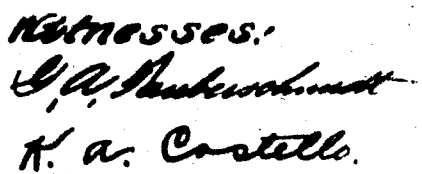


HOPPER,

949,672.

Patented Feb. 15, 1910.



Inventor.

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UNITED STATES PATENT OFFICE.

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HOPPER.

949,672.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWIN M. BASSLER, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hoppers, of which the following is a specification.

This invention relates to hoppers and relates particularly to hoppers designed and adapted for containing pulverized material, as pulverized fuel,—coal, coke, and the like,—provided with a discharge opening in its lower end through which the contents thereof are discharged and delivered to the point of use, as the burners of a furnace, kiln or the like, usually by means of a suitable screw conveyer.

Where pulverized coal is used for fuel, it is usually delivered into a suitable hopper from which it is discharged and delivered to the burners by means of a suitable conveyer, as a screw conveyer, the casing of which is in open communication with a suitable discharge opening in the bottom of the hopper, the sides of the hopper usually declining toward said discharge opening so that the pulverized material will settle through the discharge opening by gravity. Owing, however, to the peculiar character of some pulverized material, coal, among others, it is found, in practice, that the pulverized material does not settle uniformly and regularly at all points of the hopper, but tends to bank up or lodge at the sides of the hopper, a hole or opening forming in the body of the material contained in the hopper directly above and of about the same size as the discharge opening in the bottom of the hopper, the sides of said hole or opening thus defined by the lodged fuel being almost vertical. Also, it is found that, at intervals, considerable quantities of the pulverized material around said opening become loosened and detached and fall into the discharge opening in solid masses, which operate to compress the air in front thereof, creating a constant air pressure throughout the conveyer and the burners, causing the burners to belch, thus seriously interfering with the uniform action of the burners and, also, causing a considerable waste of fuel.

The object of the present invention is to overcome the foregoing objectionable features and to provide a hopper adapted for containing and feeding pulverized material,

so constructed and arranged that material may be fed therefrom continuously and uniformly, unaffected by masses of the pulverized material becoming dislodged and falling into the discharge opening, in the manner heretofore described.

To this end my invention consists in providing a vent within the hopper supported adjacent to the discharge opening thereof, whereby any air accumulating in the lower end of the hopper may escape without creating any appreciable pressure in the apparatus connected to the discharge opening of said hopper.

The invention also consists of the various other features and details of construction hereinafter described and claimed.

In the accompanying drawing, in which my invention is fully illustrated—Figure 1 is a vertical sectional view of a hopper, the discharge opening of which communicates with the casing of a screw conveyer, said hopper being provided with my improved venting apparatus. Fig. 2 is an end view of a venting apparatus of my invention, separated from the hopper. Fig. 3 is a top plan view thereof. Fig. 4 is a fragmentary sectional view thereof on an enlarged scale; and Fig. 5 is a bottom plan view of the discharge end of the hopper showing my improved venting apparatus in position.

Referring now to the drawing, 1 designates a hopper of usual or approved construction, such as is commonly used for containing pulverized material, as pulverized coal or the like. Formed in the bottom of said hopper is a discharge opening 2 which, as shown, is in open communication with the casing 3 of a screw conveyer adapted for discharging the pulverized material from said hopper and delivering the same to the point of use, as to the burners of a furnace, kiln, or the like. The sides of the hopper decline toward the discharge opening 2, so that the material contained in said hopper will tend to settle by gravity toward said discharge opening. Owing, however, to the peculiar character and action of some pulverized materials, as, for example, pulverized coal, it is found that they do not settle uniformly over all parts of the hopper, but lodge around the sides of the hopper, leaving a hole about equal in size to the discharge opening of the hopper, extending down through the contents of the hopper,

the sides of which are almost vertical. In the drawing, the dotted line 4 indicates approximately the side of the opening which will be formed through the material contained in the hopper. At intervals, also, sections of the pulverized material around the opening 4 become detached and fall into the discharge opening 2, which operates to compress the air contained in the opening 4 below such dislodged mass of material, creating a constant excessive pressure in the connections to said discharge opening, as the conveyer 3 and the burners, not shown, which interferes with the uniform operation of said burners and causes them to operate irregularly and imperfectly. To overcome these objectionable features, I provide a vent for the hopper adjacent to the discharge opening 2 therefrom, whereby any air accumulating in the bottom of said hopper may escape without creating any appreciable pressure in the connections to said discharge opening 2.

In the preferable construction shown, a vent of my invention comprises a hollow structure 5 located within the hopper 1 adjacent to the discharge opening 2 in such position that an unobstructed space of desired size will be left around said structure 5 to provide a desired rate of feed therethrough. For purposes of convenient reference, the hollow structure 5 will hereinafter be referred to as a hood. Said hood 5 may be made of any suitable material, desirable material for the purpose being galvanized sheet iron. To provide for air entering the hood 5 freely, the bottom thereof is preferably entirely open. Preferably, also, said hood 5 is provided with holes or openings 6 in its side walls, through which the air accumulating in the lower end of the hopper 1 may enter said hood 5. To prevent the pulverized material from entering the hood 5, the openings 6 are covered by what may be designated as baffles 7 consisting of strips of sheet metal secured to the sides of the hood 5 above said holes or openings, said strips being shaped to form sections 8 and 9, of which the sections 8 extend outwardly from the hood and the sections 9 downwardly even with or slightly below the lower sides of the holes or openings 6 covered thereby, respectively, thus forming spaces 10 between said baffles 7 and the sides of the hood open at their lower sides, which will operate to prevent the material contained in the hopper from entering said holes or openings, but will permit air to enter said hood freely.

In the preferable construction shown, the holes or openings 6 are arranged in several rows or series each extending entirely around the hood 5, the baffle 7 for each row or series of holes or openings being likewise continuous around said hood. To prevent the material contained in the hopper from

lodging on the hood 5, the top thereof is preferably inclined at a steep angle, say 15 degrees to the vertical. As shown at 11, the top of said hood declines both ways from its longitudinal center. To provide for the escape of any air under pressure accumulating in the hood 5, said hood is provided with a discharge opening so disposed that it will at all times be unobstructed by the material contained in the hopper. In the preferable construction shown, air is adapted to escape from said hood 5 through a pipe which communicates with the top of said hood and which extends upwardly above the normal level of the material in the hopper 1. To prevent pulverized material from being blown into the room, when the top of the hopper is open, and to prevent objects from falling into said pipe, which might clog the same, the upper end of said pipe 12 is preferably bent over, as shown at 13, so that the discharge opening therefrom will be directed downwardly into the hopper 1.

The top of the hopper 1 is usually closed, as by a cover 14. The hood 5 may be supported in position in any suitable or desired manner. In the preferable construction shown, said hopper is suspended from rods 15, the lower ends of which are secured in the top of said hood, and the upper ends to the cover 14 of the hopper. To provide for varying the operative size of the discharge opening 2 from the hopper 1, the rods 15 are preferably connected to the cover 14 of the hopper in such manner that the position of said hood may be adjusted vertically. As shown, the upper ends of said rods 15 are screw threaded for a considerable distance and pass freely through holes or openings formed in the hopper cover 14, and threaded to the upper ends thereof above said cover and adapted to rest thereon are nuts 16.

I claim:—

1. A hopper and a vent therefor, said vent comprising a hood constructed and arranged to be supported within said hopper adjacent to the discharge opening thereof, said hood being provided with an opening or openings for the admission of air thereto, and with an opening or openings for the escape of air therefrom, substantially as described.

2. A hopper and a vent therefor, said vent comprising a hood constructed and arranged to be supported within said hopper adjacent to the discharge opening thereof, said hood being provided with an opening or openings for the admission of air thereto, and a pipe which communicates with said hood provided with a discharge opening located above the designed level of material in the hopper, substantially as described.

3. A hopper and a vent therefor, said vent comprising a hood constructed and arranged to be supported within said hopper adjacent to the discharge opening thereof, said hood

being provided with an opening or openings for the admission of air thereto, and a pipe which communicates with said hood, the upper end of which is open, substantially as described.

1. A hopper and a vent therefor, said vent comprising a hood constructed and arranged to be supported within said hopper adjacent to the discharge opening thereof, said hood being provided with an opening or openings for the admission of air thereto, and a pipe which communicates with said hood provided with an opening directed downwardly within said hopper, substantially as described.

5. A hopper and a vent therefor, said vent comprising a hood constructed and arranged to be supported within said hopper adjacent to the discharge opening thereof, said hood being provided with an opening or openings for the admission of air thereto and with a discharge opening, the top of said hood being downwardly inclined, substantially as described.

6. A hopper and a vent therefor, said vent comprising a hood supported within said hopper adjacent to the discharge opening thereof, the bottom of said hood being open and said hood being provided with a discharge opening for the escape of air admitted thereto, substantially as described.

7. A hopper and a vent therefor, said vent comprising a hood supported within said hopper adjacent to the discharge opening thereof, said hood being provided with openings in its side walls through which air may enter said hood and with a discharge opening for the escape of air therefrom, and baffles which project over said holes or openings at a distance from the sides of said hood forming spaces communicating with said holes or openings, the tops and sides of which are closed and the bottoms of which are open, substantially as described.

8. A hopper and a vent therefor, said vent comprising a hood supported within said hopper adjacent to the discharge opening thereof, the bottom of said hood being open and said hood being provided with openings in its side walls and through which air may enter said hood, and with a discharge opening for the escape of air therefrom, and baffles which project over said holes or open-

ings at a distance from the sides of said hood, forming spaces communicating with said holes or openings, the tops and sides of which are closed and the bottoms of which are open, substantially as described.

9. A hopper provided with a discharge opening and a vent therefor, said vent comprising a hood supported within said hopper adjacent to the discharge opening thereof, said hood being provided with an opening or openings for the admission of air thereto and with a discharge opening, the means for supporting said hood being so constructed and arranged that said hood will be adjustable to vary the operative size of the discharge opening, substantially as described.

10. A hopper provided with a discharge opening and a vent therefor, said vent comprising a hood supported within said hopper adjacent to the discharge opening thereof, said hood being provided with an opening or openings for the admission of air thereto, and with a discharge opening, the means for supporting said hood consisting of rods, the lower ends of which are secured to said hood, and a fixed support to which the upper ends of said rods are connected, substantially as described.

11. A hopper provided with a discharge opening and a vent therefor, said vent comprising a hood supported within said hopper adjacent to the discharge opening thereof, said hood being provided with an opening or openings for the admission of air thereto, and with a discharge opening, the means for supporting said hood consisting of rods the lower ends of which are connected to said hood, a fixed support provided with holes or openings through which the rods for supporting said hood pass, the upper ends of said rods being screw threaded for a considerable distance, and nuts threaded to the ends of said rods above said fixed support, substantially as described.

In testimony, that I claim the foregoing as my invention, I affix my signature in presence of two subscribing witnesses, this 28th day of January, A. D. 1909.

EDWIN M. BASSLER.

Witnesses:

K. A. COSTELLO,
G. M. ELLINGEN.