

No. 719,682.

PATENTED FEB. 3, 1903.

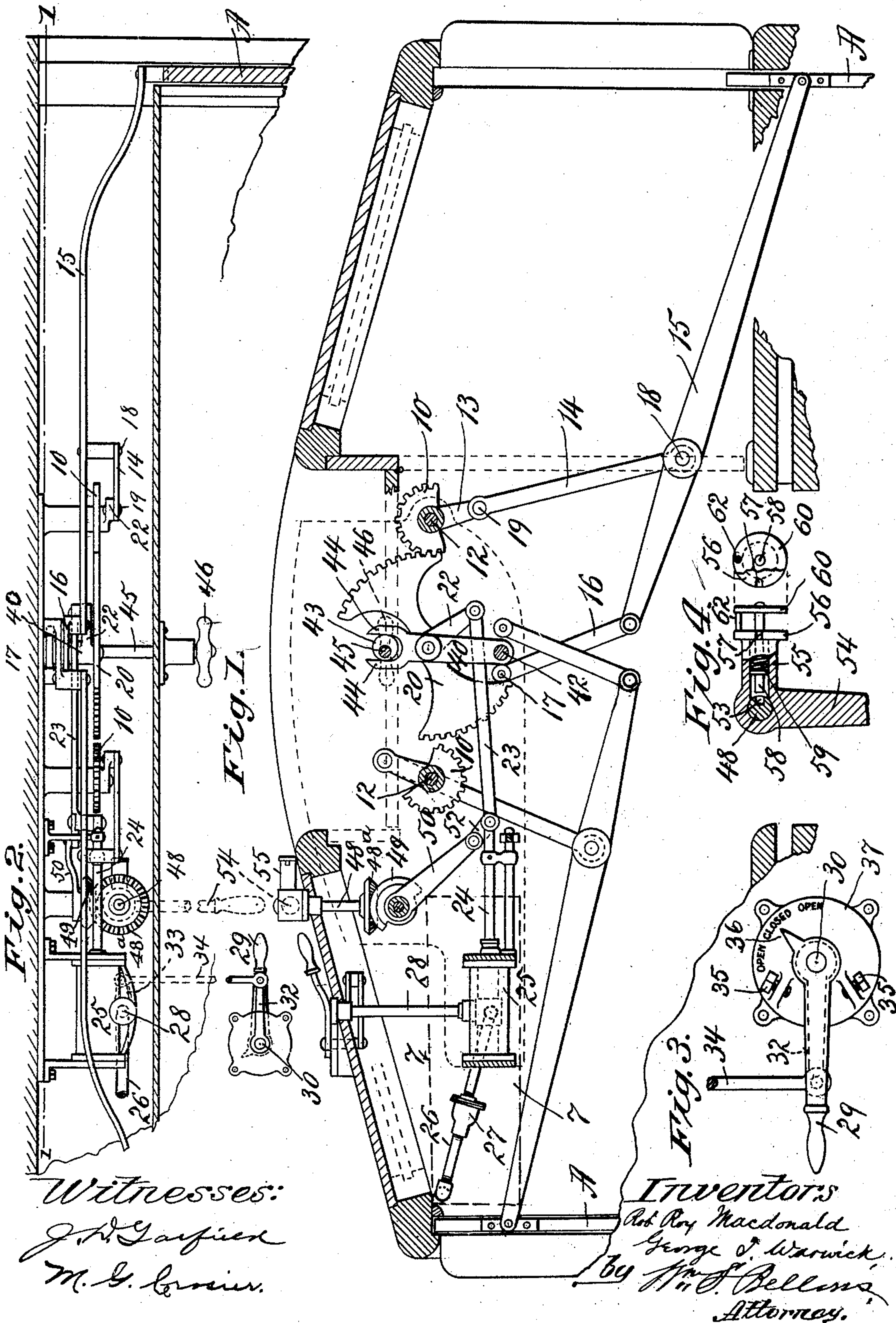
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DOOR OPERATING MACHINE.

APPLICATION FILED SEPT. 22, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



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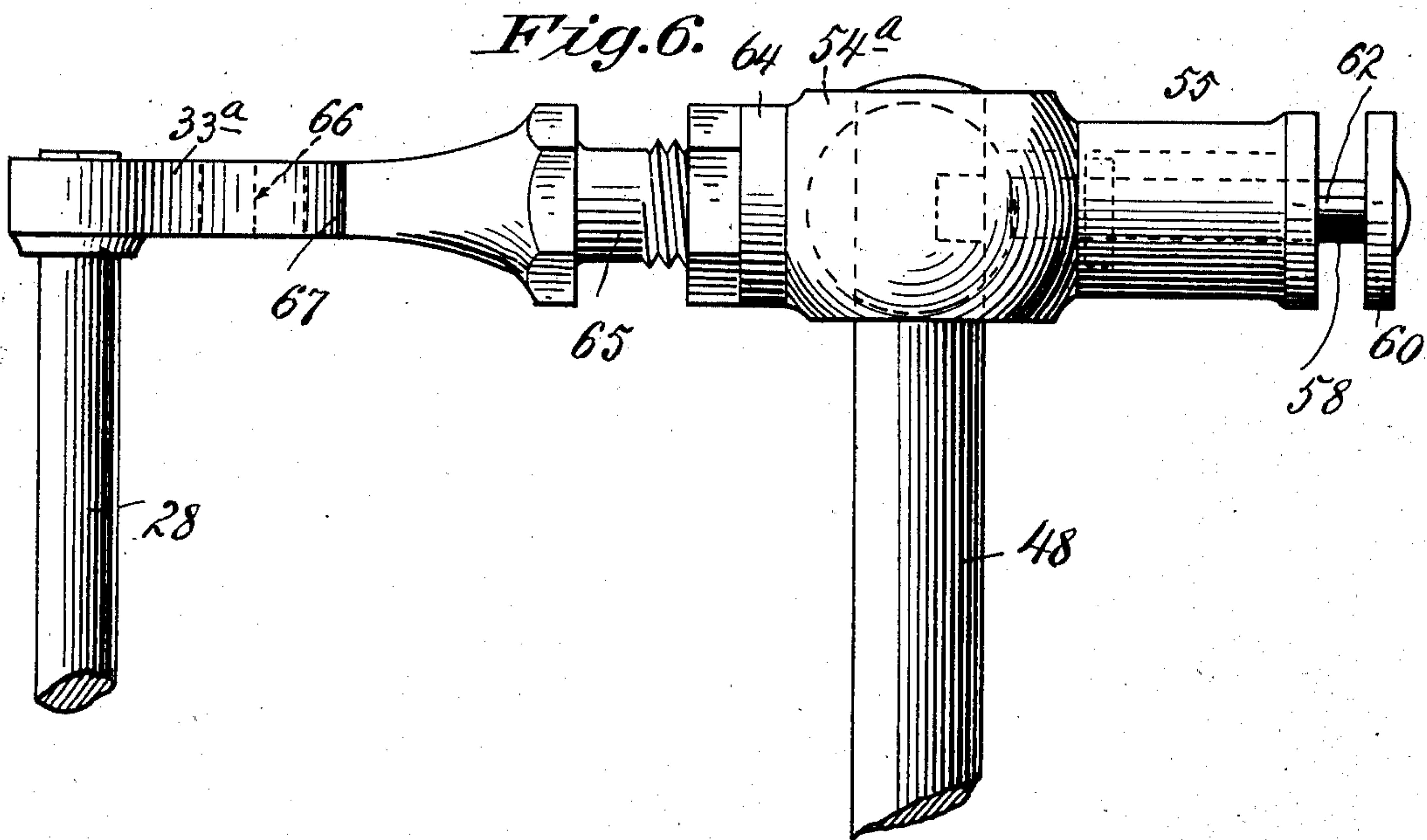
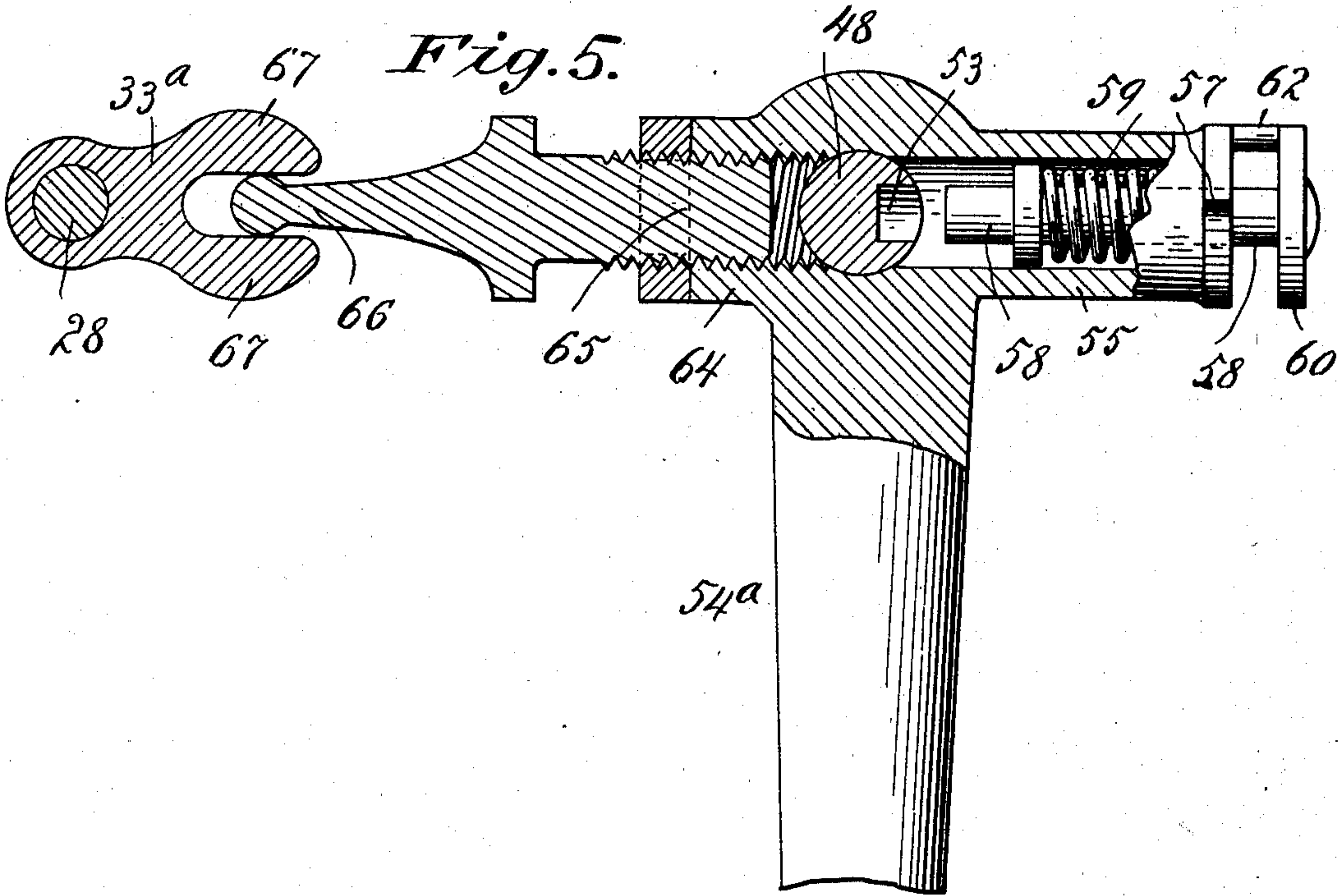
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

ROB ROY MACDONALD AND GEORGE T. WARWICK, OF SPRINGFIELD,  
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## DOOR-OPERATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 719,682, dated February 3, 1903.

Application filed September 22, 1902. Serial No. 124,304. (No model.)

*To all whom it may concern:*

Be it known that we, ROB ROY MACDONALD, a citizen of the United States of America, and GEORGE T. WARWICK, a subject of the King of Great Britain, both residents of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Door-Operating Mechanism, of which the following is a full, clear, and exact description.

This invention relates to improvements in mechanism for operating the door or doors of a car or other structure, and more particularly to mechanisms of the class in which a motor-power—such, for instance, as compressed air—is employed.

The object of the invention is to provide a new and improved door-operating mechanism to be actuated by any force which may be available and generally to provide a novel door-operating mechanism which shall be comparatively simple, susceptible of action without derangement, and entirely efficient for its purpose; and the invention consists in the combinations and arrangements of devices and parts and the construction of certain parts thereof, all substantially as hereinafter fully described, and set forth in the claims.

In the drawings, Figure 1 shows an end portion of a railway-car in horizontal section and plan view with portions of the opposite doors, the door-operating mechanisms, the compressed-air motor, and the manually-actuated device for moving the door-operating mechanisms. Fig. 2 is an end elevation, as seen from the inner part of the car looking outwardly, of the mechanism shown in the plan view. Fig. 3 is a side view of the controlling device for the compressed air as the same would be seen from without the end of the car. Fig. 4 is a section in a vertical plane through a manually-operable device, hereinafter referred to, for actuating the door-operating mechanism when the motor agent is not available. Fig. 5 is a view similar to Fig. 4, but showing the hand-operating lever arranged to control the compressed air. Fig. 6 is a plan view of the same.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings, A A represent the sliding side doors for the railway-car, for each of

which a door-operating mechanism is provided, each of such mechanisms consisting of a gear-wheel 10, fixed on a vertical journaled shaft 12 and having as a rigid part of such gear a crank-arm 13, which by link 14 has connection with a lever 15, one end of which is pivoted to the door, while the other end of such lever is pivoted to a link 16, which at fixed point 17 is pivotally connected to the framing or any suitable fixture of or in the car.

The arrangement is such that in the extremes of the movements of the parts for bringing the door by rotational movement imparted through said gear into a fully-opened or fully-closed position the pivotal points 18 and 19 of connection between the lever 15 and the crank 13 will be in a line coincident with the length of the crank intersecting the center of rotation at 12 of the gear-wheel 10, so that when the door is opened or closed the described door-operating connections constitute an automatic locking means for the door, so that the latter cannot be moved by any force exerted thereon, it being necessary to change the relations of the connected parts in the door-operating mechanism through the agency of the gear-wheel 10.

The door-operating mechanisms shown duplicated for the opposite side doors of the car have the gear-wheels 10 thereof arranged so far apart that the intermediately-disposed gear 20, which is shown for purposes of lightness in the form of a double-sector gear, will not quite reach to be in mesh simultaneously with both gears 10, but will be, according to the shifted position thereof, in mesh with one or the other thereof. This gear 20 has as a fixture thereof a crank-arm 22, to which the link or connecting-rod 23 is secured, said link 23 having connection with the rod 24, which is the piston-rod for the reciprocating piston in the cylinder 25, in which compressed air is used as the motor agent for actuating the gear 20, through which latter the one or the other side-door-operating mechanism is operated.

The compressed air is supplied into the cylinder at one or the other of the ends thereof from the usual compressed-air reservoir provided on or under the car for the brakes, the same being conveyed to the inlet-ports of the cylinder 25 through the pipe 26, in which it



is desirable to insert a pressure-reducing valve 27, and the air is shut off from entrance into either end of the cylinder or allowed to enter the one or the other end of the cylinder, according as the valve-stem 28 is turned more or less. As a means for controlling the motor agent we have shown in Sheet 1 of the drawings a hand-lever 29, fixed on a shaft 30, on which latter is a crank-arm 32, between which and the crank-arm 33 of the valve-stem 28 is secured the connecting-rod 24.

The hand-lever 32 has its range of movement between two adjustable stops 35, its normal position being midway between these stops, when its index-finger 36 will point to the word "Closed" on the plate 37, such index pointing to the word "Open" when the lever is carried against either of the stops 35. By setting in the screw-stops or reversely adjusting them the lever 29 may have a lessened or increased degree of swing to correspondingly decrease or increase the extent of opening of the valve on the stem 28.

In Fig. 1 the gear 20 is shown as engaged with the operating mechanism for the right-hand door, which latter will be successively closed and opened on each operation of the air-controlling lever 29 so long as said gear 20 remains in mesh with the right-hand gear. Gear 20 is shiftably mounted, together with its crank-arm, upon the lever 40, which is pivoted to a fixture of the car at 42. Said lever has an eccentric 43 operative between the separated members 44 thereof, said eccentric being mounted upon the vertically-rotatable shaft 45, at the lower end of which the operating-handle 46 is provided, and it will be plain that by turning the shaft 45 and the eccentric therewith the latter will move the shiftable support 40 for the gear 20 so that the latter will be carried from mesh with the one gear 10 to the other gear 10, whereby the piston-rod thrusts will serve to actuate the other door through the mechanism described as intervening between the double sector 20 and such door.

In Figs. 1, 2, and 4 a means is shown whereby either of the door-operating mechanisms can be worked by hand, the same consisting of a shaft 48, having a gear 48<sup>a</sup> affixed thereon, which meshes into a gear 49, that has fixed thereto the crank or lever 50, linked at 52 to the connection 23 between the piston-rod and the sector-gear-operating crank 22.

At the outer end portion of the shaft 48, which has the socket 53, (shown in Fig. 4,) is normally loosely fitted the hand-lever 54, which at a portion thereof adjacent the shaft has an angularly-extended hub 55, which is hollow and has the flanged end 56, provided with a marginal notch 57. A bolt 58 is movable axially and rotationally in said hub 55 and has at its protruding end a flange 60, provided with the stud 62, which when the bolt is properly turned therefor may match into the aforesaid notch 57. The spring 59 exerts a pressure on the bolt to force it into engage-

ment in the socket 53 of the shaft when the stud 62 matches with the notch 57.

While the mechanism is being operated through the motor agency, the handle-lever 54 is loose on and disconnected from the shaft 48 and will not partake of the swinging motion in consequence of the partial rotations of the gear 49, which is incidental to the reciprocations of the piston-rod connections; but by turning the flange 60 so that its stud 62 registers with the notch 57 the spring will, as will then be permitted, throw the bolt 58 to lock the hand-lever 54 on the shaft 48 and so that the swinging movement of the hand-lever will operate the one or the other of the doors, and yet when the hand-lever is unbolted from the shaft and the doors are operated by the power agency in the cylinder the hand-lever will not swing backward and forward for any uncalled-for or injurious result.

We have in Figs. 5 and 6 shown another operating and controlling means, which is preferable in many cases to that described and shown in the preceding drawings, and in these latter views a single hand-lever 54 serves as the controller for the admission of air into the working cylinder 25 and on occasion when the air in such cylinder is not available serves as the means for manually operating either of the doors. In these views, 28 is the stem of the air-admission valve for the working cylinder, and 48 is the horizontal shaft, corresponding to the one similarly designated in Figs. 1 and 2, the same having operating connection with the double sector 20, and this shaft 48 has the notch 53, and the lever adjacent thereto has the constructions described in respect of the device shown in Fig. 4. The lever 54<sup>a</sup> has adjacent to its fitting about the shaft the hub extension 64, in which is adjustably screw-connected a threaded bar 65, the free extremity 66 of which engages between the separated members 67 67 of a lever extension 33<sup>a</sup> of the valve shaft or stem.

Of course it will be apparent that the working movements of the lever 54<sup>a</sup> will impart partial rotatory movements to the valve-stem whereby to actuate the door-operating mechanisms by power, and still the same lever 54<sup>a</sup> will when interlocked with the shaft 48 be capable of working the door-operating mechanisms by hand-power.

By screwing the bar 65 in or out a given swing of the hand-lever 54<sup>a</sup> will impart a correspondingly increased or lessened rotational movement to the valve-stem.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a door-operating mechanism, the combination with the door, of a rotatable part, having a crank or lever extension, a lever connected to the door, pivotally hung to a suitable support, and having a link pivoted thereto and to said crank extension, said parts being arranged so that when the door is in its open and its closed position, the link will be



in a line coincident with the length of the said crank extension, constituting a locking means, and means for turning said rotatable part.

5 2. In combination, the two doors, door-operating mechanisms connected therewith, a driver or actuating part intermediate between said door-operating mechanisms, shiftable  
10 of, means for shifting said driver, and means for imparting actuating movement thereto.

3. In combination, a cylinder, having the rod of the piston thereof operatively connected with the door-operating mechanism,  
15 and having a valve-operating stem for controlling the admission of the motor agent in said cylinder, a handle adapted to be operated manually, having a connection with the door-  
20 operating mechanism, and having also an operating connection with the said valve-stem of the cylinder.

4. In combination, a door-operating mechanism, a cylinder having the rod of the piston thereof operatively connected with the door-  
25 operating mechanism, and having a valve-operating stem for controlling the admission of the motor agent in said cylinder, a handle adapted to be operated manually having a connection with the valve-stem, and adjust-  
30 able devices whereby the movements of the handle will regulate the degree of the opening action of the valve-stem.

5. In combination, a door-operating device, a cylinder, having the rod of the piston thereof operatively connected with the door-oper-  
35 ating device, and having a valve-operating stem, a handle having a connection with the valve-operating stem, and having also a detachable connection with the door-operating  
40 mechanism.

6. In combination, a door-operating device, a cylinder having the rod of the piston thereof operatively connected with the door-oper-  
45 ating device, and having a valve-operating stem provided with a lever, a handle-lever having lever extensions in adjustable engagement with said valve-stem lever, substantially as and for the purpose set forth.

7. In combination, a door-operating mechanism, a cylinder having the rod of the piston thereof operatively connected with the door-  
50 operating mechanism, and having a valve-operating stem provided with a lever thereon, a shaft in actuating connection with the door-  
55 operating mechanism, having a handle-lever mounted to swing thereon, and means of detachable connection between the handle-lever and said shaft, said handle-lever having an  
60 arm extensibly adjustable thereon and adapted to engage the valve-stem lever.

8. In combination, a door-operating mechanism, a cylinder having the rod of the piston therein operatively connected with the door-  
65 operating mechanism, and having a valve-operating stem provided with a lever, having separated members, a pivotally-mounted handle-lever having an extension-screw engaged

and adjustable therein and engaging between the separated members of the valve-stem lever.

9. In combination, a door-operating mechanism, a cylinder having the rod of the piston thereof operatively connected with the door-  
70 operating mechanism, and having a valve-operating stem provided with a forked lever thereon, a shaft having also actuating con-  
75 nection with the door-operating mechanism, a handle-lever mounted to swing loosely on said shaft, having a locking device for detachably connecting it to the shaft, and hav-  
80 ing the bar 65 screw-engaged adjustably with the handle-lever, and having its extremity in engagement in said forked valve-stem lever.

10. Two car-door-operating mechanisms, comprising as parts thereof separated gears,  
85 an intermediate gear-wheel, mounted on a shiftable support, a means for shifting said support, whereby the immediate gear will mesh into one or the other of said first-named gears, and means for causing an operating move-  
90 ment of said intermediate gear.

11. Two car-door-operating mechanisms, comprising as parts thereof separated gears, an intermediate gear-wheel, mounted on a  
95 shiftable support, an eccentric, engaging said support, and means for turning it, and means for causing rotational movement to said intermediate gear.

12. In combination, two car-door-operating mechanisms, comprising the gear-wheels 10,  
100 10, an intermediate gear-wheel between said mechanisms, a shiftable support therefor, and means for shifting it, a cylinder having the rod of the piston therein operatively connected with said shiftable intermediate gear,  
105 means for controlling the motor agency in and to said cylinder, for operating said intermediate gear by power, and means for operating said gear manually.

13. In combination, the two doors, two door-  
110 operating mechanisms each comprising a gear 10, the intermediate gear, a pivotally-mounted support for said intermediate gear, a manually-operable eccentric for shifting it, a crank extension of said intermediate gear, and a cyl-  
115 inder having the rod of its piston-link connected to said crank extension.

14. In combination, the two doors, two door-  
operating mechanisms each comprising gear 10, and connections between it and one of the  
120 doors, the shiftable support 40, the intermediate gear 20 mounted thereon, having the lever extension 22, means for shifting said support, 40, the cylindrical piston-rod 24 having a link connection with the lever 22, and a han-  
125 dle having a detachable operating connection with said lever 22, for the purposes set forth.

Signed by us at Springfield, Massachusetts, in presence of two subscribing witnesses.

ROB ROY MACDONALD.  
GEORGE T. WARWICK.

Witnesses:

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