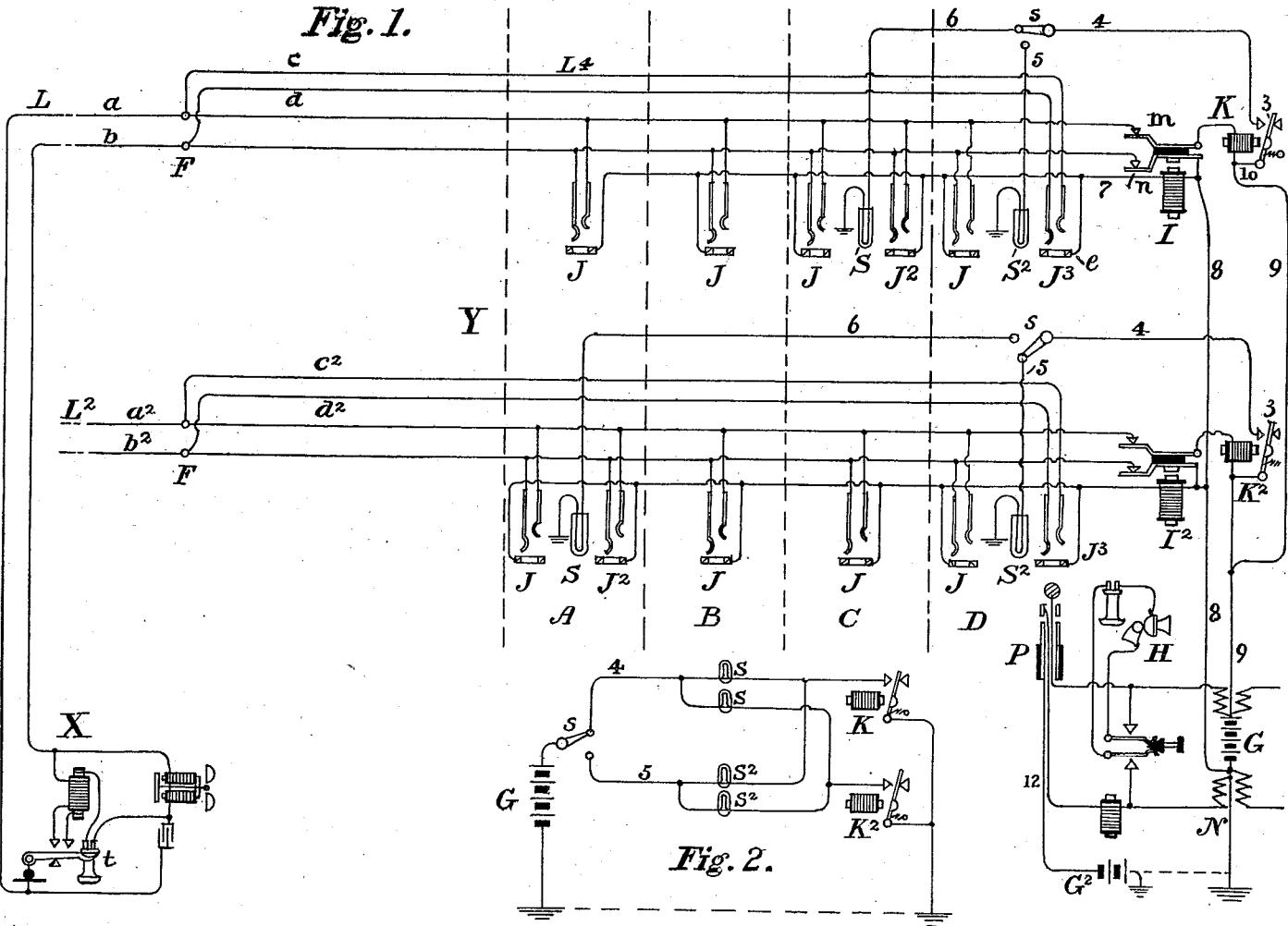
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Patented Aug. 21. 1900.

TELEPHONE SWITCHBOARD APPARATUS.

(Application filed Nov. 7, 1899.)

(No Model.)



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TELEPHONE-SWITCHBOARD APPARATUS.

SPECIFICATION forming part of Letters Patent No. 656,333, dated August 21, 1900.

Application filed November 7, 1899. Serial No. 736,149. (No model.)

To all whom it may concern:

Be it known that I, THOMAS C. WALES, JR., residing at Newton, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Telephone-Switchboard Apparatus, of which the following is a specification.

Telephone-exchange multiple switchboards are divided into sections at each of which are located one or more operators, and the call-receiving and call-answering devices of a certain number of substation-circuits are allotted to each section, the said number being based upon the maximum number of conversations called for by the substations; but owing to the increase of calls in several sections of the board at certain hours of the day, usually in the forenoon, the operators at said sections are unable to maintain the same efficiency in connecting together the substation-circuits. Thus to maintain the best grade of service it is necessary to provide means for reducing the number of circuits connected to such sections during the busy hours and to redistribute them to sections which are not so busy or to a special or extra section or sections of the switchboard provided for this purpose. The substation-conductors entering the central station are connected to a main distributing frame or board, whence they extend to an intermediate distributing-frame, from which they pass through the several sections of the switchboard, being provided at each of said sections with a branched jack or switch socket, and at the section at which any individual circuit is to be answered it is represented by a line-signal or call-indicating device and an extra jack or switch device denominated the "answering-jack." The said answering-jack usually comprehends the terminals of a circuit branching from the main circuit at the intermediate distributing-frame, and therefore is (as, in fact, are all of the line-jacks) in a parallel branch of the main circuit.

My invention relates to means whereby the work of the operators or assigned to the several operators' positions in receiving, answering, and attending to calls may be quickly and readily distributed by transfer

from the regular sections to other or special operators' positions or sections and performed there during the busy hours of the forenoon, and whereby the circuits may be quickly and readily returned to their normal condition or arrangement when the busy time has passed.

In carrying out the invention there is provided one or more extra sections of the switchboard, preferably at one end thereof, each comprising the usual outfit of one or more operators, to which all of the substation-circuits extend and upon which each circuit is represented by the ordinary connecting-switch or line-jack. It is not ordinarily necessary that more than a relatively small part or portion of the substation-lines shall be provided with answering-jacks and call-signal devices at the special sections or extra positions in addition to those at their regular section, and a permanent branch or parallel circuit will be extended from the intermediate switchboard-terminals of each such circuit (the busiest circuits being generally chosen) to an auxiliary jack on one of such extra or special sections. Associated with the auxiliary answering-jack of each line-circuit is a duplicate line-signal or call-receiving device alternative to the call device at the regular section of the said line, and means are provided whereby either of the said signal devices can be brought into active association with the line concerned, the other at the same time being dissociated. This may be done by placing the said signals in alternative branches of a local circuit whose main conductor leads through circuit-controlling contact-points of a call-receiving relay in the normal line-circuit and in providing a suitable switch whereby the said main conductor of such local circuit may be connected at will with its return conductor through either the regular or special call-signal device exclusively. I have therefore chosen to illustrate the invention in connection with the common-battery relay-switchboard, in which the line-signal is in such a local circuit and is controlled by a relay whose magnet is normally in the main circuit and the duplicate or auxiliary line-signal upon the extra section of the substation-circuit is shown as being controlled by the same relay,

a manually-operated switch being provided to close the said relay-controlled local circuit through either of said signals, according as it may be desired to receive the calls at the regular or special answering-section. By the invention, therefore, in the morning hours or whenever the work is sufficiently heavy the calls of a portion of the lines may be switched over to the special positions or sections and attended to there and in the afternoon be retransferred to the regular positions or sections, the answering-jacks at both the regular and special sections being unchanged or at all times associated with the line-circuit.

In the drawings which accompany and illustrate this specification, Figure 1 is a diagram of two common battery or relay substation-circuits entering a central station and provided there with means embodying my invention, and Fig. 2 is a diagram showing means for switching a plurality of line signal-circuits simultaneously.

Land L² are the substation-circuits entering the central station Y, and *a* and *b* and *a*² and *b*² are their respective conductors, the substation X of circuit L only being shown and the apparatus there being of the usual description for common battery-circuits. Each circuit extends through the several sections of the switchboard, as represented by spaces A, B, and C, and also to the special or extra section D. The main conductors of the said line-circuit leading normally to the contact-springs *m* and *n* of the armature of the cut-off relay I are thence continued the one, *a*, through the signal-relay K and conductor 9 to one pole of the generator G and the other, *b*, by conductor 8 to the opposite pole of the said generator. At each switchboard-section, including the extra section, are normally-open branches to the line-switch devices or jacks J, and at the regular answering-sections are additional or answering jacks J². At the special section are auxiliary answering-jacks J³, whose line-terminals are preferably connected by the branch or parallel loop L⁴ with the main circuit-terminals at the intermediate switchboard F. At the regular answering sections or positions, for example, of circuit L at section C and of circuit L² at section A are the ordinary call-receiving devices S (shown as incandescence or glow lamps) in a local circuit extending from ground at the section by wire 6, switch *s*, and wire 4 to the front stop and armature contacts 3 of the line or call relay K, the said armature being connected by the wire 10 with the battery-conductor 9. At the extra switchboard-section D duplicate call-receiving devices or line lamp-signals S² are associated with the auxiliary answering-jack J³. These signals are normally in the alternative open-ground branch 5 of the local circuit, but are adapted to be connected to the part 4 of the local signaling-circuit by means of the switch *s*, in which case the branch 6 of the said local circuit is in turn opened. H represents one-

half of a cord-circuit, showing the answering-plug P having its tip connected through a winding of the coil N to one pole of the generator G, its forward sleeve-contact through another winding of said coil to the opposite pole of said generator, and its rearward contact connected by conductor 12 with the local generator G², as indicated.

In the operation of the invention under ordinary conditions of switchboard service the calls sent over, say, circuit L from substation X will be received at the regular section or position C, and when the telephone *t* at the substation is removed from its support the latter closes the circuit through the generator G in a well-known manner, causing the relay K to attract its armature 3 to its front stop and complete the local circuit from the said generator over conductors 9, 4, and 6 and the lamp-signal S, causing the illuminative display of the latter, also in a manner well understood; but when the calls at section C come in so quickly that the operator there cannot respond to them with the rapidity required or at the busy time in the forenoon the switch *s* is turned from the branch 6 of the local circuit to the alternative branch 5 of said circuit, and when a call is made by the substation in the manner described the circuit from generator G is completed through the lamp-signal S² at the extra or special section or position D and is responded to by the operator there, who inserts the answering-plug P into the auxiliary jack J³. When the rear contact of said plug comes into connection with the ring *e* of the jack J³, current from generator G² circulates over conductor 12, said contact and ring, conductor 7, cut-off relay I, and conductor 8 to the opposite pole of said generator, and the relay operates to attract the armature-levers *m* and *n*, thus opening the normal main circuit, cutting off current from relay K, and causing the extinguishment of the lamp-signal, all as is usual in the operation of this type of circuit.

The local signal-switch *s*, associated with the line-circuit L², is shown as having been turned into position where it brings the signal-lamp S² at the special section under the control of the line-relay K².

To facilitate the transference of line-signals from the regular to the extra switchboard-sections and reversely, I may combine the lamp-signal circuits at the regular switchboard-sections, so that any number of lamp-signals may at the same time be disconnected at a regular section from their switching-relays K and immediately thereafter a similar number of lamp-signals at the extra section or position be together switched to the said relays K. This is illustrated by Fig. 2, where the regular lamp-signals S in separate local circuits for two substation-circuits are shown in connection with their respective switching-relays K K² and in circuit with the common generator G by means of the switch *s*. When it is desirable to cut these lamp-signals

off and to make the signals S^2 active for the circuits at the extra section, the switch s is turned from the conductor 4 to the conductor 5, and current from the generator G is now provided for the lamp-signals S^2 . It will be seen that any number of regular lamp-signals can be thus switched out and the others switched in by one switch or circuit changer.

It is obvious, although I have herein termed the extra section to which certain busy lines may be temporarily transferred a "special section" of said switchboard, that any unoccupied section of the board may be utilized as a special section, if desired, or that the operator's position to which such lines are transferable might, indeed, be any one already used to attend to certain subscribers' lines but not fully employed.

Having thus described my invention and its operation, I claim—

1. A telephone-line extending from a substation to a central station, and provided at the latter with a jack or switch device at each of the regular sections or operators' positions of a multiple switchboard; an answering-jack and associated call-signal device at one of the said sections; an auxiliary answering-jack and associated call device at a special section of said switchboard; and means for alternatively connecting either call-signal device with the said telephone-line; whereby the substation calls may be received either at the regular or special answering-sections, as desired.

2. The combination in a telephone-exchange of a multiple switchboard comprising a number of regular sections or operators' positions, and a special section; with a subscriber's line branching to a line-jack at each of the said sections, and to an answering-jack at the special section, and one of the regular sections; a call-signal-receiving device associated with each answering-jack; and means for transferring the connection of said line from either call-signal device to the other; whereby the substation call-signals may be answered at the regular answering-section or at the special section, alternatively; substantially as set forth.

3. The combination in a telephone-exchange, of a multiple switchboard compris-

ing a number of regular sections or operators' positions, and a special section; with a telephone-line extending from a substation to said switchboard, and having a switch device for answering calls from the said substation at the said special section, and at one of the said regular sections, and a line-switch device at each of the other regular sections of said switchboard; a call-receiving relay connected with the said telephone-line; a local circuit controlled thereby, and having alternative branches leading to the said special and regular answering switchboard-sections respectively; local call-receiving devices one for each of the said answering-sections, associated each with the answering-switch device of its own section, and respectively connected in the said local circuit branches; and a switch for directing the local circuit controlled by the said relay through either of the said local call devices to the exclusion of the other, as described.

4. In a telephone-exchange, the combination at a central station, of a multiple switchboard comprising a number of regular sections or operators' positions, and a special section; a number of subscribers' lines all having an answering-jack or switch device and an associated call-signal device at some one and a line or connecting jack at each of the other regular sections, and a portion having an auxiliary answering-jack and call-signal device at the special section also; a local circuit for each line of the said portion controlled by a relay in the main circuit of said line, and having alternative branches containing respectively the regular and auxiliary call-signal devices of such line; and a switch adapted to close the said relay-controlled local circuit through either of the said signal devices, according as it may be desired to receive the calls of a substation-line at the regular or special answering-section.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 31st day of October, 1899.

THOMAS C. WALES, JR.

Witnesses:

GEO. WILLIS PIERCE,
JOSEPH A. GATELY.