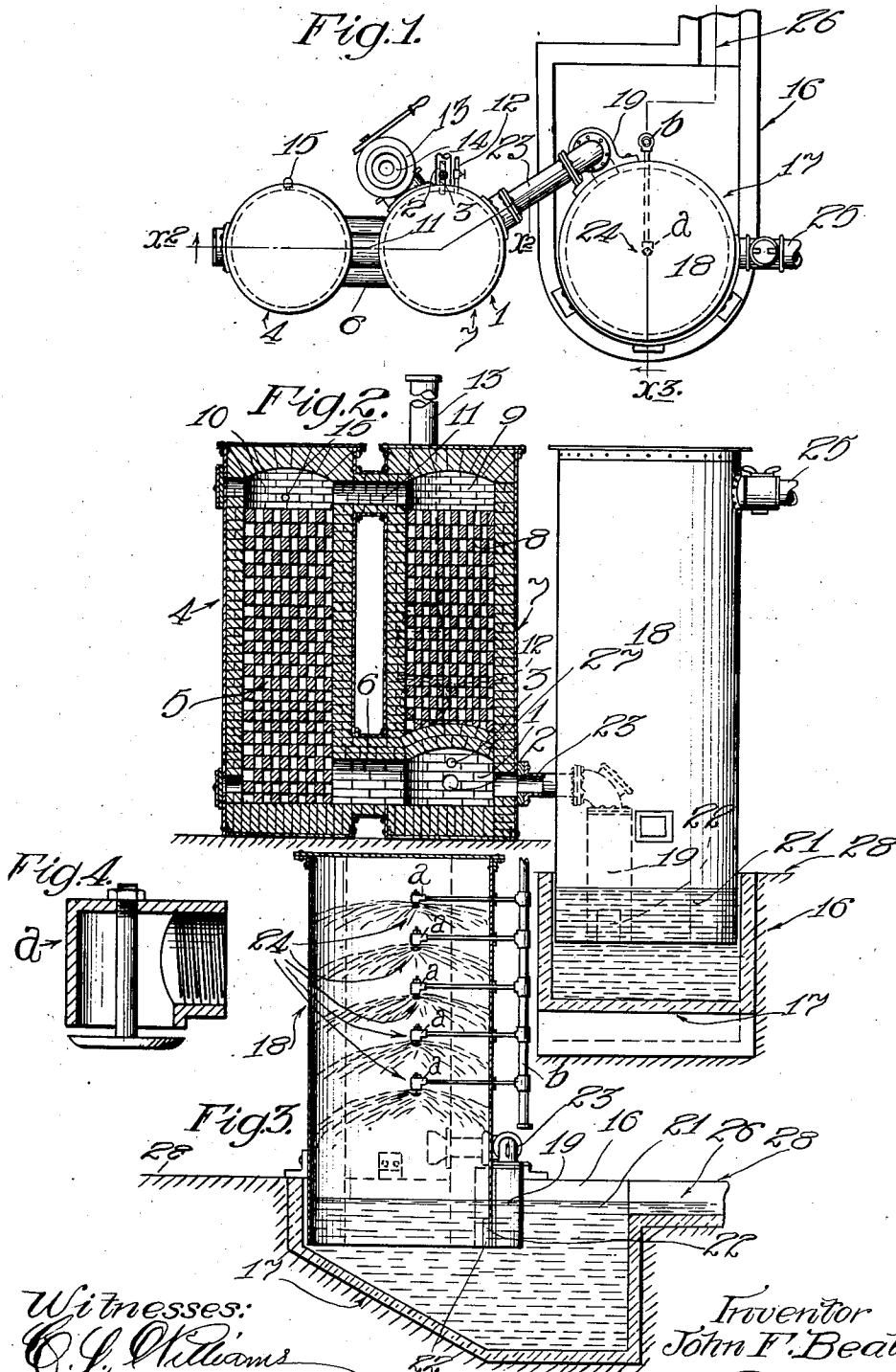


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GAS APPARATUS.

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GAS APPARATUS.

936,212.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN F. BEALS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Gas Apparatus, of which the following is a specification.

This invention relates to means for scrubbing gas in the process of producing commercial gas from hydrocarbon oils and other substances commonly employed for the manufacture of illuminating, power, and fuel gas.

The invention embraces a novel scrubbing device by means of which the cleansing of commercial gas from lamp-black, coal-tar, and other by-products which accompany the same as it comes from the generator, is accomplished in a most satisfactory manner with a minimum cost of attention and cleansing of the apparatus.

An object of the invention is to construct a gas apparatus in such a way that the cleansing of commercial gas from the named by-products will be accomplished to a large extent automatically so that commercial gas will be produced with a minimum amount of attention.

An object of the invention is to avoid the loss of time, heat, and labor usually caused by shut-downs for cleaning out the smut pipes and other portions of gas apparatus heretofore known.

Other objects and advantages may appear from the subjoined detail description.

A principle of this invention is that the way through which the materials proceed after entering the generator, is non-ascending throughout its entire extent until the water seal of the scrubber-chamber is reached, and the separation takes place between the commercial gas and the by-products largely above a point where the heavy by-products will accumulate by the action of gravity and where the same can be readily removed.

The accompanying drawings illustrate the invention.

Figure 1 is a plan of a portion of a gas apparatus embodying this invention. Fig. 2 is a vertical mid-section on line x^2-x^2 , Fig. 1. Fig. 3 is a fragmental section of the scrubber on line x^3-x^3 , Fig. 1. Fig. 4 is an axial section of the sprayer.

1 designates a fire-box. 2 and 3 designate

air-blast means and oil-burner means respectively arranged to discharge into said fire-box 1.

4 is a generating chamber provided with the usual checker-work 5, and 6 is a fire passage connecting the fire-box 1 with the lower end of the generating chamber.

7 is a superheater provided with the usual checker-work 8, and arranged above the fire-box 1.

9 and 10 designate chambers above and communicating with the tops of the checker-work bodies 8 and 5 of the superheater and generator 7 and 4 respectively.

11 is a passage-way between said chambers 9 and 10.

12 designates means for supplying steam to the lower portion of the superheater 7.

13 is a smoke-stack leading from the lower portion of the superheater 7, and 14 is a closure for said smoke-stack.

15 designates intermittent oil-burner means to discharge into the upper chamber 10 of the generator 4.

16 is an open top water-seal-pit provided with a sloping floor 17.

18 is a bottomless shell closed at the top except at the contracted gas conduit 25, and having its lower end submerged in the water-seal-pit, and otherwise practically unobstructed.

19 is a bottomless plunge-box at the side of the shell 18 farthest from the highest portion of the sloping floor 17, the lower end of the same being submerged in the water-seal 21 and communicating with the interior of the shell 18 through a passage 22 that is submerged in the water-seal.

23 is a pipe leading directly from the fire-box 1 into the plunge-box 19.

24 designates superposed spray means in the shell above the water-seal, the same being constructed and applied in such manner as to leave the interior of the scrubber-shell 18 practically unobstructed.

25 is a gas conduit leading from the upper part of the scrubber to the further cleaning and purifying apparatus which may be of the form heretofore commonly employed, and which forms no part of this invention and therefore need not be illustrated herein.

The water-seal-pit 16 is open-topped to give free access to the floor thereof so that the attendant may inspect and remove the accumulations of lamp-black which may

occur, and may also readily remove from the floor of the water-seal-pit such accumulations of coal-tar as may occur.

26 is an overflow outlet or flume leading from the water-seal-pit to carry off the water and lamp-black.

It is to be understood that the dimensions of the various parts of this apparatus may be varied within the judgment of the constructor. The following proportions may be found satisfactory under normal conditions of gas-making:—The scrubber-shell may be made, say, four feet in diameter by 15 feet high, the bottomless end being submerged in the water-seal 21 to the depth of about 3 feet. The water-seal-pit 16 should be, say, 4 feet 2 inches wide, 7 feet long, 6 feet deep at its deepest end, and 3 feet deep at its shallow end. The slope should extend practically under the entire open, lower end of the scrubber shell, thus leaving about 3 feet of the seal-pit open at the top and unobstructed for the convenience of the workmen, and also to allow ready escape of the burned gases in case of an explosion. The generator shell and the steam superheater shell may both be approximately of the same horizontal cross-sectional area as the scrubber shell. The bottomless plunge-box 19 and the pipe 23 leading thereto are about 18 inches in diameter, and the depth of the plunge-box from the top of the pipe 23 is about 4 feet, the same being submerged about 3 feet in the water of the seal. The passage-way 22 which is simply an opening in the scrubber shell below the level of the water seal and leads directly from the plunge-box into the scrubber-shell is of about the same dimensions as the pipe 23 leading from the fire-box into the plunge-box. The top of the fire-box may be formed of an arch 27 of fire-brick, the spring of the arch preferably curving from the passage 6 between the generator and the fire-box and the outlet into the pipe 23. The air-blast and oil-burner are preferably made to direct their discharge across a line drawn axially from the passage 6 to the outlet 23.

The spray means 24 by which the water is introduced into the scrubber-shell to precipitate the by-products,—as lamp-black and tarry substances,—comprise a series of sprayers *a* arranged one above another along the vertical axis of the shell, the same being supplied through water-pipe *b* led into the shell in any appropriate manner, the object being to avoid as much as possible any obstructing appliances inside the shell, for the reason that the principle of this scrubber is diametrically opposite to that of other scrubbers with which I am acquainted, in that the interior of this shell is devoid of solid scrubbing appliances; the operation of what is termed "scrubbing" being accomplished by the water which is sprayed

inside the scrubber, said water flowing from each of the sprinkler-nozzles *a* in the form of a downwardly-widening conical sheet, the edges of which extend to the walls of the shell. Said sheets form a screen or a series of screens to obstruct the named by-products.

Each sprayer *a* comprises an elbow mounted upon the inner end of a pipe and discharging downwardly, a bolt mounted vertically at the axial center of the discharge opening of the elbow, and a deflector-plate at the lower end of the bolt, said plate being larger than the discharge-opening of the elbow so as to form a narrow space between the discharge end of the elbow and the deflector-plate, said opening being continuous so as to furnish a solid sheet of water extending from the deflector-plate to the inner face of the shell so that the gas in passing upwardly must pass through this solid sheet of water, and in Fig. 3 I have shown five of the sprayers mounted one above the other so that the gas must pass successively through five solid sheets of water.

Burners and fuel may be supplied to the fire-box in the usual way to produce crude gas, and the crude gas passes from the fire-box through the outlet 23.

In practical operation of the apparatus, the gas is forced to pass downward until it reaches the water seal where its course is bent and it flows directly from the plunge-box into the scrubber-shell, there dropping to the floor the heavier tar, and thence passes upward through successive sheets of water, and the by-products are thereby washed outward toward the walls of the shell and at the same time are carried downward and the spray of water operates on the walls of the shell to keep the same free from accumulations of carbonaceous or tarry matter, and in fact from any and all by-products which may be carried out of the ascending gas. The matter thus precipitated falls into the water of the water-seal, said seal being constantly supplied from the sprays of water falling into the shell. The lamp-black will accumulate on the water inside the shell, at the bottom of the shell, and will be carried by the out-flowing water downward underneath the walls of the shell and will float into the open-topped space 16 of the water-seal-pit, and can there be removed by the attendant. The tarry matter will sink in the water and the lighter and thinner portions thereof which have not fallen at the inlet passage 22 and have been washed from the gas by the sprays will fall to and will flow down the inclined floor 17 into the open-topped portion of the pit out from underneath the scrubber-shell and can be bailed out or otherwise removed by the attendant.

The operation of cleansing the pit from accumulations of lamp-black and tarry

matter may be accomplished by the attendant while standing on the floor 28.

At the level of the top of the water-seal-pit the discharge flume 26 through which the
5 overflow of water occurs, may be 6 or 8 inches deep, or such other depth as may be found desirable by the constructor.

I claim:—

1. A water-seal-pit provided with a sloping floor and an overflow outlet, a bottomless shell mounted above the sloping floor and below the water level, the space around the bottom of the shell being unobstructed, means for discharging gas into the shell through
15 the water, an outlet at the top of the shell, and means in the shell for producing solid sheets of water through which the gas must pass upwardly to the outlet.

2. A gas-scrubber comprising a water-seal-pit having a sloping floor and an overflow outlet, a bottomless shell suspended in the water-seal-pit above the sloping floor, the space around the shell being unobstructed above the water-level, a plunge-box beside
25 the bottomless shell and discharging into the shell through the water, means for supplying crude gas to the plunge-box, an outlet at the top of the bottomless shell, and means in the shell for producing solid sheets of
30 water through which the gas must pass upwardly to the outlet.

3. A gas scrubber comprising a water seal pit provided with a floor having a sloping portion and an uncovered portion, and also
35 provided with an overflow outlet, an open bottomed scrubber-shell and an open bottom plunge-box connected together and having their open bottoms sealed by the water seal in said pit, and communicating with each

other through a passage extending above the level of the bottoms of said plunge-box and shell and terminating below said water seal, means to spray water in the shell, said shell being provided with a gas outlet above the level of the spray, the sloping portion of
40 said floor extending downward beneath the shell toward the portion of the floor that is beneath said passage way and toward the uncovered portion of the floor and the overflow outlet, for the purpose of precipitating
45 the greater portion of the tar and other heavy products near the uncovered portion of the floor and to direct to the uncovered portion of the floor the products that are precipitated by the sprays.

4. A gas scrubbing apparatus provided with a water seal pit having an overflow outlet and having a floor a portion of which is
50 aslant, an open bottomed scrubber shell and open bottomed plunge box the bottoms of which are sealed in the water seal, said shell and plunge box being directly connected by an opening in the shell below the level of the water seal, said shell being located above the sloping floor and the downward slant of the
55 floor being toward said opening, the water seal pit being constructed and arranged to allow access to the floor thereof for the purpose of removing from the lower edge of the sloping floor the tar and other heavy
60 products that may accumulate there.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this
22d day of July, 1907.

JOHN F. BEALS.

In presence of—

JAMES R. TOWNSEND,

M. BEULAH TOWNSEND.