No. 886,663. PATENTED MAY 5, 1908.

W. D. SWEETMAN.

VALVE ACTUATING MECHANISM.

APPLICATION FILED NOV. 11, 1907.

2 SHEETS—SHEET 1.

Fig. 2.

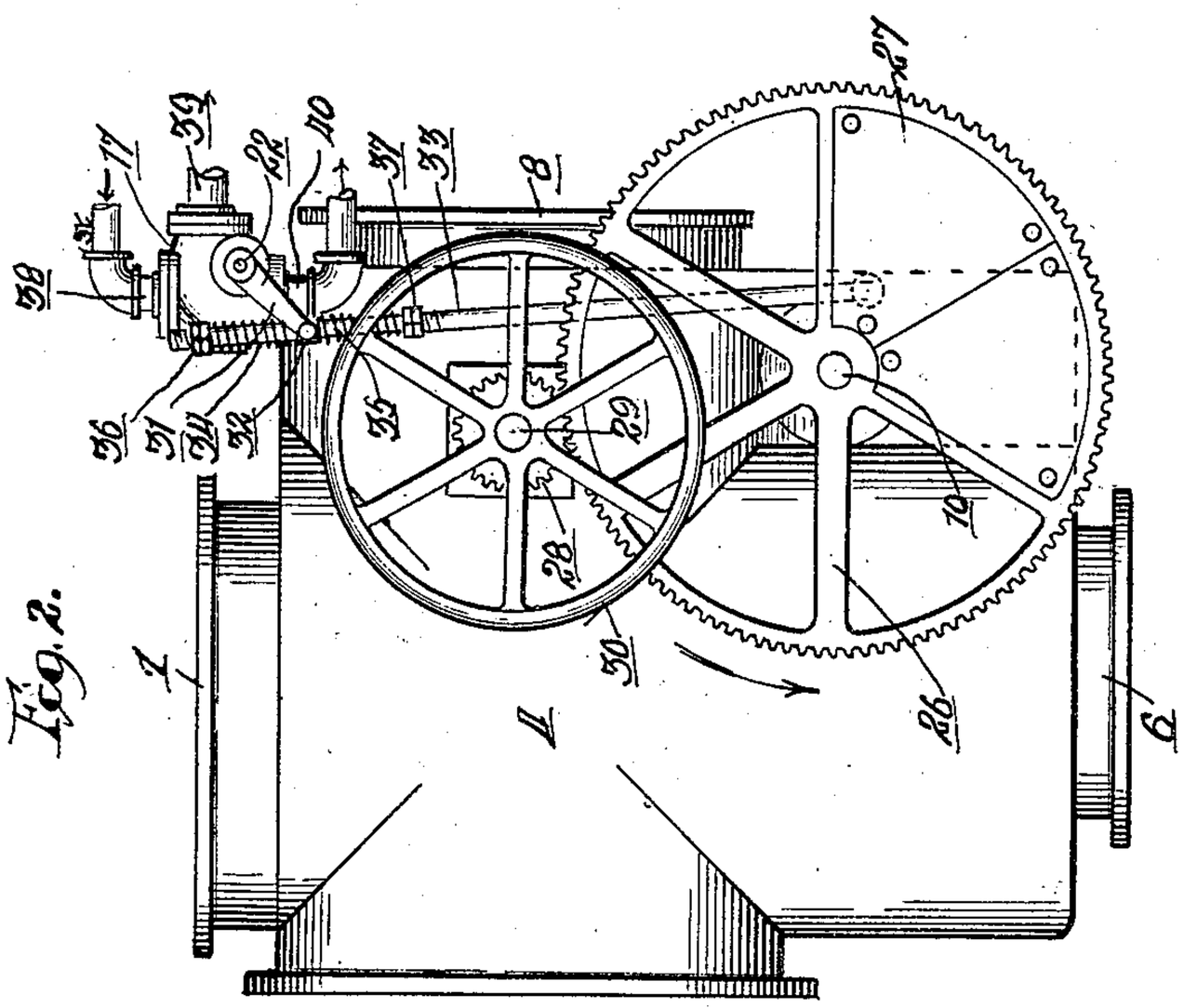


Fig. 1.

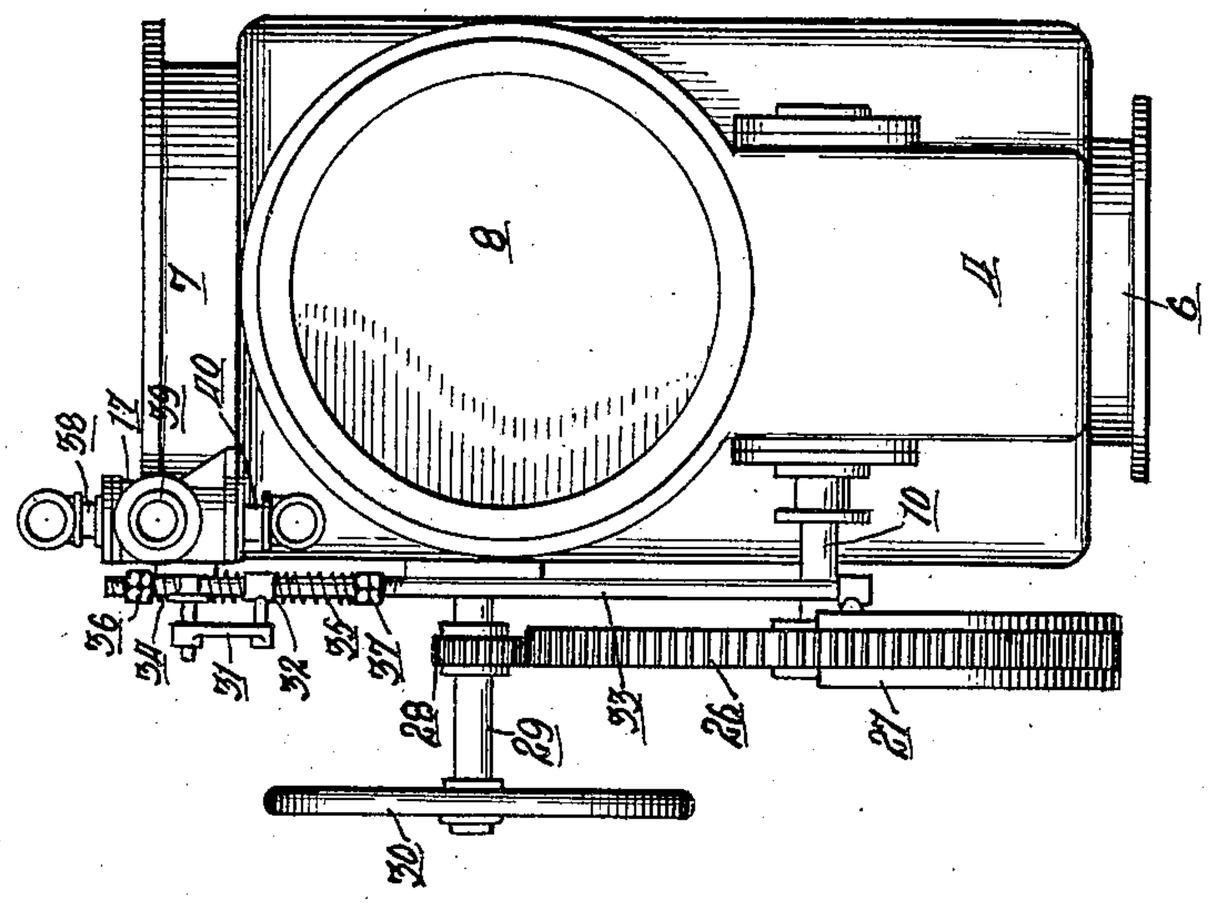


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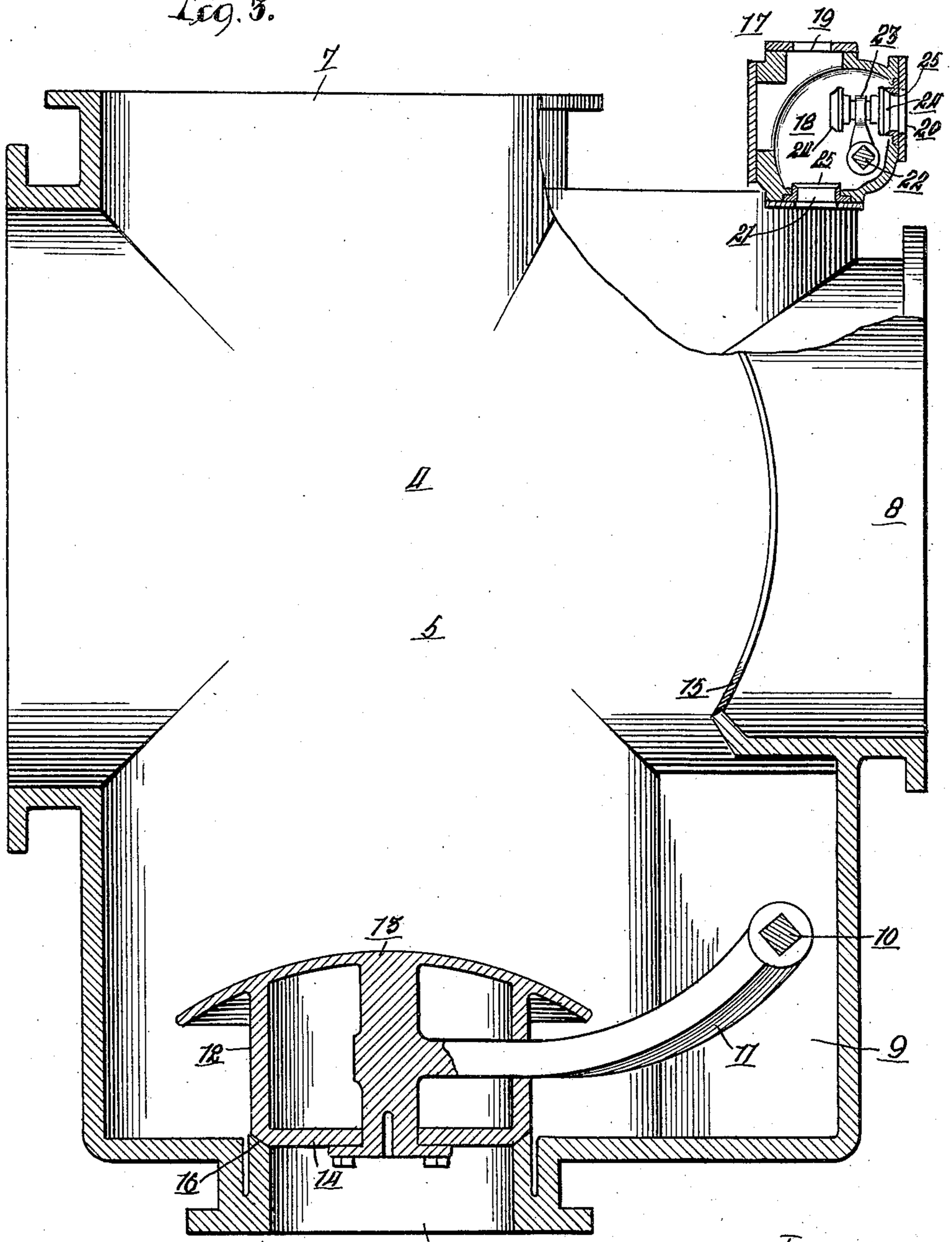
Fig. 3.

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# UNITED STATES PATENT OFFICE.

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## VALVE-ACTUATING MECHANISM.

No. 886,663. Specification of Letters Patent. Patented May 5, 1908.

Application filed November 11, 1907. Serial No. 401,680.

*To all whom it may concern:*

Be it known that I, WILLIAM D. SWEETMAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Valve-Actuating Mechanism, of which the following is a specification.

This valve mechanism of the present invention is intended more particularly for use in connection with a gas generator of the type adapted to generate water gas. In generators of this type, the steam which is intended to be decomposed into gas is alternately admitted to the generator above and below the incandescent fuel body in order to make what are known as up and down runs. When the steam is admitted above the fuel and passes down therethrough and is decomposed on the down passage, the gas is formed on what is generally called the "down run;" and in like manner, when the path of travel is reversed and the steam admitted below the fuel surface and travels upwardly therethrough it performs what is termed the "up run." In these circumstances the flow of water gas from the fuel surface must be regulated in a suitable manner to coöperate with the inflow of the steam, depending upon whether the up or down run is being performed at a specified time. This regulation of the steam and gas necessitates the employment of two valves,—a steam valve and a gas regulating valve—and the object of the present invention is to provide suitable automatic means for actuating said valves in accord with one another, so that a single manipulation of the valve actuating machinery will regulate the steam and gas valves in proper relation with one another to accommodate the intended flow of gas.

Another object of the present invention is to so construct and regulate the mechanism actuating the steam valve that it will be held under a heavy spring tension when turned to either position, which is highly desirable in that the steam is admitted under considerable pressure and it is necessary that a tight seal be provided in order to direct the steam in the proper channel.

Although the invention is designed with special reference to the requirements of gas generators, nevertheless it might be employed in other connections in which similar results are intended to be performed.

The invention consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is an end elevation of the gas and steam valves, showing the actuating mechanism in edge elevation; Fig. 2 a side elevation of the same; and Fig. 3 an enlarged view, showing in section the interior of the steam and gas valves.

The gas valve, as shown, comprises a casing 4, of the general formation of a four-way coupling and having a main valve chamber 5, provided with a lower mouth 6, an upper mouth 7, and an intermediate mouth 8, as shown in Fig. 3. The lower mouth 6 is intended to serve as an inlet for the flow of gas generated on the "down run" of steam, and the lateral mouth 8 likewise serves as an inlet for the flow of gas generated on the "up run" of steam. The upper mouth 7 serves as a discharge for all of the gas passing through the valve, which gas is thereafter led to the carbureting portion of the generator to receive its charge of illuminating oil. At the lower corner of the casing is a protuberant chamber 9, located between the mouths 6 and 8, through which chamber is entered a shaft 10, upon which is rigidly mounted a valve operating arm 11. The arm has, on its end, a double faced valve 12, having a convexly rounded upper seating face 13 and a flat disk shaped seating face 14 adapted to coöperate with valve seats 15 and 16, respectively, which are formed in connection with the mouths 8 and 6, respectively. The above specific construction of the gas valve is not claimed as new, and additional description thereof is deemed unnecessary.

Secured to the casing of the gas valve, near the upper inner front corner thereof, and immediately above the intermediate mouth 8, is located a steam valve 17, which comprises a main valve chamber 18, having upper, intermediate, and lower mouths 19, 20, and 21, on three sides thereof, which mouths correspond very nearly to the mouths of the gas valve previously described. The steam valve is provided with a transversely extending shaft 22, carrying an arm 23, which, like the arm 11, is provided with double valve faces 24, which are adapted to engage with valve seats 25, formed in connection with the mouths 20 and 21. The arm 23, however, is so mounted on the shaft 22 that the valves carried by the arm will occupy positions at right angles to

one another. As shown in Fig. 3, the valves are set for an "up run," the steam passing through the lower mouth 21, thence to the interior of the generator, and being there decomposed, after which the gas passes from the generator through the open mouth 8 of the gas valve, and thence through the discharge mouth 7. The mouths of the steam and gas valves connect with suitable pipes and passages, which lead to the intended portions of the generator structure, so that the flow of steam and gas can be regulated, by suitable movements of the valves, to perform the up and down runs.

In order to prevent any mal-adjustment of the valves, the regulating mechanism of the present invention has been designed. The shaft 10, which may be termed the gas regulating shaft, has mounted thereon a gear wheel 26, of large diameter, which is provided, on one side, with a counter-weight 27, adapted to counterbalance the weight of the double faced gas valve 12. The wheel 26 meshes with a pinion 28 on a stub shaft 29, upon the end of which is located a hand wheel 30. The shaft 22, which may be termed the steam regulating shaft, is provided on its end with an arm 31, which preferably extends at an angle of 45° with respect to the arm 23 upon which the valves are carried. The arm 31 is pivoted, at its outer end, to a collar 32, which is slidably mounted upon a rod 33, which rod is pivoted to the counter-weight 27 on the gear wheel 26, which actuates the gas valve. The collar 32 is interposed between upper and lower coil springs 34 and 35, which encircle the rod 33 and are held in position by means of upper and lower nuts 36 and 37, respectively. The rod is regulated to have a greater degree of movement, during the swing of the wheel 26, than the movement of the arm 31, so that, after the steam valve has been seated either by an up or down movement of the rod, the arm 31 will be subjected to a heavy spring tension by the continued movement of the rod 33, which in this manner serves to hold the steam valve seated under a spring tension.

The steam pipe has entered into the mouth 19 a pipe 38, which leads to the boiler or other source of steam supply. The mouth 20 has entered thereinto a pipe 39, which supplies steam for the "down run," and the mouth 21 has entered thereinto a similar pipe 40, which supplies steam for the "up run."

In use, when it is desired to create a down run of gas, the operating mechanism is thrown into the position shown in Fig. 2, which is the opposite position from that shown in Fig. 3. With the parts in the position indicated in Fig. 2, the steam valve will be in its lowered position, admitting steam through the mouth 20 and pipe 39 to the top of the fuel surface. The steam thus admitted will travel down through the incandescent fuel and will therein be decomposed into carbon monoxid and hydrogen. The oxygen gas will unite with the fuel to form carbon monoxid, while with the hydrogen gas will pass from the lower end of the generator up through the mouth 6 of the gas valve and out of the mouth 7, whence it will be conveyed to another portion of the generator for carburation and additional treatment. When it is desired to reverse the run, the hand wheel will be turned and power transmitted to the gear wheel 26, which acts directly on the shaft 10, and such movement will lower the gas valve 12 into the position shown in Fig. 3, and will simultaneously raise the steam valve into the position shown in Fig. 3, which simultaneous movement of the valves automatically reverses the flow of gas, so that mal-adjustment due to carelessness on the part of the operator will be avoided. The springs upon the rod 33 can be adjusted to proper tension by means of the nuts 36 and 37, and serve to hold the steam valve tightly seated in whatever position it may be adjusted.

What I regard as new and desire to secure by Letters Patent is:

1. In a valve actuating mechanism, the combination of two coöperating valve casings, each of the valve casings being provided with two valve-controlled passages, a valve member for each of the valve casings, adapted to be swung to different positions to close either one of the passages, a shaft for each of the valve members, a crank member on one of the shafts, an arm on the other shaft, a rod pivoted to the crank member, a slidable connection between the rod and the arm, and springs on opposite sides of such slidable connection, the movement of the rod in either direction being sufficient to subject the arm to spring tension, substantially as described.

2. In a valve actuating mechanism, the combination of two coöperating valve casings, each of the valve casings being provided with two valve-controlled passages, a valve arm for each of the valve casings, and carrying thereon a double faced valve member adapted to control either one of the passages, a shaft for each of the valve arms, a crank member on one of the shafts, an arm on the other shaft, a rod pivoted to the crank member, a slidable connection between the rod and the arm, and springs on opposite sides of such slidable connection, the movement of the rod in either direction being sufficient to subject the arm to spring tension, substantially as described.

3. In a valve actuating mechanism, the combination of two coöperating valve casings, each of the valve casings being provided with two valve-controlled passages, a valve arm for each of the valve casings, and car-

rying thereon a double faced valve member adapted to control either one of the passages, a shaft for each of the valve arms, a gear wheel on one of the shafts, a pinion meshing with said gear wheel, a hand wheel for actuating said pinion, an arm on the other shaft, a rod pivoted to the crank member, a slidable connection between the rod and the arm, and springs on opposite sides of such slidable connection, the movement of the rod in either direction being sufficient to subject the arm to spring tension, substantially as described.

4. In a valve actuating mechanism, the combination of two coöperating valves, a revoluble shaft adapted to actuate one of the valves, a swinging arm adapted to actuate the other valve, a crank member on the shaft, a rod pivoted to said crank member, a slidable connection between the arm and the rod, and springs encircling the rod on opposite sides of the slidable connection, the extreme movement of the rod being greater than the extreme movement of the arm, substantially as described.

5. In a valve actuating mechanism, the combination of two coöperating valves, a revoluble shaft adapted to actuate one of the valves, a movable member adapted to actuate the other valve, a crank member on the shaft, a rod pivoted to said crank member, a slidable connection between the movable member and the rod, and springs encircling the rod on opposite sides of the slidable connection, the extreme movement of the rod being greater than the extreme movement of the movable valve actuating member, substantially as described.

6. In a valve actuating mechanism, the combination of a gas valve casing having a discharge mouth and having two inlet mouths at right angles to one another, a shaft journaled intermediate the inlet mouths, an arm mounted on the shaft, a valve member carried by said arm and adapted to close either of the inlet mouths, a steam valve casing, located adjacent to the gas valve casing and provided with a steam inlet mouth, and steam outlet mouths at right angles to one another, a steam valve shaft journaled intermediate the outlet mouths, an arm mounted on the shaft, a steam valve carried by said arm and adapted to regulate either of the outlet mouths, a valve actuating arm on the steam valve shaft, a crank member on the gas valve shaft, a rod pivoted to said crank member, a slidable connection between the steam valve actuating arm and the rod, and springs on opposite sides of such slidable connection, the movement of the rod being greater than the movement of the arm, substantially as described.

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