

No. 846,889.

PATENTED MAR. 12, 1907.

A. K. ANDRIANO.
TELEPHONE SYSTEM.
APPLICATION FILED MAR. 15, 1905.

4 SHEETS—SHEET 1.

Fig. 1.

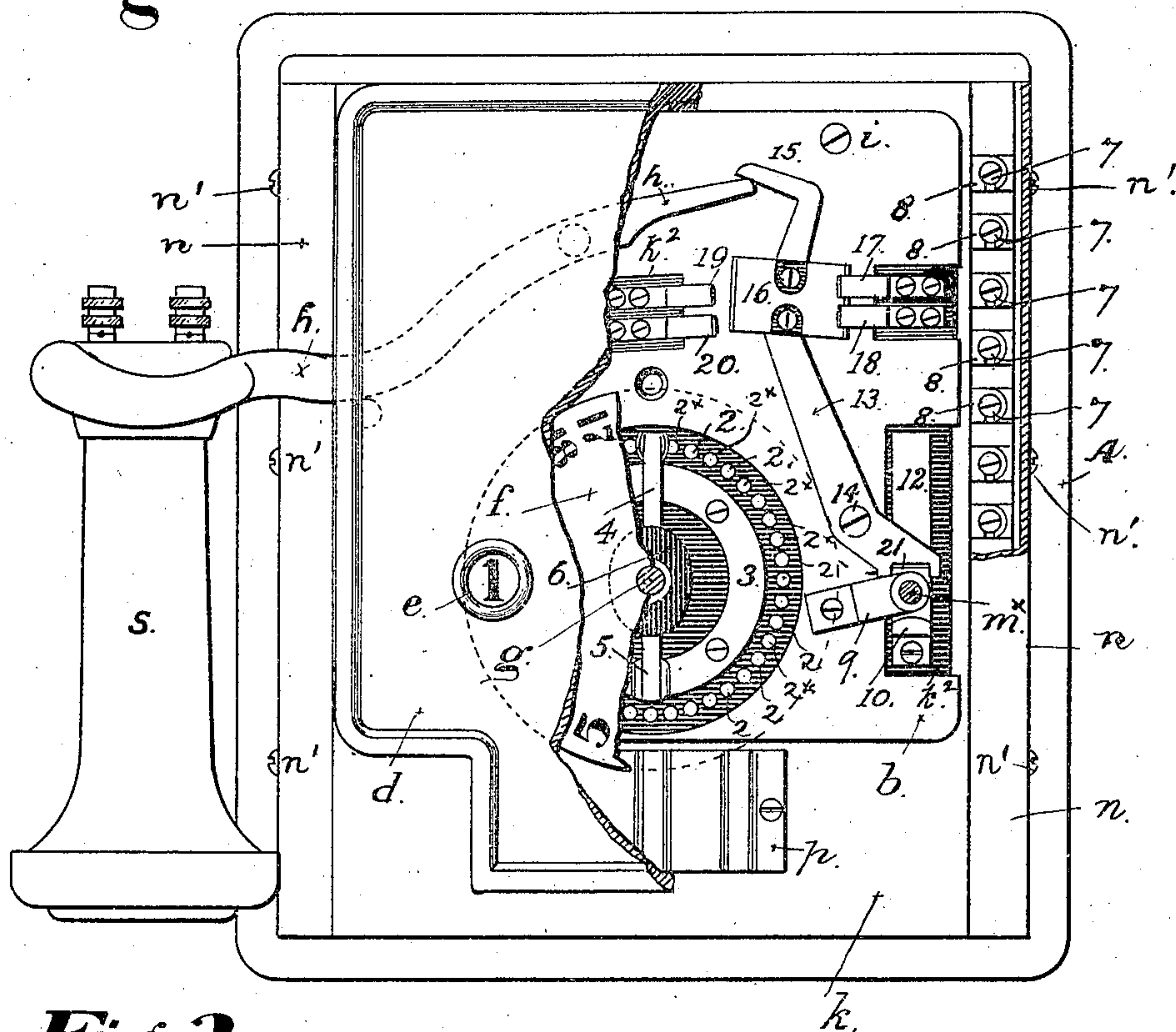
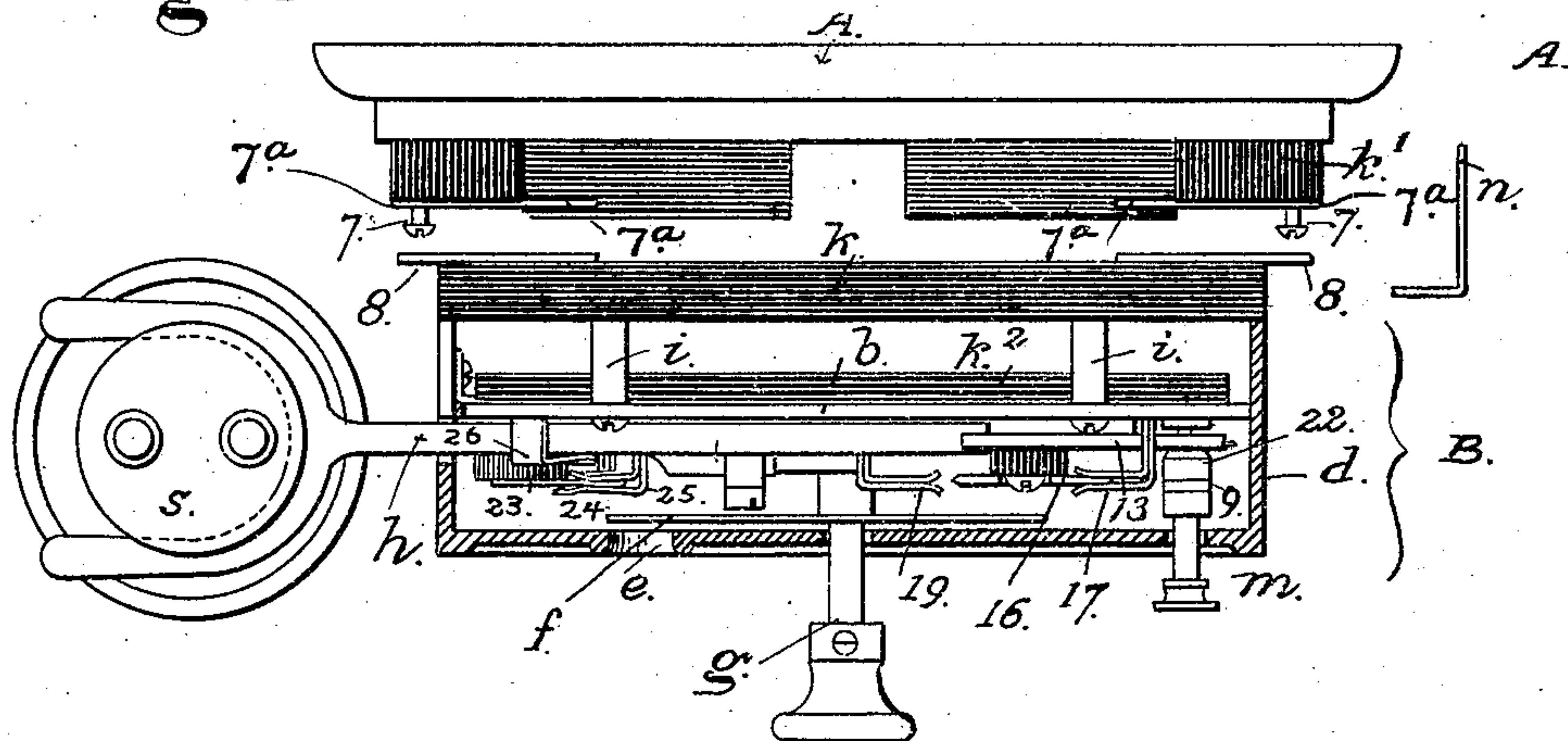


Fig. 2.



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4 SHEETS—SHEET 2.

Fig. 3.

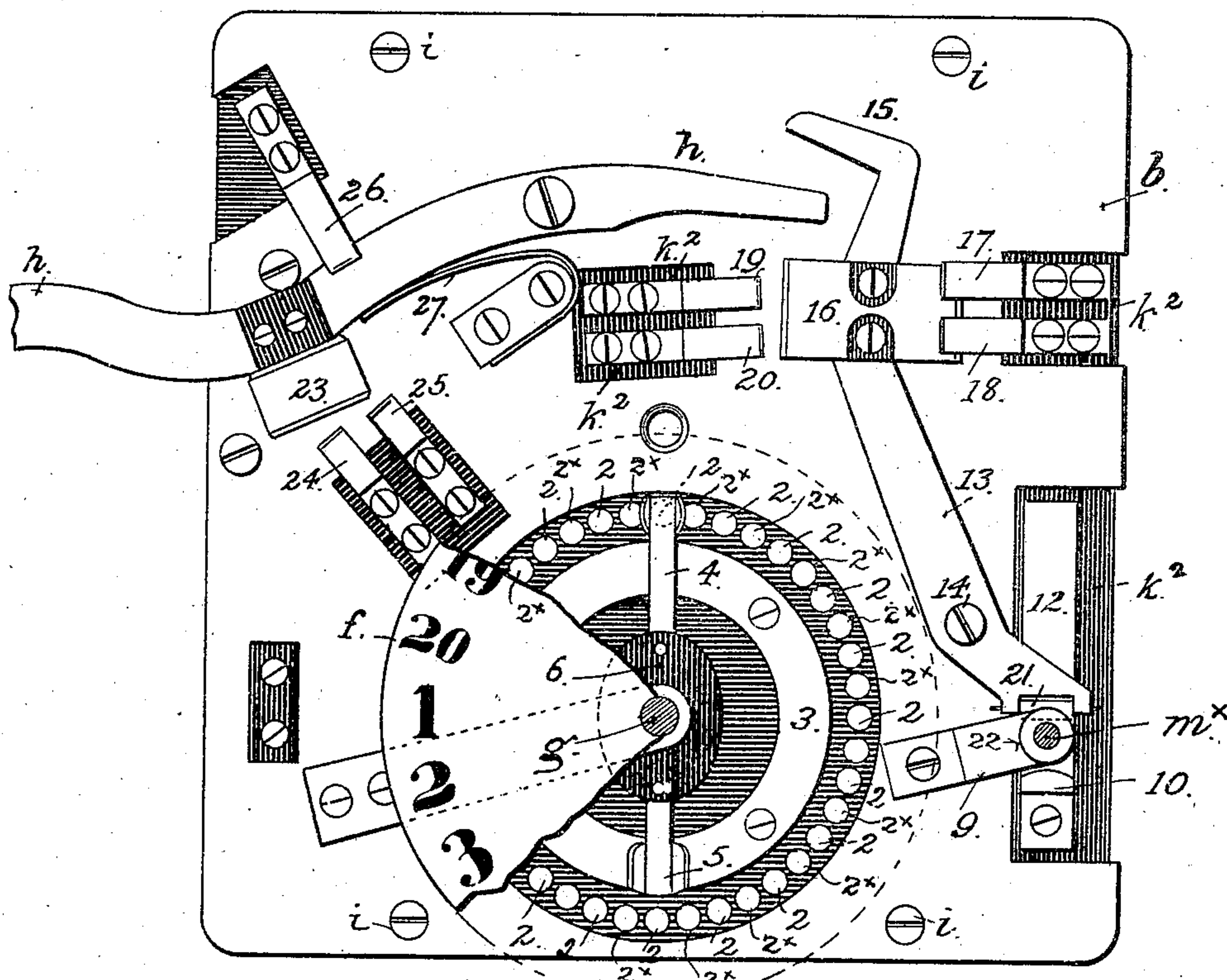


Fig. 6.

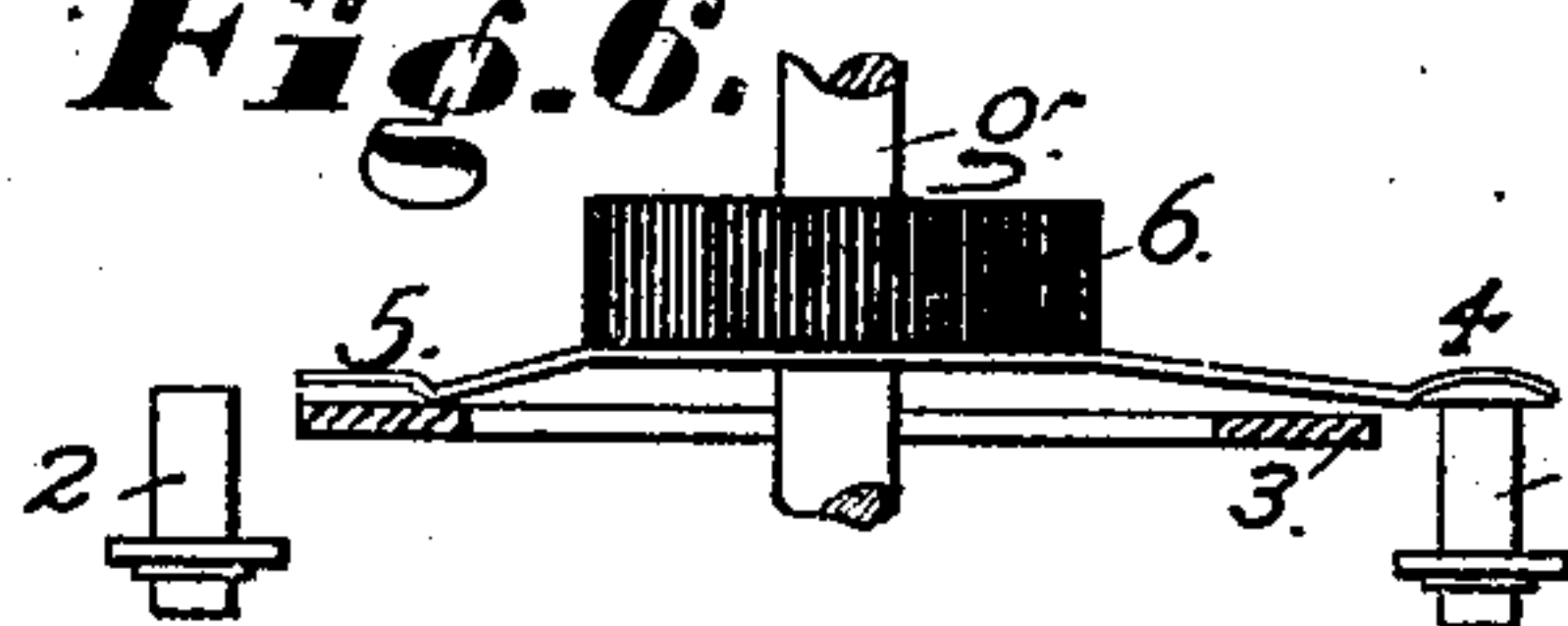


Fig. 4.

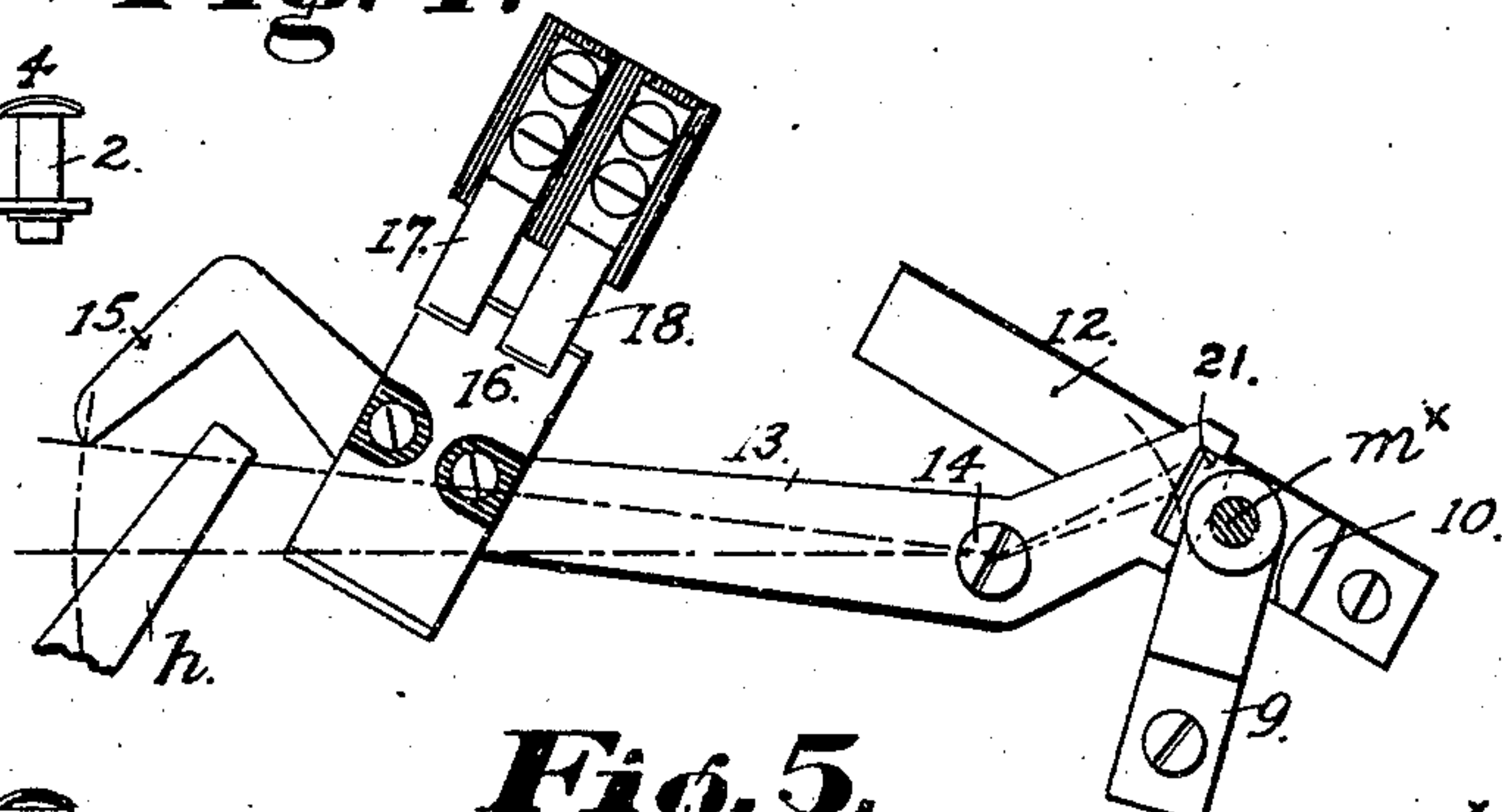


Fig. 7.

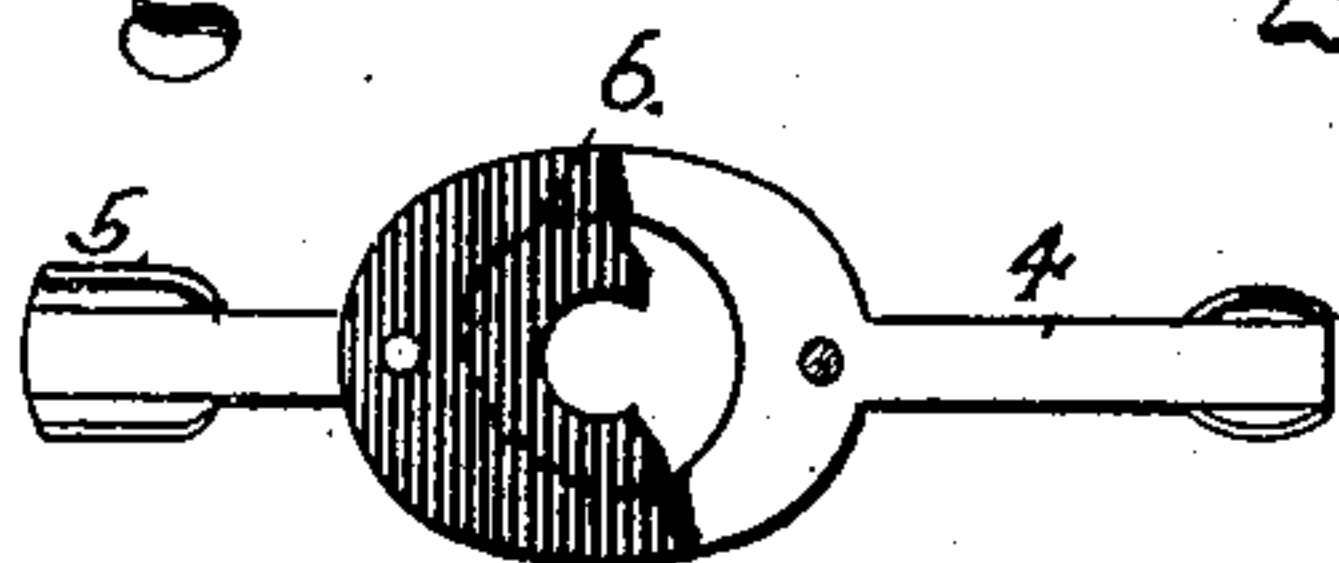
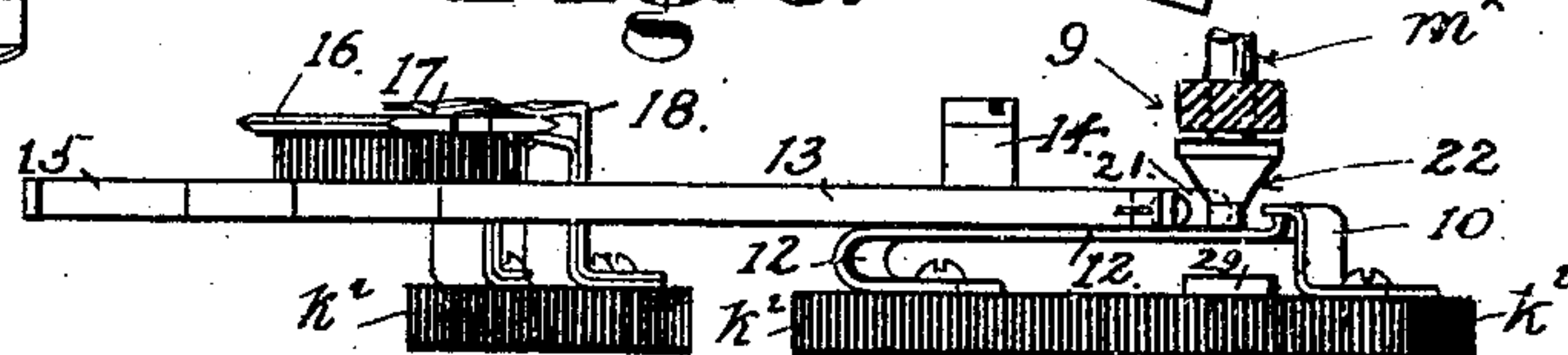


Fig. 5.



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4 SHEETS—SHEET 3.

Fig. 8.

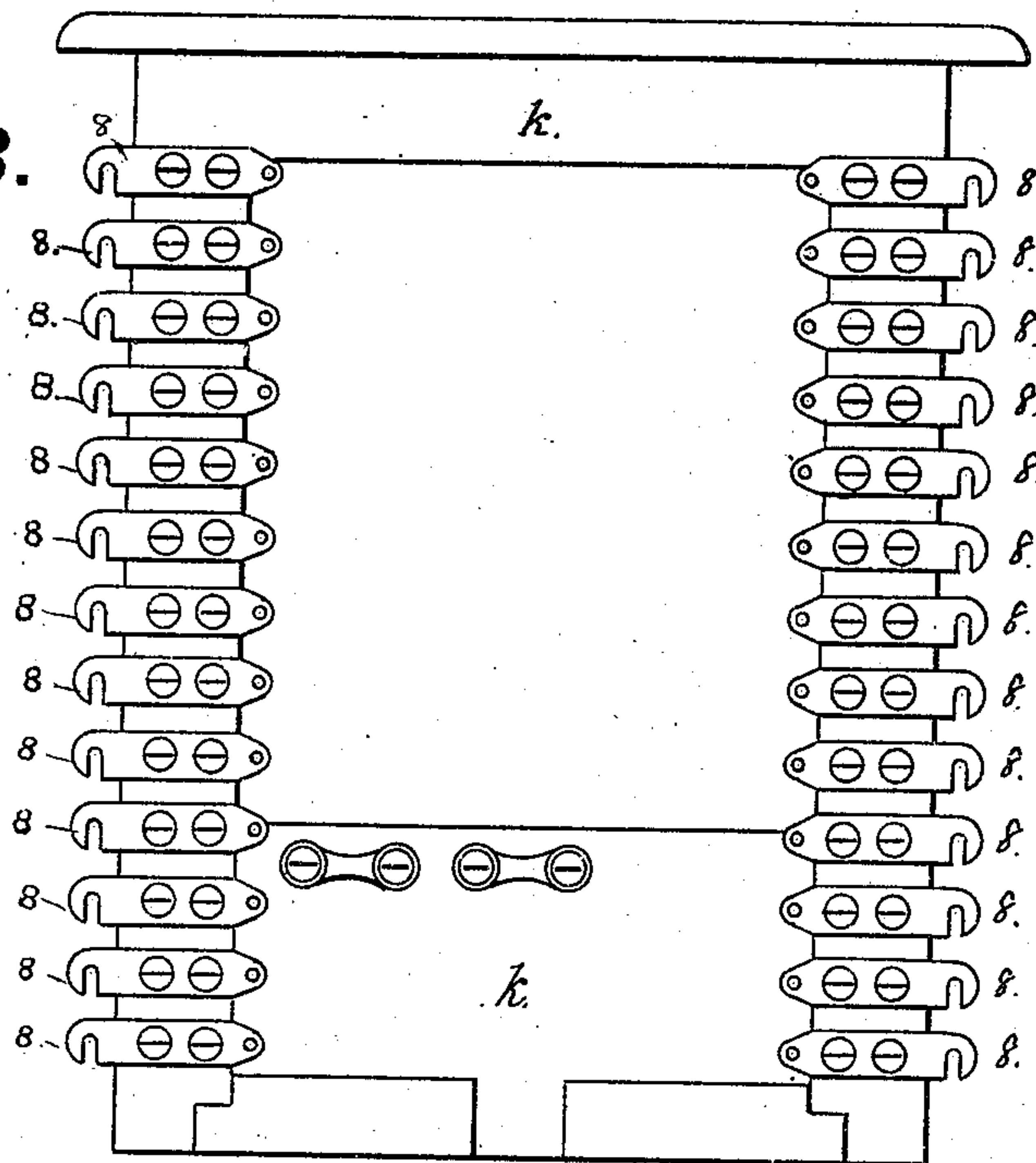
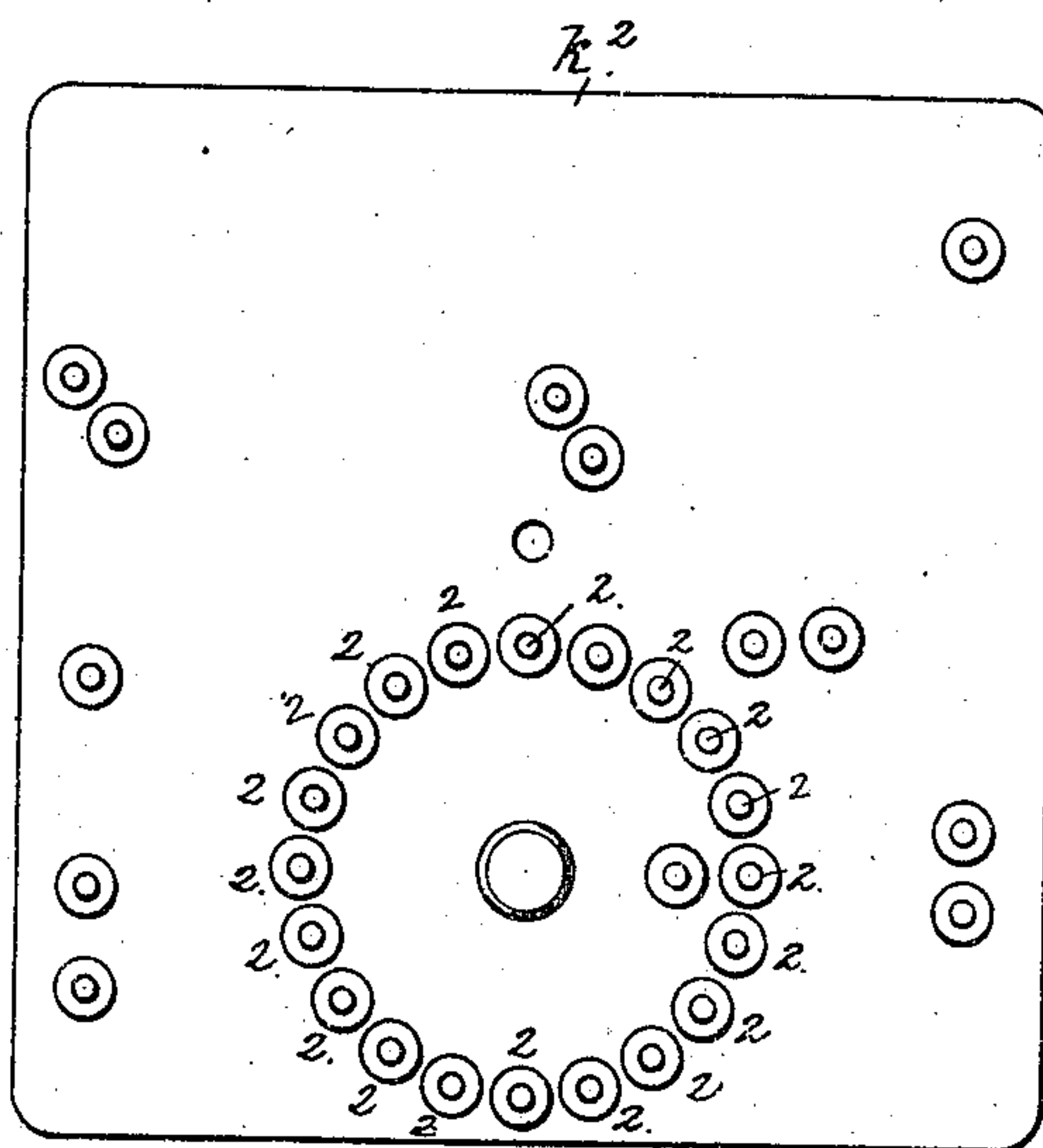


Fig. 9.



Witnesses.

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4 SHEETS—SHEET 4.

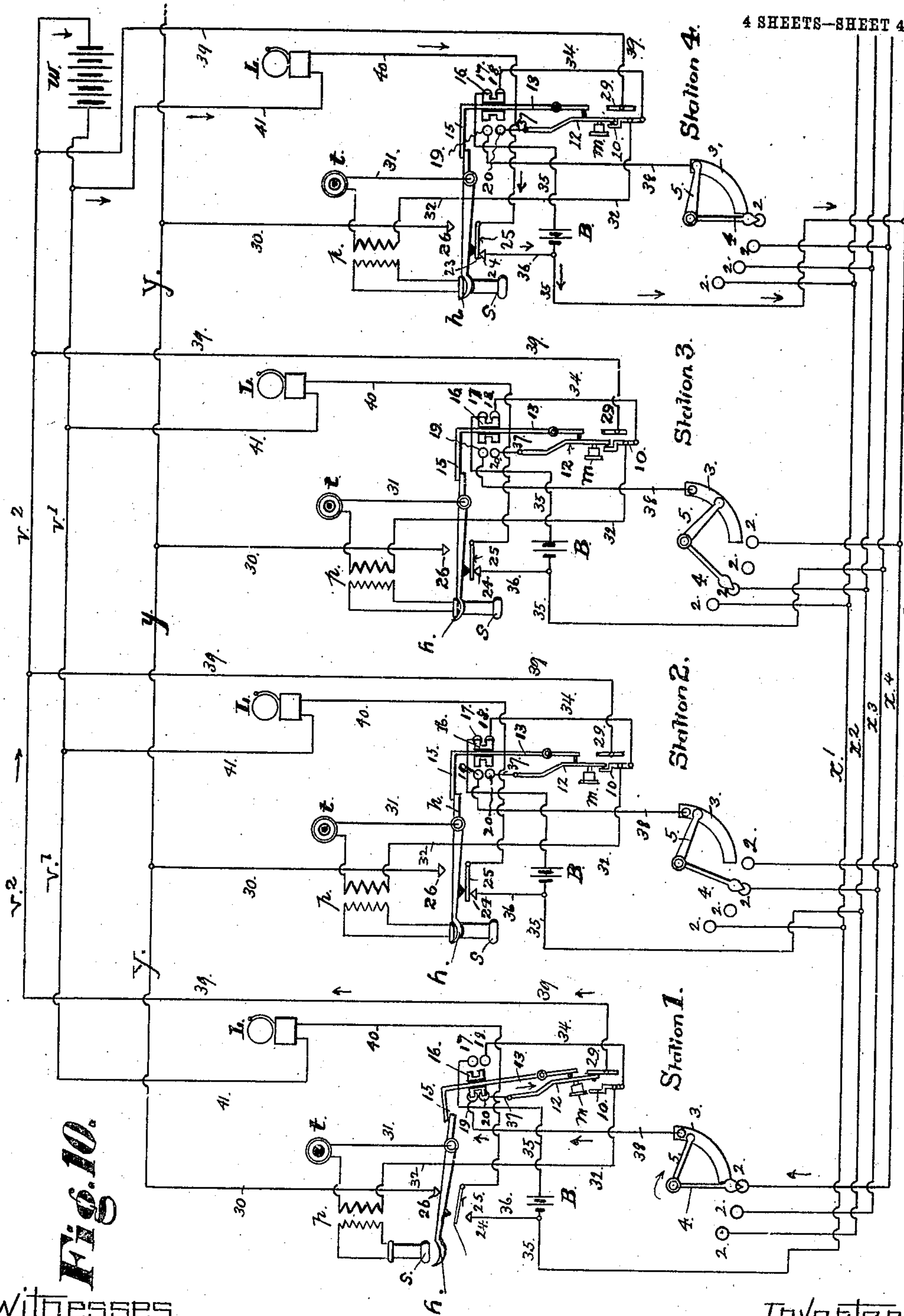


Fig. 10.

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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

No. 846,889.

Specification of Letters Patent.

Patented March 12, 1907.

Application filed March 15, 1905. Serial No. 250,153.

To all whom it may concern:

Be it known that I, ALBERT KOCH ANDRIANO, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Telephone Systems, of which the following is a specification.

This invention relates to improvements made in telephone systems of the kind that provide at every station or instrument a means for connecting with and calling up another station by the person using the telephone without the intervention of a central station and an operator. In systems of this character the necessary connection made between the line individual to a station commonly called the "home" line of the station and the primary circuit of the calling-station to complete the circuit for calling up and talking with another station is effected by means of switching devices of various forms or constructions having terminals for all the home lines and a movable switch-piece, sometimes consisting of a plug or a push-button and sometimes of a rotatable contact-piece, around which the line-terminals are arranged in a circle. The switching device most generally in use in these systems at the present time is of the last-mentioned character and is also automatic in its operation of restoring the station to its normal condition after use by the act of returning the receiver to the hook, which operation is usually effected in such rotary switch by the recoil of a spring and a controlling means, such as a pawl and ratchet, to hold the movable switch-piece in position after adjustment to a line. An automatic switch of this character, however, can be relied on to do its work only for a limited period of time where it is in constant use, for under its frequent retraction and the effects of changes in temperature the spring soon loses its resiliency and will not return the movable contact with certainty to its home line, and, again, where a switch of large capacity contains a considerable number of switch-points in the circle of contacts it becomes necessary to provide a spring of sufficient power to throw the movable contact around the entire circle, and in that case the jar or vibration produced by the arrest of the movable member at the end of its return

movement has the effect to loosen the screws and joints of the mechanism, soon rendering the switch unreliable in its return to the home line and affecting the certainty of its operation.

In the present invention the primary circuit is connected into the home line of the station outside of instead of through its switching device and in this connection is placed a circuit-controlling device that normally connects the primary circuit to its home line; but through the operation of calling up another station such controlling device makes the necessary connection between the primary circuit and the selected home line through the line-switching device. The line-selecting switch itself enters as an element in the circuit set up between two stations only at the station where the operations of switching and calling are carried on. At such time, its movable member being placed on the selected line of the station to be communicated with, it connects the primary circuit to the home line of the selected station, and the circuit between the two stations is completed as soon as the circuit-controlling device is actuated. Both sides of the talking-circuit are connected in the usual way through the telephone-hook, so that it will be opened or broken when the receiver is on the hook and will be closed when the hook is allowed to rise. Under these conditions the primary circuit at the calling-station is always disconnected from its own line conductor and is connected with or into the line of the other station through the line-switch by the act of ringing up the other station. The connections thus made are controlled by a circuit-closing device operated mechanically and so arranged between the home line and the primary circuit and also between the line-switch and the primary circuit of the station that in one position this controlling means will maintain the primary circuit on its home line ready for operation, but in another position it will cut out the home line and connect the primary circuit to the switch, and so through that part to the line of the other station. This circuit-controlling means is actuated mechanically by or through the movements of the ringing-key in such manner that the completion of the circuit after setting the

switch is made dependent on the next operation of pressing the ringing-key to call the other station.

The line-switching means being eliminated as an element in the circuit, excepting under those conditions where the station is seeking to connect with and call up another station, it is unnecessary to keep the movable member of the switch normally on any particular switch point or terminal while the instruments are not being used, as in other switching devices of similar character, and it may therefore be left at rest on any one of the switch-points. It may also be moved in either direction around the circle at the time of selecting a line without affecting the conditions under which the station can be called up and communicated with from another station.

From the foregoing description it will be seen that the invention embraces an arrangement of circuits and conductors in which the switching or connecting can be made without requiring the switch to be reset after each time of use; also, a mechanically-operated circuit-controlling means between the primary circuit, the home line, and the switching device, and cooperating therewith to control the primary circuit, and a novel arrangement of conductors and circuits through the adjustment of which a metallic circuit connecting the primary circuits of two stations is completed through the switch of the calling-station without bringing in the switch of the opposite station on the circuit, or requiring it to normally stand or to be placed on any particular line. The nature of the said improvements and the manner in which I proceed to construct, apply, and carry out the same are explained at length in the following description and pointed out in the claims at the end thereof, reference being had to the accompanying drawings, in which—

Figure 1 represents in front elevation a subscriber's outfit of the kind commonly known as a "wall-telephone," comprising a switching-device, an induction-coil, a transmitter and receiver, and a ringing-key, together with the necessary contacts and connections for the line-wires. The front of the box is partly broken away, and the transmitter is omitted in this figure. Fig. 2 is a top view of the instrument shown in Fig. 1, but with the stationary back panel and the removable front separated from each other and the casing partly in section. Fig. 3 is a view of the front plate removed from the box and showing the parts of the switch and the circuit-closing contacts that are controlled by the telephone-hook and the ringing-key, respectively. The dial of the movable contact is shown partly broken away to uncover the line-contacts of the switch beneath it. Fig. 4 is a top view of the parts composing the

circuit-closer that is operated from the ringing-key. Fig. 5 is an elevation of the same parts. Fig. 6 is an elevation of the movable contact and the stationary contacts of the switch, some parts being in section. Fig. 7 is a top view of the movable member of the switch-piece. Fig. 8 is a rear view of the removable front section of the box without the wires. Fig. 9 is a rear view of the front plate that carries the switch and its connections. Fig. 10 is a diagram of the calling and talking circuits and the mechanism of four stations in a system embodying this invention.

The line-switch and the circuit-controlling means before mentioned are contained in the box or case that furnishes a support for the induction-coil *p*, the transmitter *t* and the receiver *s*, and the ringing-key *m*. Into this box is carried the home line of every station, and out from it runs the home line of the station itself to the corresponding boxes of the other stations, each line having a contact-point in the switching device of every station but its own. Instead of terminating at a contact-point in its own switching device the home line of each station is carried around or outside of the switch in the circuit-controlling device, through the operation or adjustment of which the primary circuit is connected either into the home line or into the switching device of the station, as will hereafter be explained. According to this invention the home line of the station is closed on or connected into one side of its primary circuit, both during the time the station is not in actual use and also under those conditions where the station is called and communication is being established with it from another station. The primary circuit remains connected normally into its home line under those conditions where the home line forms one side of the main circuit between two stations; but, on the other hand, the connection with its home line is broken and the primary circuit is connected into the home line of another station by setting the switch for the purpose of communicating with that station and pressing the ringing-key. In the construction of this station outfit for operating the circuits according to my invention several novel features are involved, which I have embraced in and made the subject of a separate application for Letters Patent of even date herewith, Serial No. 250,154, and in which those features are more specifically described and claimed.

The board or panel *A* is the stationary back of the case, to be fixed in a permanent manner to the wall, whereas the front, composed of the panel *k* and the plate *b*, which it carries, is detachable and can be removed at will without disturbing the back panel.

Along the sides of the back panel a row of metallic pins *7*, separated from one another by being fixed in a block of insulating mate-

rial k' , are arranged at intervals apart along both sides of the panel. On the sides of the removable panel k are screwed metal strips 8, with hook-shaped outer ends and eyes on the opposite ends, as shown in Fig. 8.

The spaces between the pins 7 on one part being somewhat greater than the width of the strips 8 on the other part allow the strips to be set in between the studs at the time of placing one panel against the other, and then by a short downward movement of the front panel while it is thus placed with the hooks in line with the pins the two sets of couplings 7 8 will interlock and fasten the front panel to the back panel.

By using screws for the pins 7 the parts 7^a 8 can be drawn into close metallic contact after they are interlocked, and for that purpose the screws 7 are situated outside the inclosing cover d , where they can be reached and turned with a screw-driver. The front plate b is carried by pillars i , fixed on the panel k , and the latter is made of insulating material the same as the part k' of the back panel in order to separate the metallic connections on the same panel from one another. The couplings 7 8 are concealed by covering-strips n , secured by screws n' .

The various line wires and conductors to be carried into the box are soldered or tied to the ends of the metallic strips 7^a, through which the pins 7 are fixed, and in like manner the strips 8 are separately connected by different wires to the induction-coil, contact-springs, and other parts fixed on the front panel. The parts on one panel and the conductors on the other panel are therefore brought in metallic connection when the removable front panel is set in place on the back panel.

The front plate b has a backing k^2 , of insulating material, such as hard fiber, and at those parts where the switch-points 2, the circuit-closing springs 17 18 19 20, and the ringing-key stops 10 12, and other contacts 24 25 26 are placed the plate b is cut away, leaving the fiber exposed and isolating such parts from metallic contact with the plate.

The stationary switch-points 2 are set into the fiber within the circular aperture in the plate b , and in the center of the circle is pivotally mounted the movable member of the switch. This part having two contact-pieces 4 5 rides on and makes contact both with the switch-points 2 and with a continuous contact-plate 3 at the same time. The two contact members 4 5 of the switch-piece are insulated from the rotatable post g by a block of fiber 6, to which the piece 4 5 is fixed, and the post is provided with a milled head on the end outside the cover d .

The position of the movable contact 4 with reference to the contacts 2 is indicated by a dial-plate f , rotated by means of the post g beneath a sight-opening e in the cover,

and the number on the dial that appears at the aperture e corresponds to the number of the particular line-contact 2 on which the movable member 4 may be placed. All the line-contacts 2 are separated by intermediate blank contacts 2^x, insulated from the line-contacts, so as to have no electrical connection with other parts, and the blanks are placed in regular order between the contacts 2. The object of these dead stops is to prevent the movable member from touching two contacts 2 at the same moment, and thereby short-circuiting the lines having those stops for terminals. They have another advantage also in forming a support or bearing-surface for the movable contact 4 as it passes from one stop 2 to the next, and thus allowing the movable member to act with sufficient pressure upon the stops to insure a close metallic connection. Under this arrangement wherein the primary circuit is connected with its home line around and not through its line-switch and the switch performs no part in the operation of restoring the primary circuit to its own line after each time of use an additional switch is obviously required for changing the connection of the primary circuit from its home line to the line of the other station when setting up a circuit between two stations and also for restoring the primary circuit to its own line. The circuit-controlling means provided for that purpose comprises the movable connector 16 and two sets of contact-springs 17 18 19 20, placed between the primary circuit and the home-line and also between the primary circuit and the line-switch, the connections being made as follows through the front stop and the movable stop of the ringing-key for the purpose of operating the circuit-controller from or by the movement of the ringing-key and performing the two operations of ringing up and setting the circuit-controller by the one motion of pressing the ringing-key. The conductor 32 runs from one side of the primary of the induction-coil p to the front stop 10 of the ringing-key, and a conductor 34 connects that stop to the contact-spring 18 of a pair of contact-springs on one side of the movable connector 16. The remaining contact 17 in that pair is the terminal of a conductor 35, running in from the line-wire outside and forming practically the continuation of the line into the box. The line-wires of the four stations represented in the diagram Fig. 10 are distinguished by the letters x' x^2 x^3 x^4 . The contact-springs 19 20, composing the pair on the opposite side of the controller 16, are the terminals, respectively, of a wire 38, running from the continuous contact-plate 3 in the line-switch, and of a connection 37, leading from the movable stop 12 of the ringing-key to the contact 20. The part 16 is fixed on one end of the arm

13, pivotally attached at 14 on the face of the front plate *b*, so as to move in an arc and in a plane with the face of the plate. The end of the arm 13 beyond the pivot 14 is located in close relation to the movable post m^x of the ringing-key and rests under the conical face of a collar 22 on the post, so as to be moved outward at right angles to the axis of the post as the latter part is pressed against the arm by the movement of the ringing-key. A roller 21, loosely set in bearings on the end of the arm 13, reduces the frictional contact between the arm and the conical collar 22.

When pressure is applied to the post m^x , it not only brings the movable stop 12 against the back stop 29, with the effect to close the ringing circuit and to break the talking-circuit so long as the ringing-key is pressed, but it also throws the connector 16 away from the contacts 17 18 and into engagement with the contacts 19 20, thus separating the home line 35 and the primary circuit by breaking the circuit at 17 18 and connecting the latter with the line-switch (as soon as the ringing-key is released) over the following path—viz., the wire 32, the stops 10 12 of the ringing-key, the wire 37, the contacts 20 19 now united by the connector 16, and the wire 38. By the return movement of the connector, which is effected from the telephone-hook as that part is depressed, the primary circuit is restored to its home line. This is done by providing on the movable member 13 as a part thereof an angularly-bent finger 15, having its end extending over the arm *h* of the telephone-hook, or in such relation to the end of the arm *h* that the part 16 will be shifted over from right to left by the act of closing the ringing-key, provided the receiver has been removed from the hook. On the other hand, when the receiver is returned to the hook that part which lies under the finger 15 will rise and set the circuit-closer 16 into the opposite position between the contacts 17 18, thereby closing the break at 17 18 and restoring the primary circuit to its home line. Owing to the position of the arm *h* when the receiver is on the hook, the connector 16 is prevented from moving to the left and closing the break at 19 20 to complete the circuit with the station at the opposite end of the line. It becomes necessary under such conditions to remove the receiver from its hook before the calling can be done through the ringing-key, and by the act of returning the receiver to its place on the hook the station is always restored to its own line ready for being called up and communicated with from another station. The part 16 is insulated from the parts 13 and 15, as seen in Figs. 3, 4, and 5. In the construction of the ringing-key, as seen in the same figures, the lower end of the post m^x of the ringing-key rests on the movable stop 12, which being

formed of a bent spring, as shown in Fig. 5, holds up the post and touches the front stop 10 when the ringing-key is at rest. The back stop 29 is a flat strip fixed on the insulation k^2 under the movable stop 12. A stationary bracket 9, with a hole for the end of the post m^x to pass through, forms a guide for that part, and the conical collar 22 is fixed on the post below the guide.

In the system herein described the battery of each station is always on an open circuit, except at the time a circuit is completed with another station, and it is not necessary to provide special circuit-closing devices to open the battery-circuit when the receiver is returned to the hook. The bell-circuit at every station is composed of conductors 40 36, connecting one side of the bell *L* into the home line 35 outside the battery *B*, a connection 41 from the remaining side of the bell to one conductor V' of the common ringing circuit $V' V^2$ and a conductor 39 making the necessary connection of the back stop 29 into the ringing battery. This gives a circuit through the bell of the other station at the moment that the movable stop 12 at the calling-station is caused to touch its back stop. In the connection between the bell and the home line are two contacts 24 25 in close relation to a switch-piece 23, carried by the arm of the hook *h*, but insulated from it, as seen in Fig. 3, so as to open or close the circuit through the connections 36 and 40 between the line and the bell as the hook rises or is depressed. Thus by the act of removing the receiver for ringing up another station the bell-circuit of the calling-station is opened, and by returning the receiver the bell is restored to its home line. Through the same movements of the hook *h* also connection with the return-conductor γ common to the several stations is made and broken in the well-known way, the hook *h* being made a conducting element connecting with the transmitter, as indicated at 31 in the diagram, and placing above the hook a contact-stop 26, from which a conductor 30 runs out from the box to the return-conductor γ . Before a station can be called its primary circuit must be on its home line and the hook must be depressed to close the bell-circuit at 24 25. The switch 4 5 at the calling-station then being set on the proper contact 2, at which the home line of the selected station terminates, a partial circuit is formed through one side of the controlling-switch from the contacts 19 20, over the conductor 38, through the contact-plate 3 and the movable member 4 5, and over the line to the other station.

In the diagram Fig. 10 the line-switch 4 5 of station 1 is set to the home line x^4 of station 4, and the circuit over that line is traced to the bell *L*, over the connections 35, 36, and 40, and from the bell to the side v' of the ringing battery, the remaining

side of the ringing circuit being composed of the conductor v^2 and the connection 39 to the back stop 29 of the ringing-key is completed through the movable stop 12 of the ringing-key, the connections 37 and 38, and the circuit-closing members 3 4 5 of the line-switch to the line-wire x^4 as soon as the ringing-key m is pressed. The same movement of the ringing stop also shifts the connector 16 from the contacts 17 18 into the contacts 19 20, thus making the necessary connection between the conductors 37 38 to complete the ringing circuit and by the same movement cutting out the home line and the battery of the calling-station. Before the ringing stop is pressed the hook is allowed to rise by taking down the receiver, and the circuit for talking is thereupon completed by the hook making contact with the stop 26. The bell-circuit is opened at the contacts 24 25 as the hook rises, and the return of the ringing stop against the front stop completes the circuit for talking. The normal position of the circuit-controller 16 is against the contacts 17 18, where it completes the connection of the home line with one side of its primary circuit over the conductors 34 32, and it will be noticed that the switch of which the conductor 16 forms the movable member is actuated only at the calling-station, where it is operated to cut out the home line and the local battery at that end and connect the primary circuit into the home line of the other station. Both stations are then in communication with each other over the closed circuit composed of the home line x^4 of the called station and the return-conductor y common to the two stations when both receivers are off their hooks. The circuits between stations 1 and 4, Fig. 10, will then be traced as follows: from the primary of the induction-coil p at the calling-station 1, through the connections 32, ringing stops 10 12 to the contacts 19 20, thence over the conductor 38 to the contact-plate 3 of the line-switch, and through the movable contacts 4 5 of that part to the home line x^4 of the called station 4. At the opposite end of the circuit, the line 35 being closed on the connection 34 through the connector 16, which is in its normal position, the home line of station 4 is connected to one side of its primary circuit through the connections 34 32, and as the remaining side 31 of the primary circuit of each station is closed on the return-conductor y through the hook h and the connection 30 of the station it will be obvious that both sets of transmitters t and induction-coils p will be included in the circuit having for one side the home line of the station being called and for the other side the return-conductor common to both stations. The current on this circuit is thus supplied from the battery on the line at the called station. It should be mentioned also

that the receiver s is in closed circuit with the secondary of the induction-coil.

The diagram Fig. 10 represents the condition of the circuits between station 1 and 4 when the ringing circuit is closed by pressing the ringing-key at station 1. The movement of that part has shifted the connector 16 from one set of circuit-changing stops to the other, thereby connecting the primary circuit of station 1 into the line conductor x^4 , leading out from the line-switch to station 4. At that station the ringing circuit is closed on the bell L , because the hook is down; but it will be opened and the circuit for talking will be completed as soon as the hook is allowed to rise and complete the circuit by touching the return-conductor stop 26. The line-switch at that end of the line thus performs no part in the operation of setting up the talking-circuit between the two stations, and it may stand in any position without affecting the conditions.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a telephone system, stations having each a line, a switching device containing terminals for the line of every station excepting its own line, a primary circuit including a battery and the primary windings of an induction-coil, a return-conductor to which one side of the primary circuit is connectible at will, a ringing circuit including a ringing-key and a movable switch-piece operating to connect the ringing-key in circuit with the line of any selected station and circuit-connecting means between the primary circuit and the line, operating when the ringing circuit is closed by actuating the ringing-key to disconnect the primary circuit from its battery and from the line of its own station, and to establish, when the ringing circuit is broken at the calling-station, a connection between the primary circuit and the switch-piece.

2. In a telephone-switch, line-circuits comprising a line for each station and a return-conductor common to a plurality of the stations, a primary circuit at each station, a switching device containing terminals of all the lines excepting the line of the station itself, a movable switch-piece, a ringing circuit including a ringing-key at each station having a contact-stop connected into one side of the ringing circuit, and a second contact-stop connectible in circuit with the line of a selected station through the movable switch-piece, an adjustable circuit-connecting means operating to disconnect the primary circuit from the line of its own station and connect it into the line of another station through the switching device when the ringing circuit is broken at the calling-station, and means for breaking such connection and restoring the primary circuit to the line of its own station separately of the switch.

3. In a telephone system, the combination

with stations each having a line, a primary circuit including a battery and inductive apparatus, and means for connecting the remaining side of the primary circuit into the corresponding circuit of another station through a return-conductor; of circuit-controlling apparatus for disconnecting the inductive apparatus of the station from its own line and connecting it into the line of another station, a means for establishing a calling-circuit between said stations, including a key for closing said circuit and means for actuating the circuit-connecting apparatus by the movement of said key.

4. In a telephone system the combination of a calling-circuit including a signal at each station and circuit-closing device operating to close the calling-circuit, line-circuits comprising a home line to each station and a return-conductor common to a plurality of stations, a primary circuit, a source of energy, circuit-selecting devices having stationary contact-points and a movable contact, and means actuated by the movements of the calling-circuit-closing device operating to disconnect the primary circuit from its own line and its source of energy, and connect it into said movable contact by the act of transmitting a signal to the selected station.

5. In a telephone system, stations having each a primary circuit, line-circuits normally open at every station and comprising a home line to each station into one side of which the primary circuit is normally and directly connected, a return-conductor and means for connecting the remaining side of the primary circuit into the return-conductor; in combination with a ringing circuit common to said stations, including an electrically-actuated signal, a battery a calling-circuit-closing key and circuit-selecting means for bringing the home line of a selected station into relation with the battery and the signal of such station to actuate the signal, and means actuated by the circuit-closing key to cut off the primary circuit of the station from its own home line and connect it into the home line of the selected station by the act of closing the ringing circuit.

6. In a telephone system, the combination with line-circuits comprising a home line for each station and a return-conductor common to a plurality of the stations; of a line-switch at each station containing stationary contacts for the home lines of the other stations, a movable switch-piece, a primary circuit including a battery, said primary circuit being normally connected into its own home line and means for disconnecting the primary circuit from its home line and connecting it into a selected home line through the movable switch-piece.

7. In a telephone system, stations having primary circuits and sources of current, line-circuits consisting of a home line to each pri-

mary circuit containing a source of current and a return-conductor which is common to a plurality of the primary circuits, means normally connecting the primary circuit into its own home line, means for closing the said circuit on the return-conductor, the line-selecting switches, calling-circuits including a calling-signal at each station normally connected into its own home line, a source of calling-current with one side of which the calling-signal is permanently connected, circuit-closing devices at each station operating to connect the home line of any other station into the remaining side of the source of calling-current to transmit a calling-current over the circuit completed between one station and another through the selected home line, and means controlled by the calling-circuit-closing device and operating to disconnect the primary circuit from its home line and source of current thereon.

8. In a telephone system, a primary circuit, including inductive apparatus and a source of current, a home line with which one side of the primary circuit is directly connected, a return-conductor and means for connecting the remaining side of said circuit into said conductor; in combination with a switching device comprising a series of stationary contacts which are the terminals of the home lines of other primary circuits, and an adjustable contact freely movable in either direction over said stationary contacts, and circuit-controlling means operating by one adjustment to connect the primary circuit into its own home line, or by another adjustment into the home line of another primary circuit through the said switching device.

9. In a telephone system, normally open line-circuits comprising a home line for each station and a return-conductor, a primary circuit including a source of current on each home line, a line-switching device containing stationary contacts arranged in a circle and comprising terminals of the individual home lines of all the stations but the one at which the switching device is situated, and provided with a rotatable contact-piece movable in either direction at will around the circle of stationary contacts, means for transmitting a signaling-current from one station to another selected station, including a signal normally connected into the home line at each station and a common source of current and circuit-closing devices operating to complete a circuit for the transmission of a signaling-current by closing at the selecting-station the home line of the selected station on the source of such current, means actuated by the said ringing-circuit-closing device for cutting out the home line and the source of current of the primary circuit at the selecting-station and connecting said circuit into the movable contact of its line-switch, and means for com-

pleting the line-circuit through the return-conductor.

10. In a telephone system, the combination with a plurality of stations having each
5 a primary circuit and a source of current, of normally open line-circuits comprising a home line for each station, and a return-conductor common to a plurality of stations, means at each station operating to connect
10 at will the primary circuit of the station into the home line of another station, means for transmitting a signaling-current over the selected home line, and means actuated by said signal-transmitting means for cutting out the
15 battery and home line at the signaling-station and completing the line-circuit through the primary circuit so as to include the home line of the selected and signaled station and the source of current on such home line.

20 11. In a telephone system line conductors arranged to form metallic circuits, line-selecting means at each station by the operation of which a circuit for calling is completed over the selected lines to the opposite station
25 on the circuit, a calling-circuit-closing key, a circuit-controlling device by the operation of which a circuit for talking is completed with the opposite station, means for actuating the

circuit-controlling device from the movements of the calling-circuit-closing key, and
30 means operating to lock the said key by the act of hanging up the telephone-receiver and to release it for action by removing the receiver for use.

12. In a telephone system, line conductors, a line-switching device for setting up a
35 calling-circuit with another selected station, a calling-circuit-closing key, means for controlling the completion of a talking-circuit with the called station and operating to complete the same by the act of operating the
40 calling-circuit-closing key, and means for controlling the operative condition both of the calling-circuit-closing key and the talking-circuit-controlling device to lock the same
45 while the telephone-receiver is hung up and to release the said device when the receiver is removed for use.

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

ALBERT KOCH ANDRIANO.

Witnesses:

B. W. MORGAN,
A. V. B. DAVIS.