No. 709,896. Patented Sept. 30, 1902.

A. W. GILLILAND.

FUME ARRESTER.

(Application filed Apr. 19, 1901.)

(No Model.) 2 Sheets—Sheet 1.

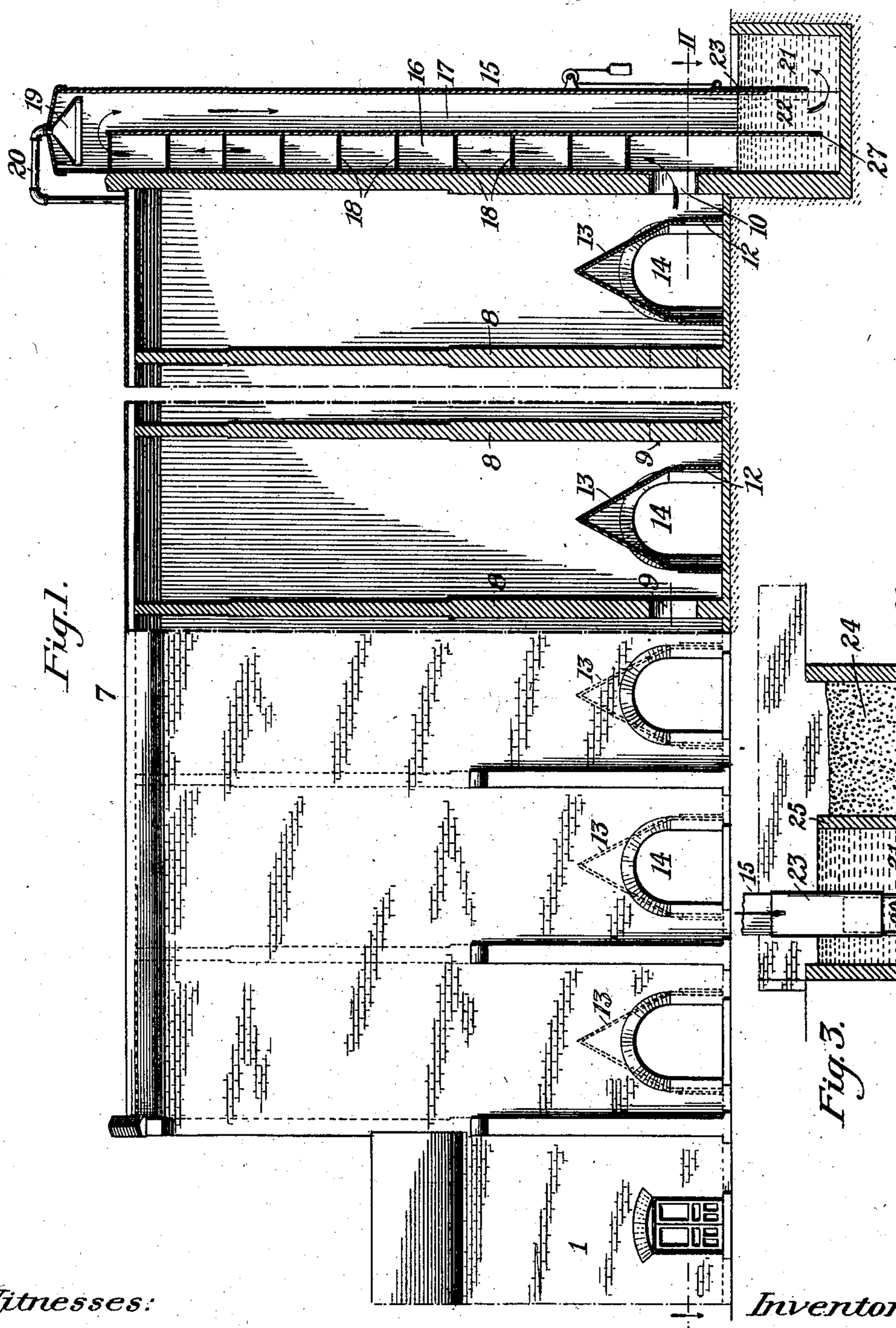

Fig. 1.

Fig. 3.

Witnesses:

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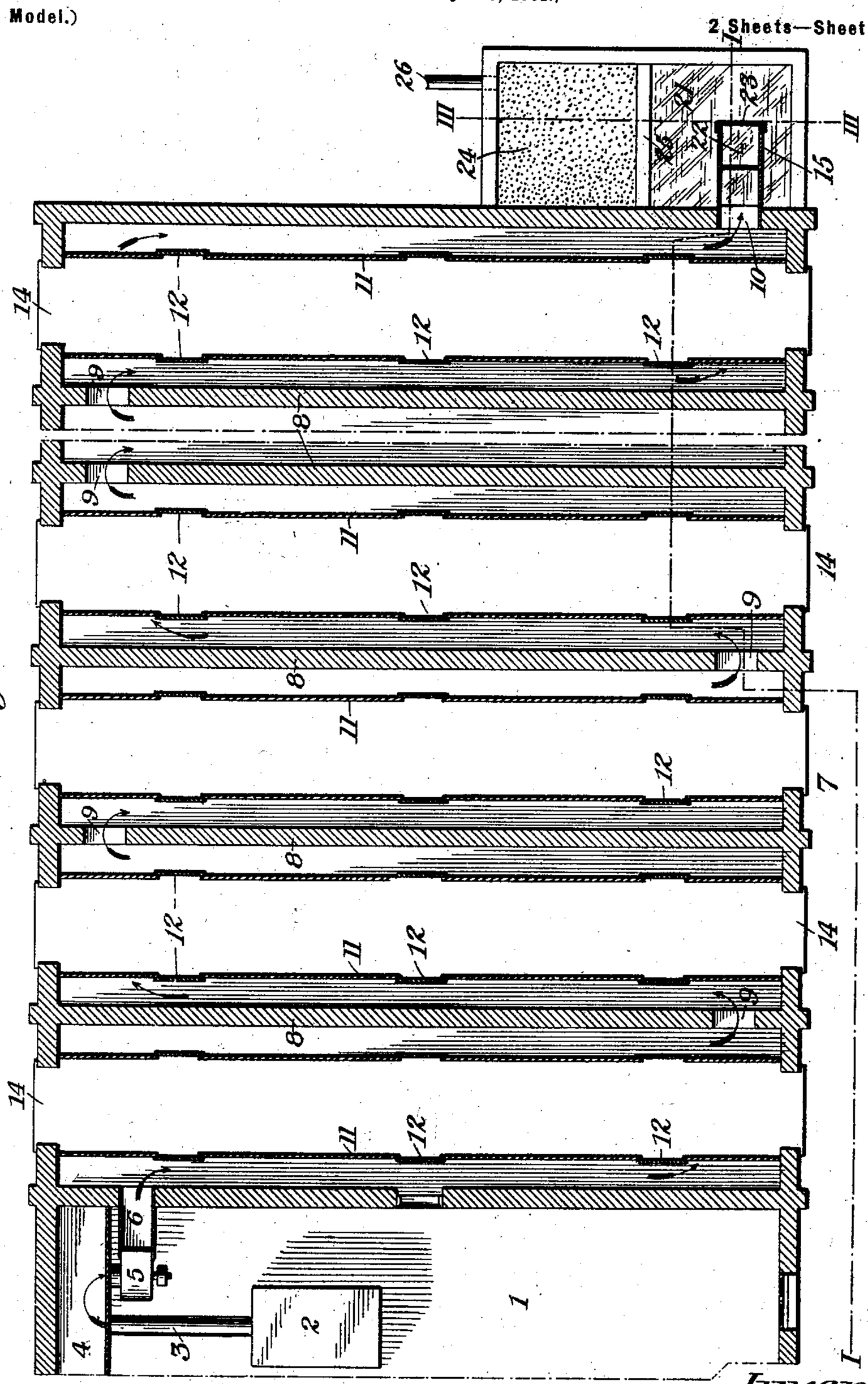
(No Model.) 2 Sheets—Sheet 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

ANDREW W. GILLILAND, OF ST. LOUIS, MISSOURI.

FUME-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 709,896, dated September 30, 1902.

Application filed April 19, 1901. Serial No. 56,657. (No model.)

To all whom it may concern:

Be it known that I, ANDREW W. GILLILAND, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Fume-Arresters, or apparatus for treating the gaseous products or fumes evolved from smelting-furnaces in order to precipitate and recover therefrom the metal values which are carried over in the form of oxids and also to remove the oxids of sulfur, arsenic, &c., which otherwise vitiate the atmosphere around the smelting plant, to the injury of health and vegetation, of which the following is a specification.

The apparatus is shown in the accompanying drawings, in which—

Figure 1 is a side elevation, partly in vertical longitudinal section on line I I of Fig. 2. Fig. 2 is a horizontal sectional plan view taken on line II II of Fig. 1, and Fig. 3 is a detail vertical section on line III III of Fig. 2.

In the drawings, 1 indicates the furnace-house, containing one or more smelting-furnaces 2 of any usual construction. The gaseous products or fumes from each furnace are carried through a pipe 3 into a common passage or fume-trail 4, extending along the side wall of the furnace-house. The gases are exhausted from this passage by a fan 5 and delivered through passage 6 into the fume-arrester.

The fume-house 7 is a rectangular structure having walls of brick or other fireproof material and arranged at the end of the furnace-house. The structure 7 is divided into separate compartments by transverse brick partitions 8, extending from the ground-level to the roof. These compartments may desirably be one hundred feet in length, thirty feet high, and thirteen feet wide. The compartment adjoining the furnace-house receives the fumes through passage 6 and delivers them into the next compartment through an opening 9 in the brick partition near the ground-level and at the opposite side of the fume-house. The second compartment communicates with the third through a similar opening in the second brick partition at the opposite side of the fume-house, and so on through the several compartments. The fumes are thus caused to travel through the several compartments in a zigzag course and escape from the last compartment through an opening 10. Within each compartment is a low sheet-metal structure extending to the side walls of the fume-house and having side walls 11, which are parallel to but spaced away from the transverse brick partitions. In the walls 11 are small sliding doors 12. The roofs 13 of each of these metal structures are inclined downward at such an angle that any metallic oxids or other solid particles deposited on them will slide down and collect in the spaces between the brick partitions and side walls 11, whence they are removed from time to time through doors 12. The chamber within each of these sheet-metal structures is placed in communication with the external atmosphere by doors 14 through the side walls of the fume-house. The metal structures are thereby maintained at a sufficiently low temperature to effect the precipitation of a large portion of the metallic oxids in the fumes, this precipitation being aided by the comparatively cool walls and roof of the fume-house itself, which expose a large radiating-surface to the atmosphere. The residual gases escaping from the fume-house through the passage 10 enter a cooling-tower 15. This cooling-tower is vertically arranged at the end of the fume-house and preferably consists of sheet-iron. The tower has two parallel passages 16 17, communicating at their upper ends, the passage 16 adjacent to the fume-house being provided with a vertical series of horizontal screens 18, preferably having removable bars or slats. At the top of the tower is a receptacle 19, which receives water from pipe 20 and showers it down through a number of fine perforations in its bottom through both passages of the tower. The gases received in the tower are thoroughly washed by the water-spray as they rise through the screens and descend through passage 17, and any remaining metallic particles are thereby carried down into a water-tank 21, into which the lower end of the tower 15 extends. The purified gases finally escape from the lower end of passage 17 through an opening 22, having a vertically-sliding counterpoised door 23. The adjustment of this door enables the back pressure on the gases throughout the various passages

of the fume-arrester and finally on the fan to be regulated as desired. The partition between the passages 16 17 is cut away at its lower end to enable the solid matter washed down into the tank to be removed. At the side of the water-tank 21 is a filter-bed 24, separated from the water-tank by wall 25, the upper edge of which is below the side walls of the water-tank and filter. The water introduced into tank 21 from spray device 19 thus overflows into the filter-bed and carries with it any light floating solid particles retained by the filter, the water finally escaping from the filter through drain-pipe 26.

This fume-arrester recovers from eight per cent. to fifteen per cent. of the metallic values of the ore and removes all sulfurous and arsenical gases from the fumes.

I claim—

1. A fume-arrester, comprising a chamber divided into compartments by transverse partitions, and openings in said partitions at alternately opposite ends and near the floor-level only, as set forth.

2. A fume-arrester, comprising a chamber divided into compartments by transverse partitions, openings in said partitions at alternately opposite ends and near the floor-level only, and means in one or more of the compartments for cooling the gases passed through them, as set forth.

3. A fume-arrester, comprising a chamber divided into compartments by transverse partitions, openings in said partitions, and means in one or more of the compartments, extending up from the floor of each compartment between said openings, for cooling the gases passed through them, as set forth.

4. A fume-arrester, comprising a chamber divided into compartments by transverse partitions, openings in said partitions at alternately opposite ends and near the floor-level only, and a cooling-passage in one or more of said compartments, communicating with the external atmosphere, as set forth.

5. A fume-arrester, comprising a compartment having an inlet and outlet, and a cooling-passage in said compartment, communicating with the external atmosphere, and having a roof of such pitch that any solid particles deposited thereon will slide off, as set forth.

6. A fume-arrester, comprising a compartment having an inlet and outlet, a cooling-passage in said compartment, communicating with the external atmosphere, and doors in the walls of said passage for the removal of precipitated fume, as set forth.

7. A fume-arrester, comprising a chamber divided into compartments by transverse partitions, openings in said partitions at alternately opposite ends, and a cooling-passage in one or more of said compartments, communicating at each of its ends with the external atmosphere, as set forth.

8. A fume-arrester, comprising a chamber, divided into compartments by transverse partitions, openings in said compartments at alternately opposite ends, and a cooling-passage in one or more of said compartments, communicating with the external atmosphere, and having a roof of such pitch that any solid particles deposited thereon will slide off, as set forth.

9. A fume-arrester, comprising a chamber divided into compartments by transverse partitions, openings in said partitions at alternately opposite ends, a cooling-passage in one or more of said compartments, communicating with the external atmosphere, and doors in the walls of said passage for the removal of precipitated fume, as set forth.

10. A fume-arrester, comprising a chamber divided into compartments by transverse partitions, openings in said partitions at alternately opposite ends, and cooling-passages in each of said compartments, said passages communicating at each of their ends with the external atmosphere, and having steep-pitched roofs and doors for the removal of precipitated fume, as set forth.

11. A cooling-tower having vertical passages communicating at their upper ends, a fume-inlet and a vertical series of removable superposed screens in one of said passages, an outlet from the other passage, and means for spraying water down each of said passages, as set forth.

12. A cooling-tower having its lower end extending down into a water-tank, vertical passages in said tower, communicating at their upper ends and opening below into said tank, a fume-inlet to one passage and an outlet from the other passage, as set forth.

13. A cooling-tower having its lower end extending down into a water-tank, vertical passages in said tower, communicating at their upper ends and opening below into said tank, a fume-inlet and a vertical series of superposed screens in one of said passages, an outlet from the other passage, and means for spraying water down both of said passages, as set forth.

14. A cooling-tower having its lower end arranged in a water-tank, a lateral outlet in the lower end of said tower, and adjustable means for varying the height of said outlet, as set forth.

15. A cooling-tower having its lower end extending down into a water-tank, means for spraying water down said tower, a filter, and a passage leading from the water-tank to the filter, as set forth.

16. A cooling-tower having its lower end extending down into a water-tank, vertical passages in said tower, communicating at their upper ends, and opening below into said tank, a fume-inlet to one passage, and an outlet from the other, and a filter connected with said water-tank, as set forth.

17. A cooling-tower having its lower end extending down into a water-tank, vertical passages in said tower communicating at their upper ends and opening below into said

tank, a fume-inlet and a vertical series of superposed screens in one of said passages, an outlet from the other passage, means for spraying water down both of said passages, and a filter connected with said water-tank, as set forth.

18. A cooling-tower having its lower end arranged in a water-tank, vertical passages in said tower, communicating at their upper ends and opening below into said tank, a fume-inlet to one of said passages, a lateral outlet from the other passage into said water-tank, and adjustable means for varying the height of said outlet, as set forth.

19. A fume-arrester, comprising a chamber divided into compartments by transverse partitions, openings in said partitions at alternately opposite ends, a cooling-passage in each of said compartments, communicating at each of its ends with the external atmosphere, a cooling-tower communicating with the last compartment and having its lower end arranged in a water-tank, vertical passages in said tower communicating at their upper ends and opening below into said tank, a vertical series of superposed screens in one of said passages, and means for spraying water down each of said passages, as set forth.

In testimony whereof I have hereto affixed my signature in presence of two witnesses.

ANDREW W. GILLILAND.

Witnesses:

CHAS. N. BROWN,

SPENCER TOMPKINS.