

A. G. WITTING & A. O. BAER.
 AUTOMATIC EXPLOSION OR BLEEDER VALVE FOR BLAST FURNACES.
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Fig. 1.

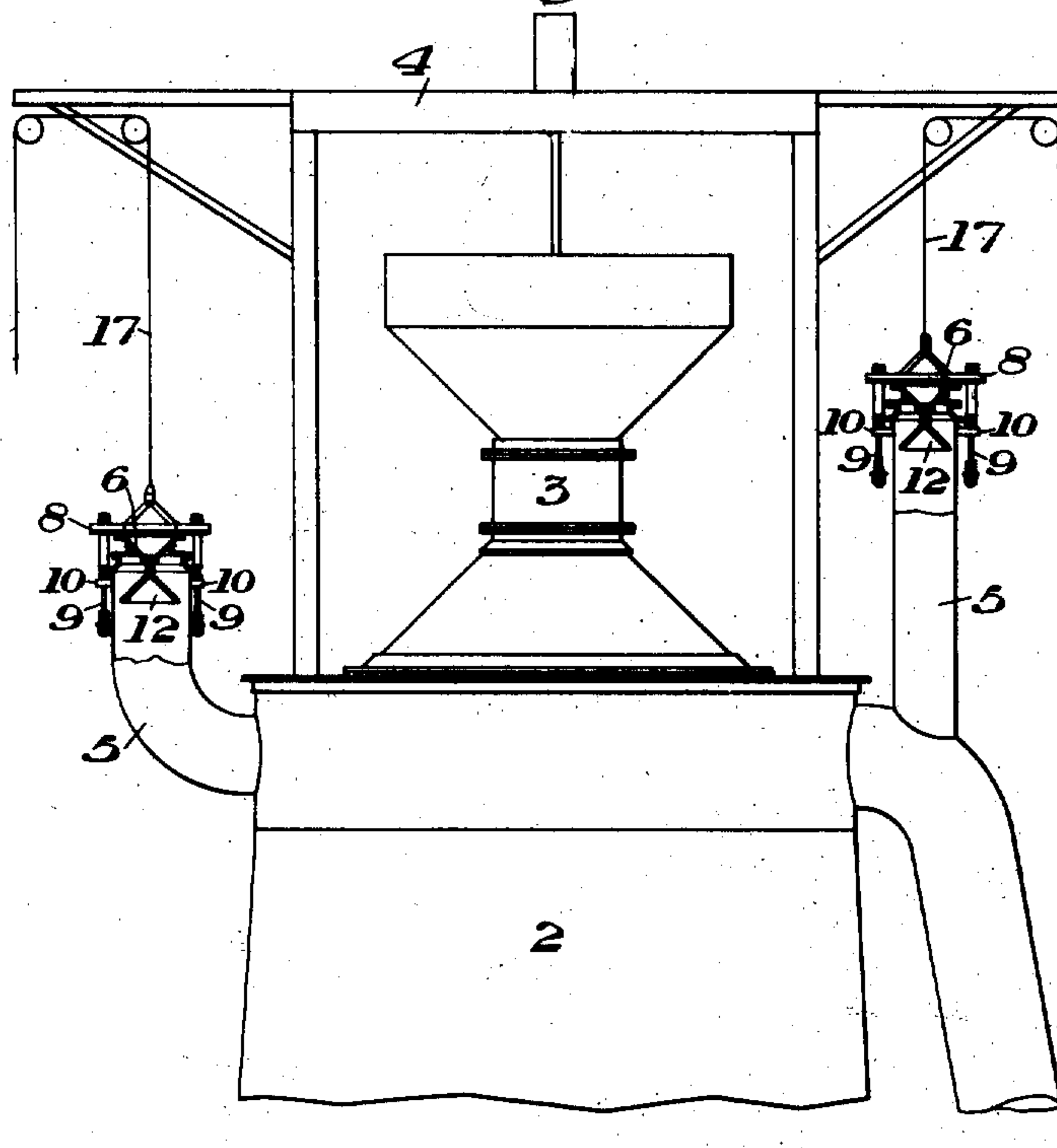
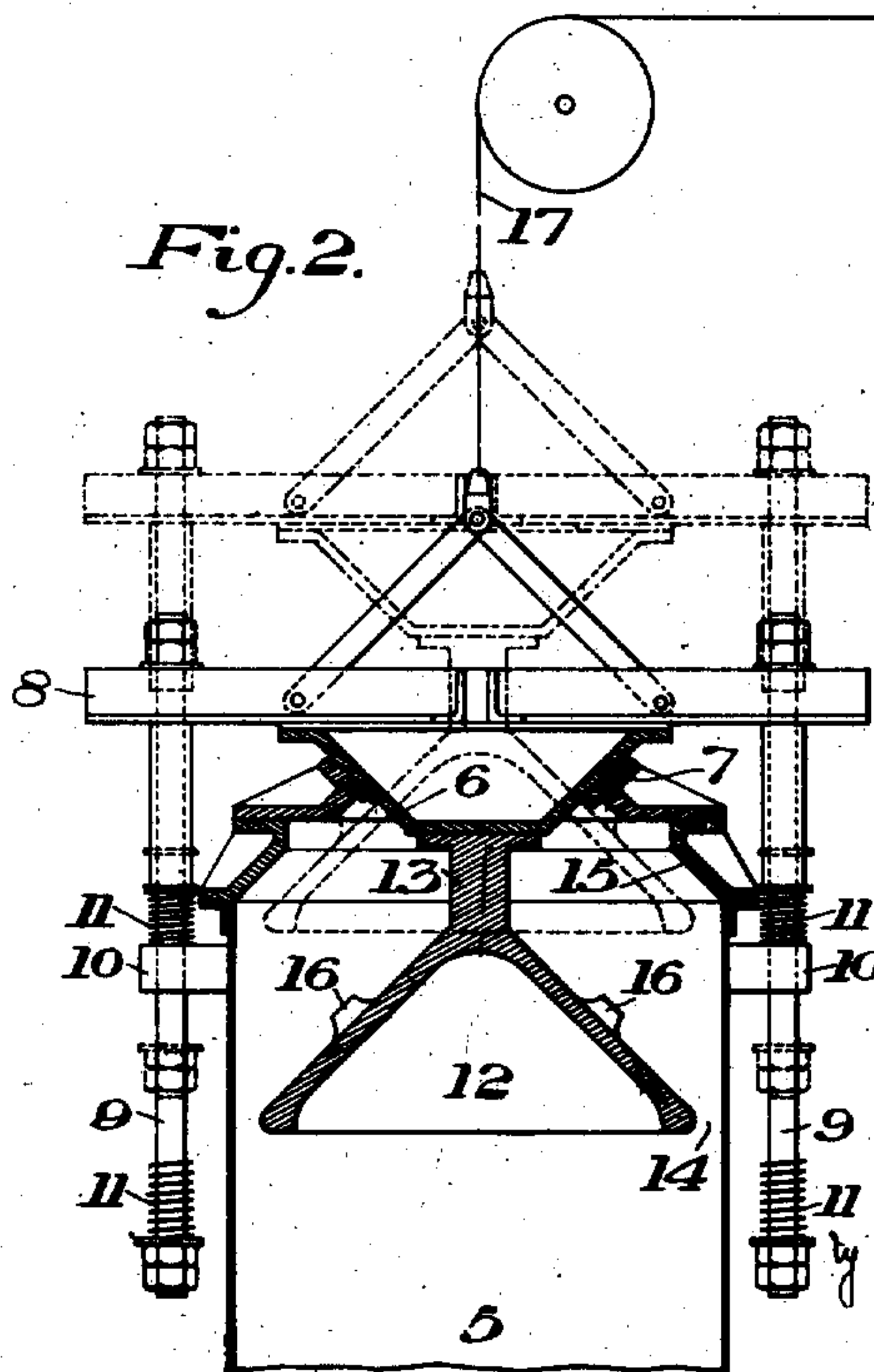


Fig. 2.



WITNESSES

W. W. Swartz
 R. A. Baldwin

INVENTORS

A. G. Witting.
 A. O. Baer.
 by Behner, Bymer & Parmelee,
 their Attys

UNITED STATES PATENT OFFICE.

ALBIN G. WITTING AND ARTHUR O. BAER, OF CHICAGO, ILLINOIS.

AUTOMATIC EXPLOSION OR BLEEDER VALVE FOR BLAST-FURNACES.

No. 903,425.

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To all whom it may concern:

Be it known that we, ALBIN G. WITTING and ARTHUR O. BAER, both of Chicago, Cook county, Illinois, have invented a new and useful Automatic Explosion or Bleeder Valve for Blast-Furnaces, 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 side view of the upper portion of a blast furnace having our invention applied thereto, portions of the bleeder pipes and valves being shown in section; Fig. 2 is a sectional elevation of our improved valve applied to a bleeder pipe.

By reason of the slips or explosions which more or less frequently occur in blast furnaces, they are usually provided with safety or bleeder pipes having closures in the form of a hinged valve, which are so arranged that when the pressure inside the furnace suddenly increases the valves are lifted from their seats so that the gas escapes and the pressure is reduced. Thereafter the valve is again seated by its own weight and closes the bleeders. After a slip or explosion, the gas is sometimes followed by large quantities of ore and coke, which are also thrown out through these valves, thereby causing a considerable loss and adding to the running expenses for cleaning up, as well as being a source of danger to the men working around the furnace.

The object of our invention is to eliminate this objectionable feature of these valves, and to provide means which will prevent ore and coke being thrown out with the escaping gases. To this end, we provide the bleeder pipes with valves having guards attached thereto, and so arranged that when the valves are opened by increase of pressure within the furnace, the guards will act to permit the free escape of gases from the furnace but will prevent the escape of ore, coke, etc.

The precise nature of our invention will be best understood by reference to the accompanying drawings, in which we have shown one embodiment thereof, and which will now be described, it being premised, however, that various changes may be made in the details of construction and arrangement of the valves and guards therefor without departing from the spirit and scope of

our invention as defined in the appended claims.

In these drawings, the numeral 2 designates the upper portion of a blast furnace, 3 the charging mechanism thereof, and 4 the usual superstructure.

5 designates bleeder pipes, of which we have illustrated two, although any desired number may be employed.

6 designates a cone-shaped valve, which normally rests against a seat 7 on the upper end of the bleeder pipe 5, and thereby closes said pipe. This valve is shown as being carried by a bar or cross-head 8 having depending guide rods 9, which work through guide projections 10 secured to the exterior of the bleeder pipe and carrying cushion springs 11 above and below such projections by which the movements of the valve are cushioned.

Depending within the upper portion of the bleeder pipe from the bottom of the valve 6 is a guard 12, which is also preferably in the form of a cone with its apex upwardly, and which is connected at its apex with the truncated portion of the valve 6 by stem 13. The diameter of the cone 12 is sufficiently less than the interior diameter of the bleeder pipe to leave a surrounding annular space 14 between the edge of the bottom of the cone and the interior wall of the pipe. The upper portion 15 of the pipe 5 which carries the valve seat 7 is also of conical interior form, so that when the guard cone 12 is raised to the position shown in dotted lines in Fig. 2, the space surrounding the said cone will be substantially of the same area as that of the annular space 14.

The normal position of the parts is as shown in Figs. 1 and 2, the valve 6 resting on the seat 7 and thereby closing the bleeder pipe. When the pressure inside the furnace is increased sufficiently to overcome the weight of the valve, it is lifted from its seat by such pressure and the gas escapes. The escaping gas passes freely out through the space around the cone 12, but this space is of such restricted character and of such shape that ore and coke or other solid material cannot follow the gas, and the pieces of such material will strike against the under side of the valve seat and be thrown back into the bleeder pipe. The outer surface of the cone 12 is preferably provided with lugs 16, which are arranged to contact with the valve-seating member 7, and thereby prevent

the coke from being lifted sufficiently to entirely close the outlet through said seat.

To enable the valve to be operated from the ground, any suitable arrangement of operating ropes or cables 17 may be attached to the bar or head 8, as indicated in the drawings.

The advantages of our invention will be apparent to those skilled in the art, since it provides a bleeder valve which will act freely and automatically to permit the escape of gas from the furnace upon abnormal increase of the pressure thereof, while at the same time it effectually prevents the escape of ore and coke.

It will be obvious that other forms of valves may be used having a guard attached thereto, and that the guard itself may be otherwise constructed and arranged within the spirit and scope of our invention, since what we claim is:—

1. A bleeder valve for furnaces; having a guard attached thereto, and depending within the bleeder pipe of the furnace; substantially as described.

2. A bleeder valve for blast furnaces, arranged to be lifted from its seat by increase of pressure within the furnace, and having a guard connected thereto and extending within the bleeder pipe, said guard being arranged to permit the free escape of gas but to prevent the escape of solid matter thereby; substantially as described.

3. A furnace bleeder pipe having a valve seat at its upper portion, a valve normally resting on said seat and closing the pipe, said valve being arranged to be opened by increase of pressure within the pipe, and a guard attached to said valve and depending within the pipe, said guard being of less diameter than the interior of the pipe; substantially as described.

4. A bleeder pipe for furnaces having a valve seat at its upper end, a cone valve normally resting on said seat and arranged to

be lifted by increase of pressure in the pipe, and a guard attached to said valve and depending within the pipe, said guard being of conical form; substantially as described.

5. A furnace bleeder valve, having a coneshaped guard attached thereto and depending within the upper portion of the bleeder pipe, said guard being of less diameter at its base than the internal diameter of the bleeder pipe; substantially as described.

6. A bleeder pipe having a contracted upper portion provided with a valve seat, a valve normally resting on said seat and arranged to be lifted by increase of pressure in the pipe, and a guard depending from said valve into the pipe and arranged to permit the free escape of gas by the guard but to prevent the escape of solid matter; substantially as described.

7. The combination with a furnace bleeder pipe having a valve seat at its upper end, of a valve normally resting on said seat and closing the pipe, said valve being arranged to be lifted by increase of pressure in the pipe, a guard attached to said valve and depending within the pipe, and means for effecting the manual operation of the valve; substantially as described.

8. The combination with a furnace bleeder pipe having a valve seat at its upper end, of a valve normally resting in said seat and closing the pipe, said valve being arranged to be lifted by increase of pressure in the pipe, a guard attached to said valve and depending within the pipe, and means for cushioning the movements of the valve and guard; substantially as described.

In testimony whereof, we have hereunto set our hands.

ALBIN G. WITTING.
ARTHUR O. BAER.

Witnesses:

W. J. PATTERSON,
R. C. AMES.