V. E. LOMBARD.

SMOKE SEPARATOR AND PURIFIER.

APPLICATION FILED APR. 19, 1910.

970,519.

Patented Sept. 20, 1910.

2 SHEETS—SHEET 1.

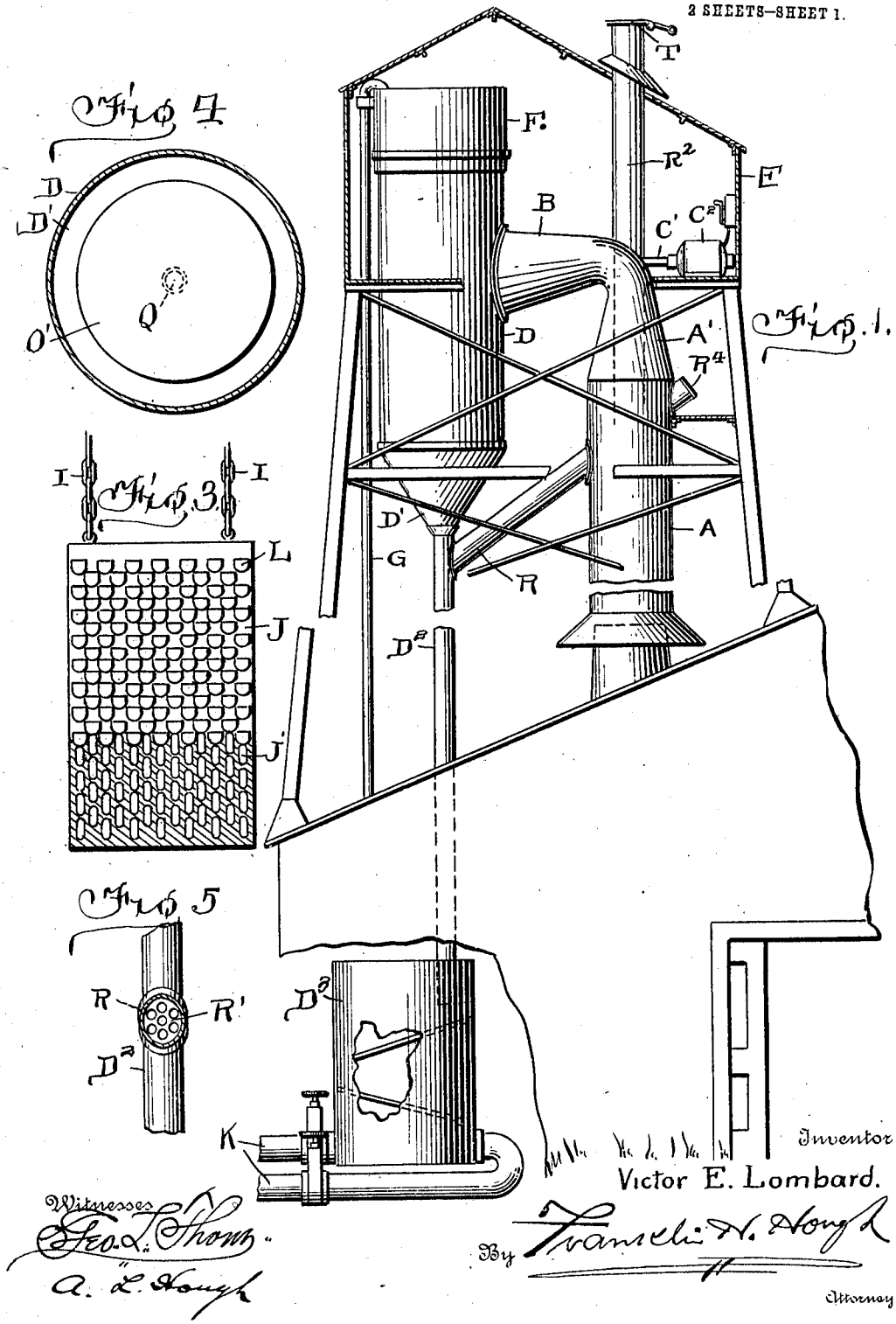

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 5.

Witnesses
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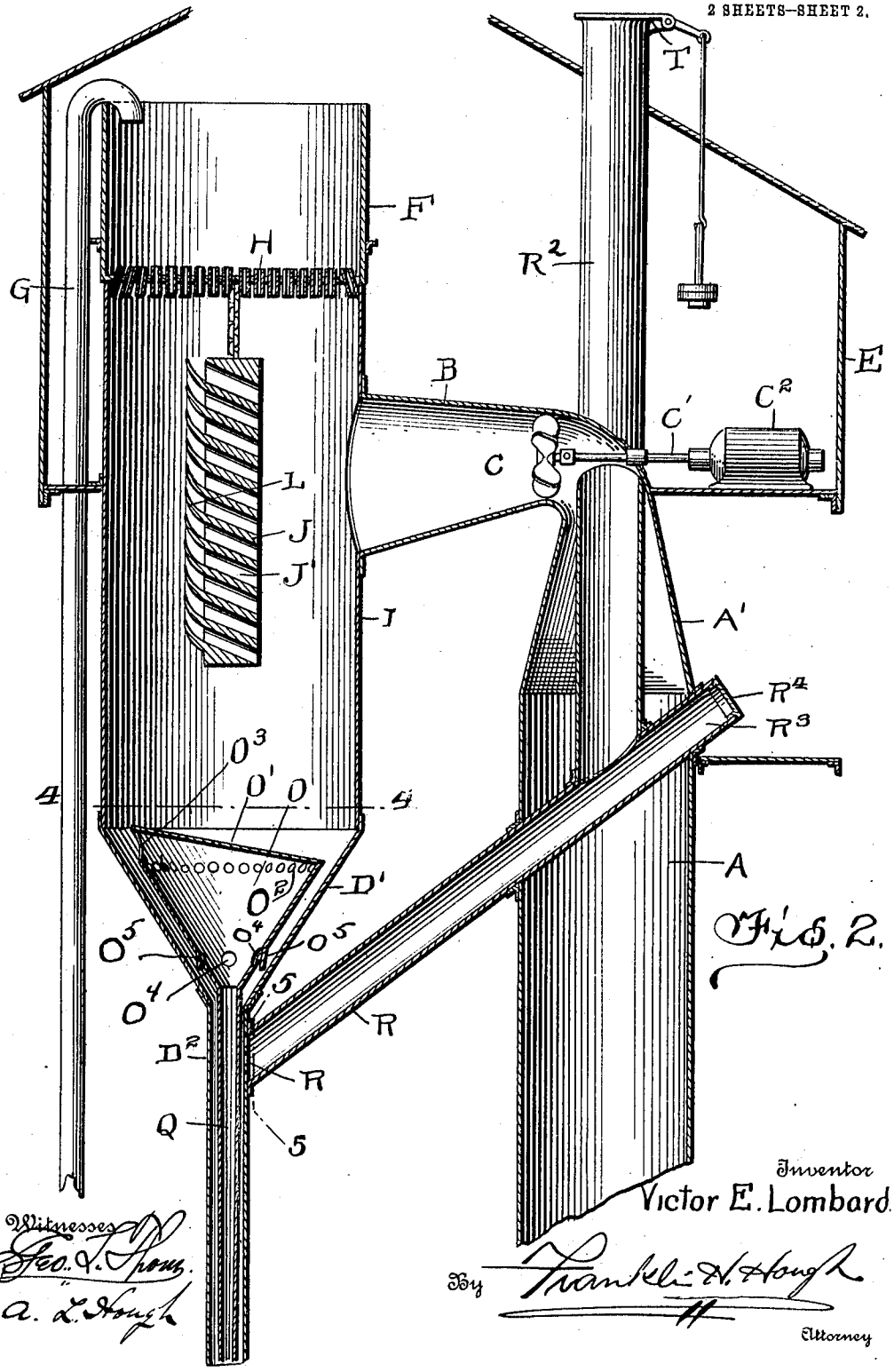

Fig. 2.

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UNITED STATES PATENT OFFICE.

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SMOKE SEPARATOR AND PURIFIER.

970,519. Specification of Letters Patent. Patented Sept. 20, 1910.

Application filed April 19, 1910. Serial No. 556,414.

To all whom it may concern:

Be it known that I, VICTOR E. LOMBARD, citizen of the United States, residing at Fort Smith, in the county of Sebastian and State of Arkansas, have invented certain new and useful Improvements in Smoke Separators and Purifiers; 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in a smoke separating and purifying system, the object in view being to separate noxious gases and soot from smoke and comprises various details of construction and combinations and arrangements of parts which will be hereinafter fully described and then specifically defined in the appended claims.

I illustrate my invention in the accompanying drawings, in which:—

Figure 1 is a side elevation of an apparatus embodying the features of my system. Fig. 2 is an enlarged detail sectional view through a part of the apparatus. Fig. 3 is a detail in elevation of an apertured deflecting plate a portion being shown in vertical longitudinal section. Fig. 4 is a sectional view on line 4—4 of Fig. 2, and Fig. 5 is a sectional view on line 5—5 of Fig. 2, looking in the direction of the arrow.

Reference now being had to the details of the drawings by letter, A designates a flue stack which may be of any suitable kind and adapted to communicate at its lower end with the fire box of a furnace and the upper portion of the flue stack is contracted as at A′ and projects laterally and has a flaring end B where it communicates with a receiving receptacle D.

A fan C is mounted at the contracted or choked portion of the flue stack where the latter changes its direction and extends toward the receiving receptacle D. Said fan is mounted upon a shaft C′ journaled in suitable bearings and is adapted to be driven by a motor C^2 or other suitable power. Said motor and the receiver together with the upper portion of the flue stack are preferably contained within a suitable housing E. Mounted upon the upper portion of said receiving receptacle is a tank F adapted to contain water conveyed thereto by means of a pipe G from any suitable source. The bottom of said tank is provided with perforations in each of which are nozzle tubes H, the upper ends of which extend above the bottom of the tank while their lower ends project slight distances below the same and provided for the purpose of separating water which makes exit through the perforated bottom of the tank into series of minute streams. Suspended by means of a chain I from the bottom of said tank is a metallic plate J which is of any suitable size, preferably rectangular shaped, and has a series of oblong openings J′ formed therein which are disposed at inclinations, as illustrated in Fig. 2 of the drawings. Underneath the lower marginal edge of the upper end of each of said openings is a deflecting plate L, preferably concaved and provided for the purpose of causing the smoke and steam, being forced through the apertures, to be deflected upward and for the purpose of thoroughly commingling the gases and soot of the pipe with the water as it is sprayed from the tank. Said plate J, which is considerably longer than the width of the flaring opening B, is positioned in front of the latter in order to receive the impact of the smoke as it is forced by the fan into the receptacle. The lower portion of said receptacle D is conical shaped, as shown at D′, and has an exit tube D^2 leading therefrom and extending downward to a settling tank D^3 having openings therein adjacent to the bottom whereby the contents of the tank may empty into twin sluices K from which the liquid is conveyed to settling basins, not shown, where the liquid may be used over again, when desired, by forcing the same upward to the tank F. Mounted within and concentric with the lower conical portion D′ of said receiving receptacle is a conical-shaped member O having an inclined top O′ and series of perforations O^2 about its circumference and also an aperture O^3 near the highest portion thereof and apertures O^4 near its lower end. Struck up lips or projections O^5 and downwardly disposed are formed over each opening O^4 to prevent the water as it passes down the inclined conical-shaped bottom of the receptacle O from entering the apertures O^4. The suction caused by the water flowing through the pipe D^2

will cause the gases within the conical-shaped receptacle O to be drawn through the opening O^4 and, when the gases pass by the perforations R′, they will be drawn by suction into the pipe R, thence to the stack. A nozzle Q which is tapering leads from the lower portion of the conical-shaped member O and is centrally disposed within the tube D^2 the lower portion of which nozzle is adapted to terminate at any suitable location, not shown. Leading from the tube D^2 at a location preferably a slight distance below the conical portion of the receiving receptacle D is a smoke conveying pipe R with a perforated partition R′ between the same and the pipe D^2 and through which the lighter particles of smoke and gases may be drawn by suction and make exit through the branching pipe R^2 having an automatically operated damper T mounted near the upper end thereof. The upper end of said pipe R has a cleaning out opening R^3 closed by a door R^4 and forming a convenient means whereby the flue or pipe R may be cleansed out when desired. It will be noted that the branching pipe R^2 passes into the flue stack A and extends upward therein and makes exit through the flue stack and its contracted or choked portion and, by thus passing into the flue stack from a distance, becomes highly heated by the surrounding smoke and gases from the furnace and thus produces a draft or current whereby the lighter smokes and gases may be drawn from the pipe D^2 leading from the lower part of the receiving receptacle. Said damper T is so arranged that it will be closed in the event of a back pressure or suction and automatically open to allow the gases and lighter smokes to make exit.

The operation of my apparatus is as follows:—Water being conveyed to the tank F, it is allowed to be sprayed into the receiving receptacle through the tubular nozzles, making a series of fine streams of water. The fan being put in operation will cause a suction within the flue stack A, causing the smoke to be drawn from the furnace and forcibly ejected through the funnel-shaped end B into the receiving receptacle D and, coming in contact with the plate J, will cause the smoke to be broken up and portions of it passing through the various apertures J′ and coming into contact with the deflecting plates L will be forced up and caused to commingle with the sprays of water falling from the tank. Owing to the impact of the smoke, which is forcibly introduced into the receptacle, said member J will be given a swinging movement which will have a tendency to further cause any soot or deposits which might accumulate upon the plate to be washed therefrom by the violent agitation of the steam generated within the receptacle and the gases together with the falling water in the tank. The water in which the heavier particles of the smoke are precipitated will fall into the lower conical-shaped end of the receptacle and the water, as it makes exit from the tube D^2, will have a stronger static force, causing a suction through the nozzle or pipe Q. The heavier particles which have been precipitated in the water will pass through the exit tube about the nozzle Q and, the lighter particles of the gases in the smoke will be drawn through the perforations O^2 in the circumferential wall of the funnel-shaped receptacle O and be drawn by the suction caused by the rapid flow of the water through the exit pipe D^2, said gases passing through the nozzle Q and mixed with the water at the discharge end of the nozzle. In the event of the capacity of the exit pipe D^2 not being sufficient to carry away the lighter gases, the suction produced in the pipe R incident to its passage through the pipe A will cause the gases to make exit through the apertures O^4 and the perforations R′ in the partition and the entrance to the pipe R, passing thence up through the pipe R and out the valve-regulated top.

From the foregoing, it will be noted that, by the construction of an apparatus as shown and described, means is afforded whereby the soot of the smoke is acted upon immediately as it is introduced into the receptacle R by the steam which is generated by the water spraying from the tank and which action of the steam and the water will have a tendency to keep the suspended apertured plate cleansed and prevented from accumulating soot and other foreign matter.

What I claim to be new is:—

1. A smoke consuming and purifying apparatus comprising a receiving receptacle having a conical-shaped bottom with an exit tube leading therefrom and provided with a smoke introduction pipe communicating therewith, a tank with a perforated bottom through which water is introduced into said receptacle, an apertured plate suspended from said perforated bottom and having inclined deflecting projections upon one face thereof, a receptacle within said conical shaped bottom and provided with an ejector tube extending through said exit tube and spaced apart therefrom, a pipe communicating with the exit tube and extending through the smoke introduction pipe, the circumference of said receptacle with the ejector tube having circumferential apertures adjacent to its exit end.

2. A smoke consuming and purifying apparatus comprising a receiving receptacle having a conical-shaped bottom with an exit tube leading therefrom and provided with a smoke introduction pipe communicating therewith, a tank with a perforated bottom through which water is introduced into said

receptacle, a plate suspended from the perforated bottom and provided with series of apertures disposed at inclinations, one face of said plate being provided with a series of outwardly curved deflecting plates, projecting from the plate adjacent to the lower marginal edges of the apertures therein, a conical-shaped receptacle positioned within said conical bottom and having a closed top and series of perforations in its circumference adjacent to its upper and lower ends, an ejector pipe or nozzle leading from the conical-shaped receptacle and within the exit tube and spaced apart therefrom, said conical-shaped receptacle provided with struck up portions partially covering the lower series of apertures in the conical-shaped receptacle, a pipe disposed at an inclination and communicating through a series of perforations with the interior of said exit pipe and extending through the smoke introduction pipe.

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

VICTOR E. LOMBARD.

Witnesses:

A. L. HOUGH,

FRANKLIN H. HOUGH.