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3,382,818

PELLET MILL FEED RECEIVERS

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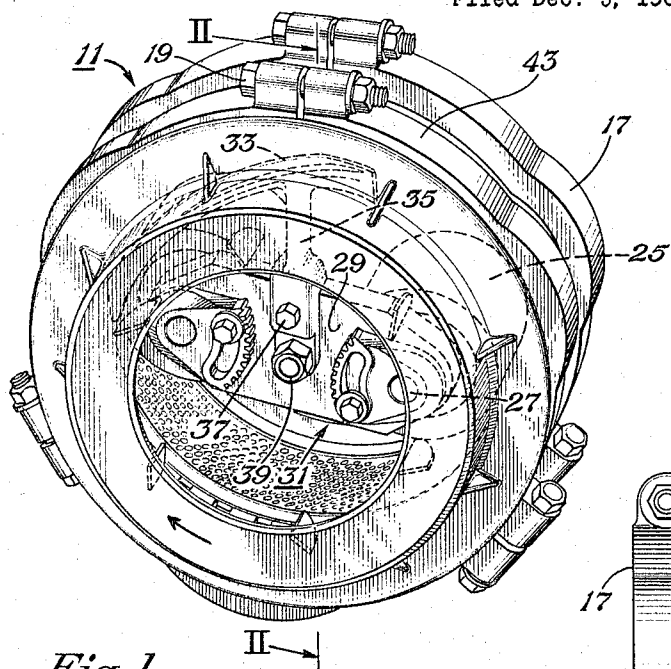


Fig. 1

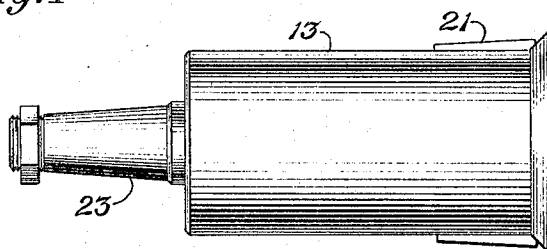


Fig. 2

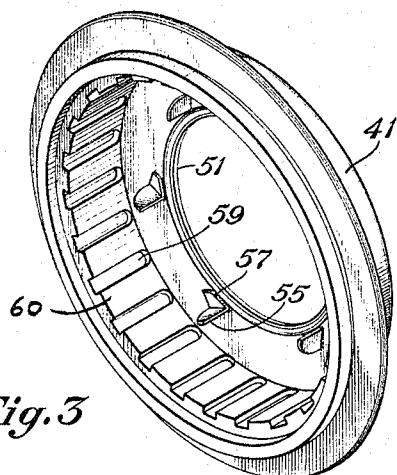


Fig. 3

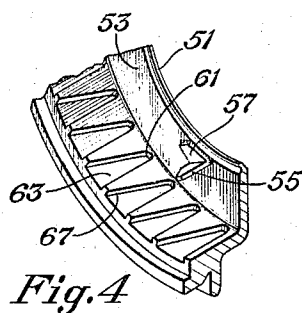


Fig. 4

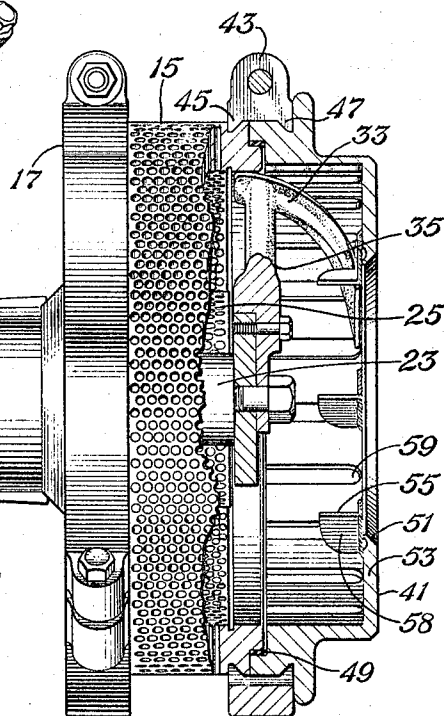


Fig. 5

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PELLET MILL FEED RECEIVERS

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ABSTRACT OF THE DISCLOSURE

Following is disclosed a pellet mill having a cylindrical rotatable die with rollers disposed on the interior thereof for extending feed outward through radial perforations in the die. A hollow feed receiver is secured to one end of the die, having a central opening through which is supplied feed to be transformed into feed pellets. A plurality of feed agitator elements are secured to the interior surface of the end wall of the feed receiver, and in addition a plurality of feed carrier grooves are formed in the interior cylindrical surface of the feed receiver. The cooperative action of the feed agitator elements and the feed carrier grooves forcibly urges feed into the interior of the die and between the rollers with further assistance from a stationary feed distributor arm.

Previously, various modifications have been made to pellet mills in attempts to more evenly distribute the feed between the rollers. One such modification is the provision of one or more stationary feed distribution arms which extend obliquely from a region adjacent the perforated die into the feed receiver to engage feed rotating with the feed receiver to draw it into the die. In addition paddles have been provided in feed receivers to agitate the feed so that it flows more evenly into the die and between the rollers. While such attempts improve the distribution of feed between the rollers, I discovered that greater improvements may be effected by modifying the geometric form of the inner cylindrical surface of the feed receiver if used in combination with feed agitator elements in the receiver and a stationary feed distribution arm.

It is accordingly the general object of my invention to provide improved feed distribution in pellet mills.

Another object of my invention is to provide in the feed receiver of a pellet mill a geometric configuration which more evenly distributes feed within the perforated rotating die and between the rollers of a pellet mill.

Another object of my invention is to provide the feed receiver of a pellet mill with a cooperative combination of feed carrier grooves, feed agitator elements and a feed distribution arm for improving feed disbursement within the die and between the rollers of a pellet mill.

These and other objects are effected by my invention as will be apparent from the following description taken in accordance with the accompanying drawing, forming a part of this application, in which:

FIG. 1 is a perspective view of a pellet mill cartridge assembly having feed distribution means constructed in accordance with the principles of my invention;

FIG. 2 is a side elevation view, partially in section, of the cartridge assembly of FIG. 1;

FIG. 3 is a perspective view of a preferred form of feed receiver constructed in accordance with the principles of my invention;

FIG. 4 is a fragmentary perspective view of another form of feed carrier grooves utilized in the feed receiver; and

FIG. 5 is a fragmentary side elevation view of a preferred form of my feed receiver as seen looking from the interior thereof and toward its central feed entrance opening.

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The numeral 11 in the drawing designates a cartridge assembly that includes a cartridge 13 upon which is secured a conventional perforated die 15 by means of a die clamp 17 consisting of three sections secured to each other by suitable fasteners 19 such as the illustrated cap screws and nuts. One or more keys 21 are provided to protrude from an exterior cylindrical surface of the cartridge 13 for engagement with slots (not shown) in an unshown portion of the pellet mill to rotate the cartridge and the die.

A main shaft 23 is adapted to extend through cartridge 13 to support a plurality of rollers 25 which engage the interior cylindrical surface of the perforated die 15 for the purpose of extruding feed therethrough. The rollers are commonly supported on shafts 27 (see FIG. 1) secured in apertures in a frontal plate 29. Commonly, radial adjustment means 31 are provided so that spacing between the rollers and the interior cylindrical surface of the die 15 may be adjusted.

A feed distribution arm 33 extends obliquely and preferably in auger fashion from a region adjacent the perforated die 15, being secured in this piston by a pedestal structure 35 and fasteners 37, 39 to the frontal plate 29 and to main shaft 23.

A hollow feed receiver 41 is secured to the otherwise free end of the die 15 by another die clamp similar to the one previously described. Typically, exterior annular shoulders 45, 47 of the die clamp extend into mating grooves formed on the die 15 of the feed receiver 41. A bushing 49 is generally provided between mating axial shoulders on the die and the feed receiver, but my invention is not limited to the specific form of die shown or to the illustrated attachment means used to secure the die to the feed receiver.

A central opening 51 is provided in a vertical wall 53 that forms the extremity of the feed receiver. Extending inward from the inner surface of the vertical wall are a plurality of radially spaced feed agitator elements 55. In this instance the agitator elements are manufactured of a thin metal plate having a vertical tab 57 secured by suitable means such as welding to vertical wall 53. As shown in FIG. 5, the agitator elements are skewed a distance D from the rotational axis of the feed receiver.

As the agitator elements rotate into engagement with the feed, their lower oblique, planar surfaces 58 urge the feed downward at an oblique angle into engagement with the feed receiver with subsequently explained advantageous results.

Formed along the length of the inner axially extending, here generally cylindrical, surface 60 of the body of the feed receiver is a plurality of feed carrier grooves 59. These grooves may be parallel with the central axis of the feed receiver as indicated in FIGS. 2, 3, and 5, and were one-quarter inch deep and about one inch wide in a successfully tested embodiment. Improved feed distribution may sometimes be obtained, however, by utilizing feed carrier grooves which extend from a narrow region 61 (see FIG. 4) near the vertical wall 53 of the feed receiver to a wider region 63, as will be explained subsequently.

In operation the cartridge 13 is rotated in a direction such that the feed receiver 41 and die 15 move as indicated by the arrow in FIG. 5. Feed is introduced into feed receiver 41 through the central opening 51 and falls downward into engagement initially with the feed agitator elements 55 which move with a velocity such that their lower oblique surfaces strike the feed particles and urges them rapidly in a downward but oblique direction toward the feed carrier grooves 59. These grooves thereafter engage the feed and move it circumferentially toward the feed distribution arm 33. A portion of the feed is distributed

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underneath the rollers 25 by the cooperative action of the feed agitator elements 55 and the feed carrier grooves 59, and another portion is carried circumferentially by the grooves. That portion of the feed carried circumferentially is engaged by the feed distribution arm and moved to a position interior of the die 15 and between and above the rollers 25.

Improved feed distribution is obtained by utilizing skewed feed agitator elements in combination with the feed carrier grooves since they seemingly tend to force the feed into engagement with the feed carrier grooves at a region of the feed receiver which facilitates their upward movement toward the feed distribution arm. Moreover, while the longitudinal grooves illustrated in FIGS. 2, 3, and 5 have been successfully utilized, especially with agitator elements having a skew distance D (see FIG. 5) of about $4\frac{1}{4}$ inches, it is advantageous that these grooves also be skewed with respect to the central axis of the feed receiver since this tends to impel greater quantities of the feed toward the die and the rollers than if nonskewed grooves are utilized. This advantage is obtained by utilizing the groove configuration shown in FIG. 4, where the trailing edge 67 of each groove is shown as being skewed with respect to the central axis of the receiver. It is primarily this edge of each groove which engages the feed particles and consequently, it is this edge of each groove which tends, if skewed, to more rapidly impel feed toward the die and rollers. A similar effect is achieved by forming skewed grooves with parallel edges in the cylindrical surface of the feed receiver. Such an arrangement has the advantage of lower manufacturing costs when compared to the configuration shown in FIG. 4. It is advantageous that the groove be deeper at the wide region 63 (see FIG. 4) than at the narrow region 61 since this further tends to cause the feed to be distributed more rapidly toward the die and the rollers.

The above described configurations are particularly effective when the lighter feed materials are processed through the pellet mill. It is this type of material that is most troublesome and with which the above apparatus may be used to best advantage, although it offers advantages with all types of feed material.

While I have shown my invention in only a few of its forms it should be apparent to those skilled in the art that it is not so limited but is susceptible to various changes and modifications without departing from the spirit thereof.

I claim:

1. In a pellet mill having a perforated and cylindrical rotatable die and interior rollers for extruding feed into pellet form, the improvement which comprises: a hollow feed receiver secured to one end of said die, said receiver having a central feed entrance opening in a generally vertical wall forming its feed receiving end and a plurality of feed carrier grooves along the length of an inner surface of said receiver; a plurality of radially spaced feed agitator elements protruding inward from the vertical

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wall in said receiver and around said central opening; and a stationary feed distribution arm supported inside said feed receiver to extend obliquely from the vertical wall of the receiver to a region adjacent the rollers; whereby incoming feed is struck by said agitator elements and impelled along the length of said feed receiver and said die, with the portion of the feed striking said feed receiver being carried upward around the receiver by the action of said feed carrier grooves and urged toward the die by said feed distribution arm.

2. The pellet mill defined in claim 1 wherein said feed agitator elements are each skewed with respect to the rotational axis of said feed receiver to engage the feed on lower oblique surfaces of said elements to urge the feed downward at an oblique angle into engagement with said feed carrier grooves.

3. The pellet mill defined by claim 1 wherein each said feed carrier groove has a trailing edge that is skewed with respect to the central axis of the feed receiver to forcefully urge feed toward the rollers.

4. In a pellet mill having a perforated and cylindrical rotatable die and interior rollers for extruding feed into pellet form, the improvement which comprises: a hollow feed receiver secured to one end of said die, said receiver having a central feed entrance opening in a generally vertical wall forming its feed receiving end and a plurality of feed carrier grooves along the length of an inner generally cylindrical surface that forms the body of said receiver, with said grooves having a skewed trailing edge to urge feed toward said die and rollers; a plurality of radially spaced feed agitator elements protruding inwardly from the vertical wall in said receiver and around said central opening; and a stationary feed distribution arm supported inside said feed receiver to extend obliquely from the vertical wall of the receiver to a region adjacent the rollers; whereby incoming feed is struck by said agitator elements and impelled along the length of said feed receiver and said die, with the portion of the feed striking said feed receiver being carried upwardly around the receiver by the action of said feed carrier grooves and urged toward the die by said feed distribution arm.

5. The pellet mill defined by claim 4 wherein said feed agitator elements are thin metal plates that are skewed with respect to the rotational axis of said feed receiver to engage the feed with oblique surfaces to urge the feed obliquely into engagement with said feed carrier grooves.

References Cited

UNITED STATES PATENTS

2,240,660	5/1941	Meakin	107—8
2,764,951	10/1956	Fisher	107—14
2,798,444	7/1957	Meakin	107—14
2,908,038	10/1959	Meakin	107—14 XR
3,191,227	6/1965	Keefe	107—8
3,332,111	7/1967	Hafliger	18—12

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