

No. 786,731.

PATENTED APR. 4, 1905.

F. H. CRABTREE & A. G. MCGREGOR.

VALVE.

APPLICATION FILED JUNE 21, 1904.

Fig. 1.

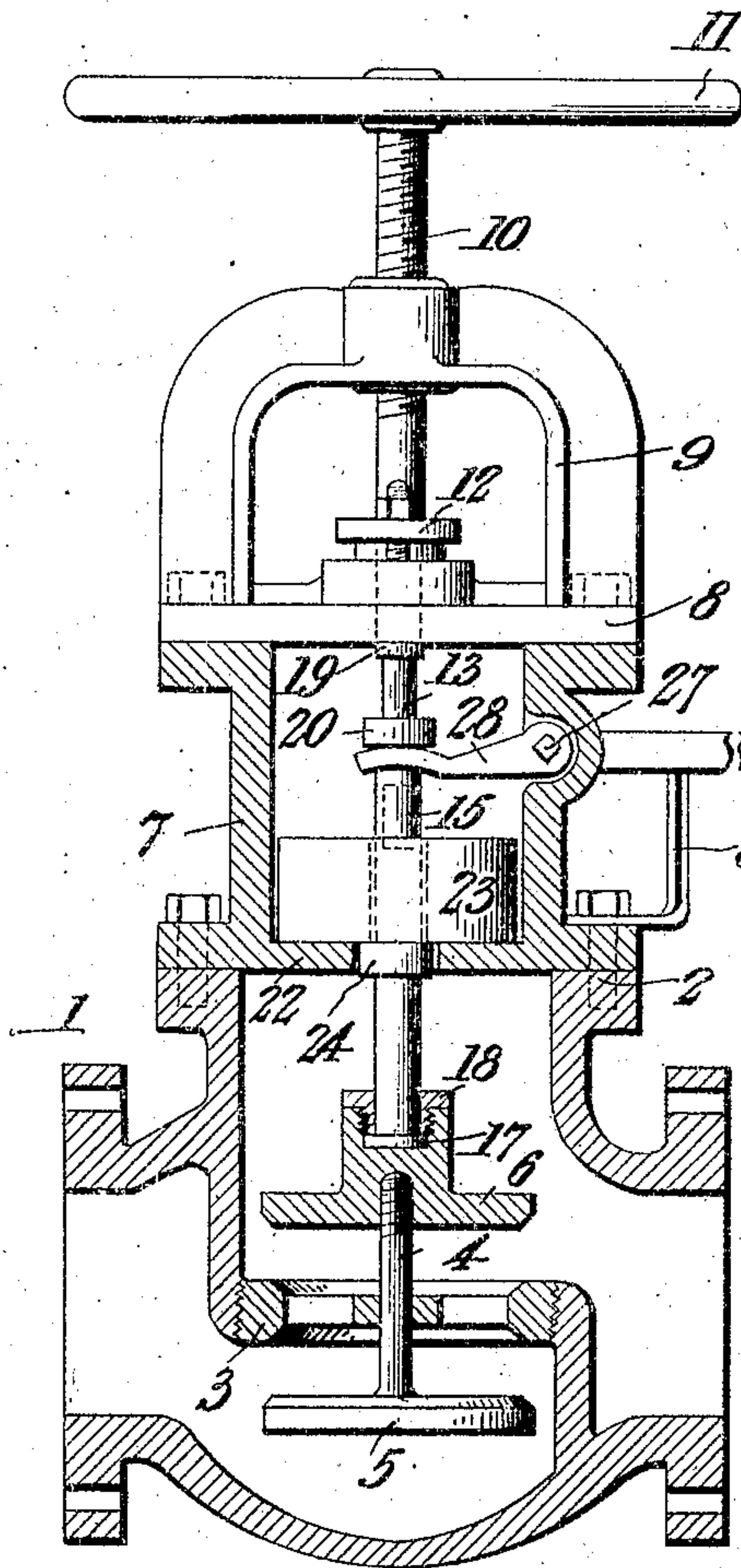


Fig. 2.

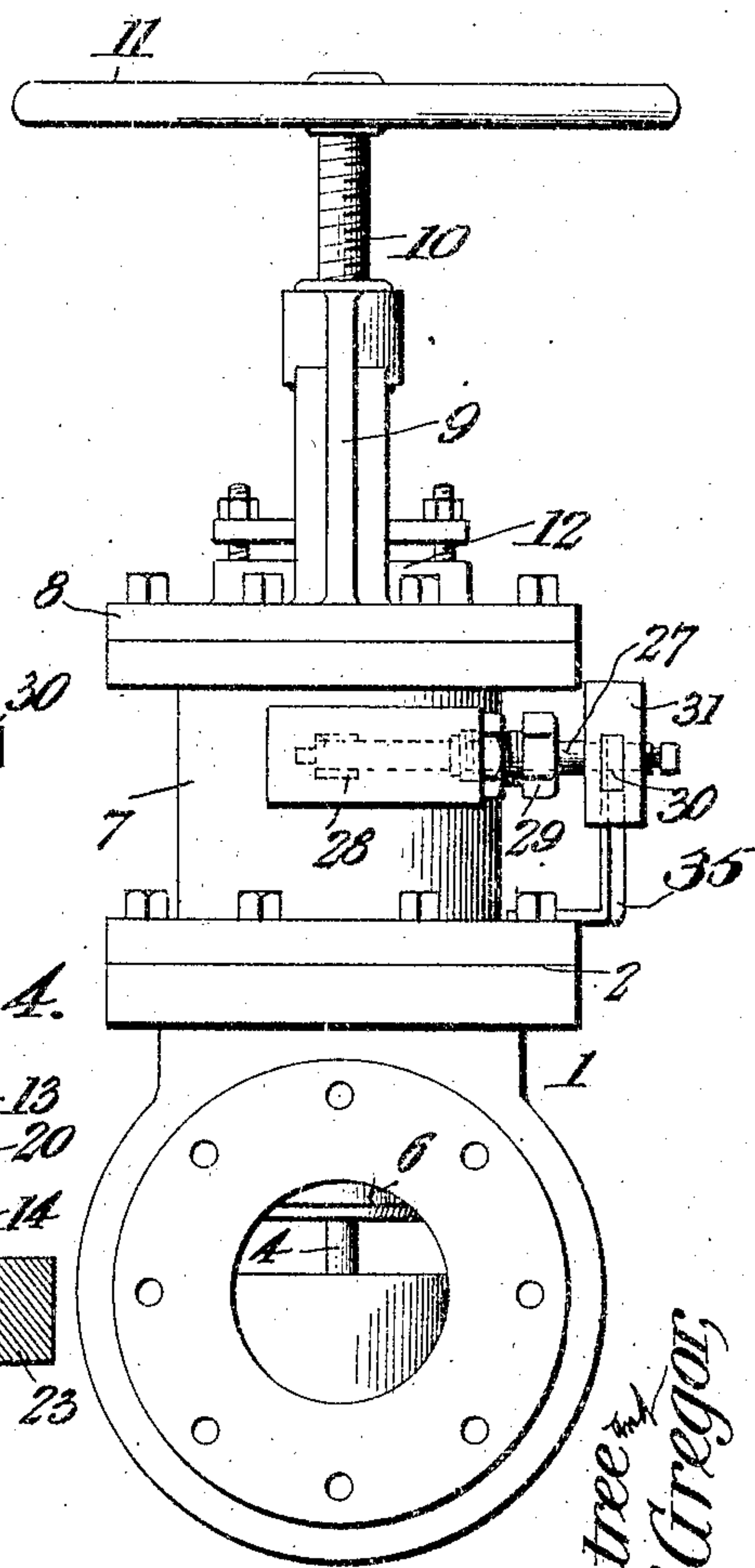


Fig. 4.

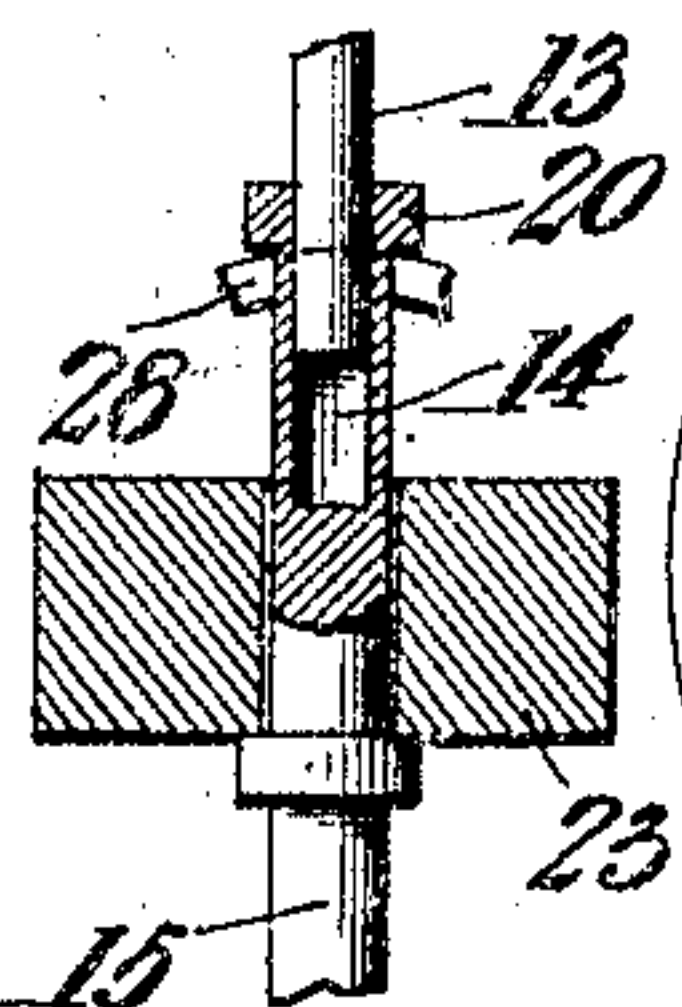
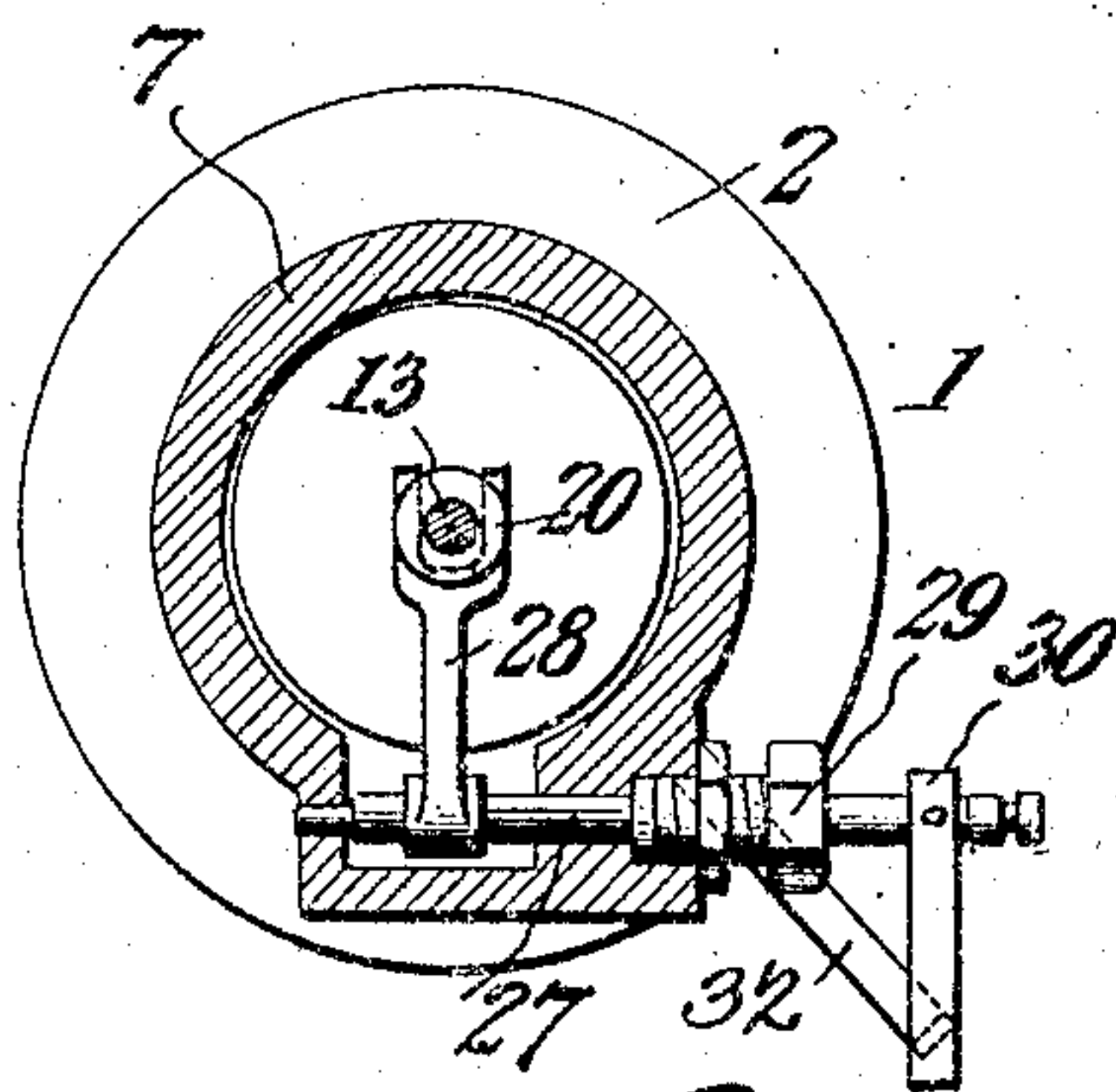


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

FREDERICK HERBERT CRABTREE AND ALEXANDER GRANT MCGREGOR,
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VALVE.

SPECIFICATION forming part of Letters Patent No. 786,731, dated April 4, 1905.

Application filed June 21, 1904. Serial No. 213,551.

To all whom it may concern:

Be it known that we, FREDERICK HERBERT CRABTREE and ALEXANDER GRANT MCGREGOR, citizens of the United States, residing at Anaconda, in the county of Deerlodge and State of Montana, have invented a new and useful Valve, of which the following is a specification.

This invention relates to automatic valves, and has for its principal object to provide a valve for automatically controlling the flow of steam from a boiler to the main steam-pipe, although it may be used in various other connections where a fluid of any character is delivered under pressure from one vessel to another.

A further object of the invention is to provide an improved automatic valve mechanism of such nature that in the event of very low pressure in the boiler, as in case where the fires of a boiler are drawn for the purpose of cleaning or repairing the same or in case a tube should burst, the valve will automatically close and cut off communication between the boiler and the main steam-pipe, this being of special value where a battery of boilers is connected to a single main.

A still further object of the invention is to provide an improved automatic valve that will close when the difference in pressure in the boiler and in the main reaches a predetermined point—as, for instance, in the event of the bursting of the main steam-pipe and consequent rapid exhaustion of steam from the boiler the valve will automatically close and prevent further escape of steam and the consequent damage resulting from such accidents.

A still further object of the invention is to provide an automatic valve that will move from its seat under steam-pressure without danger of chattering and under a predetermined normal pressure will maintain an initial position and permit the free and unobstructed flow of the steam through the main steam-pipe.

A still further object of the invention is to provide an automatic valve of this character in which provision is made for accurately adjusting the valve for closing movement at any

predetermined point, and, further, to provide a valve which may be operated in the ordinary manner for manual closing when it becomes necessary to positively cut off the main steam-pipe.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in the novel construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings, Figure 1 is a longitudinal sectional elevation of an automatic valve constructed in accordance with the invention. Fig. 2 is an end elevation of the same. Fig. 3 is a sectional plan view through the upper portion of the valve-casing. Fig. 4 is a detail sectional view of the valve-stem and one of its weights.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The valve-casing 1 is of the character ordinarily employed in large valves and is provided with the usual bolting-flanges 2. The casing is provided with a double valve-seat 3, screwed or otherwise secured within the casing and provided with a central guide for a valve-stem 4, carrying a lower disk valve 5, adapted to close against the lower seat. To this stem is further secured a disk valve 6, that is adapted to close against the upper valve-seat. Under normal conditions the two valves will remain at points equidistant from their respective seats and the steam may flow freely through the valve-casing to the main.

To the top of the valve-casing is secured a bonnet 7, and above this is a cap 8, carrying a yoke 9, the upper portion of which is threaded for the reception of a threaded guide-stem 10, having a hand-wheel 11 of any ordinary construction. The cap is provided with a stuffing-box 12 for the passage of the

stem 10, and the lower end of said stem has a reduced portion 13, that fits within a recess 14, formed in the upper portion of a valve-stem 15. The stem 15 has at its lower end a flange or collar 17, that is held down within a socket in the central portion of the valve 6 by means of a threaded sleeve 18, thus forming a swiveled connection which will permit of rotatable movement of the stem independently of the valve, if necessary. Under normal conditions the connection between the stems 13 and 15 is such as to permit free longitudinal play of the stem 15 as the valve-disks 5 and 6 move vertically under variations in the steam-pressure; but when necessary the hand-wheel 11 may be turned and the stem 10 forced down until the shoulder 19 of the stem engages a collar 20 at the upper end of the stem 15 and forces said stem and the valve 6 downward until the latter is firmly pressed against the upper valve-seat and positively cuts off communication between the boiler and the main steam-pipe.

The lower portion of the bonnet 7 has an inwardly-extending annular flange 22, on which rests a cylindrical weight 23, having a central opening for the passage of the valve-stem 15, and on said valve-stem is an enlarged collar or flange 24, which is in engagement with and presses lightly against the bottom of the weight when the two valves are in the normal position shown in Fig. 1.

On one side of the bonnet is an offset portion having bearings for the reception of a horizontally-disposed rock-shaft 27, to which is secured a rocker-arm 28, having a bifurcated portion embracing the upper portion of the stem 15 at a point immediately below the collar 20. One end of the shaft projects through the open end of the offset portion and is held in place by a gland-nut 29, and at the outer end of said shaft is secured a rocker-arm 30, resting on a supporting-bracket 35 and carrying an adjustable weight 31, the weight being placed at such a distance from the fulcrum-point that it will just about counterbalance the weight of the two valves 5 and 6 and the stem 15. The result of this is that when there is comparatively little flow from the boiler the valves will open to the position shown in Fig. 1 without danger of chattering. The rocker-arm 30 in this position rests on a stop 32, carried by the valve-casing.

In the operation of the device steam under ordinary pressure is allowed to pass freely from the boiler to the main; but should the fire of the boiler be drawn or the pressure reduced to any material extent the back pressure of the main, especially when the latter is connected to a battery of boilers, will force the two valves downward until the valve 6 closes against its seat, and when once closed the pressure in the main will hold it there until the pressure of the boiler is again restored.

If the pressure in the boiler greatly exceeds

that in the main—as, for instance, when the main is broken and there is a quick rush of steam from the boiler—the outflowing steam will raise the valves against the downward pressure of the weight 23 and will force the valve 5 to its seat and maintain the said valve in closed position until the pressure in the main has been restored to the normal, so that no manipulation by the attendant is required in cutting in or cutting out a boiler and minimizing the result of neglect, ignorance, or carelessness.

The valve is so constructed as to avoid the use of all closely-fitting pistons or like members which are likely to corrode or otherwise deteriorate to such an extent as to stick in previously-adjusted positions and prevent movement to closed positions when occasion requires.

Having thus described the invention, what is claimed is—

1. In combination, a valve-casing, a valve, and a pair of normally inactive weights tending to maintain the valve in a predetermined position, one or other of the weights being imposed on the valve when the latter moves from such position.

2. A valve, and a pair of weights connected to the stem of the valve, and acting, respectively, in opposite directions on the stem, one or other of the weights being imposed on the stem when the valve moves in either direction.

3. The combination with a valve-casing, of a pair of valve-seats, a pair of valve-disks movable respectively in opposite directions to closed positions, a stem connecting the valves, a rocker-shaft, a rocker-arm carried by the shaft and connected to the stem, a second rocker-arm also connected to the shaft and provided with an adjustable counterweight, and a stop or rest for the second rocker-arm when the valve is in mid-position.

4. The combination with a valve-casing, having a pair of valve-seats, of a pair of disk valves, a stem connected to the same, an enlarged collar or flange at the outer end of the stem, a rock-shaft, a bifurcated rocker-arm engaging on the collar, said arm being secured to the shaft, a second rocker-arm extending outside the valve-casing, and an adjustable counterweight carried by the second rocker-arm.

5. The combination with a valve-casing having a pair of valve-seats, of a pair of disk valves movable respectively in opposite directions to closed position, a stem connected to the two valves and provided with an enlarged flange or collar, a rock-shaft having one end extending through the upper portion of the valve-casing, a rocker-arm connected to the inner end of said shaft and having a bifurcated portion in engagement with the collar, a second rocker-arm connected to the outer portion of the shaft, and a counterweight carried by the second rocker-arm.

6. The combination with a valve-casing having a pair of valve-seats, of a pair of disk valves movable respectively in opposite directions to closed position, a bonnet secured to the casing and having an offset portion, a rock-shaft extending into said offset portion and provided with an enlarged collar or flange, a clamp-nut surrounding a portion of the shaft and engaging the end of the collar to retain the shaft in position, a pair of rocker-arms carried by the shaft one of said rocker-arms engaging the stem, and a counterweight adjustably secured to the second rocker-arm.

7. In valve mechanisms, a casing, a valve, and a weight having a slidable connection with the valve to permit the free movement of the valve in one direction and limited movement in the opposite direction, said weight being imposed on the valve when the latter is moved beyond the normal limit in said opposite direction.

8. In valve mechanisms, a casing having a valve-seat, a valve free to move with respect to the valve-seat, and a weight for limiting the movement of the valve, said weight being imposed on the valve only when the latter exceeds its normal limit of movement.

9. The combination with a valve-casing having a pair of valve-seats, of a pair of valves movable respectively in opposite directions to closed position, a valve-stem, and a weight having an opening for the passage of the stem therethrough to permit freedom of movement of the valves to a limited extent, the weight being imposed on the stem when such limit of movement is exceeded.

10. The combination with a valve-casing having a pair of valve-seats, of a pair of valves movable, respectively, in opposite directions

to closed positions, a stem connecting the valves, and means for counterbalancing the weight of the valve and stem, a bonnet connected to the valve-casing, a loose weight arranged within the bonnet and having an opening for the free play of the valve-stem, and an enlarged collar or flange carried by the valve-stem for engaging and raising the weight when the valve exceeds its normal limit of movement.

11. The combination with a valve-casing having a pair of valve-seats, of a pair of valves movable, respectively, in opposite directions to closed position, a valve-stem connected to both valves and having a longitudinal opening, and a manually-operable threaded stem having a reduced portion fitting in said opening.

12. The combination with a valve-casing having a pair of valve-seats, of a pair of valves, a recessed stem carrying said valves, means for counterbalancing the weight of the valves, a stem, a second weight having an opening for the passage of the stem, a collar secured to the stem and serving to engage and raise the weight when the valve-stem exceeds its normal limit of movement in one direction, and a manually-operable threaded stem having a reduced end fitted within the hollow valve-stem.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

FREDERICK HERBERT CRABTREE.
ALEXANDER GRANT MCGREGOR.

Witnesses:

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OWEN C. GRAW.