J. B. BRIGGS & V. P. HALL.

TELEPHONE EQUIPMENT.

APPLICATION FILED MAR. 24, 1910.

1,025,366.

Patented May 7, 1912.

7 SHEETS—SHEET 1.

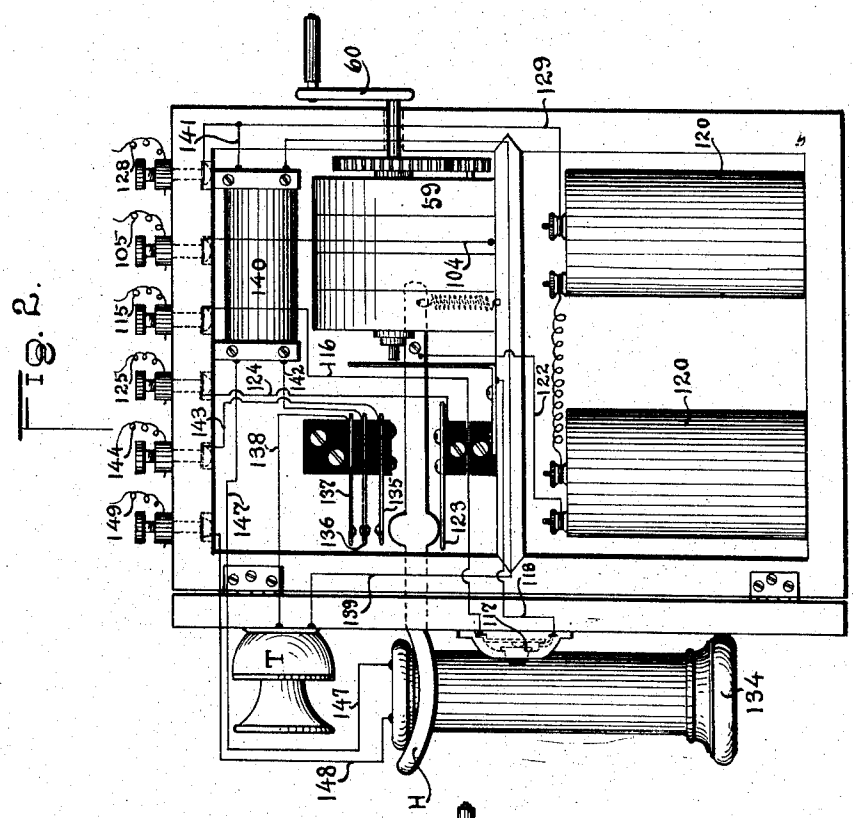

Fig. 2.

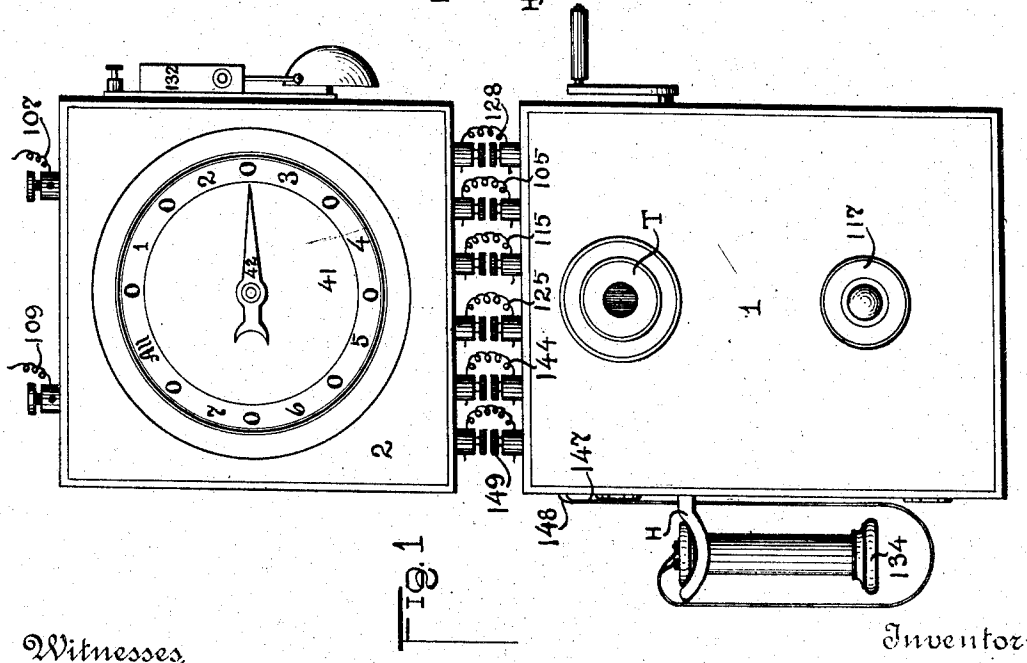

Fig. 1.

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Fig. 4

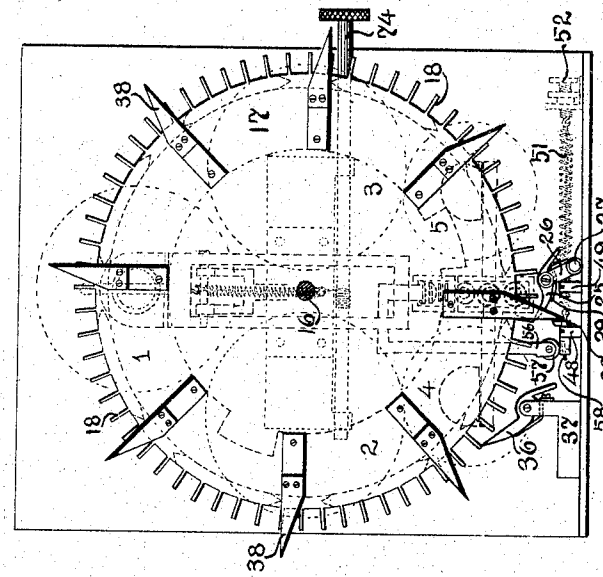


Fig. 5

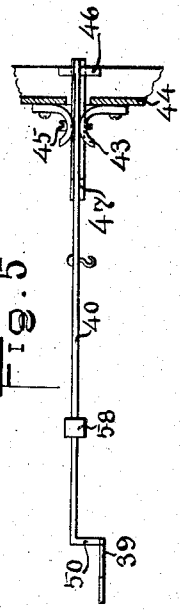
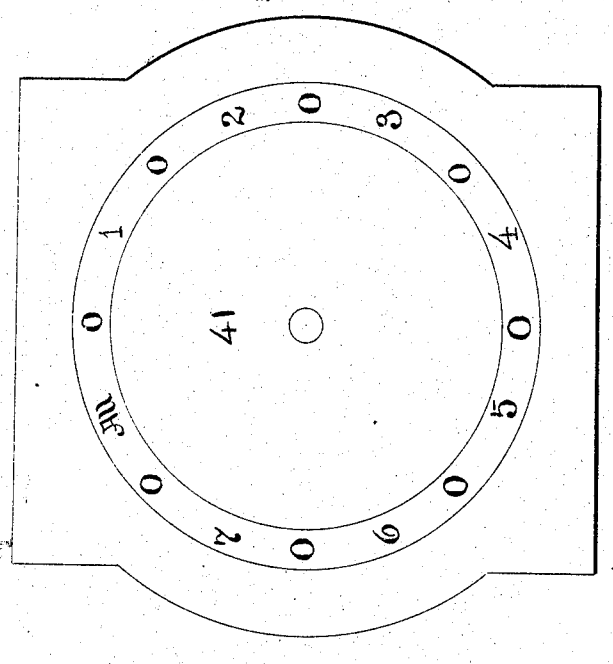


Fig. 3



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7 SHEETS—SHEET 3.

Fig. 8

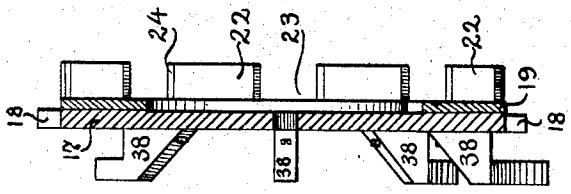


Fig. 7

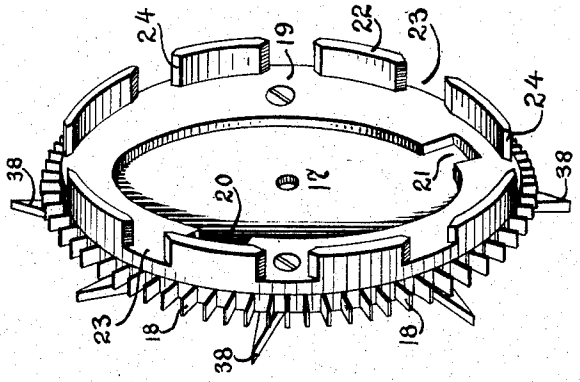


Fig. 10

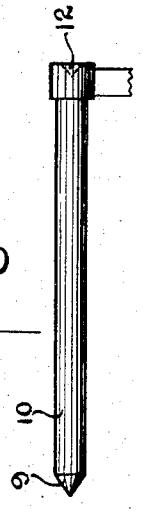


Fig. 6

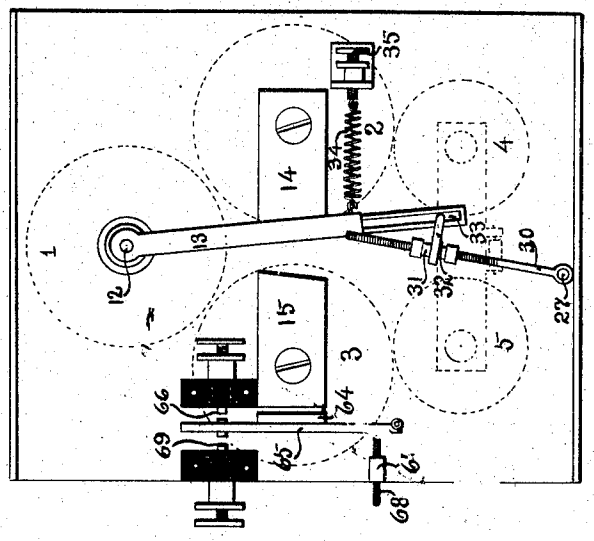
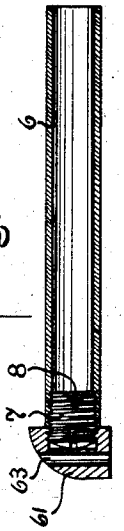


Fig. 9



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7 SHEETS—SHEET 4.

Fig. 12

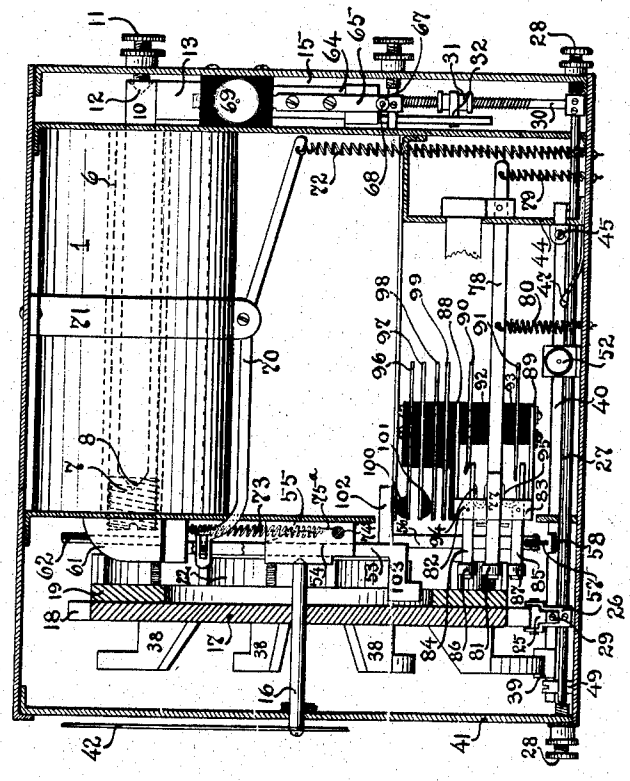
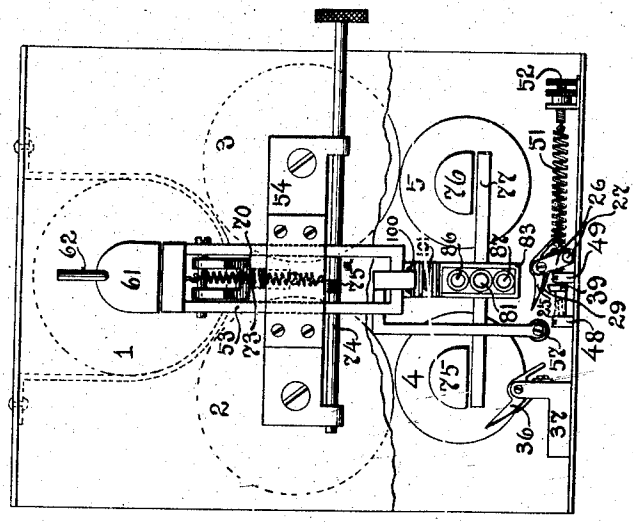


Fig. 11



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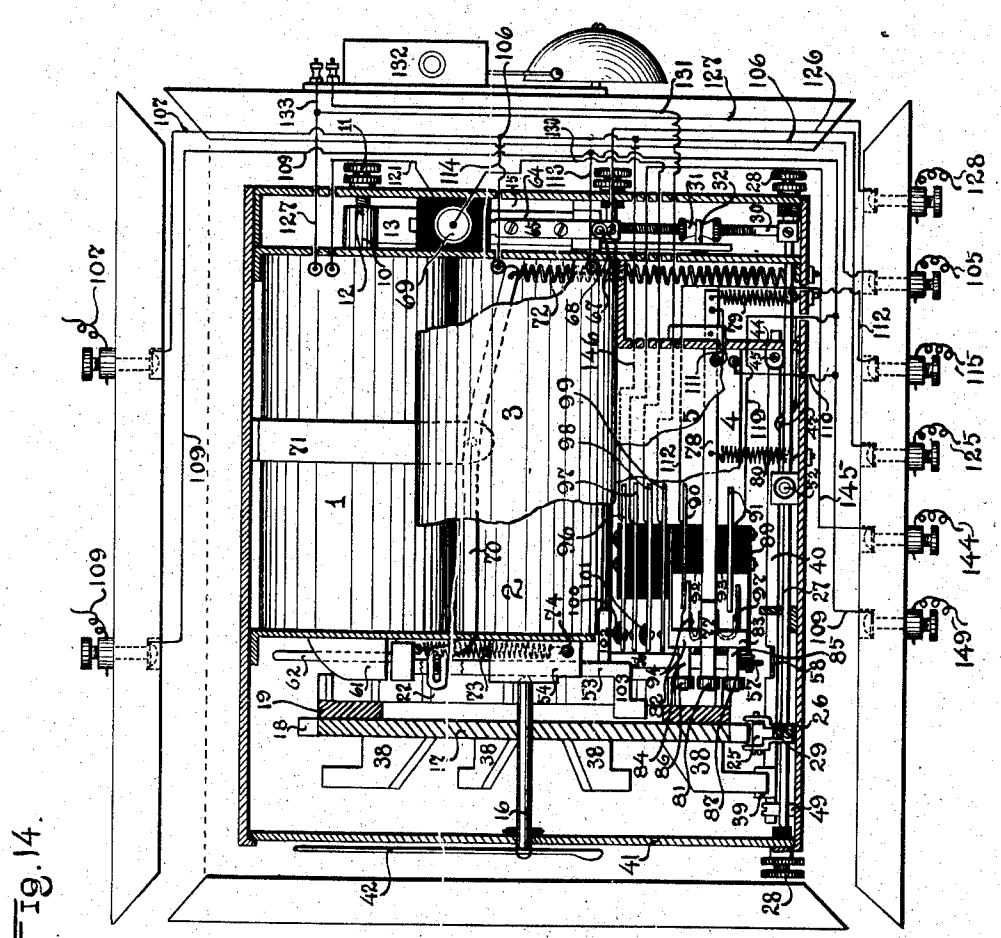

Fig. 14.

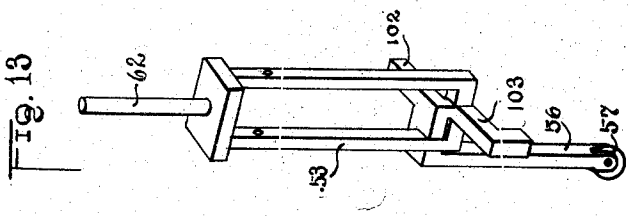

Fig. 13.

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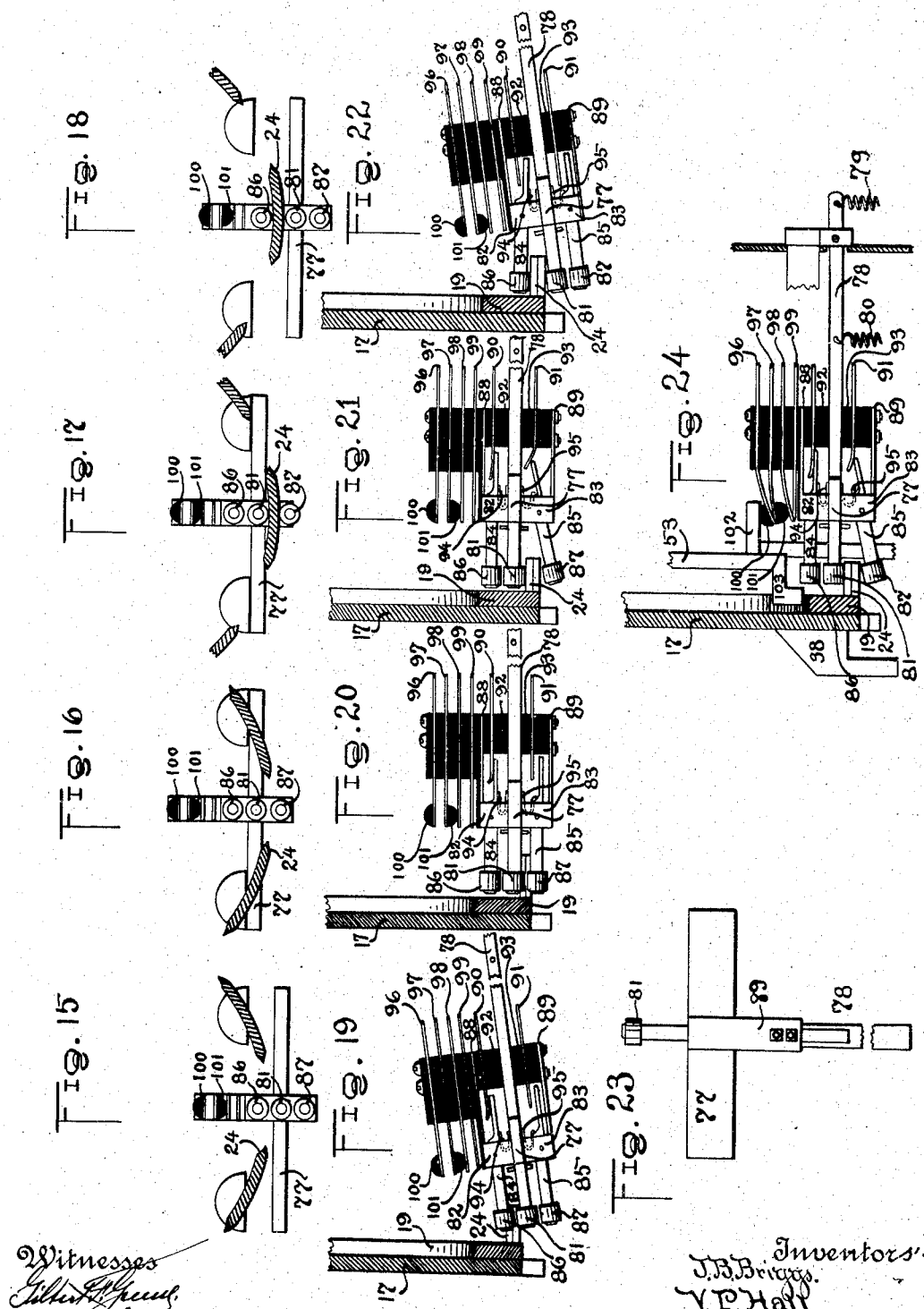
7 SHEETS—SHEET 6.



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7 SHEETS—SHEET 7.

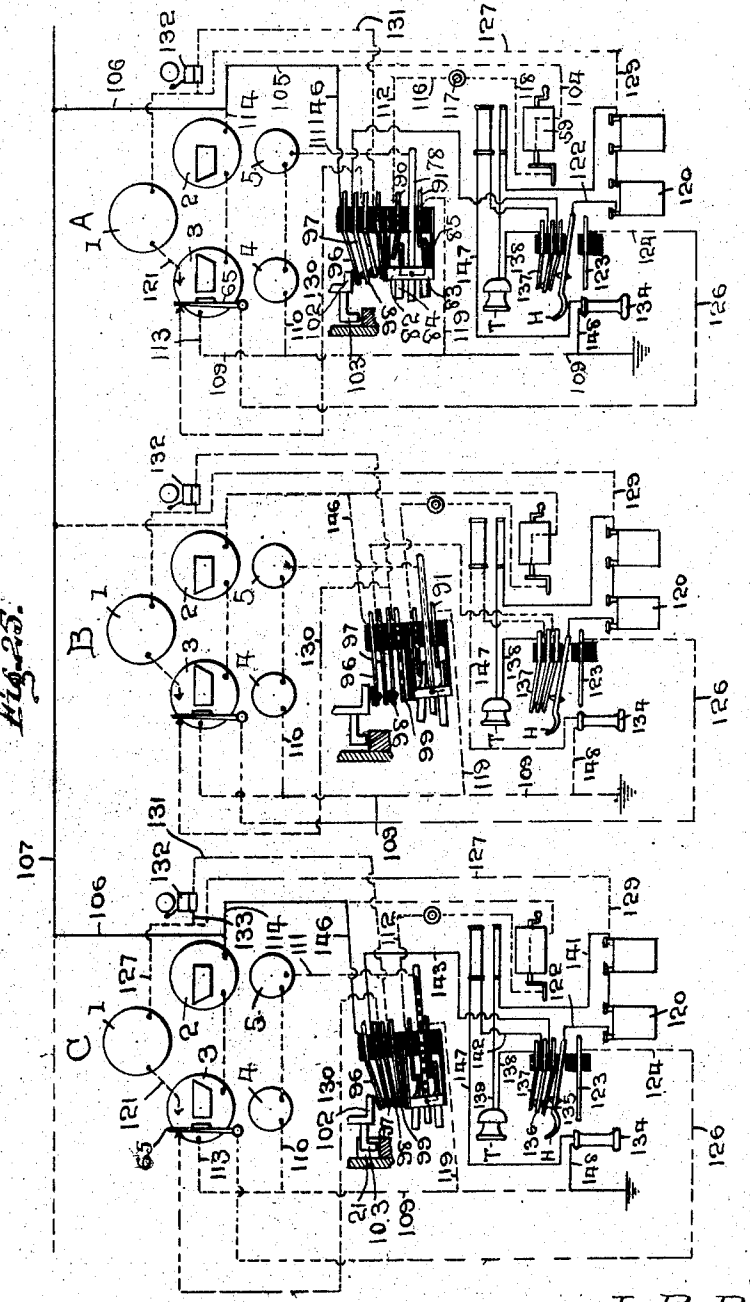

Fig. 25.

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UNITED STATES PATENT OFFICE.

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TELEPHONE EQUIPMENT.

1,025,366. Specification of Letters Patent. Patented May 7, 1912.

Application filed March 24, 1910. Serial No. 551,284.

To all whom it may concern:

Be it known that we, JUDGE BAXTER BRIGGS and VERNON P. HALL, citizens of the United States, residing at Labette, in the county of Labette and State of Kansas, have invented certain new and useful Improvements in Telephone Equipments; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to new and useful improvements in telephone equipments and is more particularly to be used in connection with systems having party lines and our object is to provide means for calling any particular party upon said line without disturbing the other parties.

A further object is to provide means for preventing any of the subscribers other than the party called, from listening or cutting in on the line after the proper connections have been made.

A further object is to provide a suitable selecting mechanism for operating the calling telephone and telephone being called.

A further object is to provide means for operating said selecting mechanism.

A further object is to provide suitable cut out mechanisms whereby the circuit will be broken between the operating and dormant telephones.

A further object is to provide suitable indicating means to designate what telephone is being called, and, a further object is to provide means whereby all of the telephones may be simultaneously called and used for talking purposes.

Other objects and advantages will be hereinafter referred to and more particularly pointed out in the specification and claims.

In the accompanying drawings which are made a part of this application, Figure 1 is a front elevation of a telephone and calling mechanism complete. Fig. 2 is an elevation of the telephone showing the manner of wiring the interior thereof with the door of the telephone box in its open position. Fig. 3 is an elevation of one form of dial for the annunciator box. Fig. 4 is an elevation of the annunciator with the dial removed. Fig. 5 is a detail plan view partly in section of a trip lever used in connection with the selecting mechanism. Fig. 6 is a rear elevation of the selecting mechanism with the casing removed. Fig. 7 is a perspective view of a disk used in connection with the selecting mechanism. Fig. 8 is a central transverse sectional view thereof. Fig. 9 is a sectional view of a core of one of the magnets used in the selecting mechanism. Fig. 10 is an elevation of an armature used in connection with the selecting mechanism. Fig. 11 is an elevation of one end of the selecting mechanism with the disk portion thereof removed and parts of the frame broken away. Fig. 12 is a longitudinal central sectional view through the indicator mechanism. Fig. 13 is a perspective view of a combined interlocking and circuit closing mechanism used in connection with the indicator mechanism. Fig. 14 is a sectional view of the indicator mechanism showing the manner of wiring the same. Fig. 15 is a detail view of a circuit making and breaking armature in its lowered position. Fig. 16 is a similar view showing the position of the armature when attracted or raised. Fig. 17 is a similar view showing parts of the disk of the indicator mechanism engaged with parts thereof. Fig. 18 is a similar view showing the disk engaged with other parts of the armature. Fig. 19 is an elevation of the armature and a section of the disk showing the armature in its lowered position. Fig. 20 is a similar view showing the armature in its attracted position. Fig. 21 is an elevation showing the parts of the armature engaged by the disk, as shown in Fig. 17. Fig. 22 is a side elevation of the armature and disk showing the disk engaging the parts of the armature, as indicated in Fig. 18. Fig. 23 is a top plan view of the armature. Fig. 24 is an elevation of the armature and parts of the indicating mechanism in their operative positions, and Fig. 25 is a diagrammatic view of a system comprising three telephone instruments, showing two of said instruments in use.

Referring to the drawings in which similar reference numerals designate corresponding parts throughout the several views, 1 indicates the telephone box which may be constructed in the usual or any preferred manner and 2 indicates the usual form of call box in which is located my improved indicating and selecting mechanism. Located within the call box 2 are electromagnets 1, 2, 3, 4 and 5, the magnets 2 and 3 cooperating with each other as do the mag-

nets 4 and 5, the magnets 2 and 3 being bridged between the line and ground, while the magnets 4 and 5 are placed in the generator circuit between the generator and the ground.

The magnet 1 is preferably positioned above the magnets 2 and 3, while the magnets 4 and 5 are positioned below the magnets 2 and 3, said magnet 1 being hollow and provided with a tubular sleeve 6, which sleeve extends entirely through the magnet 1 and has one of its ends provided with a screw plug 7, the inner end of which is provided with a conical depression 8, the plug 7 and sleeve 6 being preferably formed of soft iron. Entering the depression 8 is the pointed end 9 of a shaft 10, which shaft is smaller in diameter than the sleeve 6 so as to fit loosely therein, said shaft extending beyond the open end of the sleeve where it is engaged by an adjusting screw 11, said screw also having a pointed end which fits in a depression 12 in the outer end of the shaft.

Fixed to the extended end of the shaft 10 is an armature 13, the lower end of which passes between metal plates 14 and 15 attached to the cores of the magnets 2 and 3 respectively, the meeting ends of said plates terminating on opposite sides of the armature 13 and a distance therefrom, whereby when an alternating current is directed through the magnets 2 and 3, the armature 13 will be agitated and moved back and forth between said plates, the plates, shaft and armature being formed of soft iron, thus rendering them magnetic.

Mounted upon a horizontally disposed shaft 16 and at the opposite ends of the magnets, above described, is a disk 17, the peripheral edge of which is provided with a plurality of blade-like projections 18, while attached to the inner face of the disk 17 is a ring 19, the inner edge of which is provided with notches 20 and 21. Extending laterally from the peripheral edge of the ring 19 are segmental flange sections 22, which sections are spaced apart to form openings 23 for a purpose to be hereinafter set forth, the ends of said segmental sections being substantially V shaped as shown at 24 for a purpose which will likewise be hereinafter set forth.

The disk 17 is operated through the medium of a pawl 25, which pawl is pivotally attached to the upper end of a shank 26, which shank is in turn fixed to a rod 27, said rod being rotatably mounted within the call box 2 and adjacent the bottom portion thereof by engagement with the adjusting screws 28. The pawl is adapted to engage the projections 18 and one of its ends is held in the path of the projections by means of a spring 29 so that the end of the pawl engaging the projections will readily descend and permit the projections to pass the end thereof and will immediately arise to engage the face of the projection as soon as it has passed beyond the end of the pawl. The pawl 25 is rocked back and forth to successively engage the end thereof with the projections on the disk 17 by attaching to the end of the rod 27 farthest from said pawl, a shaft 30, the upper end portion of said shaft being threaded to receive a threaded sleeve 31, said sleeve having a finger 32 attached thereto which is adapted to engage a slot 33 in the lower end of the armature 13 so that when said armature is moved back and forth through the medium of the alternating current passing through the coils 2 and 3, the rod 27 will be rocked back and forth, which will likewise swing the pawl into engagement with the projections on the disk 17 and as the pawl is successively engaged with said projections, the disk 17 will be rotated thereby. As the pawl is required to rotate the disk when moved in one direction, the attraction of the energized plate 14 would not be sufficient to move the armature toward the plate 14 and for this reason a spring 34 is provided, one end of which is attached to the armature and the opposite end to an adjusting screw 35, the tension of said spring being such as to compensate for the resistance of the disk 17.

The disk 17 is held against reverse rotation by means of an auxiliary pawl 36 which is mounted similarly to the pawl 25 upon a standard 37, said auxiliary pawl engaging the rear face of the projection as the main pawl has completed its forward stroke. In the present instance, we have shown a system comprising seven telephones or stations and upon the outer face of each disk 17 are placed eight stop blocks 38, which stop blocks are adapted to engage the latch end 39 of a trip lever 40 and stop further rotation of the disk, until the blocks are released from the lever. In order to ascertain when a particular telephone is in position to be communicated with or what patrons are using the line, the front end of the box 2 is provided with a dial 41, on which are placed divisional numerals from 1 to 7 consecutively together with a space marked "All" and coöperating with said divisions is a hand 42 carried by the shaft 16, said hand rotating in unison with the disk 17 mounted upon said shaft.

The trip lever 40 extends from the path of the stop blocks 38 to the rear end of the box 2 and the rear end of the lever is pivotally mounted between curved arms 43 carried by one of the division plates 44 of said box, a pin 45 being entered transversely through the curved ends of the arms and through the interposed portion of the lever. The opening through the lever to receive the pin

45 is slightly larger than the pin so that said lever can have a lateral movement as well as a vertical movement, the upward swinging movement of the latch end of the lever being regulated by means of a stop 46 with which the rear end of the trip lever engages when the lever is moved to a horizontal position and said trip lever is normally held in its elevated position by means of a spring 47, one end of which is fixed to parts of the casing in the box 2, while the opposite end thereof exerts upward pressure against the bottom of the trip lever. The latch end 39 extends between pins 48 and 49, which pins limit the lateral swinging movement of the end of the lever and by providing an offset portion 50 adjacent the latch end 39, said latch end is disposed to one side of the longitudinal trend of the trip lever. The trip lever normally rests against the pin 49 and is held in such position by means of a spring 51, one end of which spring is attached to the trip lever and the opposite end to an adjusting screw 52, but said spring will yield sufficiently to permit the lever to move into engagement with the pin 48 when the latch is engaged by one of the stop blocks. As soon as one of the stop blocks moves into engagement with the latch 39 and the latch is moved laterally until it engages the pin 48, further rotation of the disk 17 is stopped, until such time as the latch is disengaged from the stop block and this result is accomplished through the medium of a sliding armature 53, the arms of which extend through a block 54 fastened to the front face of a plate 55 at the forward ends of the magnets in said box, said block being formed of soft iron and forming part of the yoke connecting electromagnets 2 and 3.

The body of the sliding armature is substantially in the form of an oblong link and is provided at its lower end with a depending foot 56, the lower end of the foot being provided with a roller 57, which roller is adapted to engage a tread plate 58 on the trip lever 40 so that when the sliding armature descends and the roller engages the tread plate, the latch end of the lever will be lowered and moved out of the path of the ends of the stop blocks.

The spring 51 will normally swing the trip lever laterally to move the latch end 39 against the pin 49, but by inclining the tread plate 58 and placing the lower end thereof on the side of the trip lever opposite the spring 51, the engagement of the roller 57 with said tread plate will cause a side pressure thereon, said side pressure assisting the spring 51 in moving the trip lever laterally in one direction. After the trip lever has been disengaged from the stop block, an alternating current is directed into the coils 2 and 3 through the medium of the usual or any preferred form of generator 59 or other mechanism located preferably in the telephone box causing the magnetic polarity of plates 14 and 15 to alternate as the direction of the current from the generator alternates and a continued operation of the crank 60 of the generator will agitate the armature 13 and cause the pawl 25 to rotate the disk 17 until the next succeeding stop block 38 is moved into engagement with the latch 39. The stop blocks engage the latch adjacent the pin 49 and move the trip lever laterally until the latch end engages the post 48, when further rotation of the disk is stopped until the sliding armature is again lowered and the latch released.

The sliding armature 53 is elevated primarily by attraction and to accomplish this result, a block 61 of soft iron is attached to the forward end of the sleeve 6 by engaging a portion of the threads of the nut 7, the upper end of the sliding armature having an upwardly extending shank 62 which projects through an opening 63 in the block 61, said shank serving to properly guide the upper end of the sliding armature. The block 61 is electrically energized by energizing the magnet 1 and such operation occurs nearly simultaneously with the energizing of the coils 2 and 3. As soon as the coils 2 and 3 are energized, the plates 14 and 15 become magnetic, an armature 64 carried by a pivoted lever 65 is attracted to the plate 15, the upper end of the lever 65 being drawn into engagement with the contact point 66, which is in turn wired to the magnet 1, such wiring to be hereinafter described. As soon as the contact point engages the lever 65, the current immediately passes into the magnet 1 and energizes the block 61, such energy elevating the sliding armature 53 and holding the same in this position until the circuit is broken and the lever 65 moved away from the contact point 66. As soon as the coils 2 and 3 are deenergized, the plate 15 ceases to be a magnet, and the lever 65 will be swung in the opposite direction or away from the plate 15 by means of a weight 67, which is adjustably mounted upon a stem 68 extending laterally from the lever 65, said lever being moved into engagement with an additional contact point 69, this operation closing a circuit, the object of which will be hereinafter set forth.

The sliding armature 53 is assisted in its upward movement by attaching thereto one end of a swinging beam 70, said beam being mounted in a strap 71 surrounding the magnet 1. The opposite end of the beam 70 has attached thereto a spring 72, which spring is in turn attached to a part of the casing of the box 2 and while the tension of said spring is not sufficient to raise the sliding armature, yet it materially assists

in doing so when the block 61 is energized. The armature 53 normally descends by gravity, but to cause a positive descent thereof, one end of a spring 73 is attached to the upper end of said armature, while the opposite end of the spring is attached to an adjusting shaft 74 by a flexible connection 75ª and as the end of the shaft 74 projects through the wall of the box 2, a minute adjustment of said spring 73 may be obtained by rotating said shaft and winding the flexible connection onto or off of the shaft.

The magnets 2 and 3 are bridged between the line and ground in the usual manner, while the electromagnets 4 and 5 are placed in the generator circuit between the generator and the ground. The magnets 4 and 5 are designed so as to respond quicker than the magnets 2 and 3. While the magnets 2 and 3 in all of the telephones on the line will be energized, the magnets 4 and 5 of the calling telephone only will be magnetized. The introduction of an electric current into the magnets 4 and 5 will cause the projecting cores 75 and 76 to attract a cross arm 77 of an armature 78 and lift said armature to a horizontal position. The rear end portion of the armature 78 is pivotally mounted in a portion of the frame work of the box 2 and has attached to its extreme rear end a spring 79, which spring is employed for assisting in elevating the armature. The swinging movement of the forward end of the armature 78 must be rapid and to this end a spring 80 is attached to the armature 78 between its pivot point and the end carrying the cross arm 77 so that immediately the current is cut out of the magnets 4 and 5, the forward end of the armature will be quickly lowered providing the end of the armature is in alinement with one of the openings 23 in the ring 19. The tension of the springs 79 and 80 is such that the armature 78 normally rests in its down position. By providing opposing springs 79 and 80 the armature 78 will start to move quicker both downwardly and upwardly than it would without such an arrangement. As the armature moves from either one of its limits of travel to the other, the pulling power of one spring constantly increases, while the pulling power of the other, constantly decreases.

The armature 78 extends beyond the cross arm 77 and is provided at its outer end with a roller 81, which roller is adapted to engage either the inner or outer faces of the flange sections on the ring 19, said engagement depending upon whether the armature is elevated or lowererd. Projecting above and below the armature 78 and carried thereby are extensions 82 and 83, in which extensions are pivotally mounted auxiliary armatures 84 and 85 respectively, the outer ends of said auxiliary armatures having rollers 86 and 87 thereon, which rollers are in alinement above and below the roller 81 and engage respectively the inner and outer faces of the flange sections when the armature is moved to certain positions.

Carried at the outer ends of the extensions 82 and 83 are rearwardly extending frames 88 and 89 and between said frames and the armature 78 are positioned contact plates 90 and 91 respectively, said contact plates being spaced from the armature and frame sections by suitable insulation 92 and 93 respectively. The forward ends of the contact plates 90 and 91 are so positioned as to be engaged by the inner ends of the auxiliary armatures 84 and 85 respectively, the auxiliary armature 84 normally engaging the contact plate 90, while the auxiliary armature 85 is normally out of engagement with the contact plate 91, said auxiliary armatures being so held by means of springs 94 and 95.

Positioned above the frame section 88 and insulated from each other and from the frame section are contact plates 96, 97, 98 and 99, the contact plates 96 and 97 coöperating with each other, while the plates 98 and 99 also coöperate with each other. The forward ends of the contact plates 96 and 97 are provided with buttons 100 and 101 respectively of insulating material, the button 100 being on the upper face of the contact plate 96, while the button 101 is below the contact plate 97 and in position to engage the contact plate 98 so that when a downward pressure is applied to the forward ends of said contact plates, the circuits will be closed between said sets of plates by the bringing together of the ends of the plates 96 and 97 and the ends of the plates 98 and 99. The forward ends of the contact plates 96—97 and 98—99 are brought together by means of a foot piece 102 on the sliding armature 53, which foot piece extends in the path of the forward ends of said plates.

Extending forwardly and downwardly from the lower end of the armature 53 is an arm 103, which arm is adapted to enter one of the notches 20 or 21 under certain conditions and rest upon the edge of the ring 19 under other conditions. When the arm 103 engages the edge of the ring 19, the foot 102 will not engage the contact plates sufficiently to close the circuits between the same when the armature 78 is in its lowered position, but will close said circuits even when resting upon the edge of the ring when the armature is in its elevated position, as shown in Fig. 24 of the drawings. Each of the rings in their respective telephones is provided with the notches 20 and 21, but the notches 21 are so arranged that no two notches will be in position to receive the arm 103 at the same time, while the notches

20 are so arranged that when the hand 42 is rotated until it registers with the word "All" on the dial, the arm 103 of each telephone will drop into its respective notch 20, in which event all of the telephones can be simultaneously called and communicated with.

In describing the operation of the device, attention is particularly called to Figs. 1, 2, 14 and 25 of the drawings. In starting to make a call, the crank 60 at the calling telephone is rotated, which will create an alternating current and energize the magnets 2 and 3 by way of wire 114 of all the telephones on the line and energize the magnets 4 and 5 of the calling station only, which will result in rotating all of the disks in the various telephones. The energizing of the magnets 4 and 5 in the calling telephone will result in raising the armature 78 and cause the flange sections 22 to pass between the rollers 81 and 87, as more clearly shown in Figs. 17 and 21, thus forcing the inner end of the auxiliary armature 85 into engagement with the contact plate 91 and completing the circuit therethrough. The flange sections 22 of all the telephones other than the calling station will pass between the rollers 81 and 86, thereby lowering the inner end of the auxiliary armature 84 and breaking the circuit between said auxiliary armature and the contact plate 90, as shown in Figs. 18 and 22.

So long as magnets 2 and 3 are not energized, the armature 13 will be held adjacent the plate 14 by means of the spring 34, thereby holding the pawl 25 in its forward stroke or position, thus necessitating the pawl to make a rearward stroke before engaging an additional projection on the disk 17 and giving the armature 78 sufficient time to rise and pass through one of the openings 23, said operation being completed before the disk 17 starts to rotate. The current passes from the generator 59 through wire 104, binding post and wire 105, wire 106 to the line wire 107 through the other instruments other than the calling telephone to the ground, thence returning on to the ground wire 109 of the calling instrument, through wire 110 to coils 4 and 5, thence through wire 111, armature 78, extension 82, auxiliary armature 84, contact plate 90, wire 112, post 115, wire 116, circuit breaker 117, wire 118 to the generator 59. The coils 2 and 3 are bridged between the wires 106 and 109 through a wire 114 extending from the wire 106 to the magnet 2 and a wire 113 extending from the ground wire 109 to the magnet 3, while the coils 4 and 5 are similarly bridged between the armature 78 and the ground wire 109 through the wire 111 extending from the magnet 5 to said armature 78 and the wire 110 extending from the ground wire 109 to the magnet 4, in which instance a part of the current will pass from wire 106 through wire 114, through the coils 2 and 3 at the calling instrument, wire 113, wire 109, through wire 110, coils 4 and 5, wire 111, armature 78, extension 82, contact plate 90, wire 112 and posts 115 through wire 116, a circuit breaker 117 and a wire 118 to the generator 59 causing the coils 2 and 3 and 4 and 5 to become magnetic at the same time.

After the flange sections in the calling telephone have moved to the position shown in Figs. 17 and 21, the inner end of the auxiliary armature 85 will be moved upwardly and into engagement with the contact plate 91, in which instance the current from the generator passes through wires 104, 106 through all the other telephones on the line, thence to the ground, from whence it enters the calling telephone through the ground wire 109, through wire 119 and into contact plate 91, thence through auxiliary armature 85, extension 83, armature 78, extension 82, auxiliary armature 84, contact plate 90, wire 112 and back to the generator. In view of the division of the circuit at the calling station, the introduction of the flange section between the rollers 81 and 87 will cut out the coils 4 and 5, the circuit passing as above described.

In all of the telephones other than the calling telephone, the armature 78 remains in its lowered position so that the flange sections of the disk will pass between the rollers 81 and 86, forcing the inner end of the auxiliary armature 84 out of engagement with the contact plate 90 and breaking the circuit to the generator at this point. When the current from the calling station leaves the generator through the wire 106 and enters the line wire 107, it is conducted through all of the telephones except the calling telephone through wire 106 by wire 114 into the coils 2 and 3, thence into the wire 109, through the wire 113 and into the ground through the ground wire 109. The current then passes through the ground to the ground wire 109 of the calling telephone and back to the generator. As the circuit from the generator 59 when returning passes through the wire 112, the breaking of the connection between the auxiliary armature 84 and the contact plate 90 through the introduction of the flange between the rollers 81 and 86 will prevent the use of the telephones other than the calling station and the called station. This device absolutely prevents anyone from cutting in on the line when in use or listening to any conversation, as the receiving portion of the telephones not in use, is dead. The stop blocks on the disk are so arranged that when the hand is midway between any two numerals on the dial, one of said stop blocks will have moved

into engagement with the latch end of the lever 40 and by so placing the stop blocks, none of the openings 21 will be in position to receive the arm 103, but said arm will always land upon the edge of the ring 19 and prevent the ringing of the bells when the push button is operated to release the lever 40 from the stop block. The spaces midway between the divisions or numerals are indicated by "0" so that the operator can always tell when it is necessary to operate the push button to release the disk 17 to permit said disk to further rotate. As the blocks 38 will engage the trip lever at a point midway between the numerals or the word "All" and the numerals at opposite sides thereof, all of the disks will be stopped at the same relative point or when the hand on the dial is at "0" and as the pawl 25 continues to operate even after the blocks are engaged with the trip lever, any disk which may have lagged in rotating from one "0" to the next would be brought up to its normal position with the other disks. This operation insures that the notch in the ring of the called telephone will always be in position to receive the arm of the sliding armature when the hand is turned to the numeral indicating the called telephone and all the disks positioned to be released simultaneously when the circuit is broken.

In calling a station should the hand 42 be at "0" before 1 and it is desired to call a station "4", the generator is operated, which will energize the magnets 2 and 3 and vibrate the armature 13, which will result in successively bringing the pawl 25 into engagement with the projections 18 and rotating the disk 17 until the next succeeding stop block 38 is moved into engagement with the latch 39 and the trip lever 40 moved laterally into engagement with the pin 48. The first stop will occur when the hand moves into registration with the "0" before 2 on the dial and the next stop at the "0" before 3 on the dial so that in order to continue the rotation of the disk 17, it will be necessary to either stop the operation of the generator or depress the push button 117, either of which will result in breaking the circuit of the generator through all the magnets 2 and 3 and at the same time demagnetize the magnet 1, whereupon the sliding armature will descend and release the latch from the stop block engaged therewith. The pawl will then engage others of the projections 18 and rotate the disk until the hand reaches the numeral 4, the station being called when the push button is operated to break the circuit or the rotation of the generator is stopped, either of which will result in lowering all of the sliding armatures 53 and entering the arm 103 of the armature at station "4" into the notch 21 of the ring 19, while the arms of the remaining armature 53 will rest upon the edge of the ring.

The stop blocks 38 are placed in alinement with one of the projections on the disk 17 and are so positioned that when the end of the lever 40 is in engagement with the pin 48, the pawl 25 will not swing rearwardly a sufficient distance to engage the next succeeding projection, but will play between the projection in alinement with the stop block 38 engaged with the latch and the next succeeding projection so that even though the rotation of the disk 17 is stopped, the armature 13 and parts operated thereby may continue to operate.

When the plate 15 is magnetized, the armature 64 is attracted and the lever 65 moved into engagement with the contact point 66 and extending from said contact point to the magnet 1 is a wire 121. The current for the magnet 1 is taken directly from the local batteries 120 through a wire 122, the receiver hook H, contact plate 123, wire 124, binding posts and wires 125, wire 126 to the pivoted end of the lever 65 and into the magnet 1 through the wire 121. The circuit is completed back to the batteries 120 through a wire 127 extending from magnet 1 to the binding posts and wire 128, thence through a wire 129 to the batteries 120. The current passing through the magnet 1 will energize the sleeve 6, shaft 10 and armature 13 and will likewise magnetize block 61, whereupon the sliding armature 53 will be attracted and held in its elevated position until such time as the magnet 1 is demagnetized. As soon as the hand 42 has reached the numeral 4 indicating the station being called, the notch 21 in the ring 19 at that telephone will be in position to receive the arm 103 and in view of the fact that said arm descends into said notch 21, the foot 102 will engage the insulating button 100 and close the circuit between the contact plates 96 and 97 and 98 and 99, although the armature 78 is in its lowered position. The arms 103 of the remaining telephones along the line will rest upon the inner edge of the ring 19, thus preventing the foot 102 from engaging the button 100 in all of said telephones except the calling telephone. The foot 102 of the calling telephone will engage the button 100 and close the circuit between the contact plates 96 and 97 and 98 and 99 although the arm 103 does engage the inner edge of the ring 19, as in this instance the armature 78 is in its elevated position, thus bringing the ends of the contact plates 96—97 and 98—99 in position to be depressed by the foot 102.

As soon as the magnets 2 and 3 are demagnetized, the armature 64 will be released from the plate 15, whereupon the weight 67 on the stem 68 will swing the lever 65 away

from the contact point 66 and into engagement with the contact point 69, where it is held until such time as the magnets 2 and 3 are again magnetized. By depressing the ends of the contact plates 98 and 99 until they are brought together, the circuit between the batteries and bells on the calling and called telephones will be closed, the circuit passing from the batteries 120 through wire 122, hook H, contact plate 123, wires 124, 125 and 126 to the lower end of the lever 65, through said lever, contact point 69, wire 130 to the contact plate 98, into the contact plate 99 through wire 131 to the vibrating bell 132, through wire 133 into the wire 127 and thence back to the batteries through wires 128 and 129. The bells on the calling and called telephones will then continue to ring until such time as the receiver 134 is removed from either the called or calling telephones or until the sliding armature has been elevated and the disk moved to such position as to prevent the operation of the various parts of the cut out system. When the receiver is removed from the hook H, the upper end of said hook moves away from direct contact with the plate 123, thus interrupting the bell cuit. When the hook reaches the upper position it closes the circuit between the contact plates 135, 136 and 137, which plates form a closure for both the primary and secondary circuits of the telephone.

In order to more clearly show the circuit arrangement of a plurality of telephones when in use, we refer more particularly to the diagrammatic illustrations in Fig. 25. In said figure the telephones and selecting mechanisms of three stations A, B and C are shown. Referring to Fig. 25, the selecting mechanism of station A has been operated to call station C. As will be seen in the diagrammatic representation of station C, the notch 21 of the disk thereof is positioned under the arm 123, so that said arm has dropped into said notch, thus permitting the foot 102 to depress the contacts 96—97 and 98—99, whereby the transmission and bell circuits are closed at such points. It will also be seen that the armature 78 has been raised in the calling telephone (station A) so that the contacts 96—97 and 98—99 carried thereby, are depressed, although the sliding armature can only drop onto the rim of the ring 19.

The primary circuit in all of the telephones may be traced from the battery 120, through wire 122, hook H, contact plates 135, 136 and 137, through wire 138, transmitter T, wire 139 to the primary coil of the induction coil 140, thence through wire 141, wire 129 and back to the battery 120, the circuit being the same in both the calling and called telephones. In tracing the secondary circuit from the calling to the called station and back to the calling station, said circuit passes from the secondary coil of the induction coil through wire 142, contact point 136, contact point 135, wire 143, wire 144, through wire 145, contact plate 97, plate 96, wire 146, wire 106, thence through line wire 107 to the called telephone, in reverse order through said called telephone to the secondary coil of the induction coil, thence through wire 147, receiver 134, wire 148, wire 149 to the ground wire 109, thence through the ground to calling instrument, on to the wire 109 through wires 149, 148, receiver 134, wire 147 to the secondary coil of the induction coil, said induction coil being the originating point.

In all of the telephones except the calling and called telephones, the bell circuit is broken between the contact plates 98 and 99 and the telephone circuit between the contact plates 96 and 97, consequently the bells upon said telephones other than the calling and called telephones will not ring, nor could the patrons at said telephones hear the conversation even if the receiver was held to the ear, as both circuits would be broken, as above described. If it is desired to call all of the patrons on the telephone at the same time and communicate with all of said patrons, the hand 42 is turned until it points to the word "All" on the dial. This will bring the notches 20 of each ring 19 in position to receive the arm 103 of the sliding armature 53, so that the circuits will be established through all of said telephones.

It will thus be seen that we have provided a positive and accurate means for selecting any particular telephone in the line of telephones and one that can be easily operated. It will further be seen that when the telephone has been properly selected, no other telephone on the line can cut in or listen to the conversation and the bells of the calling and called telephones will be the only ones to ring. It will likewise be seen that the device can be cheaply installed and practically indestructible from use and it will further be seen that all of said telephones may be called and communicated with simultaneously, when desired. It will further be understood that suitable mechanism may be provided for calling and operating the telephones through a suitable switch board, but as said construction really forms no part of my invention, it is not deemed necessary to show or describe the same.

What we claim is:—

1. The combination with a plurality of telephones and wires connecting said telephones, of rotatable disks, means to rotate said disks, means to automatically stop the rotation of said disks, means coöperating

with parts of said disks to make and break controlling circuits and additional means to establish communication between any two of said telephones or all of said telephones.

2. The combination with two or more telephones and connecting wires therefor; of a rotatably mounted disk in each telephone, controlling magnets for each of said disks, means to direct an alternating current through said magnets, an oscillating armature associated with each disk and controlled by said magnets, means controlled by each of said armatures adapted to rotate its disk, means to interrupt the rotation of each disk at intervals, an additional magnet, and a movable armature for said magnet adapted to release said interrupting means.

3. The combination with two or more telephones and connecting wires therefor, of a disk for each telephone, means to rotate said disk, means to automatically stop said disk at predetermined points, a pair of magnets, means to energize said magnets, an armature adapted to be attracted by said magnets and means on said disk coöperating with parts on said armature adapted to make and break circuits.

4. A selecting mechanism for telephones comprising a disk, a generator, means controlled by said generator adapted to rotate said disk, means to interrupt the rotation of said disk at intervals, means to break the circuit between the generator and disk rotating device, means to release said disk for further rotation, and additional means to electrically control said releasing means.

5. A selecting mechanism for telephones, comprising a disk, means to rotate said disk, means to stop the rotation of said disk at predetermined points, a sliding armature cooperating with said disk adapted to disengage the stopping mechanism from the disk.

6. A selecting mechanism for telephones, comprising a disk, means to rotate said disk, an armature having contact points thereon, a sliding armature, means on said sliding armature adapted to engage and close certain of said contact points and means on said disk adapted to engage others of said contact points and make or break the circuits therebetween.

7. In a telephone system, the combination with a plurality of transmitting and receiving instruments, of a selecting mechanism associated with each instrument, comprising a disk having a ratchet thereon, electromagnetically operated means associated with said ratchet to rotate said disk, a plurality of stops on said disk, means to engage said stops to periodically check the rotation of said disk, and additional means to release said last mentioned means.

8. In a telephone system, the combination with a plurality of telephones, of a selecting mechanism, comprising a disk, electromagnetically operated means to move said disk into desired positions, a stop to interrupt the movement of said disk at intervals, means to trip said stop, electric contacts and means associated with said disk adapted to close said contacts when desired.

9. In a telephone system, the combination with a plurality of telephones, a selecting mechanism associated with each telephone, comprising a disk having a flange thereon, said flange having a portion cut away, contacts adjacent said disk, an armature adapted to enter said cut away portion and close said contacts when said disk is in a certain position and means associated with each selecting mechanism to raise the contacts of its selecting mechanism into position to be operated by said armature when the disk is in any position.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JUDGE BAXTER BRIGGS.
VERNON P. HALL.

Witnesses:
CHAS. CRAGG,
L. RUDE.