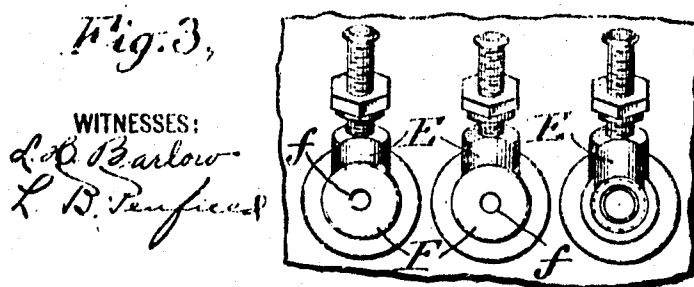
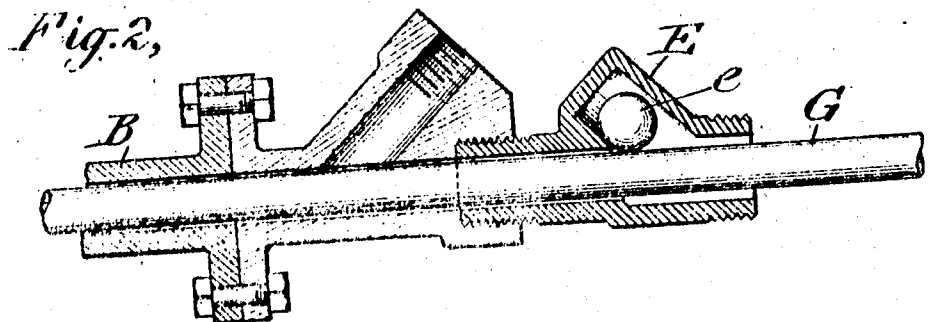
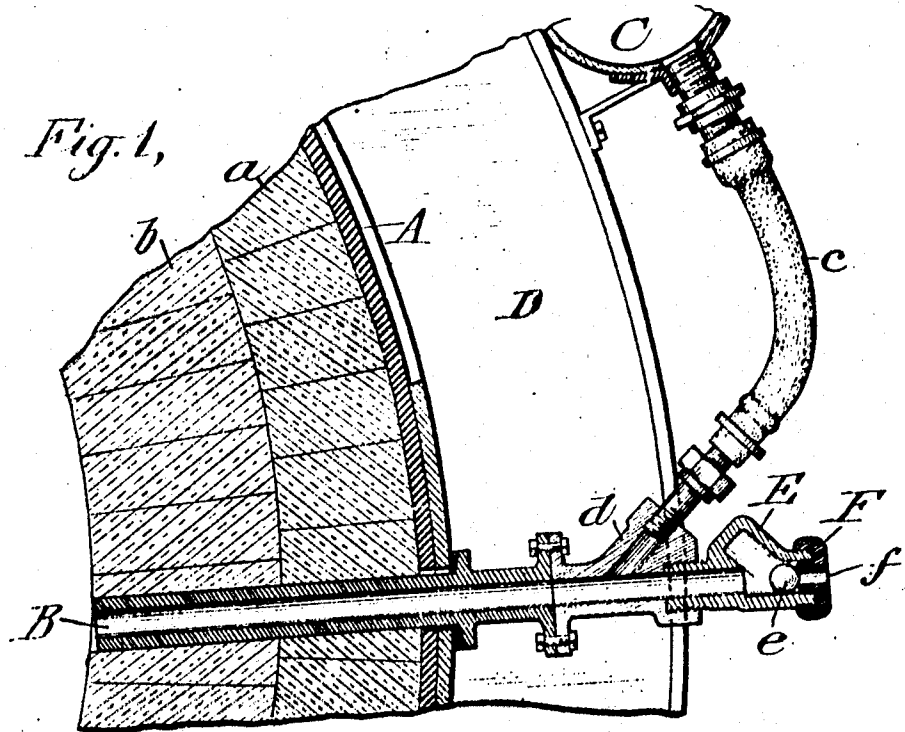


1,007,149.

Patented Oct. 31, 1911.



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UNITED STATES PATENT OFFICE.

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CONVERTER-TWYER.

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To all whom it may concern.

Be it known that I, ELIAS A. C. SMITH, a citizen of the United States, residing at Baltimore, State of Maryland, have invented certain new and useful Improvements in Converter-Twyers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In the bessemerizing of copper matte, it is the practice from time to time during the operation to insert a punch bar into the twyers from the outer end thereof and past the usual Dyblie valve for the purpose of removing such obstructions as may chance to enter the discharge ends of the twyers from the molten bath. The punch bar or drift bar commonly employed for this purpose is of an external diameter substantially equal to that of the internal bore of the main body portion of the twyers at their discharge ends; that is, where the twyers are say of one and one-eighth inch bore, the external diameter of the punch bar or drift bar is say one and one-sixteenth inches in diameter, so that it will occupy substantially the entire capacity of the bore of the twyers and will punch out all of the obstructions contained therein. In practice, it is found that, with the use of punch bars thus closely approximating in diameter the bore of the twyers, there is considerable leakage of air through the perforated end caps at the end of the twyers when the punch bar or drift bar is in operation; this leakage, in some instances, amounting to as high as from fifteen to twenty per cent.

It is the purpose of my present invention to minimize this air leakage, so as to lessen its amount and importance.

In the accompanying drawings, I have illustrated the means that I have devised for this purpose.

In said drawings, Figure 1 represents a sectional view of a portion of a copper matte converter at the twyer zone and illustrates the application of my invention thereto. Fig. 2 represents on a larger scale, and in section, a fractional view of some of the parts shown in Fig. 1, and shows, in place, a drift bar as used in the final step of clearing the twyers; Fig. 3 represents a side ele-

vation of a portion of the converter at the twyer zone.

Similar letters of reference indicate similar parts throughout the several views.

Referring to the drawings, A indicates the shell of the converter, suitably lined, as, for instance, with courses of brick *a* proximate to the shell and an inner lining made up of courses of magnesite brick or chrome brick *b*, although it will be understood that the invention is independent of the particular character of the converter lining employed.

The twyers B may conveniently be supplied with air from a bustle pipe C or the like, suitably supported upon the sustaining rings D of the converter and which communicate in any suitable way, as, for instance, by the flexible pipe *c*, with the fitting *d* bolted to and forming a continuation of the twyer. At the outer end of the fitting *d* is connected the Dyblie valve case E containing the ball *e*, which subserves the usual function of closing the outer end of the twyer against the escape of air, as indicated in Fig. 1, when the blast is on during the bessemerizing operation, but which may be pushed aside and up into the pocket of the valve fitting by the act of inserting the punch bar or drift bar.

Ordinarily, the outer end of the Dyblie valve case is screw-threaded on its inner surface for the purpose of receiving an externally screw-threaded plug, having a perforation of the same diameter as the inner bore of the main body portion B of the twyer. For instance, the diameter of this perforation, corresponding to the bore of the main body portion of the twyer is say one and one-eighth inches, and the punch bar or drift bar used in connection therewith is of an external diameter slightly smaller, say one and one-sixteenth inches, it being found impracticable to have a closer approximation of the dimensions of the perforation and those of the punch bar to enable the latter to work freely through the main bore of the twyer beyond. In spite of the close approximation of the external diameter of the punch bar to the internal diameter of the perforation through the end cap, in this usual practice, the interval between the two surfaces is nevertheless sufficient to permit the escape of a consider-

able portion of the blast when the punch bar is in use. To obviate this difficulty, I provide a cap piece for the outer end of the valve case having a perforation of less diameter than the diameter of the bore of the main body portion of the twyer B. For instance, where the bore of the main body portion of the twyer is say one and one-eighth inches, I may make the diameter of the perforation *f* of the cap piece F three-quarters of an inch. By this expedient, I am enabled to use with entire convenience, a punch bar or drift bar making practically a machine fit with the internal walls of the perforation *f*, that is, a drift bar of substantially three-quarters of an inch external diameter. This closeness of fit is such that there is practically no leakage of the blast through the perforation during the punching operation, and, because of the lesser diameter of the punch bar than the internal diameter of the main body portion of the twyer B, the punch bar is entirely unhampered in its movement through the twyer.

Because of the lesser diameter of the punch bar, it may, in some instances, happen that at the termination of the blow some slight obstruction of a minor character may be present in the twyers, not dislodged by the action of the three-quarter inch punch bar. In order to remove any such obstruction, I may, at the termination of the blow, or at any other time when the blast is cut off and the twyers raised to a level above the slag line, remove the end caps F and insert another drift bar, as shown in Fig. 2, of a diameter closely approximating the inner diameter of the main body portion of the twyers. The blast being cut off at the time of the insertion of this punch bar of larger diameter, there is, of course, no loss of air by reason of its insertion and as the accumulations which it is designed to re-

move are for the most part easy of dislodgment, because of their minor character and because they are usually made up entirely of slag, I am enabled to obtain by following out the operation described a complete clearance of the twyers before the beginning of a new blow or before the continuation of a temporarily interrupted blow, and without the losses of air blast that were incident to former practice.

It will be noted that the cap piece F is provided with screw-threads on its inner surface and that it is fitted upon the outer screw-threaded end of the valve case E, so that, as will be apparent from Fig. 2, the drift bar G inserted in the final operation of clearing the twyers after the removal of the end cap will not come in contact with the threads of the valve case so as to break them down or upset them.

Having thus described my invention, what I claim is:—

A blast twyer, provided at its outer end with a Dyblie valve and its casing having a removable cap, the main bore of the casing being in alinement with and of the same diameter as the bore of the twyer, and said cap having a perforation of but slightly less diameter than that of the twyer; whereby, during the continuance of the blast, a punch bar may be employed making a machine fit with said perforation and approximately but loosely fitting the bore of the twyer, and whereby, on removing the cap during interruption of the blow, a second punch bar may be employed still more nearly fitting the bore of the twyer; substantially as described.

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

ELIAS A. C. SMITH.

Witnesses:

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EDWIN W. ROUSE, Jr.