(No Model.)

S. S. HARTRANFT.

FURNACE TWYER.

No. 606,545. Patented June 28, 1898.

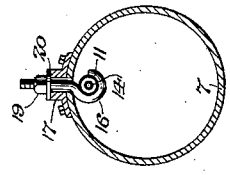


Fig. 7.

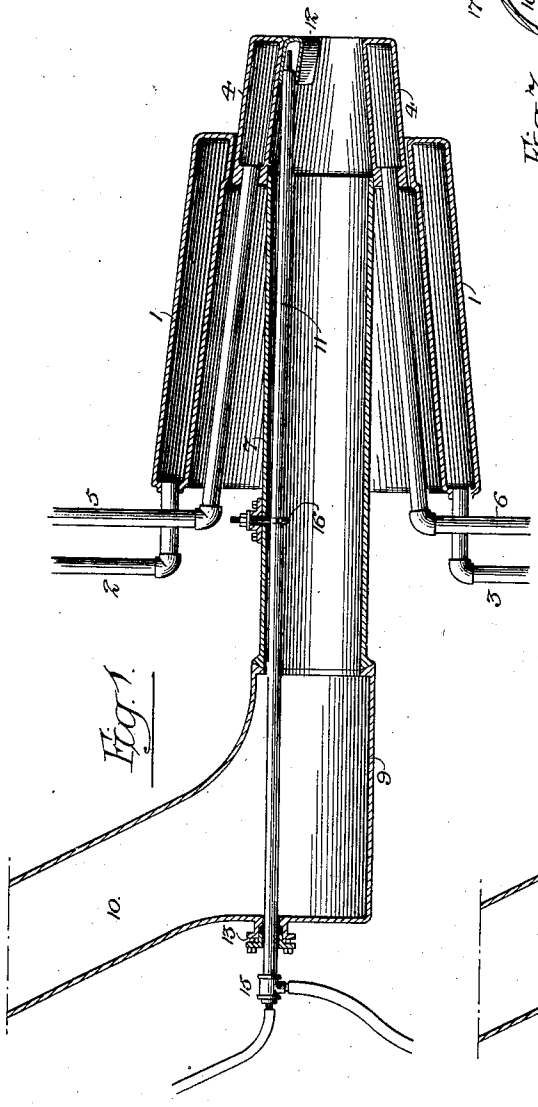


Fig. 1.

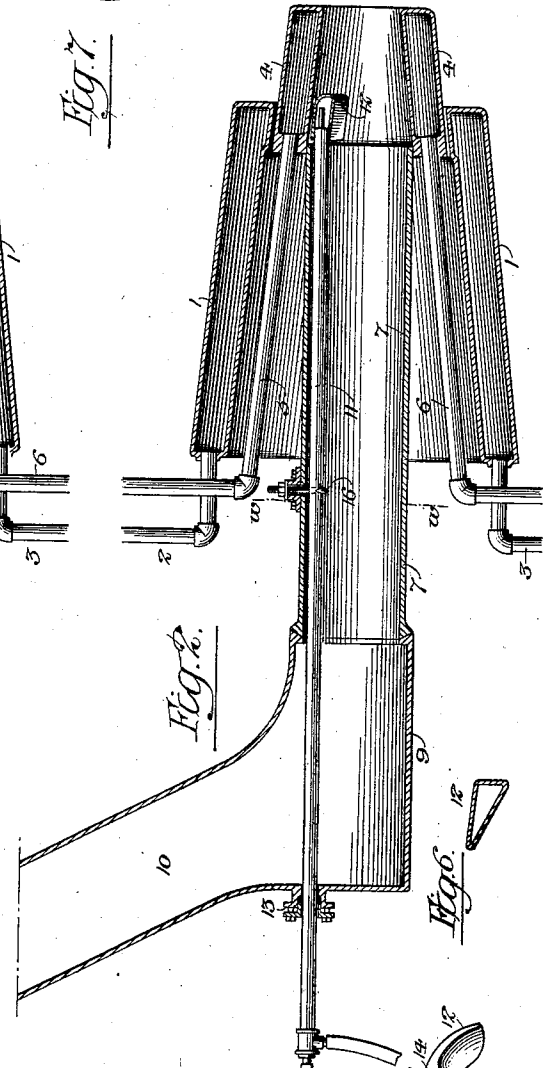


Fig. 2.

Fig. 6.

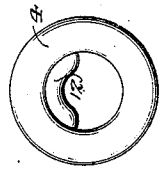


Fig. 3.

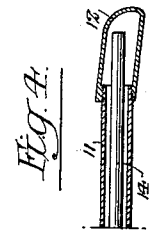


Fig. 4.

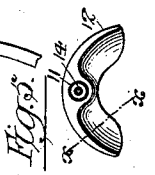


Fig. 5.

Witnesses:-
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UNITED STATES PATENT OFFICE.

SAMUEL S. HARTRANFT, OF PHILADELPHIA, PENNSYLVANIA.

FURNACE-TWYER.

SPECIFICATION forming part of Letters Patent No. 606,545, dated June 28, 1898.

Application filed October 7, 1897. Serial No. 654,359. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL S. HARTRANFT, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Furnace-Twyers, of which the following is a specification.

The object of my invention is to provide a furnace-twyer with simple and efficient means whereby the area of opening of the twyer-nozzle may be restricted when it becomes desirable to increase the force of the jet of air projected therefrom into the furnace.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a well-known form of twyer provided with an attachment in accordance with my invention, the attachment being shown in position for reducing the area of opening of the twyer-nozzle. Fig. 2 is a similar view showing the attachment in position for restoring the normal area of opening of the twyer-nozzle. Fig. 3 is a front view of the nozzle with the attachment in position therein. Fig. 4 is a sectional view of the reducer on a larger scale than Figs. 1 and 2. Fig. 5 is a rear view of the reducer, also on an enlarged scale. Fig. 6 is a section on the line *x x*, Fig. 5; and Fig. 7 is an enlarged section on the line *w w*, Fig. 2.

The twyer shown in Figs. 1 and 2 consists of a hollow annular box or casing 1, which serves as a lining for the twyer-opening and contains a chamber through which water or other cooling fluid is caused to circulate, 2 being the supply-pipe for the chamber and 3 the discharge-pipe for the same.

The twyer-nozzle 4 is fitted to the front end of the casing 1, and likewise consists of a hollow annular structure containing a chamber through which water is caused to circulate, so as to keep it cool, 5 representing the supply-pipe for this chamber and 6 the discharge-pipe for the same.

Air under pressure is supplied to the nozzle 4 through a pipe 7, which extends outwardly beyond the twyer-lining and is connected to a box or casing 9 at the lower end of the pipe 10, which depends from the usual belly-pipe surrounding the lower portion of the furnace.

Suitably supported within the upper portion of the pipe 7 is a pipe 11, which constitutes a hollow stem for a hollow block 12, the latter being suitably secured to the inner end of the pipe 11 and being so disposed that when said pipe is pushed inward to its full extent the block 12 will occupy the upper portion of the opening in the twyer-nozzle 4, as shown in Figs. 1 and 3, and will thereby reduce the effective area of discharge of said nozzle to an extent dependent upon the size of the block. When the pipe 11 is retracted, however, as shown in Fig. 2, the block 12 is withdrawn to the rear end of the nozzle, thus restoring the full area of nozzle-opening for the discharge of blast into the furnace. By this means the force of the jet issuing from the nozzle may be increased by a reduction in the area of discharge of said nozzle without increasing the force of the blast, a condition which is sometimes required in order to project the air farther into the mass contained in the furnace than it can be projected by a blast of the required pressure issuing from the full area of the twyer-nozzle.

The pipe 11 passes through a stuffing-box 13 at the outer end of the box or casing 9, and said pipe contains an inner tube 14 of smaller diameter, as shown in Fig. 4, so that water supplied through the outer end of this inner tube will be carried into the hollow block 12 and will escape therefrom through the pipe 11, a T-coupling 15 with suitable branches providing for the attachment of the flexible pipes whereby the water is supplied to the tube 14 and conveyed away from the outer end of the pipe 11.

The block 12 is preferably of segmental form, as shown in Fig. 3, so as to fit snugly to the upper portion of the twyer-opening and thus effect the desired reduction in area with the minimum amount of obstruction, and on each side of the pipe connection the block is tapered or wedge-shaped, as shown in Figs. 5 and 6, so that it will serve to deflect a poker or slice-bar thrust through the twyer, and thus prevent injury due to the contact.

Various means may be employed for supporting the pipe 11 in the upper portion of the pipe 7, so as to permit of the free longitudinal movement of the same, the means which I have shown for the purpose being a hooked bolt 16, which passes through a tubular lug 17 on the outside of the pipe and has a nut 19 and washer 20 bearing upon said lug, so that by adjusting the nut the pipe

may be held tightly or loosely or by removing the nut or turning the bolt the pipe may be released altogether when it is desired to remove it and its block 12 from the twyer. A transverse pin may replace the nut 19, if desired. Whether the adjustment of the bolt be such as to hold the pipe 11 tightly or loosely against the upper portion of the pipe 7, the said adjustment, when once made, is such as to cause the block 12 to be held snugly against the inclined inner face of the nozzle, so that the spring or resiliency of the said pipe 11 may act as below described.

The spring or resiliency of the pipe 11 is sufficient to permit the block 12 to follow the beveled inner face of the hollow twyer-nozzle as the block is pushed inwardly, said block being held snugly against the upper portion of the said inner face of the twyer-nozzle, so that its movement is not obstructed by cinder or other accumulation at the inner end of the latter.

A device of the character above described is of simple construction, it can be readily applied to existing forms of twyer structures at small expense, it provides for instant change in the area of discharge of the twyer-nozzle, and, owing to its shape and location, it offers no obstruction whatever to the free manipulation of pokers or slice-bars passed through the twyer.

While I prefer in all cases to use the water-cooled hollow block, a solid block may be used without departing from the main feature of my invention.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination of an internally-tapering twyer-nozzle and a cylindrical supply-pipe therefor, with a block adapted to reduce the discharge area of the nozzle, a stem carrying said block and located in the upper portion of the supply-pipe, so as to be longitudinally in line therewith, said stem projecting outwardly beyond the supply-pipe, and provision in said supply-pipe serving to support said stem while permitting free longitudinal movement of the same, the stem being of such resiliency as to permit the block to follow the internal bevel of the nozzle, as it is moved back and forth, substantially as specified.

2. The combination of a twyer-nozzle and a supply-pipe therefor, with a block adapted to reduce the discharge area of the nozzle, a stem carrying said block and located in the upper portion of the supply-pipe and projecting outwardly beyond the same, a hooked bolt supporting said stem and passing through the pipe, a tubular lug on the outside of the pipe, and a nut or other fastening for the bolt supported by said lug, the stem being of such resiliency as to permit the block to follow the internal bevel of the nozzle as it is moved back and forth, substantially as specified.

3. The combination of the twyer-nozzle with the hollow segmental reducing-block, and its central hollow stem, said block being as to its central portion, of a thickness equal to or exceeding the diameter of the stem, but as to each side portion, tapering to a comparatively sharp rear edge, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL S. HARTRANFT.

Witnesses:
F. E. BECHTOLD,
JOS. H. KLEIN.