No. 738,159. PATENTED SEPT. 8, 1903.

J. J. BROWNRIGG & J. K. NORSTROM.

CALLING MECHANISM FOR AUTOMATIC TELEPHONE SYSTEMS.

APPLICATION FILED JUNE 3, 1901.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1

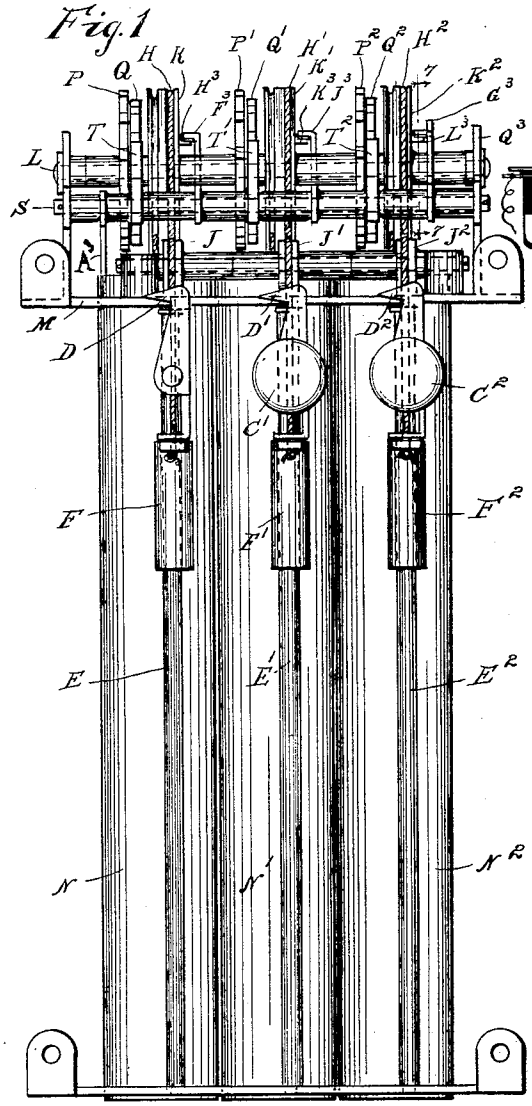


Fig. 2

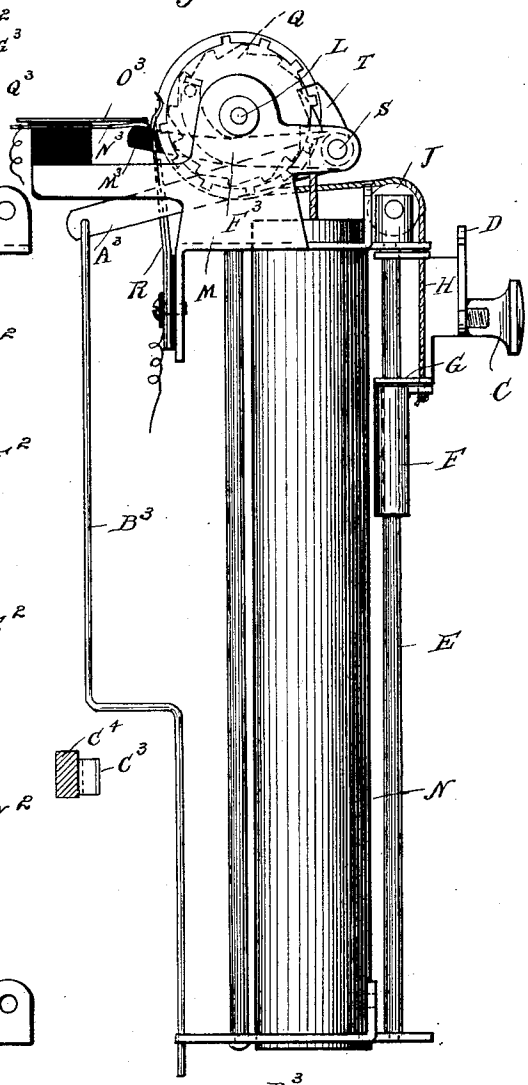


Fig. 9

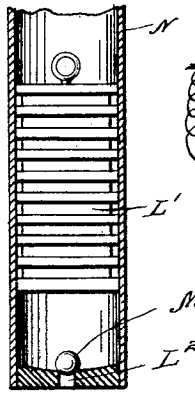
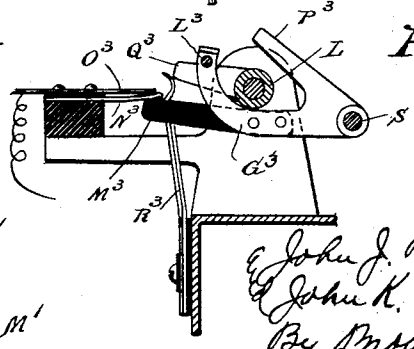


Fig. 7



Witnesses:

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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 3

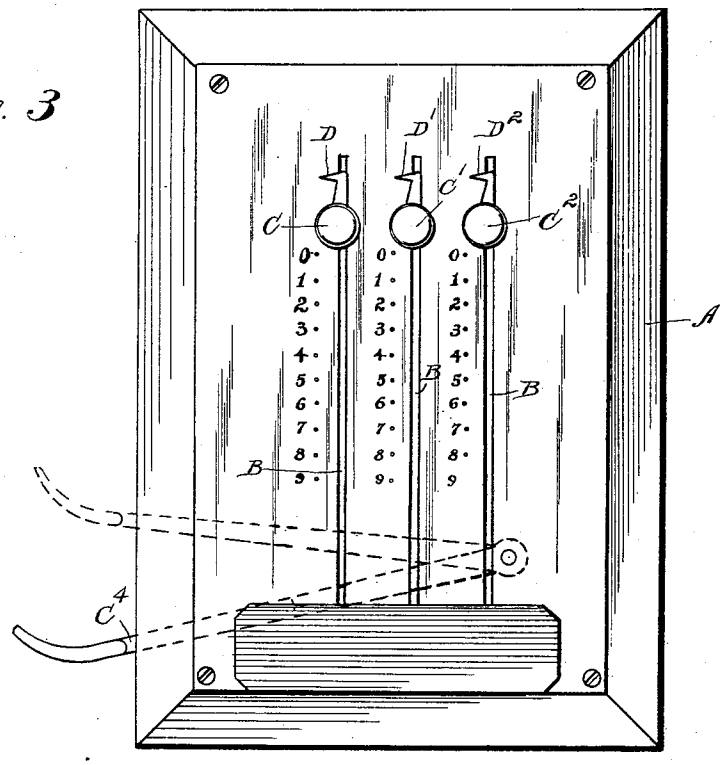
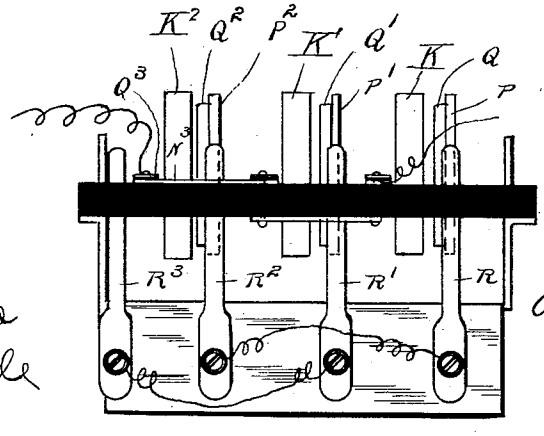


Fig. 8



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APPLICATION FILED JUNE 3, 1901.

NO MODEL. 4 SHEETS—SHEET 3.

Fig. 1.

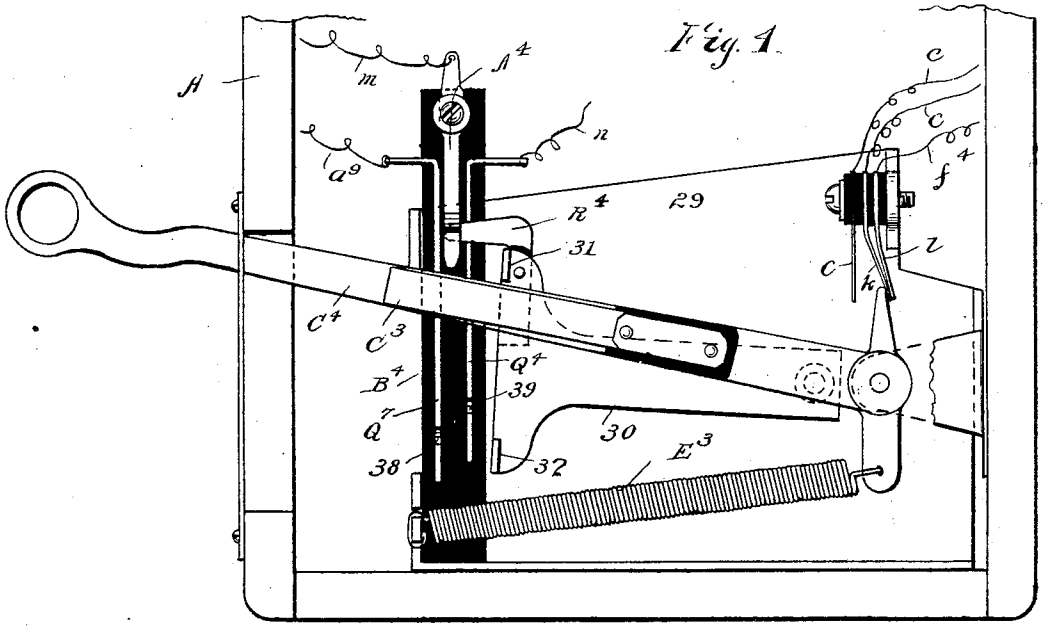

Fig. 5.

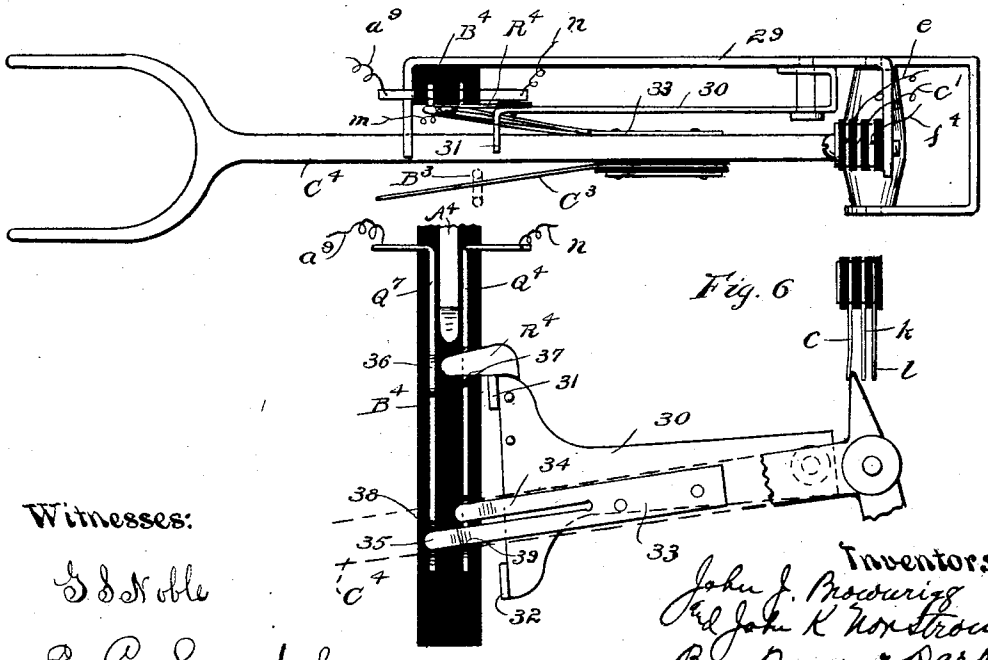

Fig. 6

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APPLICATION FILED JUNE 3, 1901.

NO MODEL. 4 SHEETS—SHEET 4.

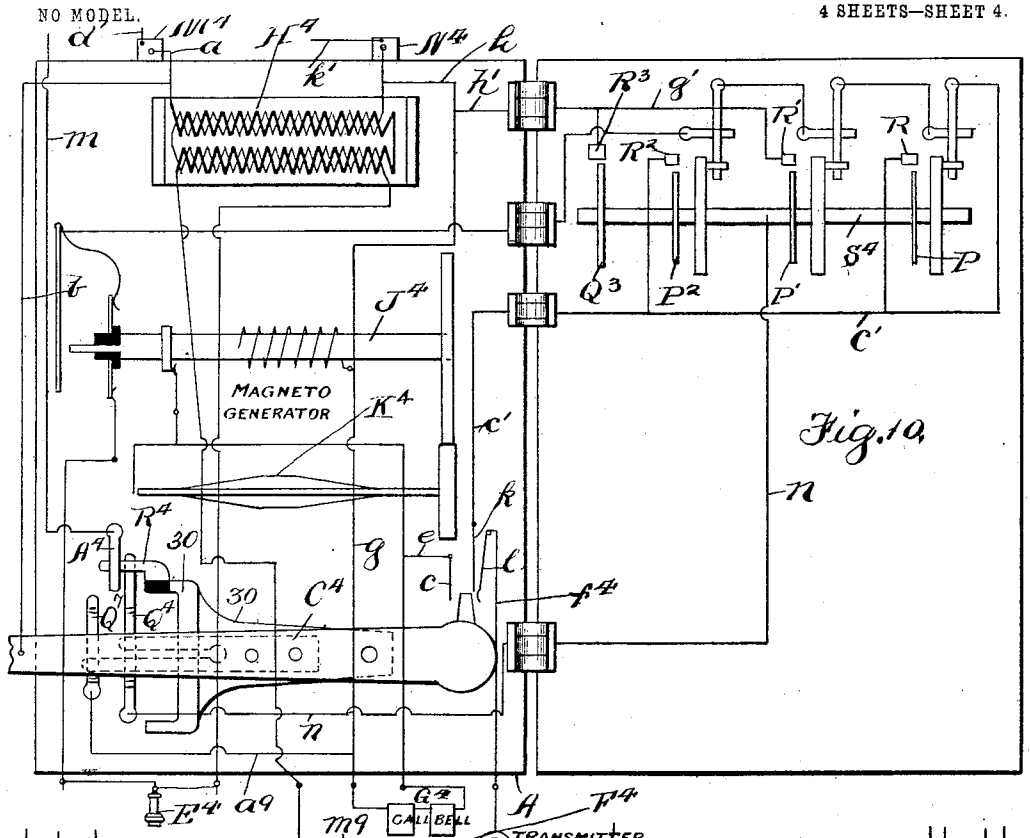

Fig. 10.

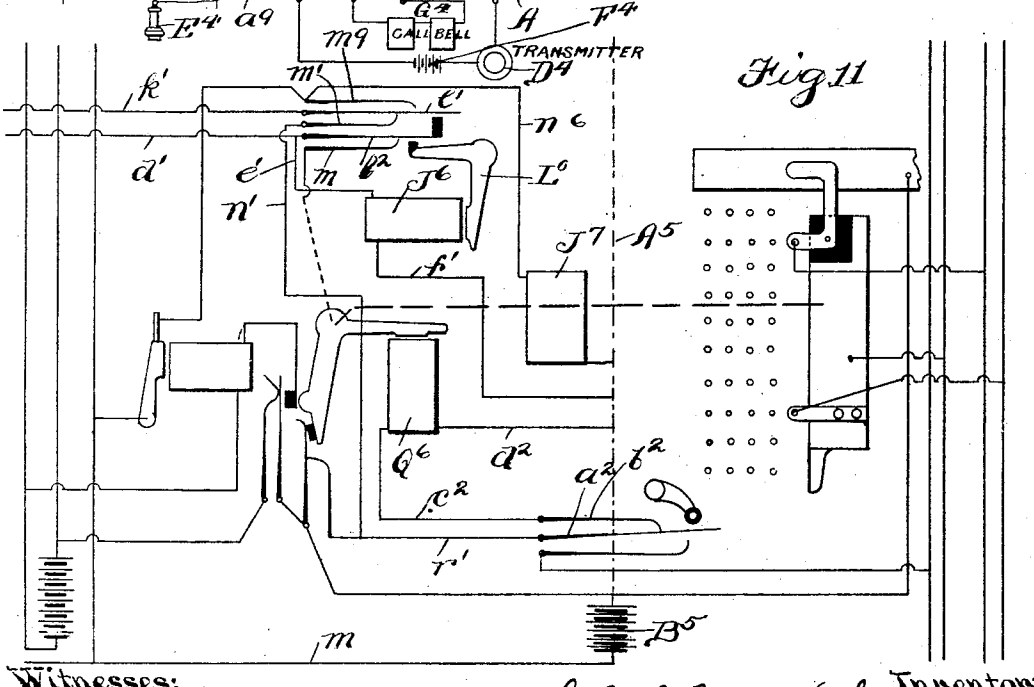

Fig. 11.

Witnesses:
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J. B. Weir

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No. 738,159. Patented September 8, 1903.

UNITED STATES PATENT OFFICE.

JOHN J. BROWNRIGG AND JOHN K. NORSTROM, OF CHICAGO, ILLINOIS, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO THE GLOBE AUTOMATIC TELEPHONE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CALLING MECHANISM FOR AUTOMATIC TELEPHONE SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 738,159, dated September 8, 1903.

Application filed June 3, 1901. Serial No. 62,877. (No model.)

To all whom it may concern:

Be it known that we, JOHN J. BROWNRIGG and JOHN K. NORSTROM, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Calling Mechanism for Automatic Telephone Systems, of which the following is a specification.

This invention relates to calling mechanism for automatic telephone systems, and is designed as an improvement upon the construction shown, described, and claimed in our pending application, Serial No. 41,134, filed December 26, 1900.

The object of the invention is to simplify and improve the construction and arrangement of parts to render the same more efficient in operation.

The invention consists, substantially, in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings and to the various views and reference-signs appearing thereon, Figure 1 is a view in front elevation of a calling apparatus embodying the principles of our invention removed from the inclosing case or call-box. Fig. 2 is a side elevation of the same. Fig. 3 is a front view of the call-box, showing the handles or knobs projecting therethrough. Fig. 4 is a broken view, in front elevation, of the call-box, showing the front board or plate removed therefrom and disclosing the arrangement of the switches controlled by the receiver-hook. Fig. 5 is a top plan view of the construction shown in Fig. 4. Fig. 6 is a detached broken detail view of portions of the receiver-hook switches. Fig. 7 is a broken detail view, in transverse section, on the line 7 7 of Fig. 1 looking in the direction of the arrows. Fig. 8 is a broken detail view, in rear elevation, of the construction shown in Fig. 7, parts being omitted and showing the relation of the contact-springs R R′ R^2 R^3 and their coöperating contact-disks. Fig. 9 is a broken detail view in section of a counterweight and cylinder employed for restoring the parts to initial position after the same have been displaced in the operation of the apparatus. Fig. 10 is a diagrammatic view illustrating the electric circuits of the call-box. Fig. 11 is a similar view of the circuits of the automatic apparatus at the central station in connection with which the calling apparatus is used.

The same part is designated by the same reference-sign wherever it occurs throughout the several views.

Referring to the accompanying drawings, reference-sign A designates a call-box, which may be of the usual or any well-known construction and arrangement and having longitudinal slots or openings B in the front plate thereof, as shown in Fig. 3. Associated with each slot B is a series of suitable graduations or indicating-points, as shown. Arranged to project through each slot B is a handle or knob C C′ C^2, each carrying a pointer or finger D D′ D^2, coöperating with the series of indicating-points associated with the particular slot in which said knobs or handles operate. Arranged within the box or casing are guide-rods E E′ E^2, forming guides for the knobs C C′ C^2, respectively. A convenient arrangement is shown wherein each knob C C′ C^2 is provided with a guide-flange G, arranged to operate over guide-rods E E′ E^2, respectively. Mounted upon each rod E E′ E^2 is a sleeve F F′ F^2 to freely slide thereon. To each sleeve F is connected a cord or other suitable flexible device H H′ H^2, said cords operating over suitable guides J J′ J^2 and around pulleys K K′ K^2, mounted upon a shaft L, suitably journaled in a bracket or framing M, arranged within the box or casing A. From said pulleys K K′ K^2 the cords or other flexible connections H lead down through pipes or tubes N N′ N^2 and are connected to plungers L′, operating in said cylinders. The weight of the plungers L′ should be sufficient to normally maintain the sleeves F in the extreme limit of their upward movement or at the upper ends of guide-rods E E′ E^2. The sleeves F bear against the under sides of flanges G of knobs or handles C C′ C^2, and consequently the counterweights

or plungers L′ normally tend to maintain said knobs or handles in extreme elevation or raised position. When a knob or handle is displaced from its normal or initial position, such displacement is against the action of counterweight L′, and when the handles or knobs are released the counterweights return the same. In order that the return movement of said knobs or handles to initial position may be uniform, the extreme lower ends of the cylinders N N′ N^2 may be provided with an opening L^2, controlled by a ball-valve M′ in a well-understood manner.

Connected to rotate with each sheave or pulley K K′ K^2 is a disk P P′ P^2 and also a ratchet-disk Q Q′ Q^2, and contact-springs R R′ R^2 are arranged to make successive contact with the teeth of contact-disks P P′ P^2 when said disks are rotatively actuated, thus making repeated interruptions in the circuit of which said disks and springs form part. Each contact-disk P should have as many teeth or contact-points to contact with spring R R′ R^2 as there are numbers in the graduations or scales associated with each knob or handle C C′ C^2. Thus when handle or knob C, for instance, is displaced to correspond with the number "5" of the graduation or scale then its corresponding contact-disk P is rotated a distance sufficient to make five successive contacts with its corresponding contact-spring R during the return movement of said contact-disk. Of course each contact-disk will make successive contacts with its contact-spring R R′ R^2 while the handles or knobs C C′ C^2 are being moved into the desired registering position with respect to the graduation or scales; but, as will be made more clear hereinafter, such contacts are made before the circuits which include said contact-disks are otherwise completed, and consequently no action is produced, except during the return of the contact-disks to initial position.

Mounted in framing M is a shaft S, upon which are pivoted pawls T T′ T^2, said pawls operating over the ratchet-teeth of ratchet-disks Q Q′ Q^2, respectively, and respectively serving to lock said ratchet-disks in displaced position. Thus when a knob or handle C has been displaced, thereby rotatively displacing its associated contact-disk and ratchet-disk, a pawl T T′ T^2, as the case may be, will engage in the teeth of the displaced ratchet-disk and hold said disk and its associated contact wheel or disk in such displaced relation. Connected to the pawl T, which cooperates with ratchet-disk Q, is a lever A^3, to which is connected a rod B^3, said rod being arranged in position to be actuated or engaged by hand or otherwise, but preferably by a spring C^3, carried by the receiver-hook C^4, when said hook is raised—that is, when the receiver is removed therefrom. The pawls T T′ T^2 may be normally held in constant engaging relation with respect to the ratchet-disks in any suitable manner—as, for instance, by gravity. In the case of the first pawl T the weight of arm A^3 aids gravity in maintaining engagement of its associated ratchet-disk Q. Thus whenever the weight of the receiver is imposed upon the receiver-hook the pawl T is permitted to engage the teeth of ratchet-disk Q. When the receiver is raised from its hook and said hook is permitted to rise or rock under the influence of its retractile E^3, the spring or engaging projection C^3, carried by said receiver-hook, engages rod B^3 and raises the same, thereby releasing pawl T from engaging relation with respect to the teeth of ratchet-disk Q, and hence permitting the overbalancing counterweight L′ to return the displaced sheave K and contact-disk P to initial position, the return of said contact-disk P effecting the successive contacts with its coöperating contact-spring R, as above explained. Suitably connected to the second pawl T′ is an arm F^3. (See Fig. 1 and dotted lines, Fig. 2.) This arm is similar in all respects with the arm G^3, (shown in Fig. 7,) except that arm G^3 of Fig. 7 is not connected to the pawl upon shaft S, while the arm F^3 is connected to the pawl T′.

Carried by sheave K is a stop H^3, arranged to engage arm F^3 and raise or rock the same when sheave or pulley K is in its initial or retracted position, thereby releasing pawl T′ from engaging relation with respect to its ratchet-disk Q′. Similarly, pawl T^2 is connected to the arm J^3, arranged to be engaged by a stop K^3 on sheave or pulley K′, when said sheave or pulley is in its initial or retracted position, thereby releasing pawl T^2 from engaging relation with respect to its ratchet-disk Q^2. The last sheave or pulley K^2 of the series is provided with a stop or projection L^3, arranged to engage an arm G^3 in similar manner, also pivotally sleeved or mounted upon shaft S, and to which is connected an insulating projection or arm M^3, arranged to close a circuit between contact-points N^3 O^3, as will be explained more fully hereinafter. The arm G^3 is provided with a projection or extension P^3, which serves to prevent said arm G^3 from dropping too far when said arm is relieved of its supporting projection L^3—that is, when sheave or pulley K^2 is rotatively displaced from its initial or normal position. Upon the end of the sleeved hub of the last sheave or pulley K^2 of the series is carried a contact-arm Q^3, (see Figs. 1 and 7,) with which coöperates a contact-spring R^3 for a purpose which will presently appear more fully.

The operation of the apparatus so far described is as follows: Suppose it is desired to call No. 567 in the exchange system. The subscriber first grasps the knob C and moves the same along its slot B in the front plate of box A until the pointer D corresponds to the number "5" of the graduation. The knob or handle C′ is then similarly displaced until the pointer D′ corresponds to the number "6" of the associated graduations, and in like manner handle or knob C^2 is displaced

until its pointer D^2 corresponds to number "7" of its associated graduations. These movements will result in rotatively displacthe contact-disks P P' P^2 to such relative positions as will cause said contact-disks to make, respectively, five, six, and seven successive contacts with their associated springs R R' R^2, when said contact-disks are returned to their initial position. The depressed movements of handles or knobs C C' C^2 are against the action of their connected counterweights L', and the pawls T T' T^2 operate to lock the contact-disks in their rotatively-displaced positions. The operator then removes the receiver from its hook. The raising of the hook effects a raising of rod B^3 and a consequent release of the pawl T of the first set of successive contact-making devices and permits the return of the first knob or handle C to its initial or retracted position. When the parts associated with said first handle or knob reach their normal or retracted position, the locking-pawl of the second mechanism is released, thereby permitting the return of the second contact-disk from its rotatively-displaced position and its return effecting the release of the next succeeding rotatively-displaced contact-wheel, and so on. The return of each contact-wheel to initial position effects the successive makes and breaks of circuits, thereby sending successive impulses corresponding in number to the number of the makes and breaks of the circuits, such impulses traversing the circuits which include the magnets J^6 and Q^6 and which control the automatic apparatus at the central station through which the desired circuit connections with the line-wire of another subscriber are effected. These magnets J^6 Q^6 when energized operate to control ratchet mechanisms for operating or controlling the movement of a circuit-completing contact (indicated diagrammatically at the right hand of Fig. 11) into the desired position for making circuit connection with the line-wire of the particular subscriber being called. The construction and arrangement of this ratchet mechanism or of the contact forms no part of the present invention, and consequently is merely indicated diagrammatically herein, the same forming the subject-matter of our copending application executed of even date herewith, filed June 3, 1901, and bearing Serial No. 62,876.

We will now describe the construction of circuit-switches controlled by the receiver-hook C^4, particular reference being had to Figs. 4, 5, and 6. Reference-sign *m* designates a wire which leads from a main battery B^5 at the central station. This wire leads to a spring contact-strip A^4, suitably mounted upon an insulated block B^4 within the box or casing. Arranged on opposite sides of said strip A^4 are contact-strips Q^7 and Q^4. A wire a^9 is connected to contact-strip Q^7, and a wire *n* is connected to contact-strip Q^4. Pivotally connected to the frame 29, upon which the receiver-hook is pivoted, is an arm or bracket 30, upon which is mounted and insulated a contact-strip R^4. The arm 30 is provided with projections 31 32, between which the receiver-hook C^4 operates, said projections being spaced a sufficient distance apart to permit considerable movement of said receiver-hook before it engages the one or the other of said projections, as the case may be. The contact-strip R^4 is arranged to engage the contact-spring A^4 when arm 30 is raised by the receiver-hook C^4, said contact-strip R^4 being in engagement with contact-strip Q^4, the parts in Fig. 4 being shown in the normal position thereof when the receiver-hook is in its raised position. Now when the receiver is placed upon the receiver-hook C^4 said hook is rocked downwardly through a distance permitted by the space between projections 31 and 32 without effecting any displacement of arm 30 from the position shown in Fig. 4—that is, with contact-strip R^4 still in bridging or contacting relation with respect to both spring A^4 and contact-strip Q^4. As the receiver-hook C^4 approaches its lowermost limit it engages projection 32, thereby rocking arm 30 about its pivot and withdrawing contact-strip R^4 from bridging relation with respect to contact-spring A^4 and strip Q^4. Carried by the receiver-hook C^4 is a spring 33, having the contacting portions 34 35. The contacting portion 35 is arranged to slide along the strip Q^7 and the contacting portion 34 is arranged to slide along the edge or surface of contact-strip Q^4, so that during the downward movement of the receiver-hook and before said receiver-hook engages the projection 32 of arm 30 to detach contact-strip R^4 from contacting relation with respect to spring A^4 circuit is completed between contact-strips Q^7 and Q^4 through the contacting portions 34 35 of spring 33. The same is true when the receiver-hook is being raised and before said hook reaches the point in its upward movement where it engages projection 31. The contact-strips Q^7 Q^4 are provided with depressions or cut-away portions 36 37 38 39, adapted to receive the contacting portions 35 34, so as to break the bridging circuit between said strips Q^4 Q^7 through said contacting portions 34 35 when the receiver-hook is in its extreme limit of movement in either direction. The receiver-hook C^4 is provided with an extension arranged to make contact with contact-strips *c*, *k*, and *l*, according to whether said hook is in raised or lowered position. For instance, when the receiver is placed upon the hook said hook makes contact with contact-strip *c* and when the receiver is raised from the hook said hook maintains contact with strips *k* and *l*. A wire *e* is connected to contact-strip *c*, and wires c' f^4 are respectively connected to strips *k* *l*.

We will now explain the electrical operation of the apparatus, particular reference being had to the diagrams in Figs. 10 and 11, Fig. 10 illustrating in diagram the circuit

connections of the call-box and Fig. 11 representing in diagram the circuits of the apparatus controlled by the calling mechanism. Reference-sign D^4 designates the transmitter; F^4, a local battery; G^4, the call-bell or ringer; E^4, the receiver; H^4, an induction-coil; M^4 and N^4, binding-posts for the line-wires; J^4, the shaft of the magneto-generator, and K^4 the armature thereof. Suppose it is desired to make a call. The subscriber manipulates the knobs or handles C to the proper position with reference to the points or indications corresponding to the number to be called. He then raises his receiver from the hook, thereby releasing the locks which hold the mechanisms displaced by the movement of the handles or knobs and permitting such mechanisms to return to initial position. The return of the rotatively-displaced contact-disks effects successive contacts with their coöperating springs, thereby completing circuits. The contact-spring R controls or is arranged in the following circuit: from main battery B^5 at the central station through line-wire *m*, contact-strip A^4, contact R^4, contact-strip Q^4, wire *n*, to contact-strip S^4, or the mass which includes the shaft L, upon which the various contact-disks P P′ P^2 are mounted. Thence from contact-disk P to contact-spring R successively, and as many successive contacts are made as there are teeth in the portion on the contact-disk which has been rotatively displaced relatively to such spring. From contact-spring R this circuit continues through wire *c′*, contact *k*, receiver-hook C^4, wire *b*, wire *a*, terminal M^4, and line-wire *d′*. Now, referring to Fig. 11, we will continue to trace this circuit through the apparatus at the central station simply for the purpose of clearly showing and describing the coöperative relation of the apparatus, enabling the desired call to be effected. The current arrives at the central station over line-wire *d′*, thence proceeds through wire *e′*, the coils of magnet J^6, wire *f′* battery strip or conductor A^5, back to battery B^5. The return of the second contact-disk P′ to initial position effects the successive make and break of the following circuit: from battery B^5 to contact-strip or mass S^4, the same as before, thence through contact-disk P′, spring R′, wire *g′*, wire *h′*, wire *h*, terminal N^4, line-wire *k′*. Arriving at the central station over said line-wire *k′*, said circuit proceeds as follows: from contact-strip *l′*, contact *m′*, wire *n′*, wire *r′*, contact a^2, contact b^2, wire c^2, the windings of a magnet Q^6, wire d^2, battery-strip A^5, to battery B^5. The return of the third contact-disk P^2 to its initial position makes successive contacts with contact-spring R^2, said contact-spring being included in the same circuit as that first above described in connection with spring R all the way through from one pole of main battery B^5 back to the other pole. As this contact-disk P^2 approaches its initial or retracted position the arm Q^3 makes contact with contact-spring R^3, thereby completing circuit from battery B^5 over the same circuit to contact-bar S^4, thence through contact-arm Q^3, spring R^3, wire *h′*, wire *h*, terminal N^4, line-wire *k′*, and on through the circuit above described with reference to contact-disk P′ and spring R′ back to battery. The energization of magnets J^6 and Q^6 effects the desired actuation of apparatus for making circuit connections with the line-wire of the subscriber's station being called, as above set forth and as fully explained in our companion application, Serial No. 62,876, referred to. In case the line-wire of the subscriber being called is already "busy" the parts are automatically returned or restored to their initial position, as fully explained in said application, and as such construction and arrangement form no part of the present invention we will not describe the same herein. When the desired circuit connections are completed, as above explained, the magneto-generator shaft J^4 is actuated to effect the signal, and the actuation of said shaft breaks the circuit of the calling subscriber's receiver and also the shunt-circuit of said generator, as already more fully explained in our pending application, above referred to. After the desired circuit connections have been completed and the message or communication delivered the subscriber again places his receiver upon hook C^4. During the first part of the travel or rocking movement of said receiver-hook—that is, until such hook traverses the space or distance between projections 31 32 of arm 30—the battery-circuit remains as above described—that is, from battery B^5, wire *m*, contact-strip A^4, contact R^4, contact-strip Q^4, wire *n*, and on as before—and which circuit remains closed between contact-strips A^4 and Q^4. While the receiver-hook was in its extreme raised position the contact projections 34 35 occupied a position over the cut-away parts or depressions 36 37 of strips Q^7 Q^4; but immediately said hook begins its downward movement said contact projections engage or bear on the strips Q^7 Q^4, thereby bridging said strips and completing two circuits simultaneously, one of said circuits being as follows: from battery B^5, wire *m*, to contact-strip A^4, contact R^4, contact Q^4, spring 34, hook C^4, wire *b*, wire *a*, terminal M^4, line-wire *d′*, and the other from battery to spring 34, as before, thence to spring 35, contact-strip Q^7, wire a^9, wire *g*, wire *h*, terminal N^4, and line-wire *k′*. These circuits are completed through the apparatus at the central station as follows: through line-wire *d′*, wire *e′*, magnet J^6, wire *f′*, battery-strip A^5, to battery B^5, thereby effecting an actuation of magnet-armature lever L^6 and a closing of the circuit between contact-strips *l′* and m^9, and hence completing the other circuit above referred to, which includes the contact-strip Q^7 at the sending-station through wire *k′*, contact *l′*, contact m^9, wire n^6, release-magnet J^7, to battery-strip A^5, to battery B^5, there-

by effecting a release of the apparatus at the central station and the return thereof to initial position. The receiver-hook, continuing on its downward movement, finally engages projection 32 and effects a rocking of arm 30 and the consequent withdrawal of bridging-contact R^1 from bridging relation with respect to contacts A^1 and Q^4, and when this position is reached the contact springs or projections 34 35 arrive at the cut-out portions 38 39 in strips Q^7 Q^4, and consequently break the circuits last-above traced between said strips and the receiver-hook.

From the foregoing description it will be seen that we provide an exceedingly simple and efficient apparatus for the purposes in view, with few working parts to get out of order, and it will also be seen that the apparatus is placed in position for making a call before any battery-current is placed on the line-wires. It will also be seen that provision is made for restoring the battery connections on the line-wires, so as to effect the automatic return of the apparatus to initial or retracted position at the central station when the communication of the parties has been completed, and that such restoration of the battery connections is effected by the act of hanging up the receiver.

Having now set forth the object and nature of our invention and a construction and arrangement of apparatus embodying the principles thereof, what we claim as new and useful and of our own invention, and desire to secure by Letters Patent of the United States, is—

1. In a calling apparatus for automatic telephone systems, a disk carrying contacts, a cooperating stationary contact, a circuit including said contacts, devices arranged in said circuit for effecting connections with the line-wire of any desired subscriber to be called, a counterweight connected to said disk and operating to hold the same in an initial or retracted position, means for rotatively displacing said disk against the action of said counterweight, means for locking said disk in displaced position, and automatic devices for releasing said lock, as and for the purpose set forth.

2. In a calling apparatus for automatic telephone systems, a disk carrying contacts, a cooperating stationary contact, a circuit including said contacts, devices arranged in said circuit for effecting connection with the line-wire of the desired subscriber to be called, a counterweight connected to said disk and operating to normally retain the same in an initial or retracted position, a manually-actuated handle also connected to said disk for rotatively displacing the same, means for locking said disk in displaced relation, and means for automatically releasing said lock, as and for the purpose set forth.

3. In a calling apparatus for automatic telephone systems, a disk carrying contacts, a cooperating stationary contact, a circuit including said contacts, devices arranged in said circuit for effecting the desired connection with the line-wire of the subscriber to be called, a counterweight connected to said disk and operating to normally retain said disk in an initial or retracted position, a manually-actuated handpiece also connected to said disk for rotatively displacing the same, a lock for holding said disk in displaced relation, a receiver-hook, and means actuated by the raising of the receiver from said hook for releasing said lock, as and for the purpose set forth.

4. In a calling apparatus for automatic telephone systems, a disk carrying contacts, a cooperating stationary contact, a circuit including said contacts, devices arranged in said circuit and actuated by the successive makes and breaks therein for effecting circuit connection with the line-wire of the desired subscriber to be called, a counterweight, connections between said counterweight and disk whereby said disk is held in an initial or retracted position, a handle, a guide-rod therefor, a sleeve mounted to travel on said guide-rod and engaging underneath said handle, and connections between said sleeve and disk whereby when said handle is displaced said disk is rotatively moved against the action of said counterweight, as and for the purpose set forth.

5. In a calling apparatus for automatic telephone systems, a disk carrying contacts, a cooperating stationary contact, a counterweight connected to said disk in an initial or retracted position, a handle, a guide-rod therefor, a sleeve mounted upon said guide-rod and arranged to engage underneath said handle, connections between said sleeve and disk whereby by actuating said handle said disk may be rotatively displaced, a lock for holding said disk in displaced relation, and means for releasing said lock, as and for the purpose set forth.

6. In a calling apparatus for automatic telephone systems, a supporting shaft or stud, a series of disks independently sleeved upon said shaft and each carrying contacts, a coöperating stationary contact for each contact-disk, circuits controlled by each stationary contact and its coöperating contact-disk, means for independently displacing said contact-disks rotatively upon said shaft, locks for holding said disks in their displaced positions, and means for releasing said locks, as and for the purpose set forth.

7. In a calling apparatus for automatic telephone systems, a disk carrying contacts, a cooperating stationary contact, a ratchet-wheel connected to said disk, a counterweight connected to said disk and operating to normally maintain the same in an initial or retracted position, means for rotatively displacing said disk and wheel against the action of said counterweight, a pawl coöperating with said ratchet-wheel to hold said disk in rotatively-displaced position, and means for automatic-

ally disengaging said pawl from said ratchet-wheel, as and for the purpose set forth.

8. In a calling apparatus for automatic telephone systems, a disk carrying contacts, a coöperating stationary contact, a ratchet-wheel connected to said disk, a plunger connected to said disk and operating as a counterweight to normally maintain the same in an initial or retracted position, means for rotatively displacing said disk and wheel against the action of said counterweight, a pawl coöperating with said ratchet-wheel to lock said disk and wheel in rotatively-displaced position, an arm connected to said pawl, a receiver-hook, said receiver-hook arranged when raised to its upper position to engage said arm and release said pawl, as and for the purpose set forth.

9. In a calling apparatus for automatic telephone systems, a series of disks each carrying contacts, a stationary contact coöperating with each of said contact-disks, a counterweight connected to each of said disks and operating to normally maintain the same in an initial or retracted position, means for independently displacing said disks rotatively, locking devices for holding said disks in displaced relation, and means for automatically releasing said locking mechanism, as and for the purpose set forth.

10. In a calling apparatus for automatic telephone systems, a series of disks carrying contacts, a coöperating stationary contact for each contact-disk, a counterweight connected to each of said disks and operating to normally maintain the same in an initial or retracted position, means for independently displacing each of said disks rotatively, locks for maintaining said disks in rotative displacement, means for automatically releasing the lock of the first contact-disk of the series to permit said disk to return to initial position, and means actuated by the return of said disk into initial position for releasing the lock of the next adjacent disk of the series, as and for the purpose set forth.

11. In a calling apparatus for automatic telephone systems, a supporting stud or shaft, a series of contact-disks independently sleeved upon said shaft, a stationary contact coöperating with each of said contact-disks, a ratchet-wheel connected to each of said disks, a counterweight connected to each of said disks and operating to maintain the same in an initial or retracted position, means for independently displacing said disks rotatively, pawls arranged to engage said ratchet-wheels to hold the same in displaced position, means for automatically releasing the lock of the first of said disks, and means actuated by the return of one of said disks to initial position for releasing the lock of the next succeeding disk of the series, as and for the purpose set forth.

12. In a calling apparatus for automatic telephone systems, a supporting stud or shaft, a pulley mounted thereon, a contact-disk connected to said pulley, a coöperating stationary contact, a counterweight, a cord or rope connected to maintain said pulley in an initial or retracted position, a manually-actuated handle, a cord or rope also operating over said pulley and connected to said handle, whereby when said handle is displaced said pulley and contact-disk are rotatively moved upon said stud or shaft and against the action of said counterweight, means for locking said disk and pulley in displaced position, and means for automatically releasing said lock to permit said disk to return to initial position, as and for the purpose set forth.

13. In a calling apparatus for automatic telephone systems, a stud or shaft, a series of contact-disks mounted thereon, a stationary coöperating contact for each of said contact-disks, a ratchet-wheel connected to each of said disks, a pawl coöperating with each of said contact-wheels, a counterweight connected to each of said disks and operating to maintain the same in an initial or retracted position, means for rotatively displacing said disks against the action of said counterweights, a stud or projection mounted to move with each disk and arranged when said disk is returned to initial position to engage the locking-pawl of the next succeeding disk to release the same, and means for automatically releasing the locking-pawl of the first disk of the series, as and for the purpose set forth.

14. In a calling apparatus for automatic telephone systems, the combination with electrical devices for selecting any subscriber's wire, circuits for said devices and including a battery, of a receiver-hook, insulated contacts arranged adjacent thereto and included in said circuits, a supplemental pivoted arm having lugs or extensions between which the receiver-hook operates, an insulated bridging contact or wiper carried by said arm and operated by the engagement of the switch-hook with said pivoted arm in its rising movement to bridge the circuit between said contacts to close said circuits through said contacts, as and for the purpose set forth.

15. In a calling apparatus for automatic telephone systems, the combination with electrical devices for selecting any subscriber's wire, circuits for said devices including insulated contacts, a receiver-hook arranged adjacent thereto, a bracket pivotally mounted adjacent to said receiver-hook, a bridging contact-piece carried by said bracket and adapted to complete the circuit between said insulated contacts, said receiver-hook arranged to engage said bracket as it approaches the limits of its up and down movement to rock said bracket, whereby said bridging contact is carried into or out of bridging relation with respect to said insulated contacts, as and for the purpose set forth.

16. In a calling apparatus for automatic telephone systems, and in combination with electrical devices for selecting any subscrib-

er's line-wire, circuits therefor, including contacts insulated from each other, a receiver-hook arranged adjacent to said contacts, a pivotally-mounted bracket provided with projections between which said hook operates, whereby as said hook approaches its limits of up and down movements said bracket is engaged and rocked, and an insulated bridging contact-piece carried by said bracket and cooperating with said contacts to make or break circuit therebetween, as and for the purpose set forth.

17. In a calling apparatus for automatic telephone systems, and in combination with electrical devices for selecting any subscriber's line, and a release device therefor, circuits for said devices including insulated contacts, an insulated wiper for bridging said contacts, a pivotally-mounted bracket upon which said wiper is mounted and having suitably-spaced lugs or projections, a receiver-hook arranged to operate between said lugs or projections to engage the same as it approaches its up and down limits of movement, and a bridging contact carried by said receiver-hook for controlling the circuit of said release device during the up and down movements thereof, as and for the purpose set forth.

18. In a calling apparatus for automatic telephone systems, and in combination with electrical devices for selecting any subscriber's line, a release device for said selecting devices, a circuit for said release device including insulated contacts, a receiver-hook carrying a contact-wiper also arranged in the circuit of said release device, said contact-wiper coöperating with said insulated contacts to control the circuit of said release device during the up and down movements of said hook, and means for breaking circuit between said contacts and wiper as the receiver-hook approaches its extreme up and down limits of movement, as and for the purpose set forth.

19. In a calling apparatus for automatic telephone systems, and in combination with means for selecting the line of any subscriber, a release device, a circuit therefor including insulated contact-strips, a receiver-hook, a contact-wiper carried thereby and operating over said contact-strips to bridge the circuit therebetween, said contact-strips provided with depressions or seats at points adjacent to the upper and lower limits of movement of said hook, whereby said contact-strips are bridged during a portion only of the up and down travel or movement of said hook, as and for the purpose set forth.

20. In a calling apparatus for automatic telephone systems, and in combination with devices for selecting the line-wire of any subscriber, a release device for said selecting mechanism, a circuit therefor including an insulated contact, electrical devices for controlling the circuit of said release device, a circuit for said electrical devices including an insulated contact, a receiver-hook, a double-ended wiper carried thereby and operating to complete said circuits from said insulated contacts during a portion of the up and down movements of said receiver-hook, as and for the purpose set forth.

In witness whereof we have hereunto set our hands, this 24th day of May, 1901, in the presence of the subscribing witnesses.

JOHN J. BROWNRIGG.
JOHN K. NORSTROM.

Witnesses:
E. C. SEMPLE,
S. E. DARBY.