

R. C. M. HASTINGS.
 SELECTING APPARATUS FOR TELEPHONE SYSTEMS.
 APPLICATION FILED APR. 22, 1912.

1,061,286.

Patented May 13, 1913.

5 SHEETS—SHEET 1.

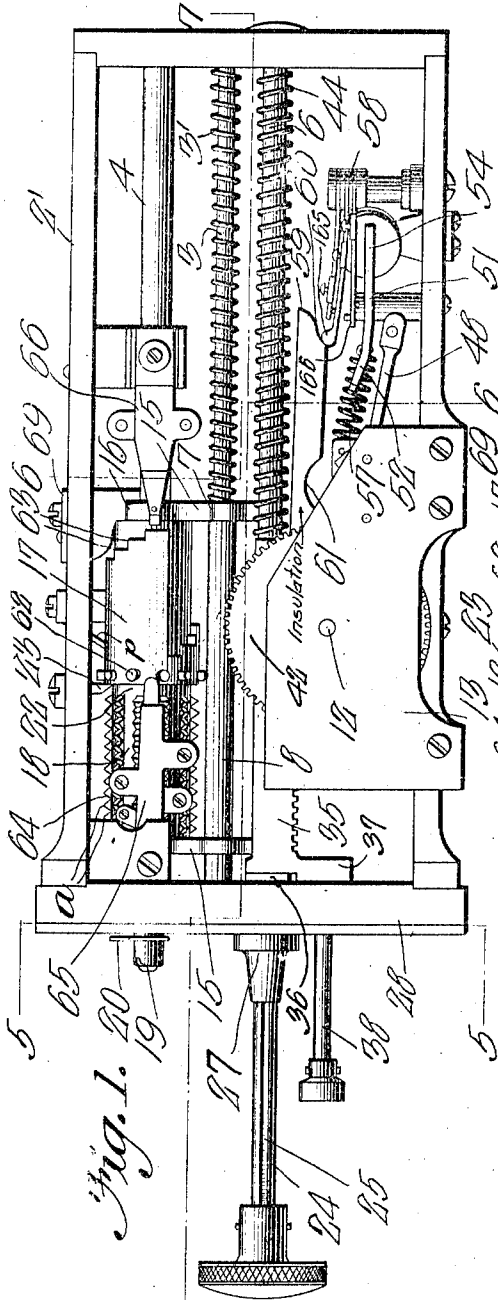


Fig. 1.

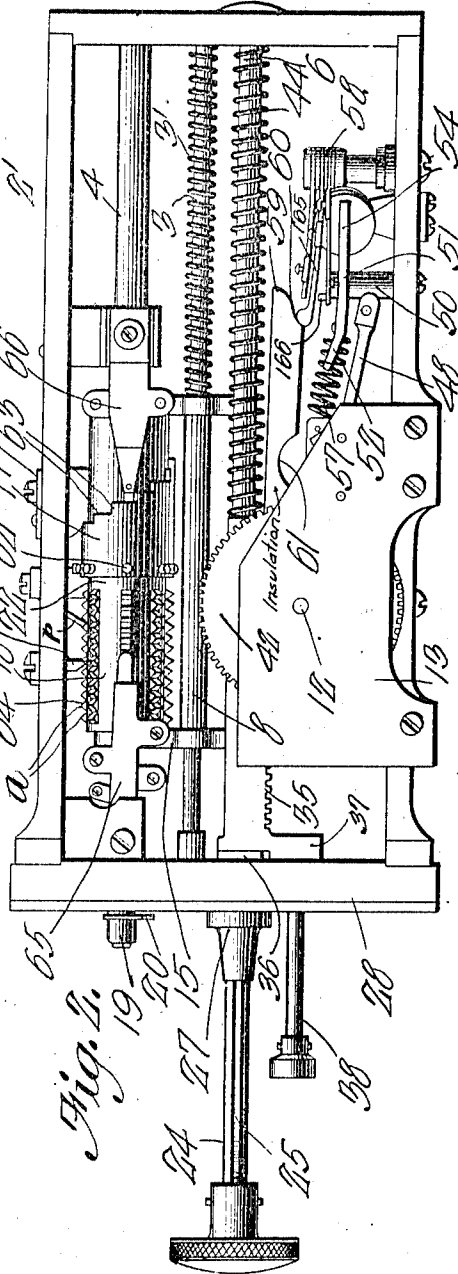


Fig. 2.

Witnesses

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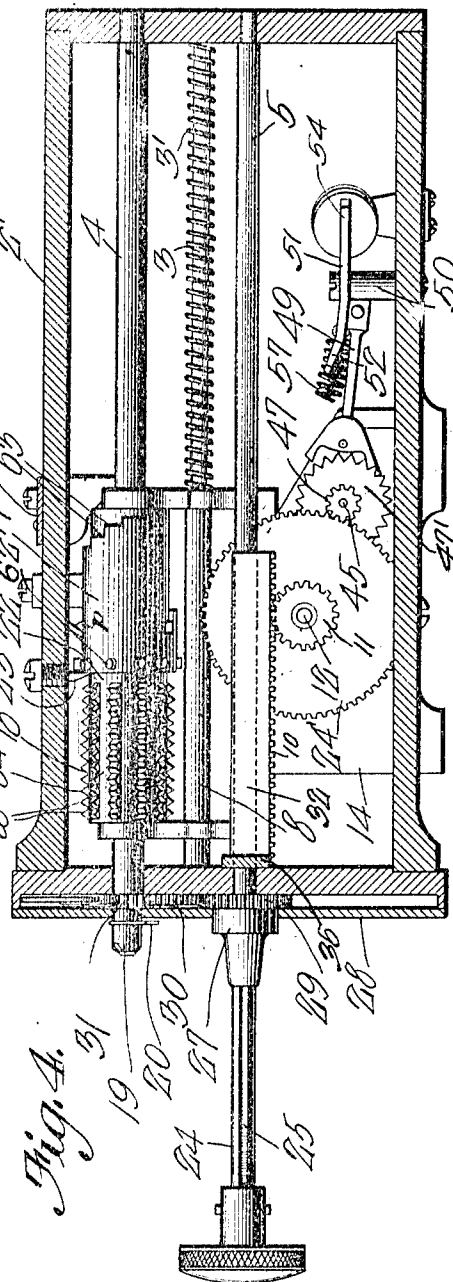
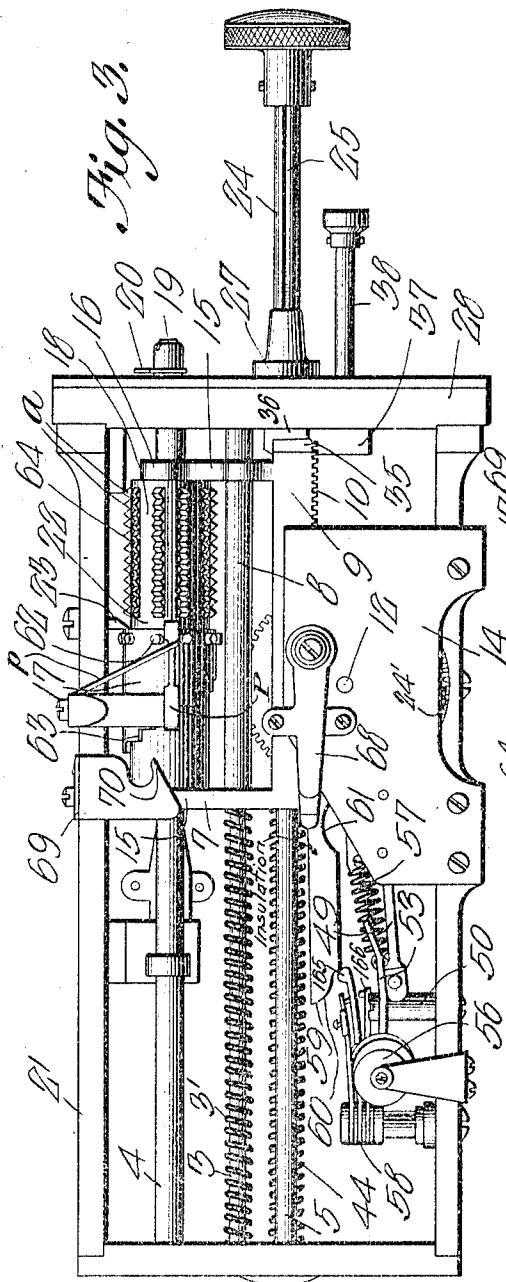
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5 SHEETS—SHEET 2.



Witnesses

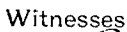
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5 SHEETS--SHEET 3.



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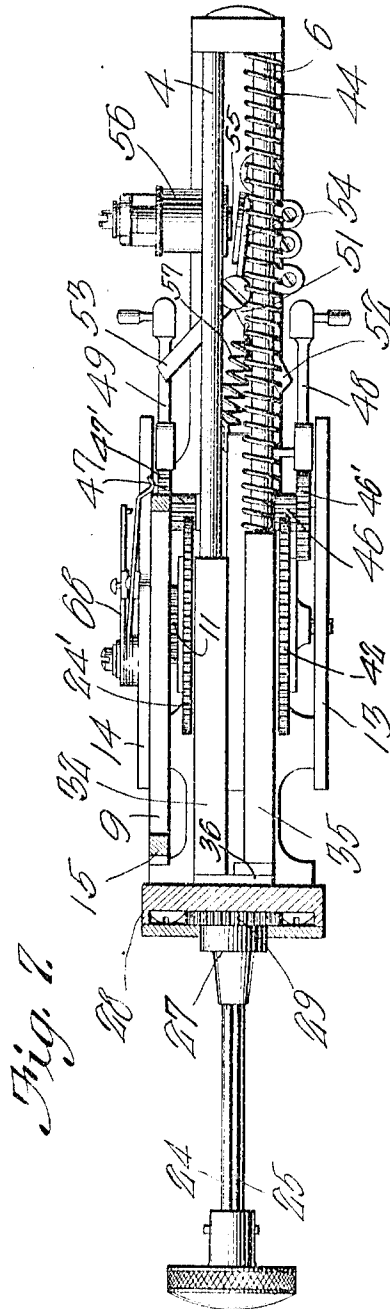
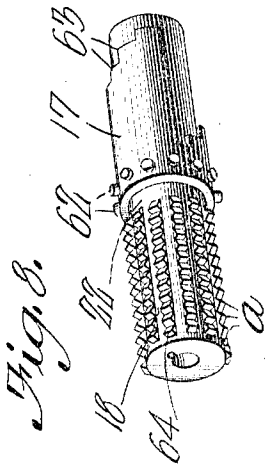
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5 SHEETS—SHEET 4.



Witnesses

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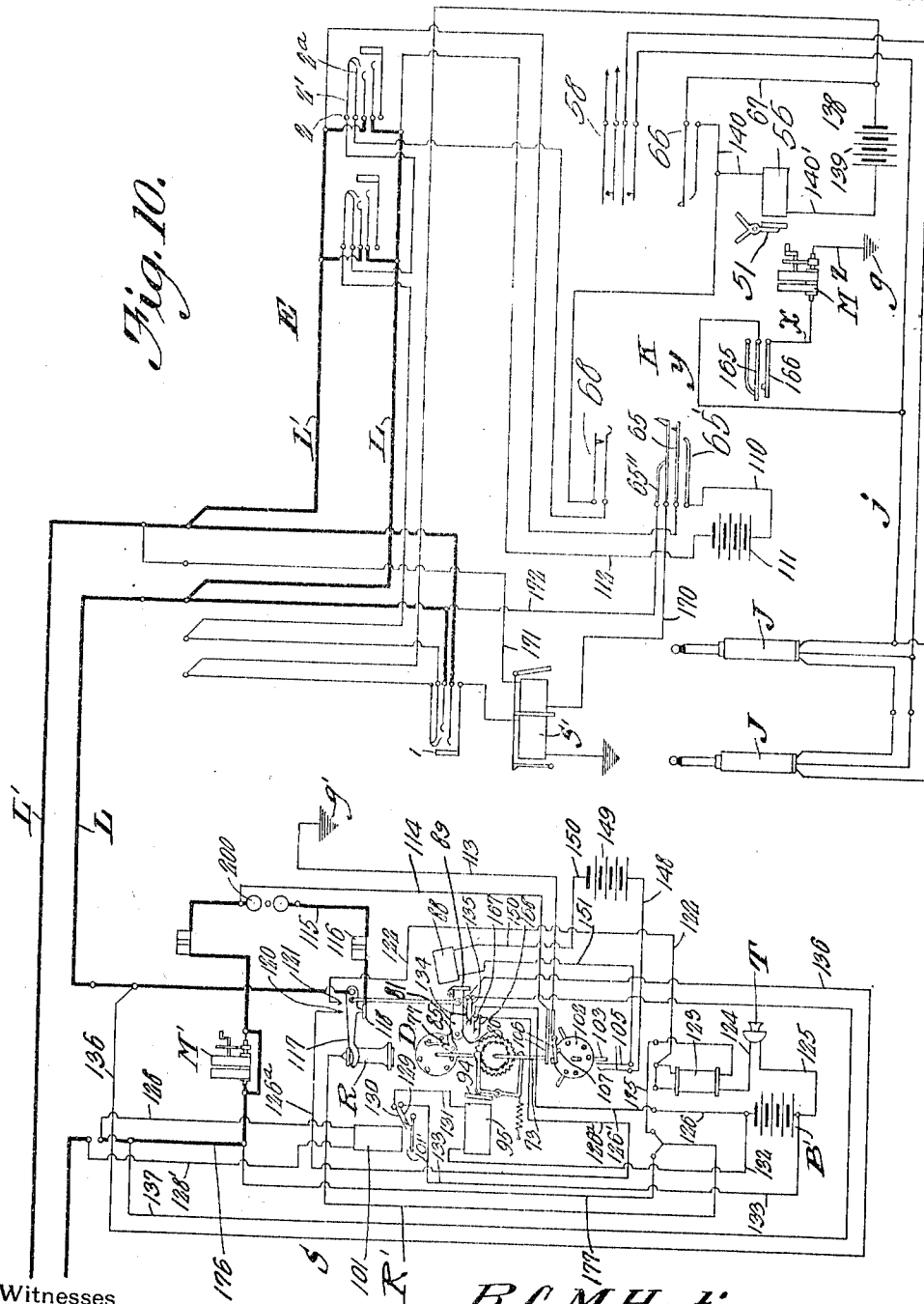
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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SELECTING APPARATUS FOR TELEPHONE SYSTEMS.

1,061,286.

Specification of Letters Patent. Patented May 13, 1913.

Application filed April 22, 1912. Serial No. 692,465.

To all whom it may concern:

Be it known that I, RUBEN C. M. HASTINGS, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a new and useful Selecting Apparatus for Telephone Systems, of which the following is a specification.

The present invention relates to an improved selecting apparatus to be mounted in the central or exchange of a telephone system, whereby the operator may select and signal a single or selected called subscriber and simultaneously shunt all other subscribers. This particular instrument is designed for use in connection with the system of selective telephony, as set forth in a co-pending application filed August 29, 1911, Serial No. 646,697, wherein a loop circuit is shown having a plurality of subscribers' sets connected in series, and provided with a peculiar form of shunting device set forth in an application filed of even date herewith, Serial No. 692,467, which by the manipulation of the present selecting apparatus, is operated to shunt those instruments not called, and yet cause a signal to be made to indicate that the line is busy.

In the present instance, a frame is provided, having mounted therein a shaft capable of being rotated in both directions, one having no effect upon the indicator and the selecting carriage and the other rotation rotating an indicator to indicate which subscriber's set will be placed on the line, and at the same time rotate the carriage to bring into play when the shaft is pushed upon the proper stops and other mechanisms to place the desired subscriber on the line, shunting all the others except the calling and called subscriber, and automatically ringing the call bell at the called subscriber's set, the carriage being retained in this position and during the conversation, at which time the removal of the jack by the exchange operator will automatically release the carriage of the selecting key and permit its movement to its initial position, and the un-shunting of all of the subscribers' sets, thus placing them all in non interfering position, and so that the exchange may be called by any one of the other subscribers for inter-communication.

With the foregoing and other objects in view which will appear as the description

proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made without departing from the spirit of the invention.

In the drawings: Figure 1 is a side elevation of the selecting key and automatic signal operating device, taken from the right-hand side thereof, with the carriage in its initial position. Fig. 2 is a similar view with the parts in the position they assume after having selected a predetermined subscriber and signaled. Fig. 3 is a left hand side elevation of the apparatus. Fig. 4 is a longitudinal sectional view of the apparatus. Fig. 5 is a cross section taken on line 5—5 of Fig. 1. Fig. 6 is a cross section taken on line 6—6 of Fig. 1. Fig. 7 is a longitudinal section taken on line 7—7 of Fig. 1. Figs. 8, 9, and 11 are detail views of parts detached. Fig. 10 is a diagrammatic view of a loop circuit telephone system with the selecting key in diagram in use therein.

The selecting key, which is particularly set forth in detail in Figs. 1 to 9, and in diagram in Fig. 10, and which is mounted for operation at the exchange or central of the system, comprises an open frame 2', the four cylindrical guide and supporting rods 3, 4, 5 and 6, respectively, upon which are mounted the respective parts of the key. Mounted for a reciprocatory sliding movement upon the main rod 3, is the carriage 7, having the central tubular portion 8, which forms the mounting for the carriage upon the rod 3. A coiled spring is mounted upon said rod 3, and exerts a tension to normally hold the carriage toward initial position or as viewed in Fig. 2, toward the left. Depending below and parallel to the portion 8, is a plate 9, provided with ratchet teeth 10, which mesh at all times with the actuating toothed wheel 11, said wheel being rotatably mounted upon the shaft 12, journaled transversely of the frame, between the two plates 13 and 14, which form in reality a casing. Projecting upwardly from and at each end of the tube 8, are two arms 15, which are provided with eyed terminals 16, which slidably fit upon the rod 4, and have disposed therebetween and upon the rotatable

rod 4, the selecting cylinder or drum 17, whose key 17', fits within the key-way 4' of the rod or shaft 4, so that the said cylinder may slide upon said rod 4, and yet be caused to rotate therewith, the purpose of which will presently appear.

By carefully examining the selecting cylinder or drum 17, it will be noted that the forward portion of the periphery thereof is provided with a series of longitudinal grooves 18, spaced apart at equi-distances the full circumferences of the cylinder, each groove representing one subscriber's set in the system, there therefore being, when twelve sets are on the line, twelve grooves 18. The outer end of the shaft or rod 4, as at 19, carries an indicating arm or pointer 20, to indicate by pointing to the numbers on a dial (not shown) upon the face of the key, the subscriber's set that will be placed in communication by the proper manipulation of the key. The outer ends of the grooves 18 terminate in the circumferential groove 22, which when the selecting cylinder is in initial position, as in Fig. 2, will have the locking pin or screw 23, mounted in the frame above the cylinder, fitting therein, to prevent the movement of the cylinder accidentally and yet permit the cylinder to be pushed inwardly to connecting position as shown in Fig. 3, through the rotation of the operating rod 24. The rod 24 is provided with a key-way 25, which permits the said push rod to be rotated freely to the right, but when turned to the left throws in the pawl and ratchet device 26, so that the sleeve 27 mounted in the casing 28, and carrying the gear 29, will operate the intermediate gear 30 and the gear 31, which is keyed upon the rotatable rod 4, and thereby cause a simultaneous rotation of the selecting cylinder or drum 17. When the pointer aligns with any one of the dial figures, the push rod 24 is pushed inwardly, so as to slide upon the central guide rod 5, upon which is slidably mounted the main actuating racked or toothed bar 32, whose toothed portion is in mesh at all times with the gear 33, which is fast upon the sleeve carrying the other toothed wheel or gear 11, and the large gear wheel 24', whose periphery projects upwardly between the bar 32 and the tube 8. The gears 33 and 24' are rotatably mounted upon the shaft 12 alongside of the gears 39 and 42. Slidably mounted upon the remaining rod 6, is the call-up and ring-off operating frame 35, at whose forward end are disposed the two lugs 36 and 37, disposed at right angles to each other, the lug 36 being slidably mounted upon the rods 5 and 6 and carried by the inner end of the push rod 24, so that both the operating bar 32 and the frame 35 are pushed in simultaneously, while the auxiliary push rod 38, mounted in the frame is

disposed to only engage the lug 37, to operate the frame 35 independently, the purpose of which will presently appear. The under side of the frame 35 is toothed and meshes at all times with the small gear 39, which is fast to the large gear 42, both of which are rotatably mounted upon the shaft 12 alongside of the gears 11 and 24', before mentioned. In order to automatically return the frame 35 to initial position, the coiled spring 44, mounted upon the rod 6, is employed, the same exerting a pressure against the main frame and the frame 35 to move the frame 35 to the left as shown in Figs. 2 and 3.

Journalled between the plates 13 and 14 and to the right of the shaft 12, as viewed in Fig. 4, is a shaft 45, having fast thereon, the two gears 46 and 47, which are at all times in mesh with the large gears 42 and 24. and by means of the ratchet wheels 46' and 47' and the governor arms 48 and 49, respectively, movement of the carriage and the frame 35, under the tension of the respective springs, is regulated, thus providing a locking escapement for each.

The selecting cylinder, when ready to be pushed in, has a space 18 between two rows of teeth *a* disposed to aline with the lower end of the pin 23, said pin being of considerably less width than the space, while the spring actuated pawl P, which is of substantially the same width as the space is also disposed in line with a space between two rows of teeth *a*. Thus when the cylinder is pushed in, the cylinder will be properly guided by the pawl P and when at the end of the stroke and the pin 62 is engaged by the hook 70, the cylinder will have a slight rotation imparted thereto, such slight rotation placing a row of teeth *a* in line to engage the pawl P but not sufficiently far to move the space out of alinement with the pin 23, thus the pawl P will lock the cylinder against a further pushing movement, while the arm 53 will lock the arm 49 due to the spring 57 so that the cylinder is locked against retraction.

As the manipulation of the carriage and selecting cylinder make the selection and line connection, it is desirable that the frame 35 be held stationary during the spring actuation or movement of the same, and vice versa, that the carriage and selecting cylinder be locked while the frame 35 is being automatically operated to actuate the call-up mechanism of the selected subscriber; and to accomplish this, a very simple, yet effective device is employed. This consists primarily of the pin 50, mounted in the main frame centrally of the bottom thereof and farther to the right as viewed in Figs. 1 and 2, and having pivoted at its top the Y-shaped armature 51, the terminals 52, and 53, respectively of which are disposed to

rest above the two governor arms 49 and 48 respectively with the terminal 54 in front of the core 55 of the electro magnet 56. It will thus be seen that when the electro magnet is energized, this being the case when the push rod 24 is first released after being pushed home, the terminal 52 will rest above the governor 49, to prevent the same from moving, thus locking the frame 35 but as the terminal 53 is free or disengaged from the governor arm 48, the carriage and selecting cylinder are free to move to the desired point of selection or stoppage. The de-energizing of the electro magnet, permits the spring 57 to act, pulling the terminal 53 from engagement with the governor arm 49, but throwing the terminals 52 in engagement with the governor arm 58, thus stopping the movement of the carriage and selecting cylinder and permitting the frame 35 to be moved by its spring, to actuate the call-up mechanism in the selected set.

Disposed near the electro magnet 56, is the call-up circuit comprising spring terminals 165—166, the upper member of which is disposed in the path of and adapted to be actuated by the arm 59, of insulation carried by the frame 35, and provided with the reduced end 60 and the notch 61, intermediate of its ends, the same being provided to permit the call-up terminals to be separated and the line opened, when adjacent the end 60 and notch 61, and to be closed when in between.

Mounted upon the exterior of the cylinder 17, beyond the circumferential groove thereof, are the studs or pins 62, one to each longitudinal groove of the cylinder, and formed upon the extreme inner end of the cylinder are the staggered shoulders 63, one to each pin and groove, and each in line with its respective pin and groove. The ribs 64 formed by the series of longitudinal grooves in the cylinder are provided each with a series α , of teeth, one to each subscriber, and all of the teeth being cut in circumferential alinement, said teeth forming a circuit making and breaking device to operate the respective shunting devices in the system, the co-acting spring contact terminals 65, being disposed to engage the teeth of one rib at a time, as shown in Fig. 2, and the specific purpose of which will be set forth in the operation later on. Disposed in the path of the staggered shoulders 63, of the selecting cylinder is another pair of co-acting spring terminals 66, whose purpose will appear later on. A conductor 67 is connected to one terminal of the pair 66, and is connected to the conductor 138, another conductor 140 being connected to the other terminal 66 and leading to one terminal of the other pair of terminals 68, which are disposed upon the plate 14, and in the path to be closed and opened by the

actuation of the carriage by the plate 9, the purpose of which will presently appear. Connected to the top of the frame of the key is a bracket 69, whose hooked lugs 70, project downwardly and in the path to enter between the pins 62, and insure upon the extreme inwardly movement of the selecting cylinder, the proper registering of the longitudinal grooves with the locking and guide screw or pin 23, thus insuring the proper registering of the cylinder, in case the pointer did not exactly point to the proper dial number when the operator pushed the rod 24.

In order that the various circuits may be traced in the diagram, as illustrated in Fig. 10 to demonstrate the full operation of a system employing the present key, the circuits will be traced in rotation or in their correct order, beginning with the calling of the operator at the exchange and the answering of such call by the operator, and to the final restoration of the various subscribers' instruments to the line.

With the various instruments in the position as illustrated in Fig. 10, the contacts 65—65' are closed so that the signal S' is connected to the line conductors L—L' through the respective conductors 170, 171 and 172, so that all subscribers' sets are in line calling connection with the exchange E. Pre-supposing that a subscriber desires to call the exchange, the receiver R is removed from the hook 117, and the magneto M' at the calling subscriber's set is actuated to actuate the exchange signal S' to indicate to the exchange operator that the calling subscriber desires to be connected with a selected subscriber. Should the magneto M' be dispensed with, the local battery B' of the calling subscriber's set will be connected to the line through the receiver hook 117 and contacts 120 and 121, thus bringing into the line the transmitter T and the receiver R with the local batteries B', which will energize, in short lines, the signal S', and give such indication to the exchange. The circuit closed when the receiver hook 117 is raised, is as follows: the contact point 121, the conductor 122, the coil 123, conductor 124, transmitter T, conductor 125, batteries B', conductors 126'—126, the contacts 167—168, the conductor 126^a, the contact 120, and the receiver hook 117. Assuming that the calling subscriber desires to converse with a subscriber, as for instance No. 5, exchange operator now inserts the jack plug J in the calling subscriber's socket 2, this action opening contacts 2'—2^a. The push rod 24 of the selecting key K is now rotated until the indicator indicates No. 5, at which time the push rod is pushed upon and during such action the contacts 66, due to the engagement thereof with the enlarged portion of the cylinder 17, are closed and be-

fore the release of the key actuating rod 24, a circuit is closed at 66, and includes one contact 66, the conductors 67 and 138, the battery 139, the conductor 140', the electro magnet 56, the conductor 140 and the other contact 66. Thus the electro magnet 56 is energized and attracts the armature 51 to place the arm 52 above and in engagement with the arm 48 to lock the automatic ringer frame 35 against release. At the same time that the cylinder 17 and frame 9 is moved inwardly, the normally open contacts 68 are engaged by the frame 9 and closed, but as contacts 2'-2^a of the jack 2 are held open by the jack plug, the electro magnet 56, as will later appear is not affected now by the contacts 68.

As before stated, previous to the cylinder 17 having reached its full limit of movement, the hook 70 engages a pin 62, and thus rotates the cylinder 17 to bring a single row of teeth *a* in line with the forward free end of the pawl P, and the pawl due to its spring *p* engages the teeth *a* to stop the cylinder against further inward movement but permits the cylinder to move outwardly, due to the pressure of the spring 3. At the opposite side of the cylinder another row of teeth *a* are disposed to engage the contacts 65 and thus close the talking circuit and intermittently open and close another circuit, as will presently appear. The cylinder and its carriage are automatically halted in its outward movement, as the contacts 66, as will presently appear, open and cause the deenergization of the magnet 56, so that the arm 53 will be above to arrest the movement of the arm 49. When the contact 65 is in the depression between the respective teeth *a*, the closure is made between the contact 65 and terminal 65'', while when the contact 65 is riding upon one tooth *a*, the contact is open at 65'' and closed at 65', thus intermittently and alternately forming a talking connection and connecting the batteries 111 to the line. The release of the push rod 24, due to the spring 3' moves the cylinder 17 and frame 9 toward the initial position, and as the contacts 66 are closed by the enlarged portion of the cylinder 17, the circuit controlling the electro magnet 56 is energized until the opening of said contacts 66 due to the snapping of said contacts from one of the staggered portions 63 of the cylinder 17. The opening of the circuit thus described, permits the spring 57 to hold the arm 53 above the arm 49, and thus lock the arm 49 to hold the cylinder 17 and carriage 7 locked against further movement toward initial position. As the cylinder 17 was moved toward initial position and before being stopped by the arm 53, the teeth *a* engaging the contact 65, moves the same, to intermittently open and close the contacts at 65 and 65'' and alternately and intermittently open and close

the contacts 65-65'. This action throws into the line the battery 111, so that the various shafts 73 in all of the subscribers' sets are operated synchronously, to lock out all uncalled sets and place into line connection the single called set.

The circuit closed to lock out the uncalled sets and connect the line in the called set, is as follows: the contacts 65-65', the conductor 110, the battery 111, the conductor 112, the line conductors L-L', the conductor 128, in each subscriber's set, the electro magnet 101, in each subscriber's set, and the conductor 128' in each subscriber's set, thus intermittently energizing the electro magnet 101 in all sets. The energization of each electro magnet 101 operates the armature 101' in each set and thus causes the contacts 129-130 to intermittently close a circuit including the electro magnet 95 in each set. This circuit includes the contacts 129-130, the conductor 131, the electro magnet 95, the conductor 132, the batteries B', and the conductor 133. Thus the intermittent energization of the electro magnet 95 in each set will operate the armature 94 to step the shaft 73 and the disk 102. The disk 102 in the uncalled set will be moved to indicate "red", if the line is busy. At this stage in each uncalled set, the receiver hook is locked and the uncalled sets shunted from the line, by reason of the lever 80 being locked in down position by the lock 77, engaging the notch 85. At the same time, the contacts 134-135 are closed by the lever 80 in such position as to shunt the uncalled sets from the lines L-L' through the conductor 136, contacts 134-135 and conductor 137. As the uncalled sets' receiver hooks are thus locked, it is impossible for the same to be released by lifting the receiver, and the conductor 136, the contacts 134-135 and the conductor 137 complete a shunt for the receiver circuit. The receiver circuit is thus shunted from the line. Also as the pin 104 in the uncalled set, is out of contact with the contacts 106, the bell 200 in each uncalled set is held inoperative and will not be affected as the bell 200 is actuated in the called set.

When the cylinder 17 was stopped in its movement, due to the contacts 66 being opened and slipping from engagement with the shoulder 63, the electro magnet 56 is deenergized and the spring 57 will hold the armature 51 so that the arm 52 releases the arm 48, to the action of the spring 44, thus the spring 44 will move the call-up bell ringer frame 35 to initial position and so that the contacts 165-166 controlled by the arm 59 of insulation and which are held open due to the positioning of the end of the contact 165 being in the recess 61 of the bar 59. Thus the movement of the frame 35 and the bar 59, will cause the lower edge of

the bar 59 to ride over and press the contact 165 to engage the contact 166 and thus throw into the line the call-up machine M of the system. By this means the call-up machine, which may be operated at all times, or when desired, is thrown into the line through the wires $x-y$ and energize the call-up alarm 200 in the called set. The period of such ringing of the call-up alarm 200 depends upon the length of the bar 59 and until its curved end 61 passes over the contact 166. Should the contact 165 be raised and separate from the contact 166, the call-up machine M is cut from the line. Should the called subscriber not respond within a reasonable time, the exchange operator will press upon the rod 38 and consequently the bar 59 will be moved inwardly and as the rod 38 is released, the spring 44, as before described, will move the frame 35 to initial position and thus again cause the actuation of the call-up alarm 200 in the called subscriber's set.

The call-up alarm circuit energized by the call-up machine M when contacts 165—166 are closed, is as follows: the ground g , the conductor z , the machine M, the conductor x , the contacts 165—166, the conductor y , the conductor j , of jack plug J, the socket 2, the line L' , the receiver hook 117 in the called set, the contact 118, the conductor 115, the call-up alarm 200, the conductor 114, the contacts 106, which are closed by the pin 107 in the called set, the conductor 113 and the ground g' .

As the locking lever 77 in the called subscriber's set is raised so as not to be in the path to engage the notch 85 of the arm 80, the receiver hook of the called subscriber's set, when the receiver has been removed therefrom, will automatically rise and thus open the contacts at 117—118 and bridge the contacts 120 and 121 and thus throw into the line the local battery circuit of the called subscriber's set so that the called subscriber and the calling subscriber's sets will be placed into connection with the line wires L and L' . The circuit thus closed is as follows: the hook 117, the bridge at contacts 120—121, the conductor 122, the primary of the coil 123, the conductor 124, the transmitter T, the conductor 125, the battery B' , the conductors 126—126', the closed contacts 168—167, the conductor 126^a, and contact 120. The receiver R is connected to the line as follows: the receiver R, the usual cord R', the conductor 175, the secondary of the coil 123, the conductor 122, the contact 121, the hook 117, the lines $L-L'$, the conductor 128', the magnet 101, the conductor 128, and the conductors 176 and 177.

At the end of the conversation, the operator at the exchange removes the jack plug J, and permits the contacts 2'—2^a to close and as the contacts 68 are closed, due

to the frame 9 of the selecting key, engaging them, the circuit including the electromagnet 56 is closed, and thus the armature 51 is moved in opposition to the spring 57 to remove the arm 53 from engagement with the arm 49. This action will release the carriage 7 and move the cylinder 17 under the action of the spring 3', so that the cylinder is moved, as for instance from the position shown in Fig. 2 to that shown in Fig. 3. During this movement, the teeth a are in engagement with the contact 65 and will intermittently open and close the contacts 65' and 65'' and thus throw into line the battery 111, which as before described will actuate all of the electromagnets 101 in every subscriber's set to automatically operate the shafts 73, the electromagnets 95, the armatures 94, so that the disks 102 will be placed in normal position to indicate that the line is free and that the exchange can be called by all subscribers. At this time all of the hooks 117 can be raised, as the locking lever 77 is in raised position and out of the path to engage the notch 85 of the various arms 80.

In the event that a receiver in any set is left off of the hook 117, such hook is consequently raised, to permit contacts 134—135 to be opened, with contacts 167—168 closed, and the arm 80 due to the armature catch 83 will have carried with it the arm 81. Now as the shafts 73 are rotated, as before described, during the selection of a called subscriber and the locking out of the uncalled subscriber, the pin 103 carried by the disk 102 will engage the contacts 105 in each set, thus closing a circuit in each set to energize the electromagnet 88. Thus in the set where the hook 117 is raised, the armature catch 83 will be moved outwardly toward the magnet 88, Fig. 10, and should this be an uncalled set, this set will be shunted from the line by the fall of the arm 81 which closes the contacts 134—135 of the shunts 136—137. This circuit is as follows: the contacts 105, conductor 151, electromagnet 88, conductor 150, battery 149, and conductor 148, thus energizing the electromagnet 88 to attract the armature catch 83, as above described, to release the arm 81, which due to gravity will fall and close the contacts 134—135, thus shunting the set from the lines $L-L'$.

As before stated, the contacts 167—167 are held open by the arm 81 when down, and by this arrangement it is evident that the local battery B' is saved, should the receiver R, be purposely or accidentally left off the hook 117.

What is claimed, is:—

1. A selecting key having a supporting frame, a carriage slidably mounted therein, a rotatable selecting member mounted in the carriage, means for rotating said mem-

ber, and for imparting to the carriage an inward sliding movement, means for retaining the carriage and member in selected position, and means for releasing said retaining means to permit the carriage to return to initial position.

2. A selecting key, having a supporting frame, a carriage slidably mounted therein, a spring for causing the return of the carriage, a rotatable selecting member mounted in the carriage, means for rotating said member and for imparting an inward sliding movement against the tension of the spring, means for retaining the carriage and member in selected position, and means for releasing said retaining means to permit the carriage to return to initial position.

3. A selecting key, having a supporting frame, a carriage slidably mounted therein, a spring for causing the return of the carriage, a rotatable selecting member mounted in the carriage, means for rotating said member and for moving the carriage and member against the tension of the spring into selected position, and electromagnetically operated means disposed to act as a lock to retain the carriage at selected position and as a release to permit the carriage to return to initial position.

4. A selecting key, having a supporting frame, a carriage slidably mounted therein, a selecting member rotatably mounted in the carriage, a rod for rotating said member and for imparting to the carriage an inward movement, means for retaining said carriage and member in selected position, and means for releasing said retaining means to permit the carriage to return to initial position.

5. A selecting key, having a supporting frame, a carriage slidably mounted therein, a spring for causing the return of the carriage to initial position, a selecting member rotatably mounted in the carriage, a rod for rotating said member and for imparting to the carriage an inward movement against the tension of the spring, means for retaining said carriage and member in selected position, and means for releasing said retaining means to permit the spring to return the carriage and member to initial position.

6. A selecting key, having a supporting frame, a carriage slidably mounted therein, a spring for causing the return of the carriage, a rotatable selecting member mounted in the carriage, a rod for rotating said member and for imparting to the carriage an inward movement against the tension of the spring to selected position, and electromagnetically operated means disposed to retain the carriage at selected position and permit the same to be released and the carriage return to initial position.

7. A selecting key, having a supporting frame, a carriage slidably mounted therein, a rotatable selecting member mounted there-

in, means for rotating said member and imparting to the carriage an inward sliding movement to selected position, means for operating a call-up circuit and to retain the carriage and member in selected position, auxiliary means for operating the call-up circuit during the stationary position of the carriage in selected position, and means for releasing the retaining means to permit the carriage to return to initial position.

8. A selecting key, having a supporting frame, a carriage slidably mounted therein, a rotatable selecting member mounted therein, a rod for imparting a rotary movement to the selecting member and for sliding the carriage to selected position, means for retaining the carriage in selected position, call-up operating means controlled during the recession of the carriage toward selected position, auxiliary means for the call-up operating means to operate the same while the carriage is in selected position, and means for releasing the retaining means to permit the carriage to return to initial position.

9. A selecting key, having a supporting frame, a carriage slidably mounted therein, a spring for causing the return of the carriage, a rotatable selecting member mounted therein, means for rotating said member and imparting to the carriage a movement against the tension of the spring to selected position, means for retaining the carriage in selected position, call-up operating means controlled during the recession of the carriage toward selected position, auxiliary call-up operating means to operate the same while the carriage is in selected position, and means for releasing the retaining means to permit the spring to return the carriage to initial position.

10. A selecting key, having a supporting frame, a carriage slidably mounted therein, a spring for causing the return of the carriage, a rotatable selecting member mounted therein, a rod for rotating said member and for imparting to the carriage and member a movement against the tension of the spring to selected position, means for retaining the carriage in selected position, call-up operating means controlled during the recession of the carriage and member toward selected position, auxiliary call-up operating means to operate the same during the stoppage of the carriage and member in selected position, and means for releasing the retaining means to permit the spring to return the carriage to initial position.

11. A selecting key, having a frame, a carriage mounted for longitudinal reciprocating movement therein, a selecting member mounted in and carried by the carriage, a spring for exerting a tension to return the carriage to initial position, means for moving the carriage and member to selected position, means for retaining the carriage in

and member in selected position, a slidably mounted spring actuated call-up operating mechanism disposed to be simultaneously set with the movement of the carriage and member to selected position, means for controlling the automatic return by the spring of call-up operating mechanism, and a locking mechanism for engaging either the carriage retaining means to hold the carriage and member in selected position or to lock the call-up operating mechanism and permit the carriage and member to return to initial position.

12. A selecting key, having a frame, a carriage mounted for longitudinal reciprocating movement therein, a selecting member mounted in and carried by the carriage, a spring for exerting a tension to return the carriage to initial position, means for moving the carriage and member to selected position, means for retaining the carriage and member in selected position, a slidably mounted spring actuated call-up operating mechanism disposed to be simultaneously set with the movement of the carriage and member to selected position, means for controlling the automatic return of the call-up operating mechanism by its spring, and an electro-magnetically and spring actuated locking means disposed to lock the carriage during the operating of the call-up operating mechanism and the call-up operating mechanism during the movement of the carriage under its spring.

13. A selecting key, having a frame, a carriage mounted for sliding movement therein, a spring for returning the carriage, a selecting member carried by the carriage, means for operating the carriage and said member, a spring actuated call-up operating means set simultaneously with the carriage and member, and means for locking the call-up operating mechanism during the recession of the carriage and the carriage during the recession of the call-up operating mechanism.

14. A selecting key, having a frame, a carriage mounted for reciprocation therein, a spring for returning said carriage to initial position, a selecting member carried by the carriage, means for operating the carriage against the tension of the spring and for operating the selecting member to cause the carriage to stop at selected position, means for locking the carriage in selected position, a line circuit completing means actuated by the carriage, a slidably mounted spring returned call-up mechanism operating in parallel with the carriage, a lock therefor, and an electro-magnetically and spring actuated means for locking either the carriage lock or the call-up operating mechanism during the operation of the other.

15. A selecting key, having a frame, a carriage mounted for reciprocation therein,

a spring for returning the carriage to initial position, a selecting member carried in the carriage, manually operated means for operating the member and for moving the carriage against the spring, a spring actuated call-up operating means disposed parallel to the carriage and operably connected with the carriage operating means, a governor lock and release for the carriage and call-up operating means, and an electro-magnetically and spring controlled means for engaging either governor at a time to permit one to operate and lock the other.

16. A selecting key, having a supporting frame, a carriage mounted for reciprocation therein, a spring for holding the carriage in and toward initial position, a rotatably mounted selecting cylinder mounted in the carriage, a rotatable and slidable push rod operably connected to the cylinder to rotate the cylinder and to be pushed upon to move the carriage and cylinder against the tension of the spring to selected position, a spring returned call-up operating mechanism disposed for parallel movement to the carriage and adapted to be moved simultaneously with the carriage and through the medium of the rod, and an electro-magnetically and spring controlled locking mechanism to hold the carriage and cylinder in selected position while permitting the call-up mechanism to operate and vice versa.

17. In a selecting key, the combination with a reciprocatory selecting means, and a simultaneously set call-up operating mechanism, of an electro-magnetically and spring actuated means for permitting the automatic operation of either the selecting means or the call-up operating mechanism, whereby the call-up operating mechanism can not operate during line connection and vice versa.

18. In a selecting key, the combination with a reciprocatory carriage and rotatable selecting cylinder disposed therein, and a simultaneously set call-up operating mechanism, of a Y-shaped locking arm having its forked terminals disposed to lock either the carriage against movement or the call-up operating mechanism against movement, and means for operating said arm to release the one and lock the other.

19. In a selecting key, the combination with coöperatively disposed reciprocatory and spring returned selecting mechanism and call-up operating mechanism, and means for moving both into selected position against the tension of the springs, of a lock for locking one and releasing the other, and vice versa.

20. In a selecting key, the combination with coöperatively disposed reciprocatory and spring returned selecting and call-up operating mechanism, and manually operated means for moving both against the tension of the springs and to selected position

tion, of a Y-shaped locking arm, and a spring and an electro-magnet operated in opposed directions to actuate the arm to permit one or the other of the mechanism to
5 operate while the other is locked.

21. The combination in a telephone system, of an exchange station having a calling plug and socket; a local circuit including a source of electrical energy, an electro-
10 magnet, and three sets of spring contacts, one set being at the socket and normally closed when the socket is free; a selecting key for controlling the other two sets of
15 contacts; and a spring and electro-magnetically actuated armature lock for the selecting key controlled by the electromagnet for locking the key in selected position when the plug is in the socket, the other two sets
20 of contacts being closed by the key and the magnet energized, whereby the removal of the plug from the socket opens the local circuit and deenergizes the magnet to release the armature lock and permit the key to return to initial position.

22. The combination in a telephone system, of an exchange station having a call-

ing plug and socket; a local circuit including a source of electrical energy, an electro-magnet, and three sets of spring contacts, one set being at the socket and normally
30 closed when the socket is free; a manually operable and spring returned selecting key for controlling the other two sets of contacts; and a spring and electro-magnetically
35 actuated armature lock for the selecting key controlled by the electromagnet for locking the key in selecting position when the plug is in the socket, the other two sets of
40 contacts being closed by the key and the magnet energized, whereby the removal of the plug from the socket opens the local circuit and deenergizes the magnet to release the armature lock and free the key to the action
45 of its spring.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

RUBEN C. M. HASTINGS.

Witnesses:

L. A. KOONS,

E. C. WOODWORTH.