

No. 896,939.

PATENTED AUG. 25. 1908.

F. C. ROBERTS.  
RELIEF VALVE.

APPLICATION FILED FEB. 24, 1908.

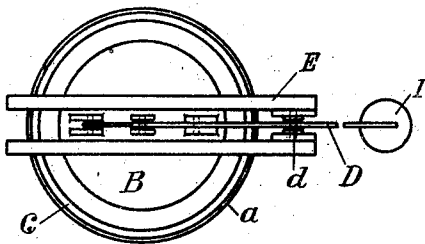


Fig. 2.

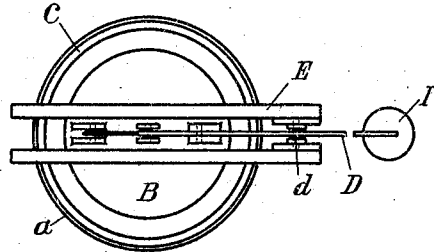


Fig. 5.

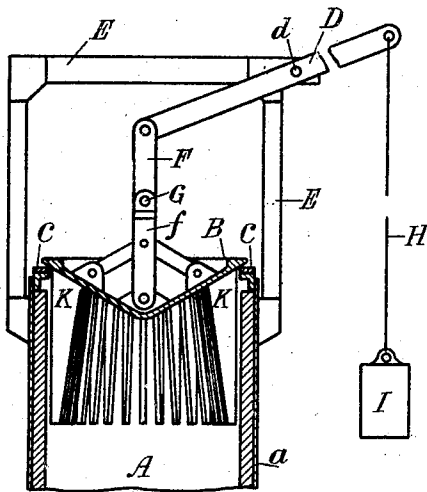


Fig. 1.

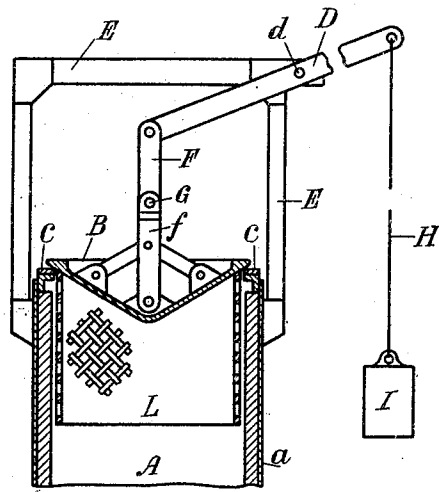


Fig. 4.

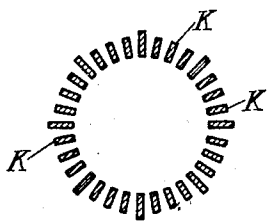


Fig. 3.

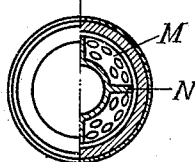


Fig. 8.

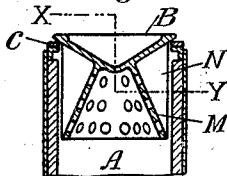


Fig. 7.

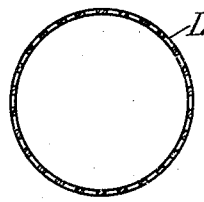


Fig. 6.

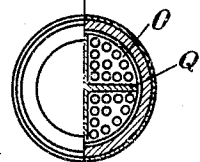


Fig. 10.

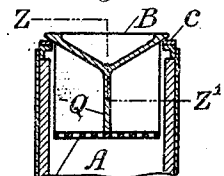


Fig. 9.

WITNESSES:

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# UNITED STATES PATENT OFFICE.

FRANK C. ROBERTS, OF PHILADELPHIA, PENNSYLVANIA.

## RELIEF-VALVE.

No. 896,939.

Specification of Letters Patent.

Patented Aug. 25, 1908.

Application filed February 24, 1908. Serial No. 417,292.

*To all whom it may concern:*

Be it known that I, FRANK C. ROBERTS, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Relief-Valves, of which the following is a description.

My invention relates to a relief valve to be used in connection with a blast furnace whereby any excess pressure of gas in the top of the furnace or in the pipes connected thereto is relieved by the opening of the valve or valves.

It is well known that when an explosion or "slip" takes place in a blast furnace, the pressure of gas in the upper part of the furnace and in the gas pipes connected thereto becomes excessive and that it is common practice to provide explosion doors or relief valves which automatically open under the excessive pressure, thus permitting free access from the interior of the furnace to the atmosphere and producing a consequent reduction in pressure. The explosions or "slips" frequently result in the discharge of coke and other materials from the furnace through the explosion doors or relief valves, thus endangering life and leading to considerable expense both in waste of materials and labor required to collect the materials so discharged.

The object of my invention is to provide a relief valve which will automatically open when the pressure becomes excessive and at the same time largely prevent the discharge of materials from the furnace through the valve.

I attain my object by means of the apparatus illustrated in the accompanying drawings in which:—

Figures 1 and 2 are respectively a vertical section and a plan of one form of relief valve and Fig. 3 is a horizontal section through the screen of the same design of valve. Figs. 4 and 5 are respectively a vertical section and a plan of a second form of relief valve and Fig. 6 is a horizontal section through the screen thereof. Figs. 7, 8, 9 and 10 illustrate other forms of relief valves.

Similar letters refer to similar parts throughout the several views.

Referring to Figs. 1, 2 and 3:—A is a vertical pipe leading and connected to the space within the top of the furnace or to another pipe or pipes leading to said space. B is a valve resting when closed on seat C attached

to the top of A. D is lever supported by the framework E secured to B and pivoted at *d*. The valve B is suspended from D by rods *F* and *f*, a pivot G being provided between the two rods to permit of the proper adjustment of B to its seat C. To the outer end of D a rod H is attached carrying a counterweight I, the purpose of I being to partly counterbalance the weight of B and thus reduce the force required to raise B. A series of prongs K are attached to the bottom of B, said prongs forming what I term a screen and being made of such length that when B is open and raised to its highest position, the lower ends of K are not raised above the seat C.

The operation of the apparatus is as follows:—When a "slip" or explosion takes place the pressure so developed raises the valve B above its seat C thus providing a free outlet in the spaces between K for the gas thereby reducing the pressure. Coke or other material that may be discharged from the furnace into A is prevented from being turned discharged into the atmosphere through the opening provided by the raising of the valve, by the prongs K which form a screen. After the pressure within the furnace is reduced to a proper point, the valve B closes automatically by reason of the fact that B is heavier than I. It is evident that by the use of this device the coarser materials are prevented from escaping from the furnace and that only the finer particles in size dependent upon the width of the spaces between K, are allowed to be discharged. Should particles of the materials fill up or clog the spaces between K, said spaces can readily be cleaned from the outside by raising the valve B so that the portions of the spaces between K that are clogged become exposed above C.

Figs. 4, 5 and 6 show another design of relief valve identical in design and operation with that described except that in place of the prongs K a wire screen L is attached to the bottom of B.

Figs. 7 and 8 show a third form of valve; Fig. 7 is a sectional elevation and Fig. 8 a half plan and a half section on the line X Y. In this case the screen M is conical in shape with wings N forming, in connection with the inside surface of the seat C, guides to direct the movement of the valve B.

Figs. 9 and 10 show a fourth form of valve; Fig. 9 is a sectional elevation and Fig. 10 a half plan and half section on line Z Z'. In this case the screen O extends across A and is

suspended from the valve B by suitable supports Q which also act, in connection with the inside surface of C, as guides for directing the movement of the valve B.

5 I do not limit my claims to design of valve, operating apparatus or screen shown on the drawings.

10 Having described my invention, what I claim and desire to cover by Letters Patent is—

1. In a relief valve, the combination of a valve, a seat for said valve, an opening in said seat, an operating apparatus for said valve, a screen approximating in its greatest diameter the diameter of said opening, said screen being attached at one end to the under side of said valve and being of such length that the other end of said screen is not exposed beyond said seat when said valve is open.

2. In a relief valve, the combination of a valve, a seat for said valve, an opening in said seat, an operating apparatus for said valve, a screen attached to said valve and approxi-

imating in its greatest diameter the diameter of said opening, said screen being so designed and located that a portion thereof is not exposed beyond said seat when said valve is open.

3. In a relief valve, the combination of a valve, a seat for said valve, an opening in said seat, an operating apparatus for said valve, a screen attached to said valve and approximating in its greatest diameter the diameter of said opening, said screen being so designed and located that it is not exposed beyond said seat when said valve is open.

4. In a relief valve, the combination of a valve, a seat for said valve, an operating apparatus for said valve, a screen attached to said valve, said screen being so designed and located that the escaping gases pass through said screen when said valve is open.

FRANK C. ROBERTS.

Witnesses:

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J. D. PAXTON