

No. 830,653.

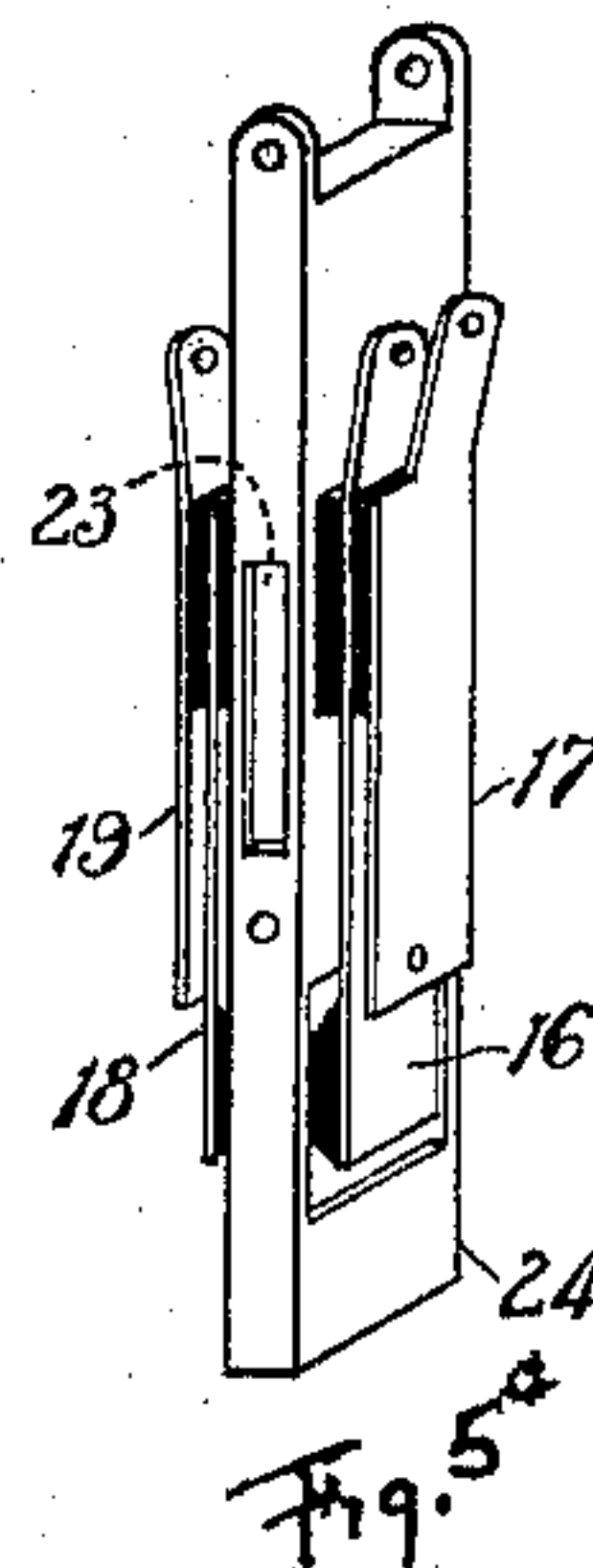
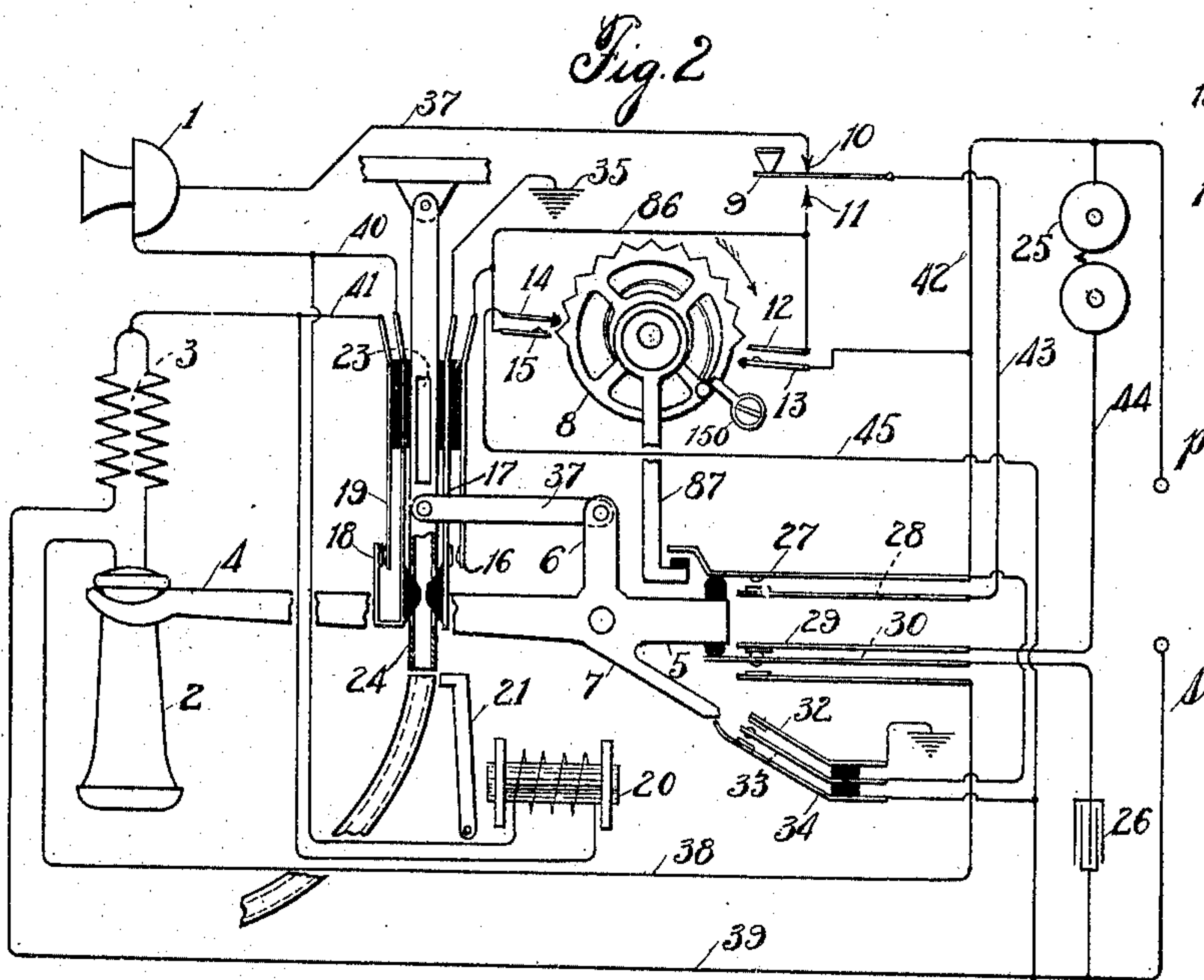
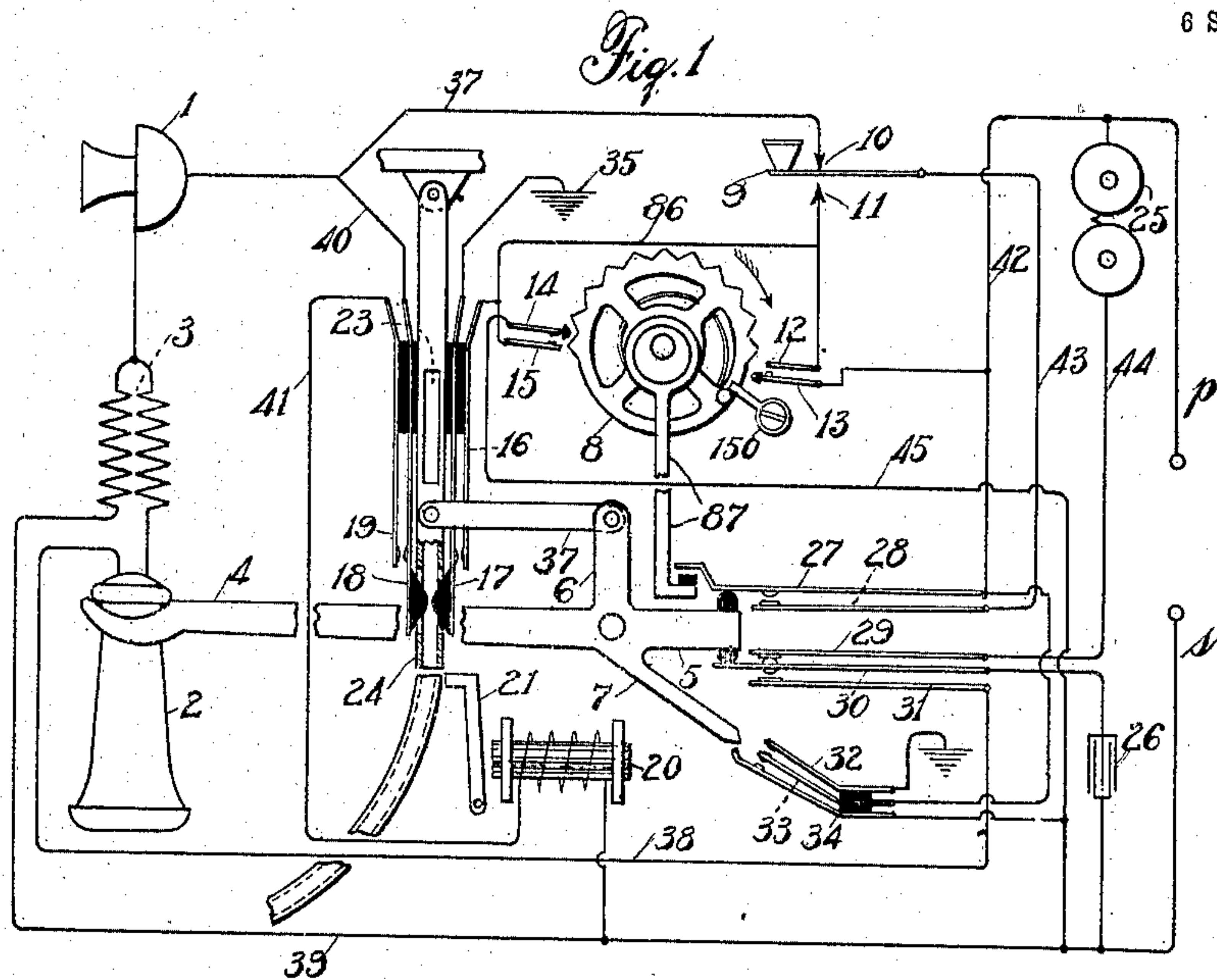
PATENTED SEPT. 11, 1906.

A. H. DYSON.

TELEPHONE PAY STATION DEVICE AND SYSTEM.

APPLICATION FILED DEC. 30, 1904.

6 SHEETS—SHEET 1.



WITNESSES:

L. D. Kierog  
H. C. Mueller.

INVENTOR.  
Alfred H. Dyson

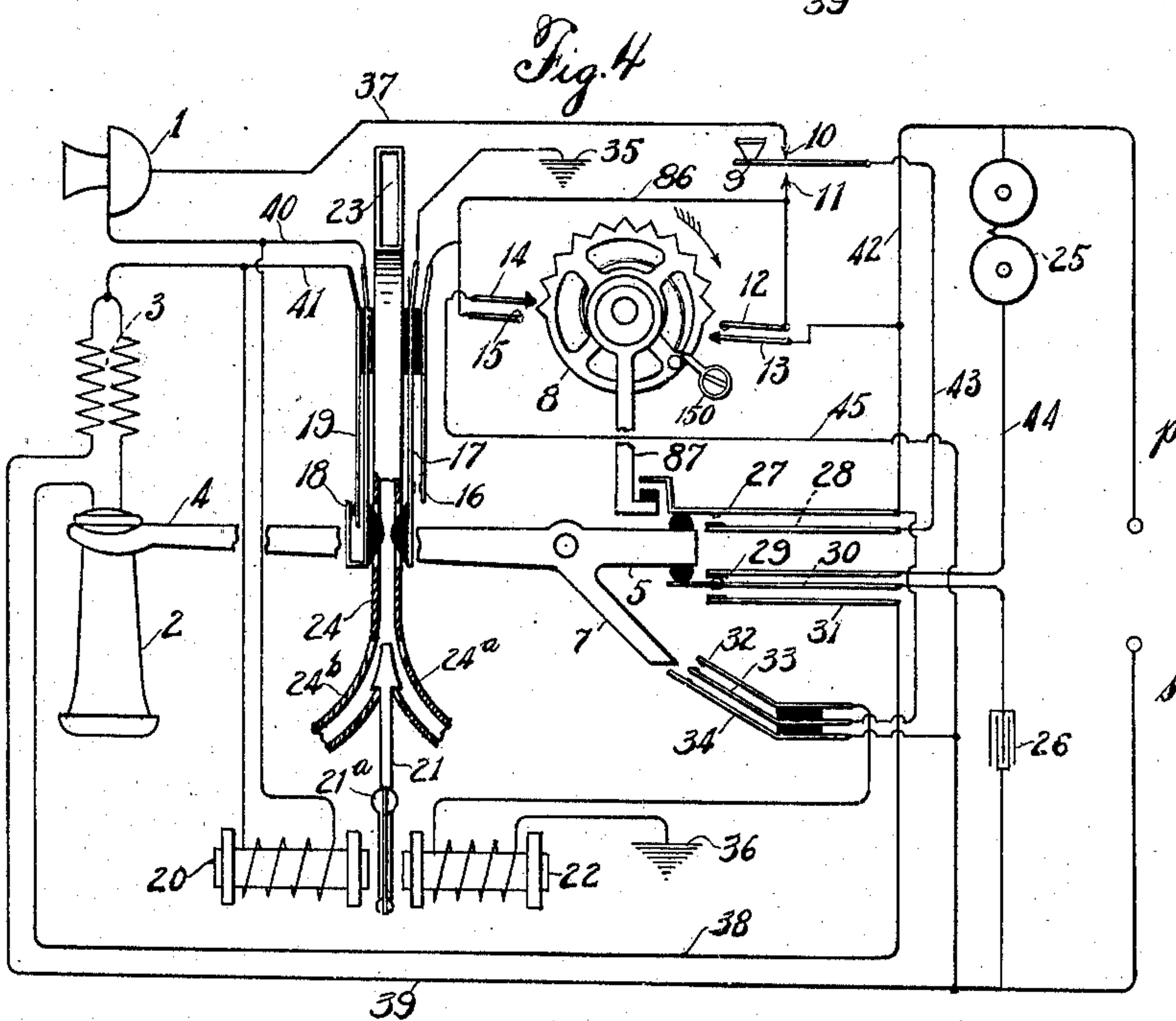
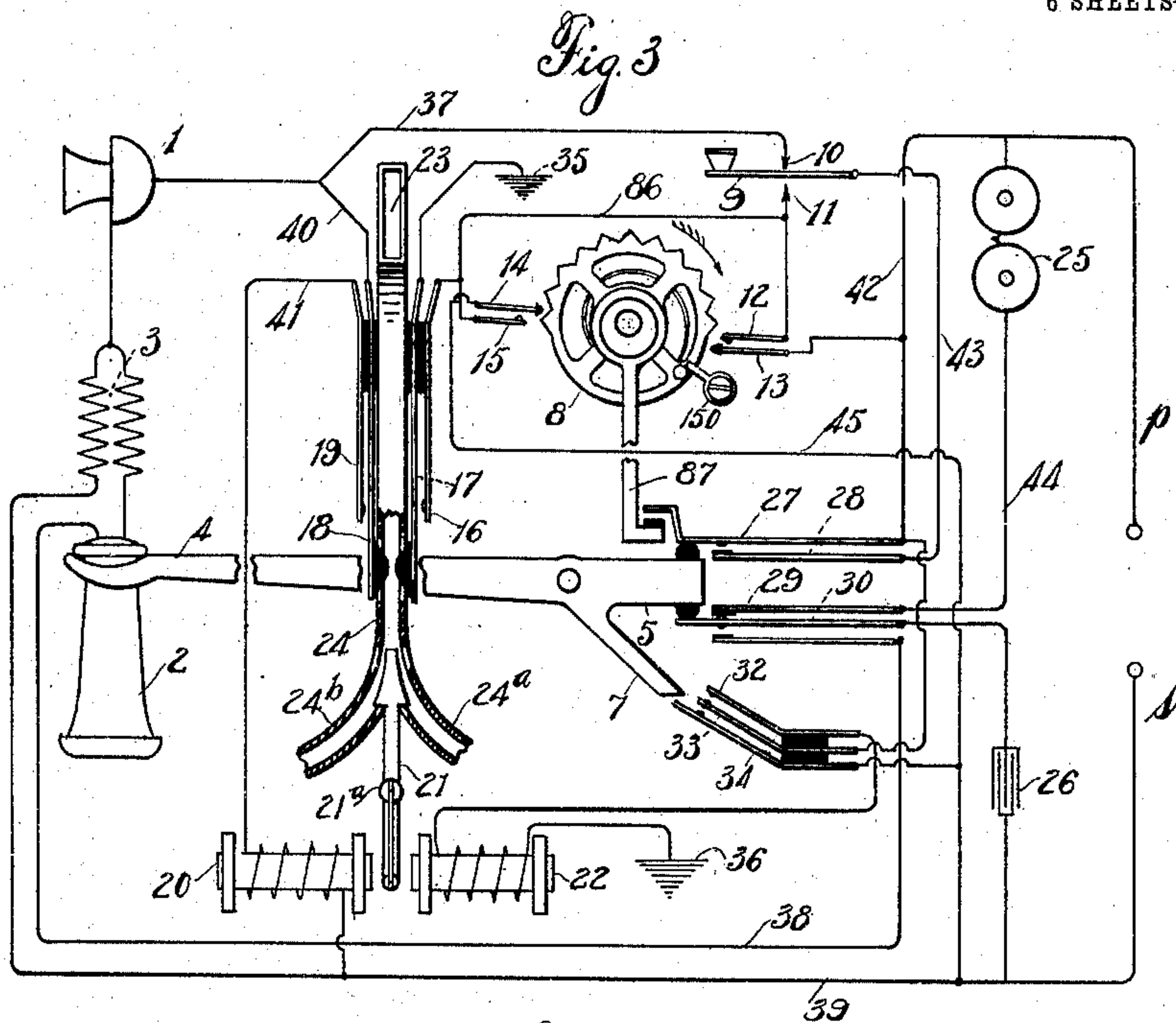
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WITNESSES:

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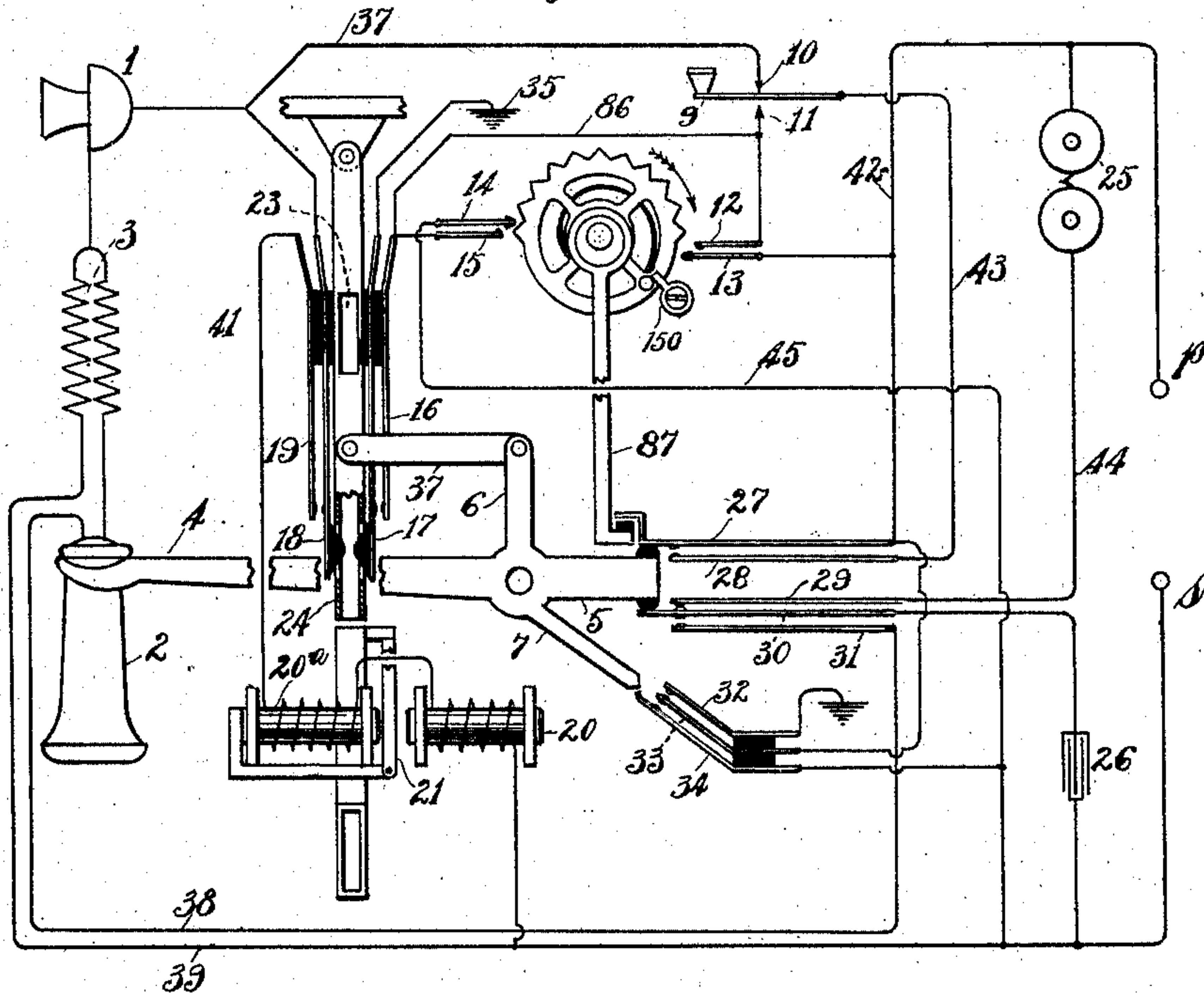
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TELEPHONE PAY STATION DEVICE AND SYSTEM.

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6 SHEETS—SHEET 3.

Fig 5



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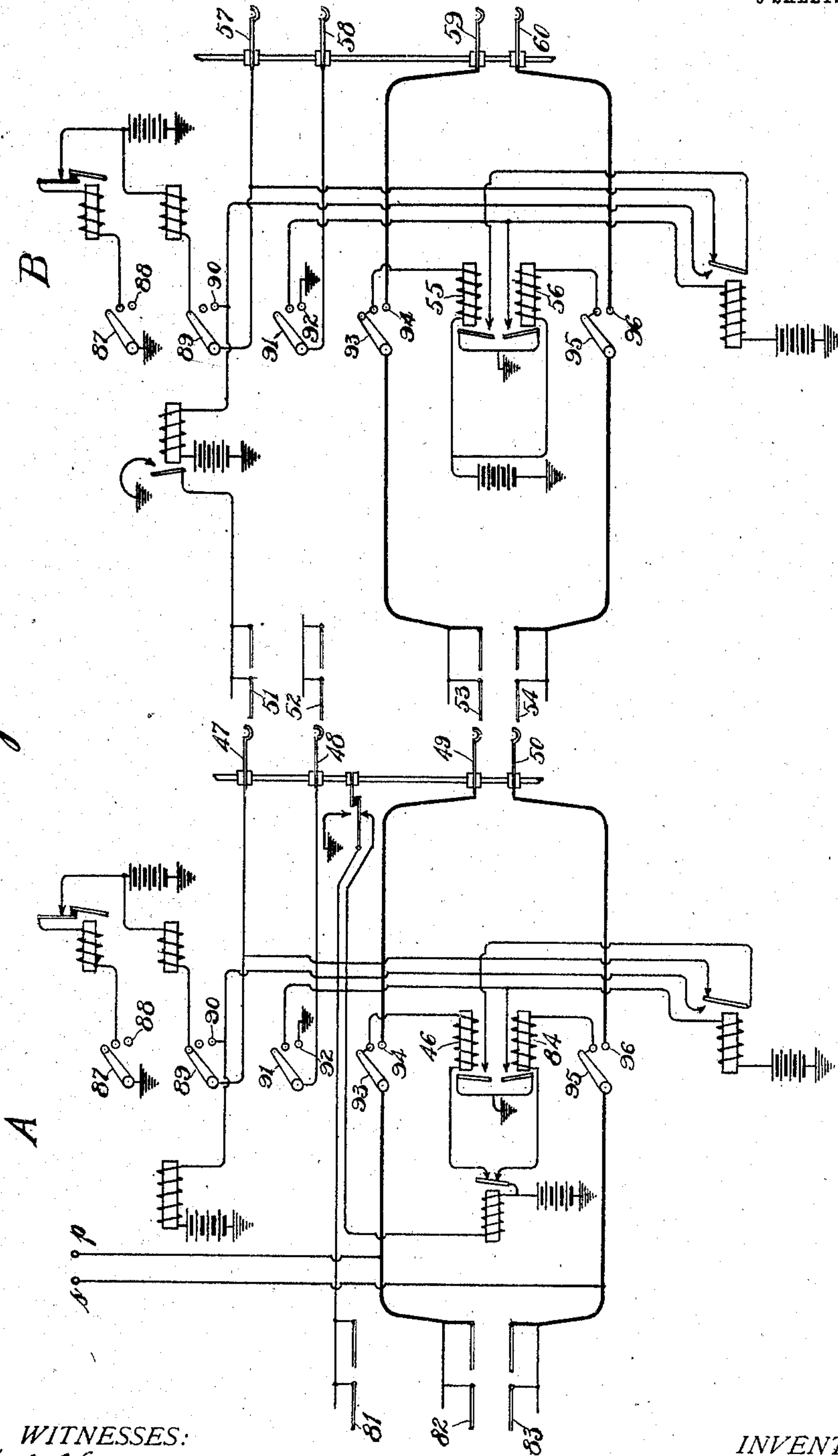
PATENTED SEPT. 11, 1906.

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TELEPHONE PAY STATION DEVICE AND SYSTEM.

APPLICATION FILED DEC. 30, 1904.

6 SHEETS—SHEET 4.

*Fig. 5—sheet 1*



WITNESSES:

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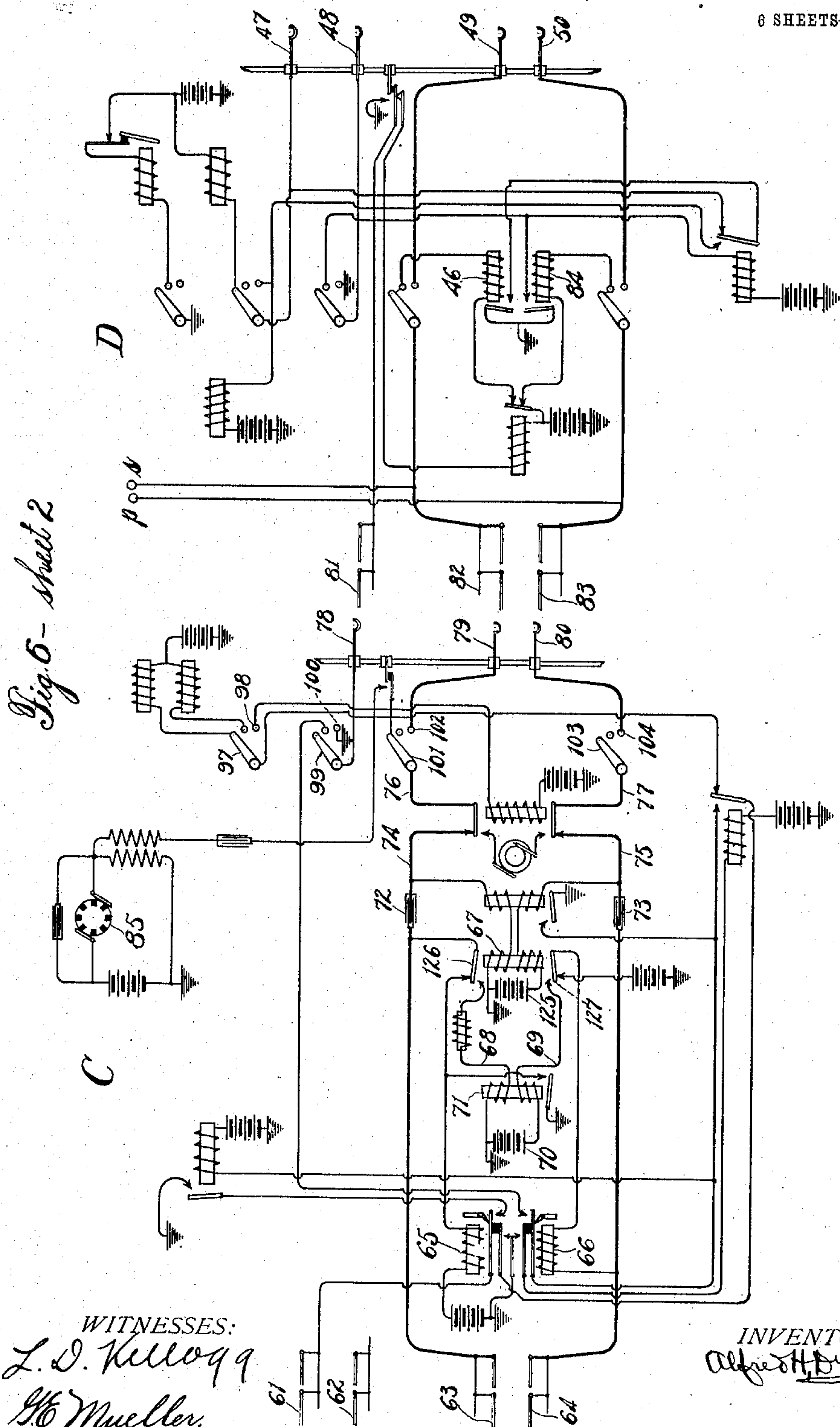
PATENTED SEPT. 11, 1906.

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TELEPHONE PAY STATION DEVICE AND SYSTEM.

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6 SHEETS—SHEET 5.



*WITNESSES:*

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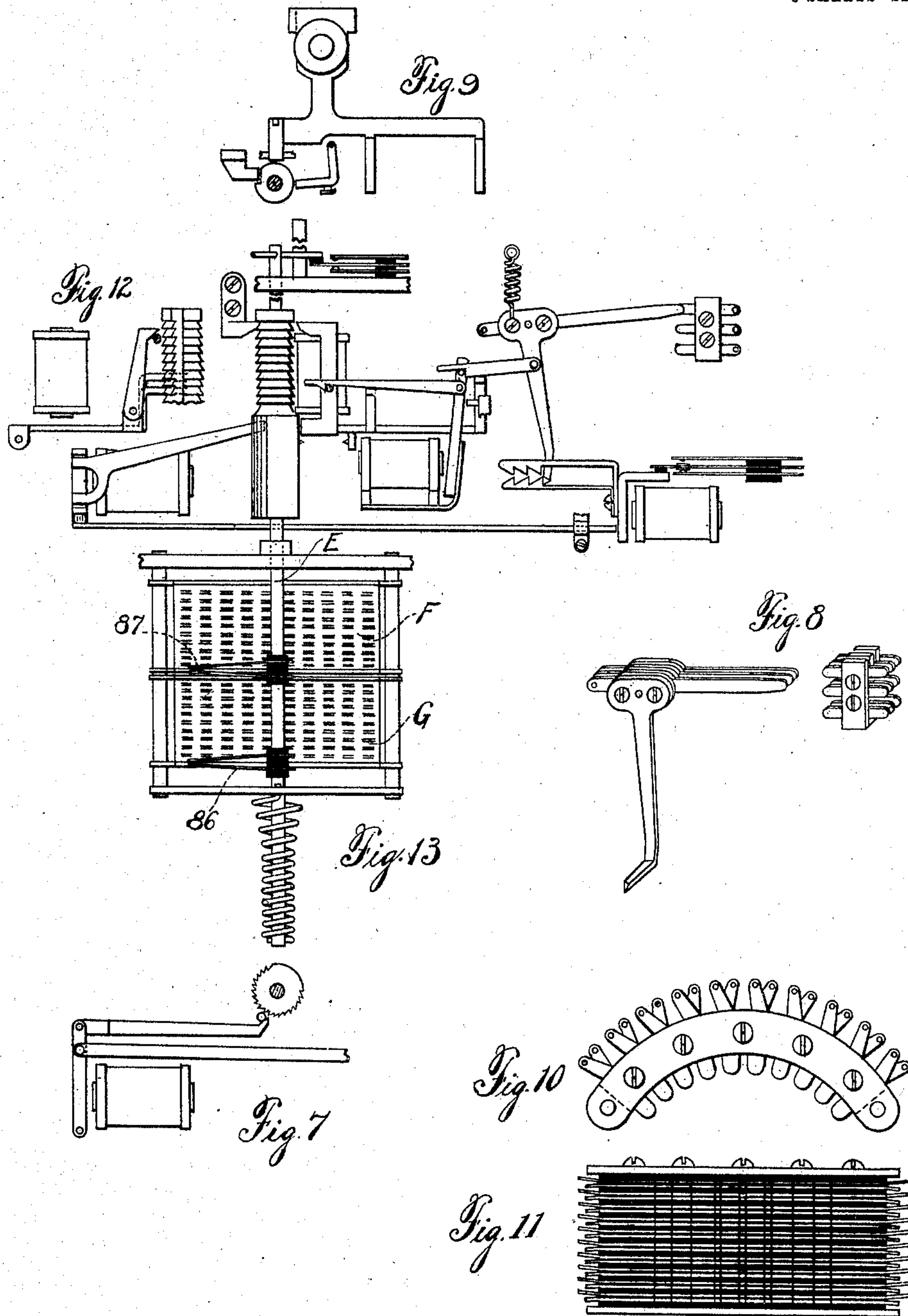
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TELEPHONE PAY STATION DEVICE AND SYSTEM.

APPLICATION FILED DEC. 30, 1904.

6 SHEETS—SHEET 6.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

ALFRED H. DYSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO MILO G. KELLOGG, OF CHICAGO, ILLINOIS.

## TELEPHONE-PAY-STATION DEVICE AND SYSTEM.

No. 830,653.

Specification of Letters Patent.

Patented Sept. 11, 1906.

Application filed December 30, 1904. Serial No. 238,911.

*To all whom it may concern:*

Be it known that I, ALFRED H. DYSON, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented new and useful Improvements in Telephone-Pay-Station or Call-Registering Devices and Systems, (Case No. C<sup>2</sup>), of which the following is a specification.

My invention relates particularly to pay-station devices of a type requiring the subscriber to deposit a coin or token in the pay-station associated with his instrument in order to place his substation in position to make a call. I provide means by which the coin or token is returned to the subscriber in case a connection is not obtained and means by which the coin or token is deposited in a receptacle at the substation in case a connection is obtained.

An object of my invention is to secure a superior arrangement to the arrangements of this general nature heretofore known in the art.

In accordance with my invention I provide an arrangement at the subscriber's station requiring the subscriber to deposit a coin before sending in his call. In case a connection is obtained the answering subscriber by his act of answering the call, ordinarily by the removal of his telephone from its hook, deposits the coin in the receptacle provided for it. In case a connection is not obtained the calling subscriber, by placing his telephone upon its hook, causes the coin to be returned to himself.

Various other features of my invention will appear in the following detailed description. I shall describe my invention in connection with an automatic telephone-exchange system, but do not restrict myself to the application thereof to the system described, as arrangements will readily suggest themselves to those skilled in the art, by which my invention may readily be applied to and used in connection with telephone systems of varying description.

Referring to the drawings, Figure 1, Fig. 2, Fig. 3, Fig. 4, and Fig. 5 illustrate diagrammatically five different arrangements of substation apparatus embodying my invention. Fig. 5<sup>a</sup> is a view in perspective of a coin-slide adapted to be used in connection with my invention. Fig. 6, consisting of Sheets 1 and 2,

illustrates symbolically automatic telephone-exchange-switchboard apparatus adapted to operate in connection with the substation arrangements illustrated in the preceding figures. Fig. 7 is a detail view of the rotary magnet of the switch, Fig. 13. Fig. 8 illustrates the side switch mechanism thereof. Fig. 9 is a top view of the vertical magnet and its parts. Fig. 10 is a top view of a contact-bank, and Fig. 11 a front view thereof. Fig. 12 is a side view of the vertical magnet of the switch. Fig. 13 is a general view of a switch adapted for use in connection with the circuits shown in Fig. 6.

Like characters refer to like parts in the several figures.

Referring first to Fig. 1, I show substation apparatus consisting of transmitter 1, receiver 2, induction-coil 3, a pivoted switch-hook consisting of long lever-arm 4 and short lever-arms 5, 6, and 7, bell 25, condenser 26, a calling device consisting of dial 8 and its associated springs 12, 13, 14, and 15, and a pay-station device consisting of the slide 24, its associated springs 16, 17, 18, and 19, and electromagnet 20 with its associated armature 21. Assuming that the subscriber desires to make a call, he first removes his telephone from its switch-hook, the long arm 4 of which moves in an upward direction turning on the pivot. The short lever-arm 6 being pivoted to arm 37 and moving backward draws the end of coin-slide 24 so that it rests upon armature 21 in such a manner that when a coin is placed in slot 23 it will descend by gravity until it rests upon the said armature 21. The subscriber now deposits the coin, which descends, as described, and when it reaches armature 21 it presses outward spring 18 to make contact with spring 19, thereby bridging the winding of electromagnet 20 between conductors 37 and 39. It also presses outward spring 17 to make contact with spring 16, thereby connecting ground 35 to conductor 86.

Upon the removal of the telephone from the hook as described the movement of lever-arm 5 closed contact between springs 27 and 20, broke contact between springs 29 and 30, and closed contact between springs 30 and 31. Lever-arm 7 moved to a position below spring 34 such that when the receiver is replaced on the hook the said arm



will close a temporary contact between springs 32, 33, and 34. Referring now to the dial 8, this is so constructed as to be movable by the subscriber in the direction indicated by the arrow and when released returns of its own accord in the opposite direction until it reaches the position illustrated, when its motion is arrested by stop 150. It will be seen that when the subscriber has revolved the dial in the direction of the arrow the return thereof will cause contact between springs 13 and 12 to be made and broken as many separate times as the subscriber has moved teeth on the dial past the spring 13. With the return of the dial to normal contact will be made and broken a single time between springs 14 and 15 at a time subsequent to the breaking of the last contact made between springs 13 and 12. The contacts between springs 13 and 12, as described, cause a number of momentary ground connections to be made to limb *p* of the telephone-line, depending upon the extent to which the dial has been revolved. The path may be traced as follows: from ground 35, through contact between springs 17 and 16, conductor 86, contact between springs 13 and 12, and to limb *p* of the telephone-line. The contact between springs 15 and 14, as described, causes a single momentary ground connection to be made to limb *s* of the line, the path of which may be traced as follows: from ground 35, contact between springs 17 and 16, contact between springs 14 and 15, over conductor 45, to limb *s* of the telephone-line. The arm 87 is attached eccentrically to the dial 8 in such a manner that when the dial is in any but its normal position the said arm will raise and keep broken the contact between springs 27 and 28, thus separating limbs *p* and *s* of the telephone-line at all times when the dial is in actual use.

Referring to Fig. 6, A illustrates symbolically the first selector-switch of the calling subscriber, including the circuit arrangement thereof. B similarly illustrates a second selector-switch and its circuit arrangement. C similarly illustrates a connector-switch and its circuit arrangement, and D illustrates in a similar manner the first selector-switch of the subscriber to be called in the following description.

Fig. 13 illustrates the mechanical construction of the first and second selector-switches A, B, and D. The connector-switch C is of similar construction with the exception that instead of a pair of wipers 87 a single wiper is used, and the upper bank of contacts F consists of single contacts instead of pairs, as shown in Fig. 13.

The pairs of wipers 86 and 87 are rigidly mounted upon shaft E, which is movable with respect to the contact-banks F and G

by means of a pawl and ratchet adapted to secure an upward movement of the said shaft and by means of a second pawl and ratchet adapted to secure a rotary movement of the said shaft.

The operation of the system is as follows: Assuming that the subscriber whose instrument is illustrated in Fig. 1 has removed his telephone from its hook, has placed a coin in the coin-slide, and desires to call the subscriber whose first selector is symbolically shown at D in Fig. 6 and whose number is assumed to be "2345," the calling subscriber moves dial 8 until two teeth have passed below spring 13 and releases it. The return, as described, will cause two momentary ground connections to be made to limb *p* of the line and will cause two momentary energizations of relay 46, (shown in Fig. 6,) which, referring now to Fig. 6, will raise the pairs of wipers 86 and 87 to positions horizontal with the second rows of contacts counting from below in the two banks of contacts F and G, the detail of which is shown in Fig. 10 and Fig. 11. The pairs of contacts in these rows are terminals of ten second selector-switches associated with a division of the switchboard wherein terminate lines of subscribers numbered from "2000" to "2999." The single momentary ground connection made to limb *s* of the telephone-line by the contact between springs 14 and 15, as described, energizes momentarily a single time relay 84, Fig. 6, which momentary energization effects the movement of the pairs of wipers 86 and 87, Fig. 13, into contact with the first pairs of contacts at the left of the second rows described above. These contacts are multiplied to other first selector-switches in the exchange, and if the selector of the first pairs is already in use the wipers will move along the row until they reach pairs of contacts which are terminals of an idle second selector-switch. When the wipers have reached such contacts, contact will be closed between arm 93 and contact 94 and arm 95 and contact 96, (shown in Fig. 6,) and relays 46 and 84 there shown will be cut off from the telephone-line. Wipers 47, 48, 49, and 50 (shown in Fig. 6) are now in contact with contacts 51, 52, 53, and 54, respectively, leading to the idle second selector-switch, which has been picked out in the manner above described. The subscriber now moves his dial a second time until three teeth have passed below spring 13 and releases it. The impulses of current thereby sent over limb *p* of the line will cause three momentary energizations of relay 55, (shown in Fig. 6,) which raise the pairs of wipers 57 58 and 59 60 of the second selector-switch to positions horizontal with the third rows of contacts in banks F and G, Fig. 13, counting from below, which in the said second selector-



switch lead to connector-switches associated with a division of the switchboard wherein terminate lines of subscribers numbered from "2300" to "2399." The single impulse sent  
 5 over limb *s* of the line on the return of the dial to normal causes a single momentary energization of relay 56, Fig. 6, which momentary energization places the pairs of wipers 57 58 and 59 60 in contact with the  
 10 first pairs of contacts at the left in the third rows above described. These contacts are multiplied to other second selector-switches and in case the connector-switch of the first contacts is already in use the pairs of wipers  
 15 will be moved to the next pairs of contacts and continue until they reach idle pairs. Upon reaching said idle pairs, arm 93, Fig. 6, will be moved into contact with contact 94 and arm 95 with contact 96. Wipers 57, 58,  
 20 59, and 60 are now in contact with the contacts 61, 62, 63, and 64, respectively, of the idle connector-switch which has been picked up. The subscriber now moves his dial until four teeth have passed below spring 13, and  
 25 the resulting impulses energize relay 65, Fig. 6, four times and move the wipers 78, 79, and 80 of the connector-switch to positions horizontal with the fourth rows of contacts in banks F and G, Fig. 13, of the said switch,  
 30 counting from below. The contacts comprising the fourth rows are terminals of subscribers' lines numbered from "2340" to "2349." The single impulse over limb *s* of the line in this case energizes relay 66, but does not result in motion of the wipers, but instead  
 35 places relay 65 in a position to control the movement of wipers 78, 79, and 80 from left to right upon the next movement of the dial 8. The subscriber now sends five impulses  
 40 over the line by means of his dial, which energizes relay 65 five times and moves wipers 78, 79, and 80 of the said connector-switch to the fifth contacts in the said fourth rows, counting from left to right. These contacts  
 45 are terminals of the line of the desired subscriber "2345." Wipers 78, 79, and 80, Fig. 6, are now in contact with contacts 81, 82, and 83. In case the said line is already in use the connector-switch automatically releases and  
 50 its wipers return to their normal position. The subscriber now depresses ringing-key 9, grounding limb *p* of the line, which in the case of the called line being busy gives him the busy signal from the busy back machine 85.  
 55 In case the called line is idle the depressing of the ringing-key 9 grounds limb *p* of the telephone-line and operates to send ringing-current over the line of the called subscriber.

In case the subscriber has received a busy  
 60 signal in the manner described he replaces his telephone upon the hook, thereby returning the coin-slide 24 to the position shown in Fig. 1, permitting the coin to drop down through the curved extension of slide 24 and be re-  
 65 leased.

When the called subscriber removes his telephone from its hook in response to the call, he closes a metallic circuit through his substation for the flow of current over a path  
 70 which may be traced as follows: from the grounded side of battery 125, through one winding of relay 67, over conductor 74, conductor 76, contact between arm 101 and contact 102, contact between wiper 79 and contact 82, over limb *s* of the line, returning over  
 75 limb *p* of the line, through contact between contact 83 and wiper 80, contact between contact 104 and arm 103, over conductor 77, conductor 75, through the other winding of relay 67 and to the opposite side of the said  
 80 battery 125. Relay 67 is thereby energized, its armatures 126 and 127 are attracted, closing current from the grounded side of battery 70 over conductor 68, armature 126, back through the contacts of the second selector  
 85 and the first selector-switches of the calling-subscriber, over limb *p* of the calling subscriber's line, conductor 42, Fig. 1, conductor 43, contact 9 10, conductor 37, conductor 40, contact between springs 18 and 19, conduc-  
 90 tor 41 through the energizing-winding of electromagnet 20, returning over limb *s* of the calling subscriber's line through the contacts of the first and second selector-switches, Fig. 6, relay 66 of the connector-switch, armature  
 95 127 of relay 67, conductor 69, and to the other side of battery 70. A portion of said current also passes through transmitter 1 and conductor 39, which are in parallel with the circuit of electromagnet 20. The said electro-  
 100 magnet is thereby energized, attracts its armature 21, and allows the coin to fall into the receptacle provided for it. The subscribers are now in conversation, their transmitters being energized by current from batteries  
 105 125 and 70, respectively, the condensers 72 and 73 being connected in the talking-circuit at points intermediate of the bridges of said batteries. When the subscribers have fin-  
 110 ished their conversation, they replace their telephones upon the hooks. Lever-arm 7 of the hook-switch thereupon closes contact momentarily between springs 32, 33, and 34, thereby grounding simultaneously limbs *p*  
 115 and *s* of the telephone-line. As soon as either subscriber has thus grounded the limbs of his line the connector-switch is released, and when the calling subscriber hangs up the remaining switches are also released.

It will be noted that until the called sub-  
 120 scriber has responded by removing his telephone from the hook all currents employed in establishing the connection and signaling the called subscriber have been sent from ground over one limb or the other of the tele-  
 125 phone-line without passing through the energizing-winding of electromagnet 20.

In describing the automatic telephone-switchboard disclosed in the drawings I have not considered it advisable or necessary to  
 130



describe in the fullest manner the operation thereof. It will be seen that the feature thereof particularly pertaining to the operation of my pay-station system is the closure of current in metallic circuit over the line of the calling subscriber secured by the response of the called subscriber.

The detailed operation of the switchboard disclosed may be readily understood by those skilled in the art from the description and drawings.

Referring now to Fig. 2, the operation of the substation apparatus there illustrated is generally similar to that shown in Fig. 1, already described. When, however, the subscriber deposits a coin in the coin-slide upon the descent thereof, spring 18 is pressed outward and breaks its normal contact with spring 19, thereby opening the normal talking-circuit of the substation at the contact-point of springs 18 and 19 and including the winding of electromagnet 20 in series between conductors 40 and 41. When the called-for subscriber answers the call, thereby closing current in metallic circuit through the substation, the path through the substation illustrated in Fig. 2 will be as follows: over limb *p* of the telephone-line, over conductor 42, conductor 43, through contact 9 10, conductor 37, through transmitter 1, through the winding of electromagnet 20, through one winding of induction-coil 3, over conductor 39, returning over limb *s* of the telephone-line. Electromagnet 20 is thereby energized, attracts its armature, and deposits the coin in the receptacle provided for it. This establishes the talking-circuit of the substation by closing contact between springs 18 and 19 and leaves the winding of electromagnet 20 short-circuited during conversation. In case the calling subscriber fails to secure the connection his act of replacing the telephone on the switch-hook releases the coin in the manner already described with reference to Fig. 1.

Referring now to Fig. 3, lever-arm 6 of the switch-hook and arm 37 (shown in Fig. 1) are omitted, and armature 21 extends into the coin-slide and acts normally as a stop to the descent of the deposited coin. The said armature is pivoted at 21<sup>a</sup>, and in case a connection is obtained with the called subscriber the energization of electromagnet 20, which is accomplished in the manner already described with reference to Fig. 1, attracts armature 21, which turning on its pivot moves the portion thereof projecting into the slide toward the right and permits the coin to descend through the portion of the coin-slide designated 24<sup>b</sup>, thereby depositing it in a receptacle provided therefor. I here show an additional electromagnet 22, adapted to be energized when the subscriber replaces his telephone upon the hook by current flowing over the following path: from ground 36

through the winding of said electromagnet, contact between springs 32, 33, and 34, over limb *s* of the telephone-line, and to battery at the exchange. This energization attracts armature 21 and causes the portion thereof projecting into the coin-slide 24 to be moved toward the left, thereby permitting the coin to descend through the portion of the coin-slide designated 24<sup>a</sup> and be released to the subscriber unless the coin is already collected by the operation of electromagnet 20.

Referring now to Fig. 4, I have here illustrated a modification of the arrangement shown in Fig. 3. The operation of the electromagnet 22 releases the deposited coin in the manner already described with reference to Fig. 3. In case a connection is obtained with the called subscriber electromagnet 20 is energized upon the response of the said subscriber by a flow of current over a path similar to that described with reference to the energization of electromagnet 20, as described in connection with Fig. 2. The energization thereof attracts armature 21, moves the part thereof projecting into the coin-slide 24 to the right, and permits the coin to descend through the portion of the coin-slide designated 24<sup>b</sup> and deposits it in the receptacle provided.

Referring now to Fig. 5, I show an arrangement of substation apparatus embodying my invention, the general operation of which may be understood from my description in connection with Fig. 1. In present arrangement I have illustrated a polarized electromagnet 20<sup>a</sup>, the winding thereof being arranged in series with the winding of electromagnet 20.

In Fig. 1, Fig. 2, Fig. 3, and Fig. 4 the return of armature 21 to normal upon the de-energization of the electromagnet placing it in an abnormal position is secured by gravity. In the present arrangement pivoted armature 21, adapted to play between the cores of electromagnets 20 and 20<sup>a</sup>, is so arranged as to extend the magnetic circuit of the permanent magnet forming the core of electromagnet 20<sup>a</sup> in such a manner that the said armature 21 is normally of a permanent polarity opposed to the polarity of the adjacent end of the core of electromagnet 20<sup>a</sup> and is thereby maintained in its normal attracted position. When a call has been made and by responding the called subscriber has included battery 70 in the metallic circuit of the calling-subscriber's line, as previously described, the flow of current passes through electromagnet 20, as described with reference to Fig. 1, and also serially through electromagnet 20<sup>a</sup>. The energization of electromagnet 20 attracts polarized armature 21. The flow of current in electromagnet 20<sup>a</sup> induces magnetism in the core thereof of polarity opposed to its permanent



magnetism and neutralizes the attraction between armature 21 and the core of electromagnet 20<sup>a</sup>, thus freeing the said armature 21 and allowing it to be moved readily toward the core of electromagnet 20 upon the energization thereof. The coin deposited in the coin-slide is thus collected in a manner similar to that described with reference to Fig. 1. The resulting opening of contact between springs 18 and 19 interrupts the flow of current in electromagnets 20 and 20<sup>a</sup>. Armature 21 is thereupon moved by the permanent magnetism of electromagnet 20<sup>a</sup> to its normal position, as shown in the illustration.

It will be noted that in the arrangement shown in Fig. 5 the flow of current over the telephone-line through magnet 20<sup>a</sup> in order to cause the collection of the coin must be in a predetermined direction or of a predetermined polarity—namely, such as to cause or tend to cause a neutralization of the permanent magnetism of electromagnet 20<sup>a</sup>.

It is apparent that a flow of current in the opposite direction would add to the normal attractive force of electromagnet 20<sup>a</sup>. Such a flow will cause armature 21 to stick and prevent movement thereof under the influence of electromagnet 20, and under such condition a deposited coin would not be collected.

It will be noted that in the operation of the telephone system disclosed the current used in establishing the connection, controlled by the use of dial 8 over limb *p* of the line, is from ground at the substation and that the flow of current over the said limb *p*, caused by the inclusion of battery 70 in circuit thereof by the response of the called subscriber, is in the opposite direction or of opposite polarity.

It will be understood that my invention is not limited to the precise structures shown and described.

It is apparent that electromagnetic devices generally similar to those described may be used to register calls in ways well known in the art without requiring the deposit of a coin each time a call is made.

Means will readily suggest themselves to those skilled in the art for embodying my invention in call-registering devices to be associated with subscribers' lines at the central office, and various other modifications may be made without departing from the substance of my invention.

Whenever I use the word "coin" in the specification or claims I intend and desire that the idea of "token" be understood to be included in the meaning thereof, as well as the idea of metallic currency.

It is apparent that tokens or pieces of metal may be used in connection with structures of the nature of those shown in Figs. 1, 2, 3, 4, and 5 instead of coins. When coins are not used, the function of such structures

is to record the numbers of calls, and such recording may be used as a basis for measured-service charges.

The interchangeable and equivalent character of such structures as coin-collectors or call-counters is well known in the art and I do not wish to be limited in this respect.

I claim—

1. In a telephone-exchange system, the combination with a calling-subscriber's line and a called-subscriber's line connecting their substations with the central office and switched to connection thereat, of a central source of current for operating purposes, a pay-station device associated with the calling-subscriber's line at the substation, and apparatus associated with said device adapted to be actuated by the response of the called subscriber to automatically collect a coin deposited in said device.

2. In a telephone-exchange system, the combination with a calling-subscriber's line and a called-subscriber's line connecting their substations with the central office and switched to connection thereat, of a central source of current for operating purposes, a pay-station device associated with the calling-subscriber's line at the substation, an electromagnet associated with said device adapted to be actuated by the response of the called subscriber, mechanism controlled thereby adapted to automatically collect a coin deposited in said device when said magnet is actuated and mechanism controlled by the calling subscriber adapted to release a deposited coin prior to a response by the called subscriber.

3. In a telephone-exchange system, the combination with a calling-subscriber's line and a called-subscriber's line connecting their substations with the central office and switched to connection thereat, of a central source of current for operating purposes, an electromagnet at the central office in circuit with the called-subscriber's line adapted to be energized when the subscriber answers the call, a pay-station device associated with the calling-subscriber's line at the substation, apparatus associated with said device adapted to be actuated, in response to the energization of said electromagnet, to automatically collect a coin deposited in said device, mechanism controlled by the calling subscriber adapted to release a deposited coin prior to a response by the called subscriber and means actuated, when a coin is released, to destroy connection between said lines.

4. In a telephone-exchange system, the combination with a calling-subscriber's line and a called-subscriber's line connecting their substations with the central office and switched to connection thereat, of a central source of current for operating purposes, an electromagnet at the central office in circuit



with the called-subscriber's line adapted to be energized when the subscriber answers the call, a pay-station device associated with the calling-subscriber's line at the substation, an  
 5 electromagnet associated with said device adapted to be actuated in response to the energization of said first-mentioned electromagnet and mechanism controlled thereby adapted to automatically collect a coin deposited in said device when said magnet is  
 10 actuated.

5. In a telephone-exchange system, the combination with a calling-subscriber's line and a called-subscriber's line connecting  
 15 their substations with the central office and switched to connection thereat, of a central source of current, an electromagnetic switching device at the central office in circuit with the called-subscriber's line adapted to be energized, when the circuit of said line is closed,  
 20 to close the circuit of said source in the line of the calling subscriber, a pay-station device associated with the line of the calling subscriber at the substation, an electromagnet associated with said device adapted to be energized to cause the collection of a coin deposited in said device when the circuit of said  
 25 source is closed in said line and mechanism controlled by the calling subscriber adapted to release a deposited coin prior to a response by the called subscriber.  
 30

6. In a telephone-exchange system, the combination with a calling-subscriber's line and a called-subscriber's line connecting  
 35 their substations with the central office and switched to electrical connection thereat, of a central source of current for operating purposes, a pay-station device associated with the line of the calling subscriber at the substation, a polarized electromagnet and associated  
 40 mechanism included in said device in circuit with said line adapted to be actuated to cause the collection of a coin deposited in said device when a flow of current in a predetermined direction is caused in said line and  
 45 then only, means, actuated by the response of the called subscriber, for causing such flow of current, mechanism controlled by the calling subscriber adapted to release a deposited coin prior to a response by the called subscriber,  
 50 and means actuated, when a coin is released, to destroy connection between said lines.

7. In a telephone-exchange system, the combination with a calling-subscriber's line and a called-subscriber's line connecting  
 55 their substations with the central office and switched to electrical connection thereat, of a central source of current for operating purposes, a pay-station device associated with the line of the calling subscriber at the substation, a polarized electromagnet and associated  
 60 mechanism included in said device in circuit with said line adapted to be actuated

to cause the collection of a coin deposited in  
 65 said device when a flow of current in a predetermined direction is caused in said line and then only, and means, actuated by the response of the called subscriber, for causing such flow of current.  
 70

8. In a telephone-exchange system, the combination with a calling-subscriber's line and a called-subscriber's line connecting  
 75 their substations with the central office and switched to connection thereat, of a central source of current for operating purposes, a pay-station device associated with the line of the calling subscriber at the substation, a polarized electromagnet and associated mechanism included in said device in circuit with  
 80 said line adapted to be actuated to cause the collection of a coin deposited in said device when current in a predetermined direction is caused to flow in said line and then only, and an electromagnetic switching device at the  
 85 central office in circuit with the called-subscriber's line adapted, when the circuit of said line is closed at the substation, to cause a flow of current from said source in the calling-subscriber's line in said predetermined  
 90 direction.

9. In a telephone-exchange system, the combination with a calling-subscriber's line and a called-subscriber's line connecting  
 95 their substations with the central office and switched to connection thereat, of a central source of current for operating purposes, a pay-station device associated with the line of the calling subscriber at the substation, a polarized electromagnet and associated mechanism included in said device in circuit with  
 100 said line adapted to be actuated to cause the collection of a coin deposited in said device when current in a predetermined direction is caused to flow in said line and then only, an electromagnetic switching device at the central office in circuit with the called-subscriber's line adapted, when the circuit of  
 105 said line is closed at the substation, to cause a flow of current from said source in the calling-subscriber's line in said predetermined direction and mechanism controlled by the calling subscriber adapted to release a deposited coin prior to a response by the  
 110 called subscriber.  
 115

10. In a telephone-exchange system, the combination with a calling-subscriber's line connecting a substation with the exchange, of  
 120 a central source of current for operating purposes, switching mechanism at the substation, adapted to be used by said subscriber for calling purposes, normally not in operative relation with said line, a pay-station device at said substation adapted to place said  
 125 mechanism in operative relation with said line upon the deposit of a coin therein, a called-subscriber's line connecting the substation with the exchange adapted to be con-



connected with said calling-subscriber's line, and apparatus associated with said device adapted to be actuated by the response of the called subscriber to collect a deposited coin and restore said mechanism to normal.

11. In a telephone-exchange system, the combination with a calling-subscriber's line connecting the substation with the exchange, of a central source of current for operating purposes, switching mechanism at the substation, adapted to be used by said subscriber to ring the bell of a called subscriber, normally not in operative relation with said line, a pay-station device at said substation adapted to place said mechanism in operative relation with said line upon the deposit of a coin therein, a called-subscriber's line connecting the substation with the exchange adapted to be connected with said calling subscriber's line, apparatus associated with said device adapted to be actuated by the response of the called subscriber to collect a deposited coin and restore said mechanism to normal, and mechanism controlled by the calling subscriber adapted to release a deposited coin prior to a response by the called subscriber.

12. In a telephone-exchange system, the combination of a calling subscriber's line connecting the substation with the exchange, a called-subscriber's line connecting the substation with the exchange, calling mechanism at the calling substation normally not in operative relation with the line, a pay-station device at said substation, a central source of current for operating purposes, a switch adapted to place said calling mechanism in operative relation with said line upon the deposit of a coin in said device, to enable the calling subscriber to control the flow of current over the line for calling purposes, automatic switching mechanism at the exchange adapted, in response to said calling mechanism, to place said line in connection with the called-subscriber's line, an electromagnetic switching device at the central office in circuit with said called-subscriber's line when said connection exists, adapted, when the circuit of said line is closed at the substation, to close the circuit of said source in the line of the calling subscriber, an electromagnet associated with said pay-station device adapted to cause the collection of a deposited coin and the return of said mechanism to normal when the circuit of said source is closed in said line and mechanism controlled by the calling subscriber adapted to release a deposited coin prior to a response by the called subscriber.

13. In a telephone-exchange system, the combination of a calling subscriber's line connecting the substation with the exchange, a called-subscriber's line connecting the substation with the exchange, a central source of current for operating purposes, calling mechanism at the calling-substation for enabling

the subscriber to control the flow of current over the line for switching purposes, automatic switching mechanism at the exchange adapted, in response to said calling mechanism, to place said line in connection with the called-subscriber's line, a pay-station device at the calling-substation, mechanism associated therewith for ringing the bell of a connected subscriber normally not in operative relation with the line, means adapted to place said ringing mechanism in operative relation with said line upon the deposit of a coin in said device, an electromagnetic switching device at the central office in circuit with said called-subscriber's line when said connection exists, adapted, when the circuit of said line is closed at the substation, to close the circuit of said source in the line of the calling subscriber, and an electromagnet associated with said pay-station device adapted to cause the collection of a deposited coin and the return of said mechanism to normal when the circuit of said source is closed in said line.

14. An automatic telephone-exchange system including a calling-subscriber's line, calling mechanism at the substation normally not in operative relation with said line, a pay-station device, apparatus adapted for operation by the deposit of a coin in said pay-station device to place said calling mechanism in operative relation with said line, a called-subscriber's line, and mechanism automatically operated on the response of a called subscriber to place said calling device in its normal relation to said line.

15. An automatic telephone-exchange system including a calling-subscriber's line, calling mechanism at the substation normally not in operative relation with said line, a pay-station device, apparatus adapted for operation by the deposit of a coin in said pay-station device to place said calling mechanism in operative relation with said line, a called-subscriber's line, switching mechanism at the exchange adapted to cause a flow of current of predetermined polarity in the calling-line on the response of a called subscriber, and mechanism responsive to current of said predetermined polarity only adapted to place said calling device in its normal relation to said line.

16. An automatic telephone-exchange system including a calling-subscriber's line, calling mechanism at the substation normally not in operative relation with the line, means for placing said mechanism in operative relation with said line on deposit of a coin by the subscriber, a called-subscriber's line, a link circuit for connecting said lines, and apparatus for collecting a coin deposited at the calling substation, effective only after connection is made with the called line.

17. An automatic telephone-exchange sys-



tem including a calling-subscriber's line, a  
calling device at the substation, a signaling-  
circuit for said calling device having a nor-  
mally open contact adapted to be closed on  
5 deposit of a coin by the subscriber, a called  
subscriber's line, a link-circuit for connecting  
said lines, and apparatus at the calling-sub-  
station adapted to be automatically op-  
erated on the response of the called sub-

scriber to collect a deposited coin and re- 10  
store said contact to its normal condition.

In witness whereof I hereunto subscribe  
my name this 2d day of December, A. D.  
1904.

ALFRED H. DYSON.

Witnesses:

G. E. MUELLER,  
L. D. KELLOGG.