

S. D. ROSENFELT & H. HELMHOLTZ.
MECHANISM FOR OPERATING FURNACE DOORS.

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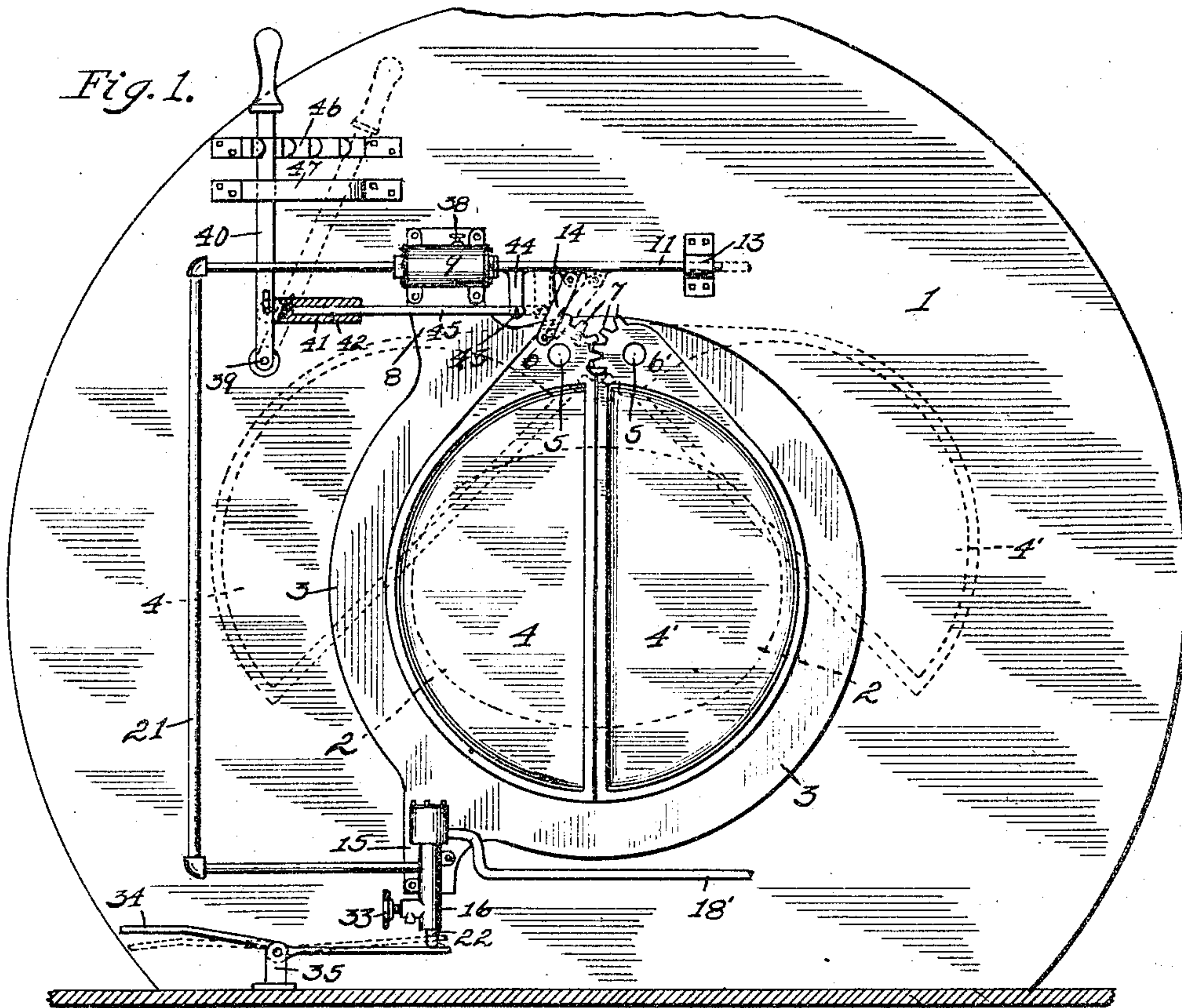


Fig. 4.

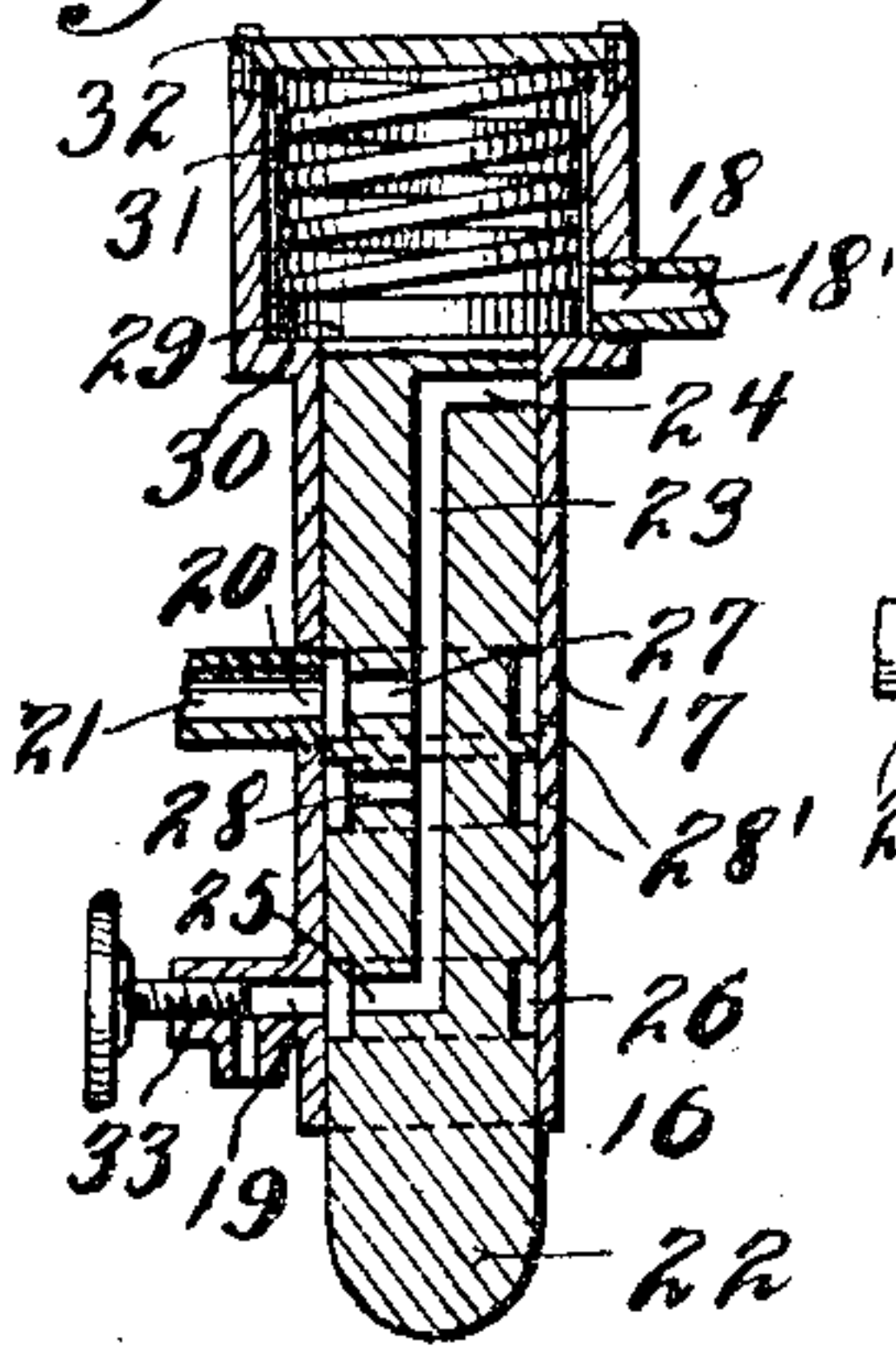


Fig. 2.

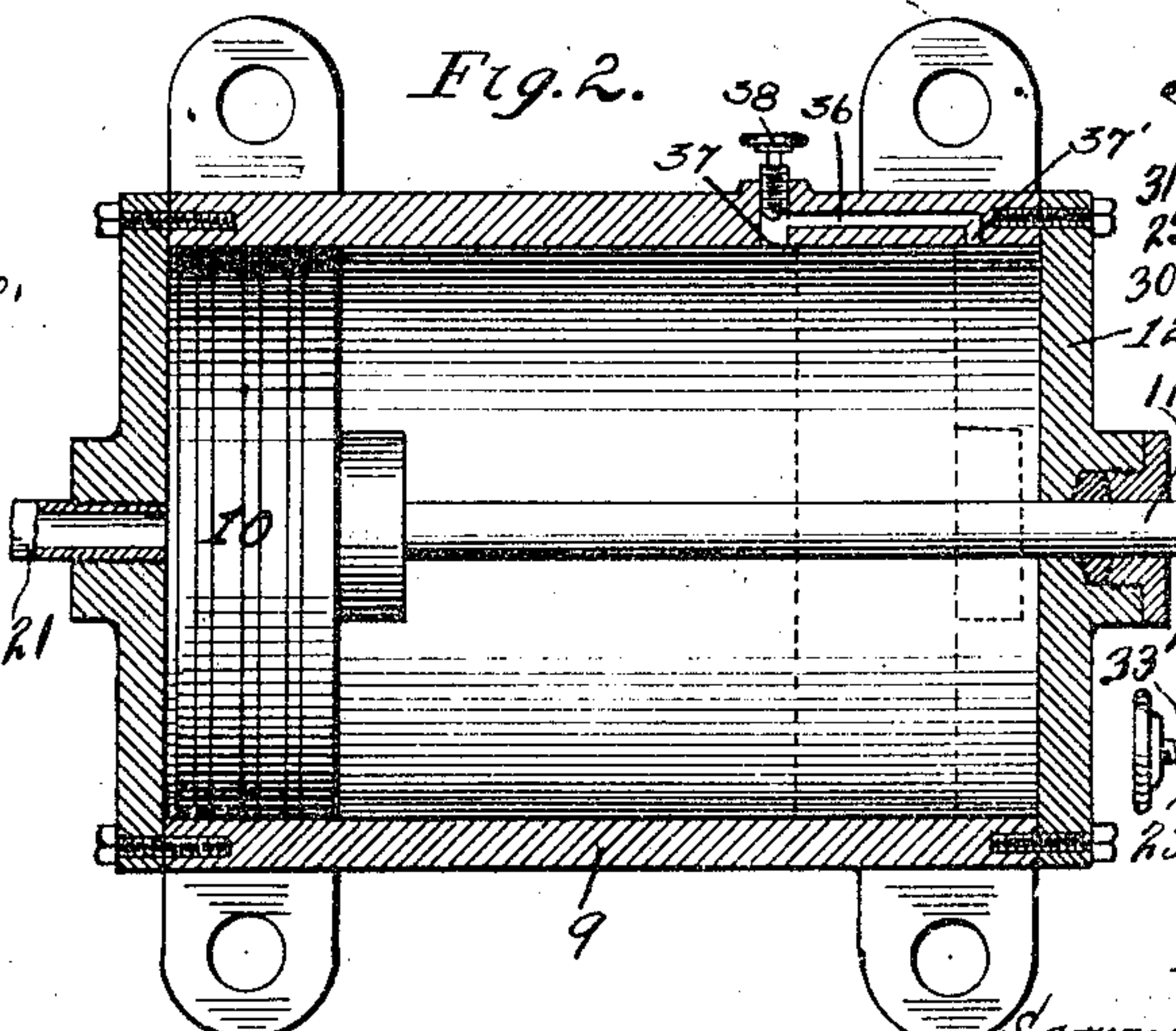
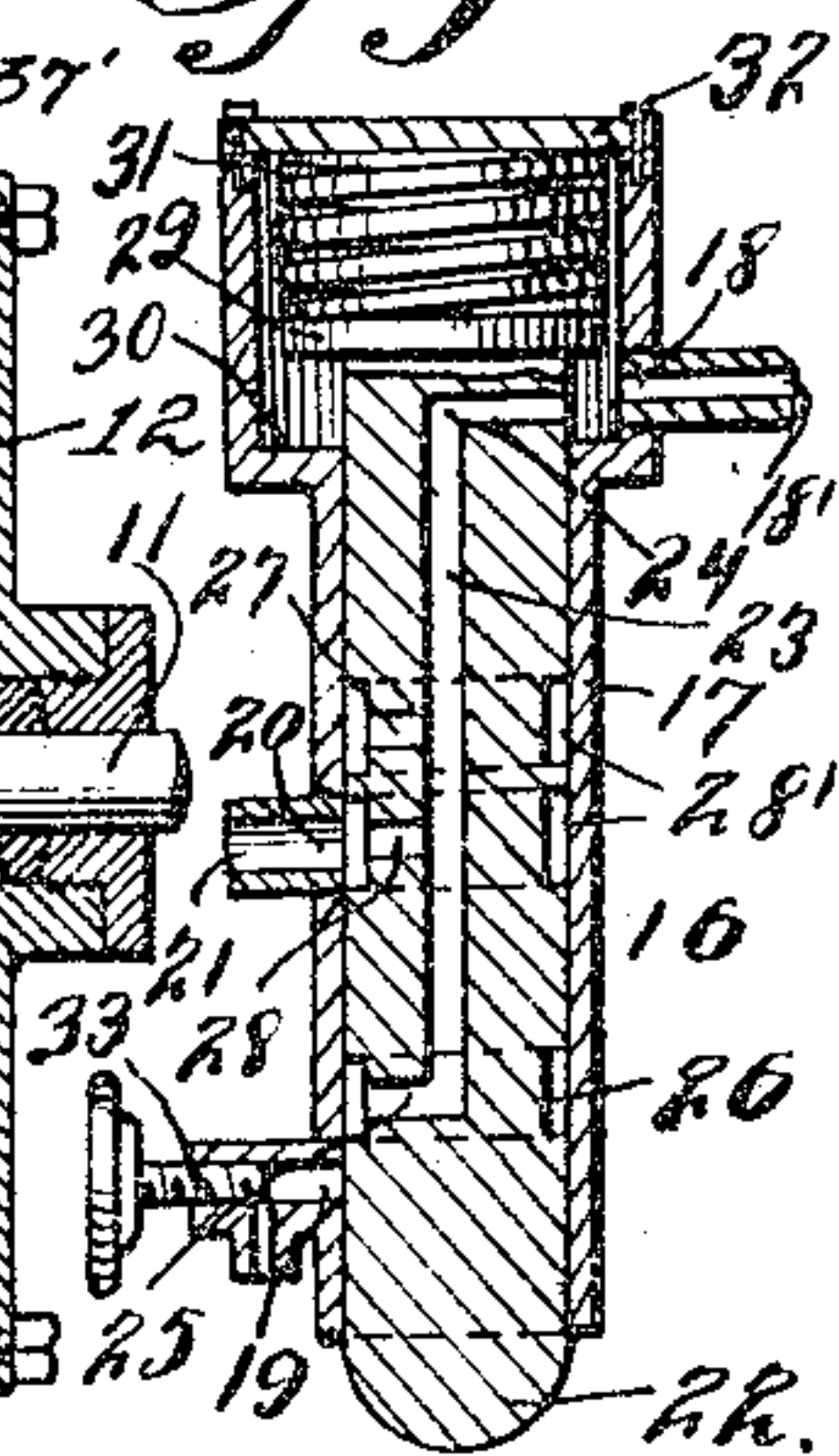


Fig. 5.



Witnesses:

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Fig. 3.



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UNITED STATES PATENT OFFICE.

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MECHANISM FOR OPERATING FURNACE-DOORS.

966,601.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, SAMUEL D. ROSENFELT and HENRY HELMHOLTZ, citizens of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Mechanism for Operating Furnace-Doors, of which the following is a specification.

Our invention relates to mechanism for mechanically opening and closing the fire-doors of a furnace, and more specifically to such as is designed particularly for use in conjunction with the fire-doors of a locomotive.

The object of our invention is to provide a mechanism of the character mentioned which will be quick acting in operation and of the highest possible efficiency.

A further object of our invention is to provide a mechanism as mentioned which will be strong, and durable and which will be extremely simple of construction, hence of low cost to manufacture.

Other objects will appear hereinafter.

With these objects in view our invention consists in a fluid pressure actuated mechanism characterized as above mentioned and in certain details of construction and arrangement of parts all as will be hereinafter fully described and particularly pointed out in the claims.

Our invention will be more readily understood by reference to the accompanying drawings forming a part of this specification, and in which,

Figure 1 is a front elevation of a locomotive boiler and a section of the floor of the locomotive cab showing the same equipped with the preferred form of our mechanism, Fig. 2 is an enlarged central longitudinal section of a cylinder embodied in our mechanism, Fig. 3 is a detail of a toothed rack included in the construction, Fig. 4, an enlarged central longitudinal section of a fluid flow controlling valve embodied in the construction, and Fig. 5, a similar section of said valve showing the parts in a different position.

Referring now to the drawings, 1 indicates the boiler of a locomotive engine and 2 the mouth of the fire box thereof surrounding which is the usual reinforcing annular edging 3. Closing said mouth are preferably semi-circular similar doors 4—4', the same being pivotally secured to said edging

by pivotal pins 5 passing through the enlarged upper end portions 6—6' respectively thereof. Said portions 6—6' are circularly formed and are formed in their peripheries with meshing spur teeth 7, the latter obviously serving to effect the simultaneous movement of said doors, in other words, the opening or closing of either of said doors will simultaneously cause the opening or closing of the other.

Referring now particularly to the preferred form of our mechanism shown in Fig. 1, mounted preferably upon an integral enlargement 8 projecting from the edging 3 is a horizontally disposed cylinder 9 in which is mounted a piston head 10 carrying an exteriorly projecting piston rod 11 the latter being mounted in bearings provided in the cylinder head 12 and a bearing bracket 13 secured to and projecting from the locomotive boiler head. 14 indicates a connecting link the respective extremities of which are pivotally secured to the piston rod 11 and the outward side of the door enlargement 6. Such provision it is evident, effects the operative connection of the piston rod and the doors 4—4', it being obvious that upon the reciprocation to the right of the piston 10 and hence said rod, said doors will be opened. Mounted preferably upon an enlargement 15 projecting from the lower side of the edging 3 is a valve 16. Comprised in said valve is an outer tubular casing 17 provided in its upper enlarged end portion with an intake port 18 communicating by a pipe 18' with any suitable source of compressed fluid supply, preferably the main drum of the locomotive, in its lower end portion with an exhaust port 19, and intermediate said ports 18 and 19 with an opening 20 which communicates by a pipe 21 with the cylinder 9. Slidably mounted in said casing is the cylindrical valve plug 22. Formed in said plug is a central longitudinal extending passage 23 the offset upper end portion 24 of which opens close to the upper extremity of said plug, the offset lower end portion 25 thereof communicating with a circumferential groove 26 formed in the outer surface of said plug at the lower end portion thereof. Formed in the plug 22 intermediate the passages 24 and 25 are similar passages 27 and 28 communicating at their inner extremities with the passage 23 and their outer extremities with circumferential

grooves 28' formed in the outer surface of said plug. Said passages 24, 25, 27, and 28 are so positioned in the plug 22 that, when the latter is at its uppermost position, communication will be established between the compressed fluid supply pipe 18' and the pipe 21 leading to the cylinder 9, as clearly shown in Fig. 5, and when said plug is at its lowermost position, such communication between said supply pipe and cylinder will be cut off and communication will be established between the latter and the exhaust port 19, as clearly shown in Fig. 4. In order to normally hold said plug at its lowermost position, or in a position in which the projecting flange 29 formed at the upper extremity thereof is resting in engagement with the shoulder 30 formed in the upper enlarged portion of the casing 17, we provide a helical compression spring 31 interposed between the upper extremity of said plug and the head 32 closing the upper extremity of said casing. A gage cock 33 of suitable design is provided in the exhaust port 19 by means of which the flow of the exhausting fluid therethrough may be regulated for reasons which will be hereinafter described. 34 indicates a foot lever rockingly mounted upon a standard 35 secured to and suitably positioned upon the locomotive cab floor. The inner extremity of said lever rests in engagement with the lower extremity of the valve plug 22, hence by depressing the outer extremity thereof the valve 16 may evidently be actuated.

In the construction thus far described upon desiring to open the door of the fire box, all that is necessary is to depress the foot lever 34. Upon so doing the valve plug 22 will be elevated whereupon communication will be established between the supply pipe 18 and the cylinder 9 as before described. In such event the piston head 10 and hence the rod 11 carried thereby will be forced to the right thereby evidently causing the opening of the doors 4-4' as shown in dotted lines in Fig. 1. When it is desired to close the fire-doors said lever needs only to be released, in such event the valve plug, because of the spring 31, will be returned to its normal position or in a position in which an exhaust passage through the valve 16 from the cylinder is effected, as before described, hence permitting of the exhaustion of the compressed fluid from the cylinder and the closure of the fire-doors which drop to such position by gravity. It is in order to prevent said doors dropping with a slam or with too great a velocity that the gage cock 33 is provided. With such provision, the flow of exhausting fluid, as before stated, may be throttled sufficiently to prevent the piston head 10 being forced back too quickly to normal position and hence the fire-doors to drop to closed position with too great a

velocity. In order to prevent the piston head being jammed against the cylinder head 12 upon the admission of compressed fluid to the cylinder, we preferably provide in the lateral wall of the latter close to head 12, a longitudinally extending passage 36 the extremities 37-37' of which communicate with the interior of said cylinder. Said extremities 37-37' are spaced apart to an extent slightly greater than the thickness of the piston head. With such provision it is evident that, upon the piston in its forward movement reaching a position intermediate said openings, or a position as shown in dotted lines in Fig. 2, a quantity of air will flow through said passage to the opposite side of the piston, such action evidently equalizing the pressure on each side of the moving piston, thus stopping the motion thereof and preventing the jamming of the same against the cylinder head 12. A valve needle 38 is preferably provided by means of which the flow of fluid through said passage may be regulated.

Having its lower extremity pivoted as at 39 to the locomotive boiler head, is a lever 40 carried at the lower extremity of which is a tubular member 41 in pivotal connection therewith. Having its end portion 42 slidably resting in said member 41, the opposite extremity thereof being pivotally connected as at 43 to a lug 44 depending from the piston rod 11 is a rod 45. With such construction, the opening of the fire doors may evidently be effected by a slight rocking of said lever, hence upon the compressed fluid actuated means described becoming inoperative through disarrangement or any other cause, the fire-doors may still be opened by manual power. In order to hold said doors in opened position, when actuated by said lever, a toothed rack 46 is provided the same being preferably secured to the boiler head, said lever being adapted to engage the teeth of said rack, the same and hence the fire doors may be locked or held in any position desired. By having a slidable connection between the tubular member 41 and the rod 45, when the piston and its rod are actuated by fluid pressure, the lever 41 will evidently not be vibrated, inasmuch as the rod 45 will merely reciprocate in said member 41. 47 indicates a guide strap or loop for said lever.

While we have shown what we deem to be the preferable forms of our mechanism we do not wish to be limited thereto as there might be many changes made in the details of construction and the arrangement of parts without departing from the spirit of our invention comprehended within the scope of the appended claims. And although we have designed our mechanism with special reference to locomotive engine boilers we may use the same in connection with any other construction to which it is applicable.

Having described our invention what we claim as new and desire to secure by Letters Patent is:

1. The combination with a furnace, of fire
5 doors pivoted at their upper extremities to swing in the same vertical plane; intermesh-
ing gear teeth on the upper extremities of
said doors; a piston cylinder, means for ad-
mission and exhaust for said cylinder; a
10 piston rod; a link connection between said
piston rod and said doors for operating the
latter; a manually operated lever pivoted to
said furnace; means for holding said lever
in different positions; a tubular socket mem-
15 ber pivoted to said lever; and a connecting
rod slidable in said socket member and con-
nected with said piston rod, substantially as
described.

2. The combination with a furnace, of fire
20 doors pivoted at their upper extremities to swing in the same vertical plane; intermesh-

ing gear teeth on the upper extremities of
said doors; a piston cylinder; means for ad-
mission and exhaust for said cylinder;
means for regulating the exhaust; a 25
piston rod; a link connection between said
piston rod and said doors for operating the
latter; a manually operated lever pivoted to
said furnace; means for holding said lever
in different positions; a tubular socket mem- 30
ber pivoted to said lever; and a connecting
rod slidable in said socket member and con-
nected with said piston rod, substantially as
described.

In testimony whereof we have signed our 35
names to this specification in the presence
of two subscribing witnesses.

SAMUEL D. ROSENFELT.
HENRY HELMHOLTZ.

Witnesses:

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