

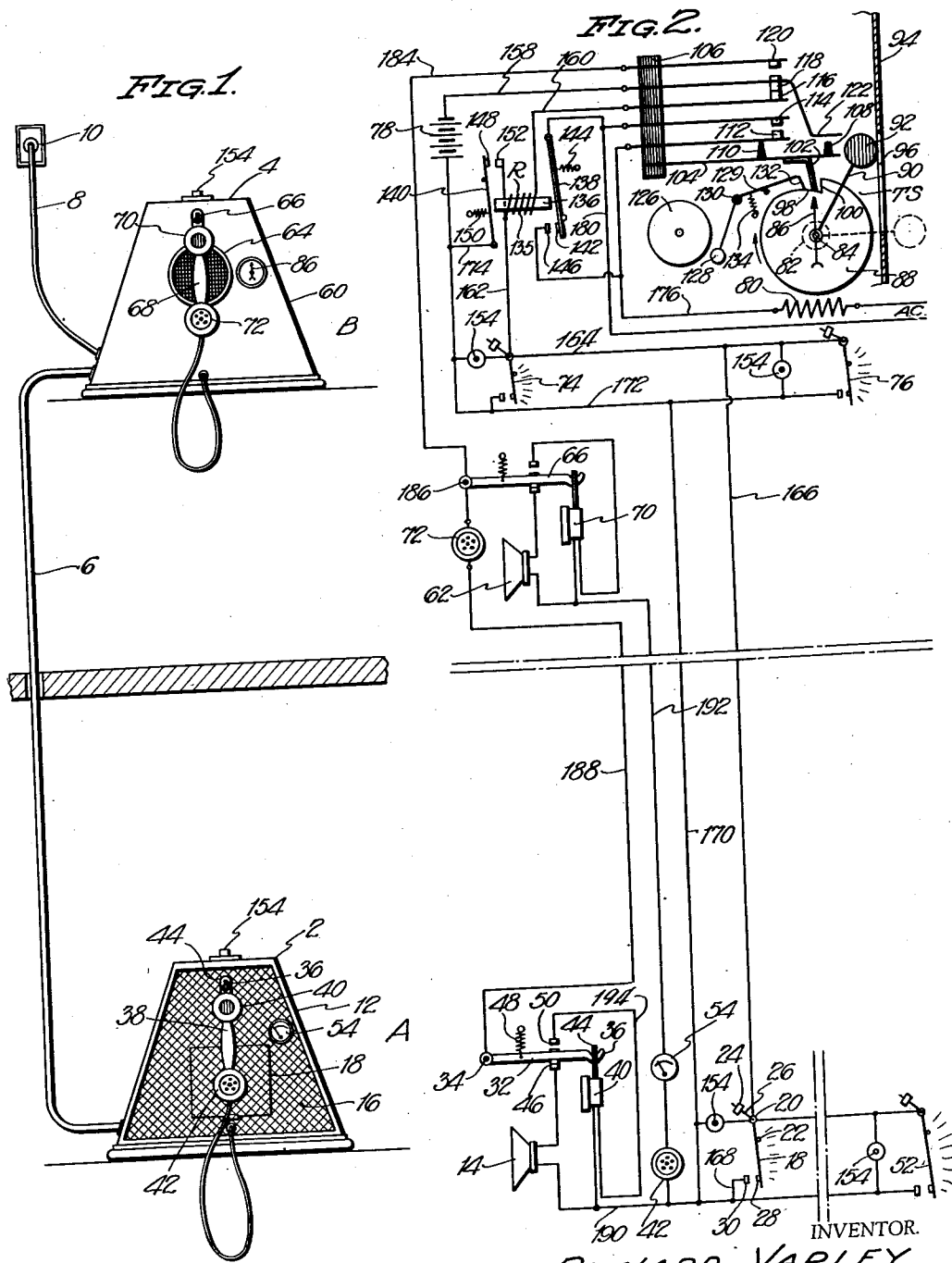
June 1, 1937.

R. VARLEY
INTERIOR TELEPHONE EQUIPMENT

2,082,130

Filed Aug. 24, 1935

2 Sheets-Sheet 1



WITNESS:

E. Newton Lusk

INVENTOR.
RICHARD VARLEY.

BY

Sheppard, Mullin, Morgan

ATTORNEYS.

June 1, 1937.

R. VARLEY

2,082,130

INTERIOR TELEPHONE EQUIPMENT

Filed Aug. 24, 1935

2 Sheets-Sheet 2

FIG. 3.

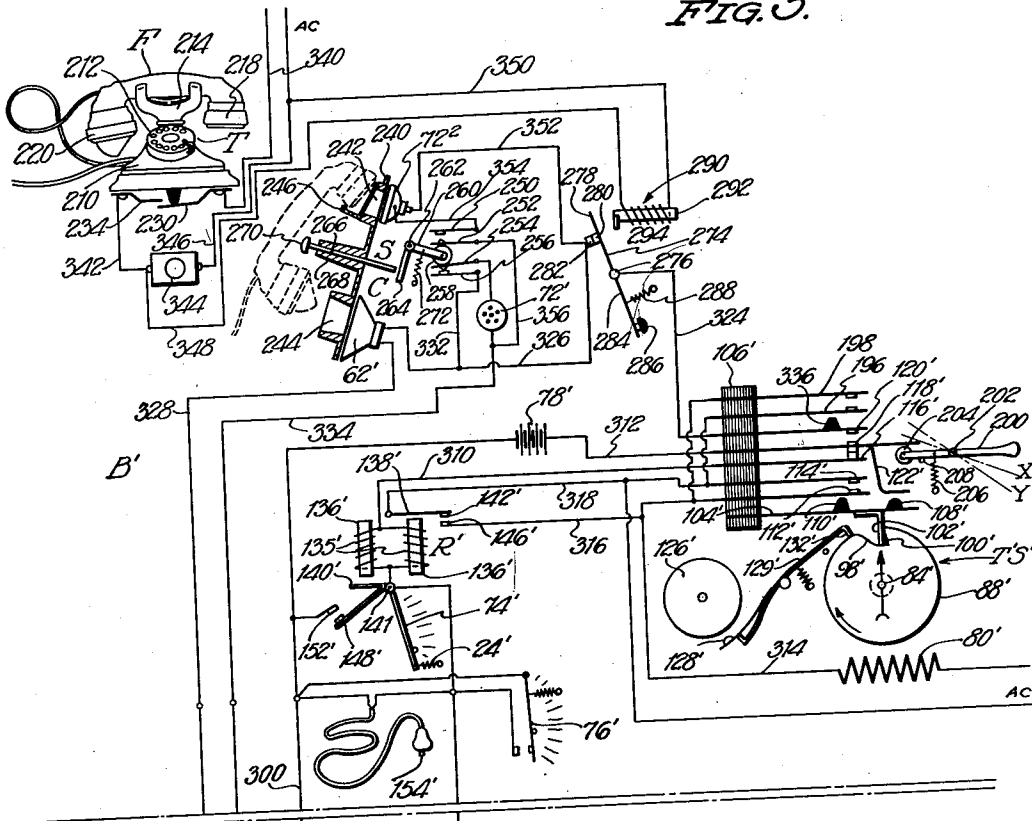
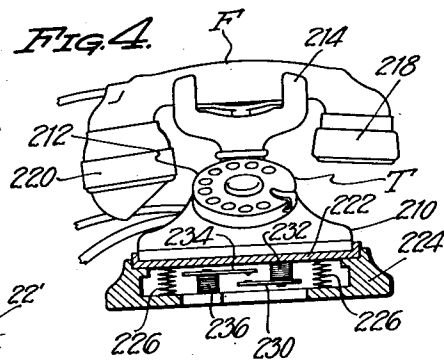


FIG. 4.



INVENTOR.

RICHARD VARLEY.

BY

James A. [Signature]
ATTORNEYS.

WITNESS:

[Signature]

Patented June 1, 1937

2,082,130

UNITED STATES PATENT OFFICE

2,082,130

INTERIOR TELEPHONE EQUIPMENT

Richard Varley, St. George, N. Y., assignor to
Inter-Outer Telephone Corporation, Dover,
Del., a corporation of Delaware

Application August 24, 1935, Serial No. 37,625

24 Claims. (Cl. 179-1)

My invention relates to improvements in systems of telephonic communication, and it has special reference to interior or inter-office telephone equipment of a type that is particularly adapted for service between telephone stations in the offices of two or more individuals who have unusually close business relations as, for instance, between the office of a busy business executive and his private secretary or assistant.

In the conduct of many large business enterprises busy executives must depend and rely upon their secretaries or assistants to a large degree to keep well informed as to all business matters and to take notes, answer questions and supply information of various kinds at any time. Therefore, it is highly desirable to be able to establish telephonic communication between the respective offices with ease and expedition and without interfering with the work at hand.

One of the objects of my present invention is to improve the telephone service between individuals so intimately associated in business, in such a way as to conserve the time and effort of the superior or executive head and to provide him with convenient facilities for conducting his business with dispatch and readiness.

Another object of my invention is to provide improved telephonic service between office stations of two such closely related individuals, which will enable them to have ready and immediate telephonic communication, without the necessity of either one putting aside his current work for the purpose of picking up and utilizing the usual telephone instruments.

A further object of my invention is to so arrange the interior telephone equipment that in addition to enabling the use of the regular telephone instruments, which are located at more or less specific points in the respective offices, as, for instance, at desks or tables, it is possible through the agency of suitable loud-speakers and transmitters, to enable them to converse without the use of the usual telephone instruments, and from whatever position in their offices they may happen to occupy at the moment, or, at least, from various distributed points therein.

A still further object of my invention is to provide simple, effective and expeditious means for initiating the setting up of such telephonic facilities by the mere act of momentarily depressing a push button or gently blowing upon any one of a number of suitable control devices that may be conveniently and unobtrusively located at distributed points in an office, and for subsequently and automatically terminating the telephonic service

after a predetermined time interval so as not to require further attention of the parties, unless, perchance, it appears that the conversation will not be finished in the time interval available, in which case the period of operation may be readily extended to whatever time is requisite.

Still another object of my invention is to improve and augment interior or inter-office telephone service, such as that hereinbefore mentioned, by making provisions for acoustically coupling the interior telephone system with the subscriber's telephone instrument of a public telephone system, so that incoming calls can be handled at the branch station in secretary's or assistant's office, if so desired by the superior.

These and other objects of my invention and features by means of which they are attained, will be understood from the following description of the accompanying drawings, of which

Fig. 1 is a diagrammatic view of one form of my invention, showing the apparatus as it appears when installed;

Fig. 2 is a diagrammatic view of the circuit connections of the interior telephone system shown in Fig. 1;

Fig. 3 is a diagrammatic view of the circuit connections of an improved modification of my invention, and

Fig. 4 is a detailed view, partially in section and partially in elevation, of the construction of a portion of the equipment shown diagrammatically in Fig. 3.

Referring now to Figs. 1 and 2 of the drawings, the interior telephone equipment therein shown is adapted for communication between two stations A and B, which for illustrative purposes may represent the offices of an executive and his secretary or assistant, respectively. The installation includes a desk set or instrument 2 located at station A and a desk set or instrument 4 located at station B, an interconnecting cable 6 including a plurality of conductors for operatively connecting said desk sets 2 and 4, and a cable 8 furnishing energy to desk set 4 from a source of alternating current represented by the plug 10 of Fig. 1 and marked "AC" in Fig. 2.

Desk set 2, which is adapted to rest upon a desk or table in the office of station A, comprises a cabinet 12 within which is contained a loud-speaker 14 (not shown in Fig. 1) which is adapted to be heard when in operation through the open or screened front wall 16 of the cabinet. Within the cabinet 12 and immediately behind the screen 16 is also located a suspended, swingable diaphragm 18 which, as shown in Figure 2, is

pivotaly mounted at 20 and is held against a stop 22 by an adjustable counterbalance weight 24 carried on an arm 26 fixedly associated with the floating diaphragm 18. This diaphragm is light in weight and is delicately suspended in such manner that it may be easily actuated through a limited degree of movement by the simple act of blowing gently thereon. The diaphragm carries an electrical contact 28 near its lower end, which is adapted to make momentary electrical engagement with a cooperative stationary contact 30 when swung through a small arc in the manner described.

Also mounted within the cabinet 12 is a hook lever 32 pivotaly mounted at 34 and having its free hooked end 36 projecting outwardly through the front screened wall of the cabinet for the purpose of serving as a support for a hand-grip telephone instrument 38 which comprises a receiver 40 and a transmitter 42 which are fixedly spaced at the extremities of the hand grip, as is the customary practice. This hand grip telephone instrument 38 is provided with a suspension member 44 which is adapted to be placed over and hung upon the outer end 36 of the hook lever 32.

For the purposes of my invention, this hand-grip telephone instrument 38 is hung upon the hook lever in such a position that the transmitter 42 faces outwardly from the cabinet, and, therefore, is in position to respond to speech directed thereto. On account of its sensitivity this microphone will operate effectively even though the speaker be several feet removed therefrom.

As a matter of simplicity of the circuit connections, the receiver 40 and transmitter 42 of the hand-grip instrument 38 are not shown in Figure 2 as rigidly connected, but in service this will usually be the case. When the hand-grip instrument 38 or, as shown in Figure 2, the receiver 40 is hung on the hook lever 32, said hook lever makes an electrical engagement with a lower stationary contact 46, but when the receiver 40 is removed from the hook lever the spring 48 raises said lever until it makes engagement with an upper stationary contact 50.

In addition to the provision of a suspended floating diaphragm 18 within the desk set 2 of station A, said station may be provided with other similar floating diaphragms, such as shown at 52, which may be located at various distributed points within the room of station A where they will be conveniently available for ready use. Also associated with the desk set 2 of station A is a signal device or indicator 54 which, as shown, is of the well-known meter type, but which may, however, take any other suitable form.

The facilities shown and described in connection with station A are more or less duplicated at station B, although in somewhat different form, and station B is also provided with certain additional equipment which will presently be described.

In the first place, it should be understood that the desk set or instrument 4 at station B comprises a cabinet 60 in which is mounted a loud-speaker 62 (not shown in Fig. 1) which may be heard through the screened front opening 64 of the cabinet, which is also provided with a hook lever 66 similar in construction and function to hook lever 32 previously described with respect to station A. A hand-grip telephone instrument 68 having a receiver 70 and a transmitter 72 normally hangs on hook lever 66 with the transmitter 72 facing outwardly in readiness for use. As

shown, the desk set 4 at station B does not contain a suspended, floating diaphragm such as 18 and 52 previously described, but similar diaphragms 74 and 76 are provided at conveniently located points in the room of station B.

Station B is also provided with various auxiliary control devices which are conveniently located within the cabinet 60. Among these devices is a motor-operated timing and switching device TS, an electromagnetic relay R of the well-known "grab magnet" type and also a battery 78.

The motor-operated timing and switching device TS includes an electric motor of the well-known alternating current self-starting synchronous type, such as is commonly employed in self-starting electric clocks. This motor is diagrammatically represented in Fig. 2 by its field winding 80 and a rotor 82 (shown in dotted lines), which rotor is operatively associated through suitable gearing (not shown) to a shaft 84 which carries an indicating needle or pointer 86, and upon which is also mounted a cam 88. The gearing above referred to may be so designed as to produce any desired degree of gear reduction so that the time required for the indicating needle 86 and the cam 88 to effect one complete revolution may be fixed in accordance with the requirements of the service under consideration. An ordinary electric clock motor, of course, is so geared as to cause the second hand to complete one revolution each minute, and, for illustrative purposes, let it be assumed that in my invention the driving mechanism is geared to require a period of one minute for each complete revolution of the associated cam and indicating needle.

Operatively associated with the shaft 84, and driven thereby by any ordinary friction drive, is an arm 90 carrying at its outer end an indicating disk or semaphore 92 which may appropriately be painted red, if desired, to constitute a signal. When the motor mechanism is at rest, this semaphore, if it has been manually reset, occupies a position, as shown in full lines in Fig. 2 and is disposed entirely within the cabinet 60, one wall 94 of which is provided with a slotted opening 96, and is shown diagrammatically in Fig. 2. When the driving motor is operated to turn the geared cam 88 and indicating needle 86 in the direction of the arrow, the friction drive at the inner end of the semaphore arm 90 immediately rotates the semaphore in a corresponding direction until the signal disk 92 occupies a position shown in dotted lines in Fig. 2 as it comes to rest by reason of the engagement of its arm 90 with the lower end of the slotted opening 96 in the wall of the cabinet, thus indicating that the motor-driven timing and switching device TS is or has been in operation. Of course, this semaphore signal may be reset manually whenever desired, in view of its friction drive connection with the shaft 84.

For the purpose of effecting suitable circuit connections at predetermined relative times in accordance with my invention, the motor-operated cam 88 is provided with an actuating cam surface 98 and an undercut shoulder 100, and cooperatively engaging with the cam is an operating arm or finger 102 which is carried by a spring arm 104, one end of which is mounted in an insulating block 106 and the free end of which carries an insulating button 108, while another insulating button 110 is mounted at an intermediate point on said spring arm. This spring arm 104, with its associated component parts as just described, serves to actuate a plurality of spring switch contacts 112, 114, 116, 118 and 120, which

are mounted on the insulating block 106, and constitute the control switch for regulating and adjusting certain circuit connections of my system. The spring contacts just referred to normally occupy the positions shown in Fig. 2 in which contacts 116 and 118 are in electrical engagement, but all of the others are disengaged. Spring contact 118 is provided with an extended end 122 which projects into proximity with the insulating button 108 which is carried by the actuating spring arm 104, a suitable gap being provided between the button 108 and the extended end 122 so that there is a certain amount of lost motion before operative engagement takes place.

Assuming the driving motor and associated mechanism to be at rest, and the component parts of the timing and switching device TS to occupy the positions shown in Fig. 2, if the motor is supplied with alternating current energy it will immediately start into operation to rotate the cam 88 and needle 86 in a clockwise direction, thereby causing the finger 102 to ride up the actuating cam surface 98 and thus raise the actuating spring arm 104 with its two insulating buttons 110 and 108. As the button 110 is raised, it immediately effects an electrical engagement between the spring contacts 112 and 114, but, by reason of the gap previously mentioned between the insulating button 108 and the extended end 122 of spring contact 118, the engagement of button 108 and arm 122 is delayed until after the engagement of contacts 112 and 114 is effected. Thereupon, however, spring contacts 116 and 118 are disengaged, and immediately thereafter spring contacts 118 and 120 are brought into electrical engagement. This sequence of operation has a definite functional relation to the operation of my invention, as will be understood as the description proceeds.

In order to warn or signal the party at station B a short interval, of ten or fifteen seconds, for instance, prior to the completion of one full revolution, a suitable signal is provided which, as shown, takes the form of a bell 126 which at the proper time is struck by a hammer 128 mounted at one end of a bell crank lever 129 which is pivoted at 130 and which is provided at its other end with a cam-engaging finger 132 normally held by a spring 134 in cooperative engagement with the cam 88. The relative positions of the cam-engaging fingers 102 and 132 are such that the fingers 132 drops off the undercut shoulder 100 of the cam a predetermined time interval before the shoulder reaches the finger 102. As the shoulder 100 passes from under the finger 132 the spring 134 quickly rotates the bell crank 129 and causes the hammer 128 to strike the signal bell 126, thus giving the warning above referred to.

The relay R is of the well-known "grab-magnet" construction, and performs an important function in the control of my system, particularly with respect to the suspended swingable diaphragms which have already been set forth as capable of being actuated by blowing gently against them to cause a momentary electrical engagement of their cooperating contact members. Such engagement of any one of the several suspended floating diaphragms is adapted to energize a winding 135 of the grab magnet relay R which is disposed around a magnetic core 136 and which serves, when energized, to attract to the respective ends thereof a plurality of armature switch arms 138 and 140, respectively. Armature switch arm 138 is provided with a contact

142 normally held by a spring 144 in the position shown and out of engagement with a cooperating stationary contact 146. Similarly, armature switch arm 140 carries a contact 148 which is normally held by spring 150 out of engagement with stationary contact 152. Both armature switch arms 138 and 140 are actuated and drawn toward the respective ends of the core 136 when the winding 135 is energized to thereby effect the electrical engagement of the cooperating contacts respectively associated therewith.

The electrical engagement of contacts 148 and 152 connects the winding 135 of the relay R directly across the battery 78, and therefore holds and maintains the respective armature switch arms in closed position, irrespective of the subsequent action of the suspended swingable diaphragms. This is important in view of the delicate nature of these floating diaphragm control devices, it being only necessary to effect a momentary and light engagement of the contact members associated therewith in order to energize the winding 135 and close the contacts 148 and 152 to establish a holding circuit for the relay.

In addition to the various diaphragm control devices located at both stations A and B, a plurality of conveniently located push buttons 154 are provided at the various stations, any one of which may be utilized momentarily to energize the winding 135 of the grab magnet relay R. One of these push buttons 154 at each station is conveniently located on the top of the respective desk sets 2 and 4.

The indicating needle 86 of the motor-driven cam device is located in the front panel of the desk set 4 at station B, where it may be constantly observed by the party using the instrument, thus enabling him to determine when the predetermined time interval of the motor-driven timing and switching device TS will terminate, so that he may either govern his conversation accordingly or take the necessary steps to extend the time interval.

Having described the general construction and functions of the various component parts of the system, a description of the circuit connections and operation will now be set forth.

Assuming that during the conduct of his business, the party at station A, whom I have for illustrative purposes assumed to be a business executive, desires to speak with the party at station B, whom I have assumed to be his private secretary or assistant, he has only to blow gently against the suspended floating diaphragm 18 located within the desk set 2 to initiate the operation of the motor-driven timing and switching device TS for setting up the necessary telephone circuits for conversation. By so doing the suspended diaphragm 18 swings through a small arc in response to the gentle current of air, and effects a momentary engagement of the cooperating contacts 28 and 30, thereby immediately energizing the winding 135 of the grab magnet relay R through a circuit from one side of the battery 78, including conductor 158, spring contacts 118 and 116, conductor 160, energizing winding 135 of the relay R, conductors 162, 164, and 166, swingable diaphragm 18, contacts 28 and 30 associated therewith, conductors 168, 170 and 172 to the other side of the battery. This energizes the winding 135 of the relay R, which immediately draws the armature switch arms 138 and 140 toward the core, thus engaging contacts 152 and 148 and establishing a holding circuit from the

winding 135 through said contacts, armature 140, conductor 174 and conductor 172 to the battery. This immediately sets up and maintains a holding circuit through the energizing winding 135, so that its subsequent action is entirely independent of further movements of the swingable diaphragm 18.

Concurrently therewith, the contacts 142 and 146 associated with the armature 138 are closed, thus connecting the alternating current, self-starting synchronous motor to the source of power marked A. C. This circuit is from one terminal of the power source, through the field winding 80 of the driving motor, conductor 176, conductor 178, contacts 146 and 142 of the relay R, armature 138 and conductor 180 to the other terminal of the source of power. The driving motor, which, as set forth is self-starting in character, immediately starts into operation and, by reason of the reduction gearing previously referred to but not shown, rotates the indicating needle 86 and the cam 88 in a clockwise direction.

This rotation causes the cam-engaging fingers 132 of the signal bell mechanism and the cam-engaging finger 102 of the actuating spring arm 104 to ride over the operating cam surface 98, and thereby be raised in position as the cam rotates. Accordingly, the bell crank 129, upon which the hammer 128 is mounted, is thus rotated in a counterclockwise direction against the action of the spring 134 to set the hammer in striking position. Similarly, as the spring arm 104 is raised, the insulating button 110 immediately presses the spring contact 112 into engagement with the contact 114. This action bridges the circuit including the contacts 142 and 146 of the armature switch arm 138 associated with relay R, by means of a circuit which includes conductor 176, and spring contacts 112 and 114, thus establishing a new operating circuit for the driving motor, which is independent of the subsequent action of the relay R.

As the cam 88 continues to rotate, the insulating button 108 at the end of the actuating spring arm 104 is raised through the gap previously mentioned and engages the extended finger 122 which subsequently raises spring contact 118 and causes it to disengage spring contact 116, thereby interrupting the holding circuit of the grab magnet relay R, which is thereby deenergized.

This permits its respective armature switch arms 138 and 140 to be restored by their respective springs 144 and 150 to normal position, and effects a disengagement of the cooperating contacts 142 and 146, and also of the contacts 152 and 148.

The continuing rotation of the cam 88 causes spring contact 118 to be raised into engagement with spring contact 120 to thereby set up the telephone circuits between stations A and B. These circuits include conductor 158 from one side of the battery 78, spring contacts 118 and 120, and conductor 184 to the pivotal point 186 of the hook lever 66 at station B, where the circuit divides, one branch including the transmitter 72, conductor 188, hook lever 32, loud-speaker 14 and conductor 190, and the other branch including hook lever 66, loud-speaker 62, conductor 192, signal device 54 and transmitter 42, and thence after joining conductor 190 through conductors 170 and 172 to the other side of the battery 78. The necessary telephone circuits are thus established for communication between stations A and B.

In the interim, the semaphore signal device 92, by reason of its friction drive with the shaft 84, is rotated in a clockwise direction through the slot 96 in the wall of desk set 4 and to the position shown in dotted lines in Fig. 2, thus indicating that the motor-driven timing and switching device TS is in operation. The indicating needle 86 gives a similar indication and, in addition, progressively indicates the proportion of the time cycle which has been consumed. The signal device 54 at station A also shows that the motor-driven timing and switching device TS is in operation and that the telephone circuits are established and ready for service.

The party or executive at station A may then converse with the party at station B without the necessity of using his hands to pick up a telephone instrument and without being obliged to lay down any papers or the like upon which he may be working. He merely speaks in his normal conversational tone in the general direction of the transmitter 42, which hangs facing outwardly on his desk set 2. It is unnecessary for him to be in close proximity to the transmitter as it will satisfactorily pick up the voice even if the speaker is several feet distant therefrom in another part of the room.

The party at station B hears the conversation through the loud-speaker 62 as it emanates from the desk set 4 through the screened opening 64, and is, in turn, enabled to converse with the party at station A in a similar manner through the transmitter 72 which is hung facing outwardly on the desk set 4. The party at station B, therefore, may also converse without being required to pick up a telephone instrument or lay down the work at hand.

If the conversation occupies a period of time no longer than the time interval of the motor-driven timing and switching device TS, no further manipulation of the system by either party is requisite, and the motor-driven timing and switching device will at the end of its cycle automatically interrupt the motor and telephone circuits and restore the system to normal inoperative condition. This will be accomplished as the cam 88 completes its revolution, thereby dropping the cam-engaging finger 102 from shoulder 100, thus permitting the several spring contacts of the switching device to resume their normal positions and thereby interrupt the several circuits of the system.

In the event that it becomes apparent that the conversation will not be completed within the cycle period of the timing and switching device TS, the party at station B, noting from the position of the indicating needle 86 on his desk set, that such is the case, may extend the period of operation and set up a new cycle period by either depressing one of his push buttons 154 or by blowing gently against one of the floating diaphragms 74 or 76 which are located in his office. In either case, the winding 135 of the relay R will be energized from battery 78 immediately upon the completion of the cycle period of the timing and switching device TS, as will be understood. This will reconnect the driving motor to the source of power and initiate a new cycle of operations analogous to those previously described and which need not be repeated.

As a matter of convenience, it will be unnecessary for the party at station B to watch the indicating needle 86, as just prior to the completion of the first time cycle or revolution of said needle and associated cam 88, the signal bell 126

will be operated in the manner previously described, which will warn the party of the approach of the end of the cycle period and permit him to initiate a new cycle of operations in the manner just referred to, if so desired.

If for any reason the party at station B should not make suitable arrangements for repeating the cycle, the source of current for the driving motor of the timing and switching device TS will be interrupted at the end of the cycle and the telephone circuits will also be opened. However, the operation may be immediately resumed by either party by merely again actuating one of the floating diaphragms or one of the push buttons, so that as a practical matter the interruption will only be momentary and will not seriously interfere with the conversation.

Although the operation of the system has been described as being initiated by the party at station A through the operation of the suspended floating diaphragm 18 within the desk set 2, it is evident that any of the floating diaphragms, such as 52, for instance, which are located at convenient places in the office, may be utilized for this purpose, as will be understood without further description. Moreover, any of the several push buttons, such as 154, for instance, which are located in the office, may be similarly employed.

It is unnecessary, therefore, that the party at station A be at his desk to effect the establishment of telephone connections, but he may do so while occupying other positions in the office, and, by reason of the sensitivity of the transmitter 42, he may talk with station B, even though he be located several feet away from the instrument. Similarly, the facilities may be utilized at station B in a similar manner and irrespective of the place in the office which the party may occupy.

Through this improved telephonic service, as described, it is unnecessary for either party to incur the inconvenience of putting aside his work and picking up the telephone instrument, as has been the practice in the past. Moreover, if there are visitors in either office and the conversation is of a confidential character, the telephone instruments in either office may be picked up and used, thereby disconnecting the loud speaker in that particular office and substituting therefor the ear phone or usual receiver.

For instance, if the party at station A desires to exclude visitors from hearing the conversation, over the loud-speaker, he may merely remove the hand set 38 from its hook lever 32, whereupon the telephone circuit through the loud speaker 14 is interrupted by the disengagement of the hook lever from the lower contact 46 while the engagement of the hook lever with the upper contact 50 immediately connects the telephone receiver 40 in the circuit by means of conductor 194.

If the party at station B should happen to be out of his office at a time when the party at station A attempts to communicate with him, the operation of the motor-driven timing and switching device TS will be initiated and the device will function through its usual cycle and then come to rest. In so doing, the semaphore signal device 92 will be moved into its lower warning position, as shown in dotted lines in Fig. 2, and thus indicate at station B that a call has been attempted. The party at station B, noticing this signal upon his return may then call station A, in the general manner which has already been described.

Referring now to Figs. 3 and 4 of the drawings, the modification of my invention in interior tele-

phone equipment, as diagrammatically illustrated therein, is in many respects similar in construction and operation to that previously described, but in accordance therewith certain new and important features are incorporated which are especially useful for service of the general character hereinbefore indicated.

According to this form of the invention, I have extended the utility of the previously described system by making suitable arrangements whereby it may be acoustically coupled to the usual subscriber's telephone instrument of a public telephone system, without in any way interfering with or affecting in the slightest the operation of said public telephone system. With this arrangement, it is not only possible for parties at the two stations to have telephonic communication between themselves in a general manner already set forth, but telephone calls may be conducted with parties on the public telephone system by acoustically interconnecting the interior telephone equipment with that of the public system.

As shown in Fig. 3, the system in the main corresponds with that of Figs. 1 and 2 and includes at station A' a loud-speaker 14', a transmitter 42', a signal device 54', a floating diaphragm control device 18' and a push button 154', all of which may conveniently be housed in a single cabinet.

Station B' is equipped with a loud-speaker 62', a transmitter 72', an electromagnetically operated relay switch R', floating diaphragm control devices 74' and 76', a push button 154' and a motor-driven timing and switching device T'S'.

The electromagnetic relay switch R' differs slightly in construction, but not in function, from that previously set forth, more particularly in that it comprises two magnetic cores 136' with energizing windings 135' therefor. One of the electromagnets is adapted to actuate an armature switch arm 138', while the other operates an armature switch arm 140' which, in this particular arrangement, is constructed in the form of a bell crank, which is fixedly secured to or integral with the suspended swingable or floating diaphragm 74' having a restoring spring 24' in lieu of a counter-balance weight, as previously set forth.

The timing and switching device T'S' is also similar in construction and function to that of Fig. 2, and therefore requires no further detailed description to enable a full understanding thereof. It is pointed out, however, that the timing and switching device T'S' includes two additional spring contacts 196 and 198 and also a manually-operated control lever 200, the function of which will become apparent as the description proceeds.

The control lever 200 is pivotally mounted at 202 and its inner end carries a movable roller 204 in engagement with an extension of the spring contact arm 118', said control lever 200 being normally held by a spring 206 against a stop 208. This control lever is adapted to occupy two operative positions, as indicated by dotted lines marked X and Y.

In addition to the apparatus previously mentioned as part of the equipment at station B', there is also an acoustical coupling device denoted generally by the letter C, together with a desk type telephone set T which constitutes a part of a public telephone system. The telephone set T comprises a base 210, a dial mechanism 212, a cradle 214 and a French type telephone instrument F having mounted in fixed spaced relation at the opposite ends thereof a receiver 218 and a transmitter 220.

In order to carry out certain functions of my improved invention, the telephone desk set T normally rests upon a floating platform 222 (Fig. 4) which is yieldingly positioned within a sub-base 224 upon a plurality of springs 226 in such manner that when the entire desk set, including the base 210 and the French type telephone instrument F, rests upon the supporting platform 222, the platform is depressed to its lowermost position by the total weight of the desk set. However, when the French type telephone instrument F is removed from its cradle for use, the floating platform 222 is raised by the springs 226 to an elevated position.

I utilize the movement of the floating platform 222 into the positions indicated to control certain operations of the system. This is accomplished by mounting a spring contact 230 upon an insulating block 232 which is fixed to the bottom of the platform 222, and in cooperative relation with said spring contact 230 I provide another similar spring contact 234 which is mounted on an insulating block 236 suitably secured to a stationary portion of the sub-base 224. The arrangement is such that when the entire telephone desk set T rests upon the floating platform 222 the spring contacts 230 and 234 are out of electrical engagement, while when the French telephone instrument F is removed from its cradle, the springs 226 raise the floating platform 222 and effect an electrical engagement between the spring contacts 230 and 234.

The acoustical coupling device C (Fig. 3) comprises a cabinet, of which a fragment or portion of its front inclined panel 240 is shown in section. This panel is provided with suitable openings 242 and 244 located in vertical relation and fixedly spaced to correspond with the receiver 218 and the transmitter 220 of the French telephone instrument F when it is placed in registry therewith. Immediately below the upper opening 242 is a supporting flange member 246 upon which the French telephone instrument rests and by which it is suspended in operative position when an acoustical coupling is effected. In order to effect such an acoustical coupling or connection between the public telephone instrument F and my interior telephone system, an auxiliary transmitter 72³ is mounted within the cabinet immediately behind the upper opening 242 in the front panel, and the loud-speaker 62' is similarly positioned in proximity with the lower opening 244 in said panel.

For control purposes, a switching device S is also provided within the cabinet and comprises a plurality of spring contacts 250, 252, 254 and 256. Intermediate the spring contacts 252 and 254 is a movable roller 258 pivotally mounted at the end of one arm of a bell crank 260 which is pivoted at 262, and the other end 264 of which is so positioned as to be cooperatively engaged by a switch-actuating rod 266 which projects through a boss 268 on the front panel 240. This actuating rod carries a head or button 270 at its outer end by means of which it may be depressed by the operator to effect the actuation of the bell crank 260 against the action of a spring 272, to thereby actuate the spring contacts 250, 252, 254 and 256. The spring 272 normally holds the various parts of the enclosed switch S, including the actuating rod 266, in the position shown in the drawings, in which spring contacts 250 and 252 are disengaged, while spring contacts 254 and 256 are in electrical engagement.

The head or button 270 of the actuating rod

266 normally occupies a position such that the French telephone instrument F is prevented from being placed in full and efficient acoustical relation with the microphone 70' and loud-speaker 62' until the actuating rod 266 is depressed to effect the actuation of the various switch contacts. The French telephone instrument F is shown in dotted lines in Fig. 3 in an intermediate and only partially operative position, it being understood that in order to effect a full and efficient acoustical coupling, the actuating rod 266 must be depressed before the telephone instrument can be placed in final acoustical relation and be supported therein by the supporting flange 246. After being depressed the actuating rod 266 is held in position by the telephone instrument F.

Also constituting a part of the acoustical coupling device C is a manually-operated control switch 274 which is pivotally mounted at 276 and carries on an armature portion 278 thereof a contact 280 normally held in cooperative engagement with a stationary contact 282, while its other end 284 carries an actuating button 286 which conveniently projects outside the cabinet and by means of which the operator may move the control switch 274 against the action of a spring 288. This control switch 274 normally forms a part of the telephone circuit between stations A' and B', but, when moved by the operator into inoperative position, it disengages the contacts 280 and 282 and interrupts the telephone circuits. At the same time, the armature portion 278 thereof is moved into electromagnetic relation with an electromagnet 290 having a core 292 and an energizing winding 294, which is energized whenever the French telephone instrument F is removed from its base, as will more fully later appear. When the switch is closed the armature portion 278 is not in the field of influence of the electromagnet 290.

As a matter of convenience and appearance, the acoustical coupling device C, the timing and switching device T'S', the electromagnetic relay switch R' and the suspended floating diaphragm 74' may be contained in a single cabinet with the floating diaphragm located immediately behind a suitable opening in the front panel where it is suitably positioned to be actuated by the party at station B'.

Before proceeding with a description of the operation of the system, it is important to point out that the public telephone set T, which is utilized in the system of my invention, is preferably of a type now on the market and which is provided and used in conjunction with a suitable controllable electronic amplifier unit, such as is embodied in the so-called "hard of hearing" telephone equipments. The adjustable amplifier unit is not illustrated in the drawings and its construction and operation forms no part of my invention, except as it performs the function of amplifying messages received over the public telephone system in order that they may be delivered as articulate speech through the receiver 218 at amplified or intensified volume, which may be regulated to the personal convenience or requirements of the hearer or, when used in connection with my invention, in accordance with the requisites of the service intended.

Of course, in lieu of utilizing an electronic amplifier unit for intensifying such messages before they emanate as speech from the receiver 75

of the public telephone set, and which are subsequently acoustically transmitted to the interior telephone equipment, I may find it desirable in certain instances to employ an ordinary public telephone set, which does not include an amplifying unit, and effect the necessary amplification in the interior telephone equipment by incorporating therein a suitable and adjustable electronic amplifier intermediate the transmitter 72² and the loud-speaker 14'.

Having set forth a description of the construction of certain of the added parts of this modified form of my invention, an explanation of the operation of the system as a whole follows, except that, in view of the similarity in operation of the interior telephone equipment with that previously described in connection with Fig. 2, the operation will be summarized to some extent.

Assuming then that the party at station A', whom I have assumed to be a business executive, actuates the floating diaphragm 18' (or push button 154'), the electromagnetic relay switch R' is connected across battery 78' through a circuit which includes conductors 300 and 302, diaphragm contacts 28' and 30', conductors 304 and 306, to the pivot point 141 of the combined bell crank 140' and floating diaphragm 74', and thence through the respective windings 135' of the relay R', which are connected in parallel, conductor 310, switch arms 116' and 118' and conductor 312 to the other side of the battery. The electromagnetic relay R' is thus energized and one of its cores attracts the armature switch arm 138' to effect an electrical engagement between the cooperating contacts 142' and 146', thus establishing the motor circuit of the motor-driven timing and switching device T'S' from the source of energy marked A. C. through the motor field winding 80', conductor 314, conductor 316, contacts 146' and 142' of the relay R', conductor 318 and conductor 320 to the other side of the source of energy. The driving motor of the timing and switching device T'S' then starts into operation to rotate, through suitable reduction gearing, the cam 88' and the indicating needle 84' whereby by the same cycle of operations is carried out, as already set forth in connection with Fig. 2 of the drawings.

Concurrently with the energization of the windings 135' of the relay R', the other core thereof attracts the armature arm of the bell crank 140' which causes the contact 148', mounted on the other arm thereof, to electrically engage contact 152', thus establishing a holding circuit for the relay from the battery 78' which maintains the energization of the relay R', irrespective of subsequent movements of the floating diaphragm 18'. In this way the supply of energy to the driving motor is continued even though disengagement of the diaphragm contacts 28' and 30' is subsequently effected.

As the motor driven cam 88' rotates in a clockwise direction, the cam engaging finger 102' of the actuating spring arm 104' is raised by its cooperative engagement with the cam actuating surface 98'. Thus, spring contacts 112' and 114' are engaged to bridge the temporary motor circuit through the relay contacts 142' and 146'. Subsequently, the energizing circuit of the relay R' is interrupted by the disengagement of spring contacts 116' and 118' and, immediately following this operation, the spring contact 118' is brought into engagement

with the spring contact 120' whereby the telephone circuit interconnecting stations A' and B' is established as follows:

The telephone circuit is completed from one side of the battery 78' through conductor 312, spring contacts 118' and 120', conductor 324, armature switch arm 278 of the control switch 274, contacts 280 and 282 and conductor 326, where the circuit divides, one branch including loud-speaker 62' associated with the acoustical coupling device C, conductor 328, signal device 54', transmitter 42' at station A' and conductor 300, while the other branch includes conductor 332, spring contacts 256 and 254 of control switch S, transmitter 72' associated with the acoustical coupling device C, conductor 334, and loud-speaker 14' at station A', from whence the circuit joins the circuit previously recited and is completed through conductor 300 to the other side of the battery.

Upon the establishment of the telephone circuit, the conversation between the parties at station A' and B' may be carried on throughout the predetermined time interval of operation of the combined timing and switching device T'S'. Moreover, this conversation may be carried on from whatever points in the respective offices the parties may happen to occupy, by reason of the sensitive transmitters and the loud-speaking equipment, without the necessity of using the hands and incurring the inconvenience of employing the usual telephone instruments.

As will be understood, the timing and switching device T'S' maintains the telephone circuit for a predetermined time interval and then automatically interrupts the circuit without requiring further attention by either of the parties. Just prior to the interruption of the telephone circuit and the termination of operation of the timing and switching device T'S', a signal is given by the bell striking lever 129' which has a cam-engaging finger 132' on one end and a spring mounted hammer 128' at the other. This hammer 128' strikes the bell 126' when the cam-engaging finger 132' drops off of the undercut cam shoulder 100'.

If it is desired by either party to prolong the telephone conversation, a new cycle of operations of the timing and switching device T'S' may be started through any one of the floating diaphragms or push buttons. Alternatively, if the conversation is to be continued for a short period and it is not desired to initiate a new time cycle of operations, the party at station B' may maintain the telephone circuit temporarily by depressing the control lever 200 a slight amount to position X to either maintain or even to reestablish electrical engagement between spring contacts 118' and 120', while permitting the timing and switching device T'S' to complete its cycle and cut off the source of energy to the driving motor.

In the event that it appears that the conversation may be prolonged to a considerable degree and the operator at station B' finds it inconvenient to hold the control lever 200 in operative position X for more than a brief period, he may initiate another cycle of operations of the motor driven timing and switching device T'S' by merely depressing the control lever 200 to a greater degree into position Y whereby an insulating button 336 engages spring contact 196 and forces it upwardly into electrical engagement with spring contact 198, thus establishing a shunt or bridging circuit across the disengaged spring

contacts 112' and 114' and connecting the driving motor directly to the source of power. As soon as the driving motor starts into operation, the timing and switching device T'S' performs its usual functions. It is therefore unnecessary for the operator to hold down the control lever 200 after the motor begins operation.

The operation so far described with respect to Fig. 3 is in general quite analogous to that previously set forth in connection with Fig. 2. However, the system of Fig. 3 is adapted for important additional service in enabling the interior telephone system to be acoustically connected to an outside public telephone system which is accomplished through the agency of the French telephone instrument F and the acoustical coupling device C in the following manner:

Assuming that a telephone call is received on the public telephone set T, the party at station B', whom I have assumed for illustrative purposes to be a private secretary or assistant to a business executive located at station A', picks up the French telephone instrument F to answer the call. By reason of the decrease in weight of the telephone set T resting upon the floating platform 222, the spring contacts 230 and 234 are brought into engagement. A circuit is thus established from one side of a source of energy marked "AC" through a conductor 340, spring contacts 230 and 234, and conductor 342, to a combined audible and visible signal device 344, or either one, where the circuit divides, one branch including the signal device 344 and conductor 346 to the other side of the source of energy, while the other branch includes conductor 348, energizing winding 294 of the holding magnet 290, conductor 350, and conductor 346 to the other side of the source of energy.

In this way, the signal device 344 operates at once to indicate that the French telephone instrument F of the public telephone system is out of its cradle, and this signal is maintained until the instrument is restored thereto. Furthermore, the holding magnet 290 is immediately energized and is therefore ready for use, as will later appear.

If the party or secretary at station B' is able to answer the call himself he does not disturb his superior at station A', and in order to prevent any interference with the conversation which might take place if the party at station A' should attempt in the interim to communicate with him on the interior telephone system, it is only necessary for the party at B' to manually operate the control switch 274 by depressing the button 286 thereof to thereby interrupt the telephone circuit by disengaging contacts 280 and 282. As soon as the control lever 274 is so moved, its armature switch arm 278 thereof is brought into the sphere of action of the holding magnet 290 which, already being energized, as above explained, magnetically holds the control switch 274 in inoperative position to maintain the interruption of the telephone circuit between stations A' and B' until the French telephone instrument F is returned to its cradle. Thereupon the added weight of this instrument depresses the floating platform 222 and disengages the contacts 230 and 234 to cut off the supply of energy to the signal device 344 and the holding magnet 290. Thereupon, the control switch 274 is automatically re-set to its initial operating position by means of the spring 288 and the system is thus restored to a condition for normal use.

Should it be determined by the party at station B' that it is desirable for his superior to personally answer the outside call, he merely speaks to his superior on the interior telephone system in the manner already explained, and having ascertained that his superior is ready to take the call, it is only necessary for the party at station B' to depress the actuating rod 266 of the control switch S and thereafter, or in the act of so doing, the French telephone instrument F is placed in operative position upon the acoustical coupling device C with the receiver 218 thereof in acoustical relation with the auxiliary transmitter 72' and the transmitter 220 thereof in acoustical relation with the loud-speaker 62' of the coupling device.

The actuation of the control switch S serves to cut out of operation the transmitter 72' associated with the coupling device C and to replace it by the auxiliary transmitter 72', without modifying the telephone circuit of the interior telephone system in any other way. This is accomplished as follows:

As the bell crank lever 260 of the control switch S is rotated in a counterclockwise direction when the actuating rod 266 is depressed, the roller 258 moves upwardly, thereby permitting spring contacts 254 and 256 to separate and thus interrupt the circuit through the transmitter 72'. At the same time, the roller 258 forces spring contact 252 into engagement with spring contact 250 to establish a branch circuit from stationary contact 282 of control switch 274 through conductor 352, transmitter 72', conductor 354, spring contacts 250 and 252 and conductor 356, which joins conductor 334. In this way the party at station A' is acoustically connected to the public telephone system through the coupling device C and is enabled to converse with the outside party in the usual manner.

In the event that the conversation is a relatively short one and is completed before the timing and switching device T'S' completes its cycle, no further manipulation of the equipment is necessary, and the timing and switching device T'S' will eventually interrupt the various circuits in the manner already described. However, if the signal bell 126' is automatically actuated just prior to the normal termination of the operation of the timing and switching device, the party at station B' may initiate another cycle of operations in any of the ways previously described. Moreover, by suitably locating signal bell 126' within the cabinet at station B', the sound signal produced thereby will be picked up by the auxiliary transmitter 72', and will therefore also be heard by the party at station A', so that he may initiate a new cycle in any of the usual ways if he so desires.

Of course, the operator at station B' is enabled to hear the conversation by means of the loud-speaker 62' and the receiver 218 of the French telephone instrument F, by reason of their acoustical relation with the transmitter 220 of the French telephone instrument F and the transmitter 72', respectively. When the conversation has been completed, the operator at station B' will therefore be aware of the fact and will then remove the French telephone instrument F from the acoustical coupling device C and restore it to its cradle on the telephone set T.

In so doing the spring 272 associated with the control switch S will restore the actuating rod 266 and the various spring contacts of the control switch S to their normal positions. As the

French telephone instrument F is again placed in its cradle, the total weight of the telephone set T will be sufficient to lower the floating platform 222 and disengage the cooperating spring contacts 230 and 234, whereby the signal device 344 and the holding magnet 290 are deenergized and cease to function, thus restoring the entire system to its normal condition in which it is in readiness for whatever service that it may be subsequently called upon to render.

In describing the operation of the system of Fig. 3, it has been assumed that station A' is located in the office of a superior, for instance, a business executive, and station B' is located in the office of his private secretary or assistant, and this relationship of stations will be found of great convenience and well adapted to many business organizations. However, in some organizations it may be found more advantageous to reverse the location of stations, thus having the public telephone set T and acoustical coupling device C located in the office of the executive, in which case he is in a position to have full knowledge of all outside telephone conversations and may relay such calls as he sees fit to his subordinate.

While I have shown and described my invention as embodying more or less specific details of construction, operation and arrangements of parts and circuit connections, it will be understood that many variations or modifications thereof may be made without departing from the spirit and scope of my invention, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim as my invention:

1. An interior telephone system comprising in combination, a telephone circuit adapted to interconnect two stations and including a transmitter and a loud-speaker at each station, a motor-driven timing and switching device for initially establishing said telephone circuit and automatically interrupting said circuit after a predetermined time interval and control means under the control of the operator at one of said stations for connecting the driving motor to a source of power.

2. An interior telephone system comprising in combination, a telephone circuit adapted to interconnect two stations and including a transmitter and a loud-speaker at each station, a motor-driven timing and switching device for establishing and maintaining said telephone circuit for a predetermined time interval and subsequently interrupting said circuit, and means including a floating diaphragm capable of motion when blown upon by the operator at one of said stations for connecting the driving motor to a source of power.

3. An interior telephone system comprising in combination, a telephone circuit adapted to interconnect two stations and including a transmitter and a loud-speaker at each station, means including a timing and switching device for establishing said telephone circuit for a predetermined time period and then interrupting said circuit, control devices, including a set of cooperating electrical contact members, located at each station and each adapted to respond to a current of blown air for effecting electrical engagement of the cooperating contact members associated therewith, and means rendered operative when any set of said contact members is brought into electrical engagement for effecting the operation of said timing and switching device.

4. An interior telephone system comprising in

combination, a telephone circuit adapted to interconnect two stations and including a transmitter and a loud-speaker at each station, a motor-driven timing and switching device for initially establishing and maintaining said telephone circuit for a predetermined time interval and subsequently interrupting said circuit, an electromagnetic relay switch for connecting the driving motor to a source of power, and means under the control of the operator at one of said stations for momentarily energizing said electromagnetic relay switch for initiating the operation thereof.

5. An interior telephone system comprising in combination, a telephone circuit adapted to interconnect two stations and including a transmitter and a loud-speaker at each station, a motor-driven timing and switching device for establishing and maintaining said telephone circuit for a predetermined time interval and subsequently interrupting said circuit, control means including a floating diaphragm adapted to be moved by blowing upon it and cooperating relatively movable contacts adapted to be momentarily engaged when the diaphragm is so moved, means including an electromagnetic relay switch adapted to be operated when said diaphragm contacts are momentarily engaged for connecting the driving motor to a source of power and means associated with said relay switch for holding said relay switch in operative position subsequent to the momentarily engagement of the diaphragm contacts.

6. A system of telephonic communication comprising in combination, a telephone circuit adapted to interconnect two telephone stations and including a transmitter and a loud-speaker at each station, means including a motor-driven timing and switching device adapted to supply power to the driving motor and to initially establish said telephone circuit in the order mentioned and after a predetermined period of time to cut off the supply of power to said motor and interrupt said telephone circuit, and means operable at either station for initially supplying power to the driving motor.

7. An interior telephone system comprising in combination, a telephone circuit adapted to interconnect two stations and including a transmitter and a loud-speaker at each station, a motor-driven timing and switching device for establishing and maintaining said telephone circuit for a predetermined time interval and subsequently interrupting said circuit, an electromagnetic relay switch for connecting the driving motor to a source of power, means for momentarily energizing said electromagnetic relay switch for initiating the operation of said relay switch, and means dependent upon said motor-driven timing and switching device for bridging said relay switch to maintain the supply of power to said motor and then interrupting the energizing circuit of said electromagnetic relay switch prior to the establishment of said telephone circuit, and after a predetermined time interval interrupting the power circuit of the driving motor when the telephone circuit is interrupted.

8. A system of telephonic communication comprising in combination, a telephone circuit adapted to interconnect two telephone stations and including a transmitter and a loud-speaker at each station, and means under the control of the party at either station for initially establishing said telephone circuit for a predetermined time interval and then automatically interrupt-

ing said circuit at the end thereof, means for progressively indicating at one of said stations the elapsed time and means for effecting the operation of a signal at one of said stations shortly prior to the end of said time interval.

9. An interior telephone system comprising in combination, a telephone circuit adapted to interconnect two stations and including a transmitter and a loud-speaker at each station, a motor-driven timing and switching device for establishing said telephone circuit and automatically interrupting said circuit after a predetermined time interval, control means for connecting the driving motor to a source of power, and means associated with said motor-driven timing and switching device for indicating the previous use thereof after its cycle of operation has been completed.

10. In a system of control, the combination of an electromagnetically operated device having an energizing winding, a source of electrical energy, means for momentarily connecting the energizing winding of said electromagnetically operated device to the source of electrical energy, and means operated by the momentary energization of said winding for insuring the maintenance of such energization after said connecting means has ceased to function.

11. In a system of control, the combination of an electromagnetically operated device, a floating diaphragm capable of movement when blown upon, electrical means associated with said diaphragm and adapted to be operated momentarily when actuated thereby for effecting the energization of said electromagnetically operated device, and means associated with said electromagnetically operated device and operable at the moment of its energization for establishing a holding circuit therefor at the moment of its energization.

12. An interior telephone system comprising in combination, a telephone circuit adapted to interconnect two telephone stations and including a transmitter and a loud-speaker at each station, a motor-driven timing and switching device for establishing said telephone circuit and automatically interrupting said circuit after a predetermined time interval, control means for initially connecting the driving motor to a source of power, and manually operated means associated with said timing and switching device and independent of said control means for causing said timing and switching device to establish said telephone circuit without connecting the driving motor to the source of power.

13. An interior telephone system comprising in combination, a telephone circuit adapted to interconnect two telephone stations and including a transmitter and a loud-speaker at each station, a motor-driven timing and switching device for establishing said telephone circuit and automatically interrupting said circuit after a predetermined time interval, control means for initially connecting the driving motor to a source of power, and manually operated means associated with said timing and switching device and independent of said control means and adapted to occupy two operating positions, the one for establishing and maintaining the telephone circuit while the driving motor of the timing and switching device is inoperative, and the other for connecting the driving motor to the source of power to effect the operation of said timing and switching device.

14. A system of telephonic communication comprising in combination, a public telephone system having a French type telephone instrument, an interior telephone system comprising a telephone circuit adapted to interconnect two telephone stations and including a transmitter and a loud-speaker at each station, means under the control of the operator at one of said stations for establishing and maintaining said telephone circuit for a predetermined period of time and then automatically interrupting said circuit and means for effecting an acoustical coupling between said interior telephone system and the French type telephone instrument of said public telephone system.

15. A system of telephonic communication comprising in combination, a public telephone system having a French type telephone instrument, an interior telephone system comprising a telephone circuit adapted to interconnect two telephone stations and including a transmitter and a loud-speaker at each station, means under the control of the operator for establishing and maintaining said telephone circuit for a predetermined period of time and then automatically interrupting said circuit and means for effecting an acoustical coupling between said interior telephone system and the French type telephone instrument of said public telephone system.

15. A system of telephonic communication comprising in combination, a public telephone system having a French type telephone instrument, an interior telephone system comprising a telephone circuit adapted to interconnect two telephone stations and including a transmitter and a loud-speaker at each station, means under the control of the operator for establishing and maintaining said telephone circuit for a predetermined period of time and then automatically interrupting said circuit, an acoustical coupling device at one of said stations and including an auxiliary transmitter and the loud-speaker at said station with which the telephone instrument of said public telephone system is placed in acoustical relation, and a control switch for opening the telephone circuit through the first-named transmitter at said station and connecting said auxiliary transmitter in said telephone circuit in place thereof.

16. A system of telephonic communication comprising in combination, a public telephone system having a desk type telephone set provided with a base and a French type telephone instrument normally resting thereon, an interior telephone system interconnecting two telephone stations and including a transmitter and a loud-speaker at each station, means for effecting an acoustical coupling between said interior telephone circuit and said French type telephone instrument, automatic control means responsive to the weight of said telephone set and including an electromagnetic device adapted to be energized when the French telephone instrument is removed from its base and to be deenergized when it is restored thereto, and a switching device normally biased to an operative closed position to complete said telephone circuit, but adapted to be manually operated into open position to render said telephone circuit inoperative and prevent it from picking up conversation over said French type telephone instrument when in ordinary use, said switching device being so disposed with respect to said electromagnetic device as to be out of the influence thereof when in closed operative position but to be electromagnetically held thereby when in inoperative open position and until said French type telephone instrument is restored to its base.

17. A system of telephonic communication comprising in combination, an interior telephone system comprising a telephone circuit interconnecting two telephone stations and including a transmitter and a loud-speaker at each station whereby conversation may be carried on without the use of the ordinary telephone instruments, a public telephone system including a desk type telephone set having a French type telephone instrument located adjacent the transmitter and loud-speaker at one of the interior telephone stations, manually operated switching means for

5 cated at such station for open-circuiting said interior telephone circuit when the public telephone system is in ordinary use, and automatic means dependent upon the weight of said public telephone desk set for holding said switching means in open-circuiting position when said public telephone system is in use and for subsequently returning it to its closed circuit position when said French type telephone instrument is restored to its base.

10 18. A system of telephonic communication comprising in combination, a public telephone system including a controllable amplifier type of telephone desk set having a French type telephone instrument, an interior telephone system including a telephone circuit interconnecting two stations and including a transmitter and a receiver at each station, and means for effecting an acoustical coupling between the French type telephone instrument and the transmitter and receiver at one of the stations of the interior telephone system.

15 19. A system of telephonic communication comprising in combination, a public telephone system having a French type telephone instrument, an interior telephone system including a telephone circuit adapted to interconnect two stations and having a transmitter and a loud-speaker at each station, timing and switching means for establishing and maintaining said interior telephone circuit for a predetermined period of time and then automatically interrupting said circuit, means for acoustically coupling the French telephone instrument and the telephone circuit of said interior telephone system, and controllable electronic amplifying means for intensifying incoming electrical waves to render speech conveniently audible to the listener on the interior telephone system.

20 20. An interior telephone system comprising in combination, a telephone circuit adapted to interconnect two telephone stations and including a transmitter and a loud-speaker at each station, automatic means the operation of which is capable of being initiated by the operator at either station for first establishing said telephone circuit, then maintaining its establishment for a predetermined period of time and thereafter interrupting said telephone circuit, and auxiliary means capable of operation before the termination of said time period has elapsed for preventing the interruption of said telephone circuit and maintaining its establishment for another like time period and thereafter automatically effecting its interruption.

25 21. An interior telephone system comprising in combination, a telephone circuit adapted to interconnect two telephone stations and including a transmitter and a loud-speaker at each station, automatic means the operation of which is capable of being initiated by the operator at either

station for first establishing said telephone circuit, then maintaining its establishment for a predetermined period of time and thereafter interrupting said telephone circuit, auxiliary means capable of operation before the termination of said time period has elapsed for preventing the interruption of said telephone circuit and maintaining its establishment for another like time period and thereafter automatically effecting the interruption, and means for giving a warning signal prior to the termination of said predetermined time period to enable the operation to be prolonged beyond said predetermined time period.

22. An interior telephone system comprising in combination, a telephone circuit adapted to interconnect two stations and including a transmitter and a loud-speaker at each station, a motor-driven timing device adapted to perform a definite cycle in a predetermined time period, switching means mechanically operated by said motor-driven timing device for initially establishing said telephone circuit between said stations and, after maintaining said circuit for a predetermined time period, effecting the interruption thereof, and means under the control of the operator at either station for connecting the driving motor to a source of power to initiate the operation thereof.

23. An interior telephone system comprising in combination, a telephone circuit adapted to interconnect two stations and including a transmitter and a loud-speaker at each station, manually operable electrical control means located at each station for effecting a momentary electrical engagement and automatic means responsive to said momentary electrical engagement of said electrical means at either station for initially establishing said telephone circuit between said stations and, after a predetermined period of time, effecting its interruption.

24. A system of telephonic communication comprising in combination, a public telephone system having a telephone instrument, an electrically independent interior telephone system having an operator's station adjacent said public telephone instrument and comprising a telephone circuit adapted to be connected between said operator's station and a branch station of said interior telephone system and including a transmitter and a loud-speaker at each station, means under the control of the operator at said operator's station for acoustically coupling the public telephone instrument with said interior telephone system, and means under the control of the operator at the operator's station for initiating the automatic connection of said interior telephone circuit and its subsequent disconnection after a predetermined time period, and manual means independent of said automatic means for temporarily establishing said telephone circuit.

RICHARD VARLEY.