(No Model.) 3 Sheets—Sheet 1.

E. W. HAM.

TELEPHONE SYSTEM.

No. 605,097. Patented June 7, 1898.

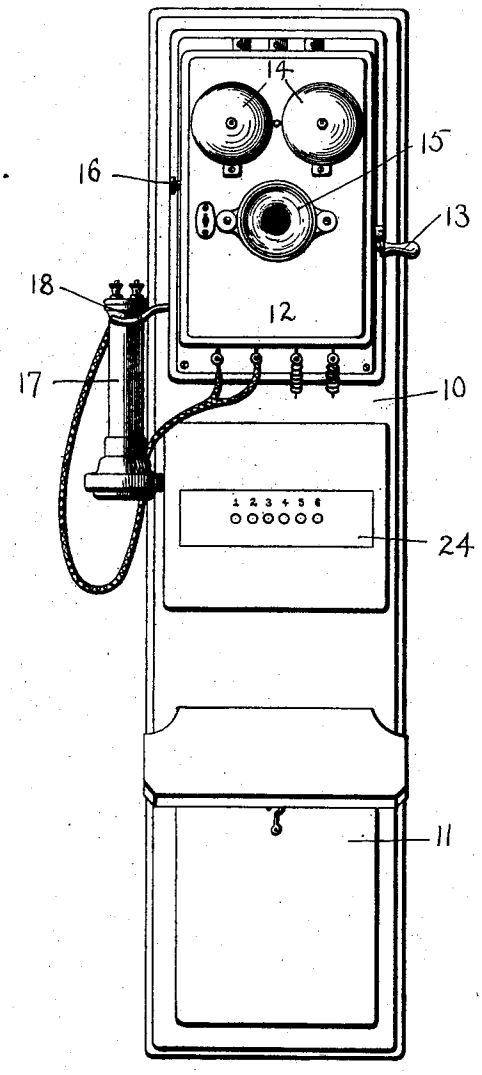

Fig. 1.

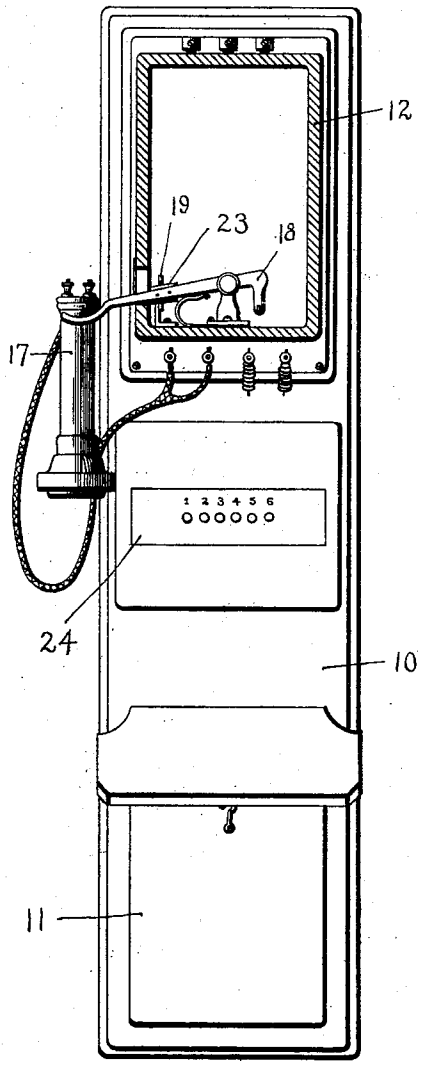

Fig. 2.

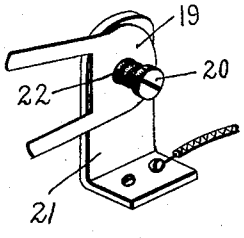

Fig. 3.

Witnesses.
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(No Model.)

3 Sheets—Sheet 2.

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TELEPHONE SYSTEM.

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Fig. 4.

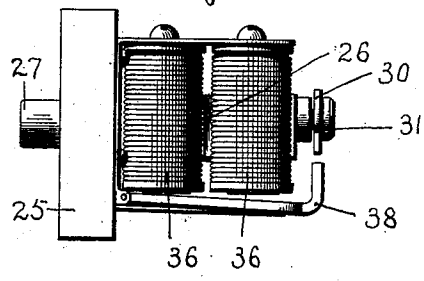


Fig. 5.

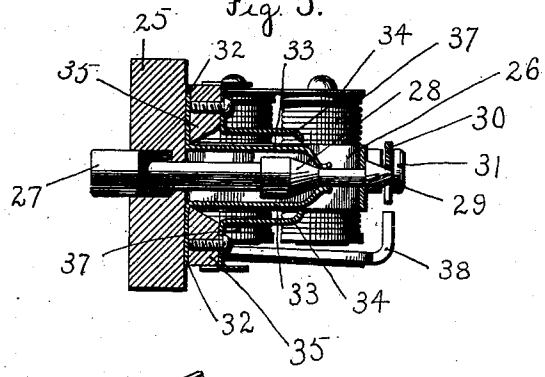


Fig. 6.

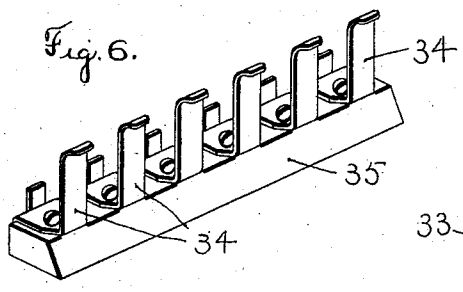


Fig. 7.

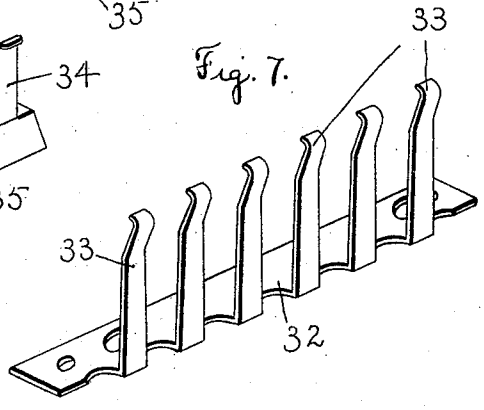
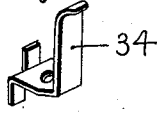


Fig. 8.



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(No Model.) 3 Sheets—Sheet 3.

E. W. HAM.

TELEPHONE SYSTEM.

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Fig. 9.

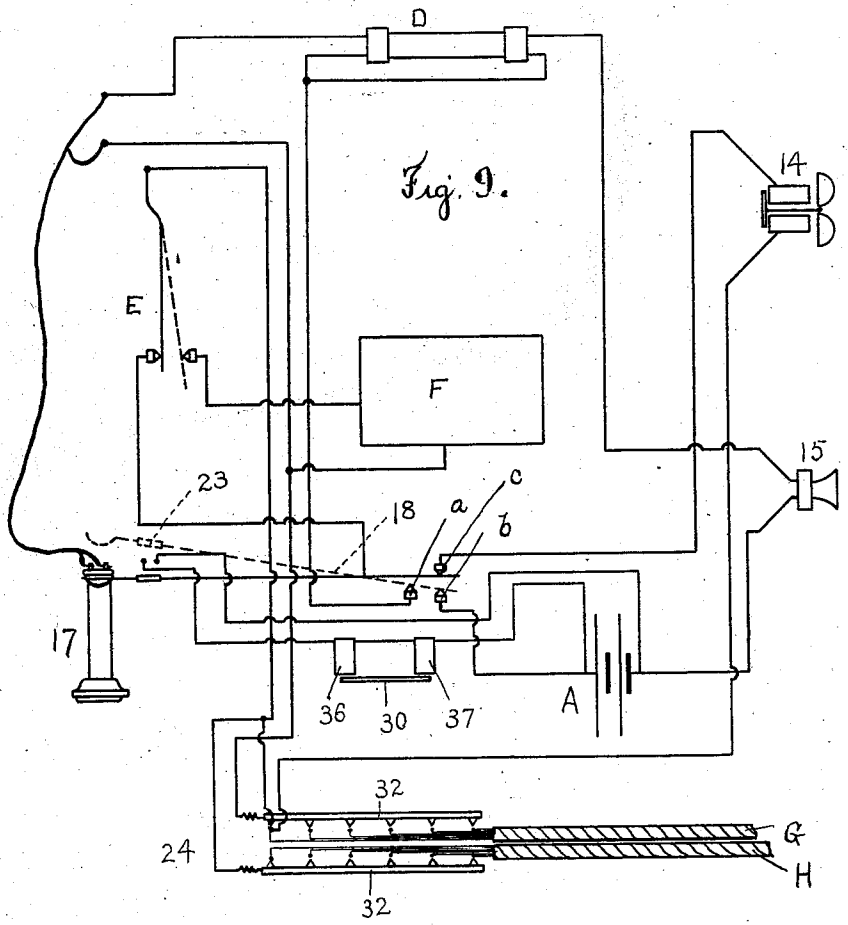
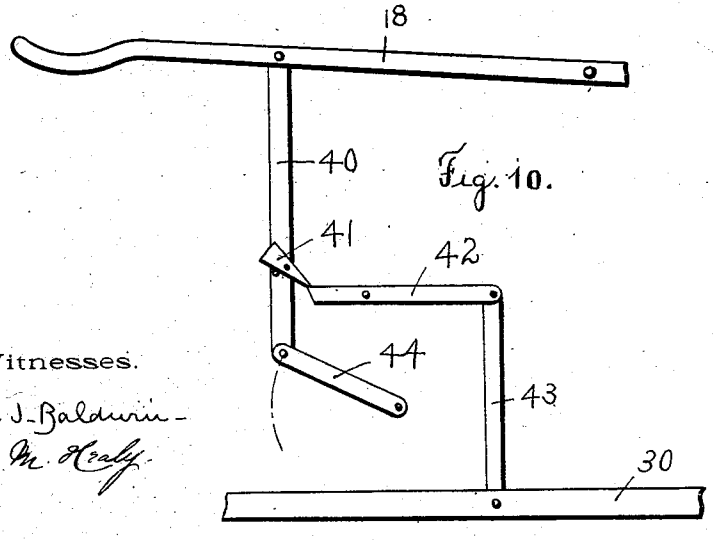


Fig. 10.



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UNITED STATES PATENT OFFICE.

EDWIN W. HAM, OF WORCESTER, MASSACHUSETTS.

TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 605,097, dated June 7, 1898.

Application filed April 22, 1897. Serial No. 633,326. (No model.)

To all whom it may concern:

Be it known that I, EDWIN W. HAM, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Telephone Systems, of which the following is a specification.

My invention relates to a system of intercommunicating or connected telephones; and the objects of my invention are to provide a simple, efficient, and novel form of switchboard for use in connection with each of the telephone instruments and to combine said switchboard with a releasing mechanism for cutting out the connections when the telephone instrument is not being used.

To these ends my invention consists of the parts and combinations of parts, as hereinafter described, and more particularly pointed out in the claims at the end of this specification.

In the accompanying three sheets of drawings, Figure 1 is a front view of a telephone instrument provided with attachments constructed according to my invention. Fig. 2 is a similar view partially broken away. Fig. 3 is a detail view of a contact-piece which I preferably employ in connection with the telephone-hook for cutting out the switchboard connections when the receiver of the telephone is replaced. Fig. 4 is an end view of a switchboard constructed according to my invention. Fig. 5 is a transverse sectional view of the same. Figs. 6 to 8, inclusive, are detail views of the contact strips or pieces. Fig. 9 is a diagrammatic view illustrating the wiring or connections preferably employed in a telephone instrument provided with attachments constructed according to my invention, and Fig. 10 illustrates a modified construction employing mechanical connections for operating the stop-bar from the telephone-hook.

A switchboard constructed according to my present invention comprises a plurality of circuit-making devices and a single releasing mechanism cooperating with said plurality of circuit-making devices.

In its preferred construction my switchboard comprises a base piece or plate, a plurality of plungers mounted therein, each plunger having a conical operating-section and a detent or cone near its rear end for holding said plunger in its operative position, two sets of normally open spring-terminals engaging the conical sections of the plungers to normally force said plungers outwardly, and a movable stop-bar for engaging the cones or detents on the inner ends of the plungers. When the stop-bar is raised, the plungers will be released and will spring back to their normal position. To raise the stop-bar, I preferably employ a plurality of releasing-magnets, which are momentarily energized by means of a contact-piece controlled by the telephone-hook.

The number of plungers or push-buttons employed in my telephone system corresponds with the instruments therein, the switchboards of the several instruments being connected together by separate wires, which are wrapped together in the form of a cable, two wires for each instrument in the system being employed.

Referring to the drawings and in detail, 10 designates the ordinary base-board or support, which carries a battery-box 11 and a telephone-box 12. Extending from the telephone-box 12 is the calling-handle 13, the transmitter 15, the call-bells 14, the push-button 16, controlling a strap-key for throwing in the calling apparatus, and a receiver 17, which may be supported when not in use upon the telephone-hook 18. These parts may be of the ordinary or approved construction and need not be herein described at length.

Mounted inside of the telephone-box 12 in position to cooperate with the telephone-hook 18 is a movable contact-piece 19. As illustrated most clearly in Fig. 3, the movable contact-piece 19 is made in the form of a yoke journaled on a stud 20, mounted in a bracket 21. Coiled around the stud 20 is a spiral friction-spring 22, which bears against the contact-piece 19. Fastened upon the telephone-hook 18 is a piece of insulating material 23, which is adapted to shift the contact-piece 19, so that said contact-piece will have but a momentary contact with the telephone-hook.

Mounted on the base-board 10 between the boxes 11 and 12 is one of my switchboards 24. The construction of the switchboard 24 is most clearly illustrated in the second sheet of

drawings. Referring to said sheet, 25 designates a plate or support, which is preferably formed of insulating material. Extending from the rear face of the plate or support 25 is a yoke 26. Mounted in the plate 25 and the yoke 26 are the plungers or push-buttons 27. The plungers 27 are provided near their centers with conical actuating-sections 28 and at their rear ends have conical detents or catches 29. Secured upon the rear face of the plate 25 are sheet-metal bars or strips 32, having integral spring contact-fingers 33, two of said spring contact-fingers normally coöperating with each plunger. The spring contact-fingers 33 are arranged to engage the conical sections 28 and normally force the plungers or push-buttons upwardly. Coöperating with the spring contact-fingers 33 and secured upon insulating-strips 35 are contact-pieces 34, which are normally out of engagement with the spring contact-fingers 33. Cooperating with the catches or detents 29 is a stop-bar 30, which is movably mounted on screws 31. By means of this construction it will be seen that when a plunger or push-button 27 is forced in the spring contact-fingers 33 will be brought into engagement with their corresponding contact-pieces 34 and the conical detent 29 will engage behind the stop-bar 30, so as to hold said plunger in its operative position.

Secured upon opposite ends of the plate 25 are releasing-magnets 36 and 37. The pivoted armatures 38 of the releasing-magnets 36 and 37 are bent up at their ends in position to engage the stop-bar 30. By means of this construction it will be seen that when the releasing-magnets are energized the stop-bar 30 will be released from the detents 29 and the plungers or push-buttons 27 will be allowed to move outwardly to their normal position under the influence of the spring contact-fingers 33.

The manner in which a telephone instrument provided with attachments constructed according to my invention is wired up is illustrated diagrammatically in Fig. 9. As shown in this figure, A designates a battery. D designates the ordinary induction-coil. E represents the strap-key for throwing in the calling-circuit. F designates the generator for energizing the calling-circuit, and *a*, *b*, and *c* designate the terminals which coöperate with the telephone-hook 18. These several instrumentalities are wired or connected in substantially the same manner as the ordinary telephone instruments, and the wires leading from said instrument are connected to two of the contact-pieces 34 of the switchboard 24. The wires from the several contact-pieces 34 of the switchboard are wound together in the form of cables G and H, two contact-pieces 34 and two wires therefrom being employed for each telephone in the system. In addition to these connections a circuit from the battery A is carried around the releasing-magnets 36 and 37, which operate the stop-bar 30 of the switchboard. This circuit is arranged to be momentarily energized when the contact-piece 19 is acted upon by the telephone-hook, as hereinafter explained.

When it is desired to communicate with any particular telephone in the system, the push-button or plunger corresponding therewith is pushed in. This will close a circuit with said instrument through the wires or cables G and H, and a call can be sounded in the ordinary way by pushing in the strap-key plunger 16, operating the strap-key E, and by turning the handle 13 to operate the generator F. When the call has been sounded, the receiver will be taken from the hook in the ordinary manner, which will leave the hook free to rise, so that the piece of insulating material 23 carried by said hook will turn the contact-piece 19. The person answering the call at the receiving end of the line will push in the push-button or plunger which controls his own local instrument. This will connect the two telephones, so that the conversation can be carried on as desired. When a receiver is replaced upon the telephone-hook 18, the hook 18 will move down in the ordinary manner and momentarily will come in contact with the contact-piece 19, closing a circuit through the releasing-magnets 36 and 37 of the switchboard, so that said releasing-magnets will raise the stop-bar and allow the push-button or plunger which has been forced in to again assume its normal position. The further downward movement of the telephone-hook 18 will bring the insulating-piece 23 again into engagement with the contact-piece 19 and will carry said contact-piece out of engagement with the telephone-hook 18, so that the parts will again assume their normal position.

In some cases instead of employing electrical connections for operating the stop-bar 30 from the telephone-hook 18 I contemplate employing mechanical connections between these parts, and I have illustrated such a construction in Fig. 10. As shown in this figure, the telephone-hook 18 is pivotally connected to a link 40, carrying a gravity-pawl 41. At its lower end the link 40 is connected to an inclined link 44. A lever 42 is pivoted so that the gravity-pawl may have a slight engagement or bearing on one end thereof. At its opposite end the lever 42 is connected by a link 43 with the releasing-bar 30. By means of this construction it will be seen that as the telephone-hook 18 moves down the pawl 41 will act upon the pivoted lever 42 until said pawl is carried away from the end of said lever by the action of the inclined link 44, which action will first raise the stop-bar 30 and will then lower the same to again resume its normal position.

I am aware that many changes may be made in the construction and arrangement of parts of my telephone system by those skilled in the art without departing from the scope of my invention as expressed in the claims.

I do not wish, therefore, to be limited to the forms which I have shown and described; but

What I do claim, and desire to secure by Letters Patent of the United States, is—

1. In a telephone-switchboard, the combination of a base-plate, a plurality of plungers mounted therein, each plunger having a conical operating-section and a detent for holding the same in its operative position, two spring-arms engaging the conical section of each plunger to normally force said plungers outwardly, a contact-piece coöperating with each spring-arm, whereby each plunger is adapted to make two electrical connections when pushed in, a single stop-bar engaging said detents, and means for actuating said stop-bar, substantially as described.

2. The combination of a yoked contact-piece 19, a telephone-hook and a piece of insulating material mounted on said telephone-hook, said parts being arranged so that the piece of insulating material will lift the contact-piece when the telephone-hook rises, and so that said piece of insulating material will move the contact-piece out of engagement with the telephone-hook after the same has had a momentary contact therewith when said telephone-hook is moved down, substantially as described.

3. The combination of a switchboard comprising a base-plate, a plurality of plungers mounted therein, each plunger having a conical section, and a detent for holding said plunger in its operative position, two normally open spring-terminals engaging the conical section of each plunger to normally force said plunger outwardly, a single stop-bar engaging said detents, releasing-magnets having armatures arranged to actuate said stop-bar, and connections for energizing said magnets from a telephone-hook, substantially as described.

4. The combination of a switchboard comprising a base-piece, a plurality of plungers mounted therein, each plunger having a conical section and a detent for holding said plunger in its operative position, two normally open spring-terminals engaging the conical section of each plunger to normally force said plunger outwardly, a single stop-bar engaging said terminals, and releasing-magnets for operating said stop-bar, a telephone-hook, and a contact-piece coöperating therewith to momentarily energize said magnets, substantially as described.

5. The combination of a switchboard comprising a base piece or plate, a plurality of plungers mounted therein, each plunger having a conical, operating-section and a detent for holding said plunger in its operative position, two normally open spring-terminals engaging the conical section of each plunger to normally force said plunger outwardly, a single stop-bar engaging said detents, and releasing-magnets for operating said stop-bar, a telephone-hook, a contact-piece coöperating therewith, an insulated, operating-piece carried by the telephone-hook, said parts being arranged so that when the telephone-hook rises, the contact-piece will be moved into position to momentarily close a circuit through the magnets when the telephone-hook is again moved down, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EDWIN W. HAM.

Witnesses:
LOUIS W. SOUTHGATE,
PHILIP W. SOUTHGATE.