

No. 822,781.

PATENTED JUNE 5, 1906.

H. F. SMITH.
CHARGING DOOR FOR GAS PRODUCERS.

APPLICATION FILED MAY 24, 1905.

2 SHEETS—SHEET 1.

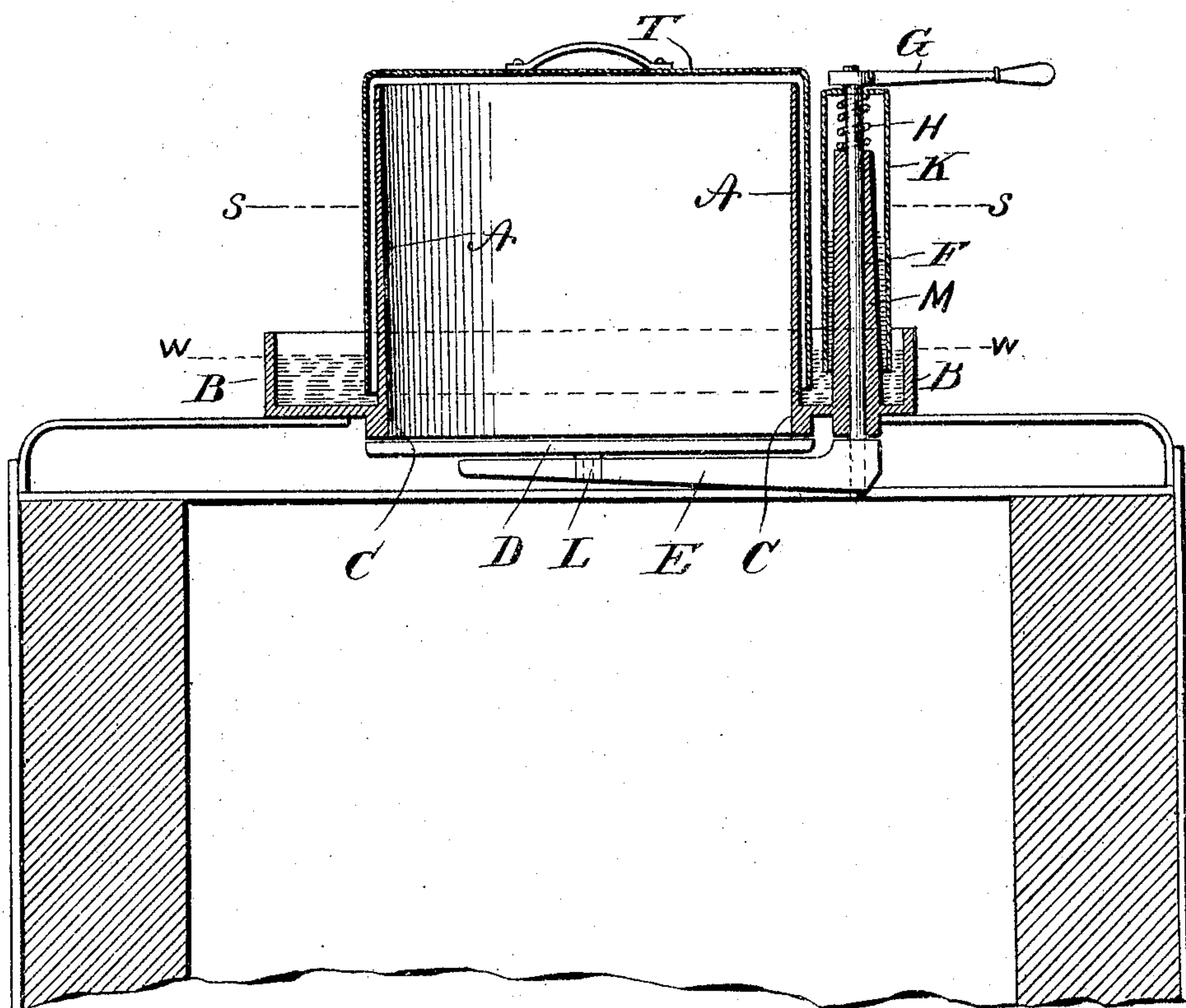


Fig. 1.

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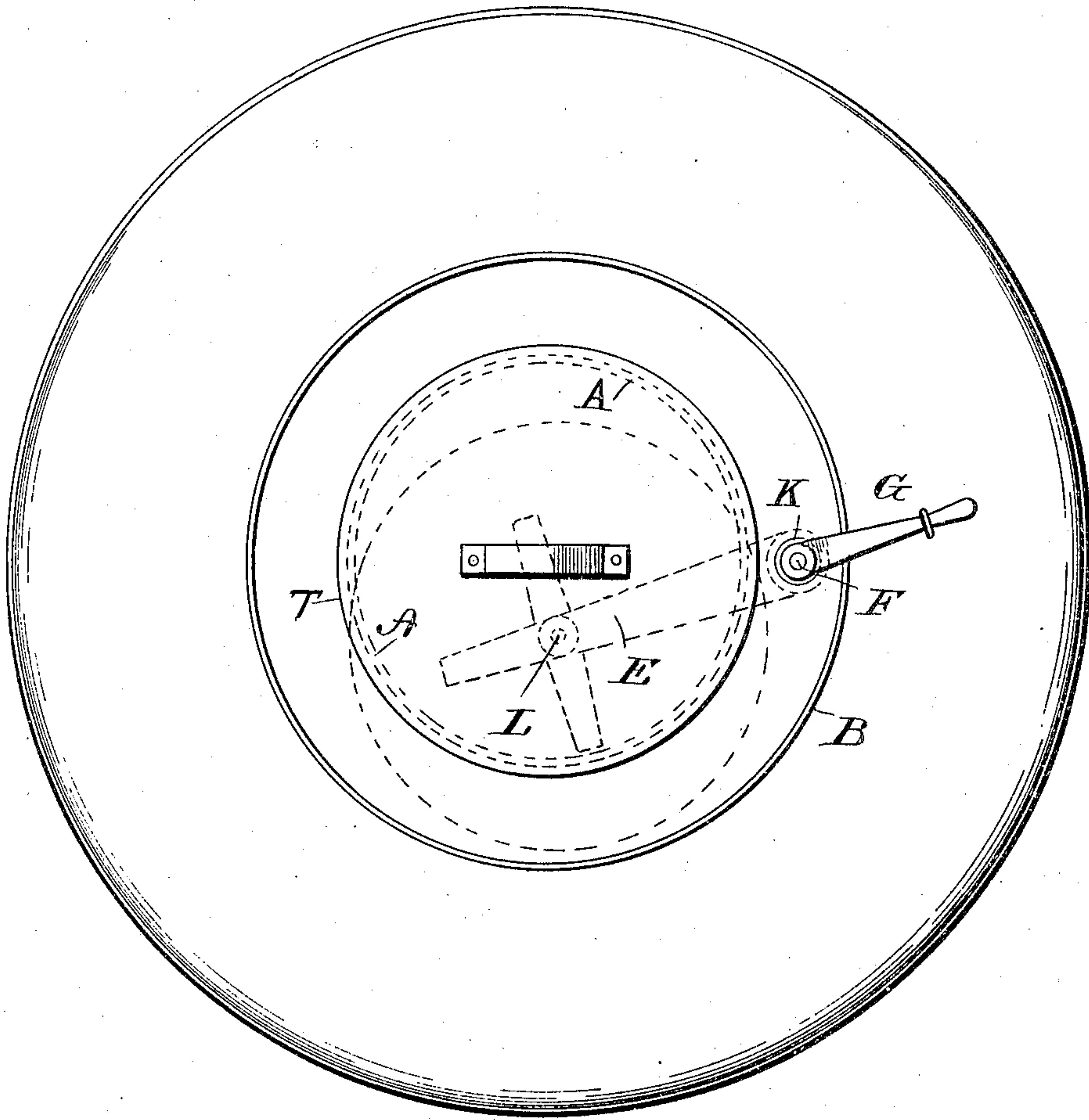
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2 SHEETS—SHEET 2.

Fig. 2



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UNITED STATES PATENT OFFICE.

HARRY F. SMITH, OF LEXINGTON, OHIO.

CHARGING-DOOR FOR GAS-PRODUCERS.

No. 822,781.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed May 24, 1905. Serial No. 262,025.

To all whom it may concern:

Be it known that I, HARRY F. SMITH, a citizen of the United States, residing at Lexington, in the county of Richland and State of Ohio, have invented new and useful Improvements in Charging-Doors for Suction Gas-Producers, of which the following is a specification.

This invention has relation to charging-doors for suction gas-producers, which doors it is desirable should be constructed so as to prevent the leakage of air, dust, or other foreign matter into the producer.

The invention consists of improved means whereby a water-sealed door may be readily and quickly manipulated to open and close the door of the retort or producer so as to not only prevent the escape of gas into the external atmosphere, but to also obviate the introduction of air, dust, &c., into the producer.

The problem of sealing the charging-doors against the escape of gas while charges are working is relatively easy of solution as compared with that of maintaining exactly desirable control of the parts while a charge is being effected or while examinations of conditions are being made, &c.

Figure 1 is a vertical sectional view of a door or mouth of a suction gas-producer, the appliances connected with the same, and the upper part of the producer. Fig. 2 is a bottom plan of the top of the producer and its connections, parts being represented as broken away.

In operating gas-producers, and especially suction-producers in which the pressure within the apparatus is below that of the surrounding atmosphere, while expedition is highly desirable in all cases it is highly important that the top of the producer be closed at all times air-tight, so as to prevent the leakage of gas and in the suction type to prevent the leakage of air into the producer, where it might mingle with the gas and become a possible source of danger. An apparatus of this kind, however, must be provided with an opening through which the fuel may be introduced into the interior and through which the condition of the fuel-bed may be examined when the producer is not in operation. It is also sometimes desirable to be able to introduce fuel into the apparatus while it is working without admitting any appreciable quantity of air, and in any case it is highly desirable that when the opening is

closed there should be no possibility of leakage of air into the interior of the apparatus. Owing to the unfavorable conditions surrounding this portion of gas-producer, the satisfactory solution of this problem presents many difficulties. It is essential that the opening be opened and closed a great many times, that the passage of the fuel, with its accompanying grit and dust and the exposure to high temperatures, should not interfere in any way with the correct working of the apparatus and that the opening should close absolutely air-tight under all circumstances. The form of apparatus usually employed for this purpose depends for its tightness on the joint formed by two machined surfaces of iron or other material. It is evident that with this construction the presence of any dust or dirt or the lack of skill or care on the part of the attendant in closing the opening may result in a leaky joint. Undue heating of the parts, especially if they are of considerable size, will cause them to warp slightly from unequal expansion, and thus prevent the formation of an air-tight joint. In the apparatus described herewith these difficulties have been in a large measure overcome in a better and more satisfactory manner than by any means for a similar purpose preceding it.

In the present case the charging-door consists of a cylindrical casting A open at both ends and surrounded at its lower end by an annular trough B. This casting is securely and permanently fastened to the top of the producer in such a manner that the door-mouth casing A forms a cylindrical opening into the interior of the apparatus. This cylindrical opening is closed by the cover T, which is a sheet-metal cylinder closed at one end and open at the other and fitting loosely over the outside of the cylindrical casting A. Water is placed in the annular trough B to such a height that the lower edge of the cover T will dip below its surface. It is evident, as has been ascertained from experience, from this construction that as long as the trough B is kept filled with water it will be impossible for any air to leak into the apparatus through the connection of the cover therewith, since a decrease in pressure within the producer will merely cause the water to rise between the casting A and the cover T to some point, as at S, where the difference in level between S and W will equal the fall of pressure within the apparatus. In practice this difference in levels is found to be from one-half inch to

five inches or six inches, and it is consequently sufficient if the height of the cylinder A be made somewhat greater than this, say twelve inches or fourteen inches. It is evident also that with this construction the door may be closed and opened any number of times without interfering with the staunchness of the joint when closed and also that the presence of dust or dirt or unskilful manipulation cannot result in a leakage of air into the interior of the producer.

When it is deemed desirable to admit fuel while the producer is in operation, recourse is had to an addition to the apparatus thus far described, which is also shown on the accompanying drawings,

The lower end C of the cylinder A is formed as a ledge or rim extending below the bottom of the annular trough and is made about twice as thick as the cylinder. The bottom or lower surface of this greatly-thickened ledge is machined off true. The sleeve M is cast as a hollow vertical projection from the bottom of the annular trough B and forms a support and bearing for the shaft F. This shaft F carries on its bottom end the horizontal arm E, which in turn carries the closure-plate D, bearing on the pivot L, carried by the arm E. The upper surface of the disk or plate D is machined off smooth, so as to fit with tolerable tightness against the lower end or edge C of the cylinder A, which, by reason of its greatly-increased thickness over the body of the door itself, affords a surface of considerable width when brought into the proper position thereunder by means of the arm E. The top of the shaft F has the inner end of the hand-lever G secured to it, so that the said shaft may be turned at will by the said lever. A spring H surrounds the upper end of the shaft and bears at the upper end against the hand-lever F or cover K and at its lower end on the top of the sleeve M for a purpose which will presently appear. In addition to this, the cylindrical cover or sleeve K, which acts in a manner entirely similar to that of the lid T, is fastened securely to the top of the shaft F, while the lower open end dips in the water in the trough B, thus effectually sealing off and preventing any leakage past the shaft F or beneath the bottom of the sleeve K into the interior of the producer. This feature of the construction is of particular importance. Great weight and effect is given by me particularly to all parts and features of the construction relating to the disk D, its pivotal support on the lever E, the milled connections of the disk D with the broadened ledge of the bottom of the door or mouth A, and the vertical rod F and all parts influenced by it as tending to simplicity, handiness of use, and perfection of function in all that is ascribed to them.

If it should be desired to introduce coal into the producer while it is in operation, the lever G is moved so that the disk or closure-plate D

is carried beneath the lower end or edge C of the cylinder A and allowed to remain in this position, the disk D being thrown tightly against the machined surface C by the action of the spring H, as before indicated, thus closing tightly the bottom of the cylinder A. The lid T can now be removed and the interior of the cylindrical mouth or door casing A filled with fuel. The lid T is then replaced and the lever G moved, so as to swing the plate D to one side, thus permitting the charge of fuel to fall into the producer. It is not essential that the joint at C be absolutely airtight, since the only opportunity for leakage would be during the short time while the lid T was not in position.

The construction of the closing-door D as a disk, the milling off of its upper surface, and also the lower surface of the cylinder C, as well as the pivoting of the closing door or disk D on the operating-lever E are most important features of the invention, since it is chiefly through these that a tight closing of the door is secured. It may be stated that it is known that the closing of the charging-door by a water seal has long been known, and no claim is therefore made to this matter, nakedly considered. It is combination of the particular means shown and described operating in connection or combination with a water seal that comprises the invention. It is known not to be new to operate slides without having their surfaces milled and not having the slides or doors constructed as disks nor pivoted to their working levers; but these are operated with difficulty with consumption of a considerable amount of time and without securing a gas-tight connection or a connection nearly so tight as by my improved means, so far as is now known to me. It will also be seen that the water in the annular ring or trough B serves to cool the machined seat C, and thereby the disk D, thus preventing warping from heat and tending to preserve a tight joint at the bottom C of the cylinder A. The pivot L is so constructed as to allow a slight tilting motion of the disk D to compensate for lack of alinement between the shaft F and the machined surface C. This matter is likewise of importance in the invention. It is seen that in this construction the water-sealed lid T is relied upon to maintain the tight closure of the producer-top by means of the water seal at all times excepting while fuel is being filled into the cylinder A. In case where it is not considered necessary to introduce fuel while the producer is running the disk D and accompanying parts E, F, G, H, K, and M may be omitted. The dotted lines in Fig. 2 are self-explanatory by way of showing how the disk D may be operated through the medium of the lever E and its connection.

It is deemed not inapt to term the entire structure herein discussed "a charging-door

for suction gas-producers," still there is no particular part of the structure that can be strictly called the "door," and while the cylinder A is at times indicated as composing the door it will be understood that in its confined sense it is a casing to the door or door-mouth. Again, while the closure-disk is in a sense a door it performs functions that would make the word door when applied to it, in a sense, a misnomer. It has been endeavored to give names or appellations to parts that will be at least not misleading, and this specification is to be so understood.

I claim—

1. A charging-door for gas-producers consisting of a door-mouth casing of cylindrical form open at both ends and surrounded at its lower end, outside, by an annular water-containing trough, the end below the water-trough being greatly thickened and trued off on its bottom surface, a cylindrical cover for the door-mouth casing, closed at one end and fitting over the cylindrical door-mouth with its lower edge resting in the water in the trough, combined with a removable cover for the lower extended, thickened and trued-off end of the circular closure for the door-mouth, having its upper surface meeting the lower extended, thickened and trued end of the door itself trued or milled off to make a tight connection, a lever connected with the cylindrical door for opening and closing the same, a water-sealed vertical rod connected with the outer end of the lever to move it, and a lever connected with the rod for operating it.

2. A charging-door-mouth casing for gas-producers consisting of a door of cylindrical form open at both ends and surrounded at its lower end, outside, by an annular water-containing trough, the end below the water-trough being greatly thickened and trued off on its bottom surface, a cylindrical cover for the door-mouth casing, closed at one end and fitting over the cylindrical door-mouth with its lower edge resting in the water in the trough, combined with a removable circular cover for the lower extended, thickened and trued-off end of the cylindrical door having its upper surface meeting the lower extended, thickened and trued end of the closure disk or door itself trued or milled off to make a tight connection and a lever extended beyond the center of the door upon which the said door or closure-disk is pivoted at its center to shift or move the latter to open and close the door and a rod through the medium of which the said lever may be actuated and means, water sealed from the retort or gas-producer proper and the door-mouth, connected with the outer end of the closure disk or door to operate it as described.

3. A charging-door for gas-producers consisting of a door-mouth casing of cylindrical form open at both ends and surrounded at its lower end, outside, by an annular water-containing trough, the end below the water-trough being greatly thickened and trued off on its bottom surface, a cylindrical cover for the door-mouth, closed at one end and fitting over the cylindrical door-mouth casing with its lower edge resting in the water in the trough, combined with a removable cover for the lower extended, thickened and trued-off end of the cylindrical closure disk or door having its upper surface meeting the lower extended, thickened and trued end of the closure disk or door, itself trued or milled off to make a tight connection, a lever upon which the said closure disk is pivoted to shift or move the latter to open and close the door, and a water-sealed vertical rod at the outer end of said lever to actuate the same.

4. A charging-door for gas-producers, consisting of a cylinder, an annular trough surrounding the said cylinder, adapted to contain water and forming an integral part of said cylinder, and a hollow sleeve or standard forming an integral part of said trough and rising from the bottom of the said trough, combined with a removable disk, adapted to fit tightly on the bottom of said cylinder which is formed as an extended thickened ledge and to form a bottom thereto, a lever upon which said bottom is pivoted for moving the same, a rod in said hollow sleeve or standard, and a lever connected with the top of said rod, said rod and hollow standard being water sealed from said lever.

5. A charging-door for gas-producers, consisting of a cylinder, an annular trough surrounding the said cylindrical door-mouth, adapted to contain water, and forming an integral part of said cylinder, and a hollow sleeve or standard forming an integral part of said trough and rising from the bottom of the said trough, combined with a removable disk adapted to fit tightly on the bottom of said cylinder which is formed as an extended thickened ledge, and to form a bottom thereto, a lever upon which the said bottom is pivoted for moving the same, a rod in said hollow sleeve or standard, a lever connected with the top of said rod, a spring bearing on the top of said hollow sleeve or standard the lower edge of the latter resting in the water in the annular trough.

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

HARRY F. SMITH.

Witnesses:

W. E. STRUBLE,
W. H. EARHART.