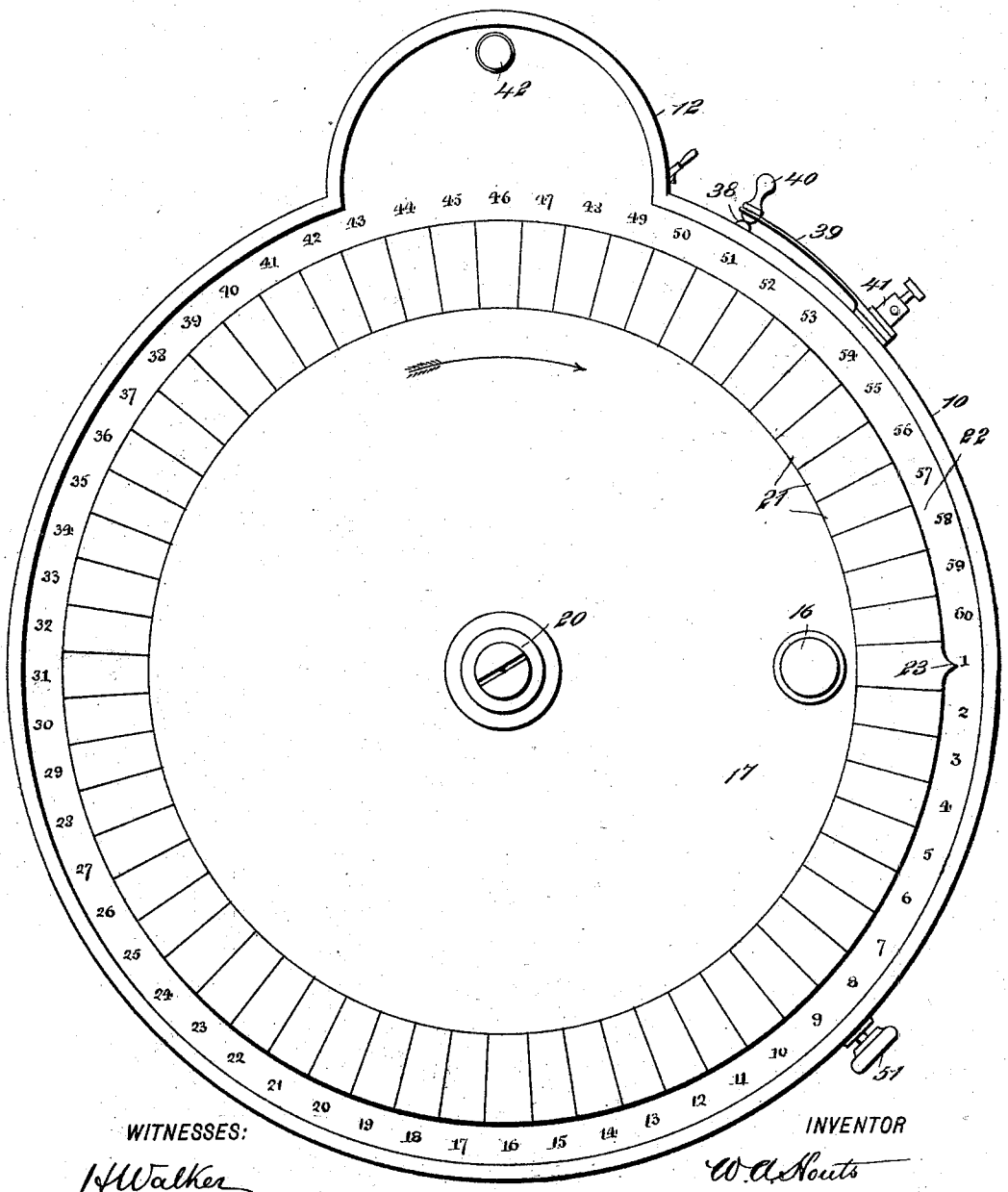
(No Model.) 6 Sheets—Sheet 1.

W. A. HOUTS.

TELEPHONE SYSTEM.

No. 554,125. Patented Feb. 4, 1896.

Fig. 1.



WITNESSES:

H. H. Walker

H. B. Hutchinson

INVENTOR

W. A. Houts

BY Munn & Co

ATTORNEYS.

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W. A. HOUTS.

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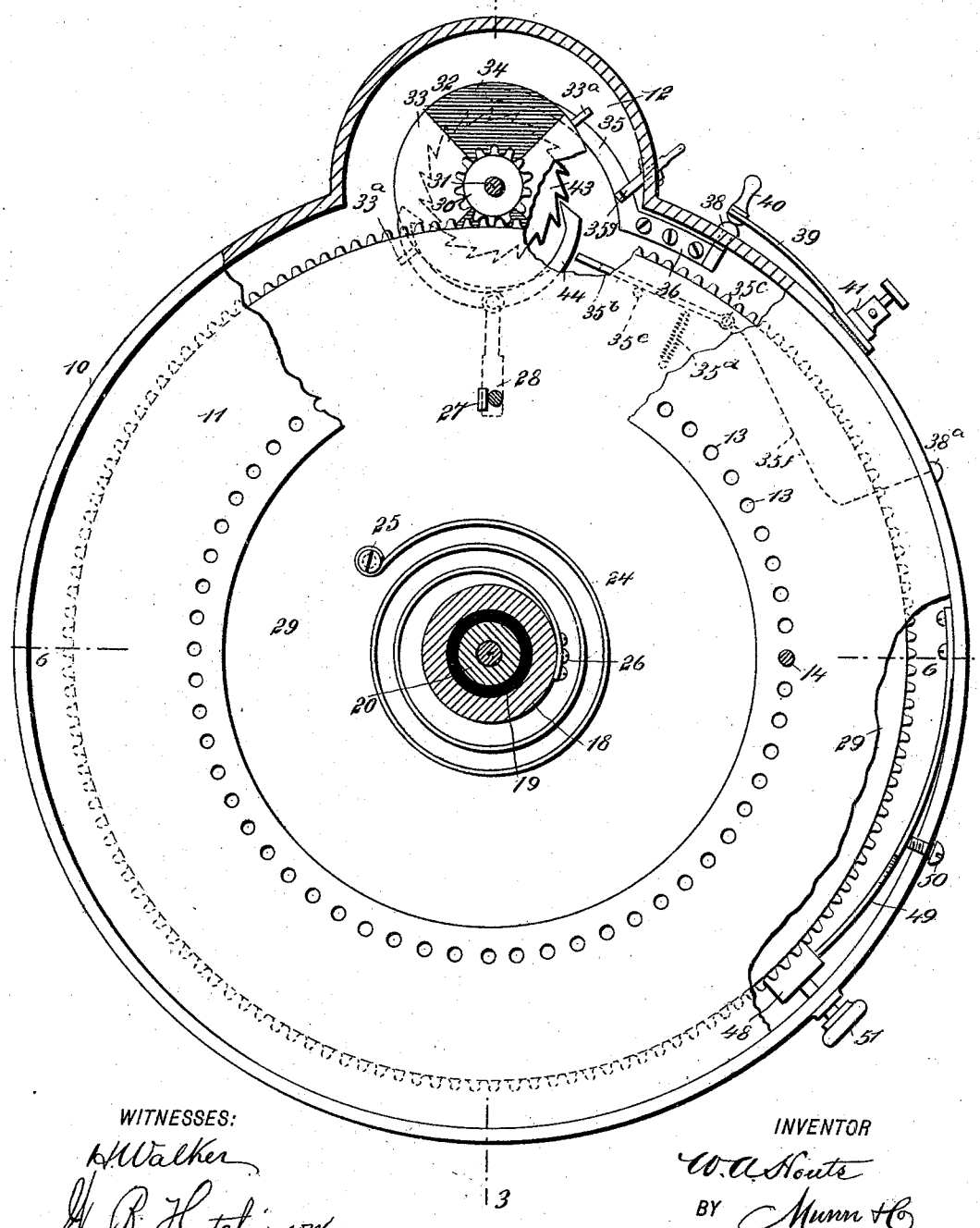
Fig. 2.



WITNESSES:

H. Walker

H. B. Hutchinson

INVENTOR

W. A. Houts

BY Munn & Co

ATTORNEYS.

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Fig. 4a.

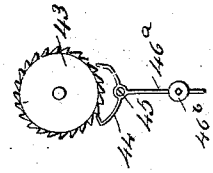


Fig. 3.

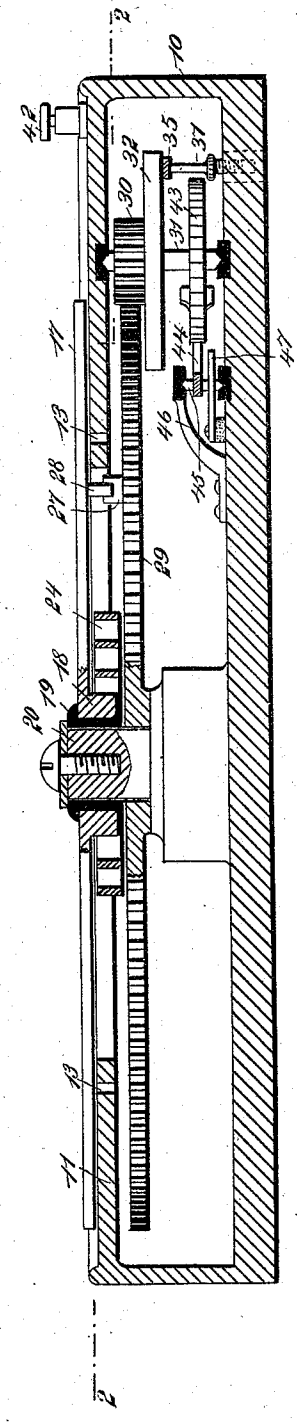


Fig. 5.

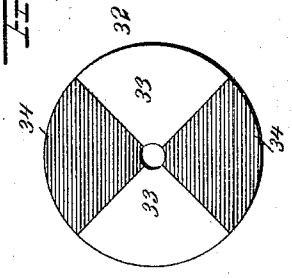
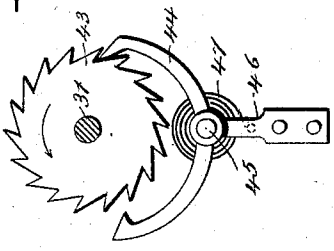


Fig. 4.



WITNESSES:

H. H. Walker

W. P. Hutchinson

INVENTOR

W. A. Houts

BY Munn & Co

ATTORNEYS.

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Fig. 6.

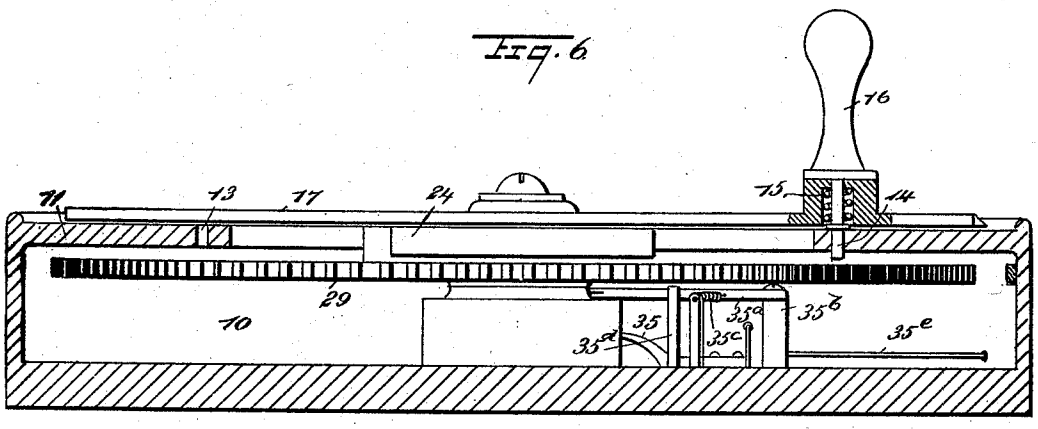


Fig. 7.

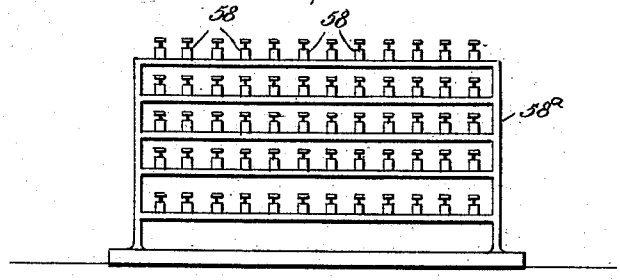
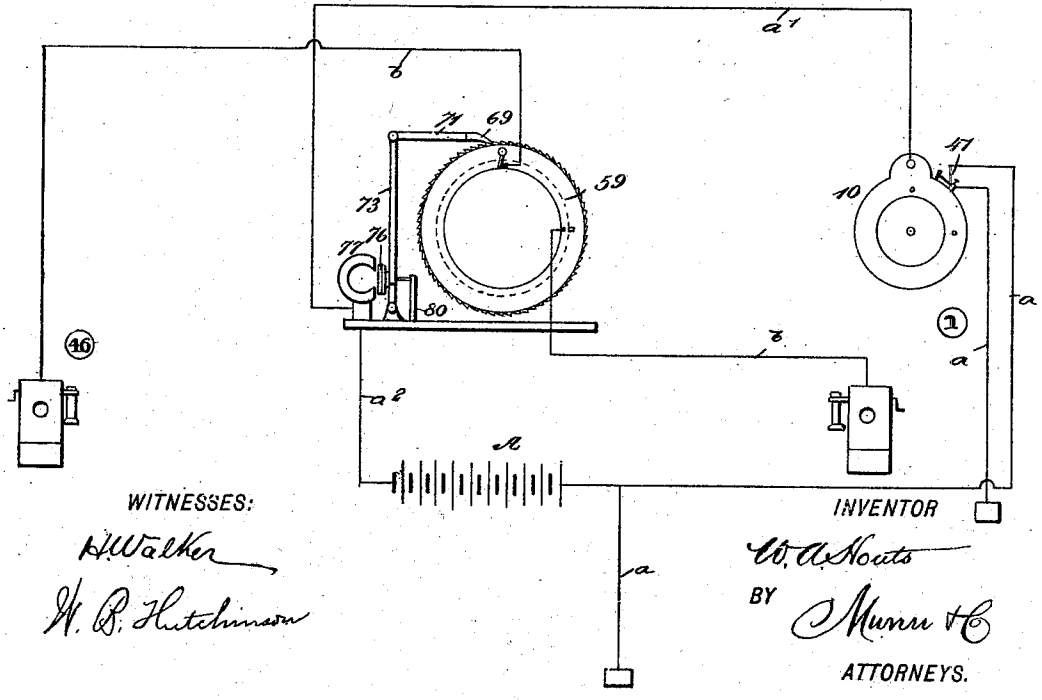


Fig. 7a.



WITNESSES:

H. Walker

H. B. Hutchinson

INVENTOR

W. A. Houts

BY Munn & Co

ATTORNEYS.

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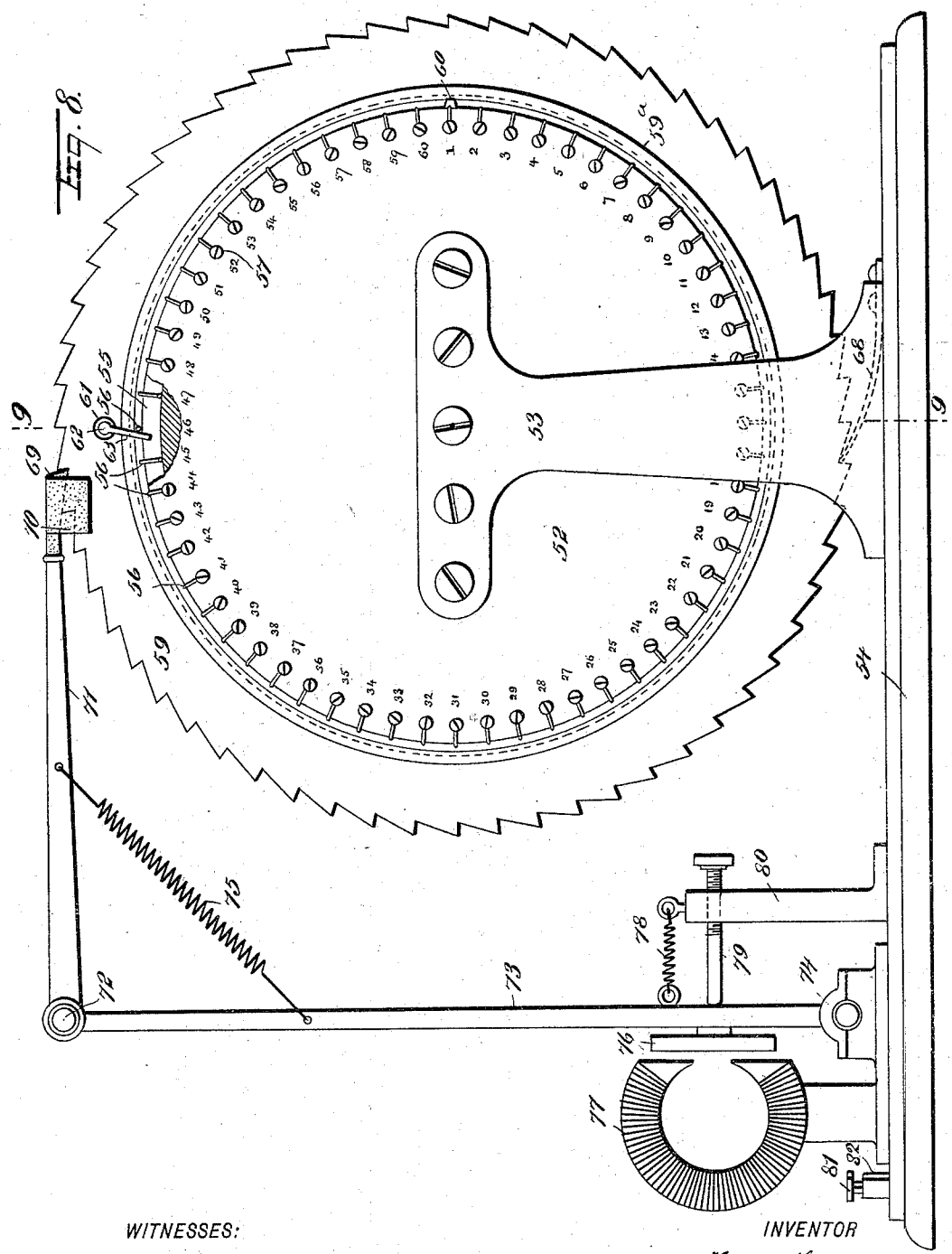
W. A. HOUTS.

TELEPHONE SYSTEM.

No. 554,125. Patented Feb. 4, 1896.

Fig. 8.



WITNESSES:

H. Walker

H. B. Hutchinson

INVENTOR

W. A. Houts

BY Munn & Co

ATTORNEYS.

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W. A. HOUTS.

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Fig. 9.

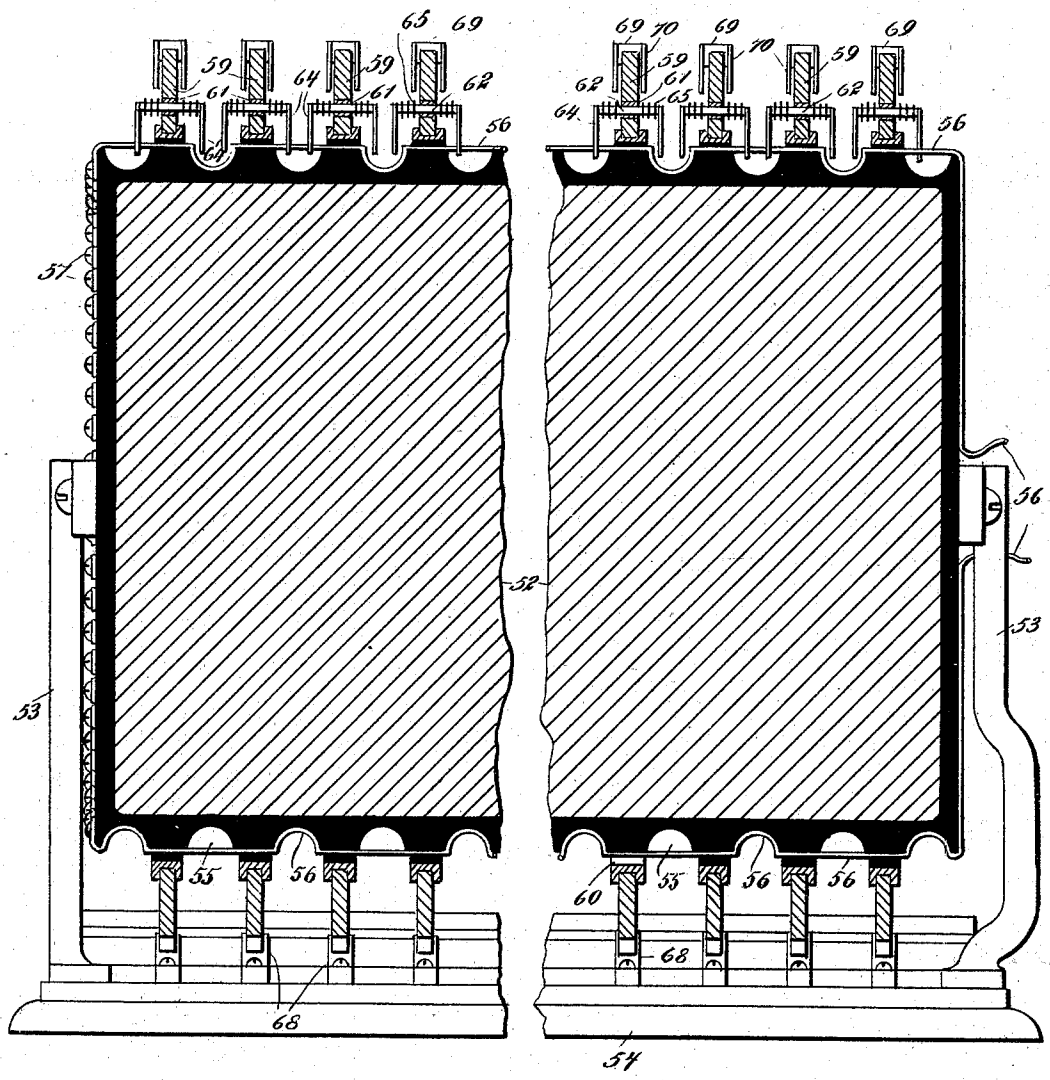
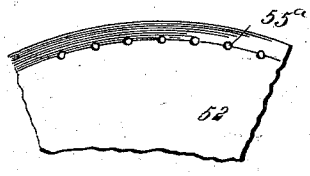


Fig. 9a



WITNESSES:

H. Walker

H. C. Hutchinson

INVENTOR

W. A. Houts

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

WALLACE A. HOUTS, OF PARKER, SOUTH DAKOTA.

TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 554,125, dated February 4, 1896.

Application filed December 24, 1894. Serial No. 532,823. (No model.)

To all whom it may concern:

Be it known that I, WALLACE A. HOUTS, of Parker, in the county of Turner and State of South Dakota, have invented a new and Improved Telephone System, of which the following is a full, clear, and exact description.

My invention relates to improvements in telephone systems and more especially to the manner of connecting the several subscribers of a system.

The object of my invention is to dispense as far as possible with the employés of a central office and produce a simple and efficient call-box and automatic switch, which devices are constructed in such a way that by arranging the switch at the central office and the call-boxes at the telephones of the several subscribers to the system any call-box may be operated so as to work the switch and connect one telephone with any one of the series.

Another object of my invention is to provide mechanism of this kind which is constructed in such a way as to be sure to work without getting out of order, and also to construct and arrange the mechanism so that the apparatus will be extremely compact.

To these ends my invention consists of a telephone system the construction, arrangement, and organization of which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a front elevation of the improved call-box forming a part of my system. Fig. 2 is a sectional elevation, on the line 2 2 of Fig. 3, of the call-box. Fig. 3 is a cross-section on the line 3 3 of Fig. 2. Fig. 4 is a detail view of the escapement of the circuit-breaking device. Fig. 4ª is a similar view of a modified construction of the same. Fig. 5 is a detail view of the circuit-breaking wheel. Fig. 6 is a cross-section on the line 6 6 of Fig. 2. Fig. 7 is a detail side elevation of the rack of binding-posts used in connection with the central switch. Fig. 7ª is a diagram of the circuit between two instruments and the central switch. Fig. 8 is an enlarged detail end view, partly in section, of the central switch. Fig. 9 is a longitudinal section, on the line 9 9 of Fig. 8, of the switch; and Fig. 9ª is a broken detail end view of the switch-barrel, showing the longitudinal grooves for holding the contact-wires.

In connection with my system I use a call-box 10 for each telephone subscriber, this box having an inturned outer flange 11 and preferably an extension 12 at one side, in which the circuit-breaking wheel and escapement are located, as hereinafter described. The call-box and the switch-barrel and wheels are, as illustrated, adapted for sixty subscribers, but it will of course be understood that this number may be increased or diminished without affecting the principle of the invention. To correspond with this idea, though, the flange 11 is provided with sixty holes 13, which are each adapted to receive the pin 14, which is pressed by a spring 15, (see Fig. 6,) so as to normally engage the holes, and is contained in the handle 16 of the dial 17, which revolves on the face of the call-box and which is provided with a hub 18, (see Fig. 3,) having a collar 19, which is journaled on the center-post 20 arranged in the call-box, as shown clearly in Fig. 3.

The dial has on its face next its periphery a series of radial spaces 21, in which are placed the names of the subscribers, and arranged in regular sequence around the dial and opposite these spaces are the numbers of the subscribers. On one side of the dial is a pointer 23, which is adapted to extend opposite any desired number and assist in fixing the position of the dial.

When the dial is to be moved the handle 16 is pulled out so as to remove the pin 14 from one of the holes 13, and the dial is then turned the desired distance to the right and the pin inserted in another hole for the purpose described presently, this movement of the dial serving to wind the spring 24, which is coiled around the hub 18 of the dial and has one end secured, as shown at 25, to the gear-wheel 29, to be referred to below, and the other end secured, as shown at 26, (see Fig. 2,) to the hub 18 of the dial. When the dial is moved, as described, and fastened by the pin, the spring 24 turns the driving gear-wheel 29 until the stop 27 on the gear-wheel strikes the stop 28 on the dial.

The gear-wheel 29 is journaled on the cen-

ter-post 20, as shown in Fig. 3, and it meshes with and drives a pinion 30, which is secured to the shaft 31, this being journaled in the box 10, and the shaft carries a circuit-breaking wheel 32, composed of conducting-segments 33 and insulating-segments 34, as best shown in Fig. 5. Against the under side of the wheel 32 presses a contact-spring 35, which is fastened to the case back, as shown at 36, and the spring is provided with a tension-screw 37, (see Fig. 3,) by which it may be adjusted so as to press snugly against the circuit-breaking wheel.

The spring and tension-screw are insulated from the box and the spring is connected with a contact-button 38, which is adapted to contact with the switch-arm 39, (see Figs. 1 and 2,) which has a handle 40 and is journaled on a binding-post 41, which is insulated on the box 10 and is adapted to receive one of the line-wires. The other wire is connected to a binding-post 42 on the box, so that the circuit passes from the binding-post 41 through the switch 39, the gears 30, the box 10, and out through the binding-screw 42.

The segments 33 of the circuit-breaking wheel are provided with projecting lugs 33^a, which are adapted to swing through and in contact with the split end of a contact-spring 35^b, which is pivoted at one end, as shown at 35^c, and is pulled by a spring 35^d against a limiting-post 35^e, (see Fig. 2,) and the contact-spring 35^b connects by a wire 35^f with a button 38^a on the call-box, so that in case the contact-spring 35 should be burned out or for any reason should not make good contact with the circuit-breaking wheel the switch-arm 39 may be turned into contact with the button 38^a, and the current will then pass from the binding-post 41 through the button 38^a, the wire 35^f, the contact-spring 35^b, and the circuit-breaking wheel 33. The spring-arm 35^b is only to be used in case something happens to the spring 35, and when the arm 35^b is not in use it may be held out of contact with the circuit-breaking wheel by a catch 35^g.

The shaft 31 is provided with an escapement-wheel 43, which is engaged by the ordinary forked escapement 44, which is secured to a shaft 45 journaled in bearings on the box back and on the supporting-arm 46, while secured to the shaft and to the box is a spring 47, which presses one of the escapement-teeth into engagement with the escapement-wheel. This escapement is to regulate the speed of the circuit-breaking wheel 32 and gear-wheel 29.

Instead of the escapement just described, the device shown in Fig. 4^a may be preferably employed, in which case the call-box must be arranged vertically, as the escapement is operated by a weight. As here shown, the escapement-wheel 43 has the escapement 44, which is pivoted at 45, as already described; but the escapement has a pendent shank or pendulum 46^a, which is provided with a weight 46^b, and this may be adjusted up and down, so as to regulate the speed of the escapement.

The gear-wheel 29 is held from turning by a clutch-plate 48, which engages the teeth of the gear-wheel (see Fig. 2) and which is carried by a spring 49 secured to the side of the box 10, the tension of the spring being regulated by a screw 50. The clutch-plate is secured to a button 51 extending out through the side of the box 10 and by pulling out the button the clutch-plate is removed from the gear-wheel so as to permit the latter to turn.

The call-box 10 is operated in connection with a switch to be presently described, and is intended to give a number of impulses or makes and breaks to the switch-circuit, which number of impulses correspond with the number of steps subscriber's switch-wheel must make to place him in desired connection. These impulses cause the switch-wheel to advance a corresponding number of steps, so as to put the two subscribers in connection, all as will presently appear.

We will suppose that subscriber 1 wishes to call up subscriber 46. The handle 16 is pulled out so as to release the dial and the handle and dial turn until the pointer 23 of the dial 17 comes opposite the number 46 on the call-box, when the handle is released, causing the pin 14 to engage the hole 13 opposite the number 46, thus fastening the dial. The above movement will have wound up the spring 24 and the operator then pulls out the button 51 so as to release the clutch-plate 48 from the gear-wheel 29 and holds the button out until the gear-wheel stops. When the button is pulled out in this way, the spring 24 causes the gear-wheel 29 to turn to the right until the stop 27 engages the stop 28 and stops the gear-wheel when the button 51 is released, and this movement of the gear-wheel will have turned the pinion 30 and circuit-breaking wheel 32 a sufficient number of times to have caused the requisite number of impulses in the circuit, the circuit-breaking wheel, pinion, and gear-wheel being accurately speeded to this end.

The switch actuated by the said impulses is shown in detail in Figs. 8 and 9. The switch has a switch-barrel 52, which is covered with insulating material and is supported on arms 53, which are secured to a suitable base 54, and the barrel has extending circumferentially around it a series of parallel grooves 55, this arrangement being for the purpose of enabling a comparatively large number of longitudinal contact-wires 56 to be used, as each wire may be bent so as to follow the course of one of the grooves and extend across the next, thus making it possible for the two arms of a contact device to strike the wire in one groove and pass it in the other. The switch-barrel has also longitudinal grooves 55^a (shown in Fig. 9^a) to receive the wires 56. There is a contact-wire 56 for each subscriber, and these wires are arranged

parallel with each other and are secured to one end of the barrel 52 by screws 57, while at the opposite end they extend outward and connect with binding-posts 58, which are mounted on a rack or frame 58ª, (see Fig. 7,) and there is a binding-post for each wire.

Each subscriber has a ratchet-wheel 59, which turns on a frame or collar 59ª on the spring-barrel, these collars and ratchet-wheels being arranged between the grooves 55, and each collar 59ª connects by a wedge 60 or equivalent contact with the subscriber's wire 56. The ratchet-wheel has a bushing 61 extending through a transverse hole in the ratchet-wheel, in which bushing is journaled a contact-arm 62, which has bent ends 64 adapted to enter the grooves 55 and contact with the wires 56, the ends forming arms and being pressed downward by springs 65 so as to cause them to be in position to strike and ride over the wires 56. The ends or arms 64 are long enough so that when one arm is released by passing a wire 56 the opposite arm strikes the next wire, so that at all times one of the arms is in contact with some wire, and, as the ratchet-wheel is constantly in connection with the subscriber, it will be seen that the subscriber is therefore in direct circuit with the wire of some other subscriber at all times.

The ratchet-wheels are prevented from turning back by pawls 68, and they are turned forward by insulated pawls 69, which have guide-flanges 70 straddling the ratchet-wheels. The pawl 69 of each ratchet-wheel is carried by an arm 71, which is journaled, as shown at 72, on a post 73, this being pivoted at the lower end, as shown at 74, and a spring 75 connects the arm 71 and post 73, so as to hold the pawl 69 in close contact with its ratchet-wheel.

The post 73 has secured to it an armature 76, which is arranged opposite a magnet 77, and the post is pulled away from the magnet by a spring 78 into contact with an abutment-screw 79, which is carried by a rigid post 80, and the base of the magnet is provided with binding-posts 81 and 82 adapted to connect with a source of electricity and with the ground or a return circuit.

The connections can best be seen by reference to Fig. 7ª. The subscriber's call-box 10 has the binding-post 41 connected by a wire *a* with the ground and serving also as a return-wire to a battery A, the return-wire being also connected to the ground. The call-box has its post 42 connected by a wire *a'* with the magnet 77 of a central switch, while the magnet is also connected by a wire a^2 with the battery A. Each telephone-instrument is connected by a wire *b* with its appropriate binding-post 58, wire 56, contact 60, frame or collar 59ª, and ratchet-wheel 59 of the central switch.

We will suppose now that subscriber 1 (see Fig. 7ª) wishes to call up subscriber 46. The call-box 10 is worked in the manner already described, so as to cause 45 impulses to be sent through the wire *a'* and magnet 77, and thus the armature 76 will be forty-five times pulled backward and forward by the magnet and by the spring 78, and the ratchet-wheel 59 will be turned until its contact-arm 62 64 strikes the contact-wire 56 of the central switch 52, thus completing the circuit, which is from the instrument 1 through the wire *b*, a wire 56, contact-wedge 60, frame or collar 59ª, ratchet-wheel 59, the contact-arm 62 64, the second wire 56, and the second wire *b* to the instrument 46. In this way a subscriber may place himself in communication with any other, for by turning his call-box he can make the necessary number of elecrical impulses which will actuate his ratchet-wheel at the central switch, so as to bring the desired wire into electrical connection with his own. The return circuit is made through the ground, or a special return-wire may be used.

From the above description of my invention it will be obvious that the device is susceptible of considerable modification without material departure from the principles and spirit of my invention, and for this reason I do not wish to be understood as limiting myself to the precise form of the parts herein set forth.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A call-box provided with a revoluble indicator, a revoluble wheel, a spring having its ends secured to the wheel and the indicator respectively, and arranged to be wound up by the rotation of the indicator relatively to the wheel, and circuit-breaking mechanism operated by the wheel, substantially as described.

2. A call-box provided with a revoluble indicator, a fastening device to fix the position of the indicator relatively to the box, a wheel journaled in the box, a spring having its ends secured to the wheel and the indicator respectively, and arranged to be wound up by the rotation of the indicator relatively to the wheel, and a circuit-breaker operated by the said wheel, substantially as described.

3. In a telephone system, the call-box comprising a containing box, a revoluble dial thereon, a fastening device to fix the position of the dial, a gear-wheel journaled beneath the dial, a driving-spring connecting the gear-wheel and dial, engaging stops on the gear-wheel and dial, and a circuit-breaking wheel driven by the gear-wheel, substantially as described.

4. In a telephone system, the call-box comprising a containing box, a revoluble dial thereon, a gear-wheel journaled opposite the dial, a driving-spring connecting the gear-wheel and dial, a movable clutch-plate engaging the gear-wheel, abutting stops on the gear-wheel and dial, and a circuit-breaking wheel driven by the gear-wheel, substantially as described.

5. In a telephone system, the call-box comprising a containing box, a revoluble dial thereon, a handle on the dial, a fastening device actuated by the handle to fix the position of the dial, a gear-wheel journaled in the box, a driving-spring connecting the gear-wheel and dial, stops to limit the relative movements of the gear-wheel and dial, a lock for the gear-wheel, and a circuit-breaking wheel driven by the gear-wheel, substantially as described.

6. In a telephone system, the call-box comprising a containing box, a revoluble dial thereon, a fastening device to fix the position of the dial, a gear-wheel journaled in the box, a driving-spring connecting the gear-wheel and dial, a fastening device for the gear-wheel, a circuit-breaking wheel driven by the gear-wheel and comprising alternating conducting and insulating plates, and a contact-spring engaging the circuit-breaking wheel, substantially as described.

7. In a telephone system, the switch comprising a barrel, a series of insulated conducting parts thereon, a series of wheels, one for each subscriber, turning on the barrel and connected with each subscriber's wire, and contact-making devices carried by the wheels to engage the conducting parts on the barrel.

8. In a telephone system, the switch comprising a barrel having circumferential grooves, contact-strips crossing the grooves and bent to enter a portion of the grooves, wheels turning on the barrel, and contact-arms carried by the wheels to engage the contact-strips, substantially as described.

9. In a telephone system, the switch, comprising a barrel, a series of insulated contact-strips thereon, a series of collars or frames on the barrel, each being in contact with one contact-strip and insulated from the other contact-strips, a series of ratchet-wheels turning on the aforesaid collars, contact-arms carried by the ratchet-wheels to engage the contact-strips, and magnet-actuated pawls to turn the ratchet-wheels, substantially as described.

10. In a telephone system, the switch comprising a barrel, a series of insulated contact-strips thereon, a series of revoluble ratchet-wheels in their frames on the barrel, each ratchet-wheel being connected with its own telephone, contact-arms carried by the ratchet-wheels to engage the other telephone contact-strips, a magnet-actuated post for each ratchet-wheel, and a spring-pressed pawl carried by the post to engage the ratchet-wheel, substantially as described.

11. A telephone system, comprising a series of telephone-instruments, a switch having a barrel and a series of longitudinal insulated contact-strips, each connected with an independent telephone-instrument, a series of ratchet-wheels turning on the barrel, each being in contact with one of the aforesaid strips, contact-arms carried by the ratchet-wheels to engage the strips, oscillating posts, pawls carried by the posts to engage the ratchet-wheel, and a call-box for each telephone-instrument, the call-box being connected with the magnet of its appropriate ratchet-wheel and adapted to send electrical impulses through the magnet, substantially as described.

12. A telephone call-box or the like, comprising a casing having a circular series of numerals marked on its face, a dial having a circular series of name-spaces registering with said series of numerals and provided with an index, and circuit-breaking devices arranged in said casing and actuated from said dial, substantially as set forth.

13. In a telephone system or the like, a switch comprising a body having a series of conducting parts each adapted to form one terminal of a subscriber's circuit, a series of movable parts arranged to move over said body, and contact devices carried on said movable parts and each adapted to form the other terminal of a subscriber's circuit, said contact devices being each provided with two contact-points adapted alternately to contact with alternate members of the series of conducting parts, substantially as set forth.

14. In a telephone system or the like, a switch comprising a cylindrical body having a parallel series of longitudinal conducting parts, each forming at all times one terminal of a subscriber's circuit, a series of movable parts guided on the outside of said body and arranged to contact successively with the respective conducting parts forming the terminals of the respective subscribers' circuits, and means for moving said movable parts independently of one another, substantially as set forth.

15. A call-box having a revoluble indicator, a revoluble wheel, stops on the indicator and wheel arranged to engage one another, a circuit-breaking device operated by said wheel, and a spring connected to said wheel and adapted when the wheel is released, to drive the same forward to engage the stops with one another and actuate said circuit-breaking device, substantially as set forth.

16. In a telephone system, a switch comprising a barrel, a series of insulated contact-strips thereon, a series of collars or frames on the barrel, each being in contact with one contact-strip and insulated from the other contact-strips, a series of wheels turning on the collars, contact devices on said wheels to engage the contact-strips, and means for actuating the said wheels, substantially as set forth.

WALLACE A. HOUTS.

Witnesses:
R. W. PRATT,
B. W. KUMLER.