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FEEDER FOR PULVERIZED MATERIAL

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My invention relates to apparatus for feeding pulverized material, and particularly to feeding pulverized fuel from a storage receptacle to a desired point of delivery.

5 An object of my invention is to provide an apparatus of self-contained character which will be of simple and inexpensive construction and readily applicable to and removable from operative position and by which a continuous and measured supply of fuel may be maintained in desired and uniform quantities without liability to clogging.

15 A further object is to provide a feeding apparatus which operates under slow speed, thus reducing wear which adds to its durability and general performance.

The novel features will be more fully understood from the following description and claims taken with the drawings, in which:

20 Fig. 1 is a longitudinal cross section through a feeding device embodying my invention taken on the line 1—1 of Fig. 2;

Fig. 2 is a transverse section taken on line 2—2 of Fig. 1; and

25 Fig. 3 is an end view looking in the direction of the arrows on line 2—2.

Referring to Fig. 1, the feeder comprises a material hopper 4 adapted to communicate with and be secured to a source of supply at its upper end 5, with a discharge opening 6 at its lower end, and a feed wheel 7 positioned over the discharge opening in such a manner so as to carry material from the inlet 5 to the discharge opening 6 in uniform and measured quantities. The feeding wheel is preferably of the star wheel type and comprises a hub 8 and radial blades 9, which is secured to a shaft 10 journaled in bushings 11 in opposite ends of a bearing 12 located beneath the hopper. At the opposite end of the shaft is mounted a driving member 13 of any suitable or desired type. At the outlet end of the hopper casing is an opening 14 adapted to provide facilities for the machining of the wheel housing and shaft bearing, and to allow the assembling of the feed wheel and shaft through that opening. A flanged cap 15 is fitted into the opening and secured by bolts, thus housing the wheel and shaft in its operative position. Between the wheel 7 and

the inlet end 5 of the hopper is mounted a plate 16 which is adapted to be slidably adjusted to regulate the flow of material between the hopper inlet and the wheel. The upper portion and one side of the wheel operates in an inverted open pocket 17 hereinafter explained. As shown in Fig. 2 the feed wheel consists of a hub from which radiate equally spaced blades, the width of which are equal to that of the hub. The formation of the blades produce V-shaped openings 18 about the hub. The recessed portion 19 of the hopper in which the wheel operates is shaped and proportioned so as to provide a seal between the inlet 5 and discharge end 6 of the feeder, so that at no time will there be a continuous or open passage between the source of supply and the discharge end. This seal is necessary and important in the successful performance of the feeder, inasmuch that should the feeder be used to feed pulverized fuel to a furnace there may be times when excessive draft would tend to draw fuel through the feeder in quantity sufficient to cause severe fluctuation in combustion within the furnace. A feeder of the screw conveyor type is particularly susceptible to this condition.

When used in combination with a pulverized fuel burner, the inlet end 5 of the feeder is secured to a supply pipe and the outlet end 6 to the burner. The fuel is fed by gravity into the hopper 4, and as it passes under the adjustable slide or gate 16 it is forced into the inverted pocket 17 surrounding the upper portion of the rotative feed wheel 7, where it is picked up by the wheel and fed into the burner.

Conditions may be such that the supply pipe is of considerable length and the weight of the column of material has a tendency to increase its density in the hopper, making it difficult to feed the material in its compressed state at a uniform rate to the burner.

To this end I have mounted the feed wheel in the inverted pocket compartment 17 in spaced relation to the hopper inlet. The axis of the wheel is substantially in the direction of the movement of the material as it passes from the hopper inlet to the wheel.

The wheel is revolved in the direction of the arrow as shown in Fig. 2, which is at right angles to the movement of the material passing under the gate 16. As the compressed material passes under the gate it is free to expand to its normal density in the pocket 17 surrounding the upper portion of the wheel. The loosened material 23 readily flows into the V-shaped openings 18 of the wheel and as the material piles up substantially at the side of the wheel in the direction of its rotation, each opening is completely filled due to the curvature 20 of the hopper at that side of the wheel before it enters the confines of the wheel housing. As each blade passes the outlet opening, the material 23 in its loosened state readily flows in a uniform manner through the outlet to the burner or source of delivery. The only interruption in the uniform flow of the material to the outlet will be the short interval in which the ends 21 of the blades are passing over the edge 22 of the outlet opening and this is comparatively negligible as there will be some material ahead of the blade up to this point which is constantly being fed into the outlet. The material will begin to empty into the outlet as soon as the end of a blade passes the outlet opening and the rate of feeding of the material into the outlet will be determined by its natural angle of repose which will remain constant throughout the emptying of each pocket and the speed of the feed wheel, thus providing a uniform feed.

Referring to Fig. 2 it will be noted that outlet opening 6 is in offset horizontal relation to the vertical axis 24 of the feed wheel. This is done to obtain a uniform discharge of material into the outlet 6 as the blade 9 passes the point of opening 22, and as the wheel moves very slowly the material between the blades has practically assumed its natural angle of repose before it discharges into the outlet. The discharge of the material in this position from there on will be uniform as the blade is advanced in the direction of the outlet. Were the opening positioned directly under the axis of the wheel there would be an undue discharge of material into the outlet until the material had assumed its angle of repose, which would cause an ununiform discharge during that period. Therefore the positioning of the outlet in relation to the axis of the feed wheel is important for the successful performance of the feeder.

From the foregoing it will be obvious to those skilled in the art that I have invented a new and useful apparatus for feeding material, in that it is self-contained, simple and inexpensive to manufacture and insures a constant and uniform flow of material under varying conditions, and due to its slow speed the wear on its parts is small.

While I have shown my invention in one form, it will be obvious to those skilled in the

art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art, or as are specifically set forth in the appended claims.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In an apparatus for feeding pulverized material, the combination, a hopper having an inlet and an outlet, and means to cause the movement of material from said inlet to said outlet in uniform quantities, the axis of said means being in the direction of the movement of the material between said inlet and said outlet and offset in relation to said outlet, said means forming a seal between said inlet and said outlet.

2. In an apparatus for feeding pulverized material, the combination, a hopper having an inlet and an outlet, and means located over said outlet to cause the movement of material from said inlet to said outlet in uniform quantities, the axis of said means being in the direction of the movement of the material between said inlet and said outlet, said outlet being offset in horizontal relation to the axis of said means and proportioned so that its vertically projected area will be within the path of said means.

3. In an apparatus for feeding pulverized material, the combination, a hopper having an inlet and an outlet, and means located over said outlet to cause the movement of material from said inlet to said outlet in uniform quantities and forming a seal between said inlet and said outlet, the axis of said means being in the direction of the movement of the material between said inlet and said outlet and offset in relation to said outlet.

4. In an apparatus for feeding pulverized material, the combination, a hopper having an inlet and an outlet, feeding means located over said outlet to cause the movement of material from said inlet to said outlet in uniform quantities, the axis of said means being in the direction of the movement of material between said inlet and said outlet, means for controlling the movement of material between said inlet and said feeding means, and a shaft rotatably mounted under the hopper and connected to said feeding means at one end.

5. In an apparatus for feeding pulverized material, the combination, a hopper having an inlet and an outlet, a rotative feed wheel located over said outlet to cause the movement of material from said inlet to said outlet in uniform quantities, the plane of rotation of said wheel being at right angle to the movement of the material between said inlet and said wheel, and a shaft to rotate the wheel mounted outside of the hopper.

6. In an apparatus for feeding pulverized material, the combination, a hopper having an inlet and an outlet, a rotative feed wheel adjacent said outlet, a compartment in spaced relation to said inlet and communicating therewith to form a pocket over said wheel and adapted to receive material from said inlet, and means to regulate the passage of material between said inlet and said pocket, the axis of said wheel being in the direction of the movement of the material between said inlet and said pocket and offset in horizontal relation to said outlet. 70
7. In an apparatus for feeding pulverized material, the combination, a hopper having an inlet and an outlet, a rotative feed wheel, a compartment in spaced relation to said inlet and communicating therewith to form a pocket over said wheel, an adjustable gate between said inlet and said pocket, and a recessed portion adjacent said outlet adapted to receive and confine a portion of said feed wheel when in operative position, the axis of said wheel being disposed longitudinally of said hopper and horizontally spaced relative to said outlet. 75
8. In an apparatus for feeding pulverized material, the combination, a hopper having an inlet and an outlet, a feed wheel rotatably mounted adjacent said outlet, a pocket over said wheel adapted to receive material from said inlet, means to regulate the flow of material from said inlet to said pocket, an opening at the end of said pocket adapted to receive the wheel and means to close said opening and retain the wheel in its operative position, the axis of the opening being disposed longitudinally of the hopper and horizontally offset relatively to said outlet. 80
9. In an apparatus for feeding pulverized material, the combination, a hopper comprising an inlet and an outlet, an inverted pocket in spaced relation to said inlet and communicating therewith and said outlet, a bladed wheel positioned between said pocket and said outlet, a shaft rotatably mounted under the hopper and secured to the wheel, means to rotate the shaft, said wheel and hopper being adapted to provide a seal between the outlet and said pocket, and an opening provided to allow the assembling of the wheel in a direction longitudinally of the hopper and a cap to close the opening and to retain said wheel in its operative position. 85
10. In an apparatus for feeding materials, a casing having an inlet and an outlet, said inlet and said outlet being disposed in different transverse planes, and a member for controlling the feed of the material through the outlet and forming a seal between said inlet and said outlet. 90
11. In an apparatus for feeding materials, a casing having an inlet and an outlet, a partition member intermediate said inlet and said outlet, and a feed wheel for controlling the flow of material from said outlet, said inlet communicating directly with the upper portion only of said wheel. 95
- In testimony whereof I hereunto affix my signature. OTTO A. KREUTZBERG. 100