S. B. SHUTTS & W. McHUGH.

BLAST PIPE FOR BLAST FURNACES.

APPLICATION FILED MAY 15, 1909.

946,404. Patented Jan. 11, 1910.

Fig. 1.

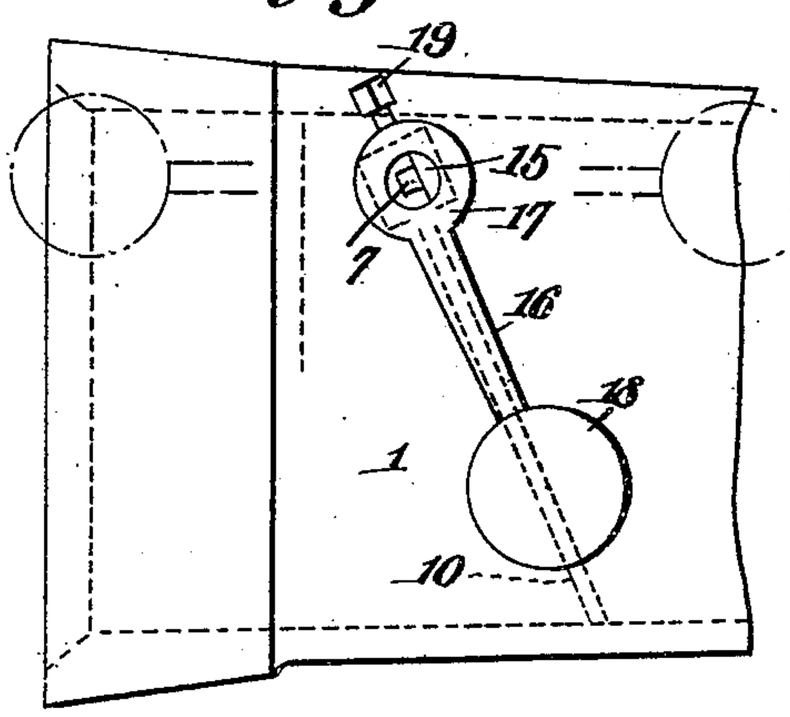
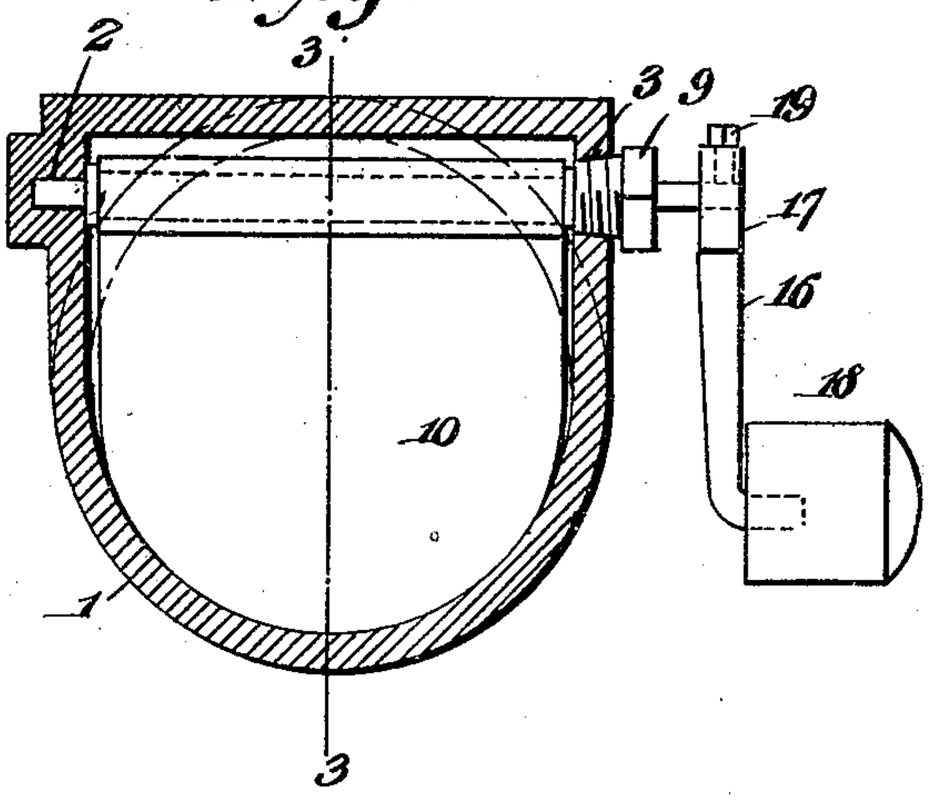


Fig. 2.



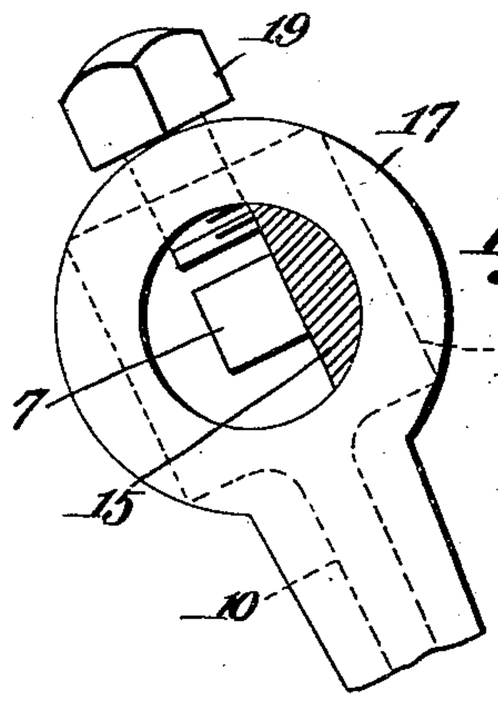


Fig. 4.

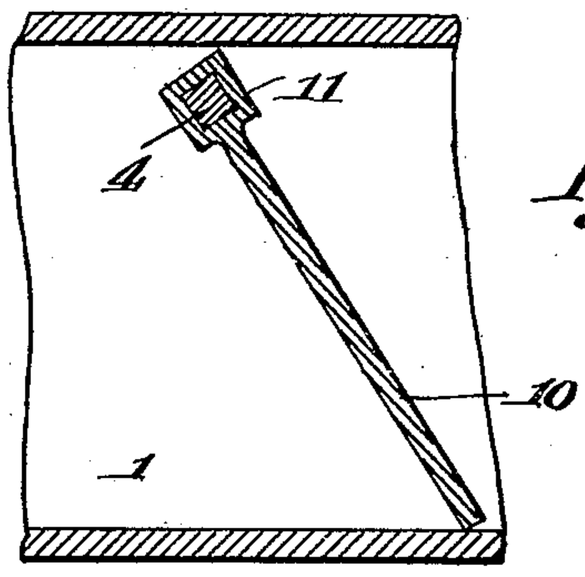


Fig. 3.

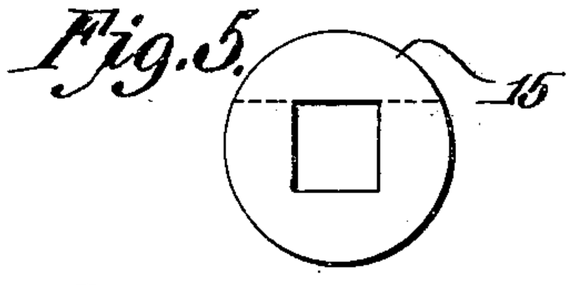


Fig. 5.

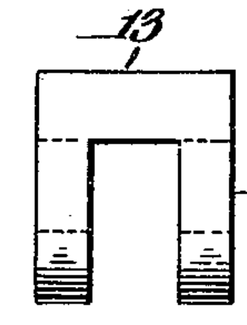


Fig. 6.

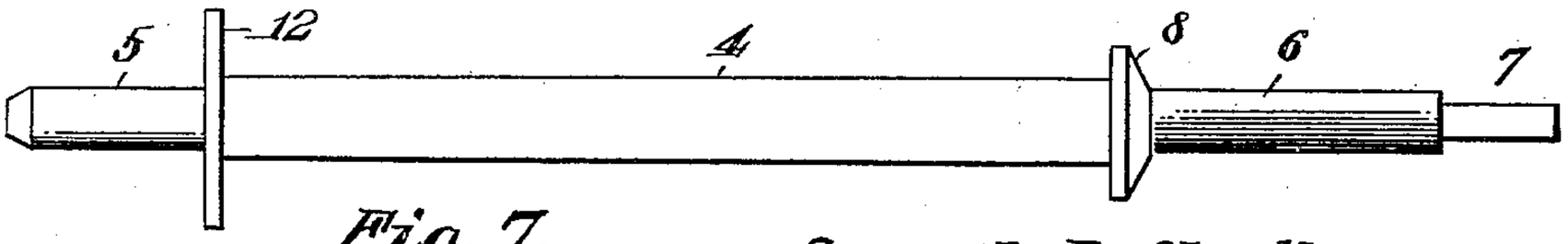


Fig. 7.

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UNITED STATES PATENT OFFICE.

SAMUEL B. SHUTTS AND WILLIAM McHUGH, OF JOLIET, ILLINOIS.

BLAST-PIPE FOR BLAST-FURNACES.

946,404. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed May 15, 1909. Serial No. 496,140.

To all whom it may concern:

Be it known that we, SAMUEL B. SHUTTS and WILLIAM MCHUGH, citizens of the United States, residing at Joliet, in the county of Will and State of Illinois, have invented new and useful Improvements in Blast-Pipes for Blast-Furnaces, of which the following is a specification.

The invention relates to an improvement in blast pipes for blast furnaces, and is particularly directed to a valve for such structure in the use of which the blast may be freely admitted to the furnace while at the same time the coke is prevented from reaching the gooseneck when the furnace slips.

The main object of the present invention is the provision of an automatically actuated valve adapted to be normally closed and capable of being freely opened by the pressure of the entering blast, so that during the delivery of the blast the valve is open and when the blast is cut off the valve will automatically close.

A further object of the invention is the provision of means whereby the valve may, if desired, be held in open position in order to maintain the blast pipe open for drawing the gas away from the furnace.

The invention will be described in the following specification, reference being had particularly to the accompanying drawing, in which:—

Figure 1 is a broken elevation, showing a portion of the blast pipe with the improved valve arranged therein. Fig. 2 is a transverse section of the same. Fig. 3 is a vertical section on line 3—3 of Fig. 2. Fig. 4 is an enlarged broken elevation, showing the means for permitting operation of the counterweight. Fig. 5 is an end elevation of the locking washer. Fig. 6 is a side elevation of the same. Fig. 7 is a plan of the washer shaft.

Referring to the accompanying drawings, 1 represents a conventional or any preferred form of blast pipe leading to the blast furnace, preferably at the point of greatest diameter of said pipe. The interior of the wall of the pipe is formed near the upper end with a bearing socket 2 and at the point transversely opposite said socket with an opening 3. Movably mounted in the blast pipe is a shaft 4 reduced at one end to form a pintle 5 adapted to seat in the bearing socket 2, the opposing end of the shaft having a rod-like extension 6, which at the free end is reduced and of angular contour in cross section, as at 7. The section of the shaft between the pintle 5 and rod 6 is of angular form in cross section, preferably rectangular and the shaft is formed at the juncture between said central portion and the rod 6 with a fixed stop or limiting washer 8. The rod extension 6 is mounted in a gland nut 9, designed for threaded engagement in the opening 3, the inner end of said nut bearing against the limiting washer 8 or against packing carried thereby, whereby to insure a proper positioning of the shaft within the blast pipe and at the same time prevent leakage through the opening 3. Secured upon the central squared portion of the shaft 4 is a valve 10 comprising a plate-like body having an edge configuration conforming approximately to the sectional contour of the blast pipe. The upper edge of the plate is formed with a sleeve-like member 11, having an interior opening of a size and sectional configuration to conform to the squared central portion of the shaft 4, whereby when the valve is in place it is fixed against movement independent of the shaft. A washer 12 is designed to fit upon the pintle 5 and to bear against the proximate end of the valve sleeve, said washer bearing also against the surface of the blast pipe wall, thus maintaining the valve in proper position within the blast pipe.

As a means of counterbalancing the valve we arrange an adjustable weight upon the outer end of the rod extension 6 of the shaft, and in securing this weight in place we fix upon the squared portion 7 of the rod extension what we term a locking washer 13, preferably a rounded body having formed centrally therein a hole 14 conforming in size and shape to the portion 7 of the shaft, the central portion of the washer being cut away throughout the greater portion of its circumferential area, leaving a transverse abutment 15 which in practice is located wholly to one side of the squared portion 7 of the shaft, with its inner edge extending beyond and in coincidence with one side edge of said portion 7, as clearly shown in Fig. 4 of the drawings. A counterweight is provided including an arm 16 formed at one end with a disk head 17, having a central opening to receive the locking washer 13, the opposite end of the arm being arranged to receive and support an appropriate weight 18. The disk head 17 is formed

with a threaded opening to receive a set screw 19, which extends into the cut out portion of the locking washer and bears beneath the abutment 15 of said washer beyond the portion 7 of the main shaft.

As will be noted from Figs. 1 and 4 of the drawings the locking washer is arranged upon the main shaft so that the relatively inner or operative edge of the abutment extends in line or in a plane parallel with the plane of the valve plate. Therefore, in the normal position of the parts in which the weight is used to return the valve to normal blast pipe closing position the set screw 19 will bear beneath that portion of the abutment above the portion 7 of the shaft, in which position it will be obvious that the arm 16 of the weight will depend from the shaft practically in parallelism with the valve plate, and that any movement of the shaft incident to the operation of the valve plate by the blast will correspondingly elevate the weight until when the valve is in fully open position the weight is practically in the horizontal plane of the shaft, tending thereby to return the valve to normal position as soon as the pressure on the valve is released. If, however, it is desired to utilize the weight to hold the valve open, as in the event it becomes necessary to entirely relieve the furnace of the blast pressure and draw away the gas from the furnace, the threaded end of the arm may be manually lifted and carried around on the locking washer as a center until said weight is in a position diametrically opposite its normal position, that is until the arm 16 projects from the shaft in a direction opposite the projection of the valve therefrom. This movement of the arm is permitted as the set screw 19 will, in such movement, travel around in the cut out portion of the locking washer until it engages the inner surface of the abutment 15 below the main shaft. In this position the weight operates to elevate the valve 10, as will be obvious, and hence is utilized to hold the valve open.

In the operation of the valve proper it will be obvious that a blast of air entering the blast pipe will elevate the valve so as to provide free inlet to the air, but in the event it is necessary to slip the furnace the valve will automatically drop to closed position as the blast pressure is reduced and the back rush of the gas and coke forces the valve to completely closed position to prevent the coke from clogging the goose-neck and peep-hole. When the blast is again put on the furnace pressure of the air forces the valve open and immediately clears the blast pipe of all coke, forcing the same back into the furnace.

The valves are designed to be made of any size to fit any kind or style of blast pipe, and while preferring that the blast pipe in that part immediately adjacent the valve have a square upper portion, in order to raise the valve entirely out of the way in use, such construction is not absolutely essential.

Having thus described the invention what is claimed as new, is:—

1. A blast pipe, a shaft mounted therein, a valve secured on the shaft, a channeled washer secured on the shaft beyond the blast pipe, a sleeve encircling the washer, a counterbalance carried by the sleeve, and means for securing the sleeve in either of two positions on the washer.

2. A blast pipe formed with a socket and with a diametrically opposed opening, a shaft mounted at one end of the socket and its opposite end projecting through the opening, a valve secured upon the shaft within the blast pipe, and a counterbalance secured upon the terminal of the shaft projecting through the opening.

3. A blast pipe, a shaft mounted therein, a valve secured on the shaft, a circumferentially channeled washer secured upon the shaft, a counterbalance movably mounted on the washer, and means carried by the counterbalance for movement in the channel of the washer, said washer being formed to limit the movement of said means in each direction.

4. A blast pipe, a shaft mounted therein, a valve secured on the shaft, a washer secured on the shaft beyond the blast pipe, said washer being formed with an interrupted circumferentially arranged channel, a counterbalance movably mounted on the washer, and an element carried by the counterbalance and projecting into the channel of the washer.

In testimony whereof we affix our signatures in presence of two witnesses.

SAMUEL B. SHUTTS.
WILLIAM McHUGH.

Witnesses:
W. W. STEVENS,
P. SHUTTS.