

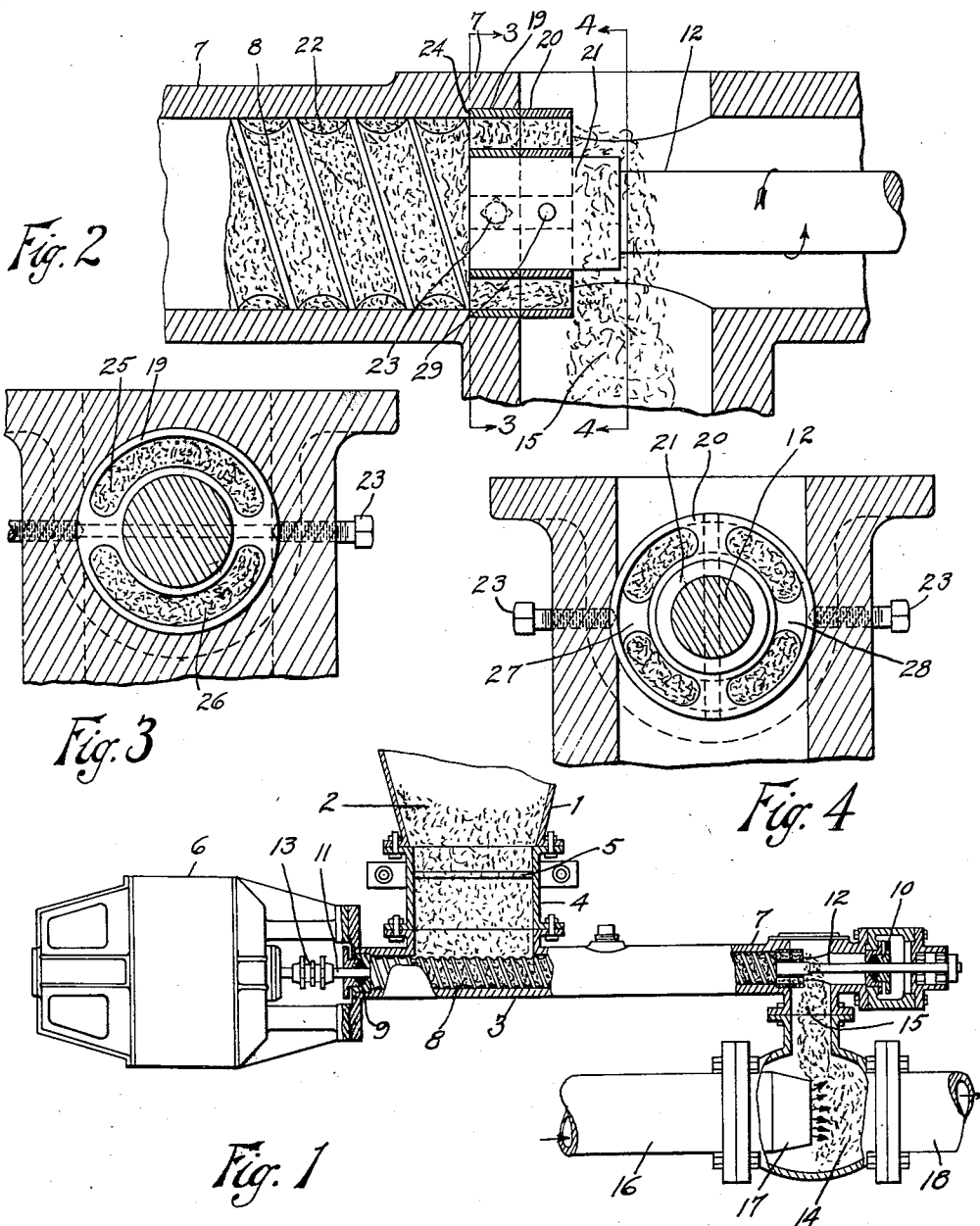
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APPARATUS FOR DELIVERING PULVERIZED MATERIAL

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APPARATUS FOR DELIVERING PULVERIZED MATERIAL

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The present invention relates to the delivery of material by a screw conveyor, and more particularly to control of the flow of pulverized fuel from a screw conveyor.

Heretofore it has been common practice to feed pulverized fuel to kilns and the like from an overhead hopper to a screw conveyor which delivered the fuel to a chamber into which proper proportions of air were admitted under pressure through a restricted orifice, the resulting mixture of air and fuel being propelled to the combustion chamber through an outlet channel associated with the mixing chamber by the air under pressure. One of the chief objections to this method has been the difficulty of preventing a congested condition from occurring at times in the mixing chamber if the fuel was delivered by the conveyor at an abnormal rate. Considerable difficulty has also been experienced due to "drippings" of the fuel collecting in the mixing chamber when the conveyor was not in operation; it having been found that the constant pressure due to the head of fuel over the worm of the conveyor has a tendency to force the fuel through the flights of the worm after the rotation thereof has ceased. This often caused stoppages in the mixing chamber with the resultant failure of the entire fuel feeding system to function. The present invention aims to eliminate the above difficulties by the use of a simple, effective and inexpensive device which controls the volume of fuel delivered during a given period of operation, and also prevents leakage of fuel from the conveyor when not in operation.

One object of my invention is to procure a complete cessation of the flow of pulverized or comminuted material from a screw conveyor instantaneously with the conveyor becoming inactive.

Another object of my invention is to prevent the flow of material from a screw conveyor when the worm is not rotating.

Another object of my invention is to control the volume of fuel fed by a screw conveyor during any given period and to obtain a uniform flow thereof.

A further object of my invention is to prevent congestion and stoppages occurring in the mixing chamber of a pulverized fuel feeding mechanism.

Other and further objects of my invention will be obvious upon an understanding

of the illustrated embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawing forming a part of the specification, wherein:

Figure 1 is an elevation partly in cross-section illustrating a complete feeding mechanism equipped with my invention.

Figure 2 is an enlarged cross-section of the delivery end of a screw conveyor equipped with my invention.

Figure 3 is a cross-section on the line 3—3 of Figure 2 showing the annular orifices of the stationary disc in juxtaposition with the annular orifices of the rotating disc.

Figure 4 is a cross-section on the line 4—4 of Figure 2 showing the relationship of the annular orifices in the two discs when the rotating disc is turned through an angle of 90 degrees from its position in Figure 3.

Referring more particularly to the drawing, an overhead hopper 1 feeds the pulverized fuel 2 to the screw conveyor 3 through the chute 4 equipped with a suitable gate valve 5. The screw conveyor 3 comprises a housing 7 containing a worm 8 which is supported by suitable bearings 9 and 10 on the shafts 11 and 12, the shaft 11 being coupled to the driving shaft of a motor 6 at 13, said motor furnishing the power for rotating the worm of the conveyor. A mixing chamber 14 is secured to the lower part of the delivery end of conveyor housing 7, being so positioned thereon that the fuel expelled by the worm will drop into the mixing chamber through the channel 15. The mixing chamber 14 has an air line 16 connected to it which furnishes air at high velocity through a nozzle 17 to mix with the fuel falling through the channel 15 and at the same time the air stream emitted from the nozzle 17 conveys the mixture through the conduit 18 to a combustion chamber. Thus it will be seen that the fuel will be delivered by the conveyor 3 to the mixing chamber 14 with no control over the volume delivered other than the rotation of the worm, and that when the rotation is stopped a certain amount of the fuel will continue to be forced or shaken from the flights of the

worm and will collect in the mixing chamber causing a congested condition in that restricted space since it is desirable to stop the flow of air through the line 16 when the conveyor is not in operation.

To obtain control of the flow of fuel from the screw conveyor I propose, in the preferred embodiment, to place two thick discs, 19 and 20 on the shaft 21 which is extended concentrically from, and is integral with, the worm 8, said shaft 21 being substantially less in diameter than the worm 8.

The disc 19 fits loosely on the shaft 21 and fits snugly into the recess 24 in the housing 7 to which it is permanently fixed by set screws 23, in such a position that the inner face of said disc is held against the delivery end of the worm 8 of the conveyor. The disc 19 has two symmetrically located annularly extending orifices 25 and 26, which are narrow as compared to the thickness of the disc, and are so positioned therein that when said disc is in place upon the shaft 21, the outer peripheries of said orifices are in line with the inner periphery of housing 7, and the inner peripheries of said orifices extend slightly beyond a line tangent to the innermost extremities of the valleys 22 of the worm 8.

The disc 20 fits snugly on the shaft 21 and is firmly secured thereto by the pin 29 in such a position that the inner face of said disc is held directly against the outer face of disc 19, the outer face of disc 20 extending substantially toward the center of channel 15. Disc 20 also has two orifices, 27 and 28 which are similar in contour and location to orifices 25 and 26 in disc 19.

From the foregoing it will be observed that when the conveyor 3 is in operation and the worm 8 is rotating, the disc 19 is held in a stationary position against the delivery end of the worm 8 and the disc 20 is rotating with the shaft 21 and the fuel can be expelled from the conveyor only through the medium of the orifices 25 and 26 in disc 19, and the orifices 27 and 28 in disc 20. The action of worm 8 in the rotation thereof tends to create pressure which forces the pulverized material into the orifices 25 and 26 and against the rotating disc 20, and through the orifices 27 and 28 at those points in the rotation thereof where said orifices match up with the similar orifices 25 and 26 in the stationary disc 19, which action occurs every time the worm 8 is rotated through an angle of 180°. At other points in the rotation of the worm 8 the orifices in the two discs do not completely match up, but in all points of the rotation thereof there is a partial matching of the orifices, thus there is at all times an outlet for the flow of the fuel from the conveyor, the area of said outlet varying from maximum to minimum size twice during each rotation of the worm 8 through an angle of 360°.

This relation of said orifices in the two

discs 19 and 20 prevents an abnormal volume of fuel from being delivered by the conveyor at any one time thus preventing a flooding of the mixing chamber 14, and at the same time delivering the desired volume of fuel during a given period of time when the conveyor is in operation. When the conveyor is inactive and there is no pressure at the delivery end of the conveyor other than the pressure of the fuel in place, the resistance offered by the thick peripheral walls of the comparatively narrow orifices 25 and 26, and 27 and 28—even when said orifices are so matched as to present a maximum area of outlet—is sufficient to prevent a leakage of fuel therethrough, with a consequent elimination of danger of congestion occurring in the mixing chamber 14 during the inactive period.

It is understood that although my invention is particularly adapted for use with an apparatus for feeding pulverized fuel, I do not wish to limit it to that particular use, as it may be used with other apparatus where it is desired to control the flow of pulverized or comminuted material.

As various changes may be made in the above embodiment without departing from the spirit of the invention, all matter herein is to be interpreted as illustrative, and not in a limiting sense.

Having thus described my invention, I claim:

1. In apparatus of the class described, the combination with a screw conveyor, of a disc mounted in fixed position contiguous the discharge end of said conveyor, said disc having a plurality of annularly extending orifices which are narrow as compared with the thickness of the disc, a disc rotatably mounted contiguous and substantially coaxial with said fixed disc, said rotatable disc having orifices similar to the orifices in said fixed disc and adapted to register therewith upon rotation of the rotatable disc.

2. In apparatus of the class described, the combination with a screw conveyor of a disc fixedly mounted adjacent the discharge end of said conveyor, and a disc rotatably mounted adjacent said fixed disc, said discs being provided with a plurality of annularly extending orifices which are narrow as compared with the thickness of one of said discs.

3. In apparatus of the class described, in combination, a screw conveyor having a discharge end, and a pair of adjacent and co-operative discs respectively fixedly and rotatably mounted in respect to said discharge end, each of said discs having an orifice and at least one of said orifices being narrow as compared with the thickness of said discs.

This specification signed this 12th day of July 1929.

WILMOT D. CLOOS.