

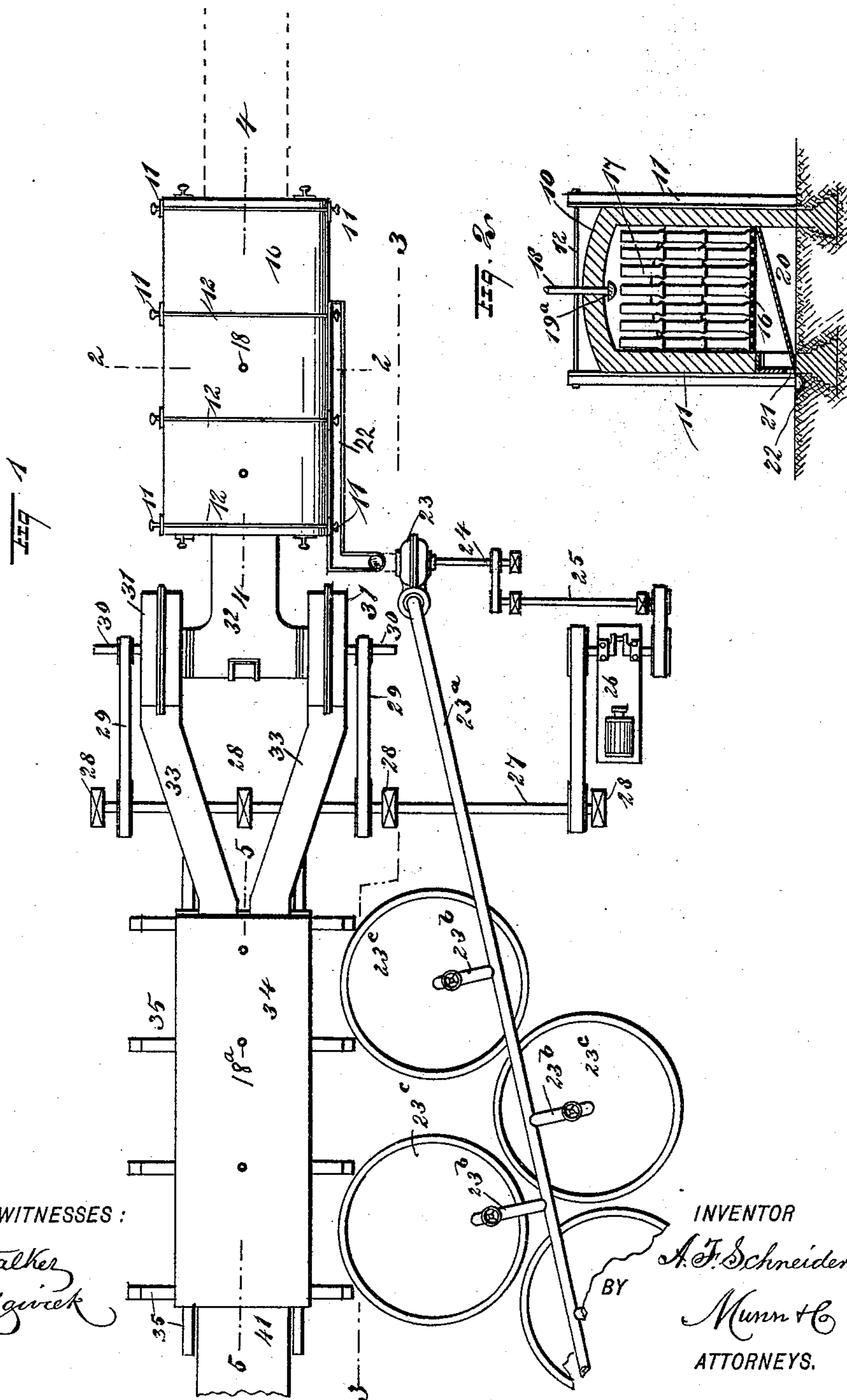
(No Model.)

2 Sheets—Sheet 1.

A. F. SCHNEIDER.  
APPARATUS FOR CONDENSING FUMES.

No. 487,971.

Patented Dec. 13, 1892.



WITNESSES:

H. Walker  
C. Sedgwick

INVENTOR

A. F. Schneider

BY

Munn & Co.  
ATTORNEYS.

(No Model.)

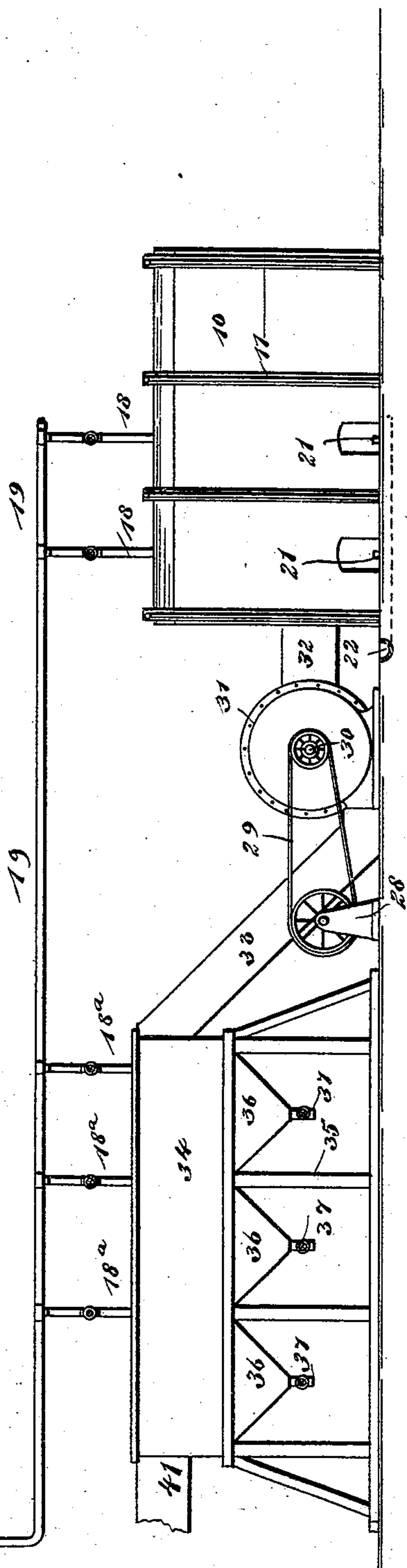
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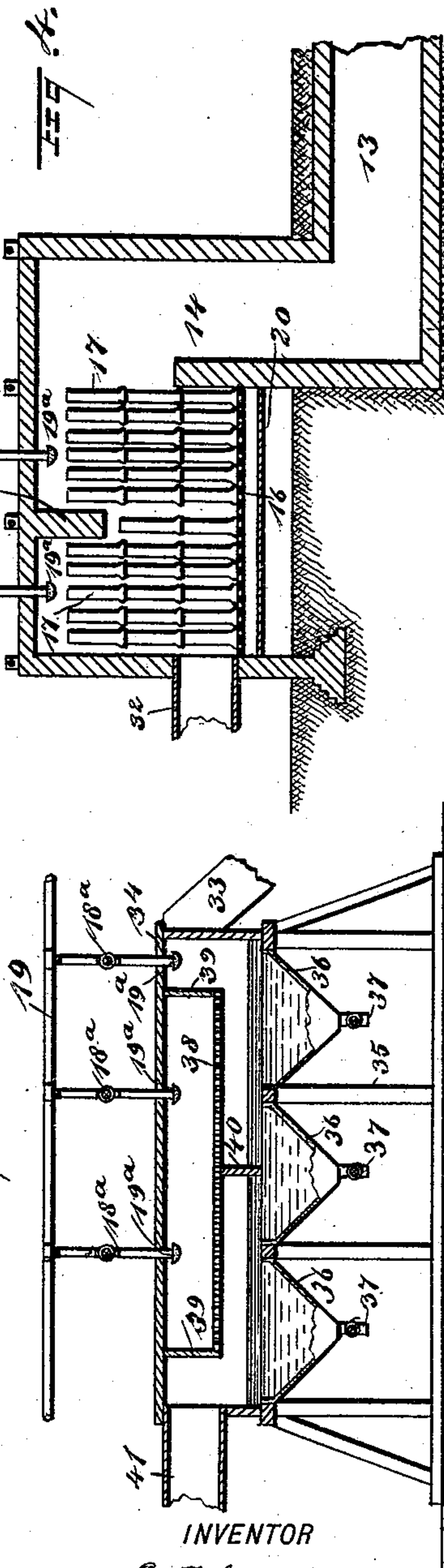
Fig. 3.



WITNESSES:

H. Walker  
C. Sedgwick

Fig. 5.



INVENTOR

A. F. Schneider  
BY Munn & Co

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# UNITED STATES PATENT OFFICE.

ALBERT F. SCHNEIDER, OF ST. LOUIS, MISSOURI.

## APPARATUS FOR CONDENSING FUMES.

SPECIFICATION forming part of Letters Patent No. 487,971, dated December 13, 1892.

Application filed March 16, 1892. Serial No. 425,164. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT F. SCHNEIDER, of St. Louis, State of Missouri, have invented new and Improved Apparatus for Condensing Fumes, of which the following is a full, clear, and exact description.

My invention relates to an improved apparatus adapted to condense and collect the fumes, gases, and dust of shaft, roasting, and reverberatory furnaces, and is especially adapted to furnaces used in silver, lead, gold, and copper ore smelting and milling works, and in refineries treating the metal products and by-products of such works.

The object of my invention is to produce a simple and a compact and comparatively-inexpensive apparatus which may be applied to any kind of a furnace, which will prevent the escape of noxious gases and fumes and thus avoid damaging the surrounding vegetation, which may be used without a high chimney, thus saving the expense of the same, which will reduce the temperature of the escaping material from the furnaces to such a degree that all volatilized material must be condensed, which will require but very little labor to operate it, which has a good forced draft, and in which the material is collected in a moist state and in good shape for handling.

To this end my invention consists in an improved apparatus, which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a broken plan view of the apparatus with parts in section. Fig. 2 is a vertical cross-section through the cooling-chamber on the line 2 2 in Fig. 1. Fig. 3 is a broken sectional elevation on the line 3 3 in Fig. 1. Fig. 4 is a broken vertical longitudinal section of the cooling-chamber on the line 4 4 in Fig. 1, and Fig. 5 is a broken vertical longitudinal section of the condensing-tank on the line 5 5 in Fig. 1.

The apparatus is provided with a cooling-chamber 10, to which the highly-heated fumes and gases from the furnaces are first sent, and this chamber is made of material which will withstand the heat, and it is supported by the

vertical stay-bars 11, erected at the sides and connected at the top by cross-rods 12. A flue 13 enters one end of the chamber at the bottom, this flue being adapted to connect with any kind of a furnace, and the flue extends well up into the cooling-chamber, as shown at 14, forming, practically, a compartment in the same. If the flue is overground, this first compartment may be filled with glazed sewer-pipe. The cooling-chamber has centrally and transversely therein a depending partition 15, which occupies the upper portion of the chamber, and which divides said upper portion into two compartments. More compartments may be provided in proportion to number of furnaces or work required.

Near the bottom of the chamber 10 is a perforated horizontal partition 16, and upon this are stood in an upright position rows of glazed sewer-pipes or glazed tile 17, these being adapted when covered by a spray to produce a large cooling-surface and surface for impact and hasten the condensation of the fumes. Branch water-pipes 18 project downward through the top of the cooling-chamber, these pipes being controlled by cocks and connected with a cold-water-supply pipe 19, and the lower ends of the pipes 18 terminate in spraying-nozzles 19<sup>a</sup>, which are adapted to produce a fine spray and fill the chamber and cover the sewer-pipes with the same, so that the fumes or gases which enter the chamber will be rapidly cooled.

The cooling-chamber is provided with an inclined floor 20, which delivers through apertures 21 in the lower portion and at one side of the chamber into a gutter 22, and the latter extends to a centrifugal pump 23, which has a discharge-pipe 23<sup>a</sup>, connecting by means of cock-controlled branch pipes 23<sup>b</sup> with collecting-tanks 23<sup>c</sup>, so that the condensed fumes and gases or dust will be forced by the pump into one of these collecting-tanks. The pump 23 is driven by a shaft 24, which has a belt connection with the shaft 25, and the latter is driven by an engine 26, although it will be understood that any suitable driving power may be used, and in the drawings I have shown an engine and a plurality of driving-shafts arranged to operate the several exhaust-fans and pump simply to show a working apparatus.



The engine 26 has, also, an operative connection with a shaft 27, which is mounted in supports 28, and this shaft connects by belts 29 with pulleys on shafts 30, which run exhaust-fans 31, these being arranged as shown in Fig. 1 and connected with a flue 32, which opens from the lower rear end of the cooling-chamber 10. It will be understood, then, that the condensed fumes and the water which drips through the perforated partition of the cooling-chamber will be carried away by the pump, and the fans will operate to maintain a good draft through the chamber and will carry the uncondensed products of combustion farther away. The cooling-chamber, however, will so reduce the temperature of the gases and products of combustion that they will have no injurious effect upon the fans. The fans 31 deliver by means of flues 33 into a condensing-tank 34, which tank is supported upon a framework 35 and is provided at the bottom with a plurality of hoppers 36, which have discharge-pipes 37, controlled by cocks and adapted to connect with hose leading to the collecting-tanks 23<sup>c</sup>.

The lower portion of the condensing-tank is filled with water, and extending horizontally through the middle portion of the tank is a perforated diaphragm 38, which is supported from the tank-top by supports 39, and produced centrally and transversely on the under side of the diaphragm is a division-plate 40, which extends downward into the water. The condensing-tank 34 has a discharge-flue 41, which is adapted to connect with the chimney, and this flue may be made sufficiently long so that what little condensed but uncollected product of combustion escape from the condensing-tank will be collected before it reaches the chimney. The cold-water-supply pipe 19 extends, also, above the condensing-tank 34, and cock-controlled branch-pipes 18<sup>a</sup> extend downward into the tank and are provided with spraying-nozzles 19<sup>a</sup>, which fill the tank with spray and which maintain the proper water-level.

The operation of the apparatus is as follows: The products of combustion which escape from the furnaces pass into and through the cooling-chamber 10 in the manner already described, the material condensed in the chamber being forced by the pump into one of the collecting-tanks 23<sup>c</sup> and the uncondensed products being forced forward by the fans into the condensing-tank 34. Here the draft will be deflected upward through the diaphragm 38 by the division-plate 40, and will then pass downward through the rear end of the diaphragm and out through the discharge-flue 41. The mud which collects in the hoppers 36 may be discharged into the collecting-tanks. The collecting-tanks are filled one at a time, which is easily done by means of their cock-controlled connections with the pipe 23<sup>a</sup> and with the condensing-tank, and when they are filled and the collected material allowed to settle the water in them may be siphoned

off or otherwise discharged, and the valuable material in the same may be obtained.

In practice the cooling-chamber, the condensing-tank, and the pumps and flues should all be provided with suitable access-apertures, which need not be described.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An apparatus of the character described, comprising a cooling-chamber adapted to connect with a furnace and provided with a perforated diaphragm, an inclined floor thereunder discharging outside of the cooling-chamber, and a series of pipes forming cooling-surfaces, a condensing-tank having collecting-chambers therein and a suitable discharge, a flue connection between the cooling-chamber and the condensing-tank, spraying-nozzles arranged to deliver into the chamber and tank, and means for discharging the condensed material from the chamber and tank, substantially as described.

2. In an apparatus of the character described, the cooling-chamber having a flue-inlet at one end and a discharge at the other, a perforated horizontal partition or grating, an inclined floor beneath the partition, which floor delivers through openings into a gutter, a plurality of pipes arranged in tiers upon the perforated partition, and spraying-nozzles extending into the chamber and adapted to connect with a water-supply, substantially as described.

3. In an apparatus of the character described, a cooling-chamber having a flue-inlet at one end and a discharge at the other end, a perforated horizontal partition near the bottom, a plurality of pipes mounted endwise upon the partition, spraying-nozzles arranged to deliver into the chamber, and means for collecting the condensed material beneath the perforated partition, substantially as described.

4. In an apparatus of the character described, a cooling-chamber having a flue-inlet at one end and a discharge at the other, a perforated horizontal partition near the bottom, a depending transverse partition arranged near the center and at the top, a plurality of pipes arranged vertically in the chamber, and spraying-nozzles arranged to discharge upon the pipes, substantially as described.

5. In an apparatus of the character described, a condensing-tank having a flue-inlet at one end and a discharge at the other, a plurality of hoppers in the bottom with suitable discharge-pipes therein, a horizontal perforated diaphragm in its upper portion, a deflecting-plate extending transversely beneath the diaphragm, and a series of discharge-nozzles arranged to deliver into the tank, substantially as described.

6. An apparatus of the character described, comprising a cooling-chamber having a suitable inlet, a perforated partition, and an inclined floor arranged to deliver into a gutter



at one side of the chamber, a condensing-  
tank having a flue connection with the cool-  
ing-chamber and having a suitable discharge-  
flue, a perforated diaphragm arranged hori-  
5 zontally in the condensing-tank, a transverse  
division-plate beneath the diaphragm, a plu-  
rality of discharge-hoppers arranged in the  
bottom of the tank, exhaust-fans arranged

to force the draft through the chamber and  
tank, and a water-supply pipe having spray-  
ing-nozzles to deliver into the chamber and  
tank, substantially as described.

ALBERT F. SCHNEIDER.

Witnesses:

F. W. SEAGER, Jr.,  
JOSEPH P. GAZZAN.