C. HIMROD.

METHOD OF CHARGING AND MANAGING BLAST-FURNACES.

No. 188,632. Patented March 20, 1877.

Fig. 1.

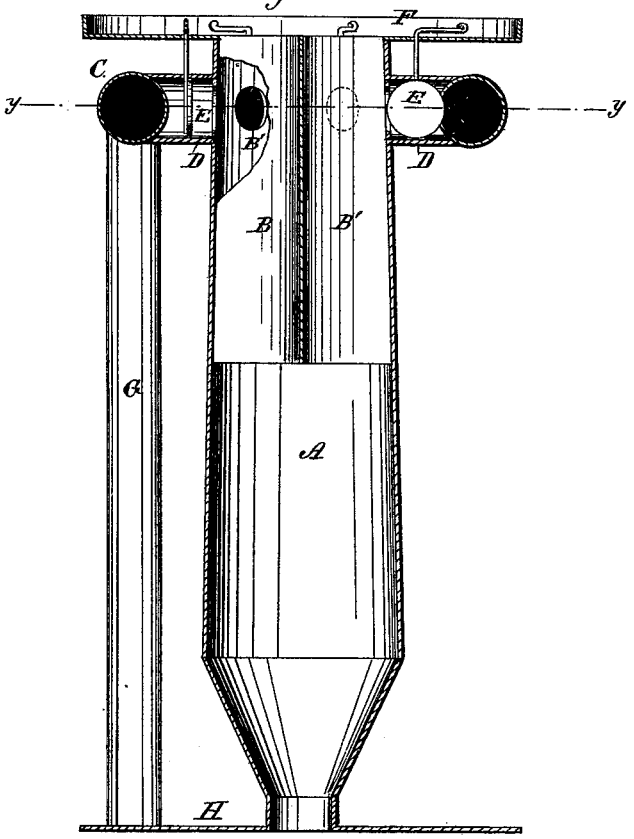
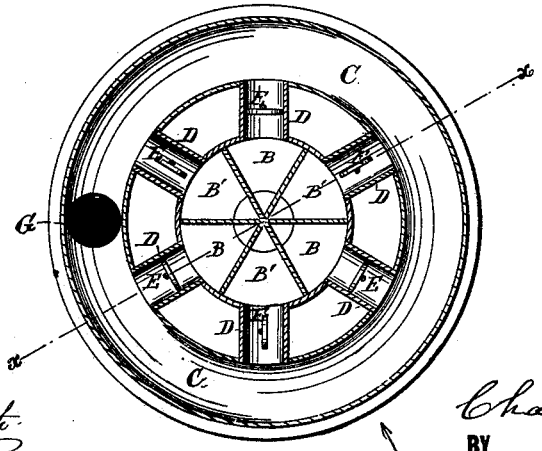


Fig. 2.



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IMPROVEMENT IN METHODS OF CHARGING AND MANAGING BLAST-FURNACES.

Specification forming part of Letters Patent No. **188,632**, dated March 20, 1877; application filed December 5, 1876.

To all whom it may concern:

Be it known that I, CHARLES HIMROD, of Youngstown, in the county of Mahoning and State of Ohio, have invented a new and Improved Method of Charging and Managing Blast-Furnaces, and means for carrying out the same; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is a vertical longitudinal section through line *x x* of Fig. 2, looking in the direction of the arrow; Fig. 2, a transverse section through line *y y* of Fig. 1.

My invention relates to an improved method of charging and managing blast-furnaces of that class in which the vertical shaft is divided by longitudinal partitions into two or more compartments; and in the means for carrying out the same, whereby the wasteful production and escape of carbonic oxide is obviated, and the distribution of the fuel and the ore and flux of the furnace-burden is more evenly secured.

In blast-furnaces having the upper portion of the stack divided into compartments, the ordinary method of charging is to insert the fuel in one compartment, and the ore and flux in another, with a view to compelling the passage of the carbonic oxide (evolved from the fuel) through the ore to effect its reduction, in which case the fuel on the one hand, and the ore and flux on the other, are always fed into the same series of compartments without any alternation.

An objection incident to this method exists in that the ore and flux disintegrate, and are reduced to a pulverulent and compact condition, more rapidly than the fuel does, and the two materials (fuel and ore) being always fed into their same compartments, respectively, they preserve their individuality of location to such an extent as to prevent the free passage of the carbonic oxide through the mass of packed disintegrated ore, thereby preventing the best contact of the said carbonic-oxide gas with the ore in its passage through the latter.

The object of my invention is to obviate this difficulty; to which end the distinguishing characteristic of my improvement consists in feeding ore and flux into one set of the compartments of the longitudinally-divided blast-furnace, and fuel into the alternate set, and at intervals reversing this mode of charging, so as to feed fuel in the ore-compartments and ore into the fuel-compartments, whereby the distribution of the two materials of the furnace-burden is so evenly effected by the alternate layers of the more porous fuel and the more pulverulent disintegrating ore that the tendency of the latter to pack in a mass is to a large extent obviated, and the passage through the ore of the reducing carbonic-oxide gas being facilitated, the reduction of the ore is made to proceed more rapidly and economically. The compartments each have at the top communications with a discharge or exhaust flue, which communications are so controlled by dampers that the discharge or exhaust of the produced gases may be always taken from the compartment in which the ore is uppermost, independently of the identity of the compartment, whereby the carbonic-acid gas which has been formed by the reduction of the ore by carbonic oxide is never decomposed at the expense of the fuel, but leaving the ore last is immediately carried away.

In carrying out my invention I employ a furnace constructed like that shown in the drawing, in which A represents a blast-furnace, the lower part of which is constructed according to any approved style, while the upper portion is provided with a series of compartments, B B′, opening below in the body of the furnace, which compartments may be formed by radial partitions, as shown, or in any other suitable manner. Near the top of the stack, and encircling the same, is arranged a circular exhaust pipe or flue, C, which flue communicates through the short radial pipes D with each one of the compartments of the furnace, and in each of which pipes D is arranged a damper, E, which opens or closes communication between its compartments and the exhaust-flue.

F is a platform at the top of the stack, and encircling the same, above which the handles

of the dampers project, so as to be easily manipulated, and upon which platform the charging of the compartments takes place.

G is a continuation of the discharge-flue, which extends vertically downward to the base-piece H, and serves to conduct away the gases of the furnace to be utilized in the usual well-known manner.

In making use of the furnace, as thus described, the compartments are charged, one set (say B) with fuel, and the alternate set (B′) with flux and ore. A cover is then applied to the top of the furnace, and the dampers of the pipes, communicating with the compartment B′ for the ore, are opened, while the alternate ones are closed. The blast being now applied, the ore commences to be reduced. As soon as recharging becomes necessary, instead of feeding more fuel into B and ore into B′, the charge of ore is fed to B, the dampers are reversed, and fuel fed to B′. Thus the distinguishing characteristics of the invention rest in the particular manner of charging the furnace, and the management of the escaping gases. By the first, each compartment of the furnace is made to do double duty as a fuel and an ore and flux conveyer, while the alternation is essential to a proper distribution of the furnace-burden in securing the best reducing effect. By the second, the generated gases are prevented from flowing through the fuel on their way to the exit, thus obviating the objectionable action of the carbon of the fuel on the passing carbonic-acid gas, which latter, in the presence of fuel, is reduced to carbonic oxide, and in this condition is permitted to escape with only partial utilization. On the other hand, while ore and flux charges are uppermost, the flow of the gases becomes desirable, because of the calcining effect and the oxidizing action of the carbonic oxide that may be in the passing gas.

By such provisions as these afforded by my invention, it will be seen that the amount of valuable gas escaping from the furnace approaches a minimum, while the reduction of the ore proceeds more rapidly and economically.

Having thus described my invention, what I claim as new is—

1. The herein-described method of charging and managing blast-furnaces having longitudinal compartments, which consists in feeding ore and flux into one compartment, and fuel into the next, and at intervals reversing this mode of charging to distribute the furnace-burden, the generated gases being compelled to traverse the compartment in which the ore is uppermost on their way to the exit, to their entire exclusion from the one in which the fuel is uppermost, substantially as and for the purpose described.

2. The combination, with a blast-furnace having longitudinal compartments, of a discharge or exhaust flue, communicating with each of the said compartments, near the top of the furnace, through outlets provided each with dampers, whereby the exhaust or discharge may be taken from any of the compartments to the exclusion of the others, substantially as described, and for the purpose of carrying out the method herein set forth.

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