

No. 703,345.

Patented June 24, 1902.

T. H. HYDE.

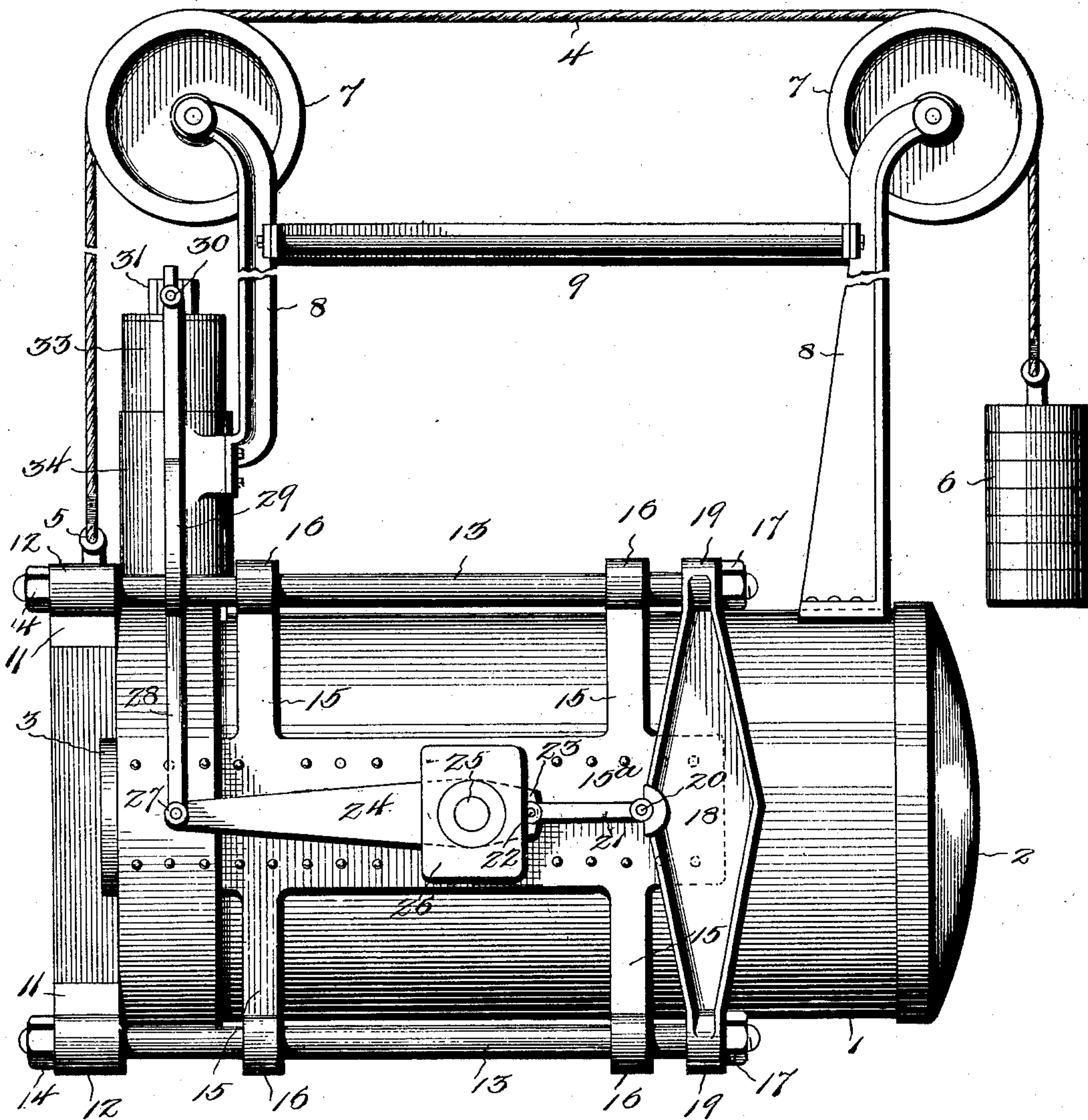
DOOR CLOSING APPARATUS FOR VULCANIZERS.

(Application filed Mar. 14, 1902.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.



Witnesses

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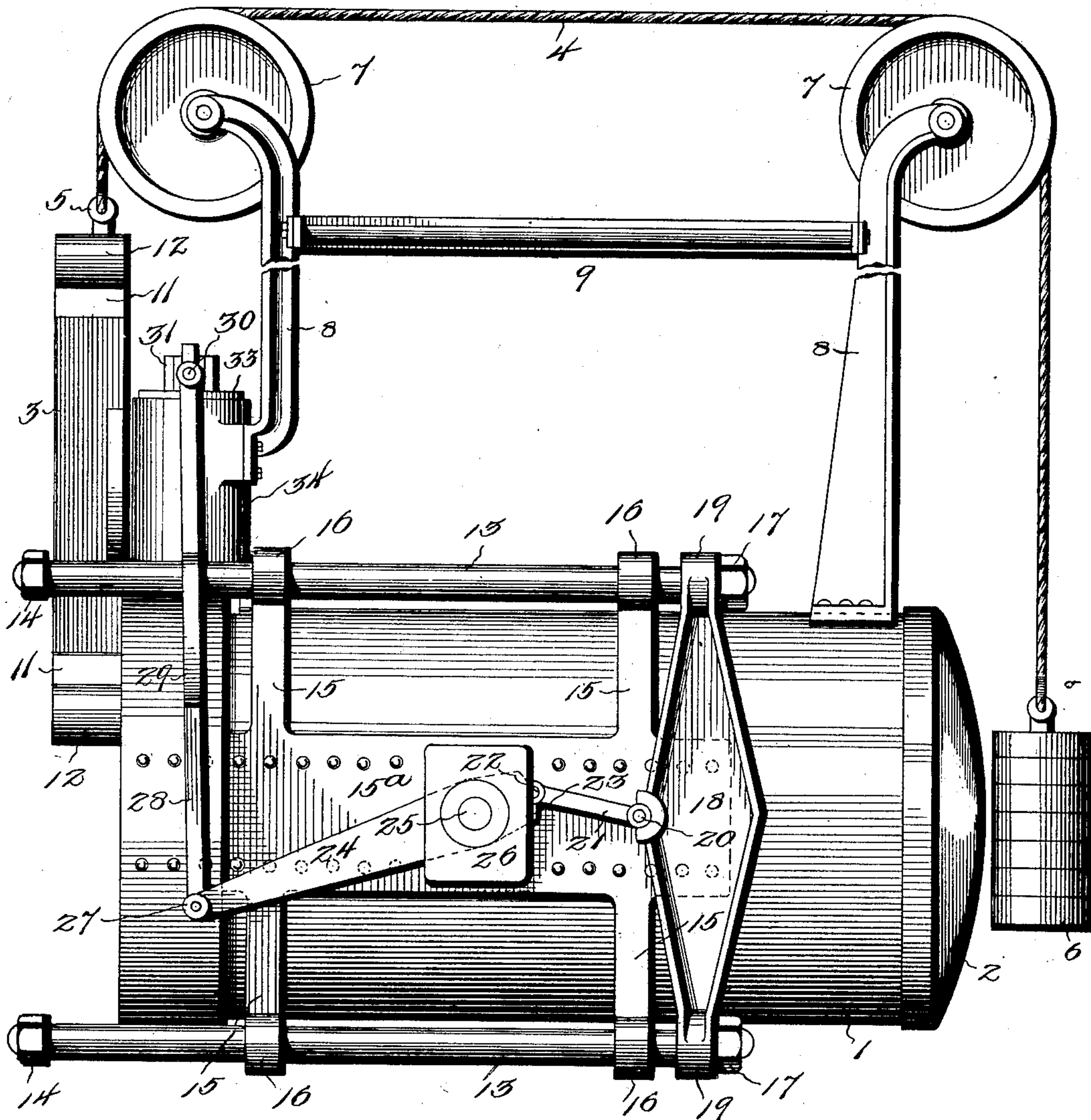
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Fig. 2.



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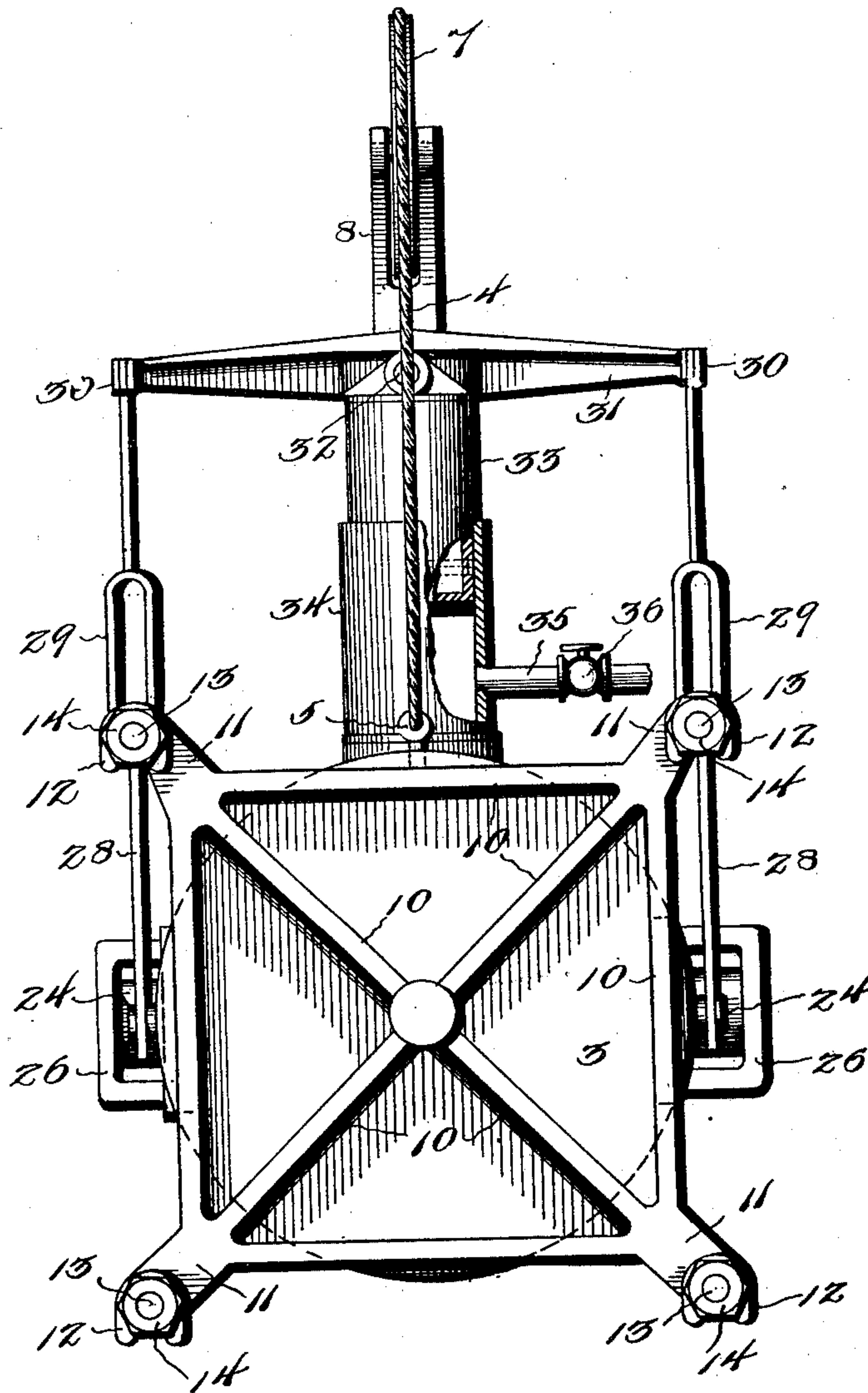
DOOR CLOSING APPARATUS FOR VULCANIZERS.

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4 Sheets—Sheet 3.

(No Model.)

Fig. 3.



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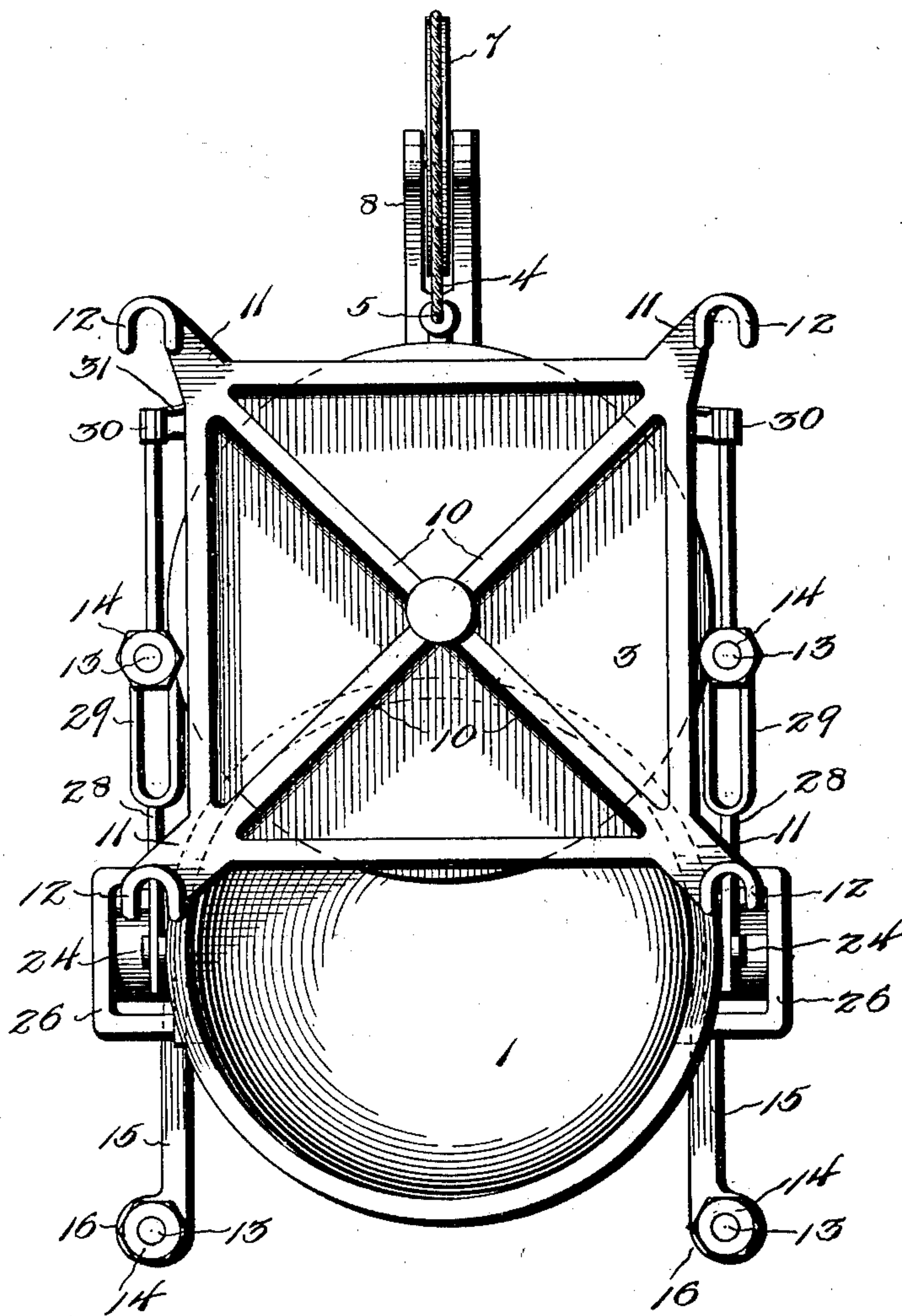
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(No Model.)

4 Sheets—Sheet 4.

Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

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DOOR-CLOSING APPARATUS FOR VULCANIZERS.

SPECIFICATION forming part of Letters Patent No. 703,345, dated June 24, 1902.

Application filed March 14, 1902. Serial No. 98,180. (No model.)

To all whom it may concern:

Be it known that I, THOMAS HENRY HYDE, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Door-Closing Apparatus for Vulcanizers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to means for handling and closing the door, cover, or other closure for vulcanizers and similar apparatus, and more particularly contemplates an improved door-closing apparatus possessing special utility in connection with vulcanizers.

Ordinarily a considerable loss of time is involved in charging and discharging the common types of vulcanizers by reason of the very slow and unsatisfactory method usually resorted to in fastening and unfastening the door. Particularly in that type of vulcanizers which are of the common cylindrical or boiler shape the door is usually hinged at one side of the vulcanizer-body and is provided with a series of peripheral notches individually receiving hinged bolts, which are thrown in and out of the notches, according as the door is to be fastened or released. In this construction the handling of a large number of individual fastening-bolts necessarily requires considerable time besides being open to the objection of rendering it practically impossible to obtain an equal distribution of clamping-pressure, inasmuch as this result could only be secured by tightening the nut of each bolt to exactly the same degree. Other forms of vulcanizers also involve fastening means which are open to substantially the objections already stated, so it is the purpose of the present invention to provide a door-closing apparatus embracing positive and practical means for closing and opening the door of a vulcanizer with a minimum loss of time.

Also the invention comprehends operating mechanism for the door which positively insures the equal distribution of a clamping-pressure throughout the entire door to provide a perfect closure or seal of the door against its seat.

The invention further provides a separable

connection between the door and its operating mechanism, whereby the same may be readily moved into and out of position with a minimum effort.

A further object of the invention is to provide a power-actuating device controlled by steam or other motive power to provide for actuating the operating mechanism for the door.

With these and many other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts to be hereinafter more fully described, illustrated, and claimed.

The essential features of the invention involved in carrying out the objects above specified are necessarily susceptible to a wide range of modification without departing from the spirit of the invention; but a preferred embodiment of the latter is shown in the accompanying drawings, in which—

Figure 1 is a side elevation of a vulcanizer equipped with the door-closing mechanism constructed in accordance with the present invention and showing the door closed. Fig. 2 is a similar view showing the door open and the operating mechanism therefor arranged in its inactive non-clamping position. Fig. 3 is an end view showing the door in its closed or clamped position. Fig. 4 is a similar view showing the door opened or elevated out of the way to permit of the charging and discharging of the vulcanizer.

Like reference-numerals designate corresponding parts throughout the several figures of the drawings.

As already stated, the invention relates, exclusively, to a door-closing apparatus, and while the same possesses special utility in connection with vulcanizers it is of course obvious that the same could be utilized with other types of furnaces or apparatus involving the employment of a door or closure designed to be held in place under a clamping-pressure. However, for illustrative purposes it has been deemed sufficient to disclose the improvements in connection with a vulcanizer, so particular reference will now be made to the drawings.

In the drawings the numeral 1 designates

the vulcanizing chamber or body of a vulcanizing apparatus. This chamber or body 1 is usually of a cylindrical or boiler shape and is provided at one end with a stationary or closed head 2, while the opposite end is open and is designed to be covered and uncovered through the medium of a door or equivalent closure 3. This door or equivalent closure 3 is ordinarily in a circular form to correspond to the cross-sectional shape of the vulcanizing chamber or body 1 and is designed to fit against the usual packing provided at the open end of the apparatus.

The invention involves no special change in this part of the vulcanizing apparatus, as any suitable character of packed or hermetical joint may be provided between the door and the open end of the vulcanizing chamber or body without affecting the mechanism which is utilized in carrying out the invention for operating the door.

In the larger sizes of vulcanizers the door or equivalent closure 3 would necessarily be of considerable weight, and it is therefore desirable to counterbalance this weight, while at the same time providing simple and convenient means for holding the door in a position out of the way when the same is removed from over the open end of the vulcanizer. While this may be accomplished in various ways, the preferred construction is shown in the drawings and consists in the employment of a supporting-cable 4, suitably connected at one end, as at 5, to the door 3 at the top and carrying at its other end a counterbalance-weight 6, which is sufficiently heavy to counterbalance the weight of the door, and thus permit of it being handled with a minimum effort on the part of the operator.

The weighted supporting-cable 4 may be conveniently arranged to pass over guide-pulleys 7, journaled at the upper ends of carrying-standards 8, mounted in fixed positions above the vulcanizer and which may be conveniently braced through the medium of the brace connection 9, although it is obvious that these details may be changed as desired or required, inasmuch as it is only necessary to provide a suitable bearing-support for the guide-pulleys over which the supporting-cable is arranged to move, whereby the weighted end of the cable will descend as the door is elevated, and vice versa. Irrespective of the counterbalancing feature of the connections described, such connections provide means for holding the door in its elevated uncovering position when removed from over the open end of the vulcanizer and disconnected from the operating mechanism cooperating therewith.

In the described form of the invention the door is therefore preferably vertically movable and separable from its operating mechanism. While said door may be constructed in any suitable or approved manner, the same

is preferably formed on the outer side thereof with a plurality of intersecting reinforcing ribs or webs 10, portions of which reinforcements are preferably extended at diagonally opposite corners into offstanding hanger-arms 11, each of which is provided at its outer end with a downturned open holding-cuff 12. The holding-cuffs 12 at the ends of the hanger-arms 11 are all disposed in the same direction and are preferably of an approximate U shape, with the notches or openings disposed downward, so that the cuffs will readily take over and also become disengaged from the movable clamping-carriers 13 of the operating mechanism for the door.

It will be observed from the drawings that the pair of hanger-arms 11, located at each side of the vertical center of the door or closure 3, are disposed in vertical alinement in the same vertical plane with the clamping-carriers 13. A pair of the clamping-carriers 13 is arranged at each side of the vulcanizer-body and, as already indicated, are disposed within the same vertical plane corresponding to the plane of the door-hangers 11 cooperating therewith. The movable clamping-carriers 13 constitute parts of the operating mechanism for the door, and this operating mechanism includes duplicate sets of devices at opposite sides of the vulcanizer-body, as may be plainly seen from the end views of the drawings. A description, therefore, of one set of the duplicate devices on opposite sides of the vulcanizer will suffice for the other.

The movable clamping-carriers 13 are not only supports or carriers for the door in its lowered position, but also provide clamping means for binding the same tightly over the open end of the vulcanizer. Preferably the movable clamping-carriers 13 are in the form of horizontally-arranged rods provided at what might be properly termed their "outer" ends with binding elements 14, adapted to bind against the outer sides of the holding-cuffs 12 and to draw the door against the vulcanizer-body when an inward pressure is exerted upon the rods or carriers 13.

The binding elements 14 at the outer ends of the rods or carriers 13 are preferably in the form of nuts mounted upon threaded portions of the rods carrying the same, although it is obvious that any headed or shouldered projection at the same point would serve as a binding element for being drawn against the hangers for the door.

The rods 13, constituting each pair of clamping-carriers, are disposed in parallelism and have a reciprocatory or sliding movement through guiding-supports. In the construction shown the guiding-supports are designated by the reference-number 15 and are in the form of upwardly and downwardly projecting arms extended from the upper and lower edges of a base-plate 15^a, riveted or otherwise securely fastened upon the side of the vulcanizer-body, and at their outer ends the

guiding supports or arms 15 are formed with guide eyes or collars 16, which slidably receive the said rods or carriers 13.

At what might be properly termed their "inner" ends the rods or carriers 13 of each pair are also provided with nuts or heads 17, which serve to hold in engagement with the rods a transverse vertically-disposed yoke or yoke-bar 18. The yoke or yoke-bar 18 at each side of the vulcanizer-body constitutes a coupling connection between the rods or carriers at that point to insure the uniform and synchronous movement of the said rods. The connection between the yoke or yoke-bar 18 and the rods is preferably secured by providing the former at the opposite ends thereof with the collars 19, in which are fitted the inner end portions of the rods or carriers.

The yoke or yoke-bar 18 at each side of the vulcanizer may be of any preferred shape or form having the proper strength and is designed to have pivotally connected thereto by means of a pivot or knuckle-joint 20 one end of a toggle-link 21. The pivot or knuckle-joint 20 is located centrally between the ends of the yoke 18 and at one side thereof, and the link 21 at its end opposite the joint 20 has a similar pivot or knuckle-joint connection 22 with the heel end 23 of a pressure-lever 24, which is fulcrumed contiguous to its heel end upon a pivot 25, fitted within an open bearing bracket or boxing 26, offset from one side of the base-plate 15^a. The pressure-lever 24 is mounted inside of the open bearing bracket or boxing 26 and in conjunction with the toggle-link 21 provides a toggle-lever connection between itself and the yoke for the clamping-carriers 13.

The long arm of the pressure-lever 24 has pivotally connected thereto, as at 27, the lower end of an adjusting-rod 28, having an intermediate vertically-disposed clearance-loop 29 for the carrier or rod 13 within the plane thereof and pivoted at its upper end, as at 30, to one extremity of a cross-head 31. This cross-head has a pivotal joint connection 32 centrally between its ends with the upper end of a piston 33, working within a cylinder 34, surmounting the vulcanizer-body and having connected therewith a motive-agent pipe 35. This pipe may be provided with any suitable valve—such, for instance, as a three-way cock 36, which controls the intake and exhaust of motive agent besides capable of being set to a normal inactive position. Other equivalent expedients of course could be resorted to in this connection for controlling the motive agent utilized in connection with the power-actuator consisting of the cylinder and piston device. Steam is usually employed to operate this cylinder and piston power-actuator, although any gas or fluid could obviously be used for the same purpose.

As already stated, the separate sets of devices are duplicated at opposite sides of the

vulcanizer-body, and consequently by reason of the power cross-head 31 being pivotally mounted at 32 the power is necessarily equally distributed between the four clamping carriers or bolts 13, as the said head 31 necessarily acts as an equalizer between the two adjusting-rods 28. Likewise each yoke 18, having a pivot or knuckle-joint connection 21 with the toggle-lever arrangement, serves as an equalizer between the two clamping carriers or rods which it connects.

Assuming the parts to occupy the positions shown in Figs. 1 and 3 of the drawings, the toggle 21 23 is straightened out and serves to hold the binding elements 14 under clamping-pressure against the outer side of the door, thus securing the same firmly upon its seat over the open end of the vulcanizer. When it is desired to open the vulcanizer, the motive agent is exhausted from the cylinder 34 of the actuator device, permitting the cross-head 31 and the rod connections 28 to lower, with the consequence of swinging the long arms of the pressure-levers 24 downward to the positions shown in Fig. 2. This action necessarily swings the pivoted ends of the toggle-links upward, with the consequence of relieving the pressure on the yokes 18 and drawing the same upward, thus permitting the clamping carriers or rods 13 to be moved forward sufficiently to relieve the clamping-pressure from the door. When this clamping-pressure is thus relieved, the door can be readily lifted or raised off of the carriers 13 and moved to an open position out of the way, such as indicated in Figs. 2 and 4 of the drawings. When it is desired to close the vulcanizer, the door is dropped to position, with the hanger-arms engaged over the clamping-carriers 13, after which motive agent is turned into the cylinder, with the result of drawing the rods 28 and their connections upward, thereby straightening out or expanding the toggle arrangement and drawing the clamping-carriers inward, so as to exert a clamping-pressure of the binding elements 14 against the hangers of the door.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described door-closing apparatus will be readily apparent without further description, and it will also be understood that various changes in the form, proportion, and minor details of construction may be made within the scope of the invention without departing from the spirit or sacrificing any of the advantages thereof.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In an apparatus of the class described, the door, operating mechanism constituting a support for the door in its closed position and comprising means for exerting a clamping-pressure thereon, and separate means for sup-

porting the door in its opened position independent of said operating mechanism.

2. In an apparatus of the class described, the door, operating mechanism constituting a support for the door when closed and comprising means for exerting a clamping-pressure thereon, said door having separable connections with the operating mechanism, and separate means for supporting the door in its open position.

3. In an apparatus of the class described, the door, a counterbalancing device connected with the door and arranged to support it when opened, and operating mechanism constituting a support for the door when closed and comprising means for exerting a clamping-pressure thereon, said door having a separable connection with the operating mechanism.

4. In an apparatus of the class described, the door, a suitably-guided supporting-cable carrying a counterbalance and connected with the door, an operating mechanism constituting a support for the door when in its closed position and comprising means for exerting a clamping-pressure thereon.

5. In an apparatus of the class described, the door, power-actuated operating mechanism constituting a support for the door and comprising means for exerting a clamping-pressure thereon.

6. In an apparatus of the class described, the door, and power-actuated operating mechanism constituting a support for the door when closed and comprising means for exerting a clamping-pressure thereon, said door having a separable connection with the operating mechanism.

7. In an apparatus of the class described, suitably-actuated operating mechanism having a plurality of clamping-carriers, and the door supported by and having a separable connection with said carriers.

8. In an apparatus of the class described, a suitably-actuated operating mechanism having a plurality of clamping-carriers, and the door having a plurality of hangers arranged to be moved into and out of engagement with the said carriers.

9. In an apparatus of the class described, suitably-actuated operating mechanism having a plurality of movable clamping-carriers, a toggle device for adjusting said carriers, and the door having a separable connection with the said carriers.

10. In an apparatus of the class described, suitably-actuated operating mechanism having a plurality of movable clamping-carriers, a toggle device for adjusting said carriers, and the door having a separable connection with said carriers when in its closed position, and a separate counterbalancing support for sus-

taining the door when opened independent of the said carriers.

11. In an apparatus of the class described, suitably-actuated operating mechanism having a plurality of reciprocatory headed rods constituting clamping-carriers, toggle devices for adjusting said rods, and the door having a plurality of hangers provided with open holding-cuffs detachably resting on the said rods.

12. In an apparatus of the class described, an operating device having a plurality of reciprocatory rods constituting clamping-carriers, said rods being provided at their outer ends with binding elements, and the door provided with a plurality of hanger-arms having U-shaped holding-cuffs all disposed in the same direction and detachably taking over the rods at one side of the binding elements.

13. In an apparatus of the class described, operating mechanism comprising opposite duplicate sets of devices each including a pair of reciprocatory rods in the same vertical plane and constituting clamping-carriers, said rods being provided at their outer ends with binding elements, and the door provided at diagonally opposite corners with hanger-arms having open U-shaped holding-cuffs, the cuffs of all of said hangers being disposed in the same direction and detachably taking over the rods at one side of the binding elements.

14. In an apparatus of the class described, the operating mechanism including opposite pairs of reciprocatory rods constituting clamping-carriers, a yoke connecting the rods of each pair, a toggle-link jointed to said yoke centrally between its ends, a suitably-fulcrumed pressure-lever jointed to one end of the toggle-link, a power-actuator having rod connections with the pressure-levers, and the door detachably connected with the rods.

15. In an apparatus of the class described, operating mechanism including oppositely-arranged pairs of reciprocatory rods constituting clamping-carriers, a yoke coupling together the rods of each pair, a toggle-link pivotally connected at one end centrally to the said yoke, a pressure-lever having a fulcrum-support and pivotally connected to the opposite end of the toggle-link, reciprocatory adjusting-rods connected at one end to the said pressure-levers, and a cylinder and piston power-actuator including a pivotally-supported cross-head having pivotal connections at its ends with the said adjusting-rods, and the door detachably connected with the rods.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS HENRY HYDE.

Witnesses:

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