

E. F. LLOYD.

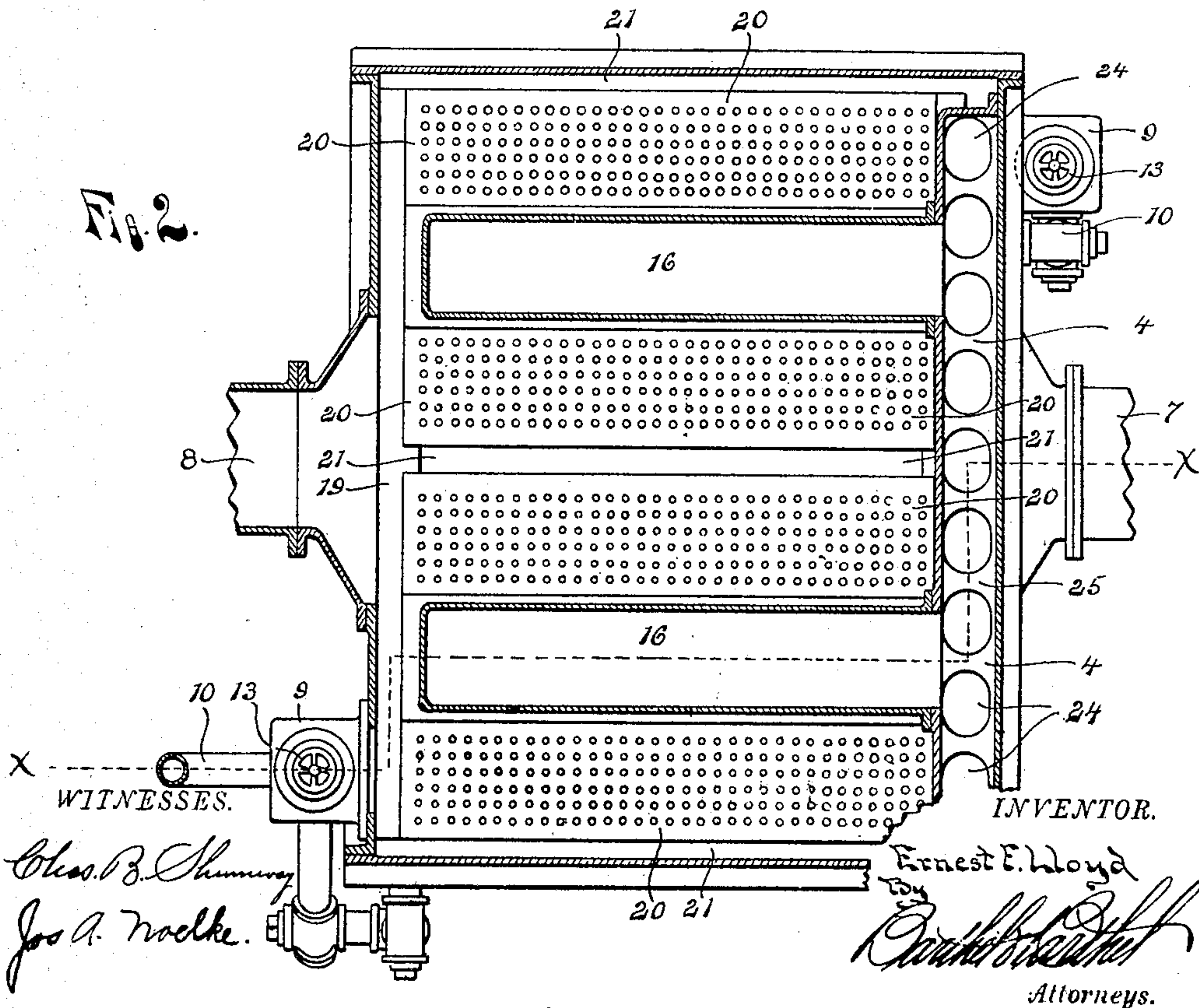
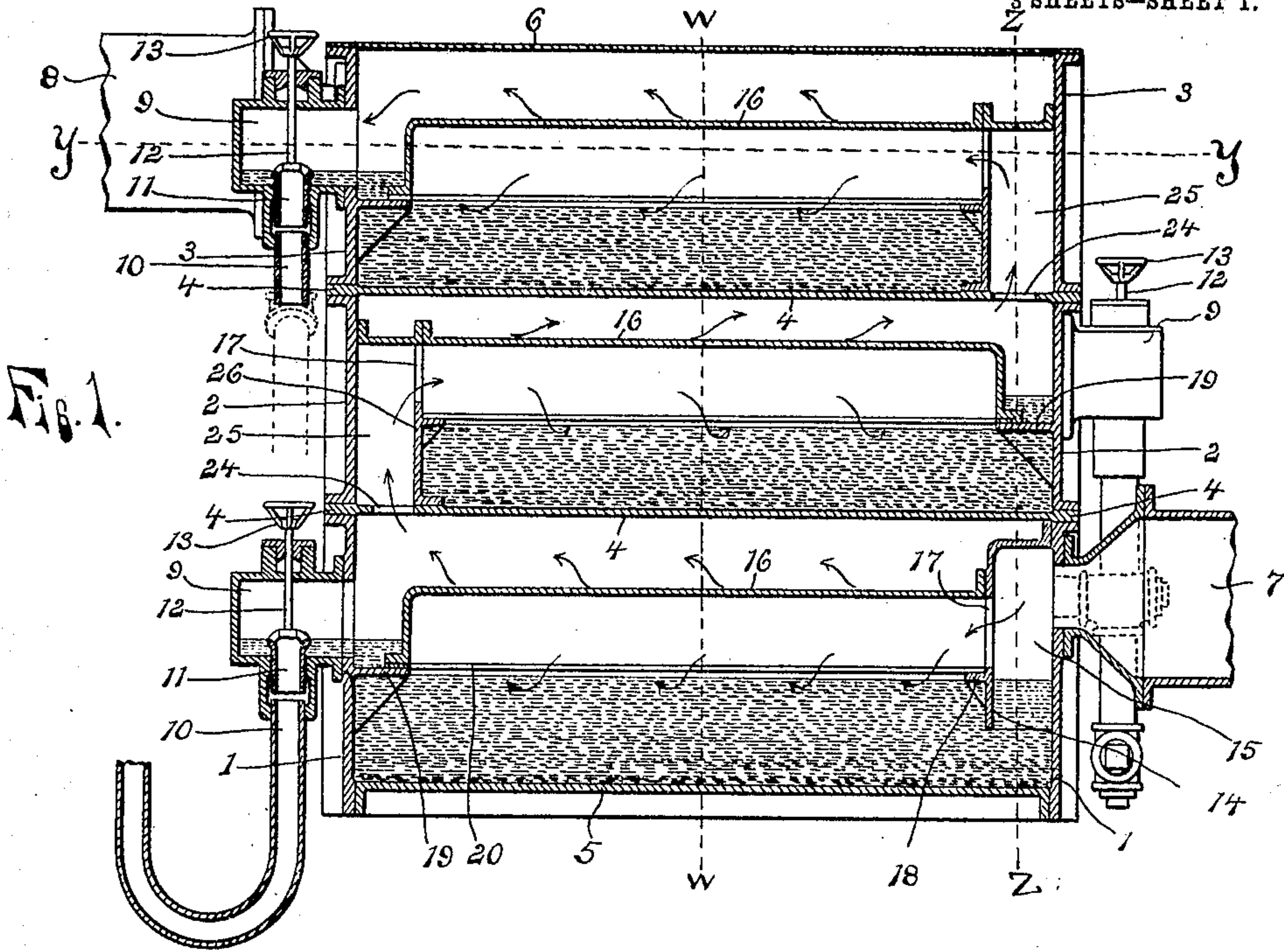
GAS SCRUBBER.

APPLICATION FILED FEB. 13, 1907.

916,464.

Patented Mar. 30, 1909.

3 SHEETS—SHEET 1.



WITNESSES.

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INVENTOR.

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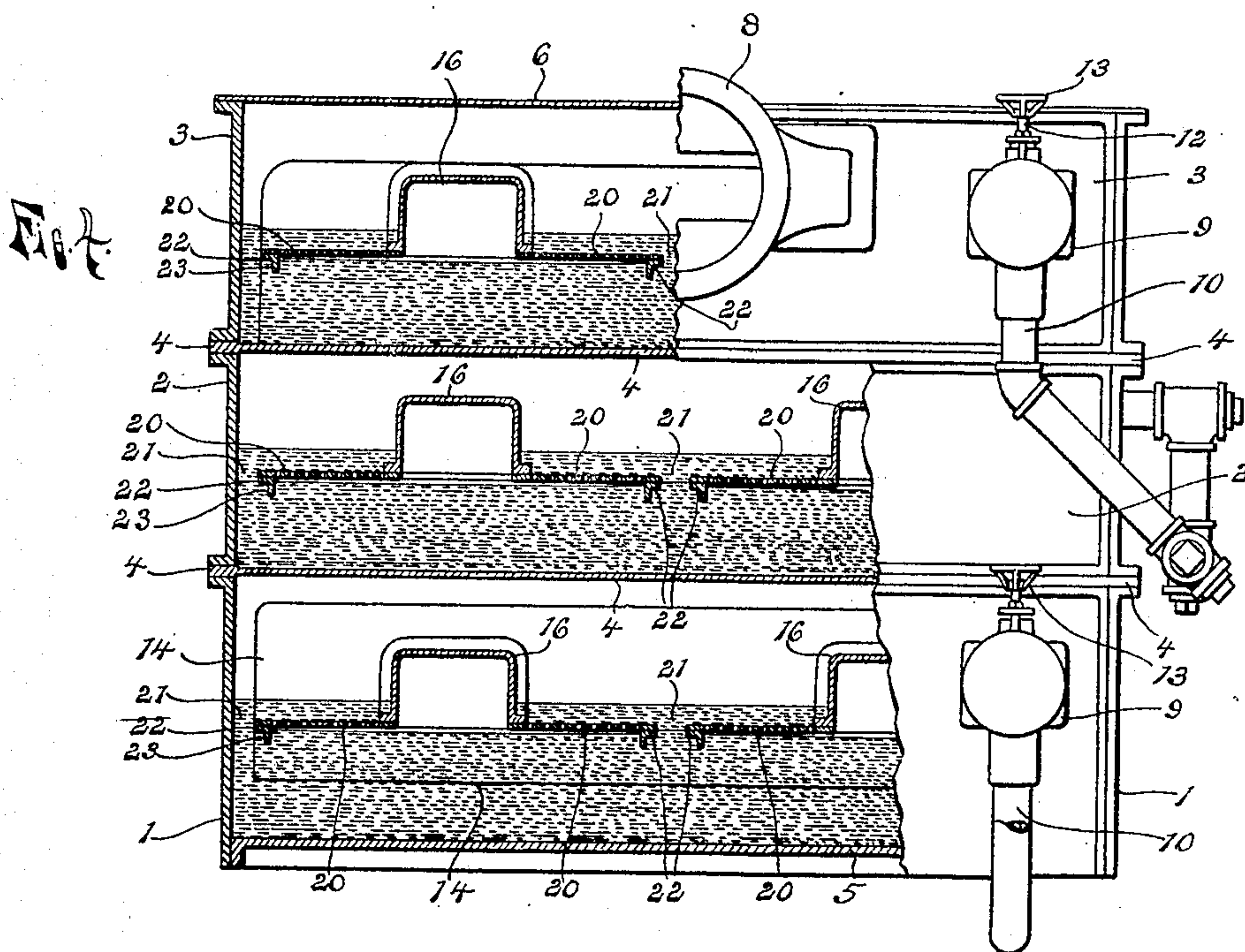
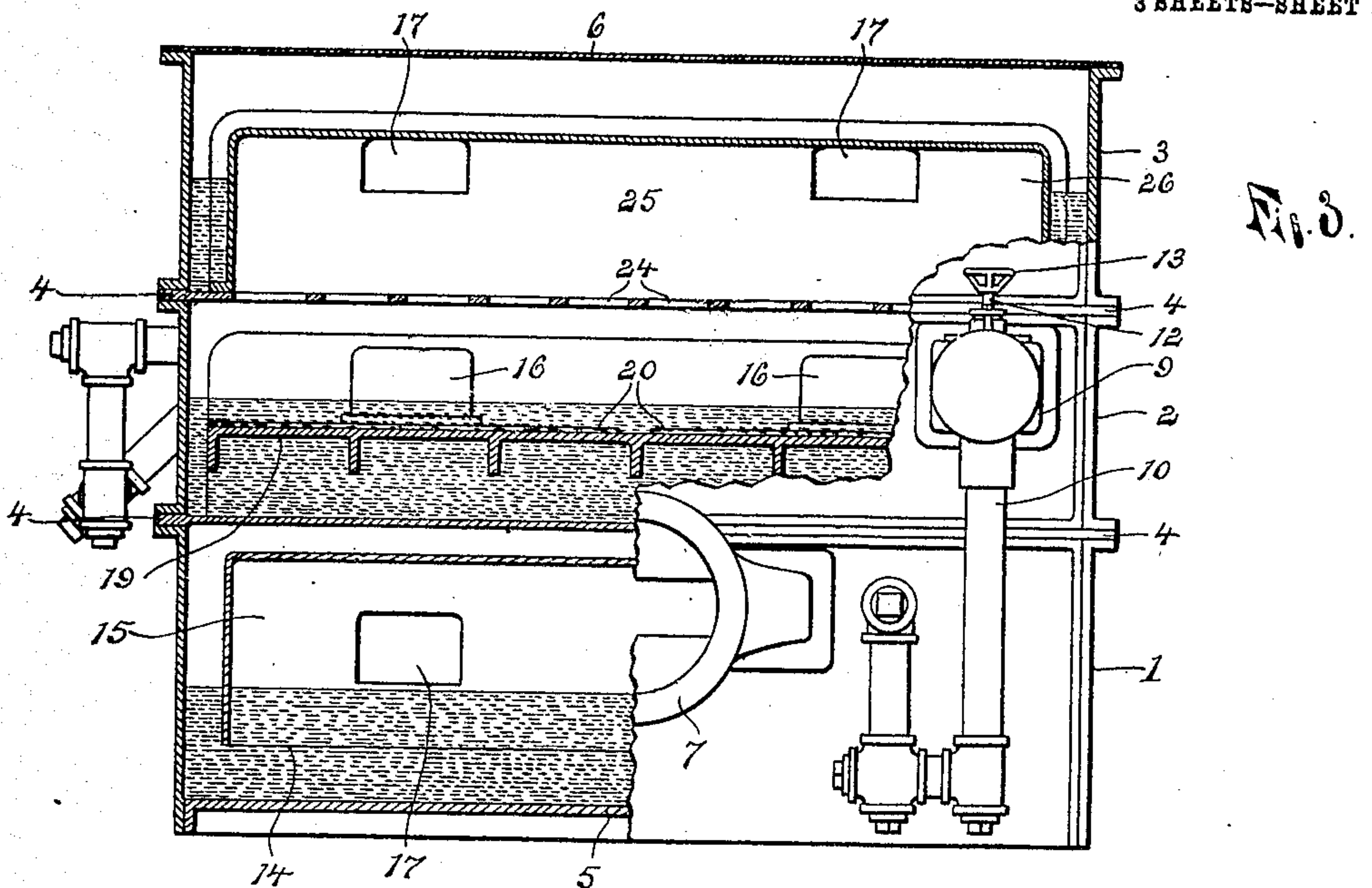
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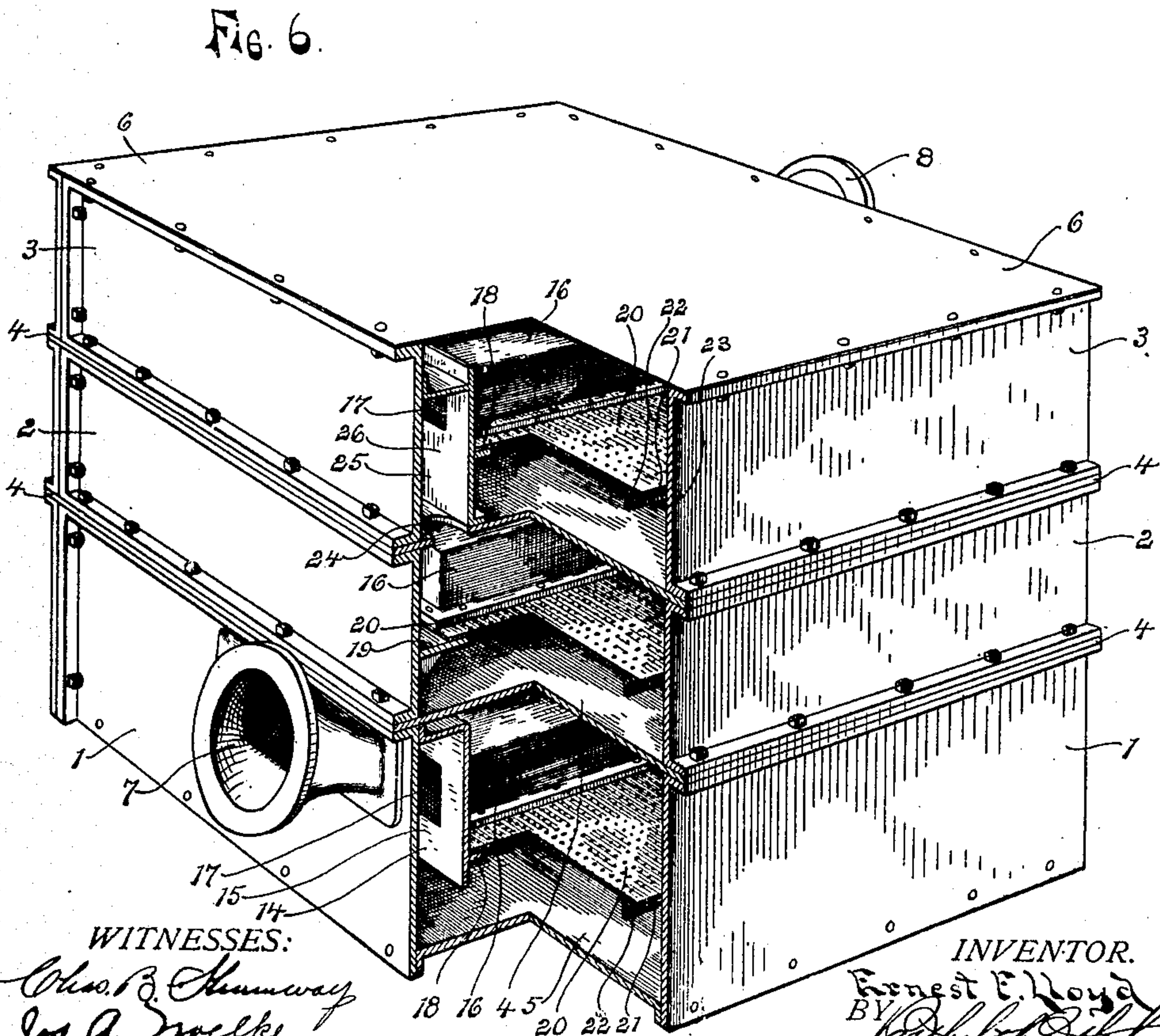
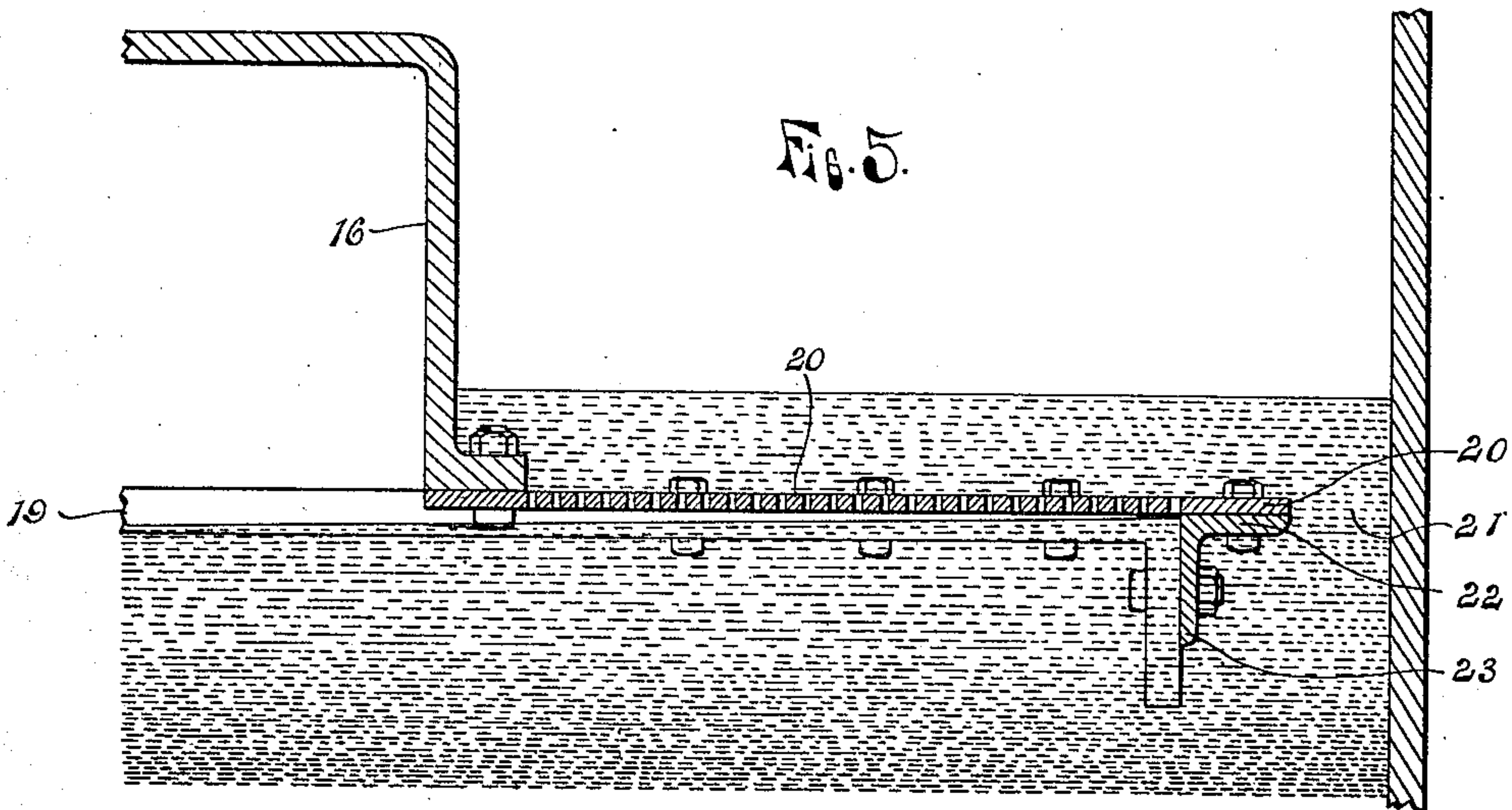
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3 SHEETS—SHEET 3.





# UNITED STATES PATENT OFFICE.

ERNEST F. LLOYD, OF DETROIT, MICHIGAN.

## GAS-SCRUBBER.

No. 916,464.

Specification of Letters Patent.

Patented March 30, 1909.

Application filed February 13, 1907. Serial No. 357,117.

*To all whom it may concern:*

Be it known that I, ERNEST F. LLOYD, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Gas-Scrubbers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to that class of scrubbers or washers for gas known as submersion washers in which the gas is caused to pass through a body of liquor for the purpose of removing therefrom the ammonia, carbonic acid, sulfureted hydrogen, etc., and an object of the invention is to so construct the device that an increased volume of gas may be passed therethrough without materially increasing the back pressure; and to so construct the same that its operation will not be stopped by clogging, thus preventing the blowing out of the drain seals of the device and permitting the employment of baffle plates having fine perforations which divide the gas into minute streams and cause it to be more effectually washed.

A further object of the invention is to so construct the device as to make the same substantially self-cleaning, the floating particles being permitted to circulate to the overflow and the heavy matter to fall to the closed bottom of the section, and to provide a structure which is formed by superposed rectangular sections and so constructed that sections may be added to increase its capacity or efficiency.

To these ends the invention consists in the construction, arrangement and combination of parts hereinafter more fully described and particularly pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1, is a vertical section on the line  $x-x$  of Fig. 2, of a device embodying the invention; Fig. 2, a horizontal section of the same on the line  $y-y$  of Fig. 1; Fig. 3, a transverse vertical section on the line  $z-z$  of Fig. 1 with one end partly in elevation; Fig. 4, a similar section on the line  $w-w$  of Fig. 1 showing the opposite end of the device partially in elevation; Fig. 5, is an enlarged detail showing a cross-section of one of the baffle plates; and Fig. 6, is a perspective view of the device with one corner

thereof broken away to show the internal construction.

The device consists of three rectangular sections, a bottom section 1, an intermediate section 2, and a top section 3, all flanged and bolted together with cast plates 4 interposed, each plate forming the top of the section below and the bottom of the section above. The lower section is provided with a tight bottom 5 and the upper section with a cover 6. Opening into one end of said lower section is an inlet pipe 7 for the gas and a similar pipe 8 is provided at the opposite end of the upper section for the escape of the gas.

To maintain at a certain level in each section the water or liquor which is supplied to the top section in any convenient manner, an adjustable overflow is provided for each section consisting of an overflow chamber 9 opening into the section and a pipe 10 formed with a water seal, connecting the bottom of said chamber with the section below, and provided with a vertically adjustable open ended section 11 screw-threaded into the open end of said pipe within said chamber. A stem 12 is secured to this pipe section and extends upward through the top of the chamber where it is provided with a hand wheel 13 by means of which the pipe section may be turned to adjust the same vertically to change the level of the liquor.

Extending across the end of the bottom section into which the inlet pipe opens, is a hanging wall or apron 14 which forms a transverse inlet channel 15 closed at its top and open at the bottom, said apron extending downward below the level of the liquor so that the bottom of said channel is closed thereby against the escape of gas but is open to permit all tarry or other heavy matter carried in by the gas to settle directly to the bottom of the lower section where it may be drawn off in any convenient manner. Extending longitudinally of the section from said apron to near the opposite end of said section or casing are two distributing channels 16 communicating through openings 17 in the apron with the inlet channel and each having a closed top, sides and end, but open at the bottom. These distributing channels are supported at their inlet ends by a ledge 18 on the apron and at their closed ends by a shelf 19 on the end wall of the casing, and at such a height within



said casing as to be partially submerged in the liquor therein. Winging outward from each side of each of these channels 16 is a perforated baffle plate 20 supported in  
 5 a horizontal position by being secured at one edge to the bottom edges of the channels and at their ends to the ledge 18 and shelf 19. These plates are of such a width that their outer or free edges are at a distance  
 10 from the side walls of the casing and a space is also left between their adjacent edges at the center of the casing thus forming a safety escape space 21 at the free edge of each plate. These plates are also stiffened  
 15 and strengthened along their free edges by angle iron bars 22 bolted to their lower surface with the free edge of the horizontal flange of each bar flush with the edge of the plate and the vertical flange 23 extend-  
 20 ing downward from the lower surface of the plate at a short distance from its edge. These angle bars not only serve to stiffen and strengthen the plate but their down-  
 25 wardly extending flanges form vertical baffle walls along said edges as will be hereinafter more fully explained.

The separating plate 4 between the bottom and middle section is provided adjacent to the rear end wall of the casing with  
 30 a series of openings 24 to permit the free passage of the gas from the lower section into the one above, the gas passing directly into the bottom of a transverse channel 25 formed by a vertical wall 26 extending across  
 35 the section adjacent to said end and corresponding to the inlet channel 15 in the lower section. From the channel 25 the gas passes into distributing channels like the channel 16 in the section below, the section being  
 40 constructed the same as the lower section with the exception of the channel 25, and the upper section is constructed the same as the middle section, the only difference being that the gas enters at its forward end  
 45 and escapes through the outlet or discharge pipe 8 at its rear end.

It is evident that if it is desired to increase the capacity of the scrubber or cause it to more thoroughly wash the gas by in-  
 50 creasing the number of times which the gas must pass through the liquor, other similarly constructed sections may be added, but the construction of each section will be substantially as described and the device is in-  
 55 tended to operate as follows: Gas enters the inlet channel 15 from the inlet pipe and passes into the distributing channels 16 under pressure. The pressure of the gas forces the liquor from said channels 16 to a point  
 60 below the lower edges of said channels, thus permitting the gas to escape laterally beneath said edges and spread out along the lower surfaces of the baffle plates where it passes through the holes in said plates and  
 65 bubbles up through the layer of liquor main-

tained by the adjustable overflow at a certain depth over said plates. The combined length of the edges of the distributing channels below which the liquor must be de-  
 pressed before the gas can escape, being so  
 70 much greater than the circumference of the inlet opening, a slight depression below said edges will be sufficient to permit the escape of the full capacity of said inlet and thus  
 an increase in the amount of gas forced  
 75 through will not materially increase the back pressure caused by the force required to displace the liquor. When the pressure has depressed the liquor below the edges of the channels, little pressure is required to  
 80 cause the gas to spread out upon the lower surface of the plates, as they extend horizontally from said edges, and the flanges 23 of the angle bars form baffles to prevent the  
 gas from passing over the edges of the  
 85 plates and cause it ordinarily to all pass through the perforations.

Should the perforations in the plates become clogged as often happens in scrubbers of the ordinary construction employing per-  
 90 forated plates, the gas would depress the liquor below the flange of the angle bars and escape up through the safety escape spaces 21 without putting pressure enough  
 upon the device to do any damage and the  
 95 stream of gas would in escaping be broken up by passing over the flange 23 and being again deflected by the edge of the plate which extends beyond said flange, and thus be quite effectually washed. The safety es-  
 100 cape spaces also permit the heavy matter collecting on the plates to pass between when it has worked outward to the edges of the plates and fall to the bottom of the  
 section, and by leaving a space between the  
 105 closed ends of the distributing channels and the end wall of the casing, the light matter floating upon the surface of the liquor is permitted to circulate around and collect in the overflow chamber, thus making the  
 110 scrubber self-cleaning.

The channels 25 form free passages for the gas to the distributing channels in the sections above and each being located at the  
 end of its section opposite to that in which  
 115 said channels are located in the adjacent sections, the gas is caused to travel from end to end through each section.

Having thus fully described my invention, what I claim is:—

1. In a gas scrubber, a rectangular casing provided with a gas inlet at one end, a gas outlet, a depending apron opposing the inlet parallel to the inlet of the wall with its  
 lower horizontal margin at an interval  
 125 above the casing bottom, longitudinally disposed rectangular inverted distributing channels closed at their outer ends, opening at their inner ends through the aprons, each secured with its lower horizontal margin at  
 130



an interval above the casing bottom, said channel having a discharge mouth whose perimeter is the greatest practical in proportion to the cross-sectional area thereof, horizontal perforated baffle plates secured at their inner edges to the lower horizontal edges of the channels with their outer edges in parallel spaced relation to each other and the casing walls, and means adapted to maintain washing liquor at a predetermined height above the baffles.

2. A gas scrubber comprising a plurality of superposed rectangular casings, a gas inlet in one end of the lowest casing, a depending apron parallel to the inlet wall opposing the inlet, with its lower horizontal margin at an interval above the casing bottom, said channel having a discharge mouth whose perimeter is the greatest practical in proportion to the cross-sectional area thereof, longitudinally disposed rectangular inverted distributing channels closed at their outer ends opening at their inner ends through the apron, each secured with its lower horizontal margins at an interval above the casing bottom, horizontal perforated baffle plates secured at their inner edges to the lower horizontal edges of the channels with their outer edges in parallel spaced relation to each other and the casing walls, vertically adjustable overflow pipes adapted to maintain washing liquor at a predetermined height above the baffles, and a plurality of discharge openings disposed across the top of the sections opposite to the inlet apron, the intermediate sections each consisting of side walls conforming to the side walls of the bottom section, a cross wall adjacent the apertures in the top of the lower section extending in to the top of the intermediate section, inverted dis-

tributing channels and horizontal baffles corresponding to those of the lowest section opening into the space between the cross wall and the casing end and discharge outlets in the opposite end of the intermediate section in the top plate which forms the bottom of the succeeding section, and a top section corresponding to the intermediate sections in the arrangement of the gas channels and baffles, having a closed top and a lateral gas outlet in the end opposing the gas inlet apertures, each of said intermediate sections and top sections being provided with a vertically adjustable discharge pipe adapted to maintain liquor at a predetermined height above the section baffles.

3. In a gas scrubber a rectangular casing, a lateral gas inlet at one end thereof, a gas outlet at the other end thereof, a depending apron parallel to the outer wall with its lower horizontal margin at an interval above the casing bottom, longitudinally disposed rectangular distributing channels closed at their outer ends supported at their inner ends by a horizontal shelf secured to the other wall of the casing, horizontal perforated baffle plates each secured at their inner edges to the lower horizontal margins of the distributing channels with their outer edges in parallel spaced relation to each other and the casing wall and supported at their outer ends on the shelf, said channels having discharge mouths whose perimeters are the greatest practical in proportion to the cross-sectional areas thereof.

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

ERNEST F. LLOYD.

Witnesses:

OLIVER E. BARTHEL,  
OTTO F. BARTHEL.