No. 836,801. PATENTED NOV. 27, 1906.

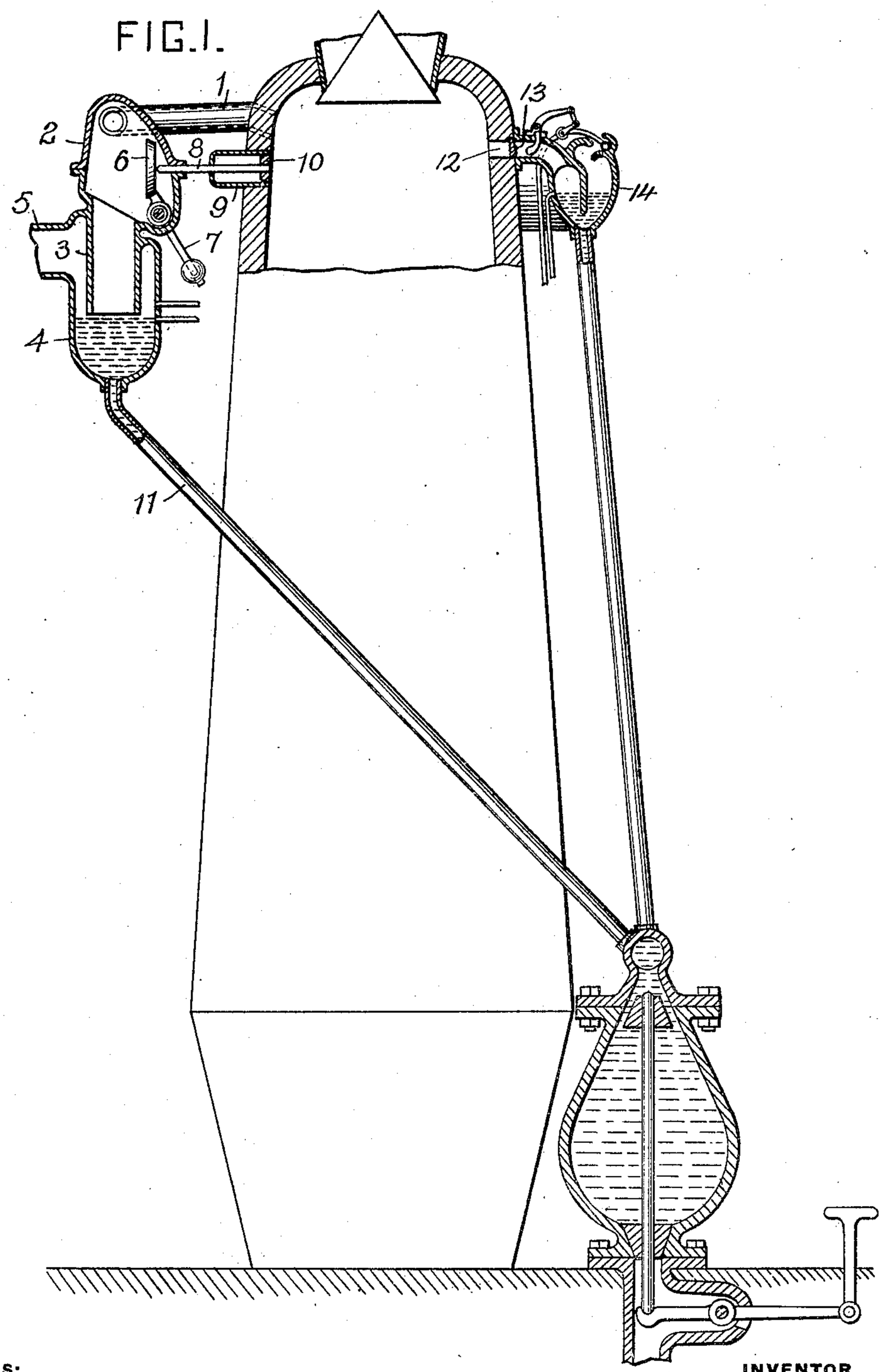
J. COYNE.

BLAST FURNACE.

APPLICATION FILED DEC. 22, 1904.

2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:

Herbert Bradley.

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2 SHEETS—SHEET 2.

FIG. 2.

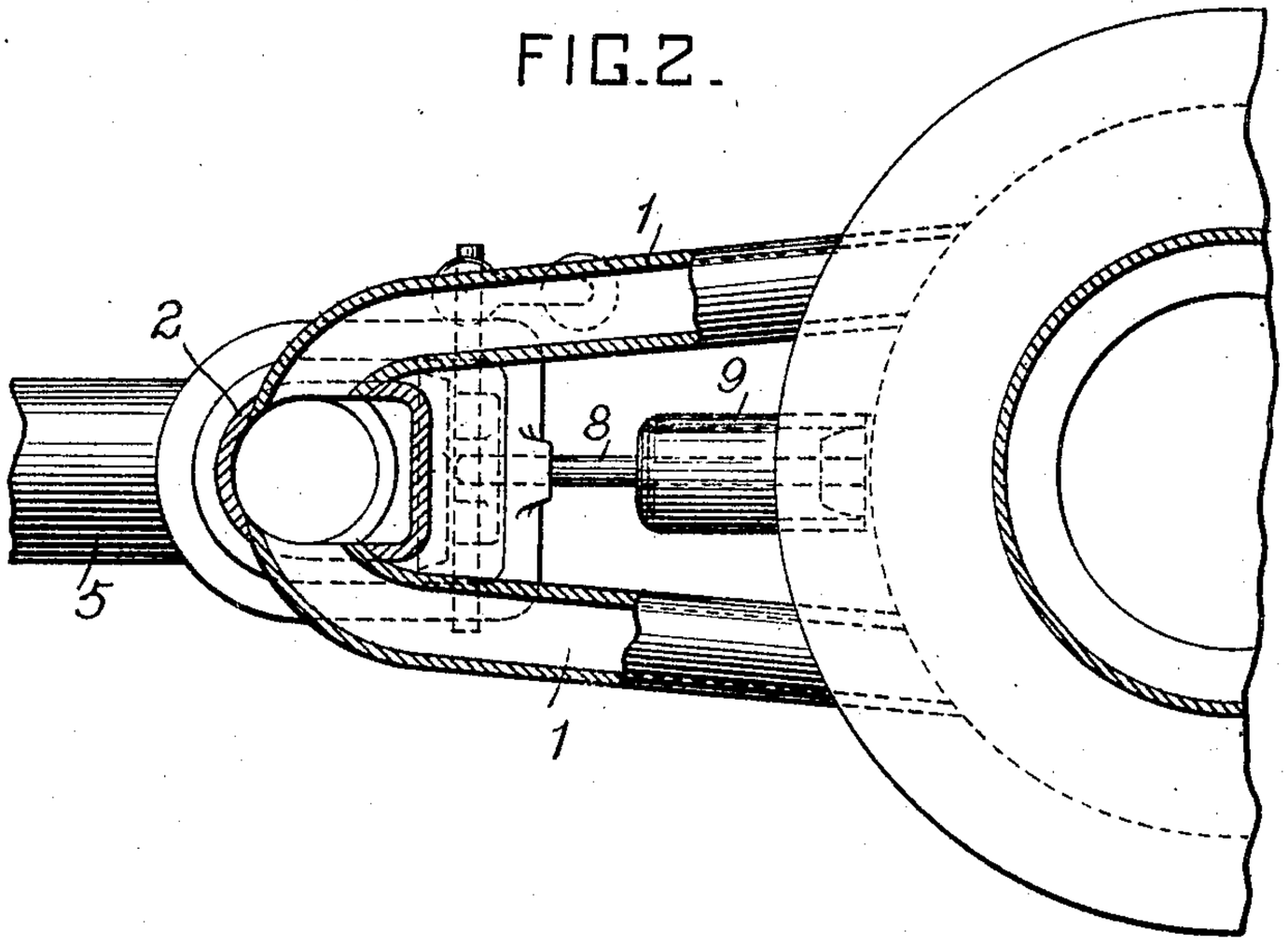
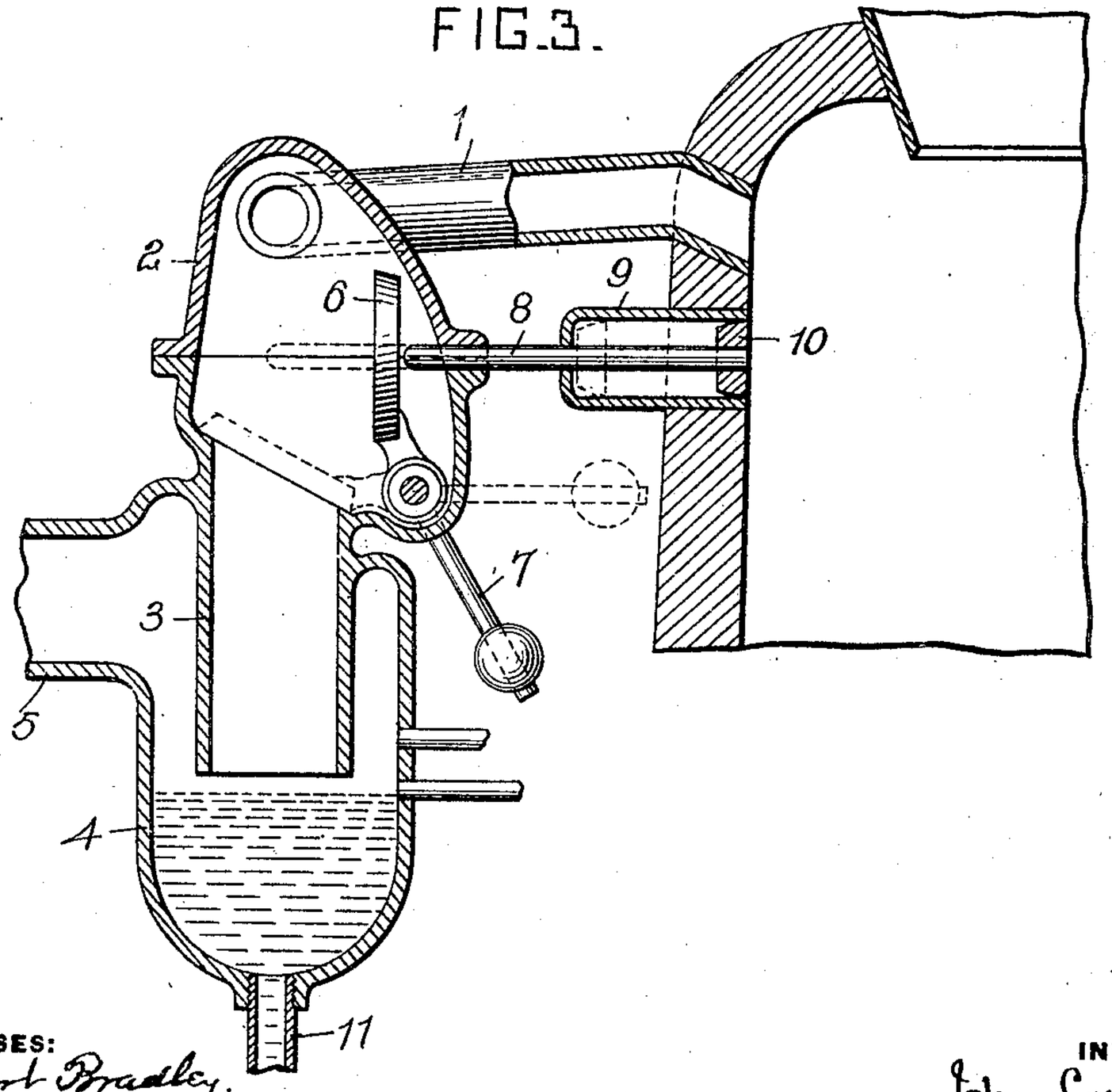


FIG. 3.



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UNITED STATES PATENT OFFICE.

JOHN COYNE, OF WILKINSBURG, PENNSYLVANIA.

BLAST-FURNACE.

No. 836,801. Specification of Letters Patent. Patented Nov. 27, 1906.

Application filed December 22, 1904. Serial No. 237,986.

To all whom it may concern:

Be it known that I, JOHN COYNE, a citizen of the United States, residing at Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Blast-Furnaces, of which improvements the following is a specification.

The invention described herein relates to certain improvements in blast-furnaces, and has for its object the provision of suitable means whereby dust, &c., can be removed from the combustible gases on their passage to the point or points of use.

It is a further object of the invention to prevent the effects due to the explosion of gases in the furnace from extending into and through the down-comer pipes, and thereby preventing the carrying of dust, &c., into the hot-blast stoves, boiler, furnaces, &c.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a view, partly in section and partly in side elevation, of the blast-furnaces having my improvements applied thereto. Fig. 2 is a view, partly in plan and partly in section, of the furnace; and Fig. 3 is a large sectional view of the upper portion of the furnace and the mechanism employed for controlling the flow of gases to the down-comer pipe.

In Letters Patent No. 777,498, dated December 13, 1904, I have described and claimed certain improvements in blast-furnaces, consisting, generally stated, in the provision of an explosion-chamber in communication with the upper portion of the blast-furnace and means whereby the dust, &c., may be removed from the gases generated on an explosion in the furnace before such gases are permitted to pass into the atmosphere. In order to prevent the gases generated on the explosion in the furnace from passing into the down-comer pipes and also for the purpose of removing dust, &c., from the gases in their passage during the normal operation of the furnace to and through the down-comer pipes, gas-exit pipes 1 are connected, as usual, to the upper portion of the furnace and at their outer ends to a receiving-chamber 2. This chamber is connected, preferably, by a straight vertical pipe 3 to a dust removing and collecting chamber 4. The pipe 3 extends down into the chamber 4 beyond the point of connection of the down-comer pipe 5 with such chamber, so that the gases will abruptly change or reverse their direction of flow and at the time of changing their direction permit of the separation of the particles of dust, &c., therefrom. Water is placed in the chamber 4, so that its surface will be a short distance below the lower end of the discharge-pipe 3, thus affording a space for the passage of the gases between the end of the pipe and the surface of the water. As the gases change direction as they leave the pipe 3, and as the particles of dust, &c., are heavier than the gases, the direction of movement of these particles will not be changed as rapidly and they will therefore come into contact with the water and be taken up thereby, while the gases without contact with the water, at least to any considerable extent, will pass on through the down-comer pipe.

In order to prevent the gases generated on the explosion in the furnace from entering the chamber 4, a suitable valve mechanism is employed which will stand open during the usual normal operation of the furnace, but will be closed on the sudden increase of pressure in the furnace, thereby preventing a flow of gases to a chamber 4 until normal conditions are reëstablished. A suitable construction to this end consists of a valve 6 so pivoted within the chamber 2 that when shifted, as hereinafter described, it will cover the upper end of the pipe 3. This valve is adapted to be held normally open by any suitable means—as, for example, a weight 7. In order to close the valve, a stem 8, connected thereto, extends into a cylinder 9, supported by the walls of furnace, and is connected to a piston 10 in said cylinder, the inner end of the latter being opened to permit the free access of pressure against the piston. On sudden increase of pressure the piston is shifted outwardly, closing the valve, and thereby preventing any further passage of gases into chamber 4 until the normal conditions are established, when the valve will be opened by the weight 7. In case of an explosion of gases in the furnace the valve 6 is closed, as stated, and the gases generated on such explosion escape through openings 12, which are closed during the usual or normal operation of the furnace by valves 13. These valves are adapted to be opened by an abnormal increase of pressure in the furnace and permit the gases, &c., to flow into the explosion-chamber 14, where provision is

made as described in Letters Patent No. 777,498, dated December 13, 1904, for the separation of solid particles from the gases, the retention of the solid particles, and the free escape of the gases.

In order to remove the solid particles collected in the chamber 4, the latter is connected by a pipe 11 to a collector similar to that shown in the Letters Patent referred to.

I claim herein as my invention—

1. A blast-furnace having in combination a down-comer pipe, a normally open valve, means operative by pressure in the furnace for closing said valve, and outlets from the furnace having normally closed valves and adapted to be opened by abnormal increase of pressure in the furnace, substantially as set forth.

2. A blast-furnace having in combination a down-comer pipe, a normally open valve, means operative by pressure in the furnace for closing said valve, and a normally closed explosion-chamber connected to the furnace, substantially as set forth.

3. A blast-furnace having in combination a down-comer pipe, a normally open valve, means operative by pressure in the furnace for closing the valve, and an explosion-chamber connected to the furnace and means for normally preventing the flow of gas through the explosion-chamber and adapted to be shifted on an abnormal increase of pressure to permit the gas to flow through the chamber, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOHN COYNE.

Witnesses:

CHARLES BARNETT,

FRED KIRCHNER.