Jan. 22, 1963 R. L. BELDIN 3,074,527

MATERIAL REDUCING MECHANISM

Filed Jan. 2, 1962 2 Sheets-Sheet 1

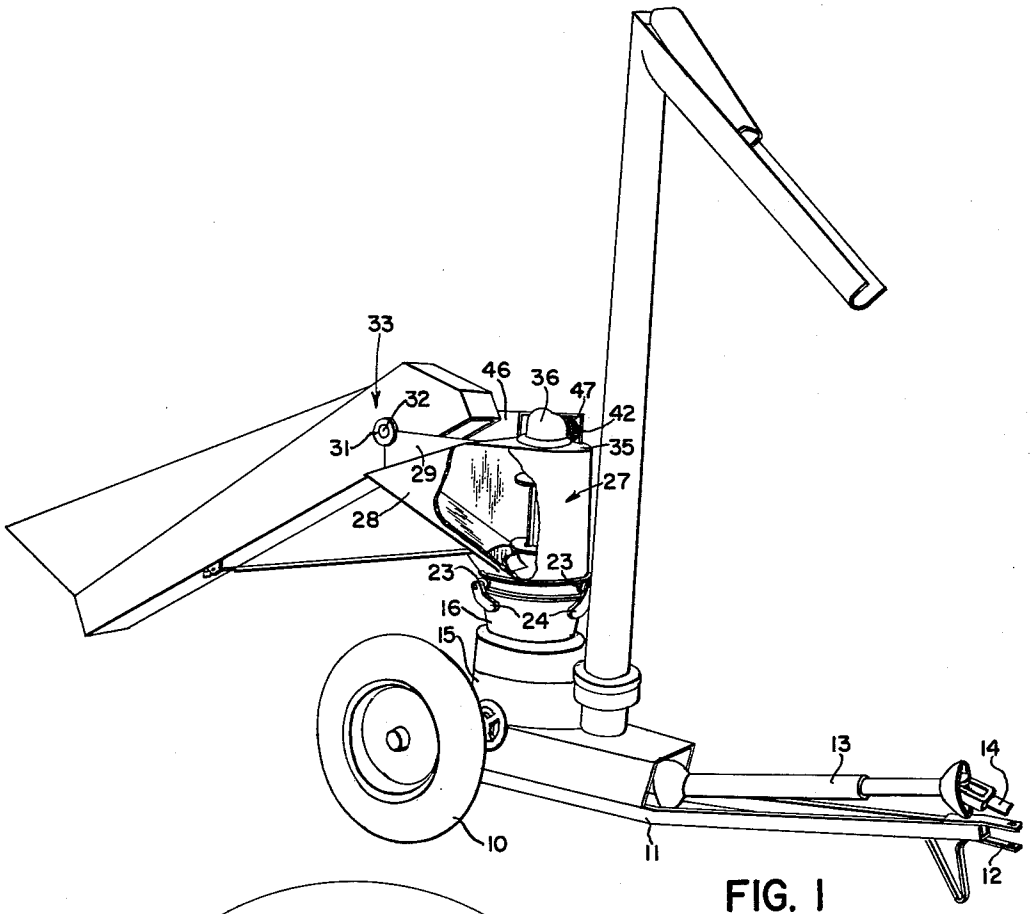


FIG. 1

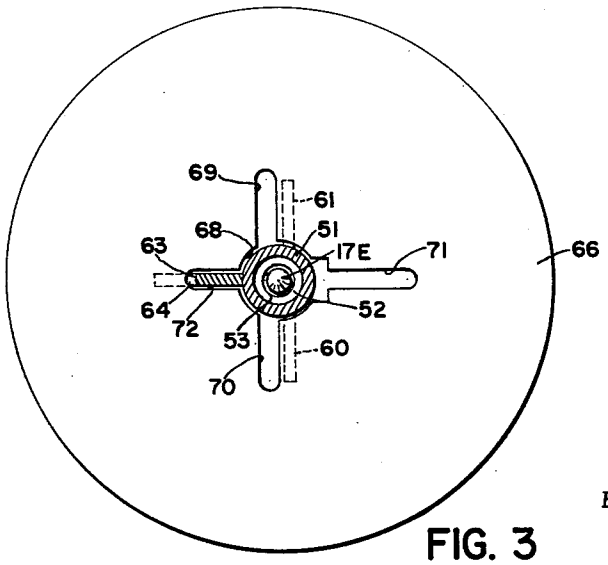


FIG. 3

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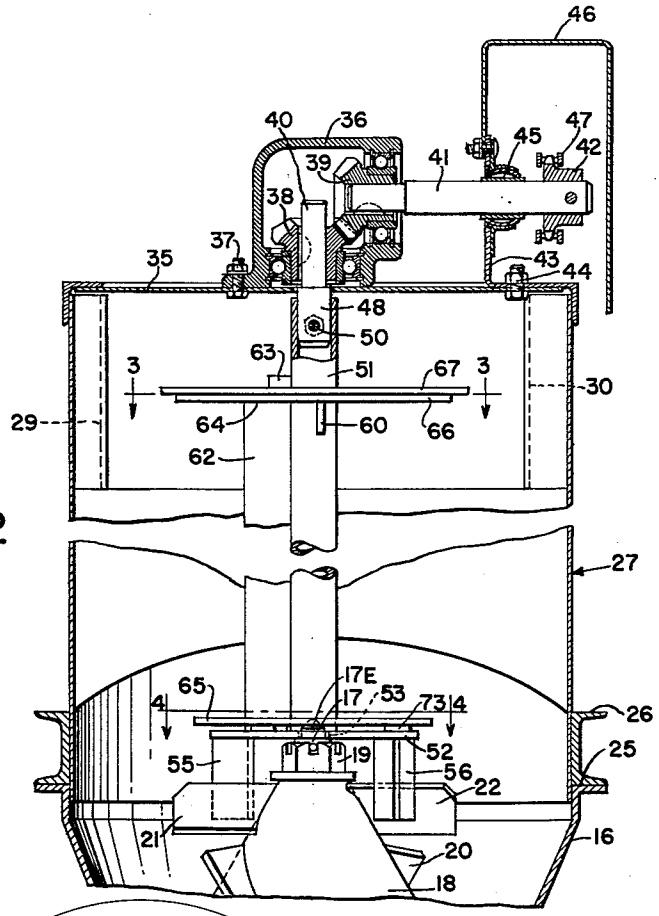


FIG. 2

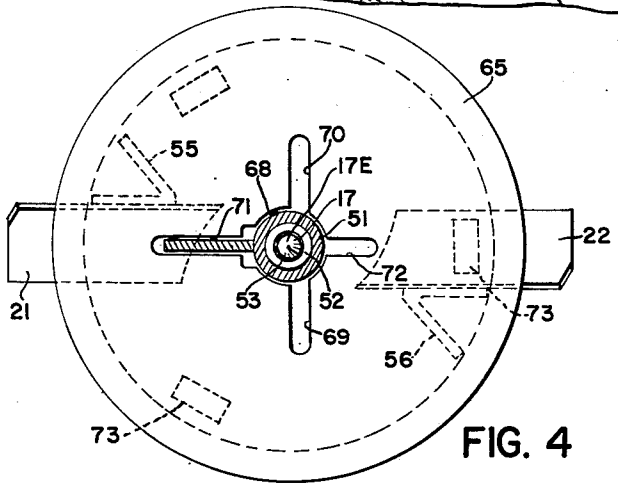


FIG. 4

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MATERIAL REDUCING MECHANISM

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This invention relates to a material reducing unit and more particularly to a retarding device normally used at the inlet of the reducing unit so as to limit the quantity of material being fed into the unit.

In the conventional type of material reducing unit used in grinding grain or farm products, there is provided a conveyor which moves material to the unit. Normally the material reducing unit has an upwardly opening inlet and the conveyor feeds to a position above the inlet so that the material gravitates into the unit. There is normally a considerable fluctuation of the feed into the inlets due to the characteristic of the conveying unit. For example, if a flight type elevator is used as the conveyor, there would be some instances in which the flights move a considerable quantity and some instances when the flights will convey very little. Consequently there is created a problem of moving the material into the grinding unit in an even flow. Also, since the material reducing units are of a general use, i.e. they are used to grind, for example ear corn, as well as the smallest of the grains, various materials must be retarded in their movement through the material reducing unit.

With the above in mind, it is the main purpose of the present invention to provide a retarding device for use in a material reducing unit which is both novel in nature and also utilizes much of the mechanism previously used in driving the feed conveyor. Specifically, it is proposed to provide a shaft that extends upwardly from the upper end of the material reducing drive shaft, which is normally disposed on a vertical axis, to the drive unit for the feed conveyor. Also mounted on the force transmitting or drive shaft is a series or a plurality of retarder plates with openings for receiving the force transmitting shaft. Outwardly projecting lugs are provided on the force transmitting shaft adjacent its upper end which permits the retarder plates to rest or to be disposed in an area positioned above the inlet of the material reducing unit. The retarder plates are also provided with slots or openings which, upon the retarder plates being moved to a predetermined or specific angular position, accommodates the outwardly projecting lugs and permits the respective plates to pass downwardly to a point adjacent the mouth or inlet of the material reducing unit. In his latter position the plates do, as the name implies, retard the flow of material into the material reducing mechanism.

Other objects and advantages of the present invention will become apparent to those skilled in the art as the nature of the invention is better understood from the following description and as shown in the accompanying drawings.

FIG. 1 is a perspective view of an entire material reducing unit.

FIG. 2 is a vertical sectional view of the upper portion of the material reducing unit and the hopper which receives material from the feed conveyor.

FIG. 3 is an enlarged sectional view taken substantially along the line 3—3 of FIG. 2.

FIG. 4 is an enlarged sectional view taken substantially along the line 4—4 of FIG. 2.

The material reducing unit herein to be described is of a conventional type being mounted on a mobile frame having a pair of ground wheels, one being shown at 10, and a forwardly projecting laterally extending frame 11 having at its forward end a drawbar connection 12 for connection to a tractor. A main drive source such as a

telescoping drive shaft 13 is mounted above the frame 11 and has a forward end 14 attachable to a power take-off shaft on a tractor. The telescoping drive shaft operates the entire mechanism of the material reducing unit.

The material reducing unit is basically of the burr mill type having a series of burrs disposed in an upright housing 15 with an upwardly opening cone-shaped inlet extension 16. Centrally located in the housing 15 and the extension 16 is an upright drive shaft 17 rotatably driven through suitable gearing, not shown, from the main drive source 13. An inverted cone-shaped distributing member 18 is fixed to the upper end of the shaft 17 and has lugs thereon which tend to forcibly feed material passing through the inlet of the extension 16 downwardly. The member 18 is held on the shaft 17 by means of a nut 19 threaded over the threaded upper end of the shaft 17. There is a short pilot extension 17E exposed above the nut 19. Adjacent the upper extremity of the cone-shaped member 18 are laterally extending lugs 21, 22 formed to create both a rotating as well as a downward movement of material passing into the burr mill.

The housing extension 15 is provided with an upper annular flanged edge 25 defining the inlet for the burr mill. Resting upon the upper annular edge is an annular U-shaped beam 26. The annular beam 26 serves as a base support for an upright hopper 27 that is cylindrically shaped at its base and flares outwardly and upwardly at one side into a chute section 28. Fixed to the chute portion 28 is a pair of upwardly projecting supporting brackets 29, 30 carrying at their upper and outer ends a pair of transverse trunnions, one of which is shown at 31, that support a transverse conveyor shaft 32. The shaft 32 is the main drive shaft for an elevating type conveyor, indicated in its entirety by the reference numeral 33. Although of not particular importance relative to the present invention, the conveyor 33 is of a flight type which moves material from a lower inlet end upwardly to a point adjacent chute 28 of the hopper 27. The conveyor 33 discharges material into the hopper 27 to be fed into the inlet of the housing extension 15. The hopper 27 is retained on the extension 16 by means of a series of angularly spaced rollers 23 carried by brackets 24 on the outer face of the extension 16 and which roll between the upper and lower flanges of the annular beam 26. The construction of the brackets 24 are such that the rollers 23 may be moved outwardly to disengage the tracks or flanges of the annular beam 26 and the entire hopper 27 be removed from the extension 16. Also, the rollers 23 permit the entire hopper 27 to be rotated relative to the extension 16 and the mill housing 15.

The hopper also includes an upper laterally disposed plate 35 having a bevel gear housing 36 bolted at 37 thereto. The bevel gear housing has enclosed therein bevel gears 38, 39 supported on a downwardly projecting shaft 40 and an outwardly projecting shaft 41 respectively the latter extending to one side of the hopper 27 and having a chain sprocket 42 supported thereon. An L-shaped bracket 43 is bolted at 44 to the upper panel 35 beneath the outer end of the shaft 41 and carries thereon a journal 45 supporting the outer end of the shaft 41. A suitable housing 46 is bolted to an upper extension of the bracket 43 and extends over the sprocket 42 to shield the entire chain drive. The sprocket 42 has a chain 47 mounted thereon and extending to a suitable sprocket, not shown, supported on the outer end of the shaft 32. It should be noted that the shaft 40 depends through the upper panel 35 and has an enlarged section 48 disposed adjacent to but beneath the panel 35.

Bolted at 50 to the enlarged depending end 48 of the shaft 40 is a force transmitting tubular or hollow shaft 51. The lower end of the shaft 51 terminates adjacent

the upper end of the vertical drive shaft 17. The lower end of the shaft 51 has rigidly affixed thereto a radially extending member or plate 52 having a central opening 53 therein for accommodating the upper pilot end 17E of the drive shaft 17. Fixed to the under side of the plate 52 is a pair of depending brackets or lugs 55, 56 normally disposed to engage the laterally extending lugs or arms 21, 22 projecting from the face of the cone-shaped member 18. Generally, it should be recognized that the shaft 51 is driven by the outwardly extending arms 21, 22 upon their engaging the depending brackets 55, 56 and as a result the entire conveyor 33 is driven by the shaft 51.

Adjacent the upper end of the shaft 51 are outwardly projecting retaining lugs 60, 61. Also provided on one face of the tube or shaft 51 is an outwardly projecting gusset or plate 62 having its upper end 63 recessed to provide a ledge or edge 64 on which the retarder plates, later to be described, may rest. It will be noted that the lugs 60, 61 are not directed diametrically or radially from the center of the shaft 51, but are offset to one side of the axis of the shaft. The upper edges of the lugs 60, 61 and the upper edge 64 of the recessed portion 63 are coplanar.

A series of three retarder plates 65, 66 and 67 is provided in the present disclosure. The plates 65—67 are circular in shape and are different in their diametric dimension, the smaller plate 65 being the lower plate and the larger plate 67 being the upper plate. Each plate has an opening 68 at its center so that it may be swivelled about the axis of the shaft 51. Each plate also has a pair of outwardly extending slots 69, 70 positioned to accommodate the lugs 60, 61. Also, each plate has a pair of outwardly extending openings 71, 72 extending outwardly from the opening 68. The openings 70 will accommodate the entire length or dimension of the plate or gusset 62 and the slot or opening 71 will accommodate the upper recessed portion 63 of the gusset 62. Referring now to FIG. 3, the plate 66 is turned so that the slots 69, 70 are offset to one side of the lugs 60, 61. Also, the slot 71 is in a position to receive the upper recessed portion 63 of the gusset 62 but be retained on the ledge 64. Consequently the plate 66 is held in a level position by the upper edges of the lugs 60, 61 and the ledge 64 of the gusset 62. However, should the plate 66 be rotated 180° the slot 71 will come into alinement with the gusset 62 and the slots 69, 70 will come into registry or alinement with the lugs 60, 61 respectively and the entire plate 66 may gravitate to the lower end of the shaft 51 until it contacts the upper surface of the plate 65.

For purposes of illustration, the present disclosure is shown with the plate 65 resting upon abutments 70, 72 which project upwardly from the radial member or plate 52. However, the plate 65 may be raised to an upper position in which it is retained by the lugs 60, 61 and ledge 64 merely by raising the plate 65 to a position above the lugs 60, 61 and ledge 64 and turning it 180° whereby the plate would be held or retained in its upper position.

The retarding effect of the plates, of course, may be increased or decreased by raising or lowering the desired number of plates. For example, the retarding effect of the plate 65 is relatively small. However, if it is desired to increase the retarding effect, the plates 66 and 67 may be lowered into engagement with the plate 65 whereupon, due to the increased diameter of the larger plates 66, 67, the retarding effect on the material is considerably greater.

It should also be recognized that the entire retarding device as well as the entire drive device for the conveyor shaft 32 is connected directly to the hopper 27 and may be completely removed upon the removal of the housing 27 since there is no direct connection to the shaft 17 or to the housing extension 16.

While only one form of the invention has been shown, it should be recognized that other forms and variations will occur to those skilled in the art. Therefore, the present disclosure was shown and described in detailed manner for purposes of completely illustrating the principles of the invention and it was not the intention to limit or narrow the invention beyond the broad concept set forth in the appended claims.

What is claimed is:

1. On a material reducing unit having an upper inlet, an outwardly extending conveyor feeding to the inlet with drive mechanism spaced above the inlet, and reducing mechanism including a rotatably driven vertically disposed drive shaft terminating at an upper end adjacent the inlet and radially extending lugs, the improvement comprising: a vertically disposed force transmitting shaft piloted on the upper end of the drive shaft and extending to and connected to the drive mechanism; a radial member on the force transmitting shaft adjacent the inlet and having depending portions engageable with the lugs for effecting rotation of the drive and force transmitting shafts in unison; plate retaining elements projecting from the force transmitting shaft adjacent its upper end; a plurality of retarder plates mounted on and having central openings about the force transmitting shaft for permitting individual angular movement of the plates about the shaft, said plates further having outwardly projecting openings for accommodating passage of the elements therethrough upon the plates being moved to a predetermined angular position to permit downward movement of the respective plate to the radial member, said plates being otherwise retained on the retainer elements.

2. On a material reducing unit having an upper inlet, an outwardly extending conveyor feeding to the inlet with drive mechanism spaced above the inlet, and reducing mechanism including a rotatably driven vertically disposed drive shaft terminating at an upper end adjacent the inlet, the improvement comprising: a vertically disposed force transmitting shaft piloted on the upper end of the drive shaft and extending to and connected to the drive mechanism; a radial member on the force transmitting shaft adjacent the inlet; coupling means for effecting rotation of the drive and force transmitting shafts in unison; plate retaining elements projecting from the force transmitting shaft adjacent its upper end; a plurality of retarder plates mounted on and having central openings about the force transmitting shaft for permitting individual angular movement of the plates about the shaft, said plates further having outwardly projecting openings for accommodating passage of the elements therethrough upon the plates being moved to a predetermined angular position to permit downward movement of the respective plate to the radial member, said plates being otherwise retained on the retainer elements.

3. On a material reducing unit having a material inlet, an outwardly extending conveyor feeding to the inlet with drive mechanism spaced from the inlet, and reducing mechanism including a rotatably driven drive shaft terminating at an end adjacent the inlet, the improvement comprising: a force transmitting shaft piloted on the end of the drive shaft and extending to and connected to the drive mechanism; a plate retainer member on the force transmitting shaft adjacent the inlet; coupling means for effecting rotation of the drive and force transmitting shafts in unison; plate retaining elements projecting from the force transmitting shaft and spaced from the inlet; a plurality of retarder plates mounted on and having central openings about the force transmitting shaft for permitting individual angular movement of the plates about the shaft, said plates further having openings for accommodating passage of the elements therethrough upon the plates being moved to a predetermined angular position to permit movement of the respective plate to the plate retainer member, and in retaining position relative to the inlet.

4. A material retarding device for use on a material treating unit having an upper inlet, comprising: suspension means above and spaced from the inlet; a vertically disposed elongated support suspended on the means and having an upper end spaced from the inlet and a lower end within the confines of the inlet; a lower retaining member on the lower end of the support; a retaining element on the elongated support adjacent its upper end; a plurality of retarder members mounted on the elongated support for permitting angular movement of the retarder members on the support, said retarder members having openings therein for accommodating passage of the element upon the retarder members being moved to a predetermined angular position to permit movement to and withdraw of the respective retarder members to and from the lower retaining member and its material retarding position relative to the inlet.

5. A material retarding device for use on a material treating unit having a material inlet, comprising: an elongated support having an end spaced from the inlet and an end within the confines of the inlet; a retaining member on the support on the end adjacent the inlet; a retaining element on the elongated support on the end spaced from the inlet; a retarder member mounted on the elongated support for permitting angular movement of the retarder member on the support, said retarder member having an opening therein for accommodating passage of the element upon the retarder member being moved to a predetermined angular position to permit movement to and withdraw of the retarder member to and from the retaining member and its material retarding position relative to the inlet.

6. A retarding device comprising: an elongated support having opposite ends; a first retainer element rigid with the support and at one end thereof; a second retainer element rigid with the support and at the opposite end thereof; and a material retarder plate normally engageable with the elements mounted on the support for longitudinal movement and limited transverse movement relative to the support, said plate having recessed portions therein adapted to permit bypassing of at least one of the retainer elements by the plate upon transverse movement of the plate to a predetermined position on the support.

7. The invention defined in claim 6 in which the support is a shaft, the retarder plate has an opening for receiving the shaft, the retaining elements are outwardly projecting lugs on the shaft and the recessed portions in the plates are slots extending from the opening and registrable with the lugs to permit the plate to pass by the lugs.

8. A retarding device comprising: an elongated support having opposite ends; a first retainer element rigid with the support and at one end thereof; a second retainer element rigid with the support and at the opposite end thereof; and a plurality of relatively movable material retarder plates engageable with the elements mounted on the support for longitudinal movement and limited transverse movement relative to the support, said retarder plate having recessed portions therein adapted to permit bypassing of at least one of the retainer elements by the plates upon transverse movement of the respective plates to a predetermined position on the support.

9. The invention defined in claim 8 in which the retarder plates are different sizes and be nested for maximum retarding effect or individually retained on the retining elements.

No references cited.