No. 783,007. PATENTED FEB. 21, 1905.

W. E. ALLEN & A. M. HOUSER.

VALVE OPERATING MECHANISM.

APPLICATION FILED MAY 19, 1904.

2 SHEETS—SHEET 1.

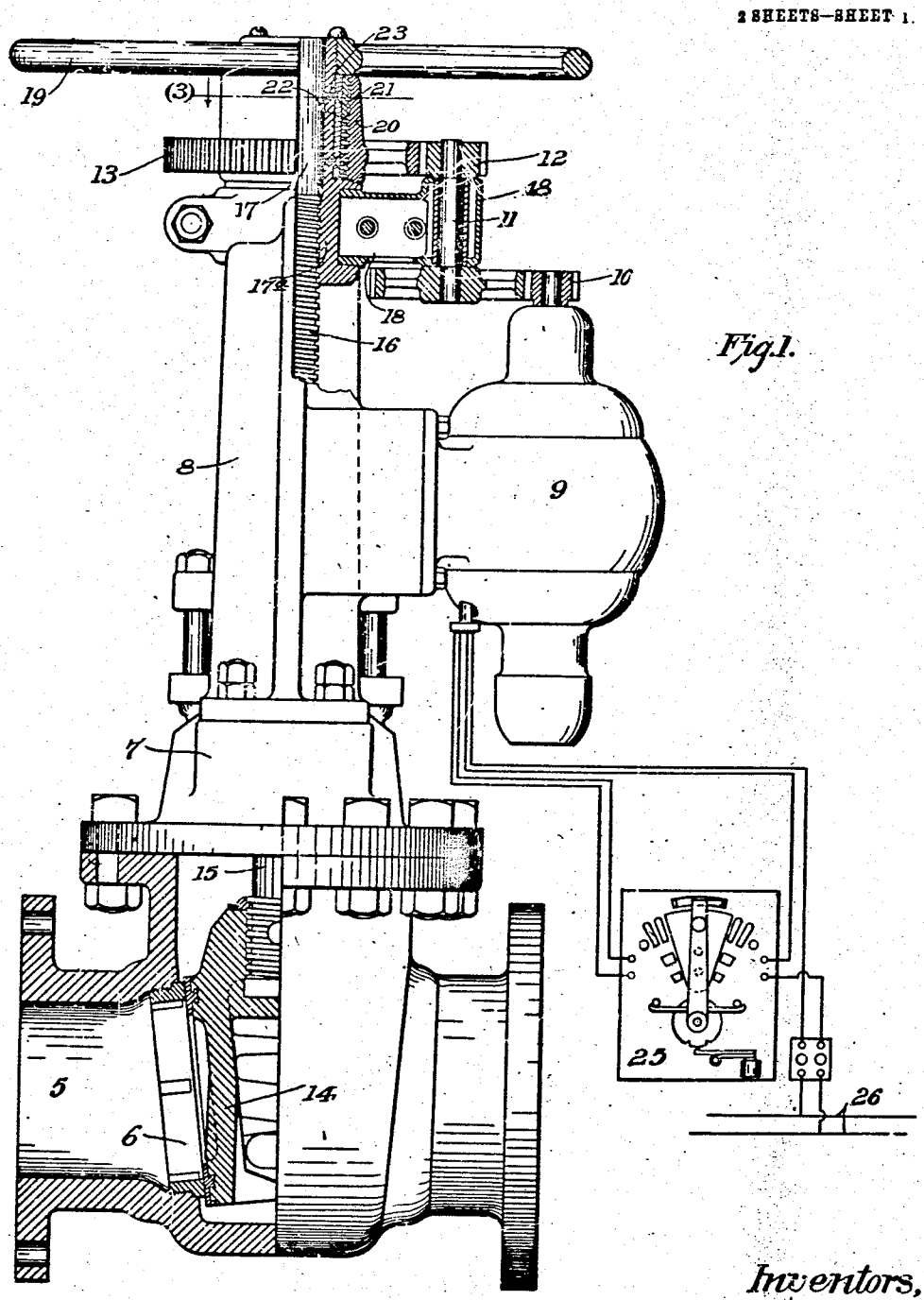


Fig. 1.

Witnesses;
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2 SHEETS—SHEET 2.

Fig. 2.

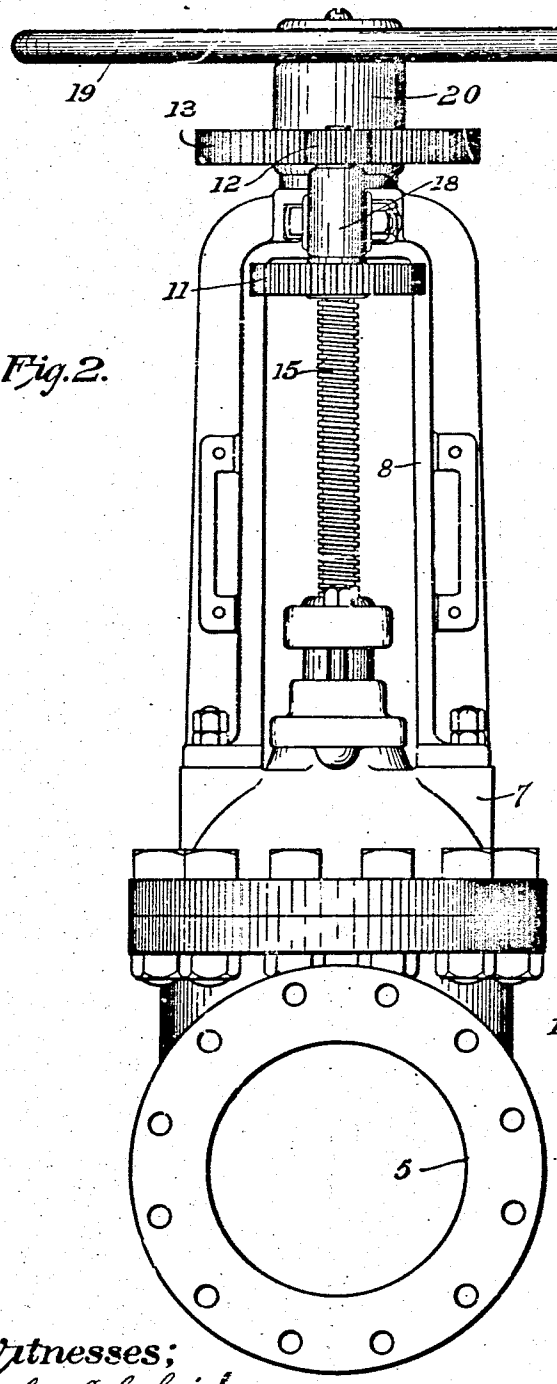


Fig. 3.

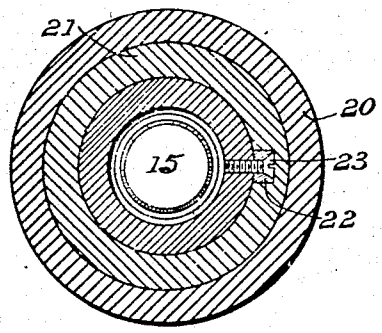
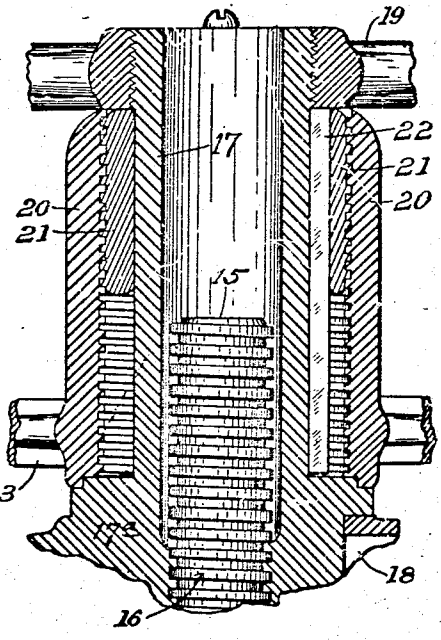


Fig. 4.



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No. 783,007. Patented February 21, 1905.

UNITED STATES PATENT OFFICE.

WILLIAM E. ALLEN AND ARTHUR M. HOUSER, OF CHICAGO, ILLINOIS, ASSIGNORS TO CRANE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

VALVE-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 783,007, dated February 21, 1905.

Application filed May 19, 1904. Serial No. 208,667.

To all whom it may concern:

Be it known that we, WILLIAM E. ALLEN and ARTHUR M. HOUSER, citizens of the United States, residing at Chicago, in the State of Illinois, have jointly invented certain new and useful Improvements in Valve-Operating Mechanism, of which the following is a specification.

Our invention relates to automatic means for opening large valves, and particularly to valve operating mechanisms in which the stem of the valve is operated indirectly by power derived from an electric motor or the like. The principal objects of the invention are, to give the motor and its gearing an opportunity to get well started before the actual load of moving the valve is thrown upon it; to allow of the operating force being brought suddenly in action to move the valve in order to jar and loosen it from its seat; to provide convenient means for raising a valve by means of a revolving threaded member engaging the stem, and to generally improve the efficiency and simplify the structure of valve operating mechanism. These objects, and other advantages which will hereinafter appear, we attain by means of the construction illustrated in preferred form in the accompanying drawings, wherein—

Figure 1 is a side elevation shown partially in section, illustrating the application of our improvements to a large gate valve moved by means of an attached electro-motor;

Figure 2 is a side elevation of the device of Figure 1 taken from the right of said figure in a plane at right-angles to the plane of Figure 1;

Figure 3 is an enlarged section along the line (3) in Figure 1, and

Figure 4 is an enlarged partial vertical central section through the top of the stem-moving sleeve and its associated parts.

It is well known that in opening a valve the heaviest resistance is met at the immediate initial starting of the valve, and this is especially true of the form of gate valve which wedges in its place in order to secure a tight fit on the seats. In order to allow of the motor's first attaining some headway before operating directly upon the valve stem, and also to give a sudden jar to the valve and valve stem to loosen and start it from its seat, we provide especial means for a lost motion at the beginning of the movement of the valve-operating gear. Thus, it will be seen from the drawing, we provide a straight-way valve casing 5 in which are slanting valve seats 6 and the valve casing has a hood 7 for the reception of the valve when raised. On top of the hood 7 are a pair of upright brackets 8 which at one side support the motor casing 9, and by means of this motor, through the gears 10, 12, and 13, gear 12 being on the spindle 11, and 13 mounted to surround the valve stem, the valve stem is engaged by a screw sleeve to raise the valve from its seat 6.

By reference more particularly to the enlarged views in Figures 3 and 4 it will be seen that we have mounted in the top of the brackets 8, in a stationary casing 18 a rotary actuating sleeve 17 which is held from longitudinal movement, and surrounds and engages with the screw threads 16 upon the valve stem 15, carrying the gate valve 14 at the bottom. The rotary sleeve 17 has seated upon its outside a shifting collar 21 which is free to move longitudinally upon the sleeve but is held from rotation thereon by being splined on by the key 22 held in place on the sleeve 17 by screws 23. The shifting collar 21 at its outside engages the revolving sleeve 20 which is made integral with the hub of the large gear wheel 13 and is confined between the lower end of the sleeve 17 and the hub of the hand-wheel 19 which is securely fastened upon the top of the sleeve 17. From this construction it will be seen that upon revolution of the gear wheel 13 and the collar 20, this collar by its internal screw threads engages the shifting sleeve 21 and since the sleeve 21 is not at the time rotating it may freely move over the sleeve 17 and key 22 to the limit of its movement when it strikes the hub of the wheel 19 and being prevented from further longitudinal movement along the sleeve 17, it will cause the actuating sleeve 17 to revolve with

the collar 20 and by its lower end 17ª engaging the stem of the valve, will operate to lift the stem 15 vertically and raise the valve off its seat.

It will be understood of course that the lower end of the valve stem 15 has proper bearings and packing in the top of the hood 7. We also provide a switchboard such as indicated at 25 and connected with the electric feed wires 26 so as to run the motor 9 in either direction as desired, to open or close the valve. When convenient, some automatic means may be provided for shifting the switch and cutting off the motor current when the valve has reached the limit of its movement.

From the above description it will be seen that in operation the motor 9 and the gear wheel have an opportunity to get under way full speed before any heavy load is thrown upon them, and the first movement takes effect merely in the longitudinal shifting of the sleeve 21, and that when this arrives at the end of its motion the power of the motor is suddenly thrown upon the sleeve 17 which will start with a jerk and loosen the valve somewhat. The initial inertia of all the parts will be overcome and before the motor and gearing lose the stored up inertia due to the running freely the valve will have started its travel. As the parts are shown in Fig. 1 of course the valve is being raised, and it will be clear that in the reverse movement the sleeve 21 will move downward until it strikes the lower end 17ª of the sleeve 17 and thereupon will start the sleeve 17 rotating in the opposite direction, to lower the valve in its place. It will be seen that by means of the handwheel 19 the valve may also be manually operated when desired. The several advantages of the device will readily occur to those familiar with the art.

Having thus described our invention and illustrated its use, what we claim as new, and desire to secure by Letters Patent, is the following:

1. In valve operating mechanism the combination with a threaded stem of the valve, and a threaded rotary sleeve operating upon said stem to lift it, of a shifting sleeve upon said actuating sleeve mounted to move longitudinally thereon a limited distance but not to rotate, and a motor and series of gears one of which engages said shifting sleeve to move it longitudinally to its limit and then to turn it in order to operate the actuating sleeve of the stem.

2. In valve operating mechanism the combination of a driving gear with an internally threaded hub, an actuating sleeve engaging the valve stem, a shifting threaded sleeve engaging said hub and being splined on the actuating sleeve, and means to limit the longitudinal movement of the shifting sleeve.

3. In electrically driven valve operating mechanism the combination with a threaded valve stem, of an actuating sleeve threaded on the stem and mounted in stationary bearings, a motor and suitable gearing including a gear mounted on said actuating sleeve to rotate thereon, and a traveling sleeve threaded in the hub of said gear and having a limited free play longitudinally on said sleeve but keyed on the same to prevent rotation thereon, whereby the driving gear may start freely and the shifting sleeve will violently engage at the ends of its motion both to turn and longitudinally strike the valve stem.

In testimony whereof we have hereunder signed our names, in the presence of the two subscribed witnesses, May 16, 1904.

WILLIAM E. ALLEN.
ARTHUR M. HOUSER.

Witnesses:
PAUL CARPENTER,
EDWARD C. BURNS.