No. 677,865. Patented July 9, 1901.

O. N. GULDLIN.

GAS WASHER.

(Application filed Sept. 20, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

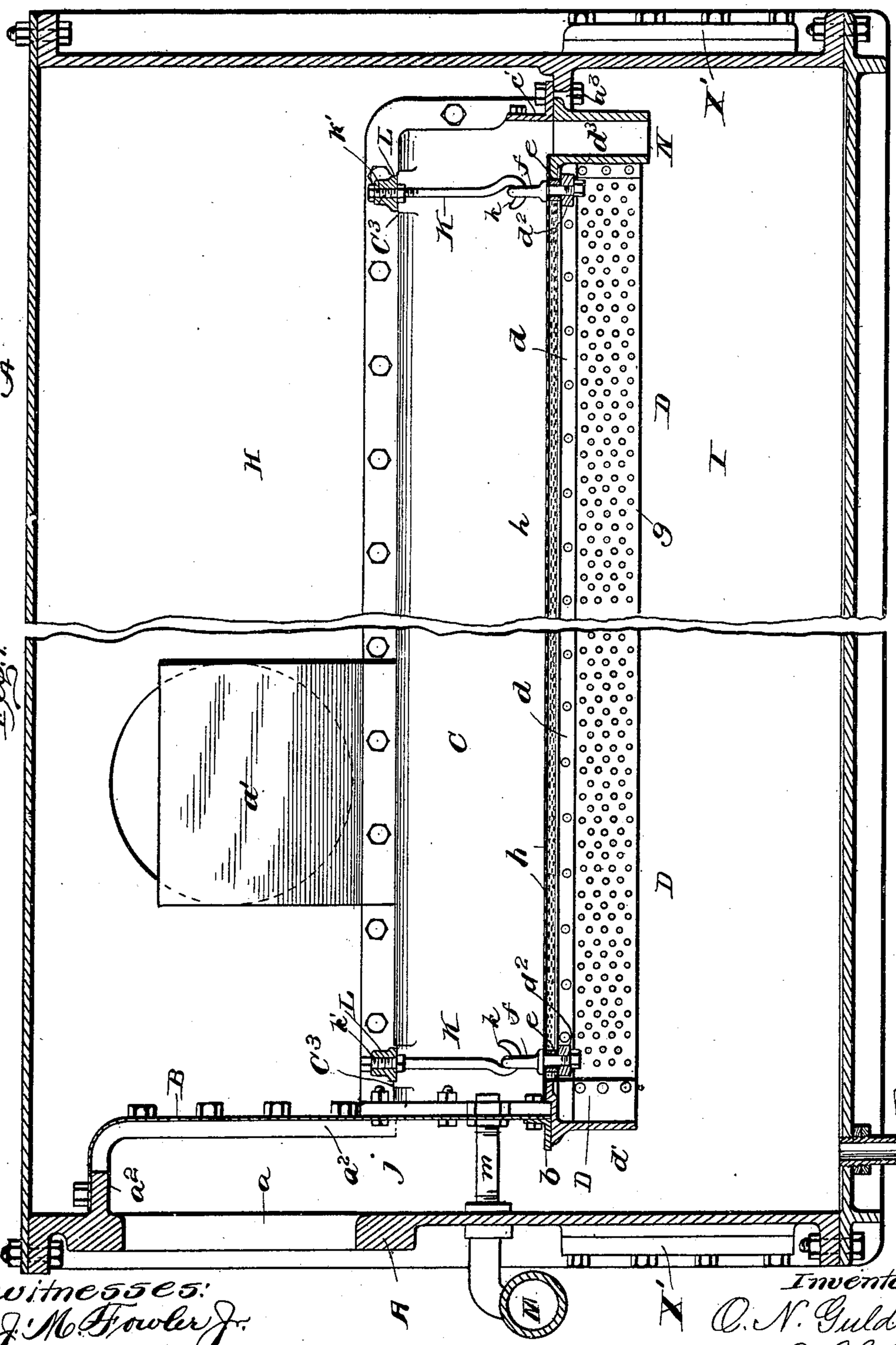

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Fig. 3.

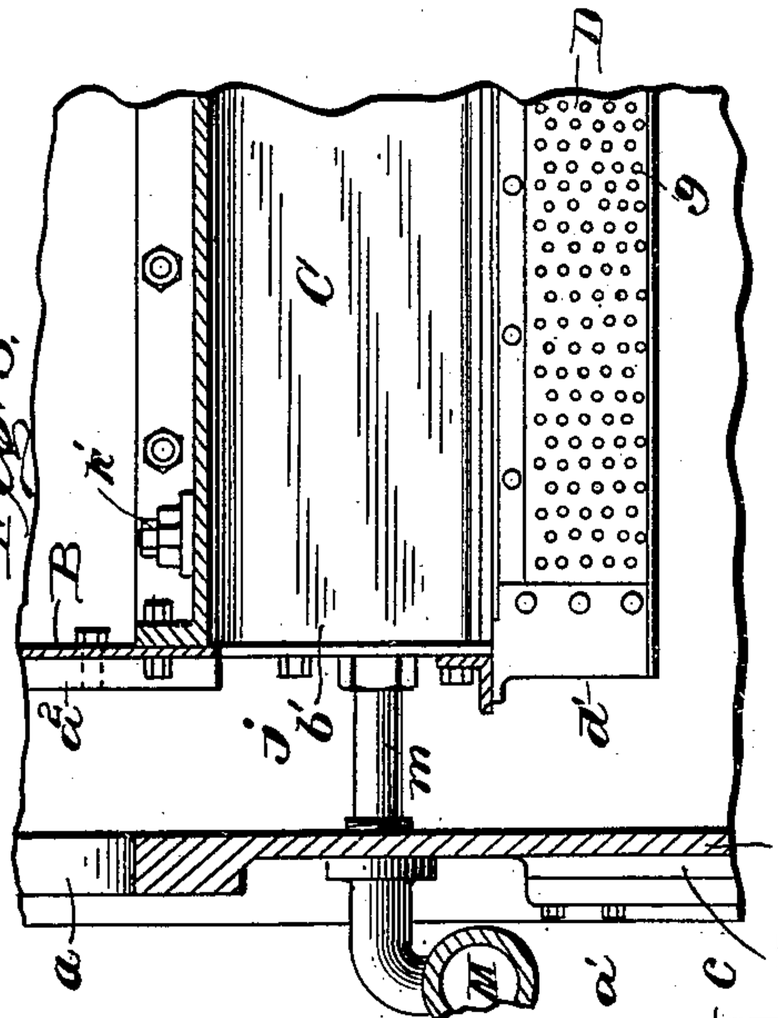


Fig. 4.

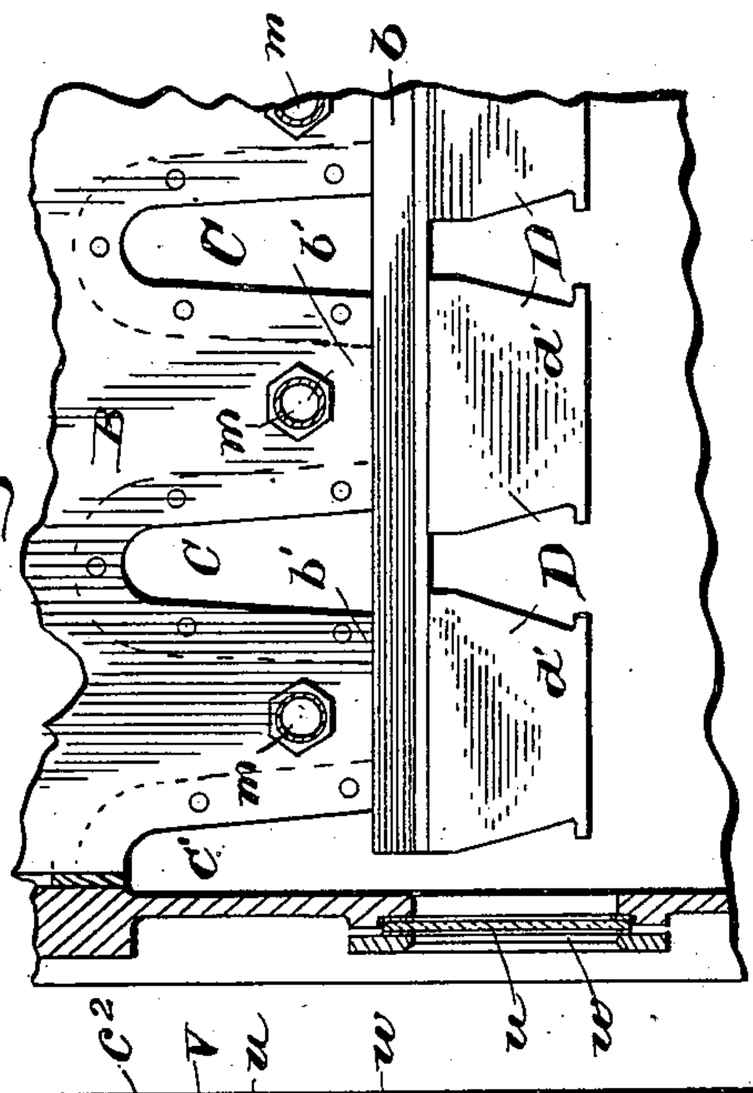
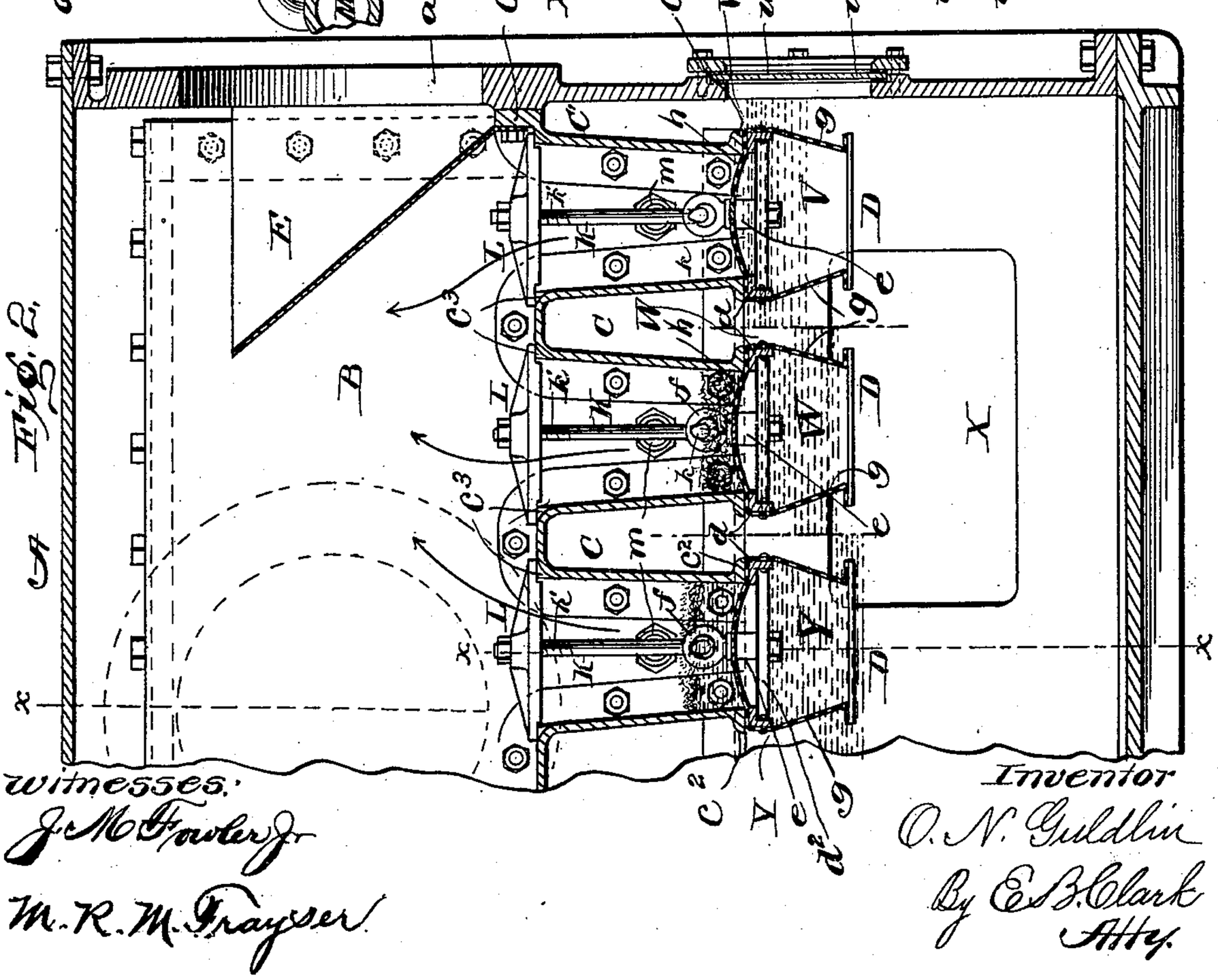


Fig. 2.



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UNITED STATES PATENT OFFICE.

OLAF N. GULDLIN, OF FORT WAYNE, INDIANA.

GAS-WASHER.

SPECIFICATION forming part of Letters Patent No. 677,865, dated July 9, 1901.

Application filed September 20, 1900. Serial No. 30,565. (No model.)

To all whom it may concern:

Be it known that I, OLAF N. GULDLIN, a citizen of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Gas-Washers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to apparatus for washing and purifying gas.

One object of my invention is to provide for more thoroughly and uniformly dividing gas into fine streams and subjecting it to the action of washing-water or ammoniacal liquor to remove various impurities, such as carbonaceous matter, ammonia, carbonic acid, and sulfur compounds.

A more specific object is to provide means for readily detaching and removing the perforated plates, or frames comprising such plates, used in dividing gas into fine streams from the washing-box for repair or renewal of parts without taking the box to pieces.

The matter constituting my invention herein will be defined in the claims.

I will now describe the details of construction of my improved washing apparatus by reference to the accompanying drawings, in which—

Figure 1 represents a vertical longitudinal section through the washing-box at the gas-inlet on line $x\,x$, Fig. 2, the middle portion being broken away. Fig. 2 represents a vertical transverse section thereof on the line of the gas-outlet. Fig. 3 represents a vertical longitudinal section through a portion of a gas-inlet channel. Fig. 4 represents an end view looking toward the deflecting-apron and into part of the gas-inlet channels.

The gas-washer box A is constructed of metal plates bolted together by their flanges in a well-known manner. One end of the box is provided with an inlet gas-opening a, where the gas-supply pipe is bolted to the plate. The gas-outlet opening a' is preferably made in one of the sides of the box, to which the outlet-pipe will be bolted. The deflecting-apron B is bolted to the inwardly-projecting flange a^2, extending across one end of the box above the inlet a and down the sides of the box, as shown in Figs. 1 and 2. This apron extends downward across one end of the box to the normal water-line and has bolted to its lower edge the angle-iron b for making a tight joint with the detachable frame D below the same. The lower end of apron B is made with a number of deep notches b', Fig. 4, corresponding to the number of inverted gas-channels C. The gas-channels C are in the nature of inverted troughs open at the bottom and are provided at their inlet ends with flanges by means of which they are bolted to the apron B around the notches b', Fig. 4. The rear ends of these channels are closed and bolted to the transverse angle-iron c', which is bolted to the inwardly-projecting flange a^3 for properly supporting the channels. The channels are made with thickened lower edges having flat surfaces c^2 for making tight joints with the detachable frames D, which carry the perforated extension-plates, as shown in Fig. 2.

The gas-channels at the sides of the box are made of the plates C′, each having at the top a flange c, which is bolted to the side plate of the box, as shown in Fig. 2.

My perforated plates for dividing the gas into numerous small streams are preferably made detachable from the gas-channels C and are so supported and arranged that they can be readily removed through the manhole X in one end of the box, so that they may be readily repaired when worn or defective and then replaced.

The side and top perforated plates are preferably secured together in a frame D, and the whole frame may be detached and removed together. The frame D is constructed of the parallel angle-irons d, the closed end plate d' at the inlet end, the closed end plate d^3 at the outlet end, and the transverse brace-bars d^2. To the angle-irons and end plates are secured the downwardly and inwardly inclined perforated extension-plates g, which are preferably provided with outwardly-bent flanges at their lower edges for giving them greater strength. A perforated crown-plate h is also secured to the angle-irons d and is preferably arched or crowned and more finely perforated than the side plates g.

The entire frame D, carrying the perforated side plates and the crown-plate, may be a

permanent extension of the gas-channels C, but is preferably made detachable, so that it may be readily removed from the box, which may be arranged as shown in Figs. 1 and 2 when frame D is clamped in position against the lower edges c^2 of the channels C by means of the clamping-hangers K and suitable connections. Eyebolts *f*, having screw-threaded lower ends, are passed through openings in the cross-bars d^2 and secured by nuts, as shown. Between the bars d^2 and the perforated crown-plate *h* are placed the spacing-sleeves *e*, which bear against plate *h* and which in turn bears against flanges of the bolts *f*. The bolts *f* are provided at their upper ends with eyes, as shown, for engagement with the hooks *k* of clamping-rods K. The rods K have screw-threaded upper ends *k'*, which pass through screw-threaded openings in the supporting-bars L. The bars L rest at their outer ends on shoulders c^3 at the tops of channels C, as clearly shown in Fig. 2. A similar construction holding the frame D in position against the channels C by supports from the bottom of the box A may be used. The clamping-hangers K, being secured to the bars L by nuts, may be readily detached therefrom by unscrewing the upper nuts, and thus lowered to the bottom of the box for removal through the manhole X. By loosening the upper nuts above bar L the hooks *k* may be disengaged from the eyebolts *f*, thus freeing the frames for removal. With regard to the walls of the channels C it is to be noted that the perforated extension-plates *g* are inclined downward and outward toward the spaces between the channels, so that bubbles of gas after passing through such plates will rise through the water entirely free from the plates instead of following along adjacent to the plates, as they would if the latter were vertical. More effective washing action is secured by causing the bubbles of gas to pass through the water away from the perforated plates instead of along the surface thereof.

The main supply-pipe M for water or ammonia liquor extends along the inlet end of the box and connects by branch pipes *m*, through the apron B, with the spaces between the channel C above the perforated crown-plate *h*. The discharge pipe or passage N for liquor extends downward from the rear end of the frames D into the lower compartment I of the box, as shown in Fig. 1. The discharge pipe or passage N is preferably made a part of the rear end plate d^3 of the frame D, and is provided at its upper outer edge with a flange, which fits up against the angle-iron *c'*.

The outlet-pipe P for liquor connects with the bottom of the box at the gas-inlet end thereof, and is in practice provided on the outside of the box with an adjustable overflow (not herein shown) of any suitable construction. The series of longitudinal gas-channels C and the intermediate perforated crown-plates *h* divide the box into an upper compartment H and a lower compartment I. The gas passes off from the upper compartment H through the outlet *a'*, which is guarded by an inclined apron E, as shown in Fig. 2.

One or more manholes X, covered by a plate X', is preferably provided at each end of the box, as shown in Fig. 1. One or more sight-openings *w* may be provided in the side wall of the box and covered by a glass plate *u*, secured in a suitable frame for observing the liquor level.

The normal water-line when no gas is passing is indicated at V, Fig. 2, just at the lower edges of the channel C, the level being uniform at the bottoms of the channels. When a medium volume of gas is being passed through the inlet-channels C, it forces the water or liquor down below the channels, through the perforated plate *g*, and up into the space between the plates and also into the space above the crown-plate *h*, as indicated at W in Fig. 2, and the gas then passes through the perforations and up through the displaced water or liquor, then through the crown-plate, and off through the spaces between the channels C to the outlet-pipe. In practice it is found that a clear gas-space is maintained below the arched-plates *h*, as shown in part marked W. While gas is passing through the channels and perforated extension-plates, water or ammonia liquor is fed through the branch pipes *m*, above the crown-plates *h*, and, owing to the pressure of gas below, gradually flows along over the perforations in the tops of such plates to the discharge-pipe N, and thence down into the lower compartment I of the box. The gas, therefore, in passing through the perforations in the crown-plates *h* is compelled to pass up through a layer of fresh inflowing liquor. When a larger volume of gas and nearly the maximum amount which can be passed is admitted through the channels, it will still further depress the surface of the liquor below the channels and cause it to rise higher above the crown-plates *h*, as indicated at Y in Fig. 2. Although a larger volume of gas is passing and will therefore flow more rapidly the streams of gas passing through the extension-plates *g* will be subjected to a greater depth of liquor, so that the washing and purifying action will be maintained substantially uniform in time contact, as illustrated in the part marked Y.

My extension-plates *g* will be effective and give valuable results without the crown-plates *h*, and the crown-plates *h* will also perform a useful function by themselves; but I preferably use both combined in a detachable frame D, as above described and as shown in the drawings, as giving the most satisfactory results. My invention, however, is not confined to the use of both the extension-plates *g* and the crown-plates *h*, nor to the detachable method of construction, as either or both may form permanent parts of gas-channels *c*.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a gas-washer, the combination with inverted gas-channels, of perforated detachable extension-plates, extending into the washing liquor and clamping devices for holding them against the lower edges of said channels, substantially as described.

2. In a gas-washer, the combination with inverted gas-channels open at the bottom, of a detachable frame carrying two perforated downwardly-extending plates, and clamping devices for holding said frame against the lower edges of two adjacent channels, substantially as described.

3. In a gas-washer, the combination with a series of inverted gas-channels open at the bottom, of detachable frames having perforated downwardly-extending plates and detachable clamping devices supported on the channels for holding said frames against the lower edges of the channels, substantially as described.

4. In a gas-washer, the combination with a series of inverted gas-channels, open at the bottom, of detachable frames having perforated extension-plates and a perforated top plate between the channels and means for suspending and holding said frames against the lower edges of the channels, substantially as described.

5. In a gas-washer, the combination with a series of inverted gas-channels open at the bottom, of a detachable arched perforated plate and means for holding said plate against the lower edges of adjacent channels, substantially as described.

6. In a gas-washer, the combination with a series of inverted gas-channels open at the bottom, of a detachable frame having perforated extension-plates and cross-bars, of a supporting bar or bars above said frames and clamping-hangers engaging with said bars and also with the frame for holding it against the lower edges of adjacent channels, substantially as described.

7. In a gas-washer, the combination with inverted gas-channels open at the bottom in the washing liquor, of perforated plates extending longitudinally between the lower edges of adjacent channels and liquor-supply pipes discharging above said perforated plates, substantially as described.

8. In a gas-washer, the combination with inverted gas-channels open at the bottom, of frames, each having lateral, inclined perforated plates, a perforated top plate and closed end plates, said frames being placed with their upper longitudinal edges against the lower longitudinal edges of adjacent gas-channels, substantially as described.

9. In a gas-washer, the combination with a series of inverted gas-channels open at the bottom, of detachable, removable frames having perforated extension-plates and a perforated crown-plate, supporting-bars resting on the tops of the channels and having screw-threaded openings, clamping-hangers screw-threaded and engaging with said supporting-bars and also engaging at their lower ends with said frames for clamping them against the lower edges of the gas-channels, substantially as described.

10. In a gas-washer, the combination with a series of inverted gas-channels open at the bottom, of extension perforated plates and perforated crown-plates between the channels, a liquor-supply pipe opening above one end of said crown-plate and a discharge-opening for liquor at the opposite end of said plate, whereby the washing liquor is caused to travel along the top of the plate and the gas to pass through the same, substantially as described.

11. In a gas-washer, the combination with a pair of inverted gas-channels open at the bottom, in the washing liquor, of a perforated plate supported between adjacent channels, a liquor-feed pipe, opening between the channels, at one end, above said perforated plate and a liquor-discharge pipe at the opposite end of said plate, whereby the fresh liquor is caused to flow over said plate and gas to pass in streams through the same, substantially as described.

12. The combination with the gas-washing box having a gas-inlet and deflecting apron at one side or end, of inverted gas-channels connecting at one end with said apron, perforated plates extending longitudinally between the lower edges of adjacent channels, liquor-supply pipes opening above said plates at one end, discharge-passages at the opposite ends communicating with the liquor-compartment below the plates, and a liquor-outlet pipe connecting with the box below the plates at the same end where the liquor is admitted above the plates whereby the liquor is caused to circulate through the box both above and below the perforated plates, substantially as described.

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

OLAF N. GULDLIN.

Witnesses:

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JOSEPH F. FEDERSPIEL.