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PATENTED JULY 23, 1907.

A. J. FULTON.

AUTOMATIC SLIP RETURN PIPE FOR BLAST FURNACES.

APPLICATION FILED MAY 23, 1906.

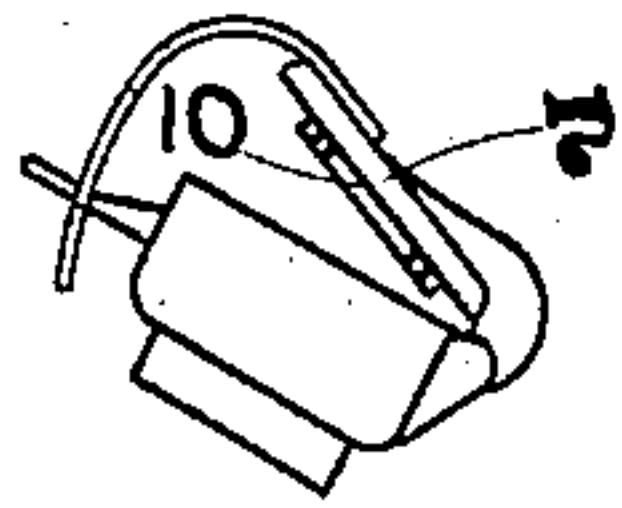


FIG. 2.

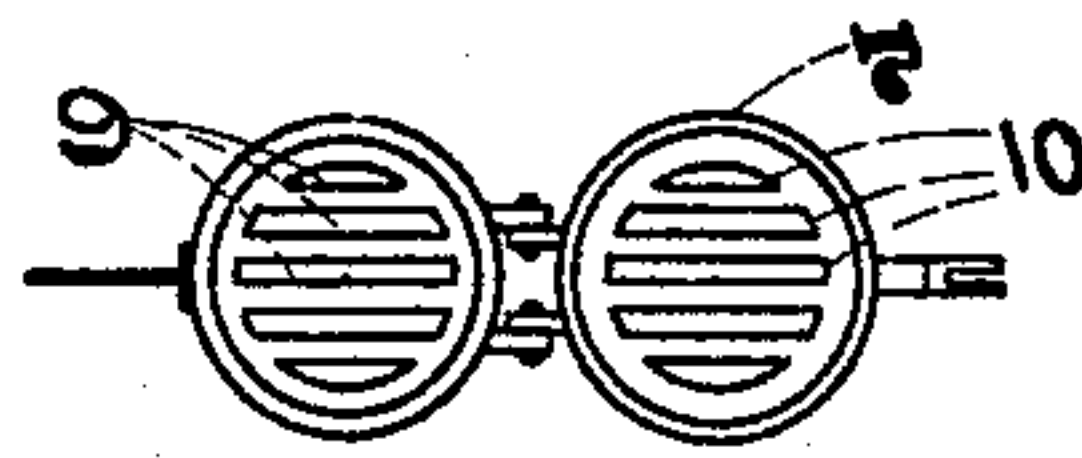


FIG. 3.

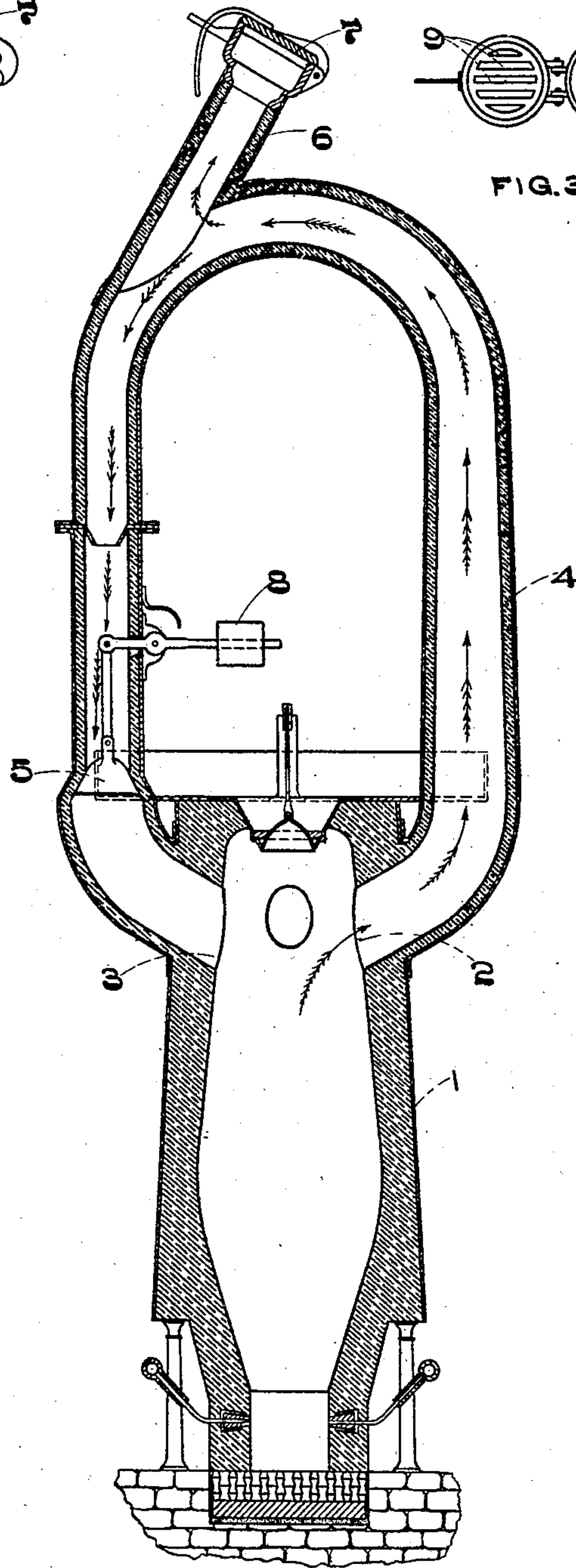


FIG. 1.

Witnesses

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# UNITED STATES PATENT OFFICE.

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## AUTOMATIC SLIP-RETURN PIPE FOR BLAST-FURNACES.

No. 860,970.

Specification of Letters Patent.

Patented July 23, 1907.

Application filed May 23, 1906. Serial No. 318,388.

*To all whom it may concern:*

Be it known that I, AUSTIN J. FULTON, a citizen of the United States, residing at Sharon, in the county of Mercer and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Slip-Return Pipes for Blast-Furnaces, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in automatic slip-return pipes for blast furnaces, the construction and operation of which is herein fully set forth, reference being had to the accompanying drawings which form a part hereof and in which:—

Figure 1 is a central, vertical section of a blast furnace equipped with my automatic slip-return pipe. Figs. 2 and 3 are details.

To those acquainted with the operation of blast furnaces, it is a well known fact that slips or explosions frequently occur in the upper portion of the furnace, and in this event, the stock is thrown from the furnace and must be returned thereto by manual labor; this interrupts the operation of the furnace, decreases the output and increases the cost of attendance.

It is the object of my invention to automatically return the stock to the furnace, when it is thrown therefrom by a slip, and the construction whereby this object is accomplished is as follows:—

Through opposite sides of the upper portion of the furnace 1, is formed openings, 2, 3, which are joined by an upwardly-extending arched pipe 4. At a short distance above opening 3 is placed a check-valve 5, the purpose of which will be hereinafter more fully set forth. Near the upper arched portion of pipe 4 I provide a relief pipe 6, the upper end of which is closed by a gate 7; said gate is so constructed as to be opened,—as shown in Fig. 2—by an excessive pressure within the return pipe.

When an explosion occurs in the furnace, valve 5,—

which is held to its seat by counterweight 8—is caused to seat more firmly and the expanded gases, and the stock driven from the furnace thereby, take the direction indicated by the arrows; in case the heated gases are not fully expanded when the relief 6 is reached, gate 7 is caused to open and a ready relief to the atmosphere is thus afforded, for said gases, but the stock continues in the direction indicated by the arrows and falls upon valve or bell 5 and the weight of the stock over-balances counterweight 8, opens valve 5 and the stock returns to the furnace without any loss of stock, interruption of operation, damage to the furnace, or additional attendance.

The opening in relief pipe 6, which is closed by gate 7, is grated or provided with cross-bars 9, and upon said gate is formed projecting bars 10, which seat between bars 9 when gate 7 is closed: This construction prevents any stock from being blown out through pipe 6 and in case portions of the stock should lodge between the bars 9 it is dislodged therefrom by bars 10 when the gate closes.

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

1. An automatic slip-return pipe for blast furnaces, consisting essentially of an arched pipe extending above the furnace, each end of which pipe enters the upper portion of the furnace at opposite sides thereof, and means for directing the course of stock when it is carried into said pipe by an explosion in the furnace.

2. In an automatic slip-return pipe for blast furnaces, a continuous, arched pipe extending above the furnace, each end of which pipe enters the upper portion of said furnace, at opposite sides thereof, an outwardly opening gate located in said pipe, and a downwardly-opening valve located in one leg of said pipe near its lower extremity.

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

AUSTIN J. FULTON.

Witnesses:

ROY NEVILLE,  
CLIFFORD C. MARSHALL.