

No. 736,294.

PATENTED AUG. 11, 1903.

R. OGLE.

APPARATUS FOR CONDENSING SMOKE, FUMES, AND GASES.

APPLICATION FILED MAY 10, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

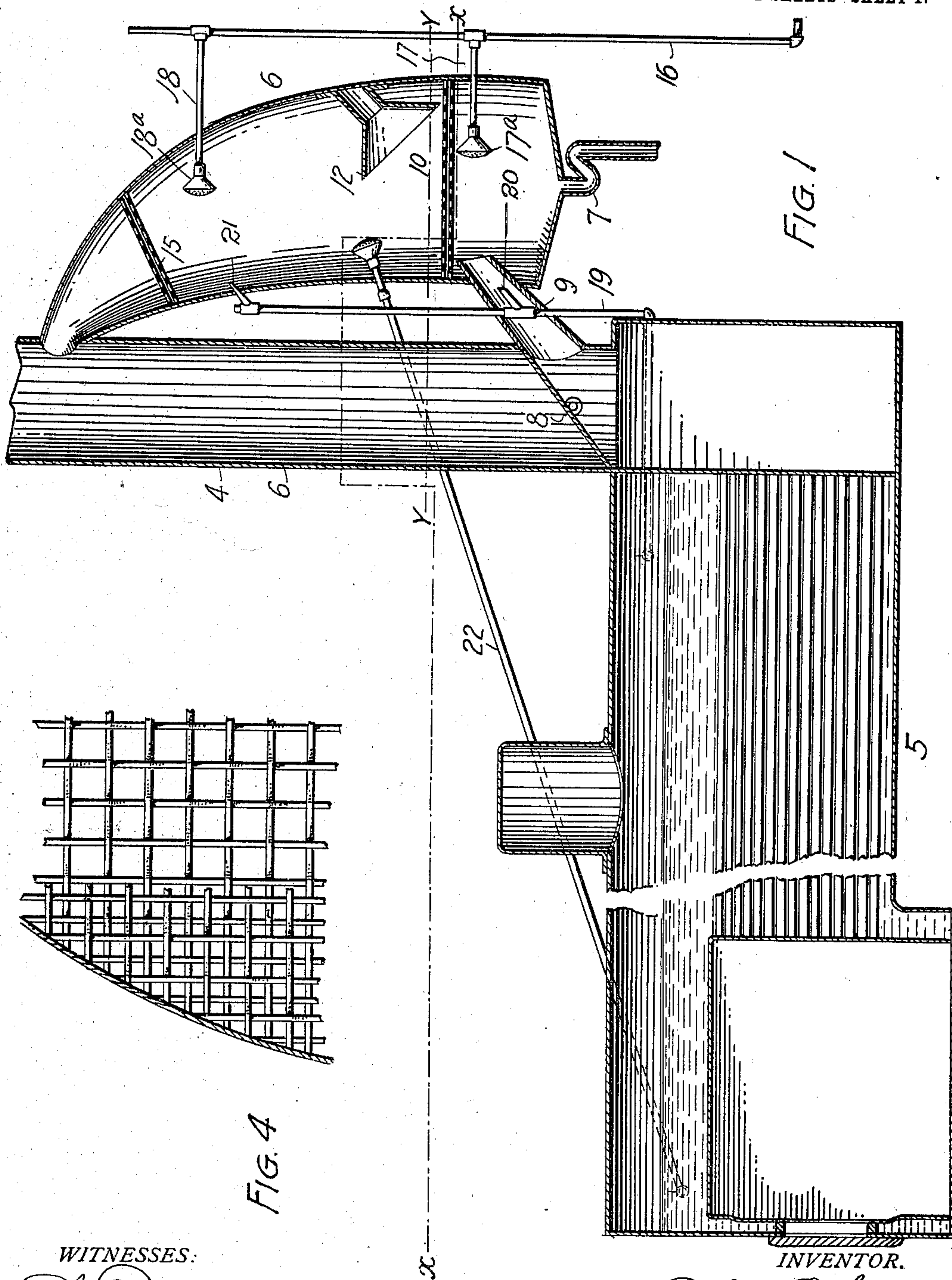


FIG. 4

WITNESSES:

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*Dena Nelson.*

INVENTOR.

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BY *J. H. Buck*  
ATTORNEY.

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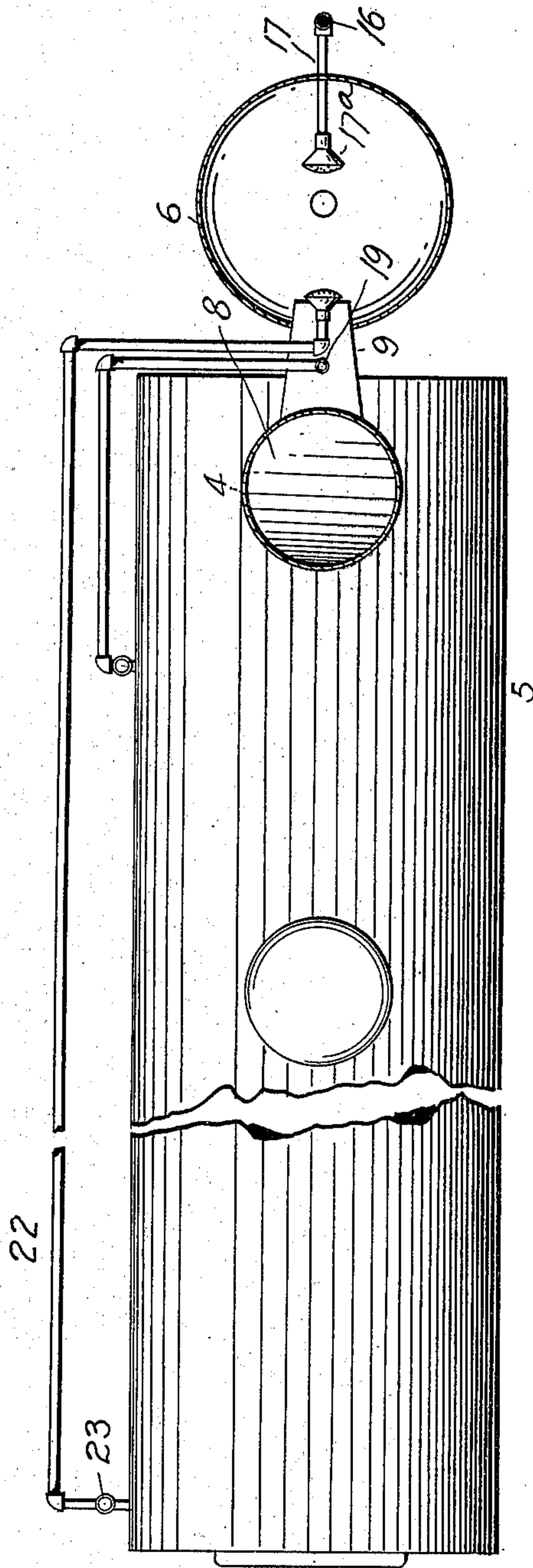


FIG. 2

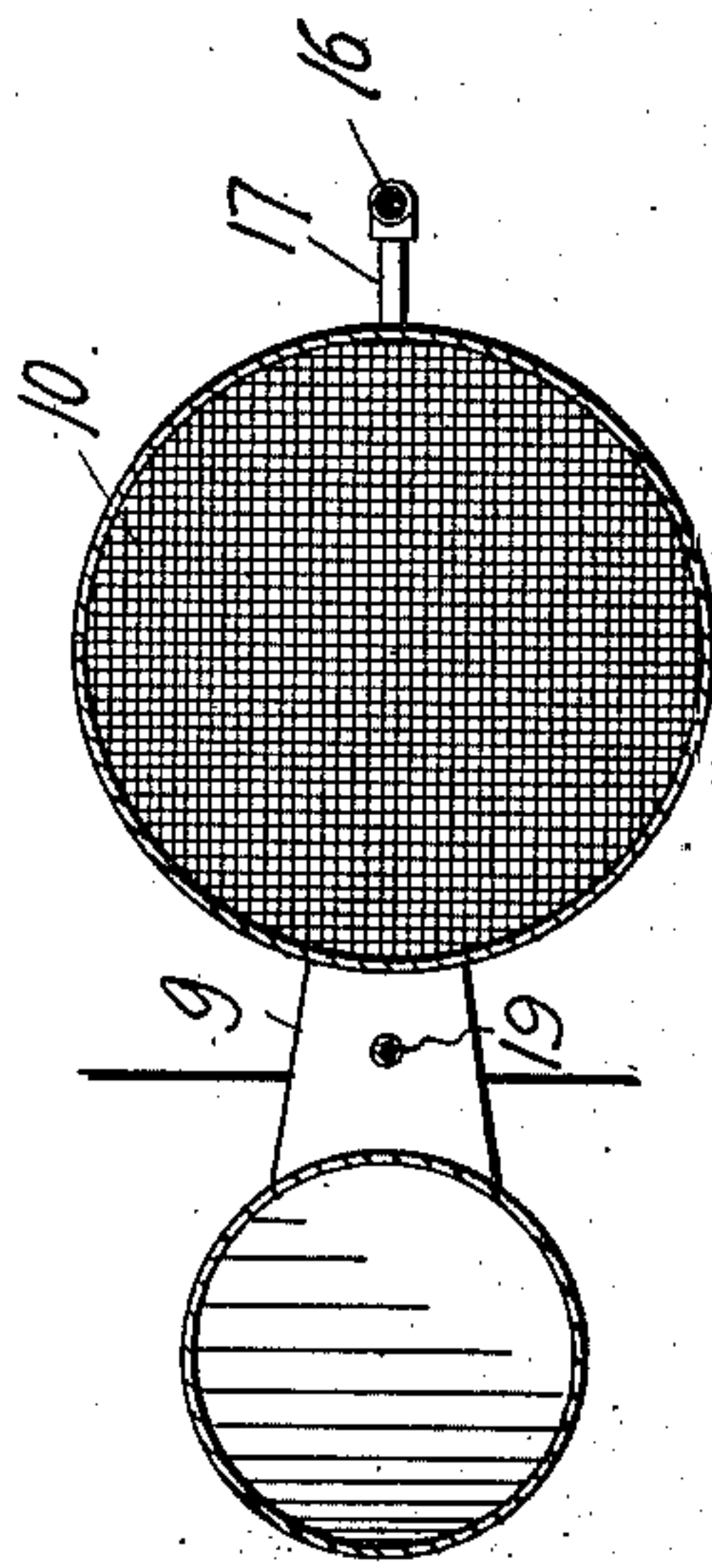


FIG. 3

WITNESSES:

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# UNITED STATES PATENT OFFICE.

ROBERT OGLE, OF PUEBLO, COLORADO, ASSIGNOR TO THE SMOKE EXTERMINATOR AND FUME CONDENSER COMPANY, OF PUEBLO, COLORADO.

## APPARATUS FOR CONDENSING SMOKE, FUMES, AND GASES.

SPECIFICATION forming part of Letters Patent No. 736,294, dated August 11, 1903.

Application filed May 10, 1902. Serial No. 106,833. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT OGLE, a citizen of the United States of America, residing at Pueblo, in the county of Pueblo and State of Colorado, have invented certain new and useful Improvements in Apparatus for Condensing Smoke, Fumes, and Gases; and I do 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 figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in means for condensing smoke, fumes, and gases from steam plants, furnaces, ore-roasting plants, and smelters, whereby the carbon and solids are separated from the smoke, fumes, &c., and discharged into the sewer or caught in receptacles when it is desired to save the carbon or recover the metallic or other values; and to this end I provide a condensing chamber or receptacle which is mounted in suitable proximity to the smoke-stack or chimney and provided with filtering-diaphragms interposed between the inlet from the stack to the chamber below the stack-damper and the outlet from the chamber to the stack above the damper. By the operation of my improved apparatus most of the gases are united with the water employed in the condensing operation. Provision is also made for the introduction of steam-jets and sprays of hot and cold water to the tank, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a vertical longitudinal section taken through the condensing apparatus shown in connection with the furnace, boiler, and stack. Fig. 2 is a plan view of the same, parts being shown in section on the line  $x x$ , Fig. 1. Fig. 3 is a section taken on the line  $y y$ , Fig. 1, looking downward. Fig. 4 is a fragmentary detail view of one of the screen-netting diaphragms shown on an enlarged scale.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate the boiler,

and 4 the stack. Suitably mounted adjacent the stack is a condensing-chamber 6, having a trapped outlet 7 at the bottom. The damper 8 of the stack is closed when my improved apparatus is in use. Leading from the stack below the damper is an upwardly-inclined conduit 9, which projects into the chamber 6 below a horizontal diaphragm 10, composed of wire-netting located in the lower part of the chamber. This diaphragm, as shown in the drawings, is composed of two layers of coarse-mesh netting, the wires of the two mesh members being staggered to divide the openings. In practice it has been found that wire-netting having eight meshes or openings to the square inch will give satisfactory results. As shown in the drawings, the chamber 6 is largest at the bottom and gradually tapers toward the top, where it is smallest. Its upper extremity projects into an opening formed in the stack above the damper. The walls of the chamber are curved sufficiently from the bottom upward to allow the upper extremity of the chamber to enter the stack, as aforesaid. This construction presents no angles to obstruct the draft. Suitably mounted on the wall of the tank above the diaphragm 10 and directly opposite the discharge extremity of the conduit 9 is a funnel-shaped receiver 12, into which the products of combustion are discharged after passing through the diaphragm. The function of this receiver is to temporarily suspend the products of combustion or the smoke, fumes, and gases as they issue from the conduit 9, whereby condensation is facilitated. Above the receiver, located near the top of the condensing-chamber, is another diaphragm, which is designated 15 in the drawings. This diaphragm is also composed of wire-netting, preferably somewhat coarser than that employed in making the lower diaphragm. In practice two six-mesh members arranged in staggered relation have given satisfactory results.

Leading from a cold-water pipe 16 are two branch pipes 17 and 18, which extend into the condensing-chamber and terminate in spray-nozzles 17<sup>a</sup> and 18<sup>a</sup>, respectively. One of these spray-nozzles is below the diaphragm 10, while the other is between the two diaphragms, being located nearer the uppermost.



Leading from the boiler and connected therewith at a point above the water-level is a steam-pipe 19, provided with two jet branches 20 and 21, one located in the conduit 9 and the other entering the chamber between the two diaphragms and, as shown in the drawings, nearer the upper diaphragm. Leading from the boiler and connected therewith at a point below the water-level is a hot-water pipe 22, which enters the condensing-chamber between the two diaphragms. The discharge of water through this pipe is controlled by a valve 23. The function of the pipe is to discharge hot water into the condensing-chamber when a fire is first made in the furnace, the object being to condense black smoke, which usually issues from the stack when the fire is started or when the fuel is renewed. This hot-water jet is only temporarily employed, and the valve 23 may be closed after the fuel has reached the proper stage of condensation.

When the apparatus is in use, the stack-damper 8 is closed, and the products of combustion containing the smoke, fumes, and gases from the furnace are driven into the condensing-chamber, where they are acted on by the water-sprays and steam-jets. The impurities, as the carbon (which is the chief element of black smoke) and the other elements, which under ordinary circumstances render the escape from furnace-stacks obnoxious, are condensed and fall to the bottom of the chamber, whence they are carried off with the water through the trapped outlet 7 and discharged into the sewer or to any suitable receptacle in case it is desired to recover the carbon. The gases or fumes from smelters and ore-roasting furnaces will unite with the water and may be discharged into the sewer. If, however, they contain mineral values, the water may be drawn off into suitable receptacles and the values precipitated at will. The mesh diaphragms 10 and 15 offer an obstruction to the products of combustion in the chamber 6 or retard their progress there-through sufficiently to make it practicable to condense the carbon and other impurities by the action of the water and steam, as heretofore explained.

Having thus described my invention, what I claim is—

1. In an apparatus for condensing smoke, fumes and gases, the combination with a stack and a damper therein, of a condensing-chamber, two mesh diaphragms located therein and suitably separated, means for introducing water in the form of spray into the chamber, a conduit leading from the stack and communicating with the condensing-chamber below the damper for discharging the products of combustion thereinto below the lower diaphragm, the condensing-chamber being largest at the bottom and having curved walls, its upper extremity projecting into an opening formed in the stack above the damper.

2. The combination with a stack, of a condensing-chamber arranged adjacent the stack and a damper therein, said chamber being largest at the bottom and tapering toward the top where it communicates with the stack above the damper, the walls of the chamber being curved and devoid of angles above the bottom, one or more mesh diaphragms located therein, means for introducing the products of combustion from the stack below the damper into the chamber below the lower diaphragm, and means for introducing jets of steam and sprays of water into the chamber, substantially as described.

3. In an apparatus for condensing smoke, fumes and gases, the combination with a stack and a damper therein, of a chamber suitably supported adjacent the stack, said chamber being largest at the bottom and curved upwardly, having no angles above the bottom, the upper extremity of the chamber entering the stack above the damper, two separated mesh diaphragms located in the chamber, means for introducing a spray of hot water between these diaphragms, and means for introducing the products of combustion from the stack below the damper, into the condensing-chamber below the lower diaphragm.

4. In an apparatus of the class described, the combination with a stack, of a chamber arranged adjacent the stack and communicating therewith at its upper extremity, said chamber diminishing in size as it extends upwardly, and having curved walls devoid of angles, two mesh diaphragms located in said chamber, means for introducing cold water in the form of spray between the two diaphragms, and means for introducing the products of combustion from the furnace into the chamber below the lower diaphragm.

5. In an apparatus of the class described, the combination with a stack, of a chamber arranged adjacent the stack and communicating therewith at its upper extremity, said chamber diminishing in size as it extends upwardly, and having curved walls devoid of angles, two mesh diaphragms located in said chamber, means for introducing cold water in the form of spray between the two diaphragms and below the lower diaphragm, and means for introducing the products of combustion from the furnace into the chamber below the lower diaphragm.

6. In an apparatus of the class described, the combination with a stack, of a chamber arranged adjacent the stack and communicating therewith at its upper extremity, said chamber diminishing in size as it extends upwardly and having curved walls devoid of angles, two mesh diaphragms located in said chamber, means for introducing water in the form of spray and steam in the form of jets into said chamber, and means for introducing the products of combustion from the furnace into the chamber below the lower diaphragm.



7. In an apparatus of the class described, the combination with a stack, of a chamber arranged adjacent the stack and communicating therewith at its upper extremity, said chamber diminishing in size as it extends upwardly and having curved walls devoid of angles, a mesh diaphragm located in said chamber, an upwardly-inclined conduit for introducing products of combustion into the chamber below the diaphragm, and a receiver mounted on the wall of the chamber opposite the discharge extremity of said conduit, the receiver being located above the diaphragm, substantially as described.

8. In an apparatus for condensing smoke, fumes and gases, the combination with a stack and a damper therein, of a chamber suitably supported adjacent the stack, said chamber being largest at the bottom and curved upwardly having no angles above the bottom, the upper extremity of the chamber entering the stack, a conduit leading from the stack and projecting upwardly into the tank, its discharge extremity being reduced in size, and a steam-pipe entering the smoke-conduit and arranged to introduce steam into the tank to increase the velocity of the conduit's discharge and facilitate condensation.

9. The combination with a stack, of a chamber suitably supported adjacent the stack, said chamber being largest at the bottom and curved upwardly having no angles above the bottom, the upper extremity of the chamber entering the stack, means for introducing the

products of combustion to the lower part of the chamber, and one or more pipes connected with the tank and arranged to introduce steam-jets thereinto to increase the draft and facilitate condensation.

10. In an apparatus of the class described, the combination with a stack, of a chamber arranged adjacent the stack and communicating therewith at its upper extremity, said chamber diminishing in size as it extends upwardly and having curved walls devoid of angles, a mesh diaphragm located in said chamber, and an upwardly-inclined conduit for introducing products of combustion into the chamber below the diaphragm, substantially as described.

11. In combination with a smoke-stack or chimney, a smoke-consumer comprising a casing having communication at its upper and lower ends with the smoke-stack or chimney, a screen arranged in the lower portion of the casing, a screen arranged in the upper portion of the casing, cold-water-discharging pipes arranged below the screens, a steam-injector arranged below the lower screen, a steam-injector arranged between the screens, and a hot-water-discharging device arranged above the lower screen.

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

ROBERT OGLE.

Witnesses:

JOHN H. OLMES,  
ELMER O. RINGER.