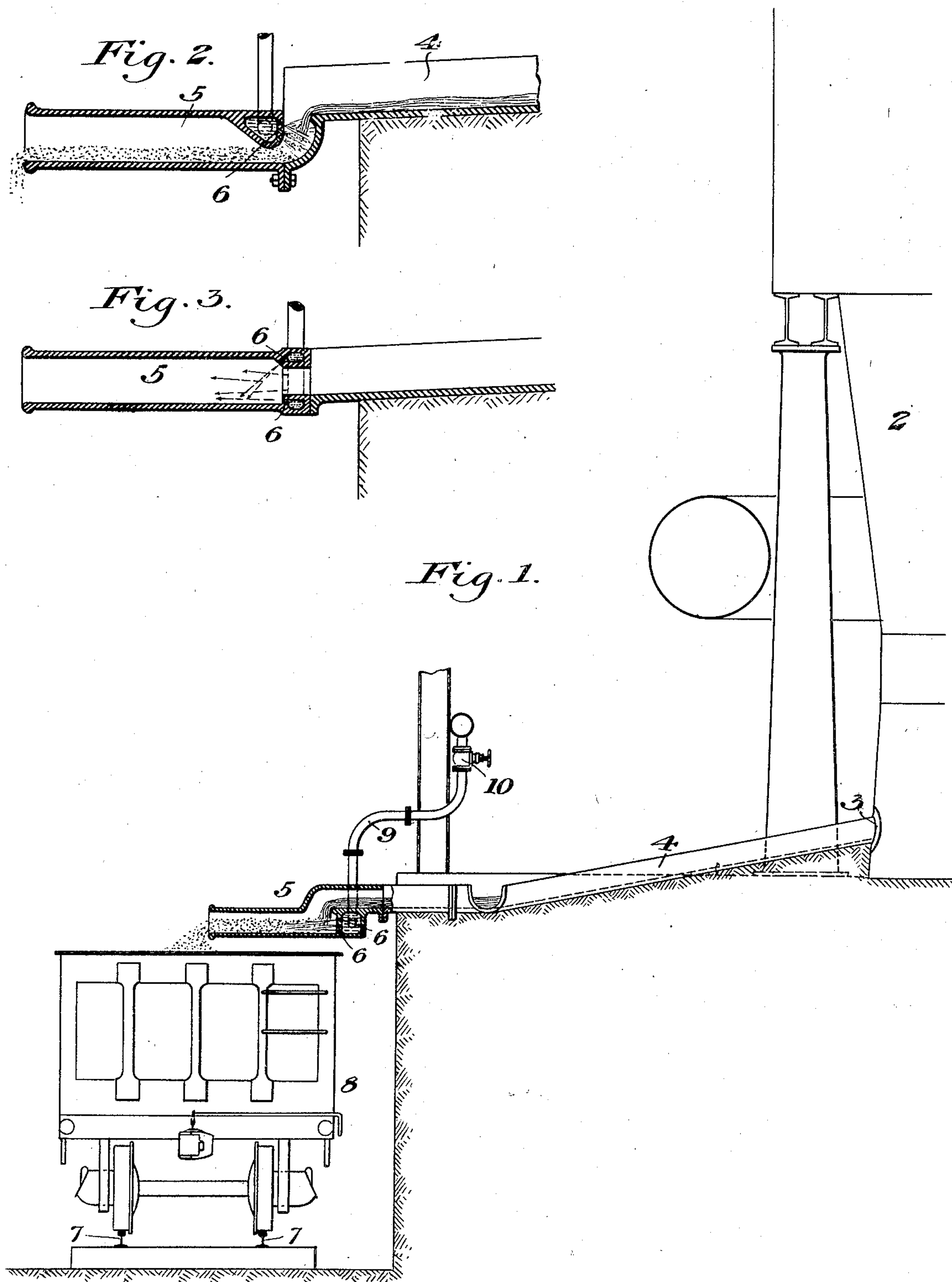


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PATENTED FEB. 13, 1906.

G. K. HAMFELDT & D. CUBBAGE.
APPARATUS FOR MAKING ARTIFICIAL SAND.

APPLICATION FILED NOV. 11, 1904.



WITNESSES

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APPARATUS FOR MAKING ARTIFICIAL SAND.

No. 812,650.

Specification of Letters Patent.

Patented Feb. 13, 1906.

Application filed November 11, 1904. Serial No. 232,311.

To all whom it may concern:

Be it known that we, GEORGE K. HAMFELDT, of Munhall, and DAVID CUBBAGE, of Swissvale, Allegheny county, State of Pennsylvania, have invented a new and useful Apparatus for Making Artificial Sand, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation, partly in section, of a blast-furnace plant equipped with our improved apparatus; and Figs. 2 and 3 are sectional views showing modifications in the manner of constructing and arranging the water-inlets in the apparatus.

Our invention relates to the converting into sand and thus disposing of the large quantities of slag which are produced in metallurgical furnaces, and particularly in the modern blast-furnace. This slag has heretofore been a waste product and has been the source of great trouble and expense in providing for its disposal.

Various attempts have been made for disintegrating the slag by bringing it while still molten into contact with water; but so far as we are aware all the attempts have been unsatisfactory in respect of the quality of the resulting product and have been very expensive on account of the cost of rehandling of the disintegrated slag and in the maintenance of the necessary equipment for such rehandling.

The object of our invention is to provide a simple and efficient apparatus into which the molten slag is delivered direct from the blast-furnace and in which the molten slag is quickly and easily transformed into an artificial sand having the characteristics and qualities of ordinary building-sand.

Another object of our invention is to provide means by which the resulting sand is delivered directly from the apparatus into cars cool and in condition to be shipped without further treatment and handling.

In the drawings, 2 represents a blast-furnace having the usual slag-tapping hole 3. A slag-trough 4 leads from the tapping-hole to the disintegrating apparatus. The apparatus consists of a tube or chamber 5, having openings at each end and also having water-inlets 6 6 located in the tube 5 near its inner end, through which end the slag enters from

the furnace. As is shown in the drawings, the apparatus is located with reference to the loading-track 7, on which cars 8 are placed so as to be above the car, which permits the slag-sand to be discharged from the tube 5 directly into the car 8. Water is introduced into the tube 5 through the water-inlets 6 6 and is supplied to the inlets by means of a suitable pipe 9, which is connected to a source of water-supply. The water is controlled by a suitable valve 10 on the water-supply pipe.

Instead of constructing the water-inlets in the interior of the pipe, as is shown in Fig. 1, they may be made as in Fig. 2, or the water-inlet may consist of an annular opening, as is shown in Fig. 3, so as to deliver the water in an annular sheet, through which the slag must flow.

The operation of the apparatus is as follows: The slag-tapping hole in the furnace is opened in the usual manner and the water is turned on in the disintegrating-tube. The stream of molten slag flows down the inclined slag-trough into the opening in the inner end of the tube and comes into contact with the water, also introduced at the rear end of the tube. The instant the molten slag comes into contact with the water the slag is violently agitated and is thrown against the walls of the tube, which prevent the slag becoming scattered by the action of the water and cause it to be disintegrated into a fine sharp sand. The water-inlets being inclined at a suitable angle toward the discharge end of the tube and the water being supplied to the tube at a considerable pressure, the slag is caused to become thoroughly mixed with the water and to be finally ejected from the discharge end of the tube into a car located beneath the tube in a suitable condition for shipment.

In the apparatus heretofore used for disintegrating molten slag by means of streams of water directed against the slag the resulting product has contained a large percentage of lumps and porous globules. These lumps and globules have made it necessary to screen the product or to crush such lumps and globules and in this way has added to the cost of disposing of this material.

By the use of the tube or chamber for effecting the granulation all this is avoided and is rendered unnecessary. Practically all of the slag is disintegrated into fine sharp sand,

which is delivered immediately into a car in condition to be used without further treatment. The amount of water necessary to be used is reduced, and the cost of delivering the slag into cars ready for shipment is greatly lessened.

We believe we are the first to use a tube or inclosed chamber in which molten slag is disintegrated by contact with water, and we intend to claim such apparatus broadly.

Variations in the construction and arrangement of the apparatus may be made without departing from our invention, since

What we claim is—

1. Apparatus for disintegrating molten slag, comprising an inclosed conduit adapted to convey a stream of molten slag, a water-supply, and means for directing a stream of water into contact with the slag within said conduit, the walls of the conduit being arranged to receive the impact of the slag when thrown laterally outward; substantially as described.

2. Apparatus for disintegrating molten slag, comprising an inclosed conduit adapted to convey a stream of molten slag, a water-supply, and means for directing a stream of water toward the outlet of said conduit and into contact with the slag within said conduit, the walls of the conduit being arranged to receive the impact of the slag when thrown laterally outward; substantially as described.

3. Apparatus for disintegrating molten

slag, comprising an inclosed conduit for the slag, a water-supply, and means for directing an annular stream of water into contact with the slag within said conduit, the walls of the conduit being arranged to receive the impact of the slag when thrown laterally outward; substantially as described.

4. Apparatus for disintegrating molten slag, comprising an inclosed conduit adapted to convey a stream of molten slag, a water-supply, and means carried by the walls for directing a stream of water into contact with the slag within said conduit, the walls of the conduit being arranged to receive the impact of the slag when thrown laterally outward; substantially as described.

5. Apparatus for disintegrating molten slag, comprising an inclosed conduit for the slag, a water-supply, and means for directing a stream of water into contact with the slag within said conduit, the walls of the conduit being arranged to receive the impact of the slag when thrown laterally outward, the end of the conduit being arranged to discharge the disintegrated slag into a car; substantially as described.

In testimony whereof we have hereunto set our hands.

GEORGE K. HAMFELDT.
DAVID CUBBAGE.

Witnesses:

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