Nov. 25, 1952 A. C. CHRISTENSEN 2,619,293

INTENSIVE MIXING APPARATUS

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Fig. 1.

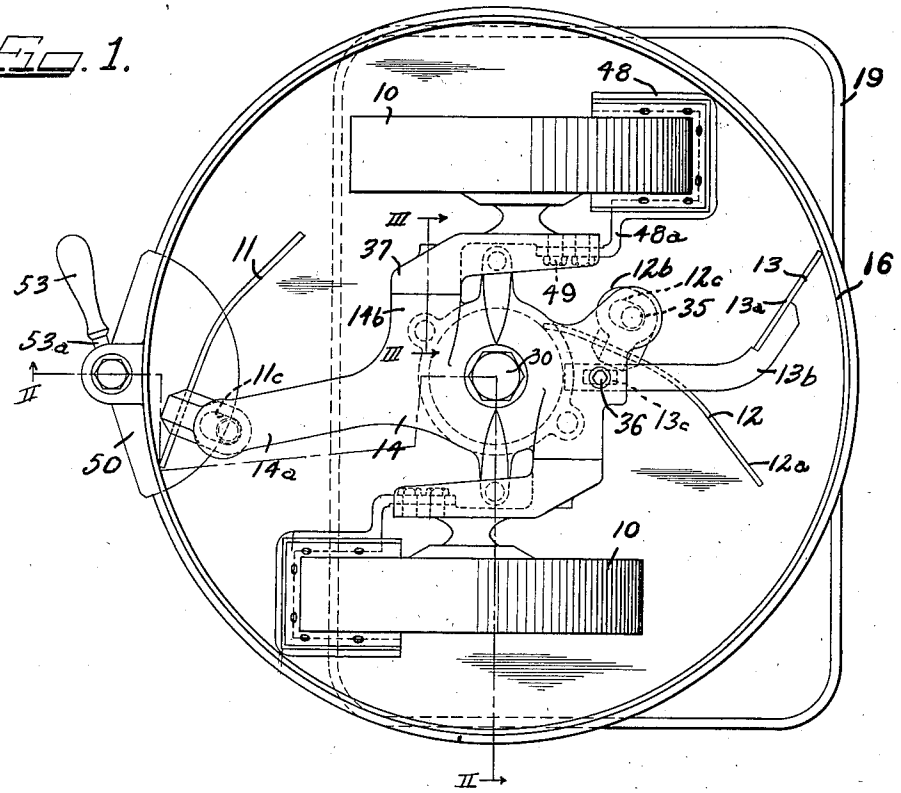


Fig. 4.

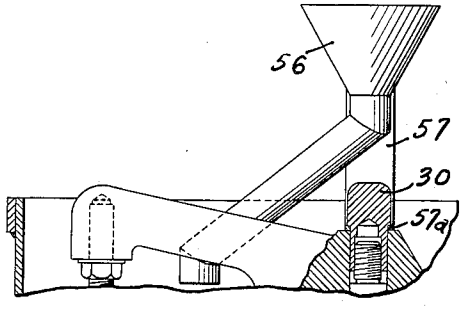
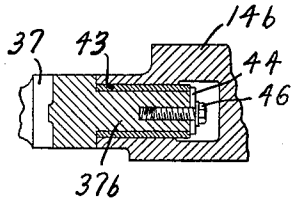


Fig. 3.



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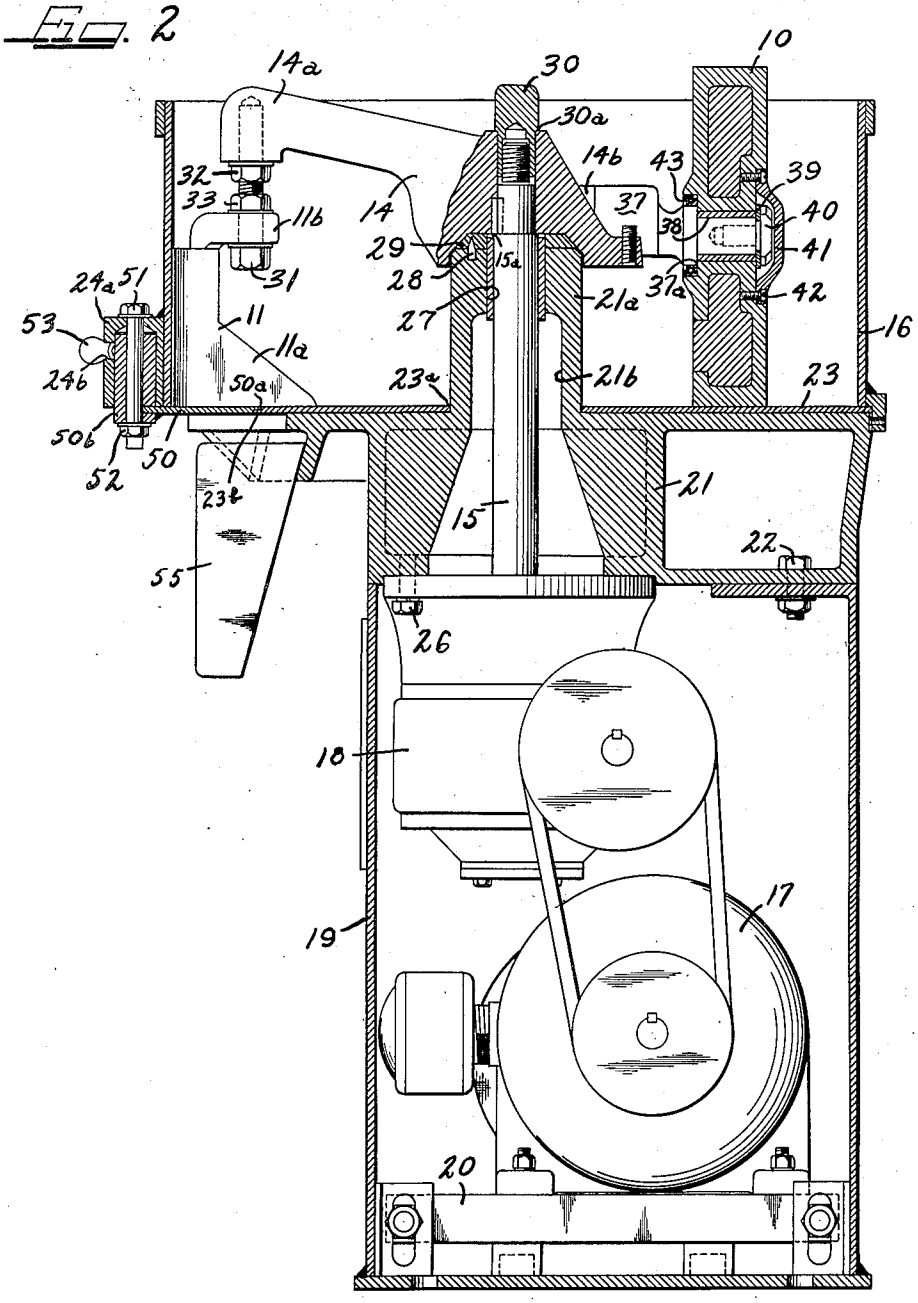
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Fig. 2



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Fig. 5.

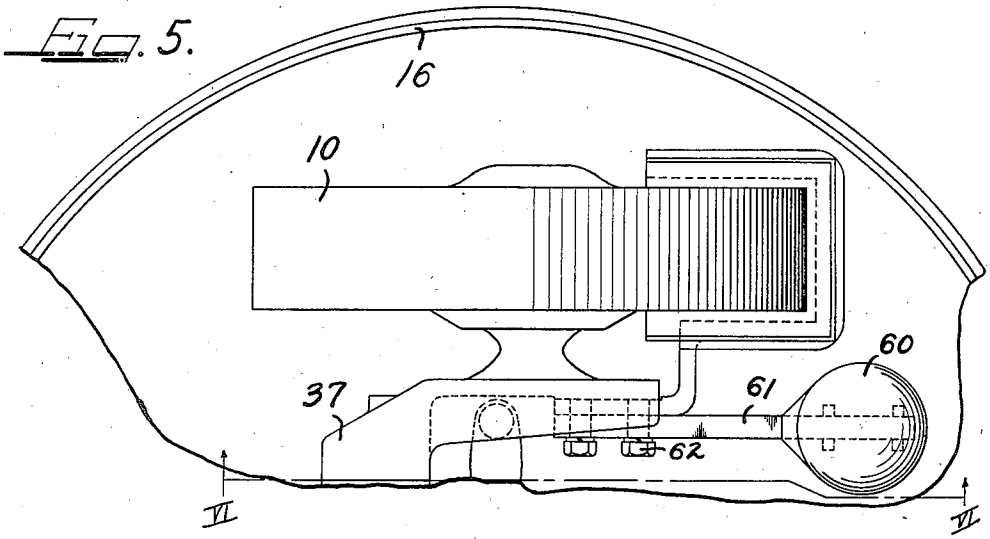
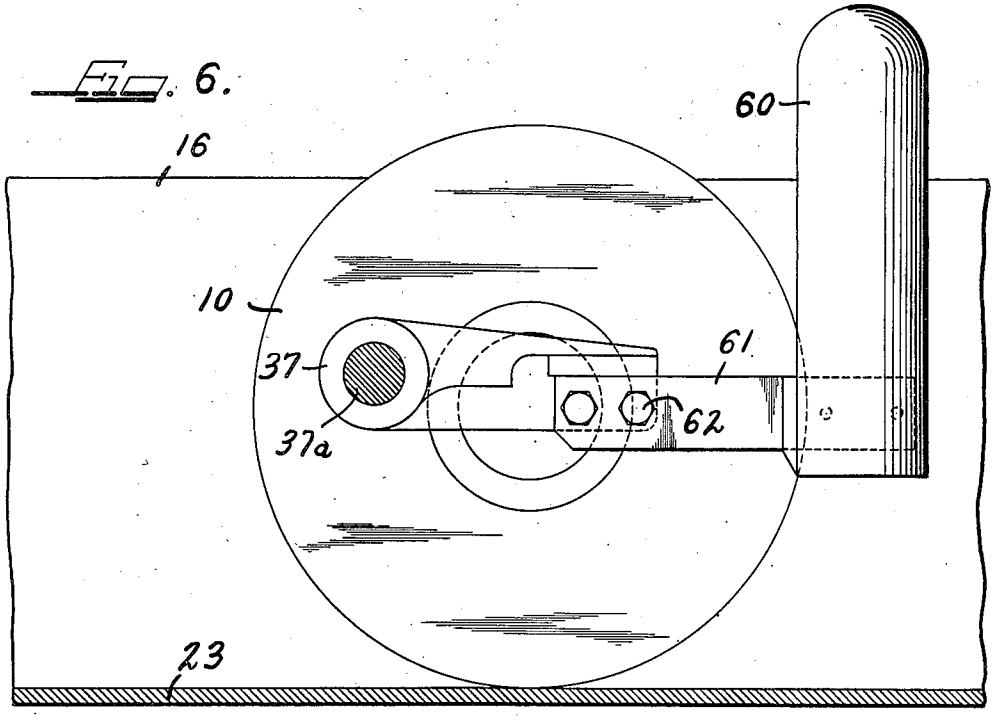


Fig. 6.



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Patented Nov. 25, 1952

2,619,293

UNITED STATES PATENT OFFICE

2,619,293

INTENSIVE MIXING APPARATUS

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Application February 27, 1947, Serial No. 731,213

3 Claims. (Cl. 241—124)

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This invention relates to a material mixer and more particularly to a mixer of the type employing muller wheels and plows to knead and work a loose, friable mixture into a pliable and plastic condition.

It is an important object of this invention to provide a relatively small mixing and mulling machine which requires floor space of approximately 18'' x 24'' and which will be efficient in operation and inexpensive to make and operate.

It is another object of this invention to provide a novel means for adjusting the plow used in this mixer.

In accordance with the features of this invention there is provided a self-contained mixing machine comprising a crib in which a scraper and plows tumble the material to be mixed in the crib, moving the material into the path of a pair of rotating mullers which pass over the mixture to knead and work the same.

An important feature of this invention is the provision of a one-point adjustment screw means by which the plows of the mixing machine may be adjusted horizontally, vertically or rotatably about the axis of the screw.

Other objects, features and advantages of this invention will be apparent to those skilled in the art from the following detail description of the annexed drawings which, by way of a preferred example only, illustrate one embodiment of the invention.

As shown on the drawing:

Figure 1 is a plan view of the mixing machine of this invention, particularly showing the relative positioning of the mullers, plows, and scrapers;

Figure 2 is a vertical sectional view taken substantially on line II—II of Figure 1;

Figure 3 is a fragmentary sectional view taken on line III—III of Figure 1 looking in the direction indicated by the arrows;

Figure 4 is a fragmentary sectional view showing the removable means for introducing water to the muller, which is a feature of this invention;

Figure 5 is an enlarged fragmentary plan view particularly illustrating the novel means of this invention for increasing the effective weight of the muller; and

Figure 6 is a fragmentary sectional view taken substantially on line VI—VI of Figure 5.

In the embodiment of my invention shown in Figures 1 and 2, a pair of muller wheels 10, an outside plow 11, an inside plow 12 and a scraper 13 are secured to a cross-head 14 for rotation by a drive shaft 15 in a crib 16. The drive shaft 15 is driven from an electric motor 17 through a gear reducer 18, which driving units are disposed in a base frame 19. Motor 17 is also adjustably mounted by means of a cross member 20 on the base frame 19.

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The base frame 19 is substantially a box-like structure preferably made of steel having walls thick enough to support the entire weight of the mounting and mechanism thereabove, including a bed plate 21 which is secured to the top surface of the frame 19 by means of a plurality of bolts 22. The bed plate 21 has a substantially rectangular shape at the bottom to conform to the shape of the base frame 19 but at the upper side the bed plate has a substantially circular shape for supporting a wear plate 23 and the crib 16 of the mixing machine. Protruding upwardly from the bed plate 21 and centrally disposed thereon is a substantially cylindrical portion 21*a*.

The speed reducer 18 is secured to the under side of the bed plate by a plurality of screws 26 having the drive shaft 15 extend upwardly through a central aperture 21*b* of the bed plate 21 and being journaled at the upper end in a bearing 27 which is secured therein.

The wear plate 23 upon which the material being mixed is deposited and upon which the muller and the plow bear while rotating in the crib is made of a substantially wear-resistance material such as steel and has a central aperture 23*a* which is adapted to slide over the cylindrical upper portion 21*a* of the bed plate 21 and to be supported by the bed plate 21.

The cross-head assembly 14 is keyed to the upper portion of the drive shaft 15 and rests on a shoulder 15*a* in the upper end thereof. A felt ring 29 is disposed about the bearing 27 between the cross-head 14 and the bed plate 21. A pin 28 fixed in the upper portion 21*a* of the bed plate 21 is adapted to hold the felt washer in position. The cross-head is held down on the shoulder 15*a* of the drive shaft 15 by means of a retaining cap 30 which is adapted to be screwed down on a threaded portion of the shaft 15 and has a shoulder 30*a* overlapping the cross-head and adapted to force the cross-head down on the shoulder 15*a* of the drive shaft 15.

The outside plow assembly 11 comprises a lower blade portion 11*a* and an upper strap portion 11*b* which is bent inwardly at a substantially right angle to the blade portion. This plow assembly is supported adjustably by means of an adjusting screw 31 which is disposed in the under side of the arm 14*a* of the cross-head 14. As seen

in Figure 1, a slot 11c is provided in the strap portion of the plow 11. A pair of lock nuts 32 and 33, together with their associated lock washers, are provided to hold the adjusting screw in the position selected. When the lock nuts 32 and 33 are loosened the plow assembly 11 may be pivoted about the adjusting screw 31 or it may be regulated laterally in the slot 11c or, by taking up on the adjusting screw 31, the plow may be raised and lowered in the crib. Thus a three-way adjustment may be quickly made by means of one adjusting screw.

The inside plow assembly 12 which is disposed to move the mixture in the crib outwardly toward the path of the muller is similar to the outside plow assembly 11 having a lower blade assembly 12a and an upper strap portion 12b. An adjusting screw 35 is disposed in a slot 12c of the strap portion and is adapted to provide the same three-way adjustment to the inside plow assembly that the adjusting screw 31 provides for the outside plow assembly 11.

The scraper assembly 13, which rotates about the drive shaft 15 as center, is adapted to scrape the vertical walls of the crib thereby removing any of the mixture that clings thereon. This assembly comprises a blade portion 13a rigidly secured to an arm 13b. The inner end of the arm 13b is inserted in a drilled hole in the side of the cross-head 14 and is secured therein by a set screw 36 which is screwed downwardly in the cross-head 14 having its lower end bearing against a flat surface 13c of the arm 13b. This arrangement provides for an adjustment inwardly or outwardly to compensate for wear of the blade portion 13a.

Each muller 10 is disposed for rotation on a bushing 38 disposed on an arm 37 pivotally connected to the cross-head 14. The muller is urged inwardly against a shoulder 37a of the arm 37 by a washer 39 which abuts the outer side of the muller face and is held in position by a set screw 40 which is adapted to be screwed into a tapped portion of the outer side of the arm 37. A cap 41 is provided to cover the outer end of the muller, being held in place by a plurality of set screws 42. At the inner side of the muller an oil seal 43 is disposed between the arm 37 and the muller. The muller may be suitably made of cast iron and have a hollow core in which lead may be disposed to add weight to the muller.

In order that the weight of the muller may be free to exert its force downwardly on the mixture in the crib, the arm 37, on which the muller is supported, is pivotally mounted with respect to an arm 14b of the cross-head 14. As best seen in Figure 3 an inwardly projecting arm 37b of the member 37 is arranged to rotate inside a bushing 43 in the arm 14b of the cross-head. A washer 44 which bears against the outer end of the bushing 43 is arranged to hold the bushing 43 in position being urged thereagainst by a set screw 46.

A muller wheel scraper assembly 48 is mounted about the muller wheel in a substantially U-shape by means of an arm 48a which is secured by set screws 49 to the support member 37. As the muller rotates the scraper 48 removes any of the mixture which is adhering to the muller wheel.

A provision is made for removing the mixed material in the crib in the form of a swinging door 50 which is substantially a semi-circular plate. As shown in Figure 2 the outer end of the plate 50 has a stepped construction 50a which is adapted to fit in sliding contact over a projection 23b of the wear plate 23. This construction renders the door leak-proof when closed.

The discharge door 50 is secured at its inner end to a substantially cylindrical member 50b which is arranged for pivoting in a support housing 24a projecting from the side of the crib 24 and rigidly fastened thereto as by welding. The door 50 is supported by a bolt 51 disposed in a central aperture in the upper part of the support housing 24a and projecting downwardly through an opening in the cylindrical member 50b to be secured at the bottom by a nut 52. A handle member 53 has a reduced portion 53a which is adapted to pivot in a slot 24b of the support housing 24a. The inner end of the handle 53 is arranged to screw into the cylindrical member 50b.

Thus the discharge door 50 may be pivoted upon the bolt 51 by means of the handle 53 which is free to swing in the slot 24b. It is to be particularly noted in Figure 2 that this type of door provides a maximum amount of space below the crib which may be advantageously used to position a receptacle under the discharge door 50.

As the discharge door is swung open any material clinging to the upper surface thereof will be scraped off by the lower inner edge of the crib 24 when the door is swung in close contact thereunder. Thus this discharge door 50 is substantially self cleaning.

A discharge chute 55 of any suitable configuration may be secured to the bed plate 21 under the discharge door 50.

In Figure 4 is shown a novel type of funnel through which water may be introduced to the mixture as needed. This funnel 56 has a support member 57 secured to its upper conical portion. A lower portion 57a of the support member 57 is turned at substantially right angle to the upright portion 57 and has a central aperture through which the cap 30, which is normally used to retain the cross-head, may be positioned. Thus the funnel assembly 56 is secured in the assembly on top of the cross-head.

In Figures 5 and 6 is disclosed a novel means by which the weight of the muller may be increased as much as 100%. A weight 60 is rigidly secured at the end of a rocker arm 61 which in turn is secured to the member 37 by means of a pair of cap screws 62. Thus the weight 60 is fastened at the end of the member 37 to add substantial weight to the muller. This method of adding weight makes use of an additional lever arm 61 and is rigidly attached to the assembly by the cap screws 62.

The mixing machine of this invention is put in operation by placing the material to be mixed in the crib 16 and then starting the motor 17. The drive shaft 15 will then begin to rotate the plows, the scrapers and the mullers in the crib. The outer plow is adapted to take the material at the outer rim of the crib and move it inwardly into the path of the muller and the inner plow 12 is advantageously disposed to take any material which is near the center of the crib and move it outwardly into the path of the muller. The scraper 13, as previously mentioned, will remove all of the material from the side wall of the crib. Due to the fact that the mullers are pivotally mounted on their arms 37 the muller is free to knead and work the mixture by exerting a force thereon in direct proportion to the weight of the muller. The tumbling action of the plows and the kneading action of the mullers is such that

a tough plastic mixture will result without any damage being done to the grain structure of the materials being mixed.

When it is desired to remove the mixture from the crib, the door **50** is swung about the bolt **51** to allow the mixture to be discharged through the opening provided in the wear plate and in the bed plate.

It is to be understood that various details of construction may be varied through a wide range without departing from the principles of this invention, and it is therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. A mixing machine comprising a base, a crib supported by said base, at least one muller arranged for working the material in said crib, means including a cross-head having a plurality of outwardly projecting arms for driving said muller, a plow blade disposed in said crib for moving the material into the path of said muller, laterally offset support means on said plow blade extending from the blade to underlie one arm of said cross-head, an adjusting member threaded at one end into said one arm of said cross-head and engaging said plow support means to suspend said plow blade therefrom, said plow support means having an elongated slot through which said adjusting member extends for adjusting the position of said plow blade with relation to the bottom of said crib by advancing or retracting the threaded portion of said adjusting member, for adjusting the plow blade with respect to the wall of said crib by sliding the plow in the elongated slot relative to said adjusting member and for adjusting radially the plow blade by pivoting it about said adjusting member positioned in said elongated slot.

2. In a mixing machine employing mullers and plows to work a mixture in a crib and having a drive member including a cross-head having a plurality of arms for moving said mullers and said plows, an adjusting member threaded at one end to one arm of said cross-head and arranged to support said plow, said plow having a laterally inwardly projecting boss underlying said one arm provided with an elongated slot through which said adjusting member extends and means clamping said boss to said member

whereby the position of said plow may be adjusted with relation to the bottom of said crib by advancing or retracting the threaded portion of said adjusting member in said arm, the plow may be adjusted with respect to the wall of said crib by sliding the adjusting member in the elongated slot relative to said plow and the plow may be adjusted radially by pivoting said plow about said adjusting member in said elongated slot.

3. In a mixing machine employing mullers and plows to work a mixture in a crib and having a drive member including a cross-head with a plurality of arms for moving said mullers and said plows, an adjusting member engaging at one end a portion of one of the arms of said cross-head and engaging at the other end a portion of one of said plows, one of said portions engaged by said adjusting member including an elongated slot, said adjusting member being slidable in said slot to adjust the plow with respect to the wall of said crib, said adjusting member and one of said portions engaged by said adjusting member being relatively rotatable to adjust the plow by pivoting said plow about the axis of said adjusting member, and one of said portions being movable along the axis of said adjusting member to adjust said plow relative to the bottom of said crib.

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