

No. 842,822.

PATENTED JAN. 29, 1907.

H. R. TURNER.
TELEPHONE SYSTEM.

APPLICATION FILED MAY 12, 1906.

4 SHEETS—SHEET 1.

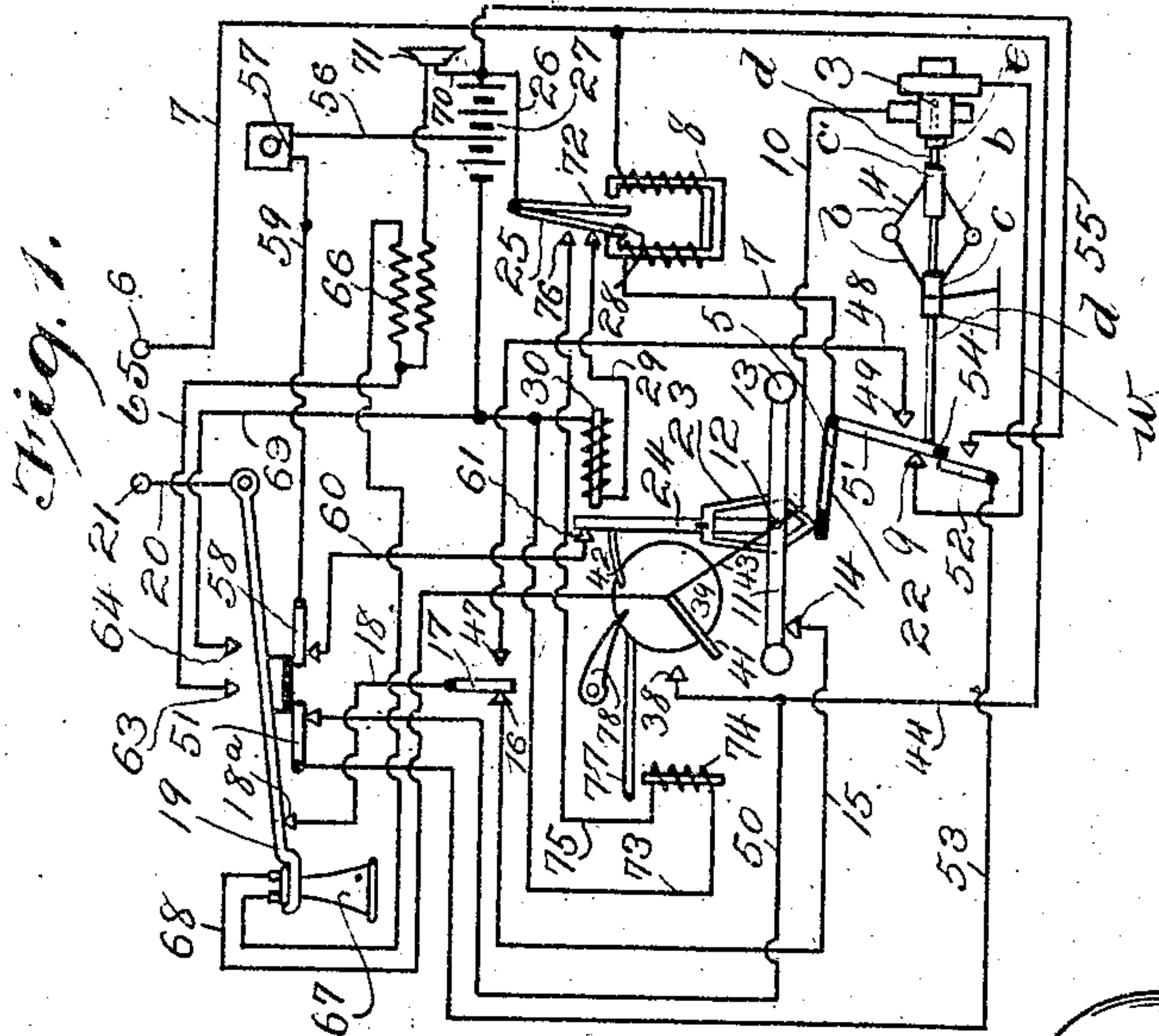


Fig. 7.

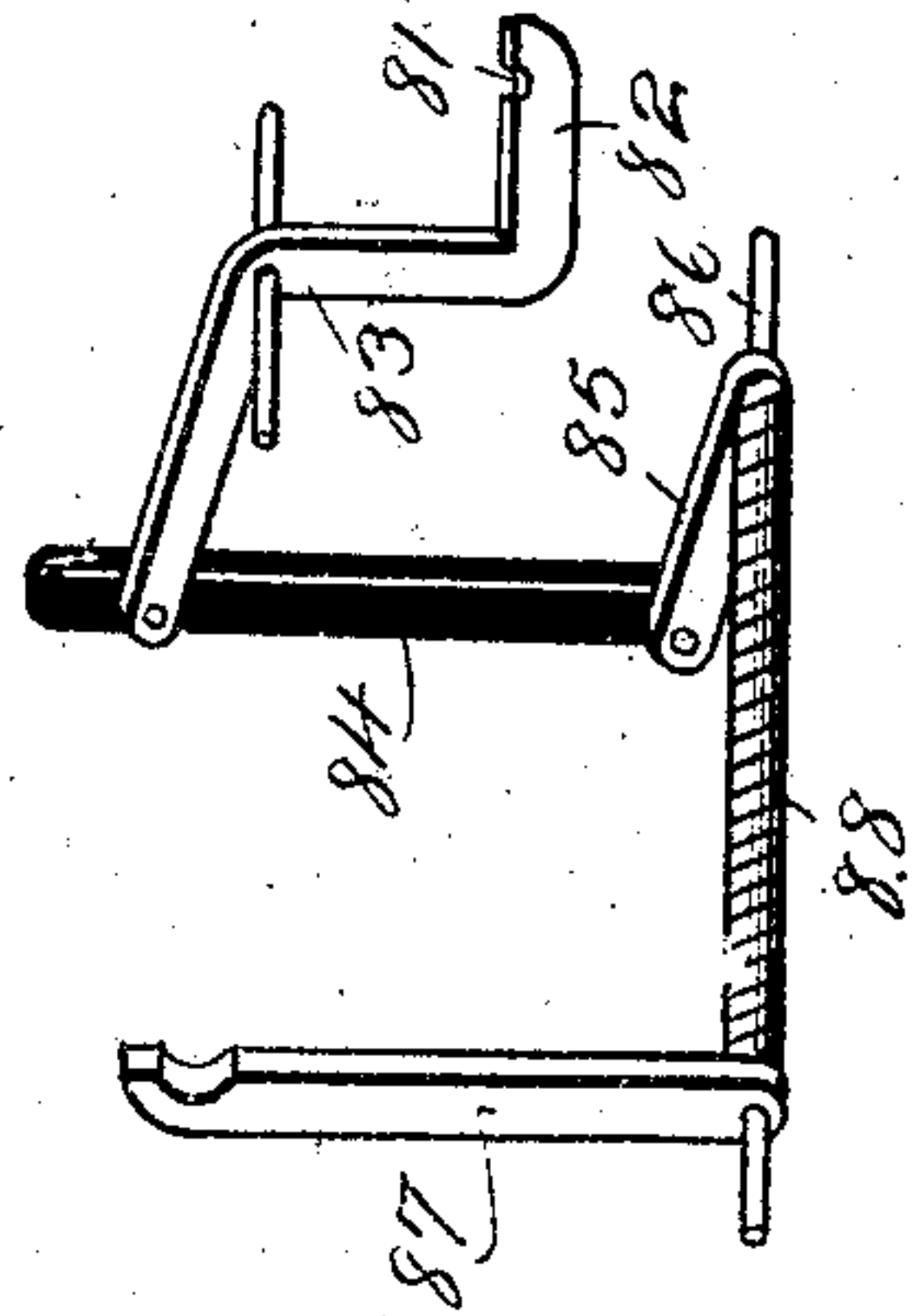


Fig. 5.

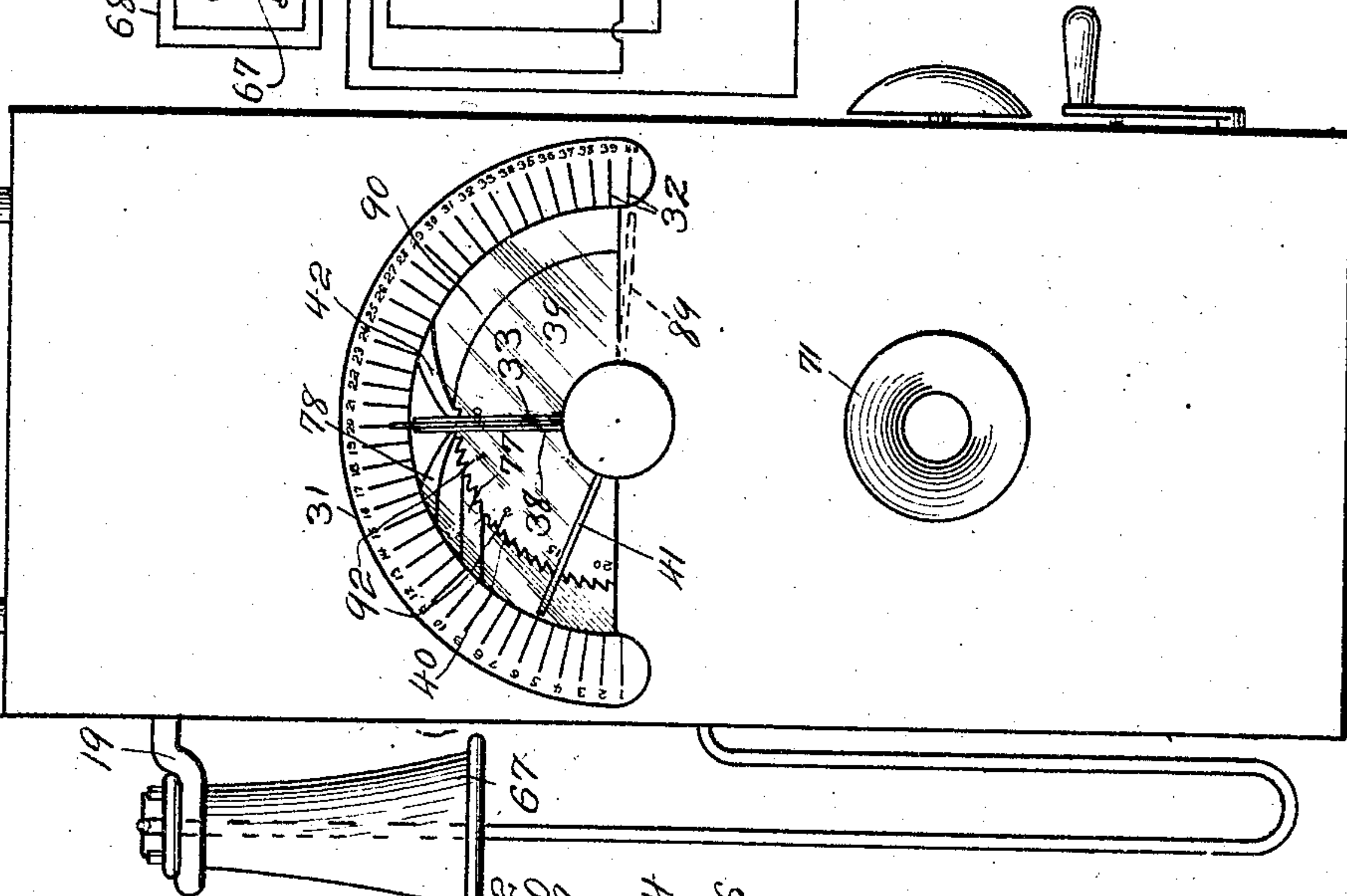
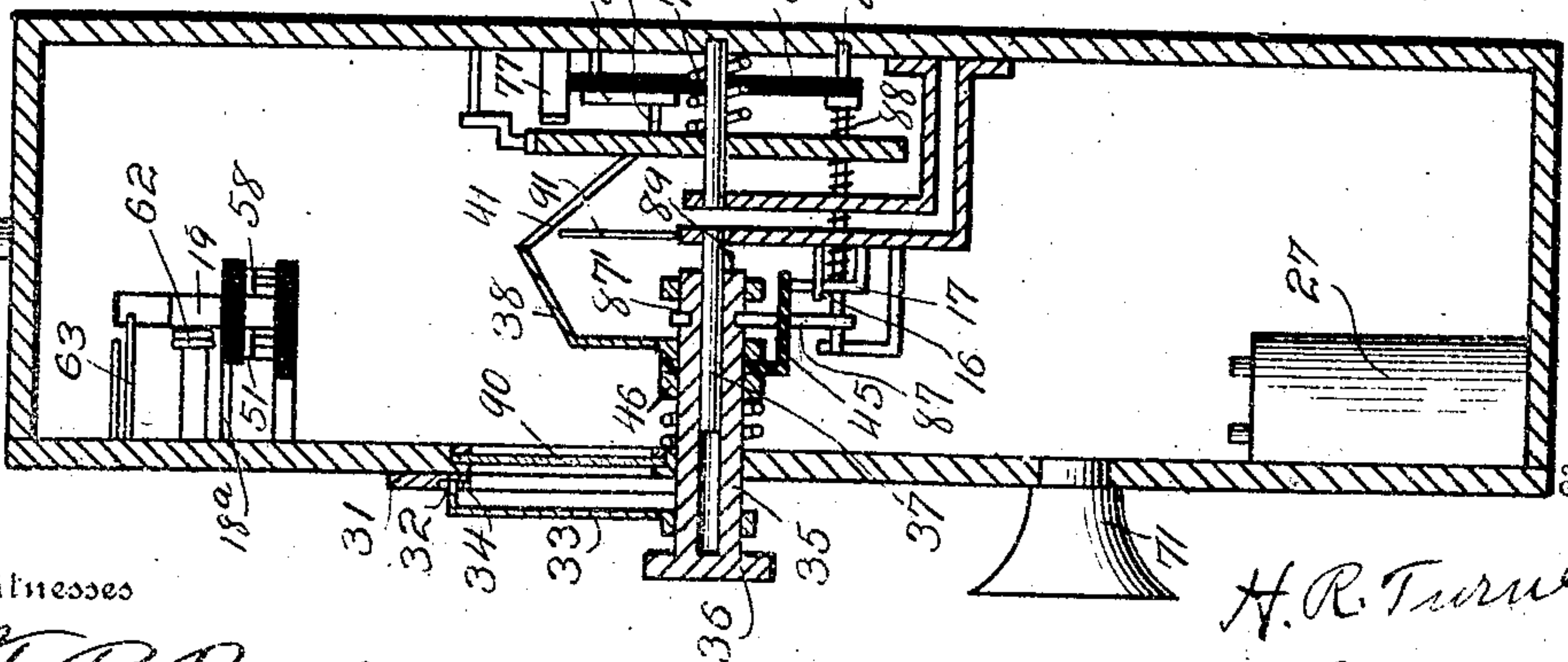


Fig. 6.



Witnesses

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334

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4 SHEETS—SHEET 2.

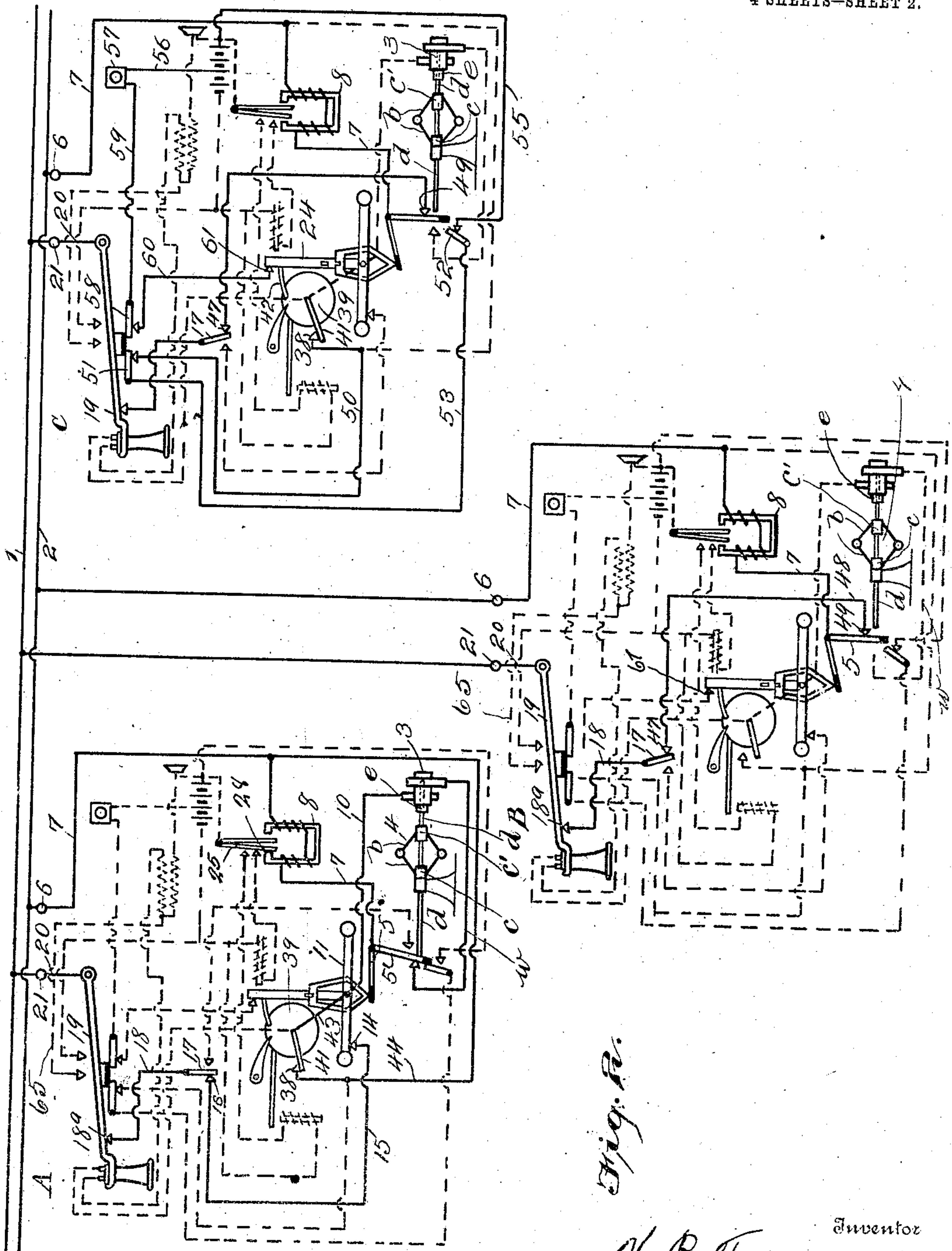


Fig. 2.

Witnesses

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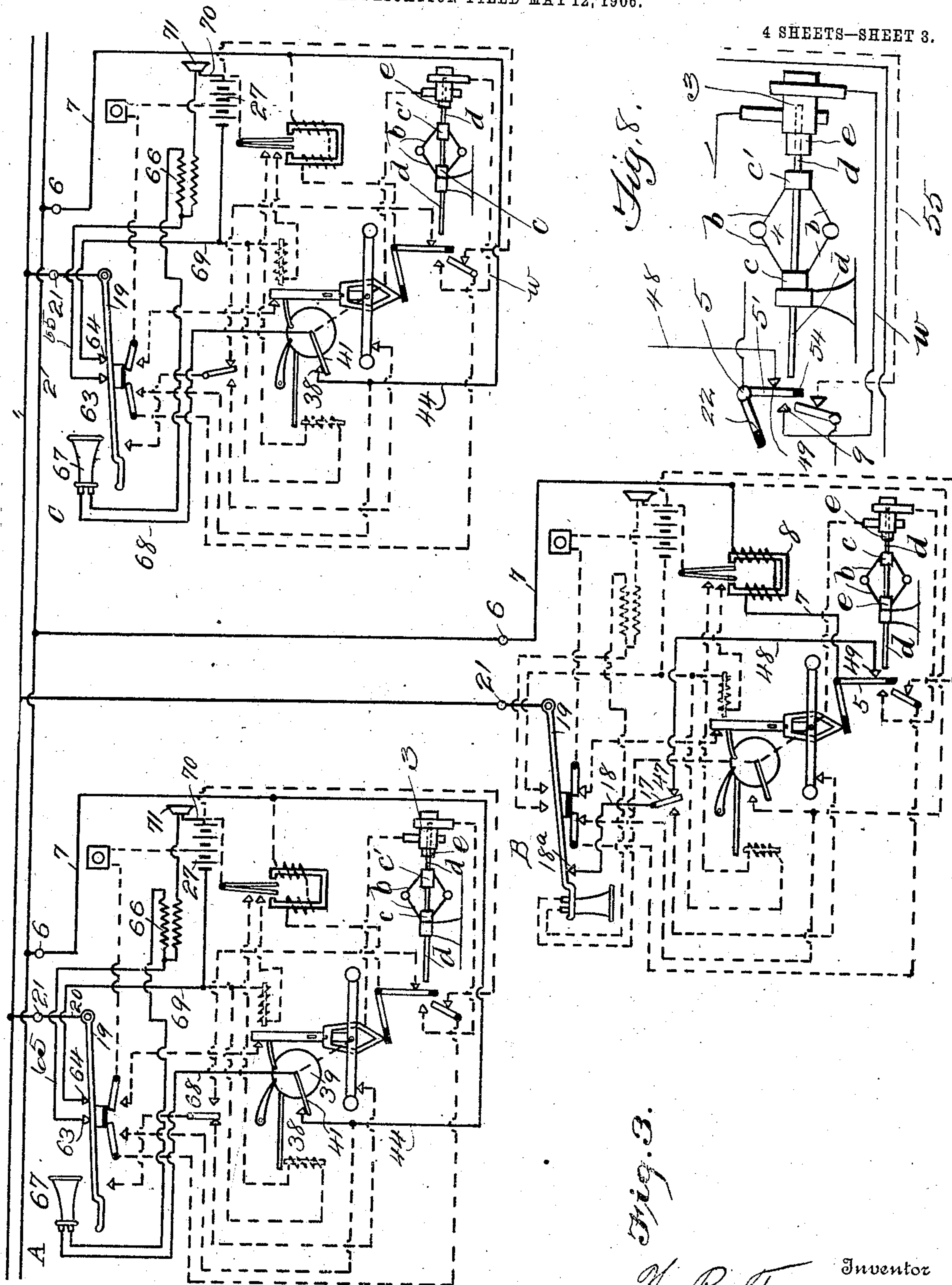
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4 SHEETS—SHEET 3.



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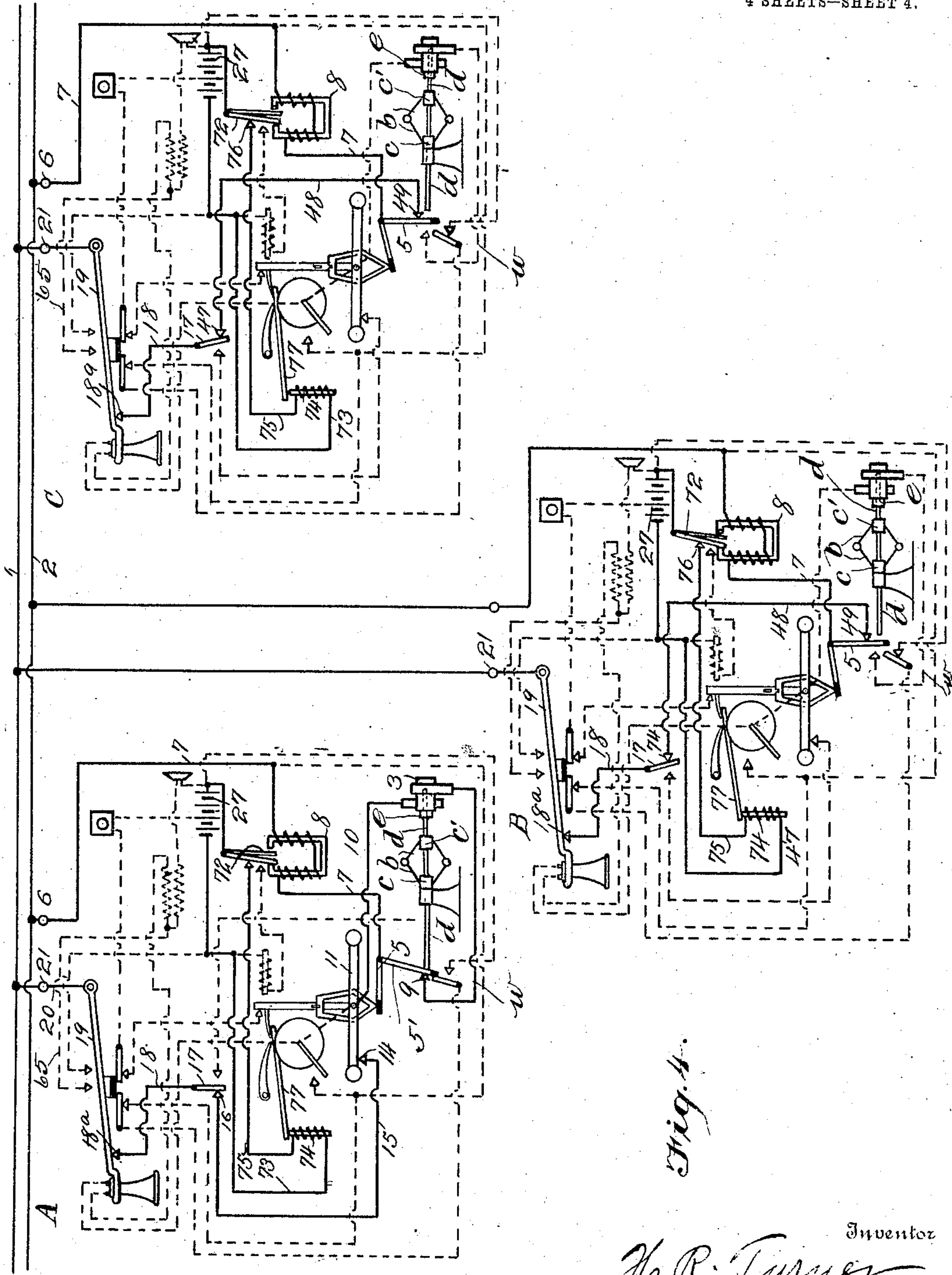


Fig. 4.

Witnesses

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UNITED STATES PATENT OFFICE.

HERSCHEL R. TURNER, OF HOXIE, KANSAS.

TELEPHONE SYSTEM.

No. 842,822.

Specification of Letters Patent.

Patented Jan. 29, 1907.

Application filed May 12, 1906. Serial No. 316,578.

To all whom it may concern:

Be it known that I, HERSCHEL R. TURNER, a citizen of the United States, residing at Hoxie, in the county of Sheridan and State of Kansas, have invented a new and useful Telephone System; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to telephone systems and apparatus therefor.

The object of this invention is to provide a party-line system especially adapted for rural systems and by which any telephone on a line can be rung up without ringing up any other on the same line, by which no others except the two talking can hear the conversation by which any one can tell by merely looking at his telephone whether the line is in use and who is talking, and by which a line-call will call every telephone on the line.

Other objects will appear in the following description and will be more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a diagrammatic view of the circuits of one telephone, illustrating the different elements of the station-circuit thrown out of their normal positions. Fig. 2 is a like view of three stations, the circuits used in calling up being shown in full lines and the other circuits being dotted. Fig. 3 is a like view of three stations, showing the circuits employed during communication. Fig. 4 is a like view of three stations, showing the circuits used in ringing off in full lines. Fig. 5 is a front elevation of a telephone made in accordance with the invention. Fig. 6 is a vertical section of the telephone, and Fig. 7 is a detail view of the lock-out mechanism. Fig. 8 is a detail view of the governor mechanism, showing several of the surrounding parts.

Referring to the drawings, 1 indicates one of the main lines, and 2 the other of the main lines. Connected in multiple to these lines are the stations A B C, three only being shown; but it is understood that any number may be connected thereto.

To provide for calling up, each telephone is provided with a current-generator 3, a centrifugal governor 4 operated thereby. This governor comprises a pair of balls, having four spring-arms *b*, which are connected to sleeves *c* and *c'*, one of which is splined to the

core *d* so as to rotate therewith, but at the same time to allow the core to have a horizontal movement therethrough. The sleeve *c* is fixed against movement toward the current-generator by any suitable means. (Not shown.) The sleeve *c'* is fixed to rotate and to move longitudinally with the core *d*, which has a telescopic movement into the shaft *e* of the current-generator 3, which core *d* and shaft *e* being adapted to rotate together, and when the radius of the balls in which they travel becomes greater from the centrifugal force thereof the core will be drawn out of the shaft, thereby causing the switch-blade 5 to be operated, as will be clearly evident from the drawings. This governor actuates a switch-blade 5, which is connected with the main circuit at binding-post 6 by a conductor 7, passing about a double-polarized relay 8. The contact 9 of the switch-blade 5 leads to one brush of the generator, the other brush of the generator being connected by a conductor 10 to a circuit-breaker 11, pivoted intermediate its ends at 12 and balanced at each end by weights 13 to retard its vibrations. Circuit-breaker 11 normally rests upon a contact 14, which is connected by a conductor 15 with a contact 16 of a switch 17, the purpose of which will hereinafter appear. Switch 17 is connected by a conductor 18 to contact 18^a, which is engaged with the receiver-hook 19 when depressed, the receiver-hook being connected by conductor 20 with binding-post 21. When the generator 3 is turned at the station which is calling up, it first operates governor 4 to shift switch 5, and thereby establishes a circuit, current flowing from one of the generator's brushes through switch 5 and relay 8 to one main line, through one of the telephones to the other main line, through switch 17, through circuit-breaker 11, and back to the other of the generator's brushes. It will thus be seen that the generator is in multiple with the main line. As switch 5 is operated an arm 22 thereon moves a pivoted latch 23 on the circuit-breaker 11 and locks a pivoted armature 24 to the said circuit-breaker, whereby the circuit-breaker and the armature will move together. The current passing through relay 8 energizes the same, so that its positive pole will attract a negative armature 25, pivoted adjacent the relay and connected by conductor 26 to one pole of a battery 27. When attracted, the armature 25 engages a

contact 28, to which is connected a conductor 29, connected to an electromagnet 30, which in turn is connected to the other pole of battery 27, thus establishing a current which energizes electromagnet 30.

The electromagnet 30 is located in a position to act on the pivoted armature 24, and thus cause a breaking of the circuit controlled by circuit-breaker 11. As this current breaks the relay 8 is of course deenergized, thus breaking the circuit in which the electromagnet 30 is located and permitting the armature 24 to return to its normal position and establish the circuit in which is located the relay 8. This make and break of the generator-circuit causes the armature 24 to vibrate, this vibration being employed for a purpose hereinafter set forth.

Each station or telephone is provided with a dial 31, having a series of numbers corresponding to the number of stations in the system and one in addition, the additional one being for a purpose to be hereinafter set forth. The dial is also provided with a number of locking notches or recesses 32, corresponding in number to the numbers on the dial. Over this dial is movable an index or pointer 33, having a projection 34 to enter any one of the notches or recesses 32. When not calling up, this pointer rests over its own number, and when it is desired to call up any other station or party the pointer or index is turned so that it points to the station with which it is desired to communicate, being first moved away from the dial to permit its projection 34 to clear the recess 32. To permit the index to be moved away from the dial, the index is mounted on an axially-movable shaft 35, provided with a finger-piece 36 on its outer end and hollowed at its inner end to receive a stud 37 on the telephone. Secured to and turning with the axially-movable shaft 35 is a contact 38, which is thus adapted to be set to a position corresponding to the pointer or index 33. Turning about an axis in alignment with the axis about which the setting contact 38 turns is a disk 39, provided with teeth 40, corresponding in number to the numbers on the dial 31. Each tooth is numbered, and extending from the disk opposite one of the teeth is a contact 41, this tooth being different in each telephone and corresponding to the number of the telephone. The disk in each telephone normally rests so that a pawl 42 lies at the zero-point of the disk, this pawl being connected to and operated by the vibrating armature 24.

When the armature 24 has vibrated a sufficient number of times to cause the pawl 42 to rotate the disk 39 until the contact 41 of the party ringing up has engaged the set contact 38, the current from the generator passes from one brush to the bearing of circuit-breaker 11, thence to the contact 41 by conductor 43, and from contact 41 through con-

tact 38, by conductor 44 to relay 8, and from relay 8 through conductor 7 to switch 5 and through the blade 5' of said switch, thence through the contact 9, through the conductor *w.* back to the generator. In this manner circuit-breaker 11 is cut out of the circuit of the generator, and as the relay 8 continues energized so also will the electromagnet 30 continue in the same condition, thus holding its armature against further movement and preventing the further rotation of the disk 39.

Action of telephone called up.—The switch 17 of all the telephones except the one calling up is open, this position being produced by an insulated projection 45, adjustably mounted on the axially-movable shaft 35 by means of nut 46, the projection 45 being so positioned with relation to the pointer or index 33 that when said pointer or index is pointing to the number of its own telephone the switch 17 will be open, due to the projection engaging the switch and moving it away from its contact 16, and when said pointer or index is pointing to any other number than its own the switch 17, being in the form of a leaf-spring, will engage its contact 16. When a station or telephone is called up, the pulsating current from the calling-up station passes from one of the line-wires to all the telephones or stations connected to the line-wires, first entering through the binding-post 21 of each phone, thence through the receiver-hook 19 to switch 17, which being open rests against a contact 47, to which a cut-out circuit 48 is connected. Cut-out circuit 48 is connected to a contact 49, against which bears the switch 5 in all but the calling-up telephone. This circuit 48 serves as a means for cutting out of the circuit the generator and the circuit-breaker of all the telephones except the one calling up. From switch 5 the pulsating current passes through relay 8 to the other main line. As relay 8 is thus intermittently energized in the same manner as the calling-up telephone, the electromagnet 30 will also be energized the same number of times as the like magnet of the calling-up telephone, thus causing the armature 24 to be vibrated and the disk 39 to be turned the same distance in all telephones of the system. However, as only one other telephone in the system will have its settable contact 38 in the same position as the calling-up telephone this will be the only one to receive the proper signal—that is, the only other one in which the contact 38 and the contact 41 will engage.

Alarm-circuit.—When contacts 38 and 41 engage, a circuit is established from contact 38 by conductor 50 to switch 51, closed by receiver-hook 19, which is insulated therefrom. From switch 51 the bell or alarm circuit leads to a switch 52 by means of a conductor 53, the switch 52 being located adjacent switch-blades 5, so that the insulated end 54 of the latter may engage the former

when the governor 4 is actuated, thus providing means for breaking the alarm-circuit of the calling-up telephone. The alarm-circuit leads by conductor 55 from switch 52 to the battery 27. Leading from battery 27 so as to include one cell thereof is a conductor 56, also forming part of the alarm-circuit and connected to an electric bell 57. Bell 57 is connected by conductor 59 to a switch 58, held closed by and insulated from the receiver-hook 19. Switch 58 is connected by conductor 60 with a contact 61, which is engaged by the armature 24 when the latter is positioned away from magnet 30, the armature, together with pawl 42 and disk 39, acting to complete the alarm-circuit to the contact 41. It is apparent that as soon as contact 41 engages contact 38 the alarm or signal will be sounded and will continue until the receiver is removed from its hook or until the party calling up "rings off." Of course there will be a slight signal or alarm in all telephones of the number less than the one called up, but this will only be momentary and will serve to notify that the line is busy.

Talking-circuit.—When the receiver is removed from the receiver-hook 19, the said hook moves under the action of a spring 62 against a pair of contacts 63 and 64. Contact 63 leads by conductor 65 to induction-coil 66 to receiver 67, which is connected by conductor 68 with disk 39. The remainder of the receiver-circuit is formed by the conductor 44, leading from contact 38 to the conductor 7, and consequently to the other wire. The transmitting-circuit is in shunt with the receiving-circuit and leads from the contact 64 by conductor 69 to one pole of the battery 27, from battery 27 by conductor 70 to the transmitter 71, and from the transmitter to the induction-coil 66.

Ring off.—In ringing off a current is sent through the line in a direction opposite to that in which it is sent when ringing up. This is accomplished in suitable manner. The connection of the brushes with the generator 3 may be reversed or the generator may be rotated in the opposite direction. The generating-circuit will be the same as in calling up; but the poles of the double-polarized relay will be reversed, thus causing in all the telephones of the system the attraction of a positive armature 72 instead of the negative armature 25. In this manner the pawl-operating electromagnet 30 is not energized, but a trip-circuit is brought into operation. This trip-circuit comprises the conductor 26, before mentioned, connected to one pole of the battery and the armature 72, a conductor 73, connecting the other pole of the battery and the electromagnet 74, and a conductor 75, connecting the electromagnet 74 and a contact 76, with which the armature 72 engages when it is attracted by the relay 8. When this trip-circuit is established, its elec-

tromagnet 74 attracts one end of a pivoted tripping-lever 77, which then engages the pawl 42 and the holding-dog 78, this holding-dog serving to hold the disk 39 while the latter is adjusted by pawl 42. Upon the release of the disk it returns to its original position under the action of a coil-spring 79, which is placed under tension by the pawl 42 in rotating the disk.

Lock-out mechanism.—To prevent any of the indexes or pointers 33 being turned after a party has started to ring up, the following mechanism is provided: Each disk 39 carries a pin 80, which is eccentrically mounted thereon and normally rests in a notch 81 in an arm 82 of a pivoted bell-crank lever 83. The other end of the bell-crank lever 83 is connected by a link 84 with an arm 85, secured at one end to a rock-shaft 86. A second arm 87 is secured at one end to the rock-shaft 86 and is notched to enter an annular groove 87' on the axially-movable shaft 35. When the disks 39 begin to rotate, they release the arms 82 and permit links 84 to move upwardly into engagement with the tripping-levers 77, before mentioned, under the action of their springs 88, thus pulling the arm 87 into the annular grooves 87' and preventing the axial movement of the shafts 35. Upon the operation of the tripping-levers 77 the links 84 are depressed, thus unlocking the indexes or pointers 33. As it is only by turning a pointer or index 33 to the position of the pointer or index of the telephone called up that a connection can be made, and as this movement is prevented, it will be seen that none but the two talking can hear what is taking place on the line. At first glance it would appear that if a party desired to hear the messages sent to any one of his neighbors he could leave his index pointing to his neighbor's number and when his neighbor's would be called up so would he, but this is not the case. If a party leaves his pointer or index at any number other than his own, the switch 17 will move to a position to cut out the relay 8, and thus prevent the operation of the electromagnet 30. The telephone is therefore virtually disconnected from the line.

Line call-up.—So that communication may be established between all the telephones on a line when there is a message of general interest the following means is provided: Each axially-movable shaft 35 is provided with a second contact 89, which when the pointer 33 is at its own number lies in a position to be engaged by the projection 41 when the pawl 42 is in the last tooth of the disk 39. It is apparent that when the index or pointer 33 of any one of the telephones is turned to the last number on dial 31 a connection with all the other telephones of the system will be obtained, as will be understood. The front of each telephone below the dial 31 is cut away and a glass 90 is fitted

in the opening. By this means one can ascertain whether the line is busy, as the disk 39 is visible through the opening.

Having thus described my invention, what I claim is—

1. The combination with two line-wires, of a plurality of stations connected in multiple to the line-wires and each having a settable and a moving contact, a generator at each station connected in multiple to the line-wires a circuit-breaker in each generator-circuit, and electromagnets controlled by the generator-current for operating the moving contacts.

2. The combination with the two line-wires, of a plurality of stations connected in multiple to the line-wires, and each having a settable and a moving contact, a generator at each station connected in multiple to the line-wires, a circuit-breaker in each generator-circuit, and electromagnets controlled by the generator-current for operating the moving contacts said electromagnets also operating the circuit-breakers.

3. The combination with two line-wires, of a plurality of stations, connected in multiple to the line-wires and each having a settable and a moving contact a generator at each station connected in multiple to the line-wires, a relay in each generator-circuit, a battery-circuit controlled by each relay, and an electromagnet controlling each moving contact and controlled by the relay.

4. The combination with two line-wires, of a plurality of stations connected in multiple to the line-wires and each having a settable and a moving contact, an electromagnet controlling each moving contact, a generator, and means for producing a pulsating current along the line and at each station to act on the electromagnets of all the stations.

5. The combination with two line-wires, of a plurality of stations connected in multiple to the line-wires, and each having a settable and a moving contact, a generator at each station connected to the line-wires, means at each station for operating the moving contact when the generator of one station is operated, and means at each station for cutting the generators of all stations, except the one calling up, out of circuit with the line-wires, when a generator is operated to call up.

6. The combination with two line-wires, of a plurality of stations connected in multiple to the line-wires, and each having a settable and a moving contact, an electromagnet controlling each moving contact, a generator, and means for producing a pulsating current along the line and at each station to act on the electromagnets of all the stations, said means being normally out of circuit with the line-wires, and being constructed to be thrown into circuit when the means is operated to call up.

7. The combination with two line-wires, of a plurality of stations connected in multiple to the line-wires, and each having a settable and a moving contact, the moving contacts of all the stations normally resting in like positions and the settable contacts normally resting in different positions and settable to positions corresponding to any of the settable contacts and means at each station connected to the line-wires, for moving all the moving contacts in synchronism to the settable contacts.

8. The combination with two line-wires, of a plurality of stations connected in multiple to the line-wires, and each having a settable and a moving contact, the moving contacts of all the stations normally resting in like positions and the settable contacts normally resting in different positions, and settable to positions corresponding to any other of the settable contacts and means at each station connected to the line-wires for moving all the moving contacts in synchronism to the settable contacts, and means at each station moved to cut out a station when a settable contact is away from its normal position and the moving contacts are operated from another station.

9. The combination with two line-wires of a plurality of stations connected in multiple to the line-wires and each having a settable and a moving contact the moving contacts of all the stations normally resting in like positions, and the settable contacts normally resting in different positions and settable to positions corresponding to any other of the settable contacts, and means at each station connected to the line-wires for moving all the moving contacts in synchronism to the settable contacts, and locking mechanism for the settable contacts effective as long as the moving contacts are away from their normal positions.

10. The combination with the two line-wires, of a plurality of stations connected in multiple to the line-wires, and each having a settable and a moving contact, a toothed wheel connected to each moving contact, a pawl for operating each toothed wheel an electromagnet operating each pawl generators controlling the electromagnets and connected in multiple to the line-wires circuit-breakers in the generator-circuits, and means normally positioned to cut each generator out of the circuit with the line-wires, but operated to throw the local generator into circuit when the local generator is operated.

11. The combination with a settable contact, of a moving contact, and mechanism locking the settable contact against movement when the moving contact is away from its normal position.

12. The combination with the settable contact, of a toothed disk, an electrically-operated pawl for moving the toothed disk, a con-

tact moving with the disk, and means locking the settable contact against movement when the disk is moved from its normal position.

13. The combination with a dial provided with a plurality of notches or recesses, of an index or pointer having a projection to enter any one of said recesses, an axially-movable shaft to which said pointer or index is secured, a settable contact turning with the shaft and the index, and an electrically-operated moving contact.

14. The combination with a dial provided with a plurality of notches or recesses, of an index or pointer having a projection to enter any one of said recesses, an axially-movable shaft to which said pointer or index is secured, a settable contact turning with the shaft and the index, and an electrically-operated moving contact, and locking mechanism controlled by the moving contact, and moved into engagement with the axially-movable shaft when the moving contact is away from its normal position.

15. The combination with the generator adapted to be connected in multiple to the line-wires, of a relay in the generator-circuit, a battery-circuit, a circuit-breaker in the generator-circuit, a settable contact, a moving contact, and an electromagnet in the battery-circuit operating the circuit-breaker and moving the moving contact.

16. The combination with the generator adapted to be connected in multiple to the line-wires, of a switch in the generator-circuit, a relay in the generator-circuit, a battery-circuit, an electromagnet in the battery-circuit, an armature for the electromagnet, a circuit-breaker, a lock for connecting the armature to the circuit-breaker when the switch is operated and a governor operated by the generator and operating the switch.

17. The combination with the generator, of a moving contact, a disk by which the contact is carried, a spring moving the disk in one direction, a pawl moving the disk against the action of the spring, a dog holding the disk when moved by the pawl, an electromagnet for the dog, an electromagnet for the pawl, a relay in the generator-circuit, a pair of oppositely-polarized armatures for the relay, one of which controls the pawl-operating electromagnet, and the other of which controls the dog-operating electromagnet, and a circuit-breaker in the generator-circuit, controlled by the pawl-operating electromagnet.

18. The combination with the moving contact, of an electromagnet for moving the contact in one direction, an electromagnet controlling its movement in the other direction, and a circuit-breaker operated by one of the electromagnets and in turn producing a pulsating current in said magnet.

19. The combination of a settable contact,

a moving contact, an electromagnet controlling said latter contact, a battery-circuit in which is located the electromagnet, a shunt-circuit, a relay arranged in multiple with the line-wires, through the shunt-circuit, when the settable contact is in normal position and controlling the battery-circuit, a generator, a governor operated thereby, and two switches one of which is operated by the generator and the other of which is operated by the settable contact to cut out the shunt-circuit.

20. The combination with a moving contact, of a settable contact, an electromagnet controlling the moving contact, and a polarized relay controlling the circuit of the electromagnet which is limited in its operation by the settable contact.

21. The combination with the generator, of a relay, a moving contact controlled by the relay, a settable contact, two circuits one including the relay and the other including the relay and the generator, and a switch controlled by the settable contact and movable to close either circuit.

22. The combination with the generator, of a relay, a moving contact controlled by the relay, a settable contact, two circuits one including the relay and the other including the relay and the generator, and a switch controlled by the settable contact, and movable to close either circuit, and a circuit-breaker in the circuit including the generator.

23. The combination with the generator, of a relay, a settable contact, a moving contact, an electromagnet controlling said moving contact, a battery-circuit in which the magnet is located, controlled by the relay, two circuits, one including the relay, and the other including the relay and the generator, a circuit-breaker in the circuit including the generator, and means operated by the generator causing the circuit-breaker to be operated by the electromagnet.

24. The combination with a moving contact, of an electromagnet operating the contact, a generator, a circuit-breaker and means operated by the generator causing the circuit-breaker to be operated by the electromagnet.

25. The combination with the settable contact, of a moving contact a generator and circuit-breaker arranged to send a pulsating current to the line-wires, and means adapted to receive a pulsating current either from the line-wires or from the generator and to operate the moving contact.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HERSCHEL R. TURNER.

Witnesses:

FARNA D. TURNER,
WASHINGTON TURNER.