

(No Model.)

3 Sheets—Sheet 1.

G. J. ROBERTS.
WATER GAS APPARATUS.

No. 549,156.

Patented Nov. 5, 1895.

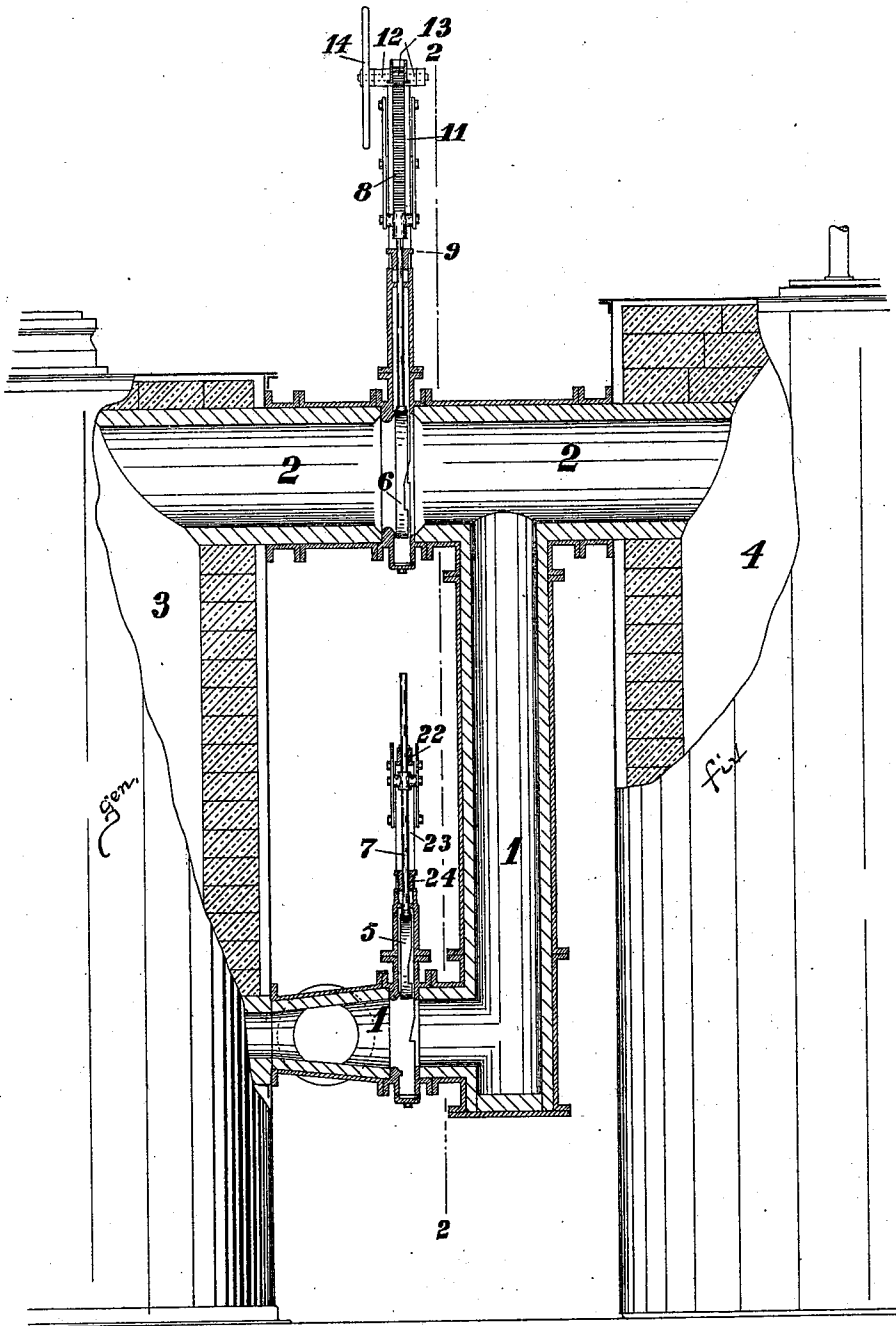


Fig. 1

WITNESSES :

M. H. Flagle
K. M. Gilligan.

INVENTOR

BY *George J. Roberts*
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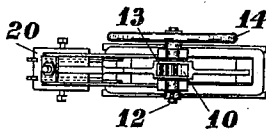


Fig. 3

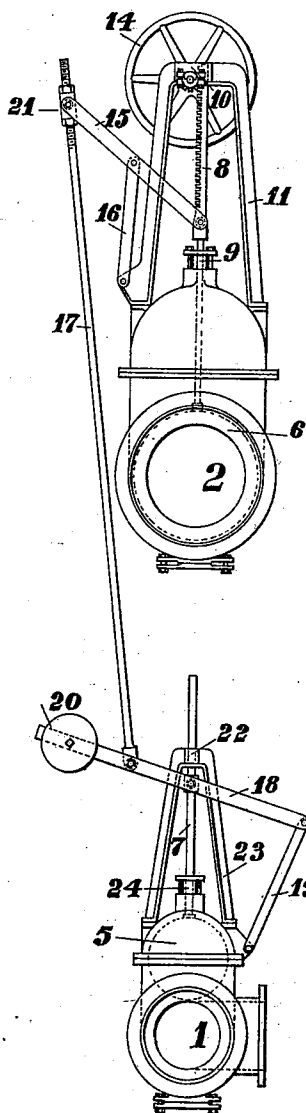


Fig. 2

WITNESSES:

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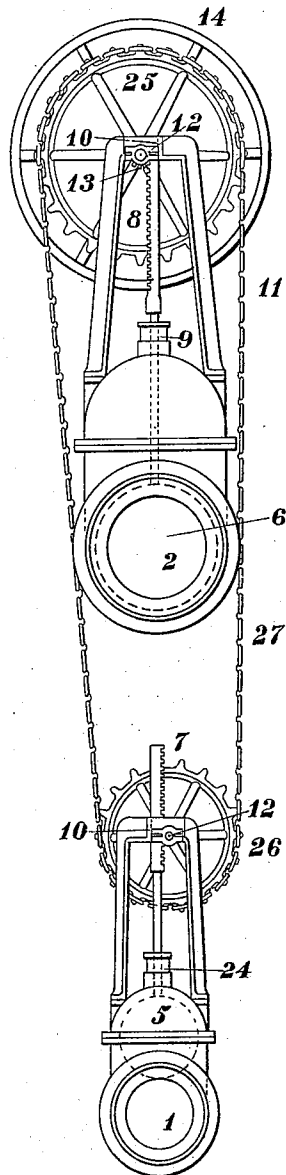


Fig. 4

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UNITED STATES PATENT OFFICE.

GEORGE J. ROBERTS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
THE UNITED GAS IMPROVEMENT COMPANY, OF SAME PLACE.

WATER-GAS APPARATUS.

SPECIFICATION forming part of Letters Patent No. 549,156, dated November 5, 1895.

Application filed March 21, 1894. Serial No. 504,489. (No model.)

To all whom it may concern:

Be it known that I, GEORGE J. ROBERTS, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Water-Gas Apparatus, of which the following is a specification.

My invention relates more particularly to water-gas apparatus in which reversals are or may be made in the direction of the operations carried on in the generator, or, in other words, in which both up and down runs may be made.

The principal objects of my present invention are, first, to obviate jamming or sticking of the valves which are employed for effecting the requisite reversals of the operations carried on in the generator and to provide reliable, durable, and efficient means for simultaneously lifting or opening one and depressing or closing the other of said valves without exerting any appreciable sidewise pressure or stress upon their valve-spindles, and, second, to compensate for any sidewise or lateral pressure or stress that may be exerted upon the valve-spindles by their elevating and depressing mechanism.

My invention consists in the improvements hereinafter fully described, and particularly referred to in the claims.

The nature, characteristic features, and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a side elevational view, partly in section, of a well-known type of generator and fixing-chamber having pipes or conduits leading from the top and bottom of the generator to the fixing-chamber and each provided with a slide or gate valve, showing mechanism embodying features of my invention for simultaneously opening one and closing the other of said valves without bending or jamming their spindles. Fig. 2 is a sectional view looking toward the left and taken on the line 2 2 of Fig. 1 in order to illustrate a side elevation of the mechanism comprising my invention. Fig. 3 is a top or plan view of the valve-actuating mechanism illustrated in

Figs. 1 and 2, and Fig. 4 is a view similar to Fig. 2 and illustrating a modification of my invention.

In the drawings, 1 and 2 are pipes, flues, or conduits connecting the upper and lower portions of a generator 3 with a fixing-chamber 4 and provided with slide or gate valves 5 and 6, having operating-spindles 7 and 8. These valves 5 and 6 are used for causing a reversal of the processes carried on in the interior of the generator 3, or, in other words, for effecting so-called "up and down runs." For this purpose one of the valves must be opened as the other is closed. According to my invention, this result is accomplished by means of linkwork and so-called "floating levers" or by means of sprocket chain and wheels.

In the accompanying drawings, the valve-spindle 8 is provided upon one of its faces or sides with teeth constituting a rack, and is afforded a range of endwise play or movement through a stuffing-box 9 and through a slot or guide-opening 10, Fig. 3, in a yoke 11, secured in the present instance to the casing of the valve 6.

12 is an arbor or shaft journaled in the yoke or bracket 11 and provided with a hand-wheel 14 and with a pinion 13, meshing with the rack of the valve-spindle 8. The rotation of the hand-wheel 14, acting through the instrumentality of the rack and pinion, causes power to be applied directly to the valve-spindle 8, so that the valve 6 may be lifted and depressed by turning the hand-wheel in one direction or the other, as required. During this operation the stuffing-box 9 and guide-slot 10 support the valve-spindle 8 at two points against sidewise or horizontal thrusts of all kinds and thus prevent the pinion 13 from bending the spindle, whereby jamming or sticking of the latter and of the valve are obviated.

Referring more particularly to Fig. 2, a description will now be given of one type of mechanism or combination of linkwork adapted to cause the valve 5 to be closed when the valve 6 is open and to cause the valve 5 to be open when the valve 6 is closed. The part 15 is pivotally supported by a rocker-arm 16, carried by the valve-casing or its equivalent, and constitutes a floating lever.

Motion is imparted to this floating lever 15 directly from the valve-spindle 8, to which it is jointed or pivotally attached. One extremity of a rod 17 is pivotally attached or jointed to the floating lever 15, and the other extremity of this rod is pivotally connected with a second floating lever 18, pivotally connected with the valve-spindle 7 and carried by a rocker-arm 19, jointed or pivoted to the casing of the valve 5 or its equivalent. If desired, a counterweight 20 may be employed for facilitating the movement of the parts, and one of the floating levers 15 and 18 may be connected with a block, as 21, adjustable endwise of the link 17, whereby the throw of the mechanism may be increased or diminished in order to accommodate it to valves of different dimensions. The mode of operation of this linkwork may be described as follows: A counter-clockwise rotation of the hand-wheel 14, acting through the instrumentality of the rack and pinion 13, causes the valve-spindle 8 and valve 6 to be elevated. During this movement the valve-spindle 8 is guided by the stuffing-box 9 and by the slot 10, so that any horizontal or sideways thrust that may be exerted by the pinion 13 or otherwise is prevented from bending the valve-spindle, because the latter is guided against horizontal displacement at two points sufficiently separated from each other. The elevation of the valve-spindle 8 imparts motion directly to the floating lever 15 and causes it to push the rod 17 downward, and the downward motion of the rod 17 imparts motion to the floating lever 18 and causes it to push the valve-spindle 7 downward. During this movement of the parts the rocker-arms 16 and 19 constitute, as it were, moving fulcra for the floating levers 15 and 18, whereby the latter are not only turned, but also permitted to move bodily, so that approximate parallelism of vertical motion of the spindles 7 and 8 is insured. However, any lateral thrust that may be exerted by the floating lever 18 is prevented from bending the valve-spindle 7, because the latter is supported by a slot 22 in the yoke 23 and by the stuffing-box 24 of the valve 5. Obviously a clockwise rotation of the hand-wheel 14 causes the valve 6 to be opened and the valve 5 to be closed.

Referring now to Fig. 4, the spindles of the valves 5 and 6 are each provided with a rack, pinion, yoke, and arbor or shaft like those above described in connection with the valve 6. In this instance the pinion of the valve 6 is operated by means of a hand-wheel 14, provided with a sprocket-wheel 25, which transmits motion through the intervention of a sprocket-chain 27 to a sprocket-wheel 26, keyed or otherwise secured to the shaft or arbor 12 of the valve 5.

As illustrated in Fig. 4 of the drawings, the sprocket-chain 27 is not crossed, so that the sprocket-wheels 25 and 26 are both rotated in the same direction, and the required dif-

ference of direction of motion of the valves 5 and 6 is accomplished by placing the racks of the spindles of these valves upon opposite sides of their respective pinions 13, as shown.

The mode of operation of the device illustrated in Fig. 4 may be described as follows: When the hand-wheel 14 is rotated in a counter-clockwise direction, the rack and pinion 13 cause the elevation of the valve 6, and the sprocket-chain 27 imparts rotary motion to the arbor or shaft 12, whereby its rack and pinion 13 cause the valve 5 to be closed or depressed. Obviously a clockwise motion of the hand-wheel 14 causes the valve 6 to be closed or depressed and the valve 5 to be elevated or opened. During the operation of opening and closing the valves the stuffing-boxes 24 and 9 and slots 10 in the yokes support the spindles and prevent their being bent by any sidewise thrust that may be exerted upon them by the pinions 13. The absence of any tendency to bend the valve-spindles is important, because if the spindles should be bent they would become jammed and thus cause the valves to stick, whereby the apparatus as a whole would be rendered inoperative.

It will be obvious to those skilled in the art to which my invention appertains that modifications may be made in details without departing from the spirit thereof. Hence I do not limit myself to the precise construction and arrangement of parts herein above set forth, and illustrated in the accompanying drawings; but,

Having thus described the nature and objects of my present invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination in a water gas apparatus of, pipes or conduits respectively provided with similarly disposed slide or gate valves, a pair of floating levers disposed respectively above and connected with the spindles of said valves and whereof one is centrally pivoted or supported, and a link or rod connected with one end of the centrally pivoted lever and operated by the movements of one of the valves, substantially as described.

2. The combination in a water gas apparatus of, pipes or conduits respectively provided with similarly disposed slide or gate valves, a floating lever supported or pivoted at its end and disposed above and connected with one of said valves, a centrally pivoted floating lever disposed above and connected at or near one of its ends with the other valve, and a link or rod connected with the other end of the last mentioned lever and with the first mentioned valve, substantially as described.

3. The combination in a water gas apparatus of, pipes or conduits respectively provided with similarly disposed slide or gate valves, floating levers disposed above and connected with said valves, and a link or rod for transferring motion from one valve to the other, substantially as described.

4. The combination, in a water gas apparatus of, a pair of slide or gate-valves each having an operating spindle, a stuffing box, and a slotted yoke for guiding each of said
 5 spindles, a pair of floating levers respectively connected with said valve-spindles and of which one is centrally pivoted, a rod connecting said floating levers, and means for imparting motion to one of the valve-spindles,
 10 substantially as described.

5. The combination in a water gas apparatus of, a pair of similarly disposed slide or gate-valves having spindles whereof one is provided with a rack, a slotted yoke and a
 15 stuffing box for guiding each of said spindles, a pair of floating levers respectively connected with the spindles of said valves, a rod connecting said floating levers, and a hand-wheel for actuating a pinion meshing with
 20 said rack, substantially as described.

6. The combination, in a water gas apparatus of, a pair of slide or gate-valves each having an operating spindle, a stuffing box and a slotted yoke for guiding each of said
 25 spindles, a pair of floating levers respectively connected with said spindles and a link connecting said floating levers and adjustably attached to one of them and adapted to elevate one and depress the other of the valve
 30 spindles, substantially as described.

7. The combination, in a water gas apparatus of, a pair of slide or gate-valves each having an operating spindle, a stuffing box and a slotted yoke for guiding the same, a

pair of floating levers respectively connected 35
 with said spindles, a link connecting said floating levers, a counter-weight attached to one of said floating levers, and means for elevating and depressing one of the valve-spindles whereby the other is depressed when 40
 the first is elevated and is elevated when the first is depressed, substantially as described.

8. The combination, in a water gas apparatus of, a pair of similarly disposed slide or gate valves each having an operating spindle, 45
 a stuffing box and slotted yoke for guiding each of said spindles, a pair of floating levers respectively connected with said spindles and whereof one is pivotally supported intermediate of its ends, and a rigid link connecting 50
 said floating levers, substantially as described.

9. The combination in a water gas apparatus of, a pair of slide or gate-valves whereof one is provided with a rack, mechanism for 55
 simultaneously elevating one and depressing the other of the pair of spindles, a slotted yoke or bracket and a stuffing box for guiding each of said spindles and for insuring parallelism of motion of said mechanism, and a 60
 hand-wheel for actuating a pinion meshing with said rack, substantially as described.

In testimony whereof I have hereunto signed my name.

GEORGE J. ROBERTS.

In presence of—

K. M. GILLIGAN,

A. B. STOUGHTON.