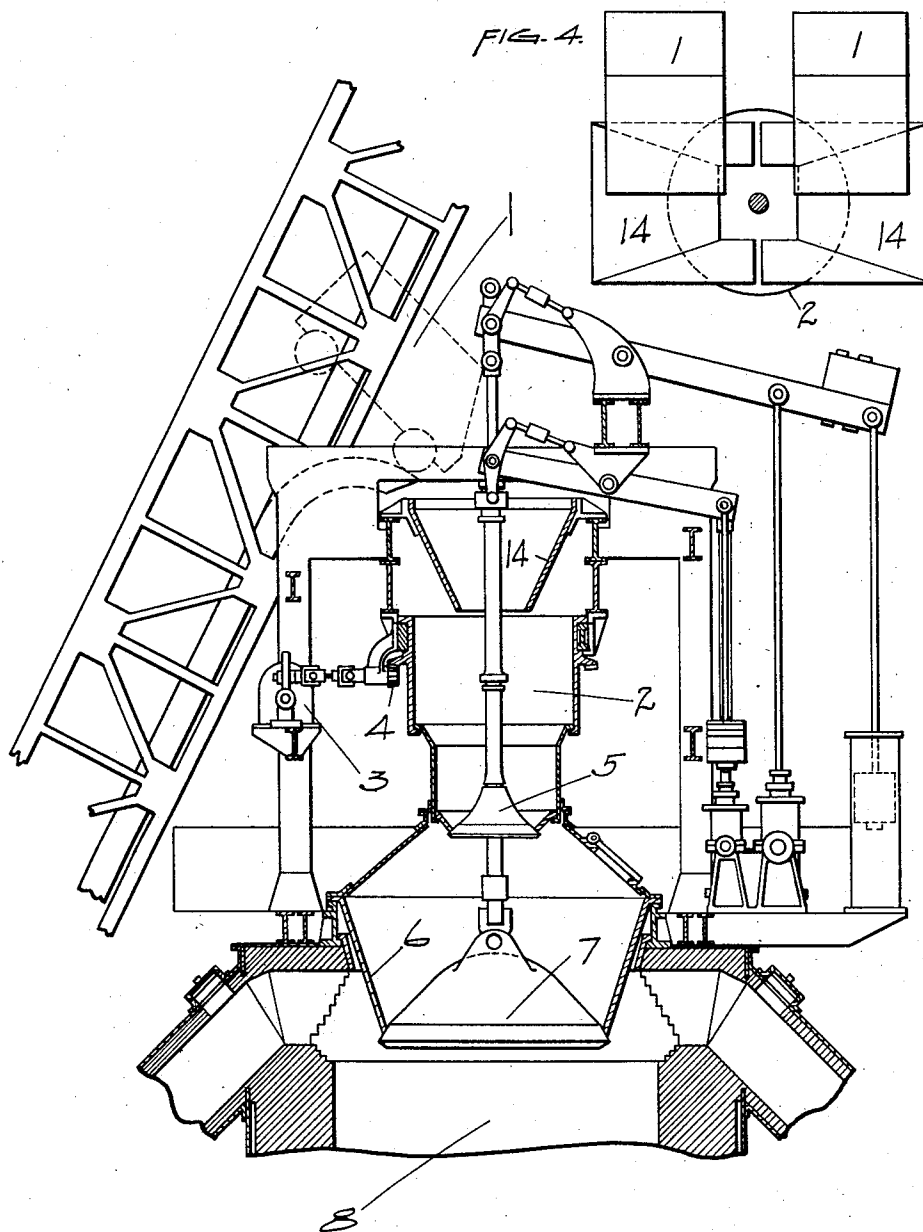




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CHARGING FURNACES.
APPLICATION FILED FEB. 24, 1912.

2 SHEETS—SHEET 2.



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FIG. 2.

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UNITED STATES PATENT OFFICE.

FRANK C. ROBERTS, OF WYNNEWOOD, PENNSYLVANIA.

CHARGING FURNACES.

1,033,036.

Specification of Letters Patent.

Patented July 16, 1912.

Application filed February 24, 1912. Serial No. 679,664.

To all whom it may concern:

Be it known that I, FRANK C. ROBERTS, a citizen of the United States, and a resident of Wynnewood, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Charging Furnaces, of which the following is a specification.

In most modern blast furnaces the material to be treated in the furnaces is delivered to the top of the furnace in skip cars and successive skip loads of material are delivered at the same side of the furnace top. The material may be dumped from the skip into a hopper or other device from which it is introduced into the furnace. Each skip load of material as it is dumped, tends to separate roughly into two portions, the coarser and heavier particles going into the hopper on the side opposite the dumping while the finer particles go more slowly and dribble down more or less into the near side of the hopper. There is thus produced in the hopper an unequal distribution. When the hopper is centrally mounted and closed by a bell this disposition of the material is maintained in the furnace itself and successive skip loads reach the furnace with the fine and coarse on opposite sides of the furnace. This produces a freer passage for the gases on one side of the furnace than on the other and there results an unequal, uneven working of the furnace which is uneconomical in fuel consumption and irregular in quality of output. One proposed method of overcoming this difficulty is to direct each skip load as a whole to one point in the circumference of the hopper and to place successive skip loads at different points so that in a plurality of skip loads a ring about the furnace is completed. It has also been proposed to rotate successive hopper fulls of the separated skip load through different degrees and thereby distribute about the furnace the irregularities of successive skip loads.

It is the object of my invention to correct the segregation of each skip load and to deliver each skip load in a ring to the furnace. I may interpose, between the skip and the furnace, a device, which rotates while the material is passing from the skip and thus correct the incipient segregation and intermix each skip load, at the same time getting an approximately uniform quantitative dis-

position of each skip load about the circumference of the furnace.

In the accompanying drawings, Figure 1, is a sectional view of a furnace charging device in which the receiving hopper is continuously rotated while receiving material from the skip; Fig. 2 is a sectional view of a furnace charging device in which there is a mixing chute through which the material passes and which is continuously rotated while material is passing through it; Fig. 3 is a plan view of one form of mixing chute and Fig. 4 is a plan view showing the location of two skips.

Material is brought to the top of the furnace in the skip, 1, and is dumped into the hopper, 2, (Fig. 1) which is rotated by the motor, 3, through the gear, 4, continuously or while receiving material. The hopper, 2, is kept closed by the bell, 5, and receives the successive portions of each skip load distributed about its circumference. It may happen that the larger and coarser portions of a skip load will reach the hopper first and that the fine material will dribble down into the hopper in a ring on the coarser material as the hopper rotates. The rotation of the hopper while receiving material insures a mixing of the coarse and fine and prevents the segregation of coarse and fine of a skip load.

If a double hopper is used on a furnace when the bell, 5, is lowered, the material passes from the hopper, 2, into the charging hopper, 6, closed by the bell 7, in which may or may not be assembled a plurality of skip loads before introducing them into the furnace, 8, by lowering the bell, 7. The hopper, 2, may be stationary when the material passes from it on lowering the bell, 5, or the hopper may be rotated while the material is passing from it, thus augmenting the mixing through the rotary or centrifugal motion imparted to the charge. To a less degree mixing may be produced if the hopper be stationary when receiving material and rotated only while discharging.

In Fig. 2, the hopper, 2, is not rotated but the material, in passing from the skip, 1, into the hopper, passes through a mixing chute, 9, provided with a suitable diaphragm, 10, against which more or less of the material may strike. The mixing chute, 9, is rotated by a motor 11, through the gear, 12, either continuously or while material is

passing through it. This rapidly rotating diaphragm intermixes the coarse and fine of each skip load and distributes it approximately uniformly in the hopper, 2, from
5 which it may be distributed in a ring in the furnace through the lower hopper, 6.

There is thus produced an intermixed charge of each skip load uniformly distributed in a ring about the circumference of
10 the furnace and when a plurality of such successive loads are in the furnace the distribution of gases and consequently the working of the furnace and its product will be maintained more nearly uniform. I may
15 provide stationary or adjustable chutes, 14, shown as oppositely disposed, to direct the material to the mixing device from the skip of which there may be one or, preferably, two side by side as shown in Fig. 4 which
20 alternately bring a load of material to the furnace top. Other apparatus than that shown in the drawing may be used in accordance with my invention.

I claim as my invention:

25 1. In charging a furnace, delivering material from a skip through a chute, mixing

the material as it passes through the chute without substantially delaying the progress of the material, and distributing each mixed skip load about the entire circumference of
30 the furnace.

2. In charging a furnace, delivering material from a skip, correcting the incipient separation without substantially delaying the progress of the material, collecting a
35 plurality of skip loads in a hopper each intermixed and in a ring about the entire circumference of the hopper, and delivering the charge as a whole into the furnace.

3. In charging a furnace, introducing material into a hopper without substantially
40 delaying the progress of the material, mixing the material by a rotary motion, and distributing the mixed material to the furnace.

Signed at Philadelphia, this 20th day of
45 February, 1912.

FRANK C. ROBERTS.

Witnesses:

RANDOLPH H. MILLER,
CLARENCE S. BUTLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."