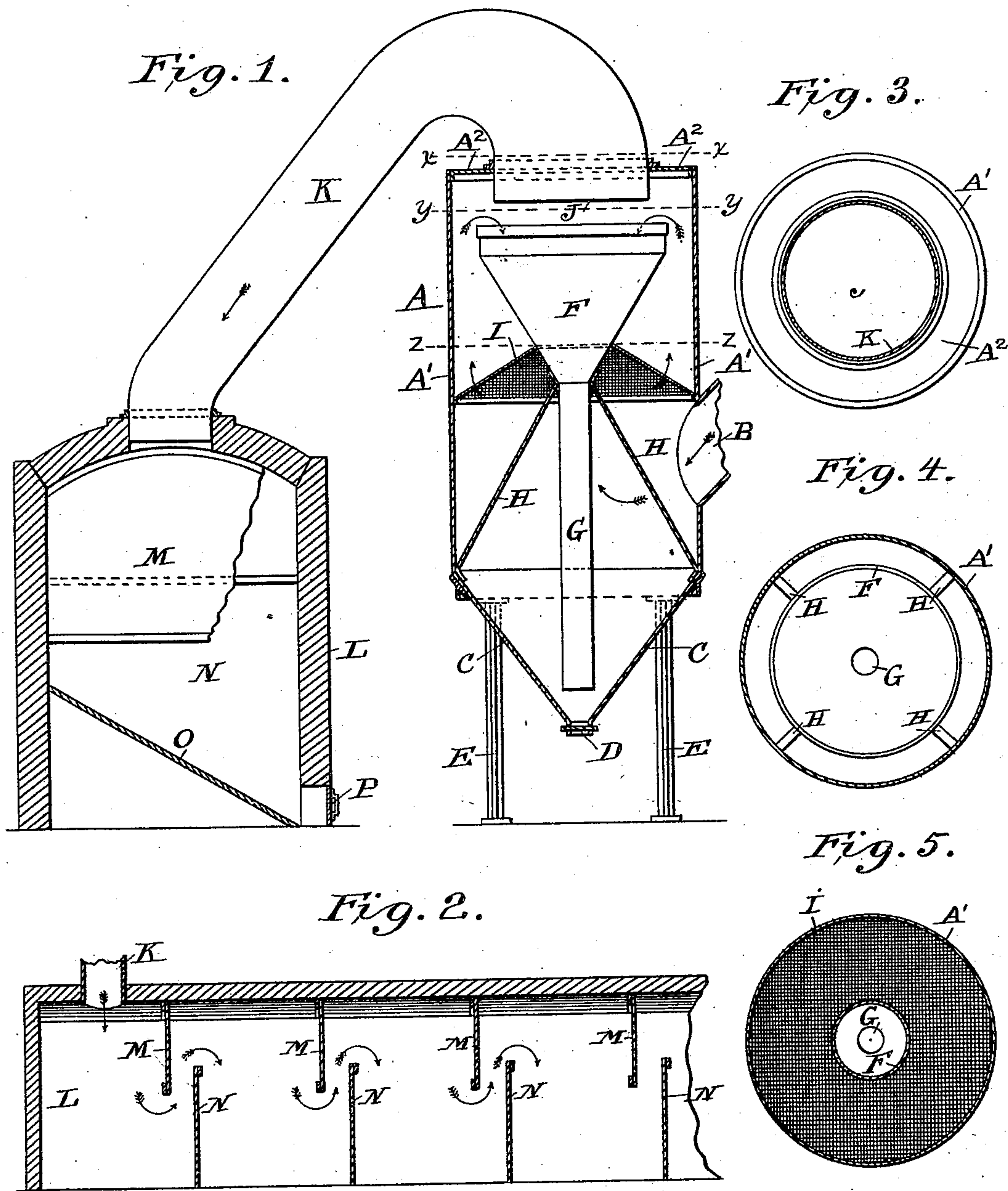


(No Model.)

H. G. WILLIAMS.
SEPARATING DUST FROM FURNACE FUMES.

No. 554,563.

Patented Feb. 11, 1896.



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SEPARATING DUST FROM FURNACE-FUMES.

SPECIFICATION forming part of Letters Patent No. 554,563, dated February 11, 1896.

Application filed July 22, 1895. Serial No. 556,755. (No model.)

To all whom it may concern:

Be it known that I, HENRY GORDON WILLIAMS, a citizen of the United States, residing at Pueblo, in the county of Pueblo and State of Colorado, have invented certain new and useful Improvements in Apparatus for Separating Dust from Furnace-Fumes; 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 letters of reference marked thereon, which form a part of this specification.

My invention relates to certain improvements in apparatus for catching the dust contained in the fumes from blast and other metallurgical furnaces, and so is especially adapted to furnaces used in smelting silver, lead, gold, and copper ores.

The object of my invention is to provide a simple and comparatively inexpensive apparatus which may be easily applied to any furnace in order to detain and save the particles of dust composed of ore and condensed metals contained in the fumes given off by the furnaces.

In the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts, Figure 1 is a vertical cross-section of the apparatus. Fig. 2 is a longitudinal section through the flue-chamber. Fig. 3 is a horizontal section and plan view on the line $x x$, Fig. 1. Fig. 4 is a horizontal section and plan view on the line $y y$, Fig. 1. Fig. 5 is a horizontal section and plan view on the line $z z$, Fig. 1.

The apparatus consists principally of a dust-catcher A, a goose-neck pipe K, and a flue-chamber L.

The fumes coming from the furnaces are first received into the dust-catcher A at a point somewhat below its vertical center through the inlet-pipe B.

The dust-catcher A is preferably constructed of as light iron material as is permissible in order to allow of as great radiation of heat

as possible from the fumes passing through it. It consists of an outer vertical shell or casing A', preferably circular in form, with a hopper-bottom C and a gate D for discharging the collected dust, and is supported by the columns E. In the interior of the dust-catcher A is placed a funnel F, with a discharge-pipe G leading downward to a point near the bottom of the hopper C, both the funnel F and its discharge-pipe G being sustained by the supports E. The dust-catcher A is also provided in its interior with a diaphragm of wire-netting I placed above the opening for the inlet-pipe B and extending through the annular space between the shell A' and the funnel F. The upper end of the funnel F is preferably made of such diameter that the annular space between it and the outer shell A of the dust-catcher will equal in area for the passage of fumes the area of the inlet-pipe B, and it is placed at a distance below the outlet J into the goose-neck pipe E, which will give a similar area for the passage of the fumes.

The discharge J from the dust-catcher A into the goose-neck pipe K is made somewhat less in diameter than the top of the funnel F and projects downward below the top A² of the casing into the interior of the dust-catcher. The goose-neck pipe K is gradually reduced in diameter after leaving the opening J and conducts the fumes from the dust-catcher A to the flue-chamber L, which is of similar construction as regards its sides and roof to an ordinary flue for the passage of smoke or other gases, but is preferably made of considerably larger corresponding dimensions. It is provided with a bottom O inclining toward cleaning-doors P for removing the dust deposited within the chamber.

Within the flue-chamber L are placed two series of aprons constructed of sheet-iron or other suitable material. Series M M project downward from the roof of the chamber, and series N N project upward from the floor. In both cases the aprons extend laterally the full distance across the flue, but in neither case do they entirely close the flue in a vertical direction. Preferably each apron shuts off somewhat more than one-half of the cross-

sectional area of the chamber, so that the tops of aprons N project above bottoms of aprons M. These aprons are arranged in pairs, consisting of one apron M and one apron N with the horizontal distance between the aprons of each pair less than the distance between the pairs.

The fumes from which it is desirable to extract the dust travel through the dust-catcher A, the pipe K and the chamber L in the direction indicated by arrows.

The dust is deposited by reason of the cooling, sudden expansions and contractions, changes of velocities and directions, and the eddying and friction of the fumes in passing through the apparatus. As the fumes enter the lower part of the dust-catcher A, below the diaphragm I, from the pipe B, their velocity suddenly is diminished and eddies are produced by the impinging of the fume-current against the casing A', the pipe G and the supports B, while their too sudden escape upward is prevented by the wire-netting diaphragm I. As a result the larger and heavier particles of dust are deposited in the hopper-bottom C to be removed at suitable times through the gate D. The fumes then ascend with gradually-increasing velocity through the diaphragm I and the annular space between the casing A' and the funnel F and pass with a sudden change of direction of current through the circular space between the bottom of the goose-neck pipe K and the top of the funnel F, where further changes of velocity and direction of current take place and eddies are created, causing a deposit of dust in the interior of the funnel F. The dust thus deposited passes down through the pipe G without disturbance from the fume-currents below the diaphragm I, and thence is removed through the gate D. The fumes finally escape through the opening J into the goose-neck pipe K and are conducted into the flue-chamber L.

In traveling through the flue-chamber L the fumes are subjected to successive changes of direction and velocity and eddying of their currents with consequent deposit of dust in passing each pair of aprons M and N till all of the dust carried by the fumes which it is desirable to secure is deposited in the bottom of the chamber which the aprons N render comparatively undisturbed by fume-currents. By means of the doors P the dust can be removed when desired.

The flue-chamber L with its aprons M M and N N may be made of any dimensions desired and may be extended to any length or in any direction before the fumes are finally allowed to escape; but on account of the very rapid depositing of the dust taking place therein, as well as in the dust-catcher A, they may be much less extensive than those usually employed, and the great expense of bag-

rooms or a series of very long flues or of passing the fumes through water may be dispensed with.

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

1. In an apparatus for the separation of dust from furnace-fumes, a dust-catcher consisting of the combination with an outer shell provided with a closed hopper-bottom, of a funnel inclosed in said shell and discharging near to and above the bottom thereof, an inlet-pipe opening into the shell at one side and in a downward direction at a point below the mouth of the funnel, and an outlet-pipe leading out of the top of the shell, substantially as described.

2. In an apparatus for the separation of dust from furnace-fumes, a dust-catcher consisting of the combination with an outer shell provided with a closed hopper-bottom, of a funnel inclosed in said shell having a spout leading downward from the bottom of the funnel to a point near to and above the bottom of the hopper, an outlet-pipe at the top of the shell, and an inlet-pipe entering the shell at one side and in a downward direction below the top of the funnel, substantially as described.

3. In an apparatus for the separation of dust from furnace-fumes, a dust-catcher consisting of the combination with an outer shell having a closed hopper-bottom and discharge-gate, of a funnel inclosed in said shell and discharging near to and above the gate, an outlet-pipe at the top of the shell, and an inlet-pipe entering the shell at one side having an area equal to the area of the annular space between the shell and the top of the funnel, substantially as described.

4. In an apparatus for the separation of dust from furnace-fumes, a dust-catcher consisting of the combination with a shell, having a closed hopper-bottom, of a funnel inclosed in said shell and discharging near to and above the bottom thereof, an annular diaphragm of wire-netting filling the space between the shell and the funnel, an inlet-pipe entering the shell at one side below the diaphragm, and an outlet-pipe at the top of the shell, substantially as described.

5. In an apparatus for the separation of dust from furnace-fumes, a dust-catcher consisting of the combination with a shell, of a funnel inclosed therein and discharging near the bottom thereof, an inlet-pipe entering the shell at one side and having an area equal to that of the annular space between the shell and the funnel, and an outlet-pipe extending down through the top of the casing, the annular space between said pipe and the top of the funnel being the same as that of the inlet-pipe, substantially as described.

6. In an apparatus for the separation of

dust from furnace-fumes, a dust-catcher consisting of the combination with a shell having a hopper-bottom and a discharge-gate, of a funnel inclosed in said shell having a spout
5 discharging near said gate, a wire-netting diaphragm extending between the funnel and the shell, an inlet-pipe opening into said shell below the diaphragm and in a downward direction, and an outlet-pipe of large initial but

progressively-decreasing area leading out of the top of the shell, substantially as described.

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

HENRY GORDON WILLIAMS.

Witnesses:

W. W. ALLEN,
W. W. COOPER.