

No. 693,240.

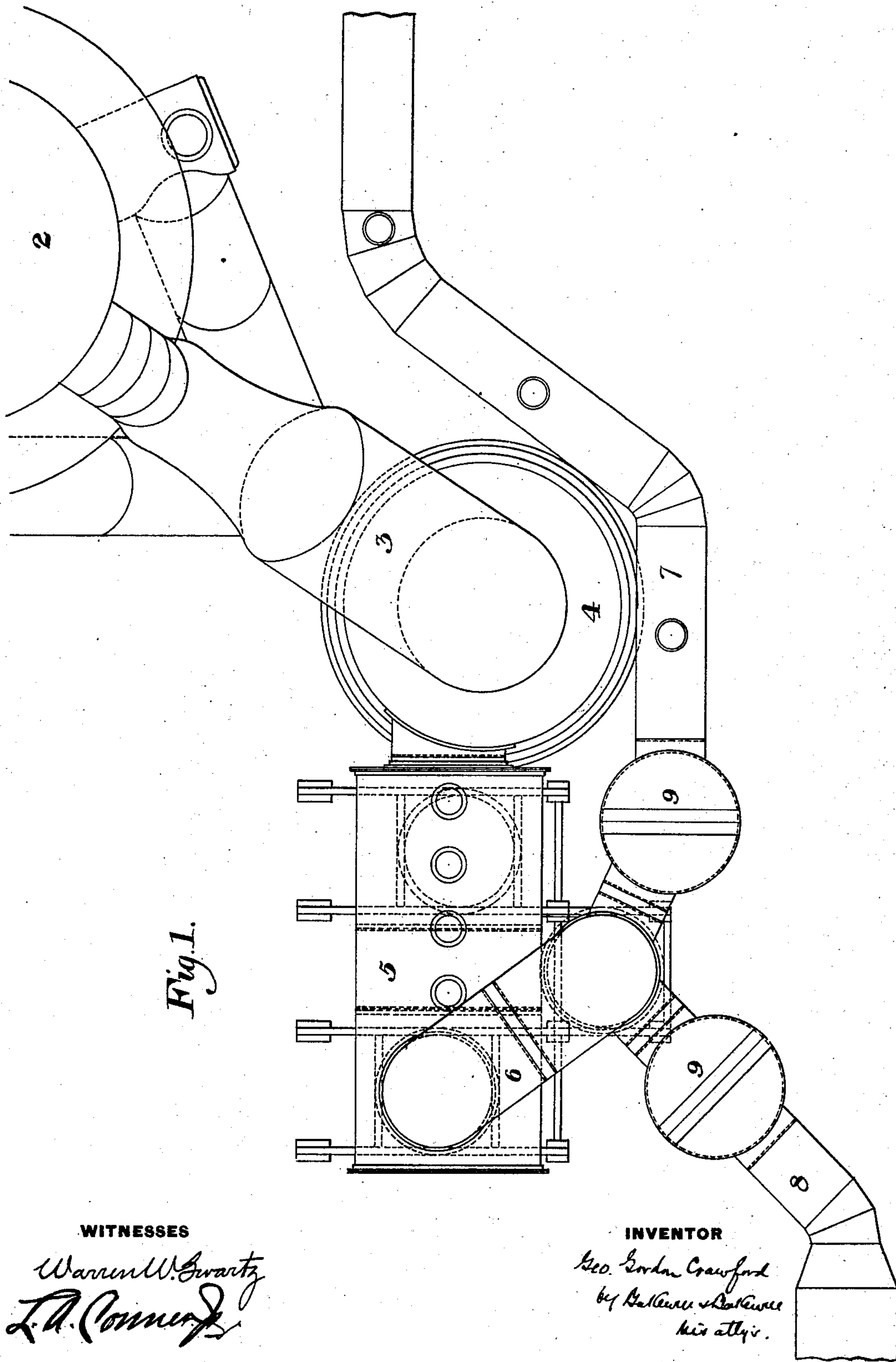
Patented Feb. 11, 1902.

G. G. CRAWFORD.
FURNACE VALVE AND DUST CATCHER.

(Application filed Nov. 26, 1900.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES

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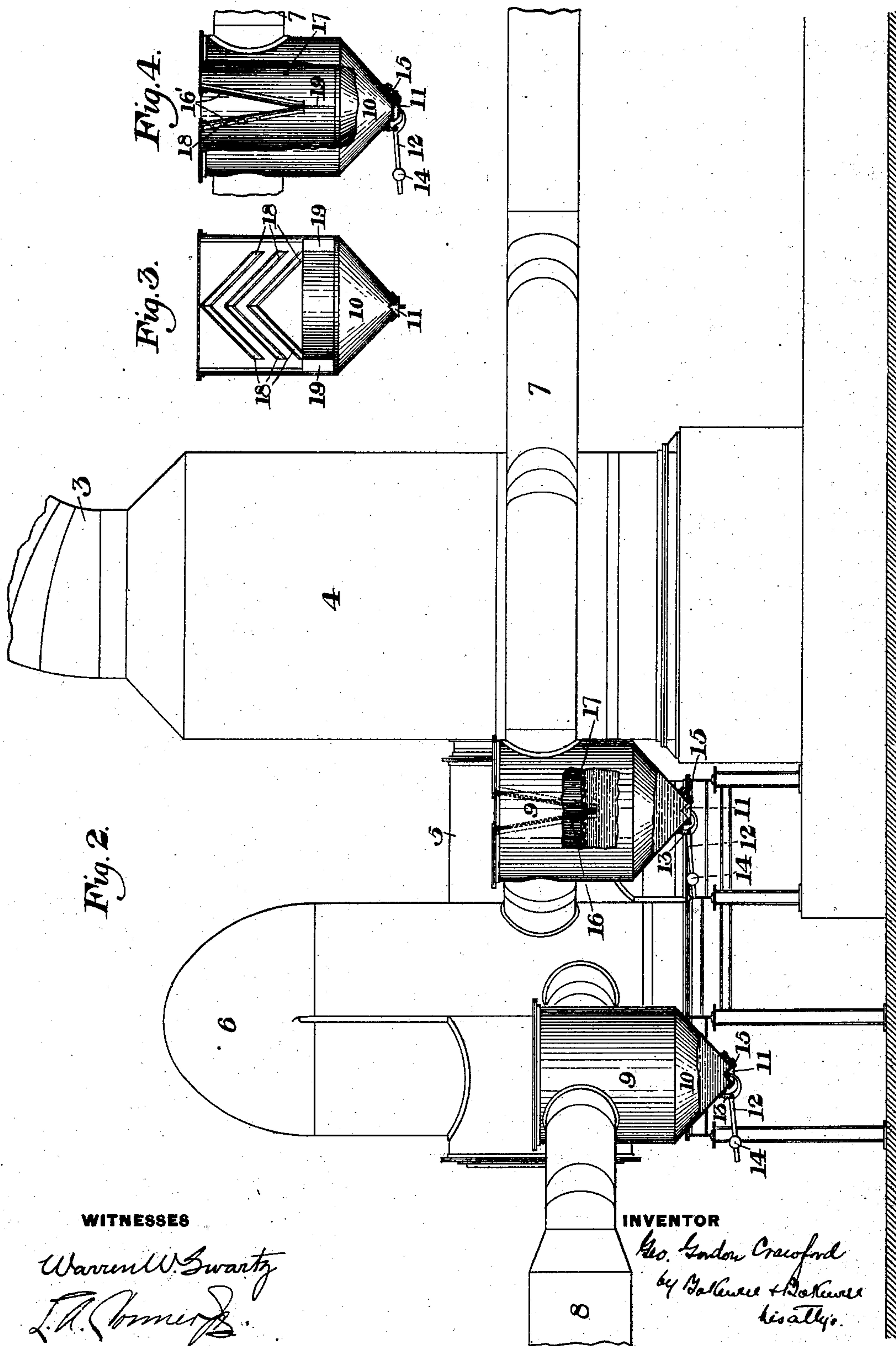


Fig. 2.

Fig. 4.

Fig. 3.

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UNITED STATES PATENT OFFICE.

GEORGE GORDON CRAWFORD, OF BRADDOCK, PENNSYLVANIA.

FURNACE-VALVE AND DUST-CATCHER.

SPECIFICATION forming part of Letters Patent No. 693,240, dated February 11, 1902.

Application filed November 26, 1900. Serial No. 37,777. (No model.)

To all whom it may concern:

Be it known that I, GEORGE GORDON CRAWFORD, of Braddock, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Furnace-Valves and Dust-Catchers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a top plan view showing a portion of a blast-furnace plant provided with my improved combined valves and dust-catchers. Fig. 2 is a side elevation of the same, partly broken away; and Figs. 3 and 4 are detail sectional side elevations showing my preferred form of the baffle-plate or partition of the valve.

My invention relates to the valves employed in pipes and channels for conveying heated gases, and especially to the separating of the dust carried in blast-furnace and other hot gases; and it is designed to provide a simple valve device which will effectually shut off the flow of gases when desired without liability to leakage; also, to arrange such valve so that when the conduit is open it may act as a dust-catcher, and, further, to provide an improved form of dust-catcher which may be employed at any desired point in the connections leading from the blast-furnace.

In the drawings, 2 represents a portion of a blast-furnace having a downtake 3 leading into the top of a vertical dust-catcher 4. From the lower part of this dust-catcher the gases pass into a horizontal dust-catcher 5, from the other end of which they pass into an inverted-U-shaped pipe 6. From the pipe 6 are led the branch lines to convey the gases to the point or points where they are burned. In the arrangement shown in the drawings 7 represents a branch leading to the hot-blast stoves, and 8 a similar branch leading to the boiler-furnace of the plant. In each of these branches is located one of my improved valves and dust-catchers 9, by means of which the flow of gases may be cut off through the branch when desired, and by which a part of the dust is removed from the stream of gases when they are allowed to pass through the

branch. In the form shown the device consists of a cylindrical chamber having a bottom portion 10, of funnel shape, with a hole at the lower end, which is normally closed by a small bell 11, mounted upon the inner end of a lever 12, pivoted to the hopper, preferably by a link 13, and having a counterweight 14 secured to its outer arm. The bell may be moved down to open the hole in the device and when closed may be secured by a latch device 15. The chamber is provided with a depending vertical baffle-plate or shield 16, which I have shown as of V form, consisting of two plates riveted together at their lower ends at a point intermediate of the height of the chamber and thence diverging and extending upwardly, their edges being secured to the inner face of the chamber by angles riveted to the chamber and the plates or in any other suitable way. The top portions of the chamber at the sides of the partition are closed by suitable plates, as shown, and a water-supply pipe 17 leads into the chamber at a point above the lower end of the partition.

In the operation of the plant if gas is to be supplied through any branch the water is emptied from the chamber 9 by lowering the bell. The bell is then raised and locked, and as the entering current of gas strikes the face of the partition it is deflected downwardly. As the current passes around beneath the lower end of the partition and thence upward to the continuation of the branch main a part of the dust will drop from the current and be deposited in the lower part of the chamber. As the chamber is gradually filled up in its lower portion the bell or other closure is opened from time to time, as desired, to remove the accumulations. If it is desired to cut off the flow of gases through any branch, water is supplied through the pipe 17 until it rises above the lower end of the partition, and the connection between the two parts of the branch is thus cut off, the partition coacting with the fluid to form a closing valve or gate.

In order to increase the amount of dust deposited in the chamber 9 when gases are flowing through it, I prefer to use the form of Figs. 3 and 4, wherein the entrance side face of the

partition 16' is provided with a series of angular ridges or ribs 18, which extend upwardly in opposite directions and join each other in pairs at the center line of the partition, as shown in Fig. 3. The outer ends of these ribs terminate short of the side edges of the partition, leaving vertical spaces at their ends which lead down to spaces partially inclosed by channels 19, extending vertically down to the level of the funnel portion from the lower end of each of the lowest ribs. The ribs may be formed by channels or angles bolted to the face of the partition, or they may be cast upon the partition, as desired. In the operation of this form the spaces between the ribs form dead-air pockets, into which the dust is projected by the entering current. The dust thus driven into these spaces slides down the ribs or ledges and thence down the end pockets formed by the vertical channels and into the funnel-shaped bottom. As the main current is through the central portion, the dust is thus more effectually removed from the current.

The advantages of my invention will be apparent to those skilled in the art. The single simple device acts both as a valve and a dust-catcher and is efficient for both purposes. In its valvular function it does away with the trouble resulting from the warping and improper seating of valves generally employed, giving a perfect seal, and in its function of dust-catcher the vertical baffle, with the outlet at the lower end, to which the dust is directed, gives a considerable deposit of dust from the current and an easy removal of the accumulation from the chamber.

Many variations may be made in the form and arrangement of the device and its location without departing from my invention as claimed. It may also be used as a dust-catcher alone.

I claim—

1. In a dust-catcher, an inclosed dust-chamber having an intermediate depending partition formed of plates secured together in general V form with an open top thereto, an inlet-pipe entering the side of the chamber opposite to the partition, an outlet-pipe leading from the opposite side of the chamber, both said pipes being of smaller diameter than the chamber, the lower portion of the chamber having sloping sides, and a removable closure arranged to discharge solid deposits from the lower end of the chamber; substantially as described.

2. A dust-catcher having a depending partition with inclined ribs thereon, and an inlet-pipe arranged to direct the gases against the face of the partition; substantially as described.

3. A dust-catcher having a depending partition provided with ribs or flanges inclined upwardly from both sides to central ridges or apices forming ridges thereon, and an inlet-

pipe entering the side of the dust-chamber opposite the partition; substantially as described.

4. A combined water-sealing valve and dust-catcher comprising an inclosed chamber, an intermediate depending partition therein, an inlet-pipe entering one side of the chamber opposite the partition, an outlet-pipe leading from the opposite side, both of said pipes being of smaller diameter than the chamber, a removable closure forming a part of the bottom of the chamber and arranged to drop away and leave an opening in the bottom for the discharge of solid deposits therefrom when used as a dust-catcher, and means for feeding water into the chamber to a level above the lower end of the partition when using the device as a valve; substantially as described.

5. A combined water-sealing valve and dust-catcher, comprising a vertical inclosed chamber with a central depending partition extending downwardly a part of the depth of said chamber, an inlet-pipe entering one side of the chamber opposite to the partition and above its lower end, an outlet-pipe leading from the other side of the chamber, said chamber having sloping sides in its lower portion, a removable closure at the lower end of the chamber arranged to drop solid deposits therefrom when used as a dust-catcher, and a water-inlet pipe between the lower edge of the partition and the level of the inlet-pipe; substantially as described.

6. The combination with a blast-furnace, of a dust-catcher connected thereto, a pipe leading from the dust-catcher and a combined valve and dust-catcher located therein and having a greater cross-sectional area than said pipe, means for feeding water into the chamber to a level sufficient to seal the device against the flow of gas therethrough when used as a valve, and an adjustable closure forming part of the bottom of said chamber and arranged to drop away and leave an opening in the bottom for the discharge of the dry material, when used as a dust-catcher; substantially as described.

7. The combination with a dust-catcher of a blast-furnace, of a pipe leading therefrom, a dust-catcher located in said pipe and having a depending partition therein, a fluid-outlet consisting of a removable closure in the lower end of the dust-catcher, said closure being also arranged to discharge solid deposits from the chamber when used as a dust-catcher, and a fluid-inlet arranged to supply water at a level above the lower end of the partition; substantially as described.

8. In a blast-furnace system, a blast-furnace, a dust-catcher, a downtake leading from the top of the furnace to the dust-catcher, a pipe leading from said dust-catcher to a device for consuming the gas, and a combined valve and dust-catcher located in said

pipe and having a depending partition, a removable closure forming a part of the bottom of said device, and arranged to drop away and leave an opening in the bottom for the discharge of dry material therefrom when
5 used as a dry-dust catcher, and a pipe arranged to supply fluid to the chamber to a level above the lower end of the partition, en-

abling the device to act as a valve; substantially as described.

In testimony whereof I have hereunto set my hand.

GEORGE GORDON CRAWFORD.

Witnesses:

L. M. REDMAN,

G. I. HOLDSHIP.