

Jan. 25, 1938.

G. FOURNESS
TELEPHONE SWITCH

2,106,299

Filed Aug. 4, 1936

4 Sheets-Sheet 1

Fig. 1.

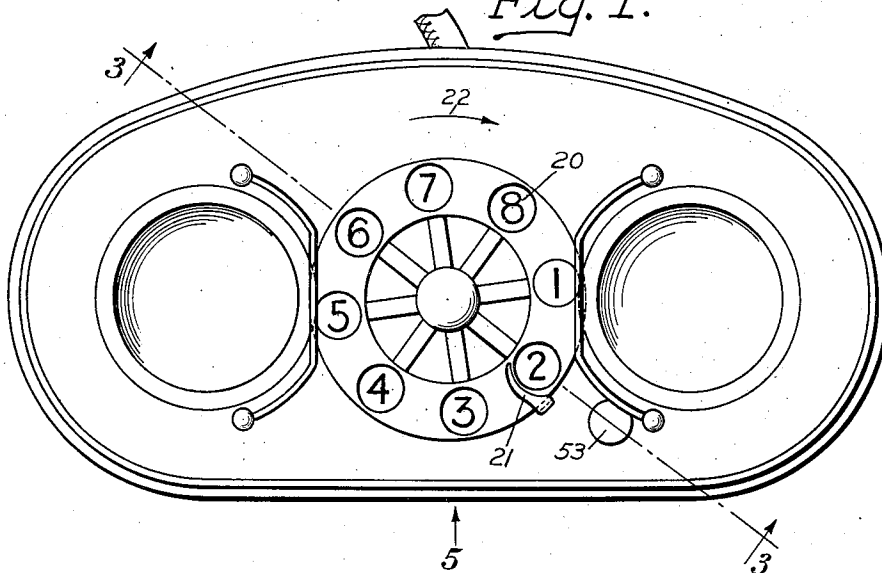
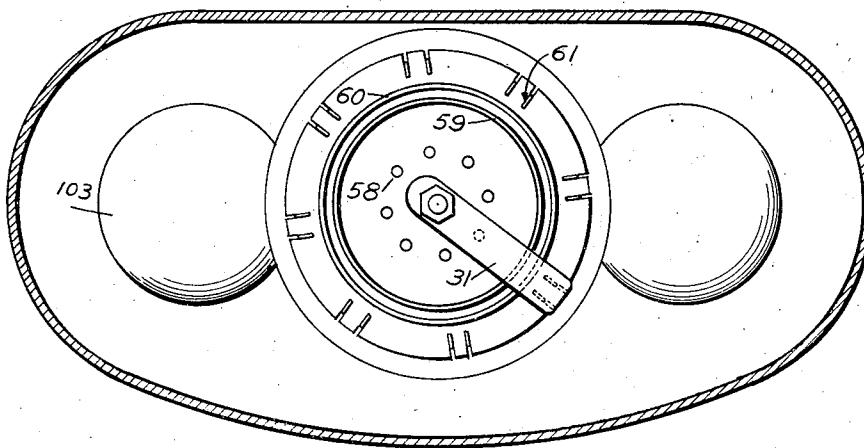


Fig. 2.



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Fig. 3.

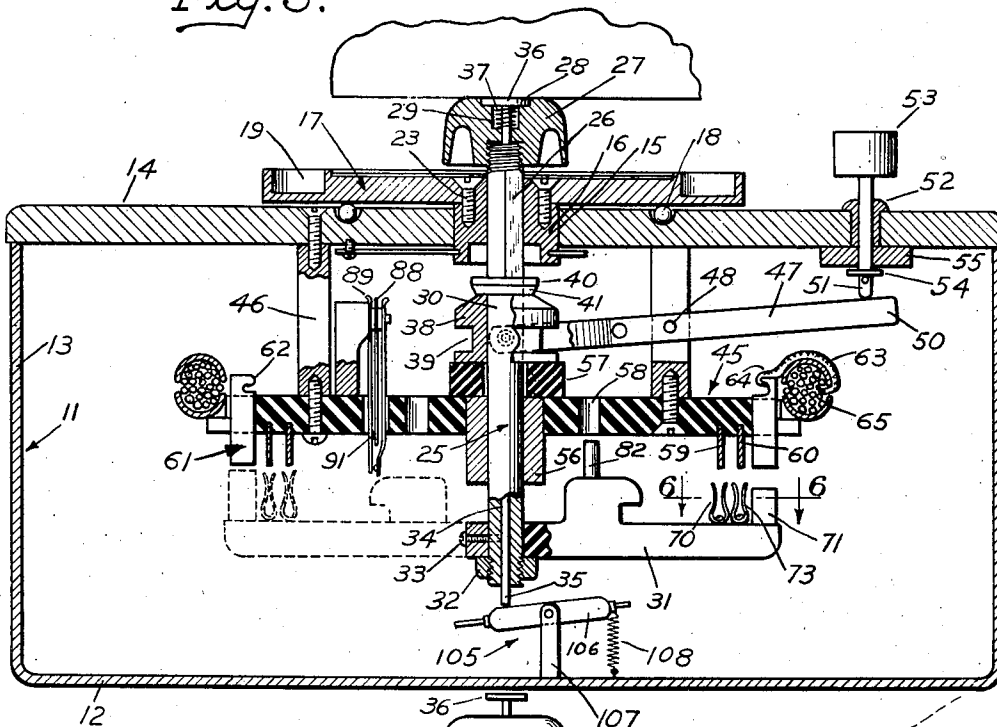


Fig. 4.

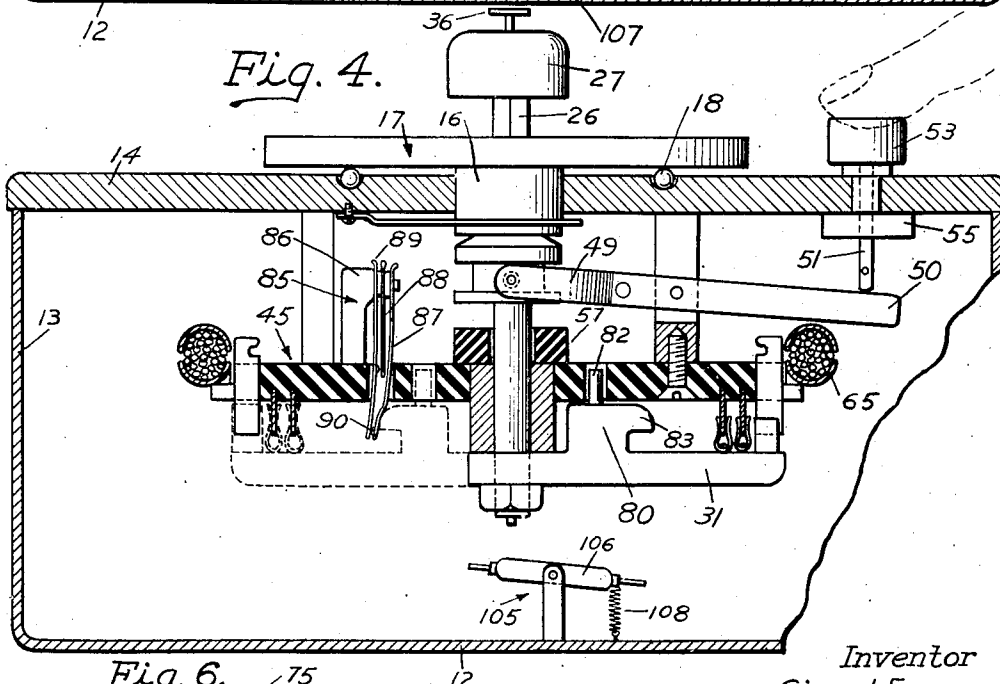
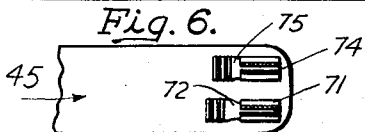


Fig. 6.



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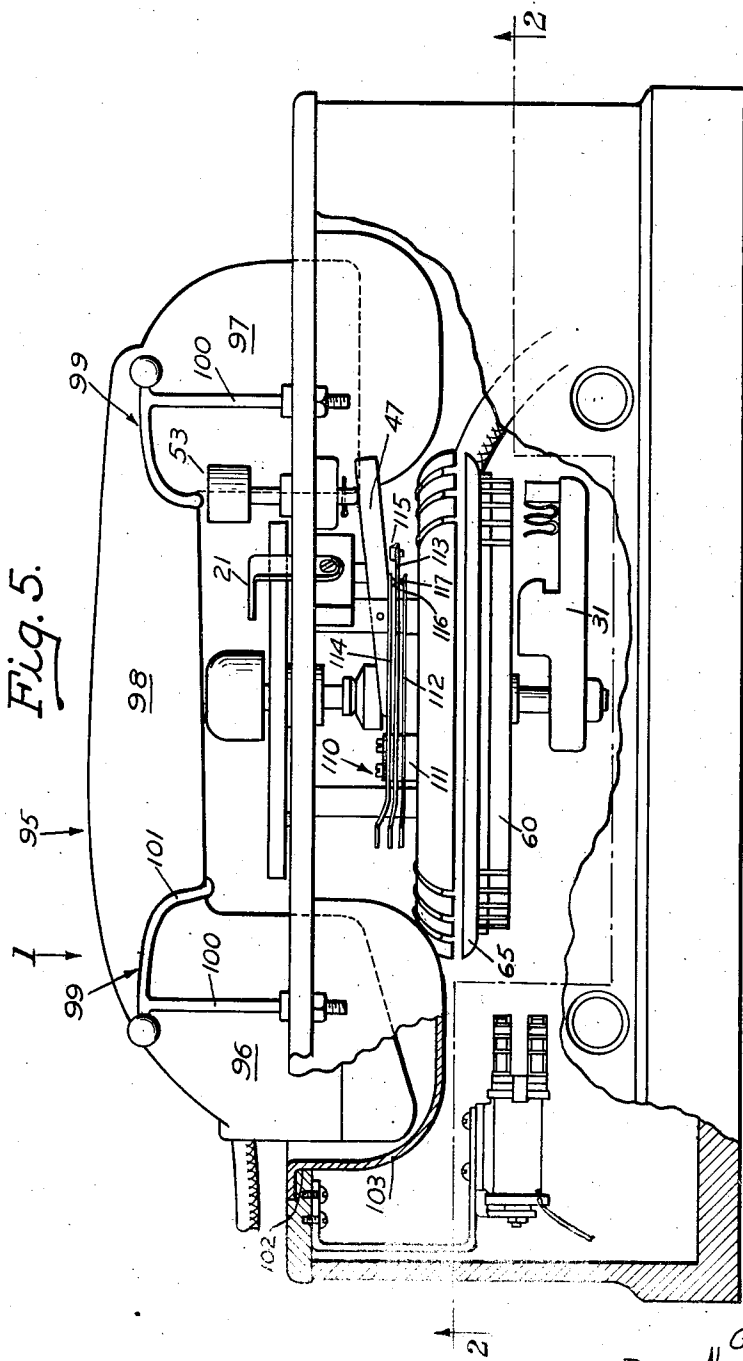
2,106,299

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Fig. 5.



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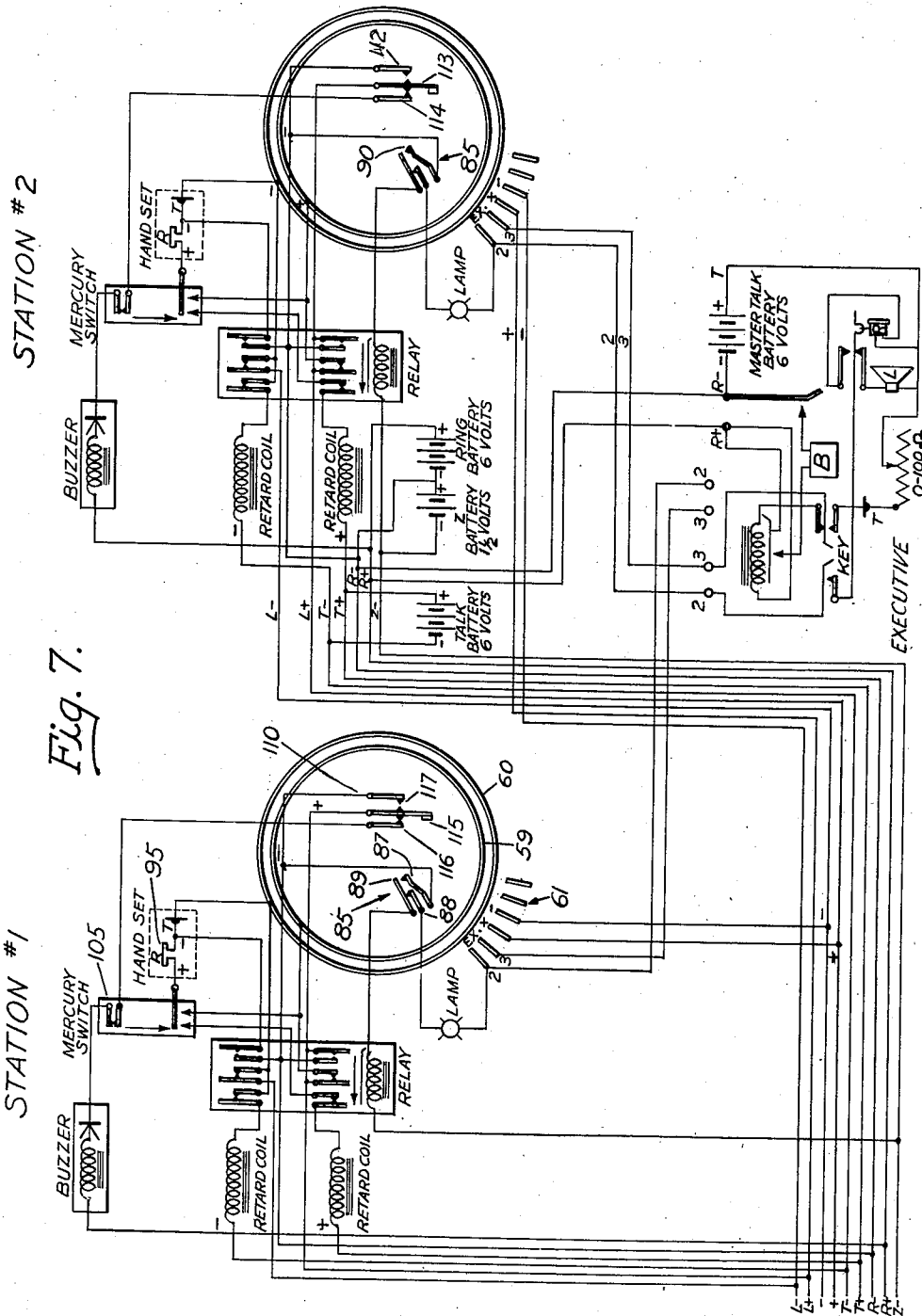
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TELEPHONE SWITCH

Filed Aug. 4, 1936

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,106,299

TELEPHONE SWITCH

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Application August 4, 1936, Serial No. 94,173

20 Claims. (Cl. 179—37)

My invention pertains to a telephone switch used in a so-called intercommunicating telephone system. That is, a system having a comparatively few interconnections in which the calling station may make the connection to a particular station to be called. Such type of system does not employ a switch operator or an automatic central exchange.

One of the objects and features of my invention in this type of telephone switch and interlinking circuits is in the employment of a rotatable dial, this being somewhat similar to the type used in automatic central exchange switching and in which the dial however is only rotated until it brings the desired station to be called to a stop position, this being the position for forming a line connection from the caller to the responding station. Another feature of my invention is that prior to the dialing, a circuit closing or switch arm is maintained in a lowered position, this being normally thrust downwardly by resting the headpiece which incorporates a receiver and transmitter on a button mounted on a shaft which is rotatable with and also vertically slidable through the dial, such dial being in the form of a disc. Therefore, as the disc is rotated with the shaft in its lowered position and such shaft carries the main switch arm, this arm is swung in a circle into position to make a closed circuit connection to the party to be called.

A further feature of my invention is in closing the circuit for establishing the buzzer or similar call and the talking circuit by means of a secondary push button which operates through a panel board on which the dial disc rotates, this secondary push button through the medium of a lever elevating the main shaft and main switch arm to complete the circuits.

A further feature of my invention is in the employment of two concentric bus-bars for forming the positive and negative side of the circuit together with a series of pairs of radial contact plates, together with the switch arm having resilient-contact fingers, which as the switch arm is elevated engage both of the bus-bars and the selected pair of contact plates for establishing the circuit. Therefore as the series of contact plates are arranged in a circle concentric with the two bus-bars, an interconnection may be made to a considerable number of stations depending on the spacing of the pairs of contact plates and the size of the circle in which these are mounted and also the size and spacing of the engaging fingers on the end of the rotating switch

arm which are brought into electrical contact with the pairs of plates.

In the usual type of intercommunicating telephone circuits of this type in which each party directly calls up any one of a plurality of other parties or stations, is that there is no privacy to the conversation, that is, other parties on other stations may listen in and hear the conversation between the caller and the responder.

A further object and feature therefore, of my invention, is in the employment of special circuits with closure switches which are designed to be restricted to calls, for instance, by executives. In the executive calls the dial is operated in the same manner. An executive, however, when calling any of the other stations on the dial has a personal connection so that the conversation, for instance, between the executive and any one of the other call stations is secret, that is, none of the parties having the ordinary telephone connection can listen in to such conversation. To obtain this result, a further detailed object and feature of my invention is in the employment of closure switches which are actuated by a displacement nub on the main switch arm. This, when engaging movable contacts for the executive calls, closes a circuit which operating through relay, gives a connection between, for instance, a limited number of executive stations and any one of the general stations or another executive station and assures privacy through such lines.

A further feature of my invention is in the employment of a switch, preferably of the movable mercury type, actuated by a pin extending downwardly through the main rotatable shaft, which pin, when the headpiece holds the main shaft and its button depressed and the main switch arm in its lowered and inoperative position, also thrusts downwardly on the movable pin which holds the mercury or similar switch in open circuit position, this switch however, being automatically closed as soon as the headpiece is removed and before the switch arm with its central shaft is raised to its closed circuit position.

My invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a plan of the switch assembly taken in the direction of the arrow 1 of Fig. 5 with the combination head set, transmitter and receiver removed.

Fig. 2 is a horizontal section taken substantially on the line 2—2 of Fig. 5 in the direction of the arrows, that is, a partial bottom view.

Fig. 3 is a vertical transverse section on the

line 3—3 of Fig. 1 in the direction of the arrows, certain parts being shown in elevation and with the main shaft and the switch arm in open circuit position, that is, with the shaft depressed and the switch arm lowered for free rotation on dialing.

Fig. 4 is a section similar to Fig. 3 with the main dialing shaft and switch arm elevated in a closed circuit position, the elevating push button being depressed.

Fig. 5 is a front elevation partly broken away, taken in the direction of the arrow 5 of Fig. 1.

Fig. 6 is a detail horizontal section on the line 6—6 of Fig. 3 in the direction of the arrows through the bus and terminal connectors.

Fig. 7 is a partial wiring diagram, indicating two stations of the intercommunicating system having my improved switch and a connection to an executive station, this latter being of a standard design and having more or less conventional circuits and control devices in the circuits.

In the set-up of my invention I employ a case designated by the numeral 11 having a base 12 and peripheral walls 13. On the upper edge of the walls there is mounted a substantial cover or cap plate 14. This plate has a central opening 15 therein through which extends a rotatable bushing 16. The cover and bushing are preferably made of insulating material. A dial 17 is rotatably mounted on the top 14, there being antifriction bearings 18. This dial has a series of depressions 19 in which there are numerals or other insignia 20 to designate the particular stations. A finger stop bar 21 extends upwardly from the cover 14 to form a limit in dialing, it being intended that the dial will be turned in the direction of the arrow 22. (Note Fig. 1.) The dial 17 and the bushing 16 are connected to operate together by screws 23 and slidably mounted in the bushing and sliding through an opening in the dial is the main shaft designated by the assembly numeral 25. This shaft has a square or hexagonal upper section 26 operating through a similar section of the dial and the bushing 16 to allow for vertical sliding movement but whereby rotation of the dial rotates the bushing.

On the upper end of the shaft there is a button head 27 securely attached thereto and a shallow recess 28 with a deep socket 29 formed integral with the button head. The shaft has a lower cylindrical portion 30 and attached to the bottom of the shaft there is a switch arm 31, this being of insulating material clamped in place by a nut 32 and held by a screw 33. A central bore 34 extends downwardly through the axial center of the shaft and through this is a switch operating pin 35 having a button head 36 at the top to seat in the shallow recess 28 and normally pressed upwardly by a spring 37 in the socket 29. A sleeve 38 is loose on the cylindrical part of the shaft 25 for rotating and sliding movement and has an annular groove 39. A collar 40 is secured to the shaft, preferably at the lower part of the squared or hexagonal section 26 and has a rubber bumper 41 to engage the sleeve 38.

An insulating base designated by the assembly numeral 45 is suspended by bars 46 from the under side of the cap 14 and in one of these brackets there is a pivotally mounted lever 47 pivoted at 48 and having a yoke 49 engaging in the groove 39 of the sleeve 38. The outer end 50 of this lever is positioned to engage a push pin 51 which operates through a bushing 52 in the cover 14 and has a finger button 53 at the top.

A washer with a cotter pin 54 is secured to the pin 51 and engages a rubber bumper 55, thus limiting the upward movement of the pin 51 which is thrust upwardly by the action of the lever 47 in a manner hereinafter detailed.

The insulating base has a bushing 56 therein through which extends the cylindrical part of the shaft 25. A soft rubber bumper 57 surrounds the shaft and stops the sleeve 38 when in its lowermost position. The insulating base has a series of sockets or perforations 58 for a purpose hereinafter detailed and is provided with two circular buses 59 and 60, these being preferably constructed of cylindrical metal strips with their upper edges secured in the under side of the insulating base 45 and concentric with the shaft 25. Spaced around the periphery of the base 45 there are a series of pairs of contact plates 61, there being one pair for each of the dial numerals 20. For purposes of simplification there are only eight numbers shown on the dial of Fig. 1 and thus eight of the pairs of the contact plates. These plates have a hook-like upper end 62 to facilitate attaching lead wires indicated at 63 (note Fig. 3) by a soldered connection 64. These lead wires are confined by a cable casing 65 having upper and lower portions, thus making a binding for the series of lead wires extending around the base 45, which is preferably circular on its periphery.

The switch arm 31 is provided with connected resilient fingers 70 to engage the inner bus bar 59 and radial fingers 71 to engage one of a pair of the plates 61, these having a connecting strap 72 (note Fig. 6). Another interconnected finger assembly has the resilient fingers 73 to engage the outer bus 60 and the radial resilient fingers 74 to connect with the other plate of a pair of plates 61, these being integrally connected by a conducting strap 75. These assemblies are attached to the upper side of the switch arm 31.

An insulating lug 80 is formed integral with the switch arm and has a stud or pin 82 thereon to register with the sockets or perforations 58 in the insulating base 45 and thus assure the proper registry of the switch arm with the pairs of contact plates 61. In addition the lug 80, which is formed of insulating material, has a curved nose 83 forming a closure for a switch.

These executive selective switches, designated by the assembly numeral 85 (note Figs. 3 and 4) are mounted on an insulating stand 86 extending upwardly from the insulating base 45 and have a long outer finger 87, a short central finger 88, and a long outer finger 89 mounted thereon, the fingers being insulated one from another. A contact point 90 is on the finger 87 to form a contact with the outer finger 89 only. A normally closed contact 91 is on the finger 89 to normally form a contact with the central finger 88. The circuits to these various fingers are described hereinafter.

The purpose of the nose 83 on the switch arm 31 is to change the circuit from the normally closed connection between finger 89 and the central finger 88 to open this connection as shown in Fig. 4 and to close the connection by the contact 90 between the outer finger 89 and the inner finger 87 when the switch arm is raised and the lug 80 and the nose 83 in position to engage one of the assembly of the switches 85.

As above described, the dial 17 is connected to the shaft 25 so that it may rotate such shaft but when the switch arm is in its normal lower position of Fig. 3 when the circuit is open rotating

the dial manifestly rotates the switch arm. Should a person using the set, after a conversation, forget to press down on the button head 27, this head is pressed to its lower position by the assembly head set 95, including the transmitter 96 and the receiver end 97 having the hand grip central section 98 which engages the button head 27 when this assembly is placed on the supporting frame 99, this having two uprights 100 with a downwardly bowed connecting strap 101 between each pair.

For purposes of convenience the cover plate 14 has large openings 102 with a receptacle 103 fitted therein to accommodate the transmitter and receiver end of the head set.

Prior to dialing, the person using the set should remove the head set assembly 95 from the supporting stand, thus exposing the dial for ready manipulation, which dial may be turned by engaging the fingers in the recesses 19 until the desired number is brought to the finger stop 21 which causes the switch arm to register with the desired pair of contact plates 61. The finger push button 53 may then be depressed, which rocks the lever 47 and as this lever engages the sleeve 38 this sleeve is elevated, thrusting through the medium of the rubber bumper 41 against the collar 40 which is secured to the shaft 25 and thereby elevates the switch arm from the position of Fig. 3 to that of Fig. 4, thus making the electrical connections, and the pin 32 fitting in the recess or perforation 58.

When the head piece 95 is removed from the stands 99 the spring 37 thrusting upwardly on the head 36 of the pin 35 operates a mercury switch 105. This is illustrated as the usual type having a tube 106 pivotally mounted on a stem 107 having one end normally pulled downwardly by a tension spring 108 and the lower end of the pin 35 tilting the tube to the position shown in Fig. 3 when the pin 35 is held depressed. Thus the removal of the head piece automatically closes the mercury switch 105. The purpose of this is detailed hereinafter.

The main switch assembly 110 (note particularly Fig. 5) has an insulating base 111 secured to the insulating base 45. This has a lower switch finger 112, a middle long finger 113 and an upper finger 114. All of these fingers are secured in the assembly but insulated one from another. The long finger has an insulated button 115 at the end which is positioned to engage the lever 47. Such finger is resilient and forms a spring normally tending to elevate the outer end of the lever 47. This forms a closure between the contact nub 116 on the upper finger 114 and the middle finger 113. However, when the finger button 53 and thus the outer end of the lever 47 is depressed, the finger 113 moves downwardly and makes a contact with the contact nub 117 on the upper end of the finger 112. Thus when the switch arm 31 is in its lowestmost position of Figs. 3 and 5 and the outer end of the lever 47 is in its upper position, there is a closed circuit between fingers 113 and 114 but when the dial is brought to the proper position and the switch arm 31 raised by depressing the finger button 53 and the lever 47, a circuit is closed through the finger 112 and the long middle finger 113.

In Fig. 7 I show a partial electrical diagram in which there are two stations, No. 1 and No. 2 of an intercommunicating system. It will be understood that there will be a number of these and also one or more executive stations, one of these being indicated in Fig. 7 as the executive sta-

tion. The executive station includes switching devices now in common use and does not have the dial switch of my present invention. This drawing indicates more or less conventional energizing batteries, retard coils and relays with more or less conventional telephone circuits.

The general operation may be described as follows in connection with the diagram of Fig. 7. In this diagram the main switch 110 is indicated with the details having the same number as in the other figures. This also applies to the executive selector switch 85, the details of this switch also having the same numerals as in the other drawings. The circular bus-bars 59 and 60 are indicated and also the series of pairs of contact plates 61. This figure however, does not show the switch arm 31 which makes the connection between the bus-bars 59 and 60 and the pairs of contact plates 61.

Presuming station No. 1 desires to call station No. 2, he rotates his dial 17 to the No. 2 position. On removing his hand set 95 there is opened a buzzer circuit to station No. 2 and a closure of his talking circuit. The buzzer circuit is only through the mercury switch and the first action is to energize the buzzer at station No. 2 with the mercury switch closed. At station No. 1 the buzzer circuit to this station No. 2 is operated through the ringing switch. No. 1 after dialing to the proper number, presses the ring-key 53 which connects a positive home line and a negative ring line energizing the buzzer at station No. 2, which station so far in the procedure has the mercury switch open with its hand set inoperative. When No. 2 picks up his hand set he closes his mercury switch, giving him his talking circuit and opening his buzzer circuit.

The talking circuit is therefore completed through No. 1 and No. 2 through the upper and lower parts of No. 1's relay, the plus and minus retard coils to the plus and minus local talking battery indicated as the T line. In this diagram the relay circuit is shown normally open, that is, the coil is not energized but the contacts are closed for the talking circuit. To ring-off after talking, each party independently hangs up his hand set which opens his talking circuit, opens the mercury switch and closes the buzzer circuit to be in position for another call. Such buzzer is energized by the ring battery. The reverse operation is done when station No. 2 calls station No. 1. In a like manner any two of the stations on the inter-communicating system may call each other.

The operation for an intercommunicating call considered in more detail is substantially as follows: presuming station No. 1 calls station No. 2, the ringing sequence is developed when at station No. 1 the hand set resting on top of the instrument is lifted. The removal of the weight of this allows upward movement of button head 36 and hence of the switch operating pin 35. This latter causes the mercury switch 105 to change its position. This opens the buzzer or ringing contacts and closes the talking contacts. This energizes the hand set at station No. 1 from talk batteries through retard coils and relay contacts (the relay contacts are normally closed during intercommunicating use).

At station No. 1 the dial 17 is rotated to the place marked for station No. 2. The person at No. 1 depresses the finger operative button 53, thus causing the rotatable selector switch 31 to close connections through positive circular bus 59 and station No. 2's positive line also, negative circular bus 60 to station No. 2's negative line.

While button 53 is depressed the main switch 110 is operated. The spring finger 115 breaks contact with spring finger 116 and makes contact with spring finger 117. Current then flows from ringer 5 battery positive to buzzer at station No. 2 and through mercury switch to ring spring finger 114 and 113 thence out on station No. 2's positive home line to station No. 1's selected contacts to circular bus 59 then through the relay contacts and to station No. 1's ring spring finger 115, then to ring battery negative wire by a spring finger 117.

The talking sequence develops when the hand set at station No. 2 is lifted, thus permitting the button head 36 and the operating pin 35 to rise, allowing the mercury switch 105 at station No. 2 to change position. This action opens the buzzer or ringing contacts and closes the talking contacts. Such action energizes the station No. 2 hand set from talk battery through retard coils and relay contacts at station No. 2 which action connects station No. 2's home line through relay contacts whereby connections are now established for conversation to be carried over station No. 2's home line with station No. 1.

When any one of the intercommunicating stations indicated as station No. 1 and station No. 2 calls the executive station, it closes the normally open executive switch. At the executive station there is a shutter relay signal and a buzzer showing which station is calling the executive. This call is made from one of the stations by such station dialing the particular executive connection. When the executive throws his key corresponding to relays energized at the executive he then operates the relay at the intercommunicating station calling him, which action opens the talking circuit between the intercommunicating stations, that is, between stations No. 1 and No. 2. Conversation is then carried on between the executive and the particular intercommunicating station by the executive talk battery supplying the power.

Presuming the executive wishes to talk to one of the intercommunicating stations, for instance, station No. 2, he throws his key switch corresponding to the station No. 2 executive relay which gives a circuit through the lamp at station No. 2 and the relay. This relay opens the local talk battery between the intercommunicating stations so that the conversation is private between the executive and the station No. 2. It is necessary that the party at station No. 2 turn his dial on receiving a lamp signal to the particular executive position to close the executive switch having assembly numeral 85. This gives a talk circuit energized by the executive talk battery. The Z battery is for energizing the lamp circuits and relays and the retard coils are equipment designed to reduce or eliminate extraneous noises. It will thus be seen that my switch affords a convenient means for intercommunicating calls between any two stations on the system. However, in such calls any other person on the intercommunicating system could listen in, but if any one of the intercommunicating stations calls the executive station, such conversation is private between such two stations.

Executive station calls considered in more detail are substantially as follows: In the ringing sequence executive station calls a substation by depressing his key associated with the sub-line in the executive instrument. This closes a circuit which causes current to flow from the executive talk battery through loud speaker and key con-

tact through line No. 2 to a signal lamp in sub-set through executive selective switch assembly 85 by the spring contacts 88 and 89 thence through relay coil through Z battery in series with master talk battery and through negative ring wire. The relay being thus energized opens four contacts which disconnects sub-station from the intercommunicating system and closes two contacts, one of which causes the buzzer to sound and this buzzer stops when the hand set on the sub-station is lifted which allows the plunger 35 to rise in the sub-set and changes the position of the mercury switch. Substation dial is then rotated to the position indicated by the signal lamp which brings the executive selective switch into position where it may connect executive line wires No. 3 and No. 2 to the circular bus bars 59 and 60. This connection is made by depressing ring key 53 which engages selector switch with the line contact and bus bars and also closes contacts 87 and 89 and opens contacts 88 and 89. This extinguishes the lamp and holds the relay in.

The executive talking sequence to substation is now established and current flows from executive talk battery through loud speaker through key contacts, wire No. 2, to circular bus 60, through transmitter in hand set, through common wire from hand set to relay contacts, through contacts to negative ring wire, whence it returns to executive talk battery. This puts executive loud speaker in series with substation transmitter and battery by use of negative ring and No. 2 wires. Executive transmitter is in series with substation receiver and battery in like manner through use of negative ring wire and No. 3 wire. When conversation is completed, substation restores switches to normal by replacing hand set on cradle and executive station key is restored to normal position manually.

The sequence of substation calling executive station is by substation lifting the hand set and rotating the dial to bring the executive selector switch 31 to the desired executive line position and depressing key 53 which interacting with selector switch 31 with the line contacts and bus bars also closes contacts 78 and 79 and opens 88 and 89. This causes relay to operate as above described to close contact in negative return wire. Current may now flow from positive ring battery to executive station through relay and closed key contacts through No. 3 wire to circular bus 59, through mercury switch, through receiver in hand set, through common wire from hand set to relay contacts and back to negative ring battery. This action has energized relays in executive set which closes contacts in local buzzer circuit causing buzzer to sound until cut off by buzzer switch or operating a key which establishes a talking circuit, the talking circuit being as above described in connection with the executive station calling a substation.

Various changes may be made in the details of the construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. In a telephone switch, a fixed structure having a main shaft rotatable and longitudinally slidable therein, a dial connected to the shaft for rotating the same to any one of a number of stations, a plurality of circular bus-bars mounted on the fixed structure, a plurality of pairs of contacts on the fixed structure, each pair corresponding to a station, a switch arm connected to the shaft and having conducting contact fingers, 75

the said shaft and arm being movable on its axis of rotation to align the fingers on the arm with any pair of contacts on the fixed structure, a first manually operable means to move the arm with the fingers out of contact, the arm therefore being free for rotation by the dial and a second manually operable means to move the shaft and the switch arm in one only axial direction to engage the fingers with the bus-bars and the fixed contacts.

2. In a telephone switch as claimed in claim 1, an executive selector switch mounted on the fixed structure and secured in a fixed relation to the bus bars and to the fixed contacts and means on the switch arm to operate the said executive selector switch when said means is aligned with the said executive selector switch and moved axially by the second manually operable means.

3. In a telephone switch, a fixed structure including an insulating base with a plurality of circular bus-bars and a plurality of pairs of contact plates arranged in a circle, a main shaft extending through the fixed structure and the insulating base and rotatable and longitudinally slidable therein, a dial having an operative connection to the shaft to rotate the shaft to any one of a number of selective station positions, a main switch arm connected to the shaft to rotate and to be moved axially therewith, said switch arm having contact fingers to engage the circular buses and the pairs of contact plates, a button on the shaft adapted to be engaged by a hand set having a transmitter and a receiver, to move the shaft longitudinally and shift the switch arm out of operative relation to the bus-bars and contact plates to permit rotation of the shaft and the switch arm by the dial, a second push button having means to elevate the shaft and the switch arm to form a contact between the bus-bars and the contact plates.

4. In a telephone switch, as claimed in claim 3, an operating pin slidably mounted in the said shaft and having a head adapted to be engaged by a hand set and held depressed, a first switch engaged by the said pin and held in one position by the pin when depressed, the said head of the pin having a spring connection with the shaft whereby on removal of the hand set the said pin is elevated and means on elevation of the said pin to move the first switch to a second position.

5. In a telephone switch the combination of a fixed structure having contacts for selective switching, a rotatable and axially movable shaft having a switch arm thereon with conducting contact fingers, means to rotate the shaft and the arm to selective positions, a first manually operable means to move the shaft axially and thereby move the arm to bring the fingers into engagement with the contacts, a main switch positioned to be operated by the first manual means and actuated when the fingers are brought into closed circuit with the said contacts.

6. In a telephone switch as claimed in claim 5, an executive selective switch, the said arm having a lug to engage the selective switch when rotated on its axis in alignment therewith and when moved by the first manual means to form a closed circuit between the fingers and the contacts.

7. In a telephone switch, the combination of a fixed structure having contacts for selective switching, a rotatable and axially movable shaft having a switch arm thereon with contact fingers and a button on the upper end of the shaft, a hand set, means to support said set in an inoperative position bearing on the button and hold-

ing the switch arm depressed, a pivoted lever having a connection to the shaft whereby on depression of the lever the said shaft is raised to bring the contact fingers into engagement with the fixed contacts, a dial having a connection with the shaft for rotating the same but allowing the shaft to have longitudinal movement there-through whereby the switch arm by rotation of the shaft may be moved to selective positions.

8. In a telephone switch, as claimed in claim 7, a main switch mounted on the fixed structure and in a position to be actuated by the lever on depression of such lever to operate the main switch, an executive selective switch also mounted on the fixed structure, the said switch arm having a lug to align with the selective switch, the lug operating said selective switch on raising of the shaft and the arm.

9. In a telephone switch, as claimed in claim 7, a mercury switch located in a fixed position in regard to the fixed structure, a pin operating through the said shaft and having a head engaged by the hand set when in its inoperative position and to retain the mercury switch in a first position, a spring interacting between the head of the pin and the button to elevate the pin on removal of the hand set, the mercury switch having means to move the same to a second position.

10. In a telephone switch, a switch housing having a cover with a dial rotatably mounted thereon, an insulating base in the housing and having contacts for selective switching, a shaft journaled in the top and the base and operating through the dial for rotation and vertical movement, a switch arm connected to the shaft and having contact fingers for engaging the selective contacts, the dial being operative to rotate the shaft and the arm to align the arm with a particular set of contacts, a push button, an operating means actuated thereby and connected to the shaft to elevate the shaft and the arm to make a connection between the fingers and the particular contacts aligned therewith, the said base having a main switch mounted thereon and actuated by the said operating means, the main switch being adapted to form a talking circuit with a station having a similar telephone switch.

11. In a telephone switch as claimed in claim 10, the insulating base having a selector switch mounted thereon, the switch arm having a lug alignable therewith to operate the selective switch when the said arm is raised, a connection from the selector switch to an executive station, the said selector switch being operative to disconnect the said telephone switch from a similar switch.

12. In a telephone connection, a plurality of telephone switches, each having a fixed structure with fixed contacts for selective switching, a rotatable and axially movable shaft having a switch arm with contact fingers, a hand set, a supporting means for the set to retain the arm in a lowered position, means to rotate the arm for alignment with any specific contacts, means to elevate the arm to form a connection between the fingers and a specific contact, means establishing a ringing connection between a first and a second station on removal of the hand set from the first station, a main switch for each telephone switch actuated by the elevation of the switch arm to form a talking circuit between the first station and the second or called station.

13. In a telephone connection as claimed in claim 12, a selective switch at each telephone switch, an executive station having a ringing connection to any one of the stations having the said

telephone switch, the closing of the selective switch for establishing a talking circuit between the executive station and a particular telephone switch station requiring the elevation of the said switch arm at the particular station, such arm having means to operate the said selective switch, the circuits through the said selector switch having means for opening a talking circuit between the particular station called by the executive station and the other stations having the said telephone switches.

14. In a telephone connection, a plurality of intercommunicating stations each having a fixed structure with a plurality of sets of contacts, there being one set for each of the other stations, each station having a selective switching arm with contact fingers alignable with any set of fixed contacts and movable to engage such set, a hand set at each station with a supporting means to retain the switch arm inoperative, a main switch at each station, connections and means to form a ringing circuit from a first station to a second station on removal of the hand set from a stand at the first station and on moving the switch arm at the first station to form a connection between the fingers of the arm at the first station and the set of contacts at the first station representing the second station, means operated at the first station by the movement of the switch arm to make the connection between the fingers and the contacts and electrical connections from the main switch to all of the stations establishing a talking circuit to all of the other stations.

15. In a telephone connection as claimed in claim 14, a selective switch at each station, an executive station having a ringing connection to any one of the intercommunicating stations with means to ring at a particular station, the switch arm at such station being movable to actuate its selective switch and means connected to the selective switch to form a talking circuit between the executive station and the particular intercommunicating station called and means actuated by the operation of the said selective switch at the station called to open a circuit between the intercommunicating station called by the execu-

tive station and all of the other intercommunicating stations.

16. In a telephone switch as claimed in claim 1, the second manually operable means comprising a pivoted lever with a manually operable means to move same in one direction only and a main switch positioned to be operated by said lever.

17. In a telephone switch a fixed mounting with a plurality of completely circular bus bars with connections for energizing to opposite polarity and a plurality of pairs of conductor contact plates, a rotating switch arm rotatable on the axis of the buses and longitudinally movable on its axis of rotation, said arm having electrical conductor contact fingers to engage the pair of buses and any one of the pairs of contact plates.

18. In a telephone switch as claimed in claim 17, a first manually operable means to rotate the switch on its axis with the contact fingers out of engagement with the buses and the pairs of contact plates and a second manually operable means to move the switch arm longitudinally on its axis to make the contacts.

19. In a telephone switch as claimed in claim 17, a first manually operable means to rotate the switch arm on its axis with the fingers out of contact with the buses and the pairs of contact plates, a second manually operable means to move the switch arm longitudinally on its axis in one direction only to make contacts between the bus bars, the fingers and the pairs of plates and a main switch operated by the second manual means during movement of the switch arm longitudinally on its axis of rotation.

20. In a telephone switch as claimed in claim 17, an executive selective switch mounted in a fixed position in relation to the bus bars and the fixed contacts and means on the switch arm positioned to pass said switch when the fingers are out of contact with the bus bars and the pairs of contact plates, but operable when in alignment with the selective switch and when the arm is moved longitudinally to make contacts with the bus bars and the contact plates to operate the said selective switch.

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