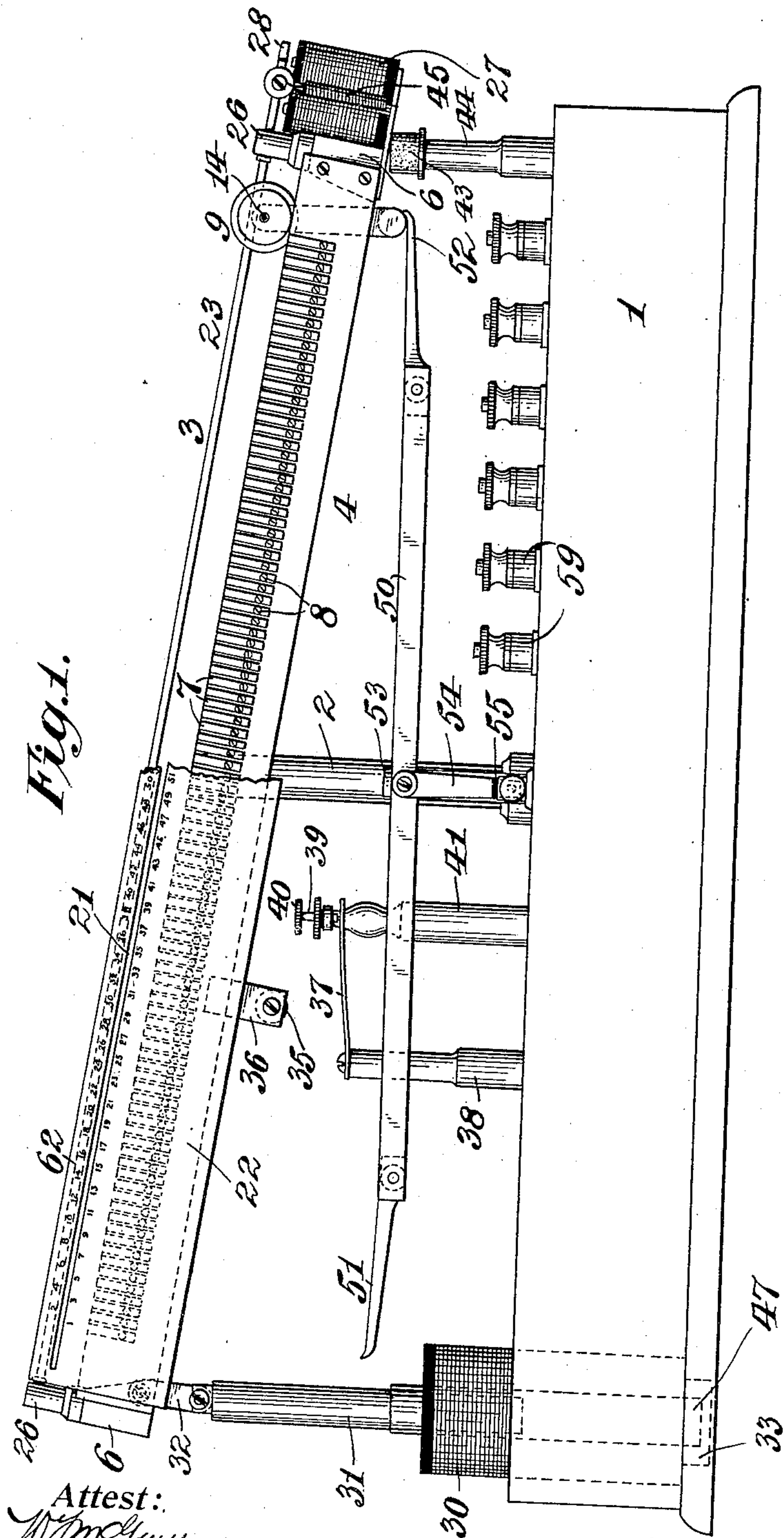


E. J. BURKE.
ELECTRIC CIRCUIT CONTROLLER.
APPLICATION FILED NOV. 9, 1909.

988,440.

Patented Apr. 4, 1911.
6 SHEETS—SHEET 1.



Attest:
Wm. J. Burke
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Inventor:
by *Edward J. Burke*
J. F. Campton Atty.

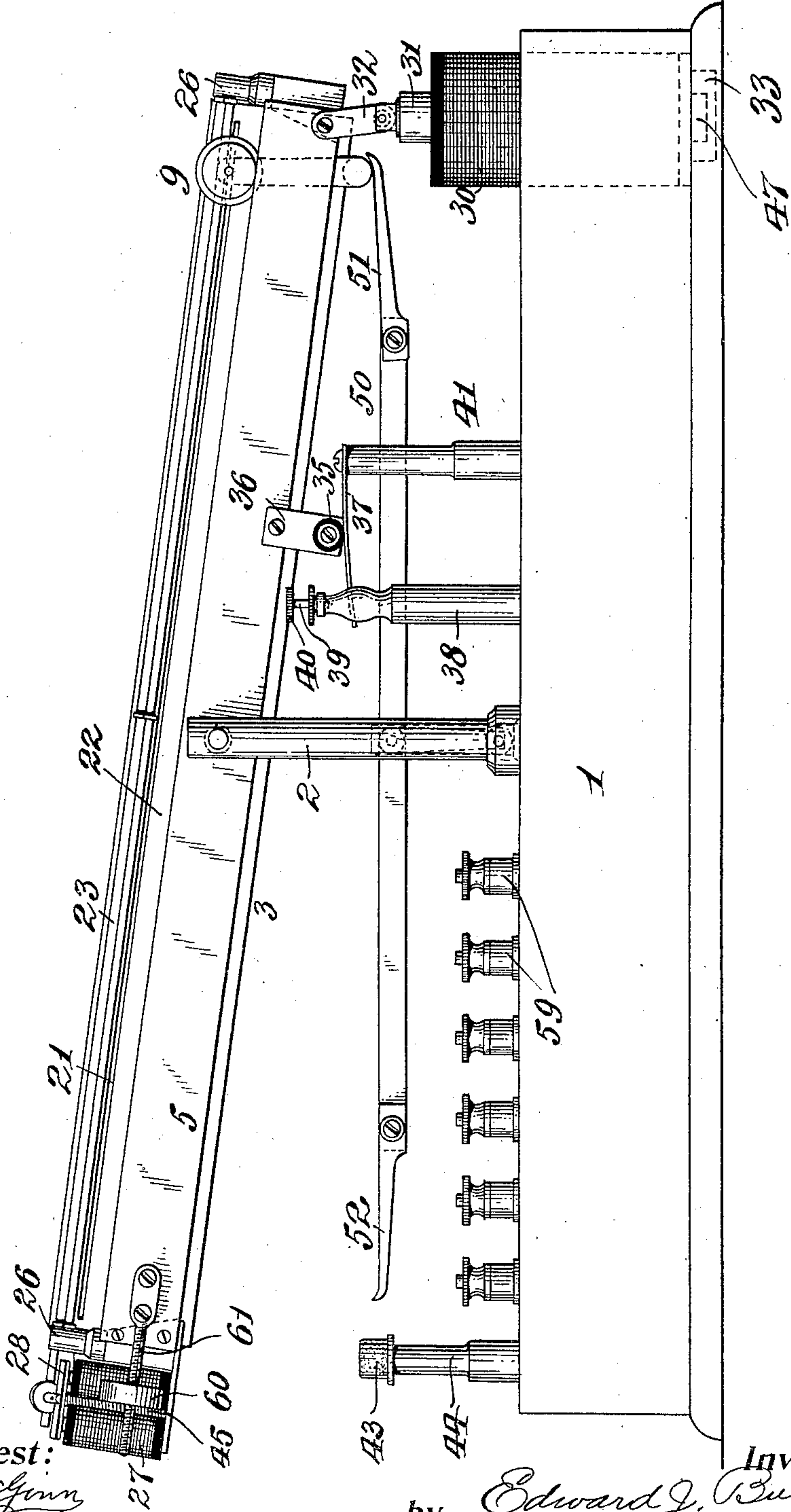
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6 SHEETS-SHEET 2.

Fig. 2.



Attest:
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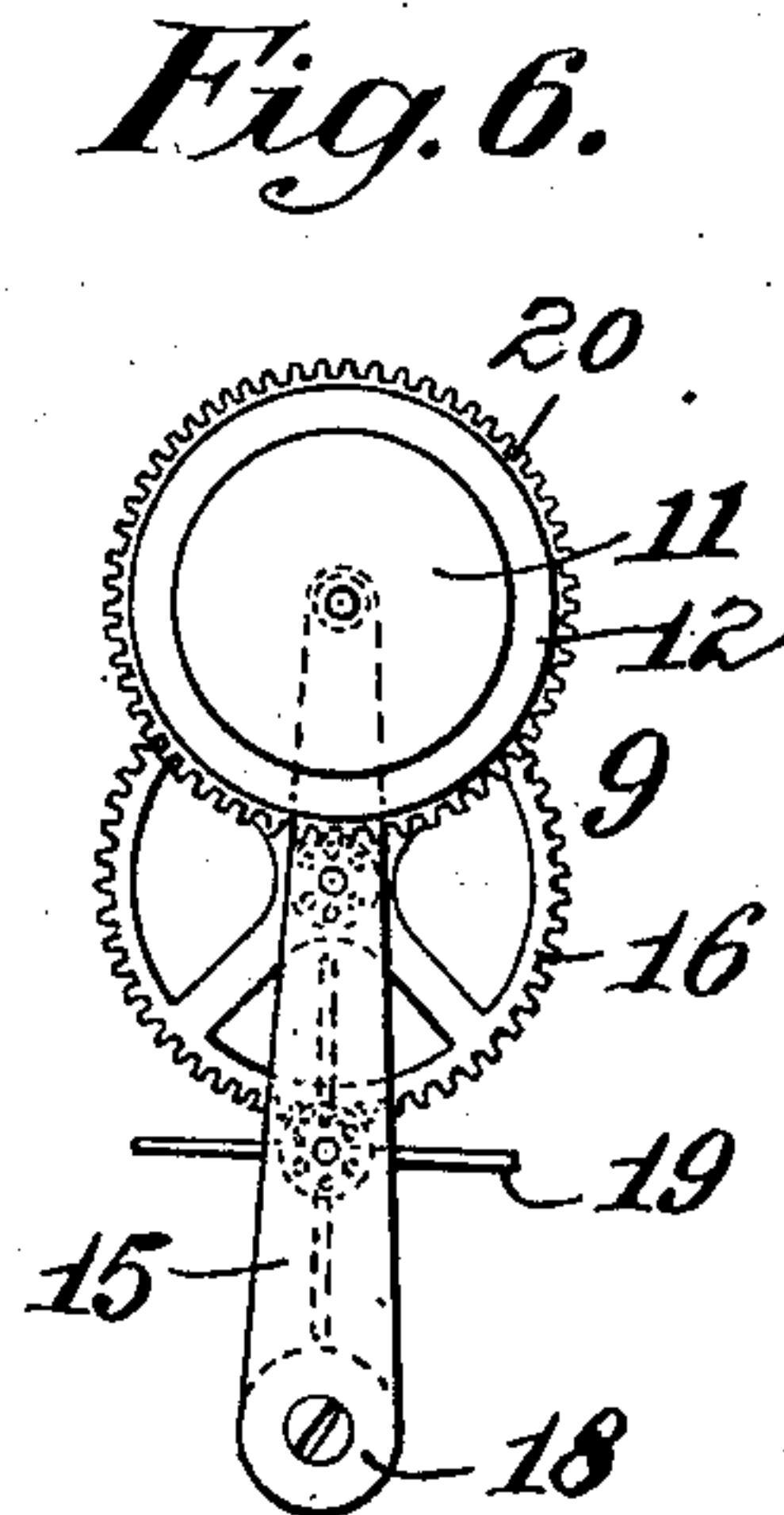
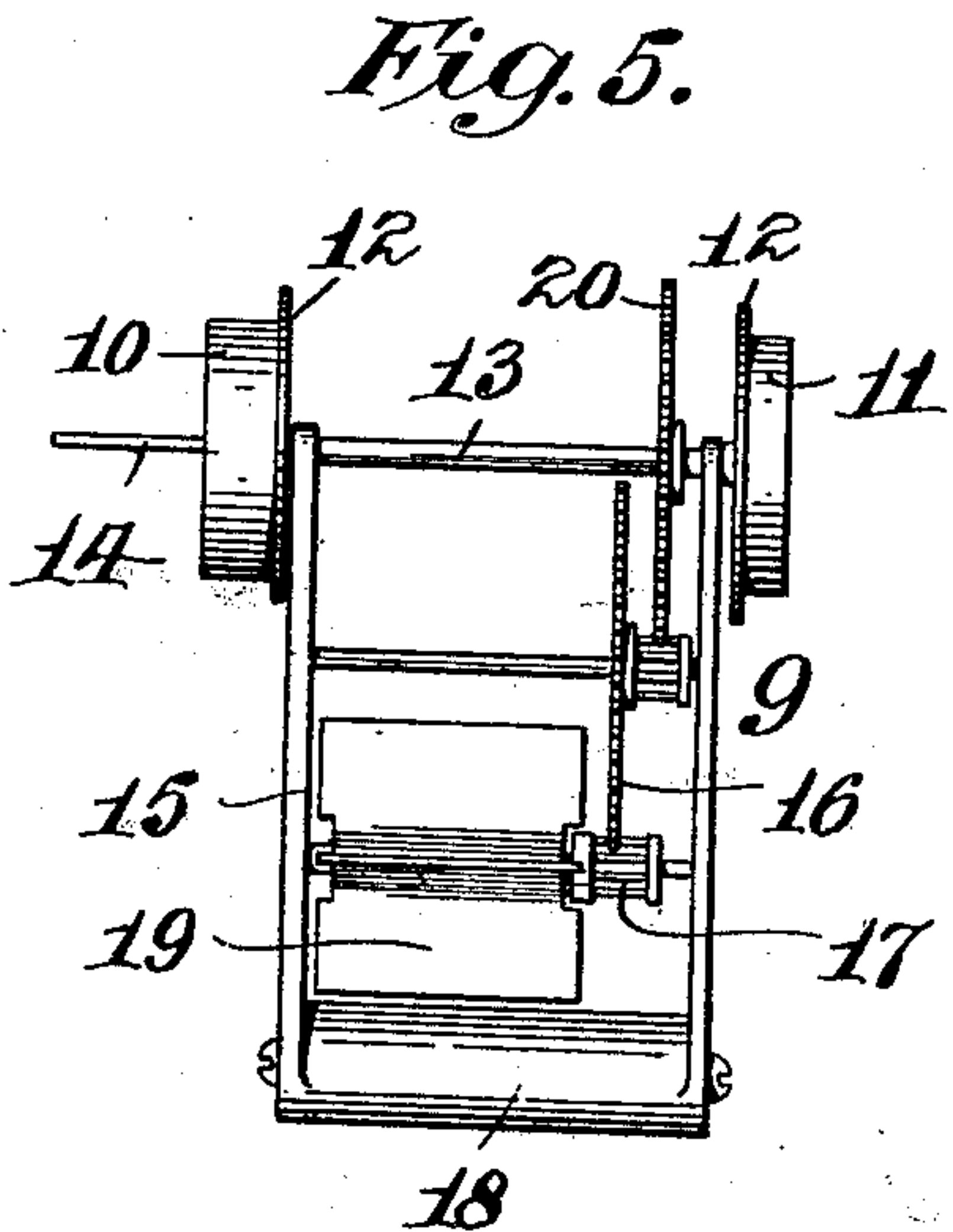
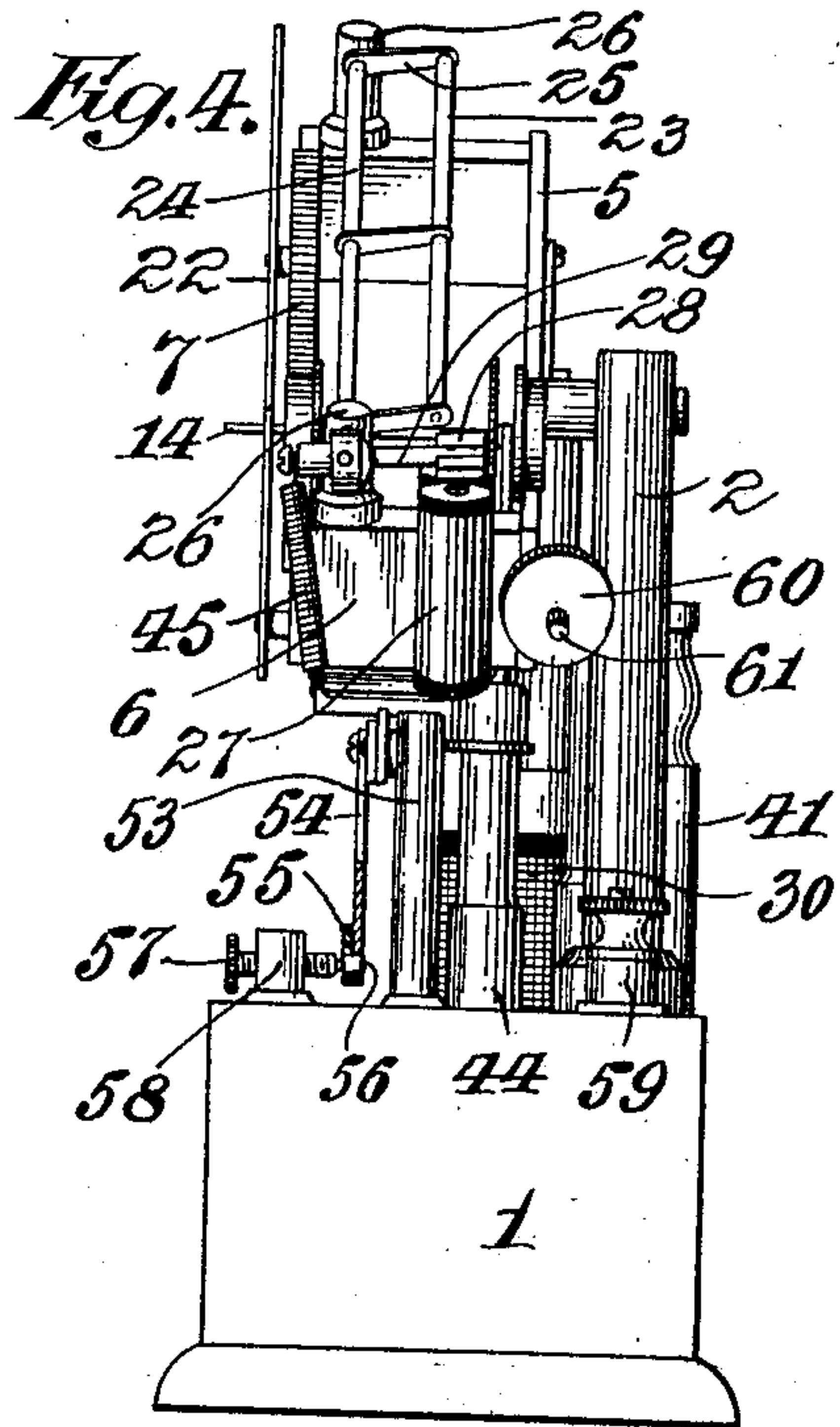
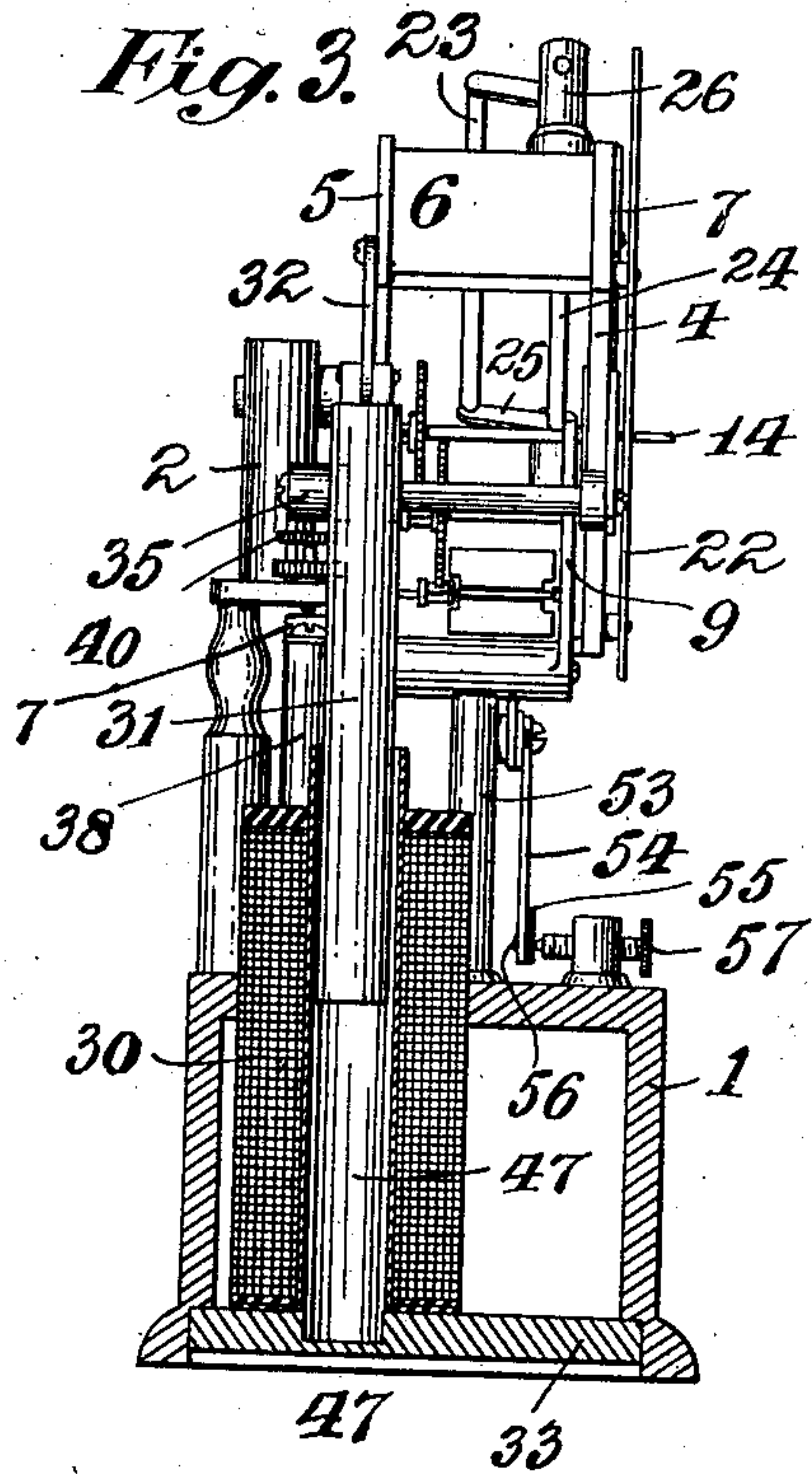
Inventor:
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988,440.

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6 SHEETS—SHEET 3.



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6 SHEETS—SHEET 4.

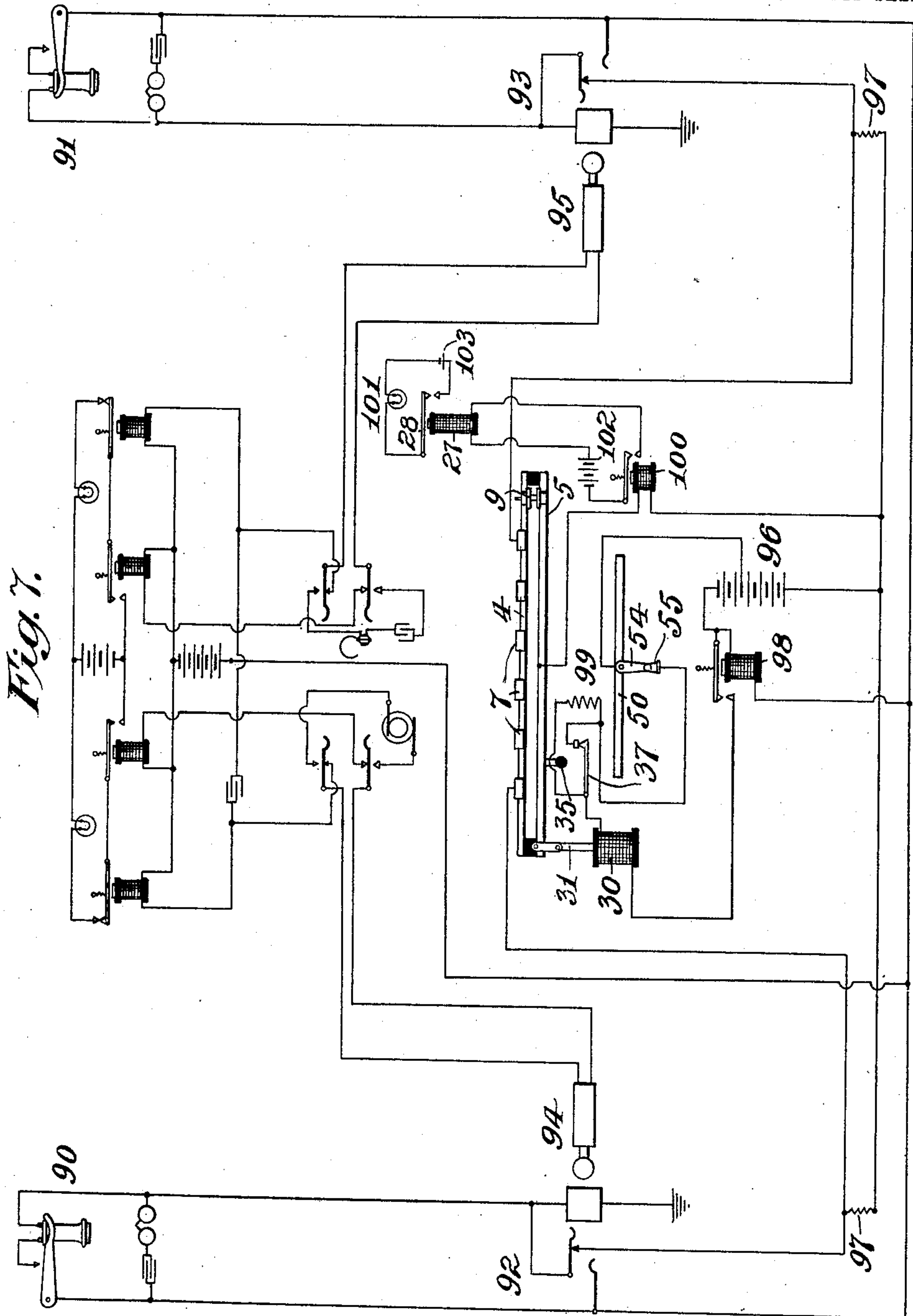


Fig. 7.

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6 SHEETS—SHEET 5.

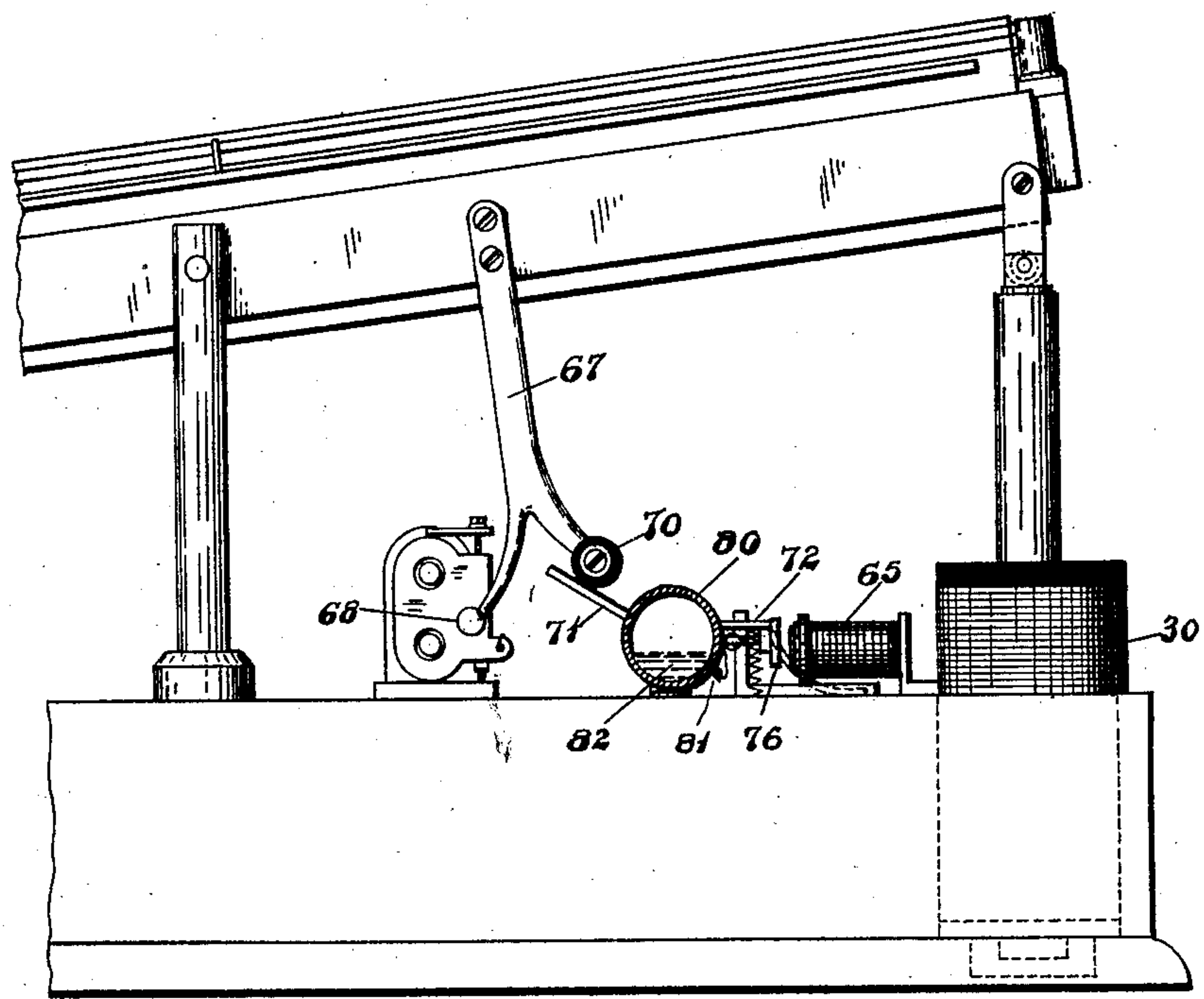


Fig. 8

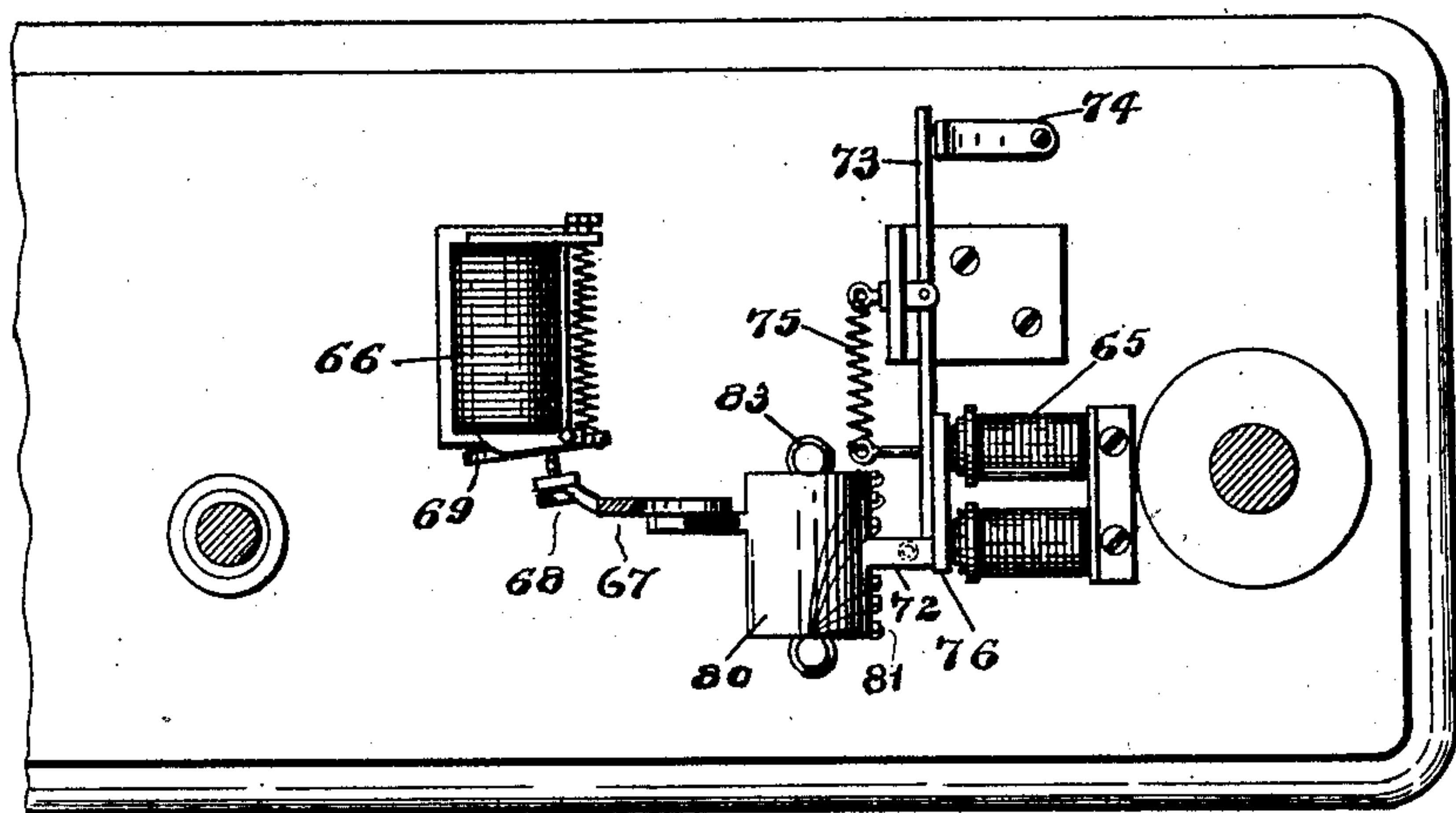


Fig. 9

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E. J. BURKE.
ELECTRIC CIRCUIT CONTROLLER.
APPLICATION FILED NOV. 9, 1909.

988,440.

Patented Apr. 4, 1911.

6 SHEETS—SHEET 6.

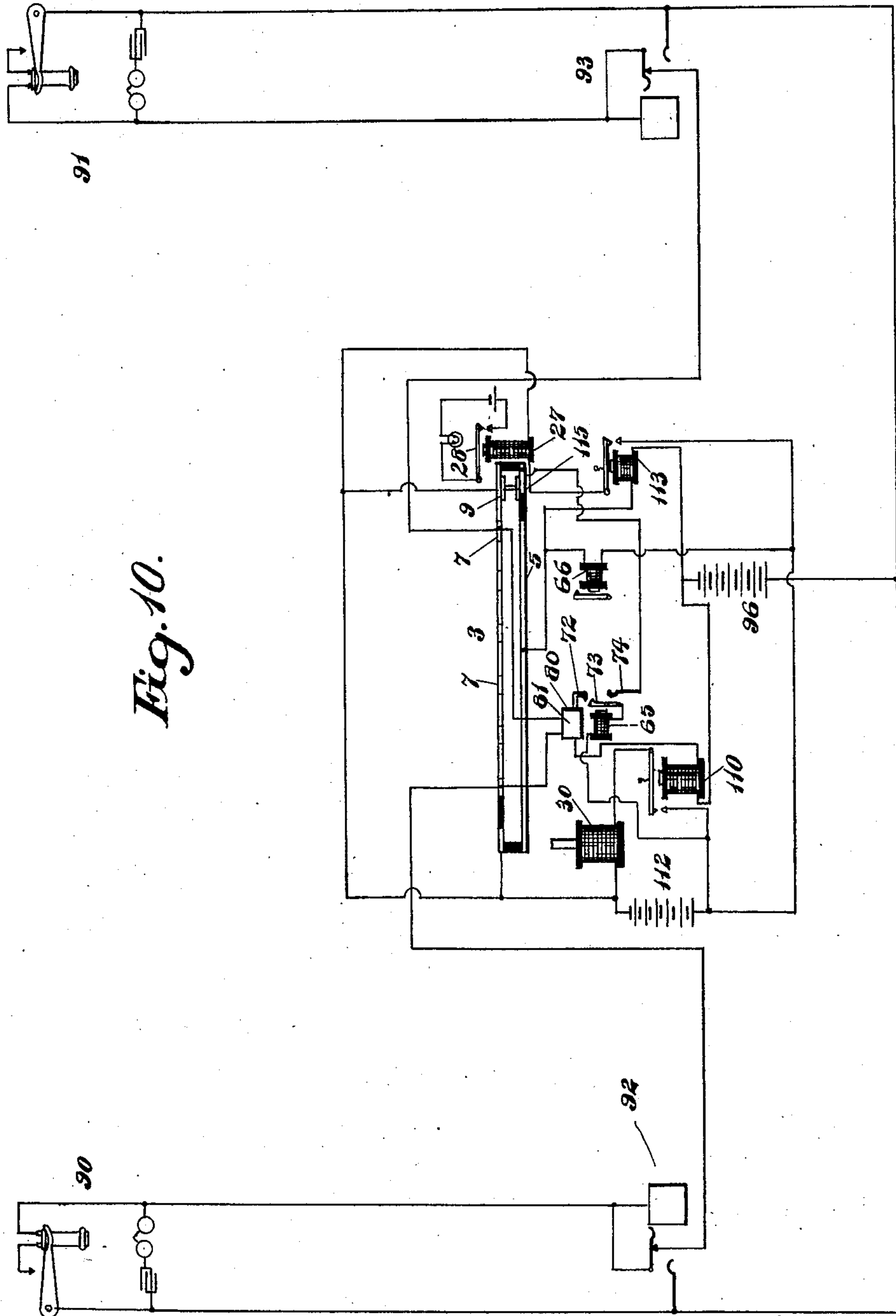


Fig. 10.

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UNITED STATES PATENT OFFICE.

EDWARD J. BURKE, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO JOHN Q. A. WHITTEMORE, OF NEWTON, MASSACHUSETTS.

ELECTRIC-CIRCUIT CONTROLLER.

988,440.

Specification of Letters Patent.

Patented Apr. 4, 1911.

Application filed November 9, 1909. Serial No. 527,047.

To all whom it may concern:

Be it known that I, EDWARD J. BURKE, a citizen of the United States, residing in the city of New York, State of New York, have
5 invented a new and useful Improvement in Electric-Circuit Controllers, of which the following is a specification.

My invention relates to devices for completing a plurality of circuits. It is primarily a circuit controller and it affords a means whereby any number of circuits may
10 be controlled.

The object of my invention is to provide a simple inexpensive and efficient means for
15 completing any number of circuits in succession and one in which very little energy is consumed during its operation.

The further object of my invention is to select and complete any one of a plurality
20 of circuits.

A further object is to provide a device that will be in operation only when it is desired to complete one or more of a plurality of circuits.

25 The invention may be used in connection with selective systems such as telephone call or automatic systems or alarm or telegraph systems or signal systems or electric sign and lighting systems.

30 The invention consists in producing a traveler which moves over a plurality of contacts and is actuated by gravity.

The invention further consists in providing a means having a surface which may be
35 inclined first in one direction then in another that will cause a gravity actuated device to complete one or more circuits.

The invention further consists in a gravity actuated controlled means for completing any number of a plurality of circuits in succession.
40

The invention consists in other features set forth in the following description and illustrated in the drawings.

45 Referring to the drawings, Figure 1 illustrates a front view of one of the devices embodying my invention. A part of the device is shown in section. Fig. 2 is a rear view of the same device. Fig. 3 is an end view of the device shown partly in section and
50 Fig. 4 is the other end view of the device. Figs. 5 and 6 are respectively side and end

views of a traveler. Fig. 7 is a diagram showing the connection of the parts of my invention when applied to a telephone system. Fig. 8 is a rear view of a part of the device shown in Fig. 2 having modified controlling devices. Fig. 9 is a top view of the devices shown in Fig. 8 with parts removed. Fig. 10 is a diagram showing the connection
55 of the parts of the device illustrated in Figs. 8 and 9.

Referring to Fig. 1, 1 is the supporting base of the device. The base may contain any suitable devices in connection with
60 which the circuit controller is used, as in the case of a telephone system, the base may be used for containing the jacks and annunciators. A pedestal 2 is located on the base for supporting a walking beam 3.
70 The walking beam 3 is composed of two parallel bars 4, 5. The bars are connected together at opposite ends by cross pieces 6. The bar 4 may be made of insulating material or it may be a metal bar covered with
75 insulating material. On the bar 4 there are located a plurality of contacts 7 which are insulated from each other. They are sunk into the insulating material so as to produce an even surface on the upper edges of the
80 bar. The contacts 7 are secured to the bar by means of the screws 8 which enter into the bar or into the insulating material located in the bar. The walking beam is pivoted to the pedestal 2 and it is limited in
85 its movement by the cushion 43 on the post 44.

A traveler 9 shown in Figs. 5 and 6 is adapted to move the length of the bars. The traveler 9 has two supporting wheels
90 10 and 11. The wheels are provided with flanges 12 and are connected together by the axle 13 which has an extended pin 14. The wheels are pivoted to the frame 15 which is adapted to support the gears 16
95 and 17. A weight 18 is supported at the bottom of the frame and tends to hold the wheels 10 and 11 firmly on tracks 4 and 5, thereby insuring necessary contact between the wheels, track 5 and contacts 7 on track
100 4. In order to retard the movement of the traveler and at the same time regulate its movement a fan 19 is provided which is supported in the frame 15 and is connected to

the gearing 16 and 17. As the traveler is moved by gravity the gear 20, which is attached to the axle 13 and wheels 10 and 11, operates the gear 17 and causes the fan 19 to rotate.

The wheel 10 of the traveler is placed on the bar 4 and the wheel 11 is placed on the bar 5. The pin 14 extends through a slot 21 which is located on the card or face plate 22 attached to the front of the walking beam. The face plate is provided with a plurality of numbers or indicating characters 62 which correspond to the contacts 7 located on the bar 4. As the traveler moves up and down the bars the pin 14 indicates the contact on which the wheel 10 is located by means of the designating characters 62 associated with the contacts. Electrical connections are completed between the contacts 7 and the bar 5 as the traveler moves along the bars.

If it is desired to maintain a connection of any one contact for any length of time a means may be provided for arresting the traveler 9 and holding it in position of contact with the desired contact. In the embodiment of my invention illustrated a rod 23, having a cushioned surface is attached to the rod 24 by means of the cross pieces 25. The frame thus formed is pivoted to the supports 26 mounted upon the walking beam 3. The cushioned rod 23 is located substantially above the center of the walking beam and above the axle 13 of the traveler 9. The rod 23 is adapted to press down upon the axle 13 at any time and engage it frictionally thus preventing for the time being any further movement of traveler 9. When the cushioned surface grips the axle 13 it holds the traveler in contact with whatever one of the contacts 7 it may be on at that time. The rod 23 is operated by means of the electro-magnet 27 which is located at one end of the walking beam 3. An armature 28 is supported upon an arm 29 which is attached to the rod 24. When the magnet 27 is energized the armature 28 is pulled down and the rod 23 grips the axle 13 and the traveler is held at any desired point in its path of motion.

A means is provided for tilting the walking beam 3 in one direction. The beam may then be allowed to return to its normal position by its own weight. When the traveler reaches either end of the walking beam it may be tilted and the traveler will travel down the inclination assumed by the beam. A solenoid 30 is located at one end of the base 1 and operates to pull one end of the beam down. The solenoid 30 is provided with a magnetic core 31 which is attached to the walking beam by means of the link 32. The solenoid 30 is supported by support 33 which extends across from side to side underneath base 1. Support 33

is preferably made of iron and when the solenoid 30 is energized, support 33 becomes magnetized and greatly aids the magnetic attraction of the solenoid, thereby securing a deeper and more satisfactory stroke to the iron core 31. I have provided an arrangement for automatically decreasing the amount of current flowing through the solenoid 30 after walking beam 3 has been drawn down. In order to accomplish this result a lug 35 is mounted upon the walking beam by means of the strip or ear 36. The lug 35 is made of insulating material and is adapted to operate upon the contact 37 which is mounted on the pedestal 38 supported on the base 1. A fixed contact 39 having adjusting screws 40 is mounted on the pedestal 41 which is also supported on the base 1. When the walking beam 3 is pulled down by the operation of the magnet 30 the lug 35 pushes the contact 37 away from the contact 39 and the circuit is opened. A resistance wire may be connected between the contacts 37 and 39 and in the circuit of the solenoid 30. The contacts are closed and the resistance is cut out when the core 31 is raised. The contacts are opened when the core is pulled down to a point where the solenoid obtains such an advantage as to easily operate the walking beam. The quantity of current used is thus reduced to a minimum.

A means is also provided for closing the circuit of the solenoid 30 when the traveler reaches the position shown in Fig. 1. This consists of an oscillator, which is operated by the traveler when it reaches the ends of its path of movement. It consists of a long lever 50 having the arms 51, 52 which are located in such a position relative to the weight 18 on the frame 15 so that the weight will strike either arm 51 or arm 52 when it reaches the extreme positions of its movement. The rod 50 is pivoted to the pedestal 53 which is supported on the base 1. An arm 54 is attached to the lever 50 and is provided with an insulating block 55 and a contact pin 56 which extends through the insulating block 55. The contact pin 56 is adapted to register with the fixed contact 57 which is supported on the post 58 located on the base 1. When the arm 54 is swung to the left the contact 57 registers with and makes contact with the contact 56. When this is done the circuit of the solenoid 30 is completed and the solenoid may be energized. When the traveler 9 strikes the arm 52 the arm 54 is swung to the left so as to complete the circuit of the solenoid through the contacts 57 and 56. When the traveler strikes the arm 51 the switch 54 is opened and the solenoid 30 relieves the core 31 and the beam returns to its normal position by its own weight which at the same time lifts the traveler and causes it to return. A suit-

able number of binding posts 59 may be provided for connecting the device with an external system.

A balancing weight 60 may be provided for adjusting the walking beam in order to aid its operation. The weight 60 is preferably located on a screw-threaded arm 61 which is attached to the walking beam and the weight is adjusted by means of merely turning the weight on the screw-threaded rod 61.

In Fig. 8 is shown a modification of the devices used for controlling the walking beam. An arm 67 is attached to the beam and coöperates with the devices which control the beam. An insulating lug 70 is mounted on the arm 67 and operates to open the circuit of the solenoid and its controlling circuits connected to the mercurial multiple switch 80. The circuit controller 80 consists of a cylinder preferably made of insulating material in which are inserted a plurality of contacts 81 which extend through the wall and into the interior of the cylinder. The contacts are closed through the mercury 82 located in the cylinder. When the walking beam is pulled down the arm 71 attached to the cylinder 80 causes the cylinder 80 to revolve a short distance on its pivots located in the standards 83. The contacts are moved upward and out of the mercury. The contacts in the cylinder are connected to the contacts located on the bar 4. The contacts are connected together through the mercury when the cylinder is in one position and may be electrically separated when the cylinder is turned to another position. The lug 70 also raises the arm 72 and liberates the armature 76 and at the same time the arm 72 is caught above the armature 76 and remains there until the magnet 65 is again operated. The lug 70 also operates upon the pivoted lever 71, 72 to control the contacts 73 and 74 which are closed by the operation of the spring 75 when arm 70 raises arm 72 and opened by the magnet 65. The spring 75 tends to draw the armature 76 from the magnet 65 and close the contacts 73 and 74.

The position of walking beam 3 on being drawn down by the operation of the solenoid 30, is maintained by means of the arm 67 attached to beam 3, the arm 67 being provided with an adjustable screw 68, which engages or locks behind armature 69 of the magnet 66. The screw 68 is adapted to move along the surface of the armature until it reaches the edge thereof when the armature will drop behind the end of the screw 68 and hold the walking beam in the position that it thus assumes until the armature 69 is operated by the magnet 66.

In Figs. 7 and 10 is shown the electrical connection of the parts of the devices shown in the other figures. I have shown the in-

vention as applied to a telephone system for the purpose of indicating the calls that are sent in by the subscribers of the system. It is understood that the device may be used for completing circuits in succession for any purpose whatsoever or for picking out or selecting any particular circuit that it is desired to complete. The device may therefore be applied to electric signs wherein electric lights are to be connected in succession or in any order desired, connections being made to contacts that are located on the bars 4, 5. A similar arrangement may be used in any other system having a plurality of similar circuits to be controlled. Where a series of circuits are to be closed momentarily, a weighted ball, preferably a metal ball, may be used to close the circuits. The ball may be allowed to roll down the inclined track first from one end and then from the other, the circuits connected to the contacts on the track being closed as the metal ball passes over them. Where it is desirable to control the movements of the traveler I find it is preferable to use the form of the traveler shown in the drawings. It is of course understood that the traveler may be embodied in many ways and such forms may be used as are best adapted to the purposes which they are to accomplish.

Referring to Fig. 7, 90 indicates a subscriber's station connected with the central station of the telephone system. 91 also indicates a second subscriber's station connected to the central station. The subscribers are provided with the usual instruments common to the art. The subscribers' lines are completed through the telephone hook switch in the manner well known in the art. The subscribers' stations are connected to the jacks 92 and 93 which are located in the switch board of the central station. The jacks are provided with the usual switches for cutting out, controlling and annunciating devices in the manner well known in the art. The jacks are connected together by the plugs 94 and 95 which are connected to the operator's circuits in the manner also well known in the art. The subscribers' switches control the operation of the electric circuit controller. The stations are connected to the battery 96 through the resistances 97 and the relay 98. When the subscriber of station 91 lifts the telephone receiver the current of the battery flows through the relay 98 and a resistance 97. The relay 98 completes a circuit through a part of the battery 96 which causes the solenoid 30 to become energized and pull down the core 31. This operates the walking beam 3. When the walking beam 3 has been pulled down a certain distance the lug 35 opens the contacts 37 and thus the current flows through the additional resistance 99. The traveler 9 moves down the incline

toward the solenoid 30 making contact with the contacts 7 located on the bar as it passes along and completes their connections with the bar 5. When the traveler 9 reaches the contact 7 connected to the subscriber's station 91, the current will flow through the relay 100 which shunts the resistance 97.

When the relay 100 is operated a circuit is completed through the magnet 27 and battery 102. The armature 28 is operated which operates the cushioned rod 23 and stops the traveler upon the contact connected with the subscriber's station 91. When the traveler comes to a standstill, the pointer 14 indicates the number associated with the contact 7 on which the traveler is located and by which it was stopped. The jacks connected to the contacts are marked with the same numbers found on the face plate 22 of the controlling device. The operator notices the number pointed out by the indicator 14 and inserts the plug 95 into the jack having the same designating number, which is the number of the jack connected to the subscriber's line of the station 91. The operator upon inserting the plug 95 opens the switch connections of the jack 93 in the manner well known in the art and thus disconnects the subscriber 91 from the controlling device. As long as there is a subscriber calling traveler 9 is permitted to continue its downward motion picking up the energized contacts in succession until it reaches the end of the walking beam whereupon the switch 54, 55 is opened and the walking beam is released from the magnet 30 and through means of operation of its own weight returns to its normal position. The traveler 9 then moves downward to the opposite end of the walking beam stopping on the contacts of the calling subscribers as before. The operator learns the number desired by each calling subscriber and inserts a plug in the jack of each subscriber that is called for. Inserting the second plug in the jack of a called subscriber also opens the switches connected to the subscriber called for and cuts off his station from the circuit controlling device at the central station. The armature 28 also completes the circuit of the battery 103 through the lamp 101. This signals the operator that a subscriber is calling. When the subscribers have completed their conversation the lamps of the plug circuit are lighted in the manner well known in the art and the plugs withdrawn by the operator and the controlling relations with the stations are reestablished.

Of course it is understood that any number of contacts may be energized by any number of the subscribers at the same time and the traveler will pick them up one by one in its movement until all of the subscribers desired to be connected are served. If but one

subscriber calls the controller will serve that subscriber and when the jack is inserted to connect the subscriber with the operator the traveler will return to its normal position.

Fig. 10 shows a diagram of the connections of the device having the modified controlling mechanism shown in Figs. 8 and 9. Inasmuch as the plug circuit is the same in the two systems shown in Figs. 7 and 10 and the connections of the plug circuits are the same, the plug circuits are not shown in connection with the system in Fig. 10. The same reference numerals are used to indicate the same parts illustrated in the other figures of the drawing. When the subscriber 91 lifts the telephone receiver from its hook a circuit is completed through the jack 93, to the battery 96, the relay 110, the mercury controller 80, contact 7 and the jack 93 of the calling subscriber which is connected to the contact 7. The relay 110 closes the circuit of the battery 112 and the magnet 30 which pulls the walking beam 3 down. It is then caught by the armature of the magnet 66. The traveler 9 then moves downward toward the solenoid 30 until it reaches the contact 7 to which the jack 93 is connected. The traveler then completes a circuit of the battery 96 to the bar 5 and the relay 113. The relay 113 completes a circuit from the battery 112 through the magnet 27. The magnet 27 then operates upon its armature 28 and causes the brake 23 to arrest the traveler 9 and hold it on the contact 7. At the same time that the magnet 30 is energized and the walking beam 3 pulled down the arm 67 opens the circuit controller 80 and also permits the contacts 73 and 74 to become closed thereby completing the circuit from the battery 112 to contact 115. The traveler has however moved away from contact 115 and will not cooperate therewith until it returns. When the traveler completes its movement downward after the calling subscriber has been served and his contact 7 has been cut off the traveler continues its downward movement until it reaches the end of the walking beam. The circuit to the battery 112 is completed through the magnet 66 which is energized whereupon the walking beam 3 is freed and allowed to return to its normal position by operation of its own weight. The operation may be repeated at any time and as many contacts 7 may be energized at any one time as may be desired. The traveler will pick them up one by one as it moves up and down the walking beam, it being stopped and liberated by the magnet 27. When the traveler returns to its normal position the circuit of the magnet 65, circuit closer 73 and 74, contact 115, and battery 112 is completed which energizes the magnet 65 and allows the mercurial switch to complete connections with all the subscribers through

the contacts located in the switch and on the bar 4 preparatory to starting the traveler in response to another call.

The invention may be modified by those skilled in the art and may be applied to many forms of systems without materially departing from the spirit of the invention. The above is merely an illustration of one embodiment of the invention and shows merely an illustration of one application of the invention to obtain a desired end. The invention, however, may be applied to many systems and may be used to secure a variety of objects.

What I claim as new and desire to secure by Letters Patent is as follows—

1. In an electric controller the combination of a plurality of circuits, contacts connected therewith, a body for supporting the said contacts, an electric means for tilting the said body, a rolling contact adapted to complete the said circuits, a switch for cutting out a portion of the current passing through the said electric means.

2. In an electric controller the combination of a plurality of circuits, contacts connected therewith, a body for supporting the said contacts, a gravity actuated contact for completing the said circuits, means for tilting the said body, a magnetic means for cushioning the said body.

3. In an electric controller the combination of a plurality of circuits, contacts connected therewith, a body for supporting the said contacts, a gravity actuated contact for completing the said circuits, a means for tilting the said body first in one direction and then in the other to coöperate with the said gravity actuated contact, a pneumatic and magnetic cushioning means.

4. In an electric controller the combination of a plurality of circuits, contacts connected therewith, a body for supporting the said contacts, a rolling contact adapted to complete the said circuits through the said contacts, means for tilting the said body, a magnetic means for holding the said rolling contact on any one of the said first mentioned contacts.

5. In an electric controller the combination of a plurality of circuits, contacts connected therewith, a bar for supporting the said contacts, an electric means for tilting the said bar first in one direction and then in the other, a gravity actuated contact for completing the said circuits through the first named contacts, a means for holding the said second contact in contact with any one of the first named contacts.

6. In an electric controller the combination of a plurality of circuits, contacts connected therewith, a bar for supporting the said contacts, electric means for tilting the said bar, a switch for reducing the current flowing through the said electric means, a

rolling contact adapted to complete the said circuits, a magnetic means for holding the said second named contact on any one of the said first named contacts.

7. In an electric controller the combination of a plurality of circuits, contacts connected therewith, a bar for supporting the said contacts, a rolling contact adapted to complete the circuits through the said first named contact, a solenoid for tilting the said bar, a cushioned rod for holding the said second contact on any one of the said first named contacts, a magnetic body having a socket for cushioning the said bar and rolling contact.

8. In an electric controller the combination of a plurality of circuits, contacts connected therewith, a pair of bars for supporting the said contacts, a rolling contact movable on the said bars, means for tilting the said bars, magnetic means for holding the said bars when tilted and for releasing the said bars and permitting their return.

9. In an electric controller the combination of a plurality of stations, contacts located at one of the said stations and connected with the other of the said stations, a body for supporting the said contacts, a rolling contact adapted to make contact with the said contacts, a means controlled at each station for causing the said body to be tilted, a magnetic means operating through any one of said contacts connected with a station to stop the said rolling contact on the said contact connected to the station thus operating.

10. In an electric controller the combination of a plurality of stations, contacts located at one of the said stations, switches located at the other of the said stations and connected with the said contacts, a pair of bars for supporting the said contacts, a rolling contact, magnetic means actuated by the said switches for tilting the said bars, a magnetic means for seizing the said rolling contact and actuated by any one of the contacts connected to the said switches.

11. In an electric controller the combination of a plurality of contacts electrically connected together, means for opening the said contacts simultaneously, and means for closing any one of said contacts as may be desired.

12. In an electric controller the combination of a plurality of contacts electrically connected together, means for simultaneously opening the said contacts, means for closing the said contacts in succession and maintaining any one of the said contacts closed as may be desired.

13. In an electric controller the combination of a plurality of stations, contacts located at one of said stations, switches located at the other of the said stations and connected with the said contacts, a gravity actuated contact, a magnetic means actuated by

the said switches for causing the operation of the said gravity actuated contact, a magnetic means actuated by any one of the said contacts connected to the switches for seizing the said gravity actuating contact and holding it in contact with one of the said contacts.

14. In an electric controller the combination of a plurality of stations, contacts located at one of said stations, switches located at the other of the said stations, and connected with the said contacts, a gravity actuated contact, a magnetic means actuated by the said switches for causing the operation of the said gravity actuated contact, a magnetic means actuated by any one of the said contacts connected to the switches for seizing the said gravity actuating contact and holding it in contact with the contact by which it is actuated.

15. In an electric controller the combination of a plurality of circuits, contacts connected therewith, a body for supporting the said contacts, a gravity actuated means for closing the said contacts in succession, means for tilting the said body, a mercurial switch connected to the said contacts operated by the said body for opening the connections with the said contacts.

16. In an electric controller the combination of a plurality of circuits, contacts connected therewith, a body for supporting the said contacts, a gravity actuated means for

closing the said contacts in succession, means for tilting the said body, a switch adapted to electrically connect the said contacts together, and to open the said electrical connections.

17. In an electric controller the combination of a plurality of circuits, contacts connected therewith, a body for supporting the said contacts, a rolling contact adapted to complete the said circuits through the said contacts, means for operating the said body to permit said rolling contact to operate, means for holding the said rolling contact on any one of the said first mentioned contacts.

18. In an electric controller the combination of a plurality of circuits, contacts connected therewith, a body for supporting the said contacts, a gravity actuated contact adapted to complete the said circuits through the said contacts, means for operating the said body to cause the said gravity actuated contact to operate, magnetic means for seizing and holding the said gravity actuated contact on any one of the said first mentioned contacts.

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

EDWARD J. BURKE.

Witnesses:

F. F. CRAMPTON,
M. A. BUTLER.