3 Sheets—Sheet 1.

C. V. SMITH & W. FARMER.

Center Seal for Gas-Works.

No. 208,644. **Patented Oct. 1, 1878.**

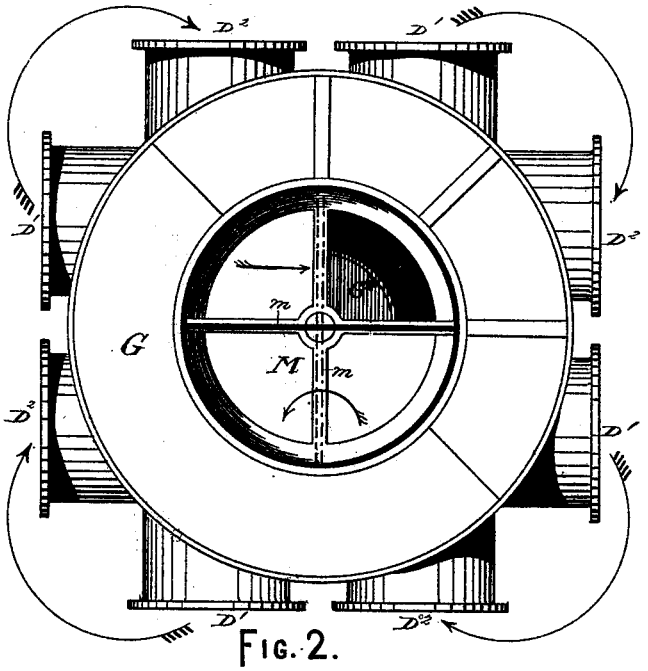

FIG. 2.

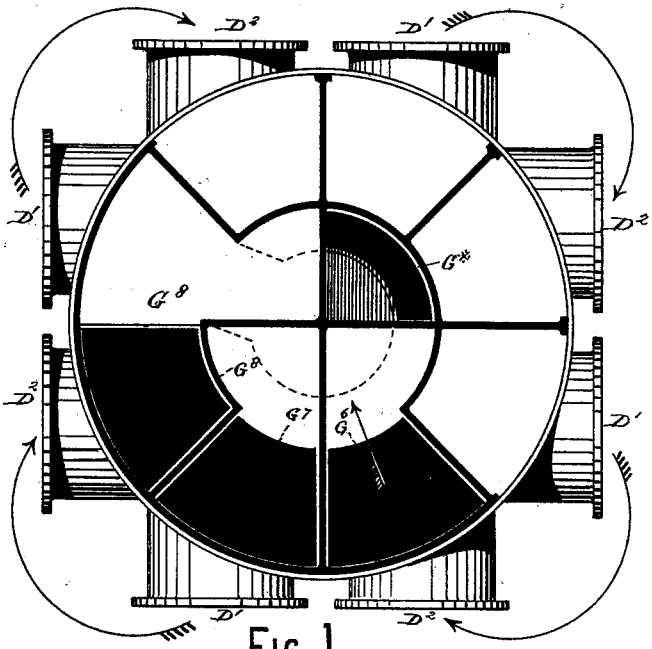

FIG. 1.

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C. V. SMITH & W. FARMER.

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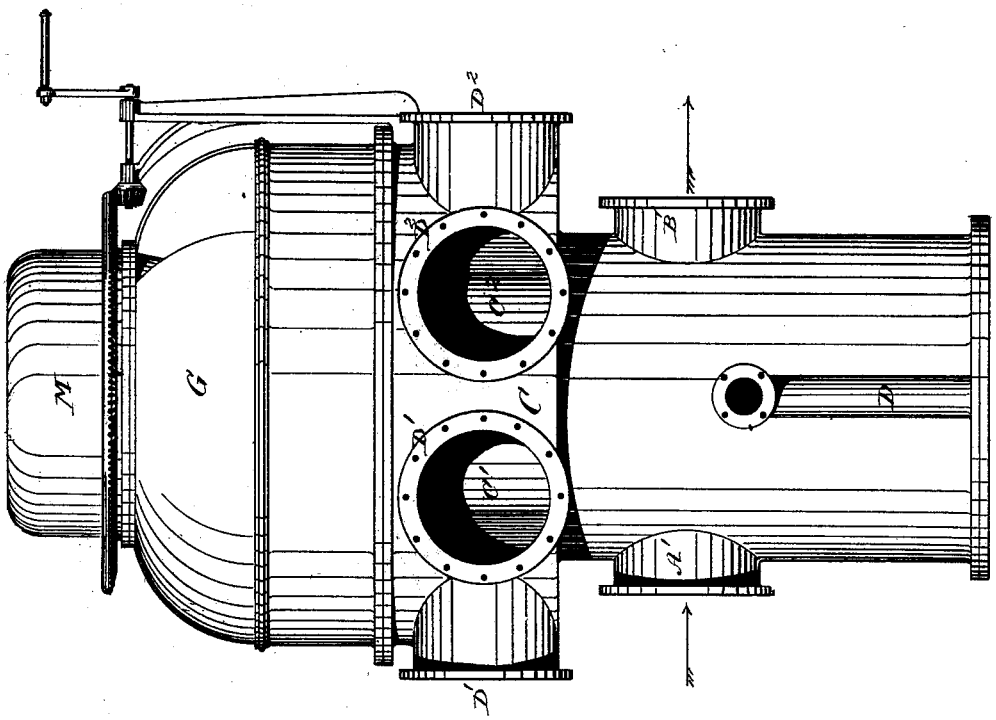

FIG. 4.

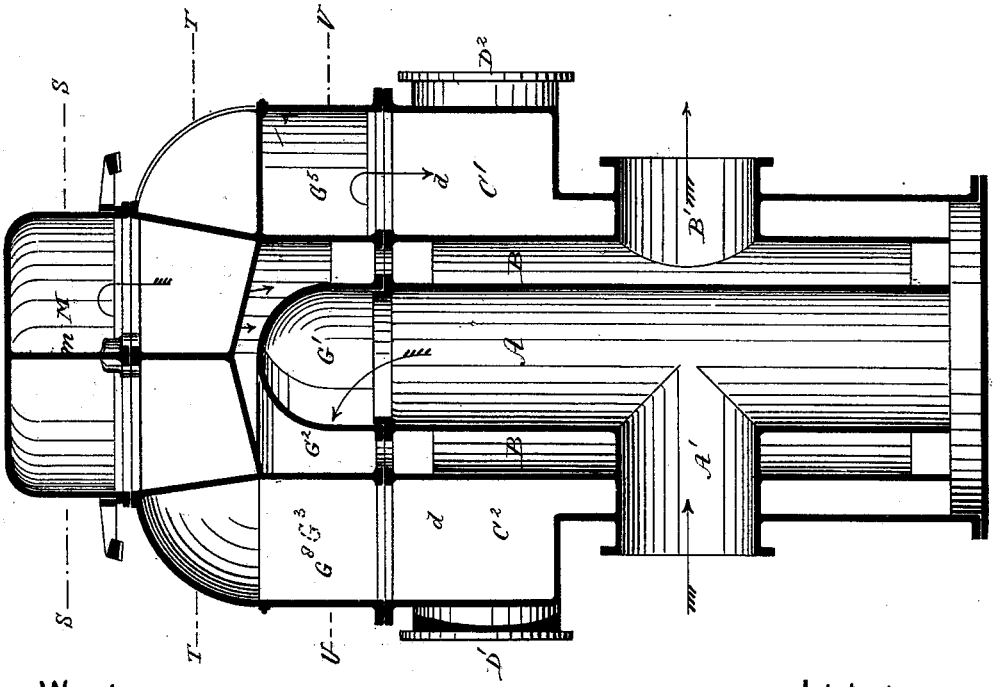

FIG. 3.

WITNESSES.

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3 Sheets—Sheet 3.

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Center Seal for Gas-Works.

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FIG. 5.

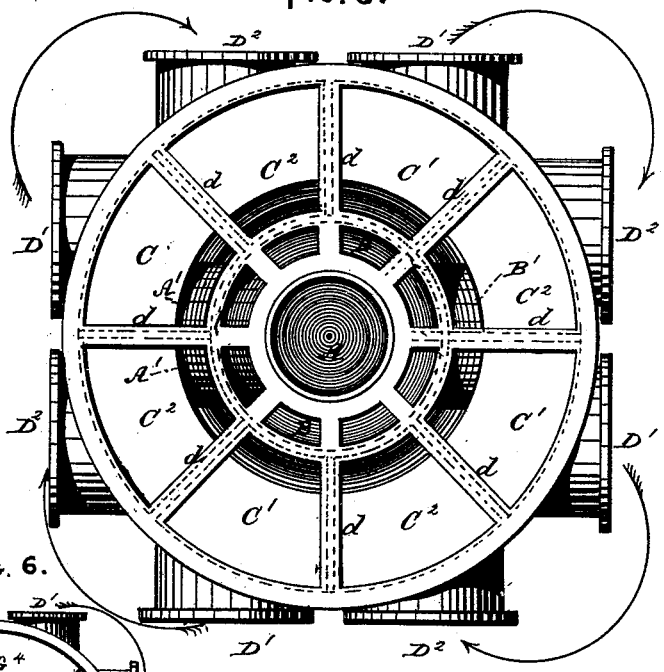


FIG. 6.

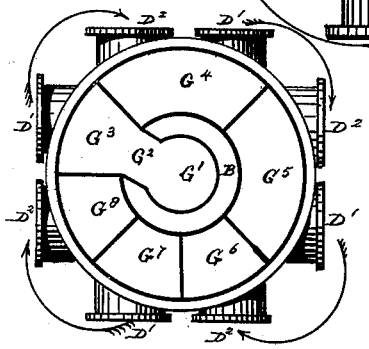
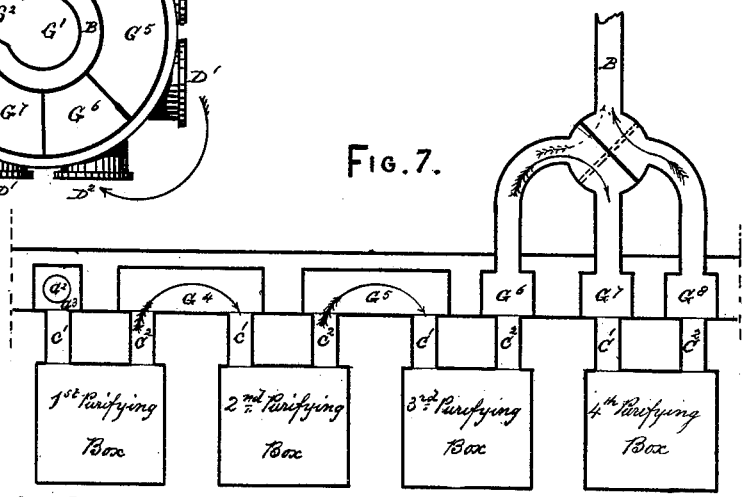


FIG. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

CHARLES V. SMITH AND WILLIAM FARMER, OF NEW YORK, N. Y.

IMPROVEMENT IN CENTER-SEALS FOR GAS-WORKS.

Specification forming part of Letters Patent No. **208,644**, dated October 1, 1878; application filed May 25, 1878.

To all whom it may concern:

Be it known that we, CHARLES V. SMITH and WILLIAM FARMER, both of New York city, in the county and State of New York, have invented certain new and useful Improvements relating to Center-Seals for Gas-Works; and we do hereby declare that the following is a full and exact description thereof.

We provide means analogous to those heretofore employed for cutting off one purifying-chamber at a time, to allow it to be ventilated and the purifying material exchanged; but instead of, as heretofore, necessarily keeping one box always out of action, we provide for having them all in use when desired. We do this by a simple arrangement of a single turning valve, with suitable passages connecting therewith.

It is common to employ four purifying-chambers or purifying-boxes in a set. With ordinary usage each will run from three days to three weeks before it requires exchanging. The operation of exchanging the material need occupy but a few hours. The usual practice of keeping only three boxes in operation, some one always being out of operation, involves an obvious loss of efficiency.

Our invention is intended to avoid such loss. We have obviated the difficulty by a slight modification in the construction of the ordinary turning valve, and the employment of an additional smaller valve on the top. Passages communicate from the ordinary valve up into this additional valve. By turning the additional valve into one position, the communications are so established as to cause the gas to traverse through all the purifying-boxes. By turning the additional valve in another position, the main valve below cuts out one of the chambers below, with the ordinary effect, allowing it to be overhauled. Thus conditioned, the changing of the main valve has the ordinary effect of determining which one shall be thus thrown out of the circuit. We provide stops, as shown, to prevent the top valve from being ever turned too far. Ordinary stops are, of course, used to adjust the position of the lower and ordinary valve. When all the purifying-boxes are at work or in operation, by turning the upper valve one-quarter turn forward, and also the upper and lower valves, locked together, one-quarter turn forward, one of the purifying-boxes will be thrown out of operation. By turning the upper valve one-quarter turn backward, the said purifying-box will be thrown into operation again.

The accompanying drawings form a part of this specification, and represent what we consider the best means of carrying out the invention.

Figure 1 is a horizontal section on the line T T in Fig. 3. Fig. 2 is a horizontal section on the line S S in the same figure. Fig. 3 is a central vertical section, and Fig. 4 is a general side elevation. Fig. 5 is a plan of the lower part of the apparatus. Fig. 6 is a horizontal section on a smaller scale. It is taken on the line U U in Fig. 3. Fig. 7 is a diagram, representing the apparatus opened out so as to present all the passages on a plane surface, in place of being arranged around a center, as in use.

Similar letters of reference indicate like parts in all the figures.

A is the ordinary central passage, into which the unpurified gas is received through the horizontal mouth A′. B is the ordinary annular chamber surrounding the former. Into this chamber B the gas is received from above after it has traversed through the proper purifying-boxes. It is sent away from the chamber B through the mouth B′. C is the ordinary annular space exterior to B, in which tar or other liquid is allowed to accumulate until it flows out through the ordinary pipe D, provided for its discharge.

The space C is divided by vertical partitions *d*. The space C may be of small capacity at the level of the inlet A′ and outlet B′; but a little above these passages its diameter is increased to afford capacious chambers.

With the ordinary number—four (4)—purifying-boxes (not represented) there are eight subdivisions or chambers of the space C, lettered alternately C^1 C^2 C^1 C^2. A pair of chambers, C^1 C^2, are connected to one purifying-box. Each chamber C^1 has a connection, D^1, serving to convey the gas to the connected purifier. Its accompanying chamber C^2 has a connection, D^2, serving as an outlet from the connected purifier, (not represented,) allowing

the gas to return purified into the chamber C^2, and to be thence discharged for use in the ordinary manner by being conducted down the annular space B, nearer the center.

So far as is yet described, the apparatus is of the ordinary construction, and operates in the ordinary manner, and will be familiar to gas-men.

The upper edges of all the partitions *d* are scraped and made to fit gas-tight against the corresponding lower edges of a cover which is fitted thereon, and is partially rotated at intervals to effect the transfer of the gas from the first purifying-box into the second, and from the second into the third, and to cut off the fourth chamber when required. We will designate the entire cover, when necessary, by the single letter G. Parts thereof carry additional marks G^1, G^2, &c., when required. The cover is chambered. Certain chambers open through to the top. There is no communication between the third purifying-box and the fourth, or between either and the discharge-passage, except through the top valve, M.

The motions of our cover and of the valve which rests on it are simple. They are simply rotations, turning on a vertical axis. The form of our top valve M is very simple. It is a dome divided by a single vertical partition; but the chambering of the lower cover, G, is complicated. It is unusually difficult to be understood. It transfers the gas into and out of the first purifying-box and the second purifying-box in the ordinary way. It transfers it into the third purifying-box in the ordinary way; but, after receiving it again from the third purifying-box, it transfers either directly into the discharge or out into the fourth purifying-box and back again, before discharging it according as the top valve, M, is set. The gas, on being received from the third purifying-box, goes up into the top. If the top valve, M, is set in one position, the gas goes directly out. If it is set in another position, it cannot go directly out, but is compelled to descend again and go out into the last purifying-box and return therefrom, and again up into the top and through the other half of the top valve, M, before its discharge. We will describe it step by step. We will first describe the diagram, Fig. 7, which shows the working of the several passages as if extended in a plane. The gas enters through a passage, G^2, into a small chamber, G^3. It thence descends through the passage C^1, and circulates through the connected purifying-box. It returns through the passage C^2 into a large chamber, G^4. It thence descends through the next passage, C^1, to the second purifying-box, and returns through the second return-passage, C^2, into the wide chamber, G^5. It thence flows out again through the passage C^1 into the third purifying-box, and returns through the passage C^2. At this point a new set of conditions is interposed. Instead of large chambers in the cover G, small ones are used. They do not connect except through the valve M in the top. The gas, returning through the passage C^2, is received in the small chamber G^6, and thence led upward into the top valve, M.

If the top valve, M, is turned in such position that its single transverse partition stands in the position shown by the strong line, the gas will not be allowed to flow directly to the outlet B, but will be compelled to descend into the small chamber G^7, thence to be conveyed out again and returned, thus traversing through the fourth purifying-box. On returning therefrom it is received in the last small chamber, G^8, from whence it rises into the other half of the valve M, which affords it a ready flow into the exit-passage B. This is the condition of the parts when it is desired that all the purifying-boxes shall be in use.

When it is desired to cut out one purifying-box and allow it to be ventilated and cleaned in the ordinary manner, while the other three purifying-boxes continue in use as usual, it is necessary simply to give a half-turn to the top valve, M, so as to bring its partition *m* into the position shown in Fig. 2. This has the effect to throw its single transverse partition into the position shown by the dotted lines. Under these conditions the gas, instead of following the direction shown by the strong-lined arrows, takes the direction shown by the dotted arrow, and the fourth purifying-box, together with the chambers G^7 and G^9 and their connected passages, are all for the time being idle. After the proper ventilation of the purifying-box and change of its purifying material, it may be again thrown into the train of connection by simply turning the top valve, M, a quarter of the revolution back again.

All this, it will be understood, is done in the circular series of chambers instead of a straight series, as here shown, and done without interference with the successive shifting of the cover a quarter round from time to time, so as to change the order in which the gas is presented to the several purifying-boxes. The cover, being changed around by turning a quarter of a revolution at a time brings each purifying-box, in turn, into the position to serve as the last purifier. The one most recently cleaned is usually used in that relation for obvious reasons.

Now, turning to Figs. 1, 2, 3, and 4, we will describe the circular arrangement actually used.

In the center is a chamber, G^1, in constant communication with the passage A, which brings the gas into the purifying-house. This communicates through a single lateral passage, G^2, with a small chamber, G^3, which occupies one-eighth ($\frac{1}{8}$) of the circumference of the cover. However the cover shall be adjusted, this chamber G^3 always stands over some one of the chambers C^1, and delivers the gas down into that chamber. Thence it goes out through the mouth D^1 into the connected purifying-box, and returns through the mouth D^2 into the adjacent chamber C^2. The cover

presents over this first chamber, C^2, a wider chamber, G^4, which occupies one-fourth ($\frac{1}{4}$) of the circumference of the cover. The gas rises into this and descends in the adjacent chamber C^1. Thence it travels out, and, having gone through the second purifying-box, returns into the adjacent chamber C^2. Thence it rises into a third chamber, G^5, in the cover. This also occupies a quarter of the circumference covering, like the preceding, a chamber, C^1, and an adjacent chamber, C^2. The gas descends from this into the adjacent chamber C^1.

So far the action has been precisely as with the ordinary center seal, and the moving of the cover (turning it a quarter-revolution at proper intervals) properly changes the order in which the gas is introduced into the several purifying-boxes.

We have now accompanied the gas a little more than half-way around the cover. If the remainder of the cover were similarly chambered, the gas would be always carried out and back in the remaining two purifying-boxes; but it is not so chambered. The remaining three-eighths ($\frac{3}{8}$) of the circumference are divided into three small chambers, each occupying only one-eighth ($\frac{1}{8}$) of the circumference. They are completely isolated from each other except as the gas is allowed to be transferred in the top valve. If the top valve is so set, as shown by the drawings, that the gas may communicate freely from the first of these narrow chambers to the next, the gas will traverse from the first into the next, and will descend from the next, and go out into the fourth purifying-box, and be brought back again exactly the same as if the intermediate partition were annihilated and a large chamber were employed which covered both the apertures C^1 C^2 below. In other words, the gas will be transferred from the passage C^1 to the adjacent passage C^2, exactly the same as in the preceding wide chambers, except for having to make a longer traverse by coming up to the top. All the purifying-boxes will be in use. The gas will go out into the third purifying-chamber from the chamber G^5 and its connected chamber C^1, and will, on returning through the adjacent chamber C^2, rise in the narrow chamber G^6 in the cover. Thence it rises into the top valve, M, and is transferred into the extension of the chamber G^7. It descends through the chamber G^7, and, passing through its connected chamber C^1, moves out through the mouth D^1 into and through the last purifying-box. On returning from this last box it has completed the circuit of all the purifying apparatus. It enters through the last mouth, D^2, into the connected chamber C^2, and thence rises into the last chamber, G^8, of the cover G.

The difficulty which might be anticipated in taking the gas from this last chamber into the annular chamber B for its discharge, is overcome by extending the passage G^8 up and sufficiently laterally to discharge it into the other half of the top valve, M. This other half allows the gas to be transferred directly over from the last chamber, G^8, into the chamber G*, which communicates directly with the annular discharge-passage B, and allows the gas to flow away.

This is the action when the top valve, M, is adjusted for keeping all the purifying-boxes in use; but when it is turned a quarter-revolution, the conditions are changed—that is to say, the conditions with regard to the three narrow chambers G^6 G^7 G^8 are changed. The conditions with regard to the broad chambers G^4 and G^5 remain as before.

Under this last-described adjustment the fourth purifying-box will be thrown out of the circuit. This is effected by reason of the fact that the top valve, M, under these conditions, instead of transferring the gas from the chamber G^6 into the chamber G^7, prevents it from going in that way at all, and allows it to go freely from the chamber G^6 directly into the chamber G* and be discharged.

It will thus be seen that, while the lower part of our cover corresponds in the main to the ordinary cover, the upper part thereof is additional and performs novel functions, leading the gas through certain chambers in the lower part up into our top valve, which, being turned in one position, prevents the chambers below from communicating, and leaves the whole cover and its attachments performing only their ordinary functions; but by turning our top valve in another position at right angles to the first, the passages are allowed to communicate, and all the purifying-boxes are thrown into the circuit and are made available in purifying the gas.

It will be understood that when it is desired to clean a purifying-box, our top valve is set in the position to throw the whole apparatus into its ordinary condition. In that condition one of the purifying-boxes is necessarily out of the circuit, and may be cleaned. Keeping the parts in that condition and turning the cover a quarter around successively, we throw all the several purifying-boxes in succession out of the circuit, and all may be cleaned. When all are cleaned, or between each operation, or at any time when it is not necessary to throw a purifying-box out of circuit, we set our top valve M in a condition to allow the chambers to communicate, and all are then in communication, so that the gas travels successively through all the four purifying-boxes.

Modifications may be made by any good mechanic without departing from the principle of our invention. Thus, by increasing or decreasing the number of chambers and connections, we can use a greater or less number than four purifying-boxes.

We have made the several parts of cast-iron; but these may be replaced by wrought-iron or other material, care being taken to retain sufficient rigidity, and to have the surfaces work gas-tight.

Instead of turning our valve M by a gear-

wheel mounted on fixed bearings, we can turn it by other means, and we can turn the cover by a lever or other means independently.

We claim as our invention—

1. The combination, with a center-seal of ordinary or suitable construction, of a chambered cover, with means for revolving it, and with a single additional valve and means for adjusting it, whereby the device may at will serve either in the ordinary manner with one of the purifying-boxes thrown out of action or in such manner as to keep all the purifying-boxes in the circuit, as and for the purposes herein specified.

2. The combination of the additional valve M on the top of the cover G with the cover having the top chambers, G^6 G^7 G^8, the whole being connected and operated as and for the purposes herein specified.

In testimony whereof we have hereunto set our names in presence of two subscribing witnesses.

C. V. SMITH.
WM. FARMER.

Witnesses:
THOMAS D. STETSON,
W. COLBORNE BROOKES.