

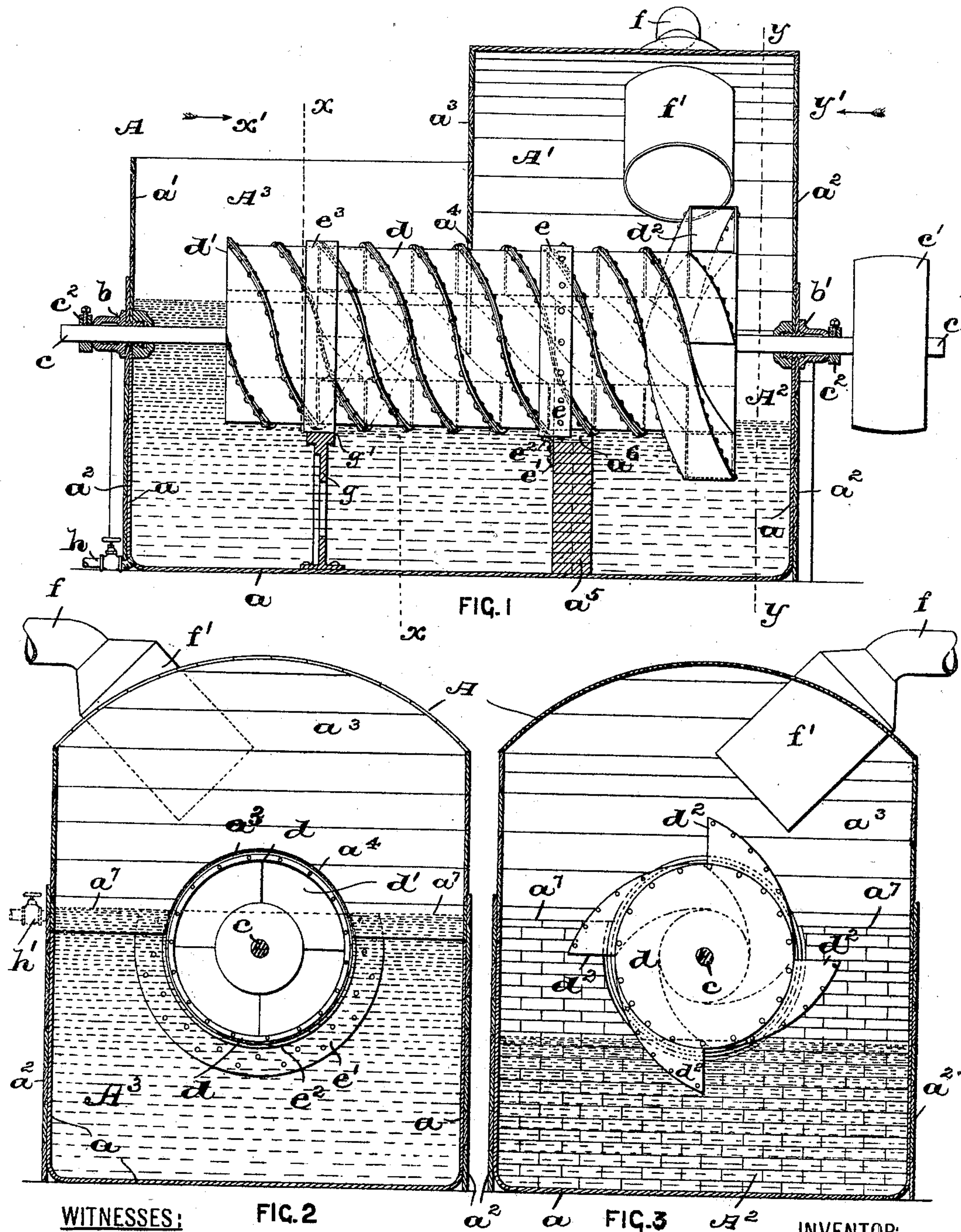
(No Model.)

2 Sheets—Sheet 1.

S. S. PRIDHAM.
SMOKE CONDENSER.

No. 554,348.

Patented Feb. 11, 1896.



WITNESSES:

FIG. 2

FIG. 3

INVENTOR:

SAMUEL S. PRIDHAM.

Wm. H. Campfield Jr.
Mary Z. Thurdell

BY
Fred C. Fraentzel
ATTORNEY

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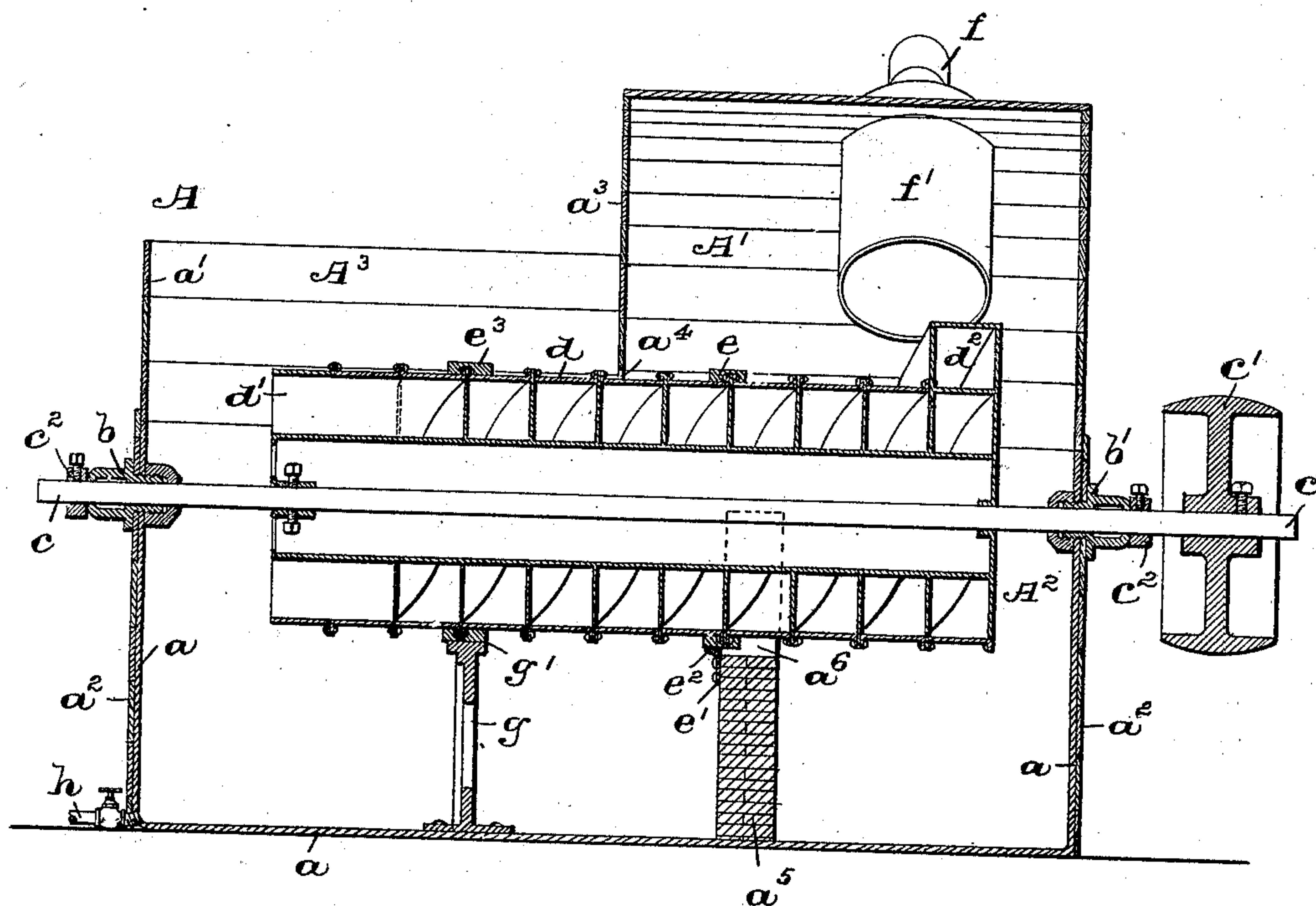


FIG. 4

WITNESSES:

Wm. H. Campfield, Jr.
Marcy J. Trusdell

INVENTOR:

SAMUEL S. PRIDHAM

BY
Fred C. Graetz, Jr.
ATTORNEY

UNITED STATES PATENT OFFICE.

SAMUEL S. PRIDHAM, OF NEWARK, NEW JERSEY, ASSIGNOR TO GEORGE HEINKEL, OF SAME PLACE.

SMOKE-CONDENSER.

SPECIFICATION forming part of Letters Patent No. 554,348, dated February 11, 1896.

Application filed October 2, 1895. Serial No. 564,370. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL S. PRIDHAM, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Smoke-Condensers; 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 letters of reference marked thereon, which form a part of this specification.

My present invention relates to improvements in machines or apparatus for condensing smoke; and the invention has for its primary object to provide a device for destroying the noxious gases generated in smelting-works, which gases are carried off in smoke, but also effects a great saving in metal, which heretofore has been carried off or escaped in the smoke.

The invention has for its further object to provide a machine or apparatus of this class which shall be very simple and effective in its operation and which can be operated with a great saving of power necessary to drive the machine over the constructions of the machines of a similar nature as heretofore made.

The invention therefore consists in the novel construction of smoke-condensing apparatus herein shown, comprising therein a water-tank having a wall or partition, forming two chambers in said tank; also an arrangement of a revolving conveyer-drum which conveys the water from the one chamber into the other chamber, and thus during the operation of said drum maintaining a lower level in the receiving-chamber than in the discharge-chamber. By means of this arrangement only one of the scoops of the conveyer-drum will be submerged at one time during the rotation of the drum on its axis, thereby resulting in a great saving of power in driving the machine.

The invention consists, furthermore, in certain other minor arrangements and combinations of parts, such as will be hereinafter fully

described and finally embodied in the clauses of the claim.

The invention is illustrated in the accompanying sheet of drawings, in which—

Figure 1 is a longitudinal vertical section of the tank in which rotates the conveyer-drum, the same being illustrated in side elevation. Fig. 2 is a vertical cross-section taken on line x in Fig. 1, and looking in the direction of arrow x' ; and Fig. 3 is a vertical cross-section taken on line y in Fig. 1, looking in the direction of arrow y' . Fig. 4 is a longitudinal vertical section of the apparatus, illustrating more particularly the arrangement of a spiral conveyer.

Similar letters of reference are employed in each of the above-described views to indicate corresponding parts.

In said drawings, A designates the tank, which may be square or of any other desirable shape, and consists, preferably, of an inner lining a , made of metal, topped off on the top by boards a' , and the outer board lining a^2 , substantially as illustrated in the several figures of the drawings. In two sides of said tank A are secured any suitable form of bearings b and b' in which is made to rotate the shaft c , operated by means of the pulley c' or in any other well-known manner. Suitably-arranged collars c^2 on said shaft c secure the latter in its operative position in the two bearings b and b' . On said shaft c I have secured in any well-known manner a conveyer-drum d , open at the end d' and provided at its opposite end with scoops d^2 , preferably four in number. The inner construction of said drum d is made in the manner of spirally-formed conveying-chambers, whereby, when the shaft C is operated, any matter—such as water, smoke, and gases—taken in by one of said scoops will be forced through said chambers and discharged at the opposite end d' of said conveyer-drum.

As will be seen from Fig. 1, the side a^3 of the upper portion of the tank A is provided with a semicircular opening a^4 , thus allowing said side a^3 to extend down and embrace more than half the cylindrical surface of the drum d . In this manner I obtain a smoke and gas receiving chamber A', into which extends the

discharge portion f' of the pipe f which brings the smoke and other obnoxious gases into said chamber. In said tank A, I have erected a suitable partition or wall a^5 , made either of
 5 brick, metal or wood, said wall being cut away at a^6 and made to embrace the cylindrical surface of the drum d and extending slightly above the plane of support of the shaft c , as clearly indicated at a^7 in Fig. 3.

10 The conveying-drum d is provided on its cylindrical surface with a suitable ring e , made of rubber or any other packing material. To the side of the wall or partition a^5 , contiguous to the semicircular opening a^6 in
 15 said wall, I have secured in any well-known manner a stout band e' of rubber or any other well-known flexible material, which has its upper portion e^2 in close frictional contact with the ring e , and thereby serves as a suit-
 20 able packing to prevent any undue leakage of water from the discharge-chamber A^3 into the receiving-chamber A^2 formed by said wall a^5 in the tank A. When said conveyer-drum is made of considerable length it may be pro-
 25 vided with an additional rubber or other flexible band e^3 which fits into the upper semicircular supporting portion g' of a suitable bearing g .

In using the device I fill both the chambers
 30 A^2 and A^3 with water to within about the shaft c , allowing the same to seek its own level, through the conveyer-ducts of the drum d when the same is at rest.

As soon as the shaft c is operated, causing
 35 the rotation of the drum d , the water in said chamber A^2 will be constantly scooped up by one of the scoops d^2 of the drum, and discharged into the discharge-chamber A^3 , causing the water to rise in said chamber until it
 40 reaches the height of the wall a^5 , and then flows back into the receiving-chamber A^2 . By keeping up the revolutions of the drum d these two heights of water in the two chambers will be maintained, thus allowing the
 45 passage of one scoop through the water, while the other three are out of the water and take in the gases and smoke delivered into the chamber A^2 , and resulting in an apparatus that can be driven with less power, and hence
 50 a great saving of fuel and steam, than in an apparatus where two, three, or more of the scoops d^2 are submerged and being forced through the water at the same time.

As has been stated, the smoke, gases, and
 55 vapors are forced from the pipe f into the receiving-chamber A' , where they are scooped up by the scoops d^2 and forced under the water in the chamber A^2 . The scoop which enters the water at the same time becomes en-
 60 tirely sealed by the water, taking up a sufficient quantity of water and carrying the same with the smoke and gases into the spiral chambers in the drum d . During this process the revolving drum d causes the commin-
 65 gling of the water, smoke, and gases, which are thus condensed and washed and finally

discharged at the end d' of the drum d into the discharge-chamber A^3 , which is also partly filled with water, as has been stated.

If the concentration is from the boiling of
 70 oil or some other volatile matter, it becomes perfectly purified in passing through the spiral chambers of the drum d and floats on the surface of the water in the discharge-chamber A^3 , from which it can be drawn off through
 75 the pipe and valve h' . (Indicated in dotted outline in Fig. 2.)

If the concentration is from bituminous, metallic or other vapors, it is precipitated by
 80 being submerged, and after passing through the drum d is discharged into the discharge-chamber A^3 , from which it can be secured when the water is drawn off through the pipe and valve h , as shown in Fig. 1.

When ordinary smoke is submerged in the
 85 water and forced through the revolving drum, the air which is liberated by the process in the discharge-chamber is pure and innocuous, the smoke having been entirely condensed while passing through the drum d . 90

The rotation of the drum d produces its own draft to draw the smoke and gases from the
 pipe f in the chamber A' , but of course it will be evident that a forced draft may be used.

As indicated in the dotted outline in Fig. 1,
 95 and as clearly shown in Fig. 4, the helical walls forming the conveying apparatus in the drum d terminate at some distance from the discharge-opening d' in the shell of said drum, thereby forming a large and considerable
 100 space in the end of said drum, in which any gases or smoke which may not have been condensed while passing through the spiral chambers in said drum are caused to be rapidly
 105 whirled around the inner cylindrical surface of the drum in the manner of a centrifugal machine, and any remaining smoke or other impurities will thus be thoroughly condensed.

Of course it will be evident that many
 110 changes may be made in the details of the arrangements and combinations of parts comprising my novel construction of machine, and hence I do not limit my invention to the exact arrangement and combination of parts
 115 herein shown and described; but one of the essential features of my invention is the arrangement of the dividing wall or partition a^5 for maintaining a lower level of the water in the receiving-chamber A^2 than in the dis-
 120 charge-chamber A^3 during the operation of the machine, thereby resulting in the better working of the machine and also in saving of time and cost of operation.

The drum d may be made of any suitable
 125 diameter or cross-section and any desirable length, the tank A being built accordingly.

Having thus described my invention, what I claim is—

1. In an apparatus for condensing smoke, gases or the like, in combination, a tank, hav-
 130 ing a dividing wall or partition, extending from the bottom of the apparatus, and a con-

veyer-drum rotatively arranged in said tank, said dividing wall or partition being made to embrace the lower sides of said drum to form a receiving-chamber on one side and a discharge-chamber on the other side of said wall, and said conveyer-drum receiving water from the receiving-chamber and discharging it into the discharge-chamber, when in operation, and thereby maintaining a lower level of the water in the receiving-chamber than that of the water in the discharge-chamber, substantially as and for the purposes set forth.

2. In an apparatus for condensing smoke, gases or the like, in combination, a tank, having a dividing wall or partition, and a conveyer-drum rotatively arranged in said tank, said dividing wall or partition having a semi-circular bearing portion made to embrace the sides of said drum, to form a receiving-chamber on one side and a discharge-chamber on the other side of said wall, a rubber or other like packing-ring *e* on said drum fitting into the bearing portion of said dividing-wall, and said conveyer-drum being adapted to receive water from the receiving-chamber and discharging it into the discharge-chamber, when in operation, and thereby maintaining a lower level of water in the receiving-chamber than that of the water in the discharge-chamber, substantially as and for the purposes set forth.

3. In an apparatus for condensing smoke, gases or the like, the combination, with a tank, and a dividing wall or partition, extending from the bottom of the apparatus, of a conveyer-drum, open at one end and having two or more scoops at its other end, said dividing-wall being made to embrace the lower sides of said drum and forming a receiving-chamber and a discharge-chamber in said tank, said drum, during its revolution, having but one of its scoops submerged at a time in the water in said receiving-chamber, and discharging the water into the discharge-chamber, and thereby maintaining a lower level of the water in the receiving-chamber than that of the water in the discharge-chamber, substantially as and for the purposes set forth.

4. In an apparatus for condensing smoke, gases or the like, the combination, with a tank, and a dividing wall or partition having a semi-circular bearing portion, of a conveyer-drum rotating in said bearing portion, a rubber or other like packing-ring *e* on said drum fitting into said bearing portion of said dividing-wall, said dividing-wall forming a receiving-chamber and a discharge-chamber in said tank, a discharge-opening in one end of said drum, two or more scoops at the other end of said drum, said drum, during its rotation, having but one of its scoops submerged at a time in the water in said receiving-chamber, and thereby maintaining a lower level of the

water in the receiving-chamber than that of the water in the discharge-chamber, substantially as and for the purposes set forth.

5. In an apparatus for condensing smoke, gases or the like, the combination, with a tank, of a drum *d*, comprising therein a cylindrical shell and having two or more scoops *d*², a dividing-wall *a*⁵ in said tank, extending from the bottom of said apparatus, having a semi-circular bearing portion in said wall, spirally-arranged channels within said shell extending longitudinally through said drum, but terminating at a distance from the discharging end of the drum, and thereby forming within said shell a cylindrical space between the discharging end and the ends of said channels, substantially as and for the purposes set forth.

6. In an apparatus for condensing smoke, gases or the like, in combination, a tank, having a dividing wall or partition, extending from the bottom of said apparatus, and a conveyer-drum rotatively arranged in said tank, said dividing-wall being made to embrace the lower sides of said drum, to form a receiving-chamber and a discharge-chamber on the other side of said wall, said conveyer-drum being adapted to receive water from the receiving-chamber and discharging it into the discharge-chamber, when in operation, and thereby maintaining a lower level of the water in the receiving-chamber than that of the discharge-chamber, and a support, as *g*, in said tank, substantially as and for the purposes set forth.

7. In an apparatus for condensing smoke, gases or the like, in combination, a tank, having a dividing wall or partition, having a semi-circular bearing portion made to embrace the sides of said drum, to form a receiving-chamber on one side and a discharge-chamber on the other side of said wall, a rubber or other like packing-ring *e* on said drum fitting into the bearing portion of said dividing-wall, said conveyer-drum being adapted to receive water from the receiving-chamber and discharging it into the discharge-chamber, when in operation, and thereby maintaining a lower level of the water in the receiving-chamber than that of the water in the discharge-chamber, a support *g* in said tank, and a rubber or other flexible band *e*³ on said drum, adapted to rotate on a bearing portion in said support *g*, all substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 28th day of September, 1895.

SAMUEL S. PRIDHAM.

Witnesses:

FREDK. C. FRAENTZEL,
GEORGE HEINKEL.