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Nelson

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[54] **POWER SHAFT AND DRIVE FOR A FARM GRINDER-MIXER IMPLEMENT**

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[52] **U.S. Cl.** .....**241/101 B,** 74/11, 192/67 R, 241/101 M

[51] **Int. Cl.**.....**B02c 19/00**

[58] **Field of Search**.....241/101 B, 101 M; 64/4; 74/11, 15.6; 192/67 R; 287/3, 14, 52

[56] **References Cited**

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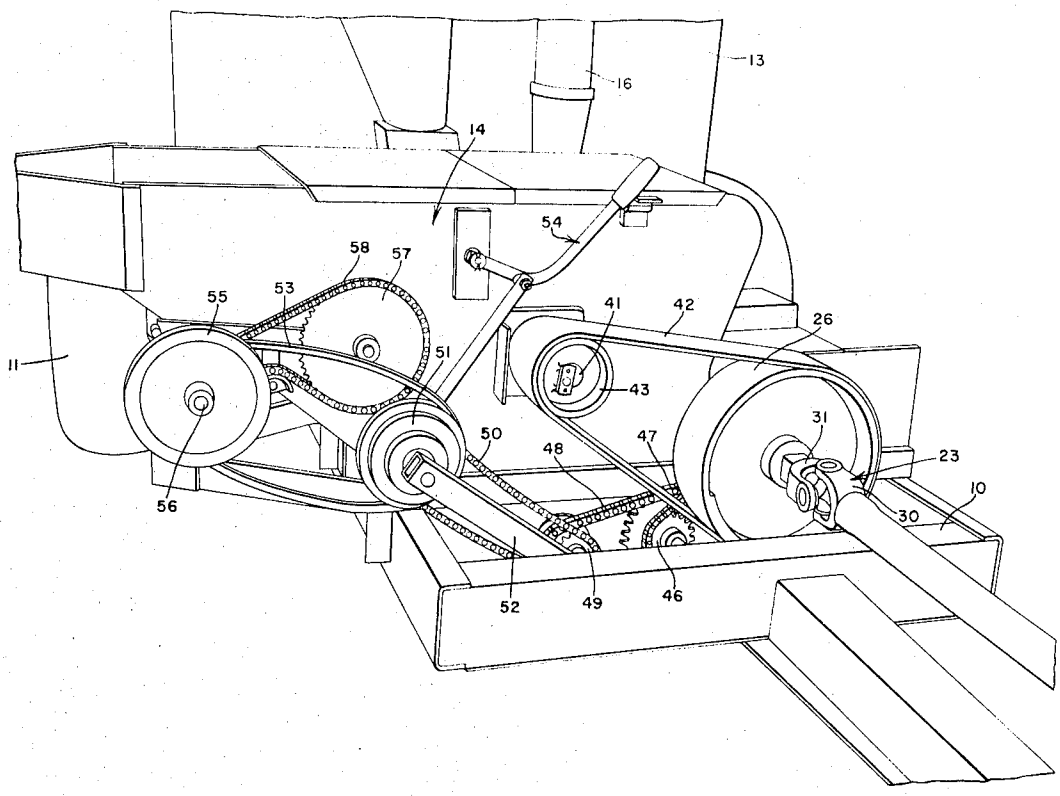
[57] **ABSTRACT**

A drive for a farm implement having a material-reducing unit and a material-blending unit composed of a driven power shaft with a rotary drive member fixed thereto for driving the blender and a second rotary drive member journaled to rotate on the shaft plus a coupler that is fixed to rotate with the shaft that is slidable axially along the shaft for coupling to the second rotary drive member. A drive extends from the second rotary drive member to the material-reducing unit for operating the latter.

8 Claims, 3 Drawing Figures



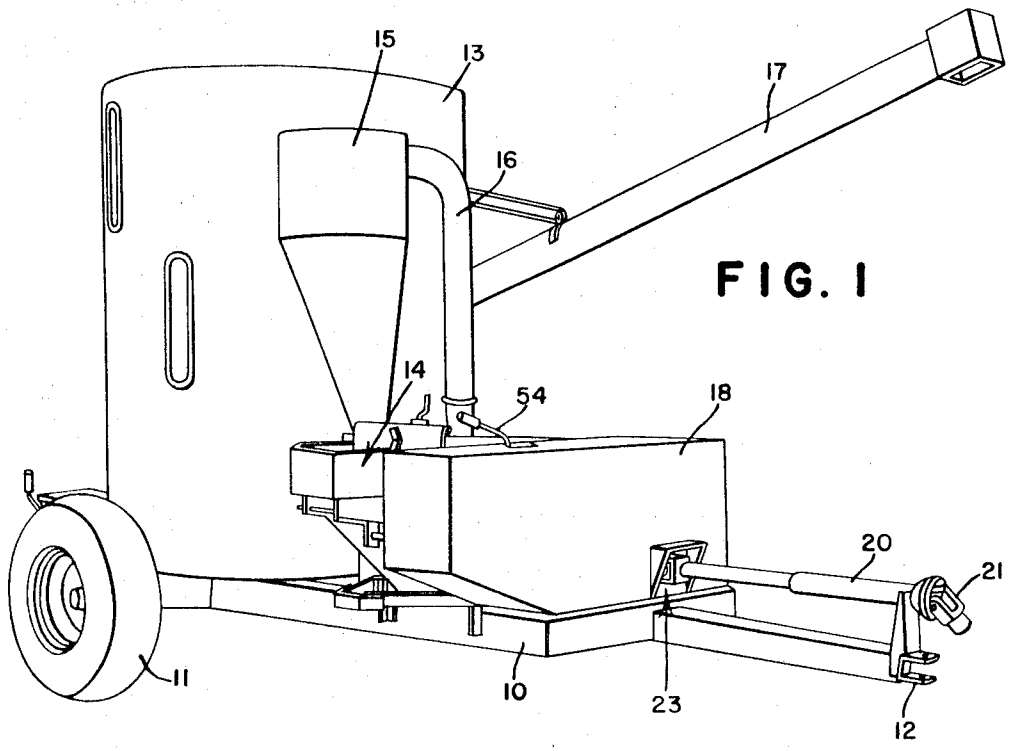


FIG. 1

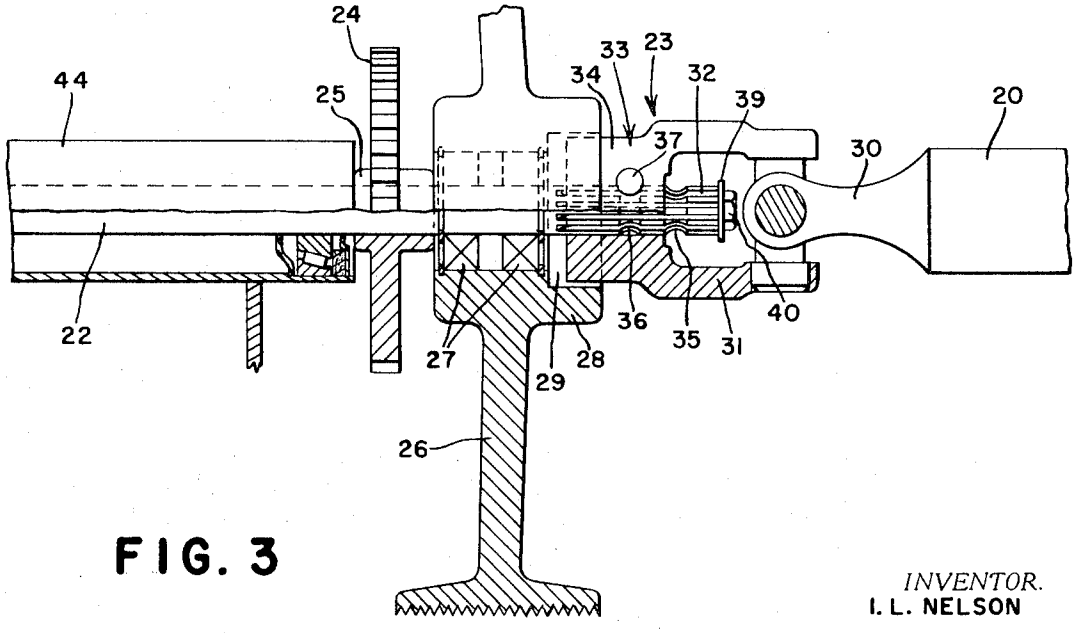


FIG. 3

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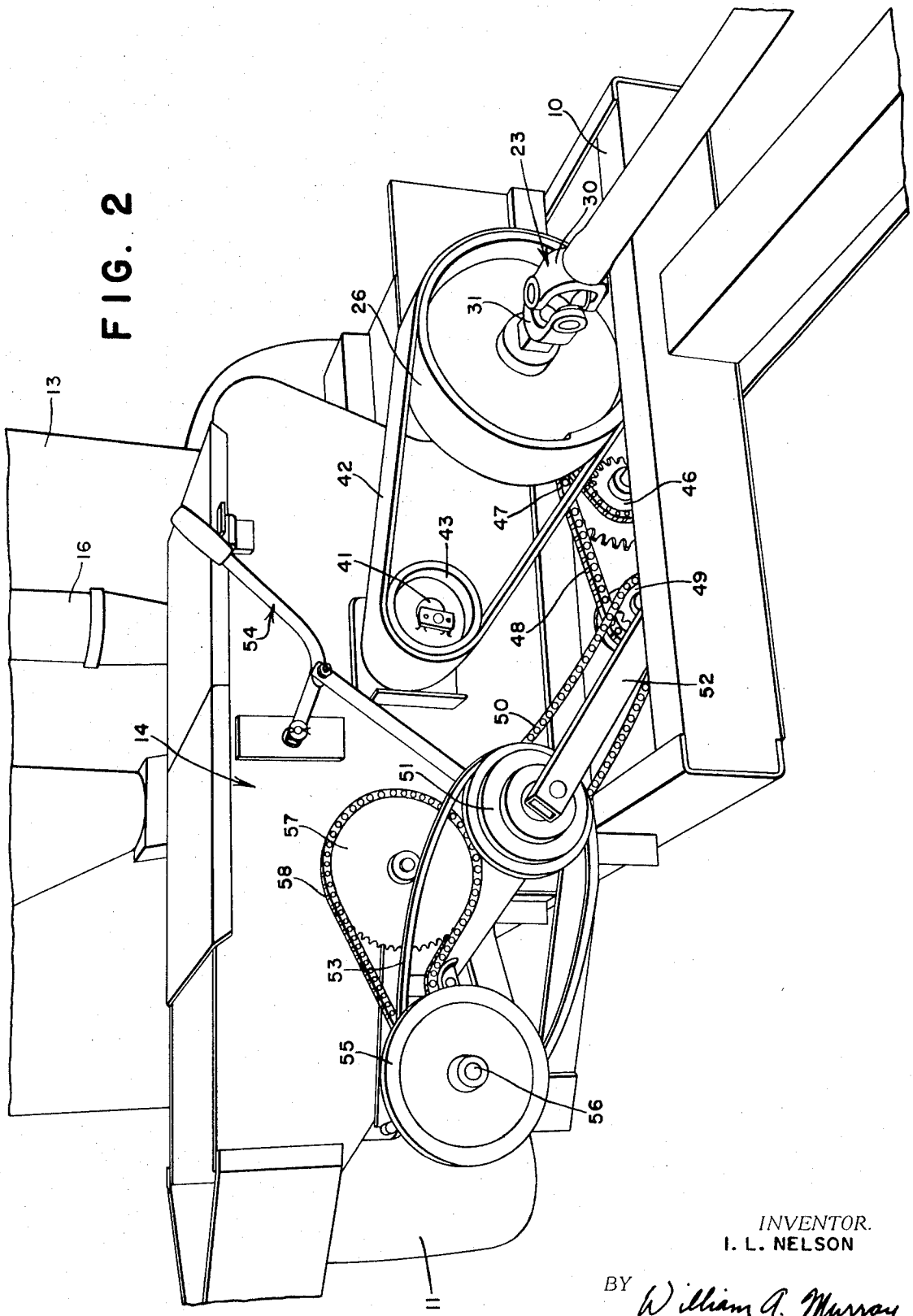
FIG. 2



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POWER SHAFT AND DRIVE FOR A FARM GRINDER-MIXER IMPLEMENT

BACKGROUND OF THE INVENTION

This invention relates to a farm implement composed in part of a grinder and in part of a mixer and to the power train which drives both units. More specifically, the invention relates to the drive that extends from a main power shaft to the mill and to the mixing or blending units. Specifically, the drive is composed of a main power shaft with a rotary drive member being fixed to the shaft to rotate therewith and being connected to the blending unit and a rotary drive shaft that is journaled on the power shaft and which may be coupled to rotate with the shaft by a sliding coupler member.

In the grinder-mixer type of implement, it has heretofore been known to use a single drive shaft for driving both the mixer and the grinding unit. In some instances, clutches or drive pins were provided for various parts of the grinding unit which permitted that part of the unit to cease operation when the unit was not needed. In some instances, the unit was permitted to operate even though no material was moving through it. It is the nature of a grinder-mixer that in many instances after the material is ground that no further use of the grinding unit is needed. Yet, a considerable length of time may be required to properly mix and unload the material in the blender or grinder tank. Consequently, it is of some advantage to be able to completely disengage the grinder or mill from the remainder of the implement.

With the above in mind, it is the primary object of the present invention to provide a drive for a mixer-blender type of implement that includes a main drive shaft which may be attached to a tractor and which extends to a main power shaft rotatably supported on the grinder-mixer frame. The power shaft is connected to the mixer or blender portion of the implement so that it will operate at all times that the drive shaft is operated. The power shaft and main drive shaft are interconnected by a universal joint having one portion mounted on the power shaft and slidable thereon. Rotatably supported on the power shaft is a rotary drive member that is drivingly connected to the grinder or mill and the drive member is positioned so as to engage and couple with the universal joint portion on the power shaft when it is slid axially to engage the drive member. The specific type of connection is a collar that is integral with the rotary drive member and which overlies and couples to a noncircular surface on the hub of the universal joint part.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front and side perspective view of the grinder-mixer incorporating the drive mechanism of the present invention.

FIG. 2 is a perspective view of the drive portion of the implement with the shielding being removed to show the driving parts.

FIG. 3 is a side view, partially in section, of a portion of the main drive to the implement.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The grinder-mixer implement is composed of a basic main frame 10 that is rigid from front to rear and is carried on a pair of transport wheels, one of which is shown at 11. The frame is normally supported at its forward end by a tractor, not shown, having a drawbar connection to a hitch 12 on the forward end of the frame 10. Supported on the rear portion of the frame 10 is a blender or mixer device contained in a mixer or blender tank 13. Forwardly of the tank 13 and also supported on the frame 10 is a material-reducing unit or mill 14 and between the tank 13 and mill 14 is a cyclone-type dust remover 15 that receives particles through a lower duct 16 for downward discharge into an auger, not shown, feeding into the mixer tank 13. Discharge means in the form of an auger 17 receives material from the mixer tank for discharge into a container or other unit positioned to receive the ground and mixed material.

The drive for the entire implement is generally forwardly of the mill and is contained under a housing 18. Referring to FIG. 2, the housing is removed so that the drive mechanism is available for viewing. It should also be recognized that while the present disclosure of the mixer and mill unit is in general terms, details of such structure is shown in U.S. Pat. No. 3,667,734 which issued June 6, 1972 and reference to this patent may be had if further details are desired.

The drive comprises a main telescoping drive shaft 20 having a forward universal-type coupling 21 adapted to connect to the power take-off shaft of a conventional tractor. The telescoping main drive shaft 20 connects to a fore-and-aft extending power shaft by a universal joint, indicated in its entirety at 23. Mounted on the power shaft at 22 to rotate therewith is a rotary drive member or sprocket 24 having a hub portion 25 keyed to the shaft 22. Also carried on the shaft 22 is a mill drive sheave 26. A bearing 27 journals the sheave 26 on the shaft 22 so that the sheave may rotate relative to the shaft. The sheave 26 has an axially extending flange or collar 28 projecting toward the universal joint 23. The collar 28 has an internal square axially extending opening 29. Referring to the universal joint 23, it is composed of a first yoke part 30 fixed to and connected to rotate with the shaft 20, a second yoke or part 31 that is splined as at 32 to the end of a shaft 25, and a spider of conventional nature that interconnects the top parts 30, 31''. The hub portion 33 of the yoke 31 has an outer noncircular or square surface 34 that is received in the square socket 29. The forward end of the shaft 22 is splined a considerable length so that the hub 33 is relatively free to move in an axial direction therealong. The end of the shaft 22 also has a pair of angular grooves 35, 36. Supported on the hub 33 and registerable with the grooves 35, 36 is a spring-loaded pin 37 that may be shiftable in and out of the grooves 35, 36 so as to lock the yoke 31 in a forward position in which the hub portion 33 is not coupled to the collar 28 and in a rearward position, as shown in FIG. 3, in which the hub portion 33 is coupled to the collar 28. The spring-loaded pin is of a conventional type, one such type being shown in U. S. Pat. No. 2,910,842 to Sensenig which issued Nov. 3, 1959. Since the main drive shaft 20 is telescopic, the yoke 31 is free to slide axially, unless restricted by the pin 37 on the shaft 22. A washer 39 is fixed to the end of the shaft 22 by a bolt 40 which prevents the yoke 31 from sliding off of the shaft 22.

Referring now to FIG. 2, the mill sheave 26 is connected to the mill drive shaft 41 through a belt 42 and sheave 43. The sprocket 24 is connected to an idler or mixer drive shaft 46 by a chain 47. A second chain and sprocket drive, indicated in its entirety by the reference numeral 48, extends from the shaft 46 to a main auger drive shaft 49 underneath the mill 14. The auger on the drive shaft 49 collects milled material and moves it to the underside of the mixing chamber 13. From there, additional augers, not shown, moves the material upwardly into the chamber 13 and mixes it with other material in a manner set forth in the aforementioned U.S. Pat. No. 3,667,734. A chain 50 extends upwardly from the rotary member or shaft 49 to an idler that includes a multiple pulley 51. The pulley 51 is carried on an arm 52 that may rock and the entire pulley device 51, 52 is moved in and out of tension with respect to a drive belt 53 by an overcenter lever and locking device 54. The belt 53 drives the second pulley 55 mounted on a countershaft 56 carrying a sprocket which drives a sprocket 57 through a chain 58. The sprocket 57 operates the feeding device for the mill 14. As may be clear from viewing FIG. 2, the entire drive between the pulley 51 and the feeding device may be engaged or disengaged by moving the lever 54 into the position shown in FIG. 1 or the position shown in FIG. 2.

When operating the entire mixer-mill, it is often desirable to operate the mill and the mixing unit at the same time. Consequently, when doing so the hub 33 is coupled to the collar 28 and the mill is driven through the drive mill sheave 26. At the same time the shaft 22 rotates and drives the sprocket 24 which is drivingly connected in the manner previously described to the mixer drive shaft 46 and the auger drive member 49, the latter two being attached to the mixing mechanism within the mixing chamber 13. However, in some instances, it is desired only to mix material in the chamber 13 or in instances when it is desired only to discharge through the discharge auger 17, it is not necessary to drive the mill. When such occurs, the spring pin 37 is released from the groove 36 and the hub portion 33 is slid forwardly until the pin aligns with the groove 35. At this time, the entire mill is shut off, and as previously mentioned, the arm 54 is moved to a declutched position. Consequently, only the blender and its associated auger feed and discharge mechanisms are operated.

I claim:

1. In a grinder-mixer implement having a main frame; a material reducing unit on the frame; and a material-mixing mechanism on the frame, wherein the improvement comprises: a fore-and-aft extensible and retractable main drive shaft on the frame; a power shaft continuing rearwardly from a forward end adjacent the rear end of the main drive shaft; a rotary drive member rotatably supported on the power shaft and having an axially extending collar; a universal joint having first and second articulately interconnected parts with the first part being fixed to rotate with the main shaft and the second part being fixed to rotate with the power shaft and having a hub portion slidable axially thereon between coupled and uncoupled positions with said collar; first drive means extending between the rotary drive member and the material-reducing unit; and second drive means extending between the power shaft and the mixing mechanism.

2. The invention as set forth in claim 1 in which the collar has an internal noncircular surface and the hub portion has an external noncircular surface complementary to the internal surface and insertable within the collar.

3. The invention as set forth in claim 1 in which the first and second parts are yokes 90° offset from one another and interconnected by a spider, and said hub of the second part is square in cross section and said collar has four equal internal sides and is coupled to the hub by sliding over the hub.

4. The improvement as set forth in claim 1 further characterized by lock means between the second part and power shaft for retaining the second part in both the coupled and uncoupled positions.

5. A power train for a farm implement having a main frame and two drivable portions thereon, said power train comprising a fore-and-aft extending main drive shaft; a power shaft journaled on the frame and continuing rearwardly from a forward end adjacent the rear end of the main drive shaft; a rotary drive member rotatably supported on the power shaft and having an axially extending collar projecting toward the forward end; a universal joint having first and second articulately interconnected parts with the first part being fixed to rotate with the main shaft and the second part being fixed to rotate with the power shaft and having a hub portion slidable axially thereon to couple and uncouple internally with said collar; first drive means extending between the rotary drive member and the implement for driving one drivable portion thereof; and second drive means extending between the power shaft and the implement for driving the other drivable portion thereof.

6. The structure as set forth in claim 5 in which the hub has a locking pin and said power shaft has a pair of axially spaced pin-receiving recesses therein receiving the pin to lock the hub selectively in its coupled or uncoupled relation to said collar.

7. The structure as set forth in claim 5 in which the hub is square in cross-section and said collar has an internal square opening for receiving the hub.

8. The structure as set forth in claim 6 in which the hub is a part of a yoke of the universal joint that is coupled by said first part with the drive shaft to rotate therewith.

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