

L. N. McCARTER.
BLAST FURNACE.
APPLICATION FILED NOV. 26, 1906.

Patented June 6, 1911.
3 SHEETS-SHEET 1.

994,175.

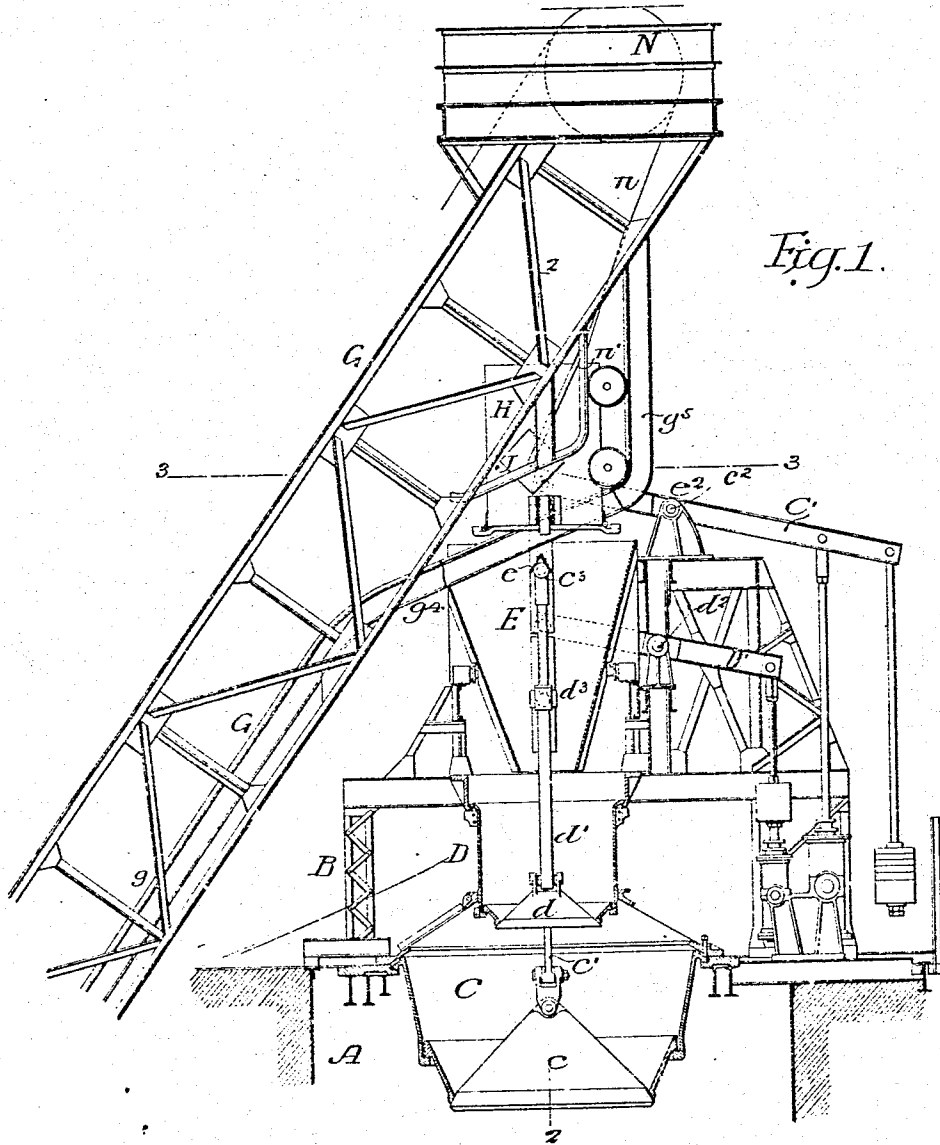


Fig. 1.

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3 SHEETS-SHEET 2.

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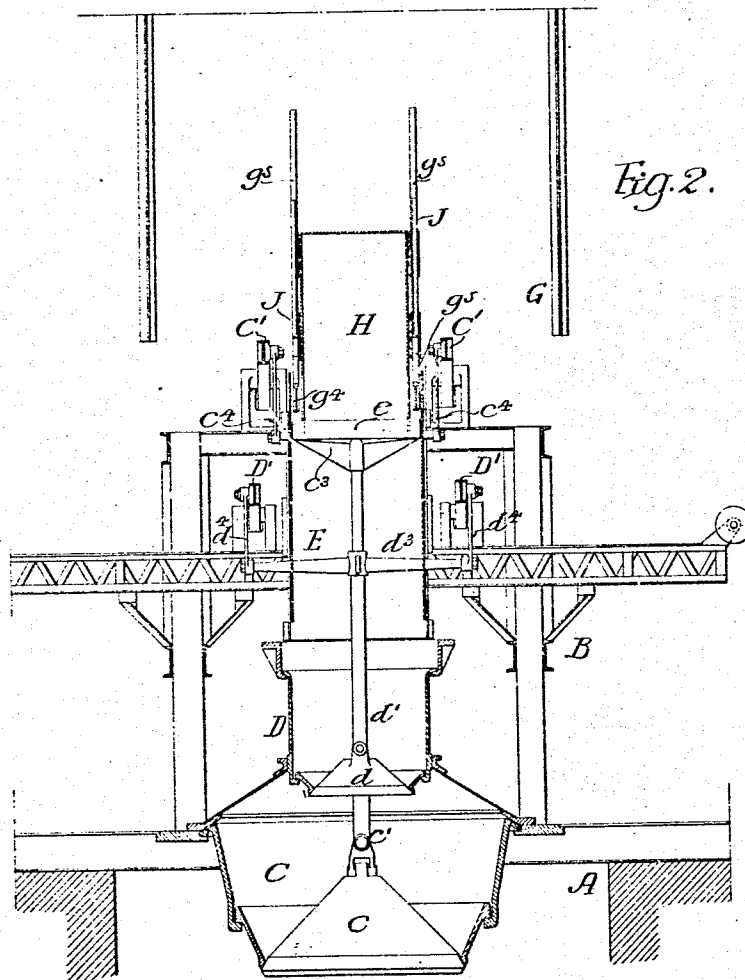


Fig. 2.

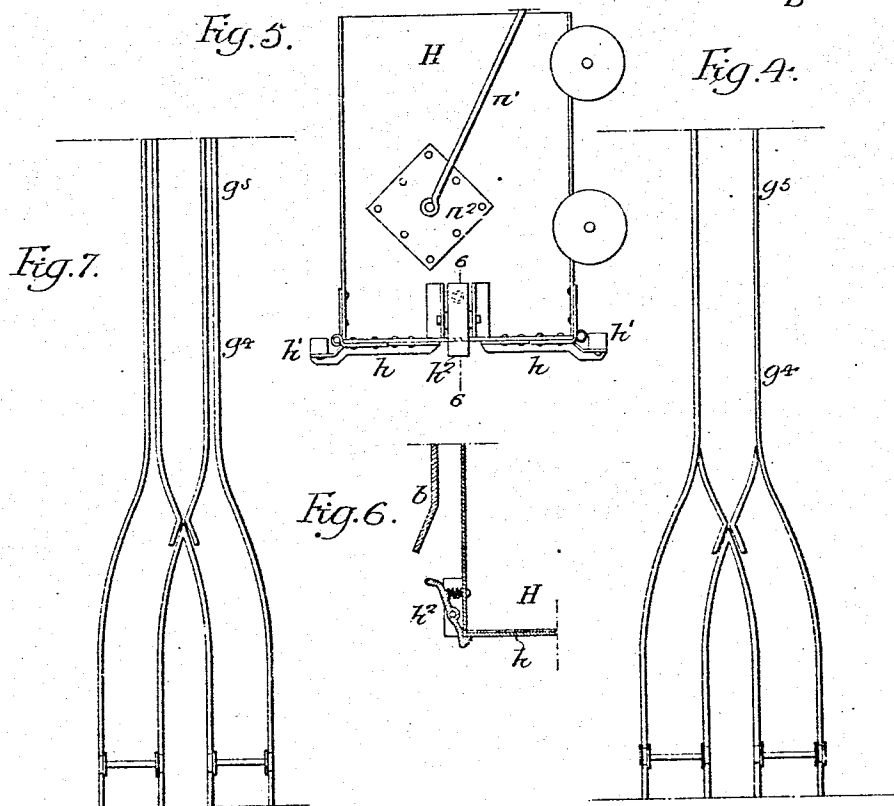
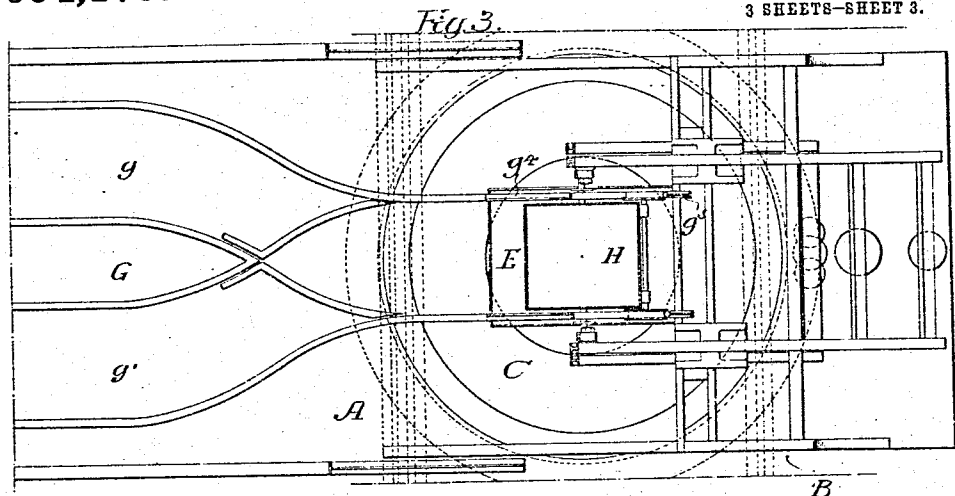
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UNITED STATES PATENT OFFICE.

LOUIS N. McCARTER, OF NORRISTOWN, PENNSYLVANIA, ASSIGNOR OF ONE-FOURTH
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BLAST-FURNACE.

994,175.

Specification of Letters Patent.

Patented June 6, 1911.

Application filed November 26, 1906. Serial No. 345,110.

To all whom it may concern:

Be it known that I, LOUIS N. McCARTER, a citizen of the United States, residing in Norristown, Pennsylvania, have invented certain Improvements in Blast-Furnaces, of which the following is a specification.

The object of my invention is to construct apparatus by which material can be fed to a blast furnace so that it will be distributed evenly over the surface of the body of the material in the furnace, as hereinafter described.

In the accompanying drawings: Figure 1, is a vertical sectional view of part of a blast furnace illustrating my invention; Fig. 2, is a vertical sectional view on the line 2-2, Fig. 1; Fig. 3, is a sectional plan view on the line 3-3, Fig. 1; Fig. 4, is a diagram view illustrating the tracks of the skip hoist; Fig. 5, is a side view of one of the cars; Fig. 6, is a sectional view on the line 6-6, Fig. 5, and Fig. 7, is a modification of the arrangement of the tracks.

In feeding blast furnaces it is difficult to properly distribute the material evenly over the surface of the material already in the furnaces, and very costly and intricate mechanism has been designed for this purpose which has not been successful.

By my invention I am enabled to discharge the material from the car over the center of the hopper so that the material will be distributed evenly into the hopper itself before being discharged into the furnace. By this means I am enabled to distribute the material over the surface of the material in the furnace in even layers so as to insure the best possible action of the furnace.

Referring to the drawings A is the body of the blast furnace, having a super-structure B which may be any of the well-known types. In the present instance, the super-structure has three hoppers C, D and E. Inclosing the bottom of the hopper C is a bell valve c , and inclosing the hopper D is a bell valve d . These valves are suspended from rods c' and d' respectively, and the rods are connected to levers C' and D', pivoted at c^2 and d^2 , respectively, and actuated by any suitable means. In the present instance, steam mechanism is shown to operate the valves. The rod d' is attached to a cross head d^3 which extends through slots in the sides of the hopper E. The cross head is at-

tached to the lever D' by links d^4 . The rod c' passes through the hollow rod d' and is attached at its upper end to a cross head c^3 also extending through slots in the side walls of the hopper E and attached to links c^4 connected to the levers C'; the cross head c^3 has a deflector e for deflecting the material as it passes into the hopper E.

G is a skip hoist extending from the bins at the base of the furnace to a point above the hopper E.

$g-g$ are two tracks separated on the lower portion of the hoist so that one car H can pass another but merging into a single track on the upper portion, so that a car traveling upward on either track can be shifted onto the single track and discharged centrally into the hopper E.

In the construction shown in Fig. 1 of the drawings, the rails on the upper portion of the tracks of the skip hoist are bent out of line so as to form an inclined section g^4 and a vertical section g^5 , and in order to insure the proper transfer of the car directly over the center of the hopper, I provide a guard rail J which is so shaped as to hold the wheels of the cars onto the main rails. The hoisting rope n passes around the ordinary drum N and is connected by a yoke n' to the body of the car. In the present instance the pivot connection n^2 of the yoke with the car is off center as shown in Fig. 5, so that the upper end of the car will slightly overbalance the lower end. This will insure the car traveling on the rails. When the car reaches the portion g^4 of the track it will swing and keep to its track until it reaches the position shown in Fig. 1, and at the same time, owing to the position of the pivot, the car will tend to keep to the rail when it is being lowered after being discharged.

In the present instance I have shown the car having two pivoted doors h h with counterbalances h' and these doors are held in place when the car is loaded by means of a spring catch h^2 which engages the doors. I preferably arrange a spring catch on each side of the car. The catches are released when the car reaches the discharge point by means of plates b which are secured to the framework of the structure B and as soon as the latches are acted upon the doors will open, discharge the load, and the counterweights will close the doors again and as

soon as the car begins to descend the catches will be released and engage the doors, preventing them swinging as the car descends. The action of the air will tend to close the doors as soon as the car commences to descend, as the cars of the skip hoist are operated very quickly and travel rapidly.

The operation of the apparatus is as follows: One of the cars is loaded with material and elevated to position, while the other car is being lowered to receive a load. As the car nears the top it veers from the direct line of pull of the rope and travels on the inclined portion g^4 of the track until it reaches the vertical section g^5 and then turns so as to be directly on end and above the center of the hopper. Then by a slight movement upward of the car the spring catches h^2 are released by coming in contact with the inclined plates b on the superstructure B, releasing the doors of the car and allowing the material to fall directly into the hopper E. The material will then pass from this hopper into the hopper D and onto the valve d being distributed evenly on this valve. Then on opening the valve d , the material drops into the lower hopper C onto the valve e , and then after sufficient material accumulates in the hopper C the valve is opened so as to allow the material to be discharged into the body of the blast furnace distributing itself over the surface of the material already in the furnace. The car in the meantime is lowered, the first movement being to release the catches which engage the doors which were closed as soon as the contents of the car was discharged and the car will then travel down the skip hoist while a loaded car is being elevated to the point of discharge.

I have shown in Fig. 4 the two tracks $g-g$ on the lower portion of the skip hoist connected to a single track at the upper end. In this instance I use a grooved wheel on each car to travel on the outside rail, as shown in said figure, to dispense with switches; thus one car travels only on one of the lower tracks being shifted onto the single track and returning over the same double track.

It will be understood that the tracks may be arranged as in Fig. 7, in which two separate tracks are used, one overlapping the other and the rails of one track forming the guards for the other track. In this construction, special grooved wheels are not necessary.

In some instances the hopper E may be dispensed with and the cars will then discharge directly into the hopper D, but I

prefer the construction shown, as I break the fall of the material and insure its even distribution.

I claim:—

1. The combination in a blast furnace, of a hopper, a valve therein, a skip hoist leading from a point near the base of the blast furnace to a point above the hopper, a track on the skip hoist deflected at its upper end to extend over the center of the hopper, a car arranged to travel on the track, the rear end of the car being open for the discharge of material and provided with a door for closing the discharge opening, the track being so formed that when the car reaches a point directly over the center of the hopper it will be turned into a vertical position with the discharge end lowermost, so that when the door is opened the material will be discharged into the center of the hopper.

2. The combination in a blast furnace of a body portion, a hopper above the body portion, a valve mounted in the hopper, a cross bar connected to the valve, two pivoted arms connected to the cross bar outside of the hopper and above its upper end, means for operating the arms, an inclined skip hoist deflected so as to extend over the hopper between the said arms, and a car on the skip hoist, the track on the skip hoist extending to a point directly above the hopper and between the pivoted arms, so that the car will discharge its load centrally into the hopper.

3. The combination in a blast furnace, of a hopper, tracks leading to a point above the hopper and turned upward, a car arranged to travel on said tracks, and a yoke pivoted to the car at one side of the center so that the upper end of the car will overbalance the lower end.

4. The combination in a blast furnace, of a hopper, tracks extending over the hopper and turned upward, a car arranged to travel on said tracks and having a door at one end to close the discharge opening, a yoke pivoted at each side of the car on one side of the center, the parts being so arranged that when the car is raised to its full extent it will be turned on end and the discharge opening will be directly above the center of the hopper.

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

LOUIS N. McCARTER.

Witnesses:

WILL. A. BARR,
JOS. H. KERN.