

H. A. HUMPHREY.

ELEVATOR.

APPLICATION FILED JAN. 19, 1909.

963,569.

Patented July 5, 1910.

3 SHEETS—SHEET 1.

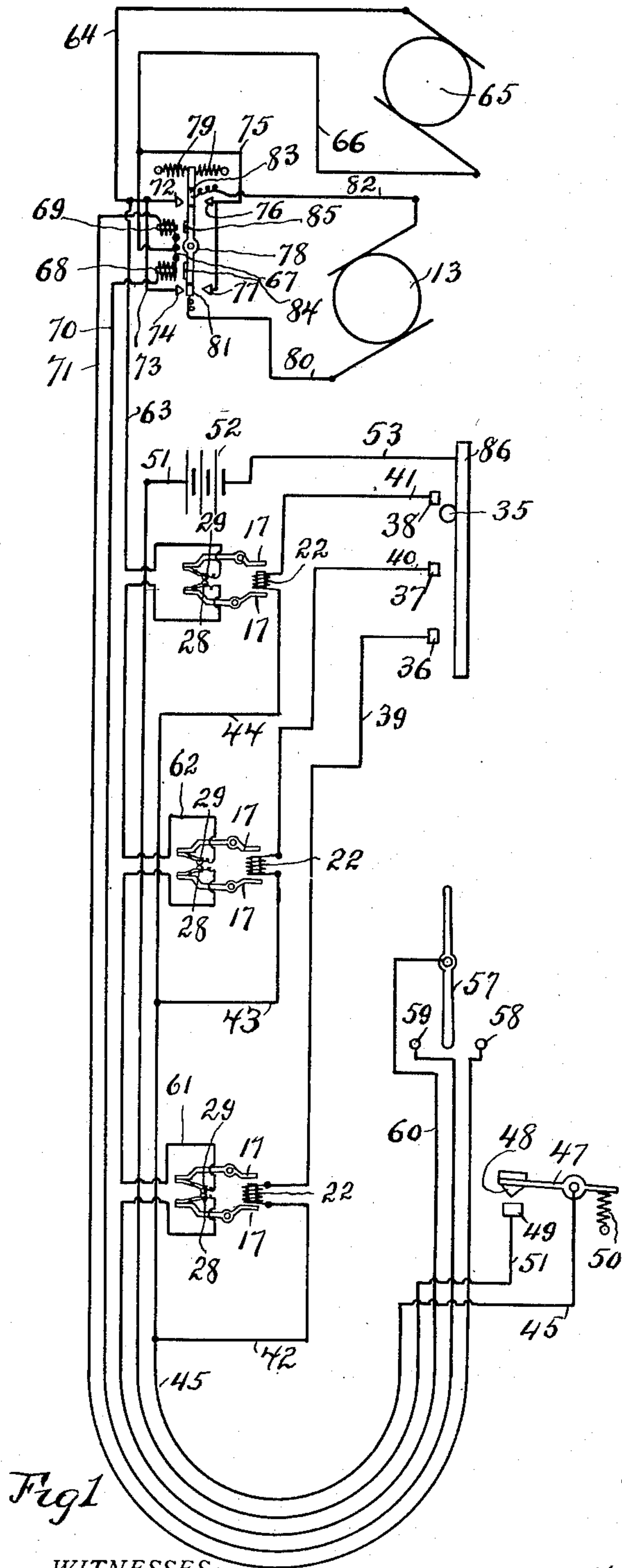


Fig 1

WITNESSES:

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E. B. House

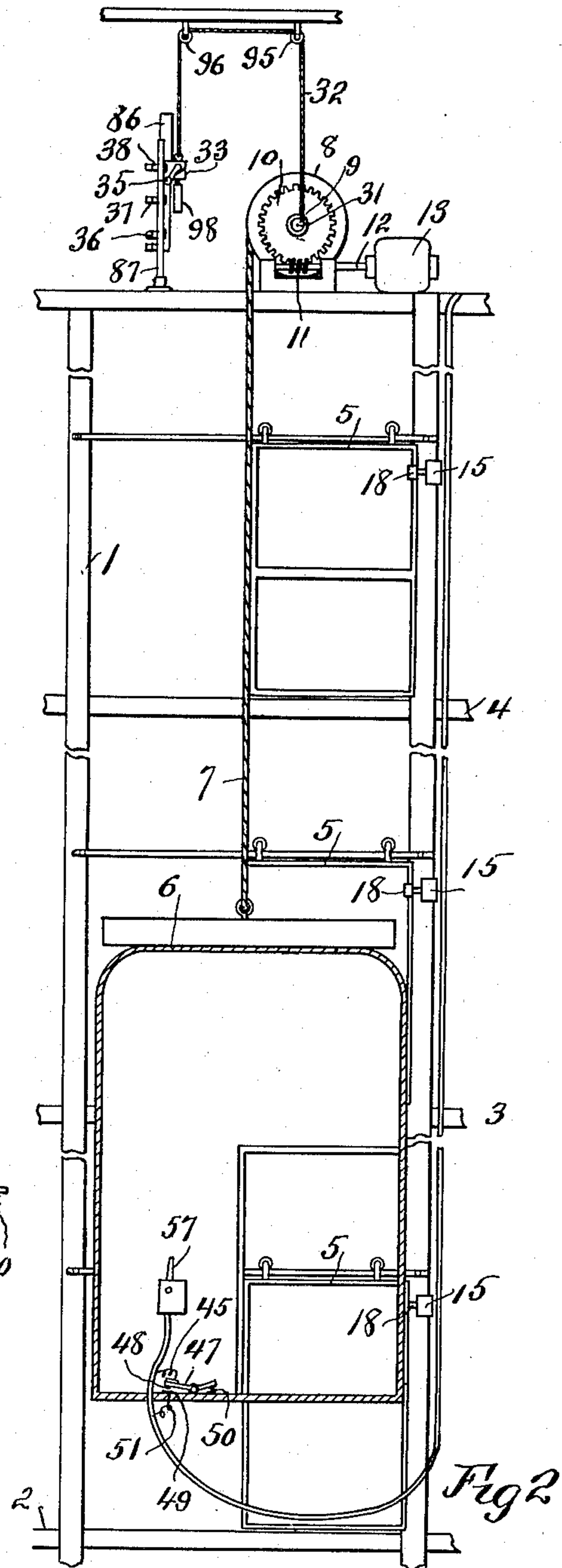


Fig 2

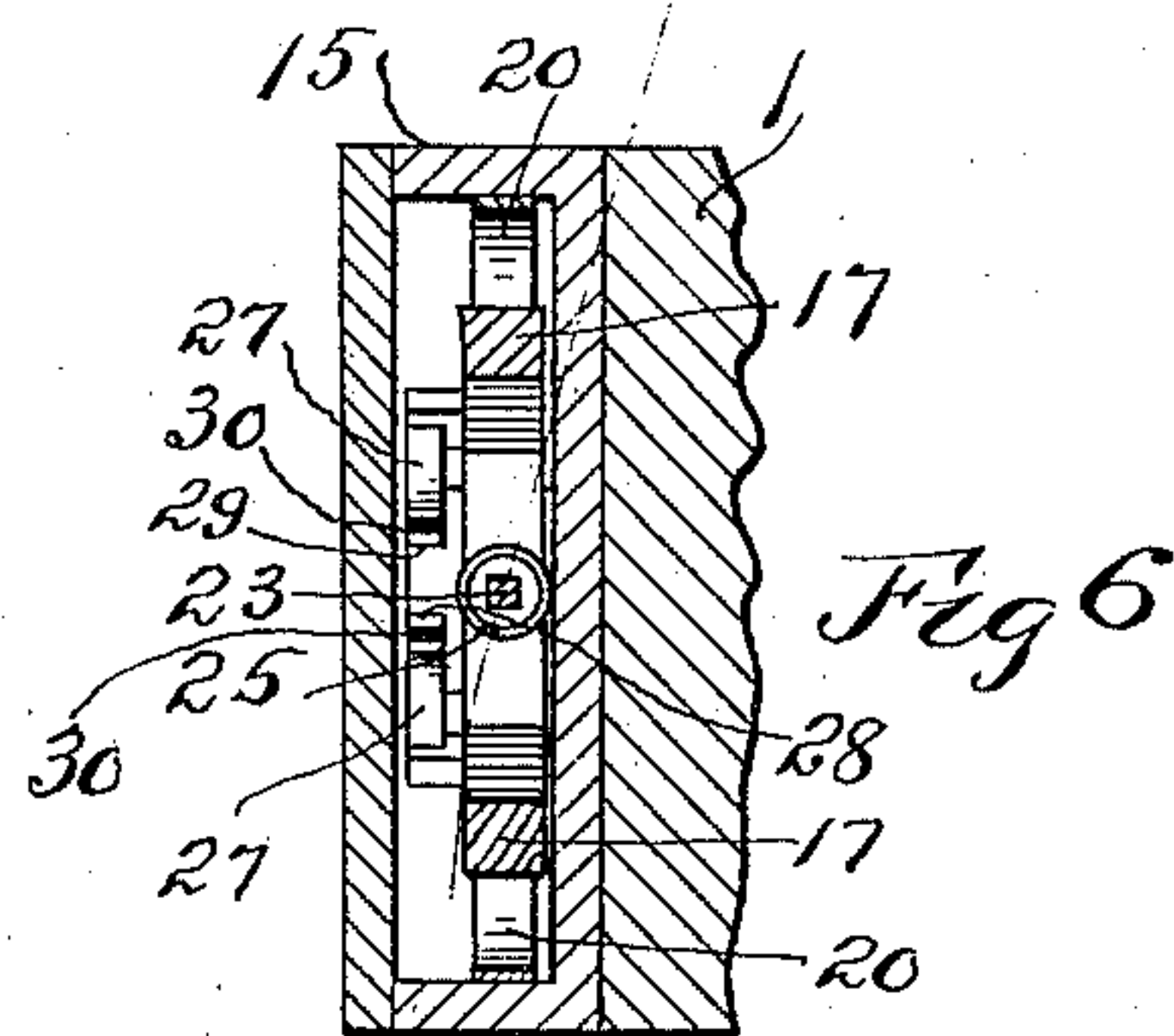
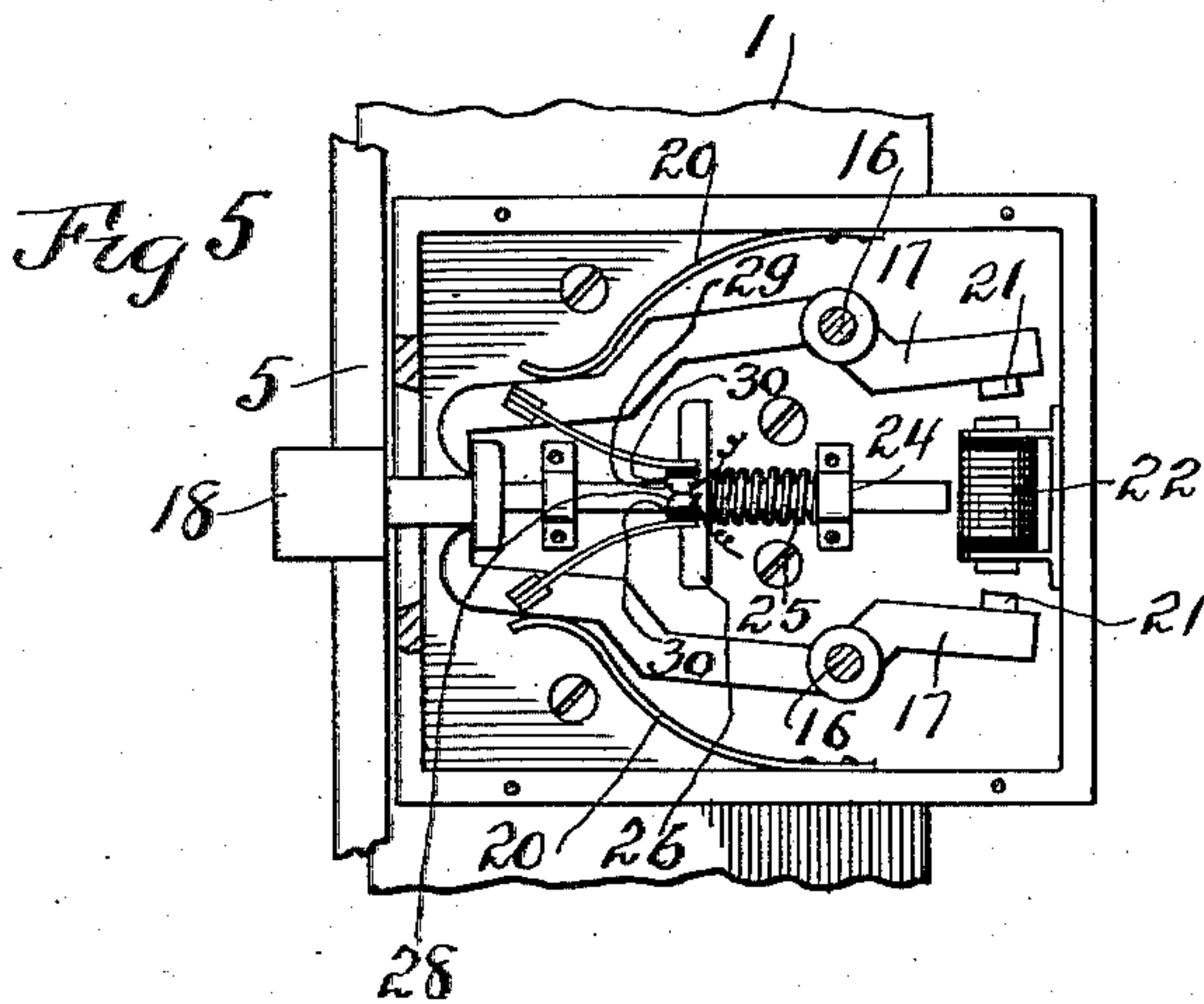
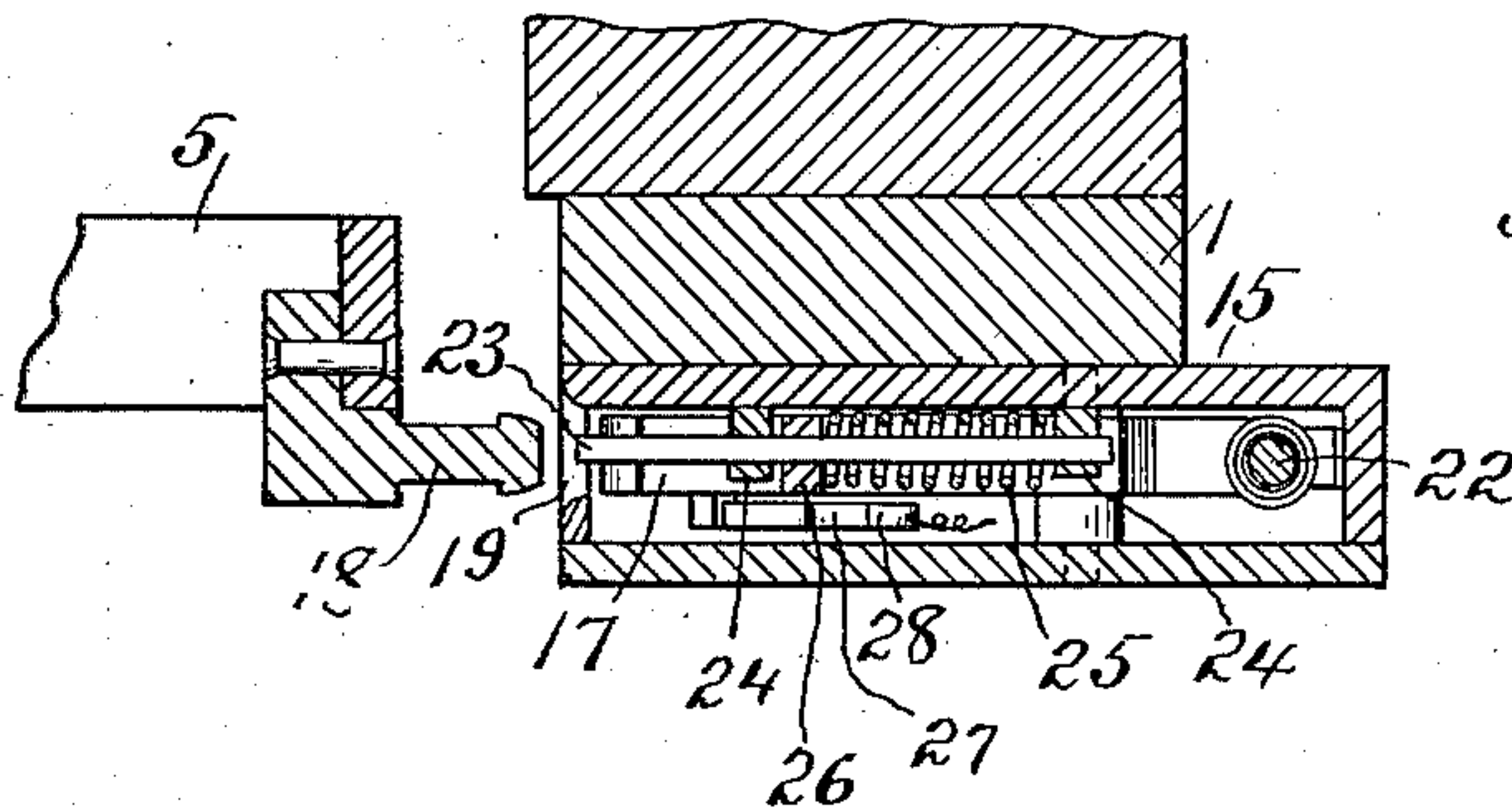
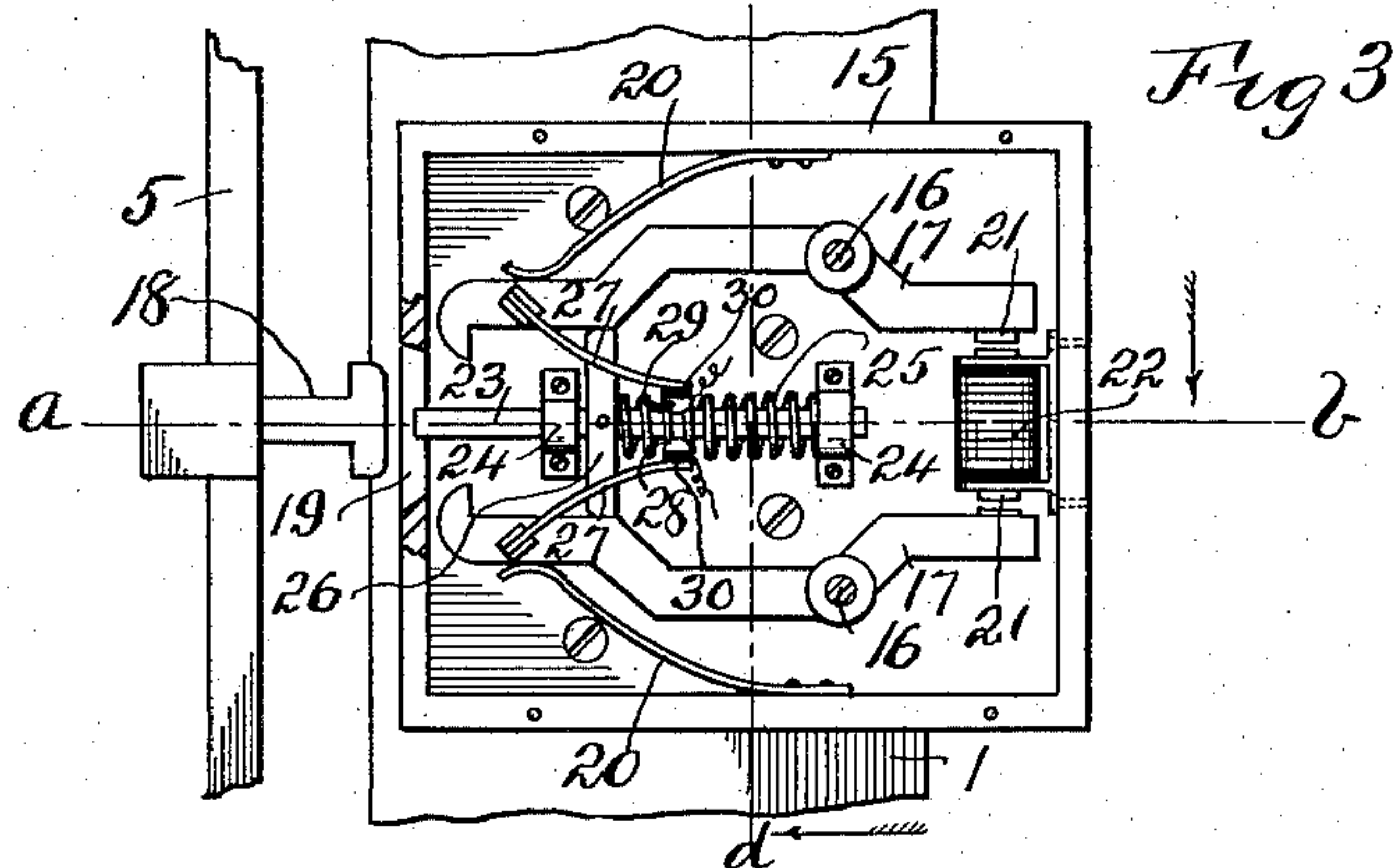
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3 SHEETS—SHEET 2.



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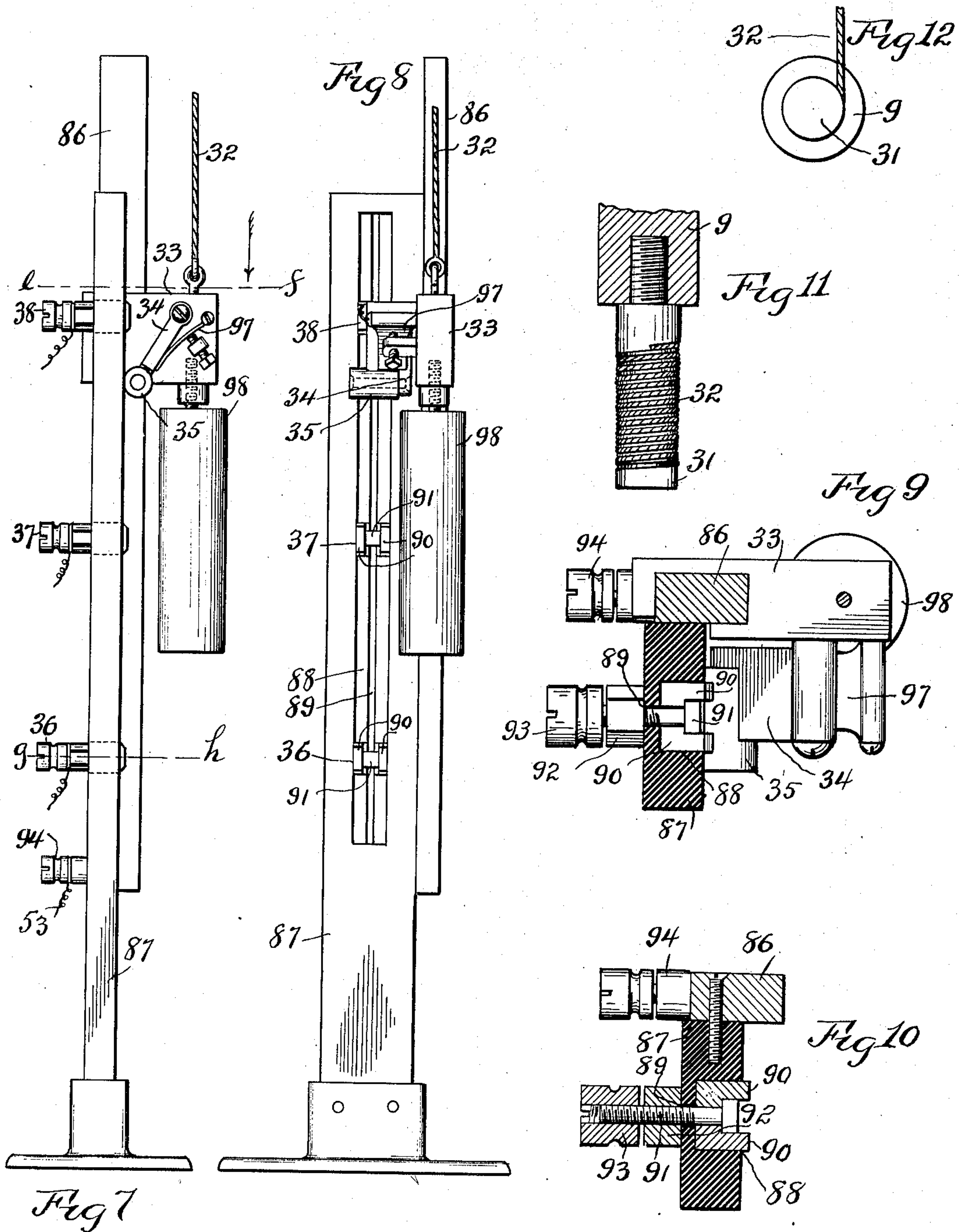
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3 SHEETS—SHEET 3.

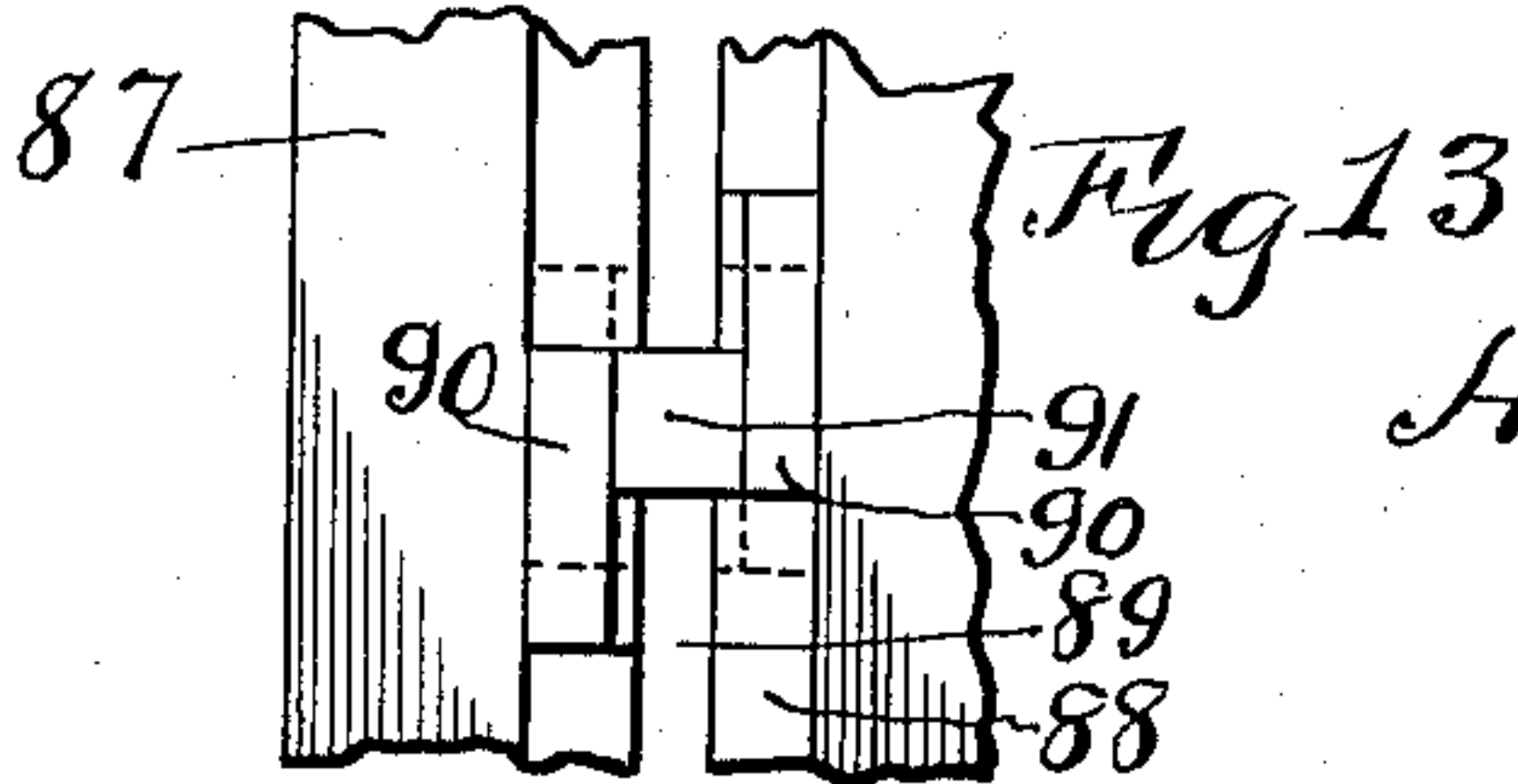
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# UNITED STATES PATENT OFFICE.

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ELEVATOR.

963,569.

Specification of Letters Patent.

Patented July 5, 1910.

Application filed January 19, 1909. Serial No. 473,042.

*To all whom it may concern:*

Be it known that I, HENRY A. HUMPHREY, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented a certain new and useful Improvement in Elevators, of which the following is a specification.

My invention relates to improvements in elevators.

The object of my invention is to provide an elevator construction in which the hoisting mechanism will become inoperative for moving the car when one of the elevator gates is open, thus eliminating the danger of any one falling into the elevator shaft through an open gateway due to the failure of the car operator to close the gate.

The novel features of my invention are hereinafter fully described and claimed.

In the accompanying drawings illustrating the preferred form of my invention, Figure 1 is a diagrammatic view of the different circuits. Fig. 2 is a view, partly in vertical section and partly broken away, of my improved elevator mechanism. Fig. 3 is a view, enlarged, partly in vertical section and partly in side elevation of one of the gate locking devices, the locking members being shown in the unlocked positions. Fig. 4 is a horizontal section on the dotted line *a-b* of Fig. 3. Fig. 5 is a view similar to Fig. 3, excepting that the locking members are shown in the locked positions. Fig. 6 is a vertical section on the dotted lines *c-d* of Fig. 3. Fig. 7 is an enlarged side elevation of the motor operated circuit controlling mechanism. Fig. 8 is an elevation front view of what is shown in Fig. 7. Fig. 9 is a cross section on the dotted line *e-f* of Fig. 7. Fig. 10 is a cross section on the dotted line *g-h* of Fig. 7. Fig. 11 is a top view of the threaded drum. Fig. 12 is an end view of the same. Fig. 13 is an enlarged fragmental elevation view of a pair of adjustable contact members.

Similar characters of reference denote similar parts.

Referring first to Figs. 1 and 2, 1 denotes the elevator shaft framework, 2, 3 and 4 the several floors of the building, 5 ordinary shaft opening gates of the horizontally slidable type, 6 the elevator car, 7 the car supporting cable mounted on the hoisting drum 8 supported on a horizontal shaft 9 to which is secured a worm wheel 10 meshing with a

worm 11 on the armature shaft 12 of an electric motor 13. A plurality of casings 15 are secured to the frame 1 at the respective floors. Said casings contain the gate locking mechanisms, and as all are alike a description of one will suffice for all.

Referring now to Figs. 3 to 6, in the casing 15 are secured horizontal pins 16 on which are pivoted two locking members 17 having hooked outer ends for engaging a T shaped bracket 18 secured to the adjacent gate 5. The casing 15 is provided with a slot 19 for receiving said bracket. Two springs 20 secured to the casing 15 normally force the members 17 to the closed positions shown in Fig. 5. Two armatures 21 are secured respectively to the members 17 at the rear of pins 16 and disposed respectively opposite the ends of the core of an electromagnet 22 disposed intermediate the rear ends of members 17. Slidably mounted in bearings 24 intermediate the members 17 is a horizontal bar 23 disposed so that its outer end may be struck and forced back by the bracket 18. A coil spring 25 encircling the bar 23 has its rear end bearing upon the rear bearing 24 and its forward end bearing against a transverse vertical bar 26 secured to the bar 23. When the gate is open and the bracket 18 withdrawn from the casing 15, the spring 25 will force the bar 23 outwardly so that bar 26 will hold the members 17 in the open position, shown in Fig. 3. Secured respectively to the members 17 are spring plates 27 carrying respectively two contact devices 28 and 29, said devices being supported by blocks 30 of insulating material. When the magnet 22 is energized and the gate 5 moved to the open position, the members 17 will be swung to the position shown in Fig. 3 in which position the contact devices 29 and 28 will be separated so as to break the circuit in which they and the motor 13 are located, thereby stopping the running of the motor. Secured to any part rotated by the motor 13, as for instance the shaft 9, is a horizontal screw threaded drum 31 to the periphery of which is secured a cord 32 adapted to be wound on the drum and secured to a support 33 to which is pivoted an arm 34 carrying a contact device comprising preferably a roller 35 adapted to successively strike a plurality of contact devices 36, 37 and 38, hereinafter more fully described, and which are respectively connected, as shown



in Fig. 1 by conductors 39, 40 and 41 with one set of ends of the magnet windings 22, the other set of ends of which are connected respectively by conductors 42, 43 and 44 to a conductor 45 which in turn is connected to a lever 47 pivoted on the floor of the car and carrying a contact device 48 adapted to strike a contact device 49 from which it is normally separated by a spring 50 which is connected to lever 47 and to the floor of the car 6 so as to swing the lever 47 to a position separating contacts 48 and 49. A conductor 51 connects contact 49 with a battery 52 which is connected by a conductor 53 with the roller contact 35 in the manner hereinafter described.

A lever 57 pivotally mounted on the car 6 is adapted when swung to and fro to strike alternately contacts 58 and 59. A conductor 60 connects the lever 57 with the contact device 28 of the lower set. A conductor 61 connects the contact 29 of the lower set with the contact 28 of the next higher set, and a conductor 62 connects contact 29 of the last named set with the uppermost contact 28. A conductor 63 connects the uppermost contact 29 with a conductor 64 which is connected to one brush of a generator 65, the other brush of which is connected by a conductor 66 with a conductor 67, the ends of which are respectively connected to one set of ends of the windings of two electromagnets 68 and 69, the other set of ends of which are respectively connected by conductors 70 and 71 with the contacts 59 and 58. A contact 72 is connected to conductor 64, and a contact 74 is connected to a conductor 73 which is connected to conductor 64. A conductor 75 connected to conductor 66 is connected to two contacts 76 and 77 disposed respectively opposite to contacts 72 and 74. A bar 78 is pivoted between the magnets 68 and 69 and between the contacts 76 and 77 and 72 and 74. Two coil springs 79 disposed at opposite sides of the bar 78 serve to normally hold the bar 78 in the intermediate central position shown in Fig. 1. Carried by but insulated from the bar 78 is a contact 81 connected by a conductor 80 with one brush of a motor 13, the other brush of which is connected by a conductor 82 with a contact 83 carried by but insulated from the bar 78. Secured to the bar 78 at opposite sides of its pivot and in the fields of the magnets 68 and 69 are two armatures 84 and 85. When the magnets 68 and 69 are alternately energized the armatures will be attracted alternately so as to bring the contacts 81 and 83 into contact with contacts 74 and 76 and then into contact with contacts 72 and 77. Thus when the bar 78 is alternately swung the direction of the current through the motor 13 will be changed thus changing its direction of running.

I will now describe the mechanism for

controlling the opening and closing of the supplemental circuit in which are located in multiple the magnets 22. Referring to Figs. 8 to 13, 86 denotes a vertical bar of conducting material on which the support 33 is vertically slidable. Said bar 86 is secured to a vertical bar 87 of insulating material provided with a vertical groove 88 in one side in the bottom of which is a vertical slot 89. The contact devices 36, 37 and 38 previously referred to are secured to the bar 87. As all of these devices are alike a description of one will suffice. Each of these contact devices comprises two members of conducting material 90 located in the groove 88 wherein they are secured by a horizontal screw 91 which extends through the slot 89 between said members, and has its head resting against said members so as to tightly clamp them to the bar 87. Upon the screw 91 at the rear of bar 87 is a nut 92 for securing the screw in position to which it may be adjusted. A second nut 93 is mounted on the screw 91. The conductor 39, 40 or 41, as the case may be is secured between the nuts 92 and 93 of the contact devices 36, 37 or 38. By loosening the nuts the members 90 may both be vertically adjusted relatively to each other and relative to the bar 87. A binding post 94 is secured to the bar 86, said binding post, bar 86, support 33 and arm 34 forming part of the conductor 53, shown in Fig. 1. The support 33 is disposed so that when reciprocated the roller contact 35 will consecutively strike the contact members 90 of the contact devices 36, 37 and 38, thereby closing the circuit in which said contacts are located and successively energizing the magnets 22. The cord 32 passes from the small threaded drum 31 upwardly to and over a pulley 95, thence horizontally to and over a pulley 96, and thence downwardly to the support 33, as shown in Fig. 2. A spring 97 secured to the support 33 serves to normally swing the arm 34 to a position in which the roller will strike the contact members 90 when the support 33 is vertically reciprocated. A weight 98 carried by the support 33 serves to move said support downward when the drum 8 is rotated so as to lower the car 6. When the drum is rotated to raise the car the cord 32 is wound on the small drum 31 thus raising the support 33. By vertically adjusting the member 90 of one set relative to the other sets the device is made to conform to floors located at different distances apart. By relatively adjusting the members 90 the length of surface contact of said members may be adjusted.

The operator on the car controls the motor 13 by the lever 57. When lever 57 is swung onto contact 59, the current from the generator 65 will pass by conductor 66 and conductor 67 to magnet 68, thence to gen-



erator 65 as follows:—By conductor 70, contact 59, lever 57, conductor 60, lowest contact 28, adjacent contact 29, conductor 61, contacts 28 and 29 of the next higher set, conductor 62, contacts 28 and 29 of the uppermost set, conductor 63 and conductor 64. The magnet 68 being energized will attract armature 84 to swing the bar 78 so that contacts 81 and 83 will strike contacts 74 and 76. The current will then pass from generator 65 by conductors 66 and 75 to contacts 76 and 83, thence by conductor 82 to motor 13, thence by conductor 80, contacts 81 and 74, and conductors 73 and 64 to generator 65. When the lever 57 is swung against contact 58 the current from generator 65 will pass by conductors 66 and 67, magnet 69, conductor 71, contact 58, lever 57 and thence by the path already described back to generator 65. The magnet 69 being energized the armature 85 will be attracted thereby thus swinging bar 78 so that contacts 81 and 83 will strike contacts 77 and 72. The current will then pass from generator 65 by conductors 66 and 75, contacts 77 and 81, conductor 80, motor 13, conductor 82, contacts 83 and 72 and back by conductor 64 to generator 65. As the motor 13 is run to rotate the drum 8 to elevate or lower the car 6, the support 33 will carry the roller contact 35 upwardly or downwardly according to the direction the car is moving. The contact 35 will thus successively strike the contact members 90 of the sets 36, 37 and 38. The disposition relatively of said sets is such that the circuit will be closed in the supplemental circuit containing the magnets 22 at such times as the car 6 is at a floor in position for ingress or egress. When the car reaches say floor 3, the contact 35 will strike contact members 90 of set 37. The circuit will then be completed from battery 52, if lever 47 has been swung so that contacts 48 and 49 are together, through conductor 53, contacts 35 and 37, conductor 40, adjacent magnet 22, conductors 43 and 45, lever 47, contacts 48 and 49, and by conductor 51 back to battery 52. The energizing of magnet 22 at floor 3 will cause the locking members 17 adjacent thereto to swing to the unlocked position, so that the gate 5 may be opened. When the members 17 are thus swung the circuit containing motor 13 will be broken at floor 3 thereby rendering the motor inoperative. The car can not leave the floor until the gate 5 has been closed. When this has been done the bracket 18 will force rearwardly the bar 23, after which the springs 20 will swing the members 17 to the closed position thereby again bringing adjacent contacts 28 and 29 together and again closing the motor circuit. In this position the members 17 will engage and hold the bracket 18 so that the gate can not be opened until the car again reaches the floor.

From the above it will be understood that at all times the gates are closed excepting when the car is at a floor, and the operator can not start the car without closing the adjacent gate.

Modifications of my invention, within the scope of the appended claims, may be made without departing from its spirit.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:—

1. In elevators, the combination with an electric car-hoisting motor, located in an electric circuit, of a gate, circuit controlling means in said circuit controlled by said gate, electromagnetic means located in a supplemental circuit and controlling said circuit controlling means, a rectilinearly reciprocative circuit controlling device for controlling said supplemental circuit, and means controlled by the motor for controlling the reciprocation of said device.

2. In elevators, the combination with an electric car-hoisting motor located in an electric circuit, of a gate, circuit controlling means in said circuit controlled by said gate, electromagnetic means located in a supplemental circuit and controlling said circuit controlling means, a reciprocative slidable circuit controlling device for controlling said supplemental circuit, means actuated by the motor for sliding said device in one direction, and means for sliding said device in the opposite direction.

3. In elevators, the combination with an electric car hoisting motor located in an electric circuit, of a plurality of gates located at different floors, a plurality of circuit controlling means located in said circuit and controlled respectively by said gates, a plurality of electromagnetic means located in a supplemental circuit and respectively controlling said circuit controlling means, a rectilinearly reciprocative device for successively closing the supplemental circuit by way of said electromagnetic means, and means controlled by the motor for reciprocating said device.

4. In elevators, the combination with an electric hoisting motor located in an electric circuit, of a gate, circuit controlling means in said circuit controlled by said gate, electromagnetic means located in a supplemental circuit and controlling said circuit controlling means, two circuit closing contacts in said supplemental circuit, one of said contacts being movable into and out of contact with the other contact, a slidable device carrying said movable contact, a rotary member, means actuated by said motor for rotating said rotary device in opposite directions, and means for sliding said device when said rotary member is rotated.

5. In elevators, the combination with an electric hoisting motor located in an electric



circuit, of a plurality of gates, a plurality of circuit controlling means located in said circuit and respectively controlled by said gates, a plurality of electromagnetic means  
 5 located in multiple in a supplemental circuit and respectively controlling said circuit controlling means, a plurality of circuit closing contacts one of which is movable, the  
 10 others being connected respectively with said electromagnetic means, a slidable device carrying said movable contact and movable to positions in which the movable contact will successively strike the other contacts so as to close the supplemental circuit  
 15 therethrough, a rotary member, means actuated by said motor for rotating said rotary member, and means for sliding said device when said rotary member is rotated.

6. In elevators, the combination with an electric hoisting motor located in an electric circuit, of a gate, circuit controlling means located in said circuit and controlled by said gate, electromagnetic means located in a supplemental circuit and controlling  
 25 said circuit controlling means, two circuit closing contacts in said supplemental circuit, one contact being movable into and out of contact with the other, means actuated by the motor for so moving said movable contact, and means for varying the length of  
 30 time the said contacts are in movable contact with each other.

7. In elevators, the combination with an electric hoisting motor located in an electric circuit, of a gate, circuit controlling means located in said circuit and controlled by said gate, electromagnetic means located in a supplemental circuit and controlling said circuit controlling means, two circuit closing  
 35 contacts in said supplemental circuit, one contact being movable into and out of contact with the other, one contact being adjustable as to the length of contact surface, and means actuated by the motor for moving said movable contact.  
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8. In elevators, the combination with an electric hoisting motor located in an electric circuit, of a plurality of gates located at different floors, a plurality of circuit controlling means in said circuit and respectively controlled by said gates, a plurality of electromagnetic means located in multiple in a supplemental circuit and respectively controlling said circuit controlling  
 50 means, a plurality of circuit closing contacts one of which is movable successively into contact with the other contacts, said other contacts being adjustable as to length of contact surface, and means actuated by  
 55 the motor for so moving said movable contact.  
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9. In elevators, the combination with a hoisting motor, of a plurality of electromagnetic devices located in an electric circuit, means by which said devices control

the running of said motor, a plurality of contact devices in said circuit, said contact devices being adjustable relative to each other, a movable contact device in said circuit adapted to successively strike said contact devices, and means actuated by said motor for moving said movable contact device.  
 70

10. In elevators, the combination with an electric hoisting motor located in an electric circuit, of a plurality of circuit controlling devices located in said circuit, a plurality of gates respectively controlling said circuit controlling devices, a plurality of electromagnetic means located in a supplemental circuit respectively controlling said circuit controlling devices, a plurality of contact devices located in circuit respectively with said electromagnetic means, and adjustable relative to each other, a movable  
 75 contact device in said supplemental circuit, and means actuated by said motor for bringing the movable contact device successively into contact with said first named contact devices.  
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 85  
 90

11. In elevators, the combination with a hoisting motor, of a plurality of means located at different floors for separately controlling the running of said motor, a plurality of electromagnetic means located in an electric circuit for respectively controlling said controlling means, a plurality of contact devices in circuit respectively with said electromagnetic means and adjustable toward and from each other, a movable  
 95 contact device, and means actuated by said motor for successively bringing said movable contact device into contact with the first named contact devices.  
 100

12. In elevators, the combination with a hoisting motor, of a plurality of contact devices located in an electric circuit and adjustable relative to each other, a movable contact device reciprocative into positions successively in contact with said contact devices, means controlled by said motor for reciprocating said movable contact device to successively close said circuit through the first named contact devices respectively, and means by which the running of said motor  
 105 is stopped when the said circuit is closed.  
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 115

13. In elevators, the combination with an electric hoisting motor located in an electric circuit, of a plurality of circuit breaking devices located in said circuit at different floors, a plurality of electromagnetic means for respectively controlling said circuit breaking means and located in a supplemental circuit, a plurality of contact devices adjustable relative to each other and in circuit respectively with said electromagnetic means, a reciprocative contact device in said supplemental circuit and adapted when reciprocated to successively strike said first named contact devices, and means con-  
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trolled by said motor for reciprocating said contact device.

14. In elevators, the combination with a hoisting motor, of a plurality of contact devices located one above the other and located in an electric circuit, a vertically reciprocative contact device in said circuit and adapted when reciprocated to successively strike said contact devices, said contact device being movable downward by gravity, means actuated by said motor for moving said contact device upwardly, and means for stopping said motor when said circuit is closed.

15. In elevators, the combination with a hoisting motor, of a plurality of contact devices located in an electric circuit and adjustable relative to each other, a reciprocative contact device located in said circuit for successively striking said contact devices when said device is reciprocated, said device being movable in one direction by gravity actuated means, means actuated by said motor for moving said contact device in the opposite direction, and means by which the motor is stopped when said circuit is closed.

16. In elevators, the combination with a hoisting motor, of a plurality of contact devices located in an electric circuit and adjustable relative to each other, a reciproca-

tive contact device adapted when reciprocated to successively strike said contact devices and close said circuit, a rotary member rotated in opposite directions by said motor, a cord connected to and adapted to be wound on said rotary member for moving said contact device in one direction, means for moving said contact device in the opposite direction, and means for stopping said motor when said circuit is closed.

17. In elevators, the combination with a hoisting motor, of a plurality of contact devices located one above the other in an electric circuit, a vertically reciprocative contact device adapted when reciprocated to successively strike said contact devices for closing said circuit, a vertically movable support for said contact device, a rotary member rotated in opposite directions by said motor, a cord secured to and adapted to be wound on said rotary member for raising said support, and means for stopping said motor when said circuit is closed.

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

HENRY A. HUMPHREY.

Witnesses:

E. B. HOUSE,  
WARREN D. HOUSE.