

April 8, 1941.

P. MARSHALL

2,237,787

FEED MIXER

Filed Feb. 9, 1940

2 Sheets-Sheet 1

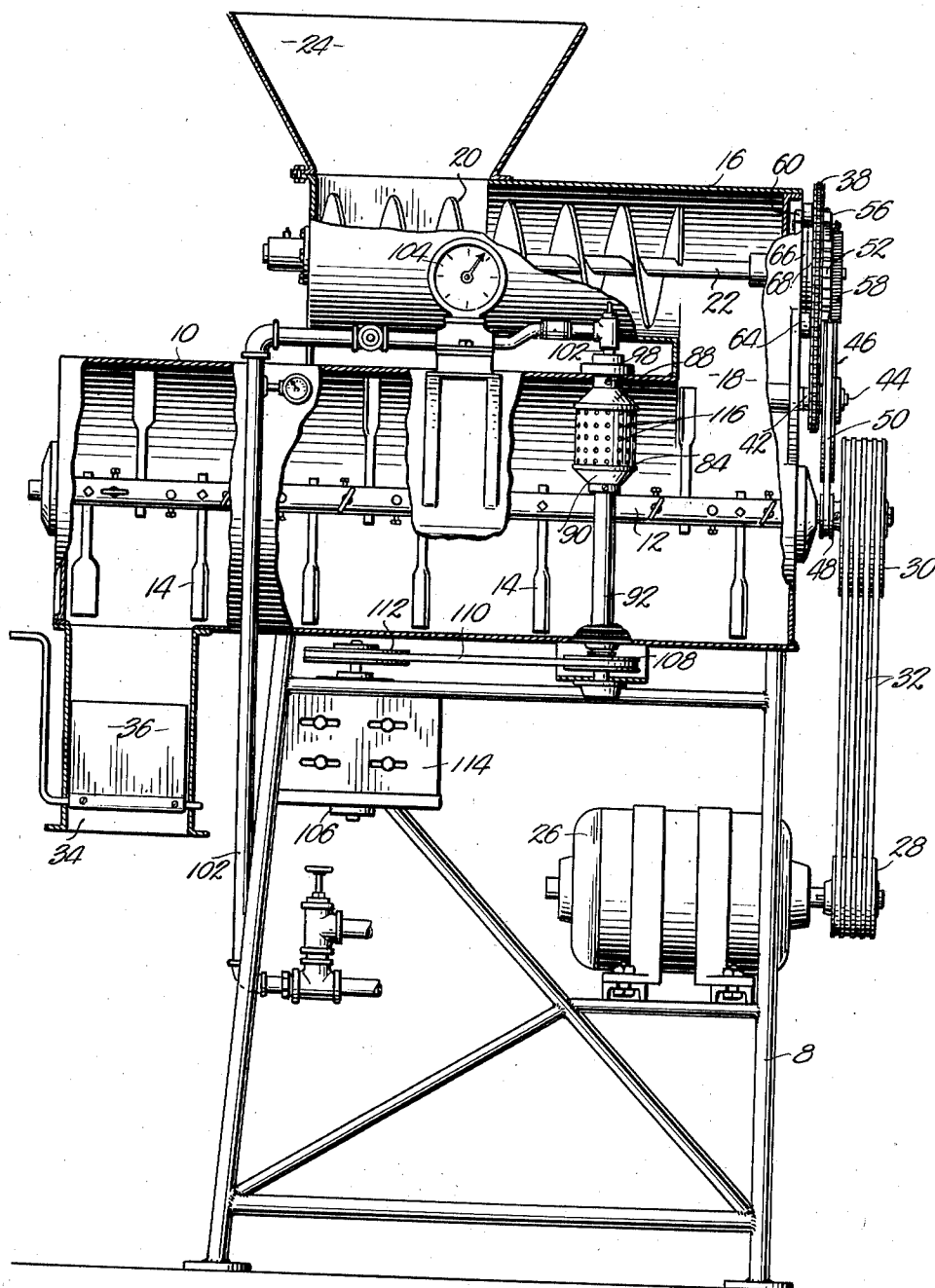


Fig. 1.

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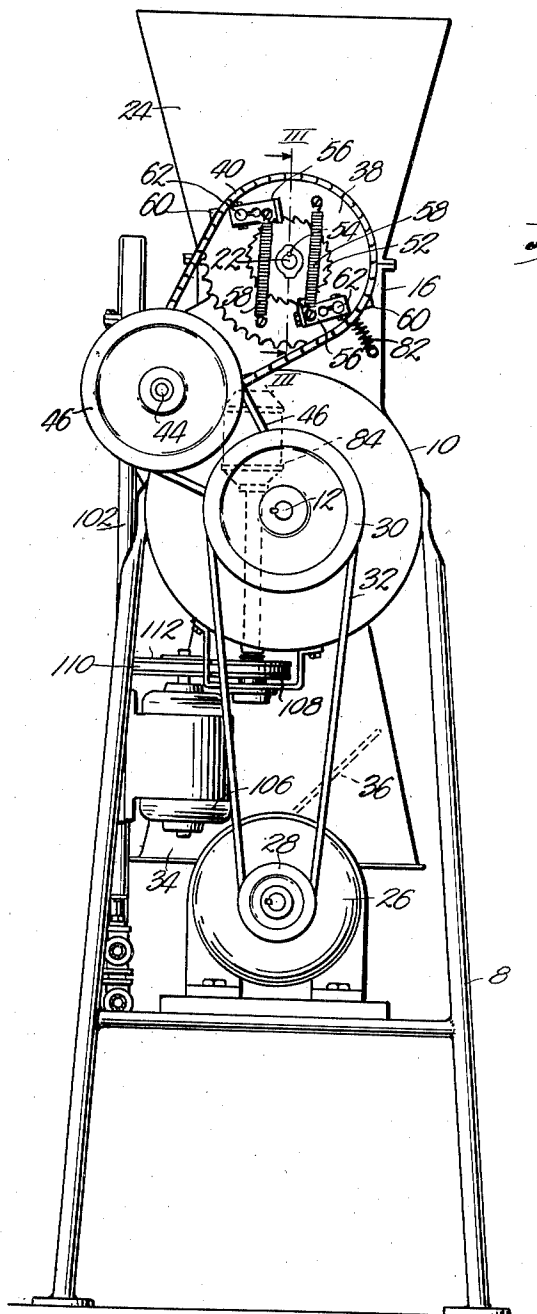
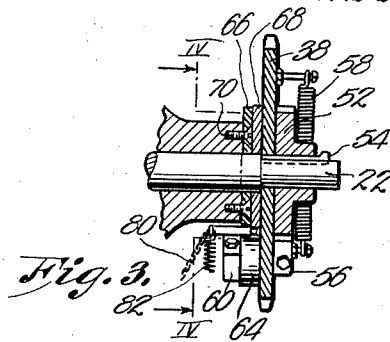
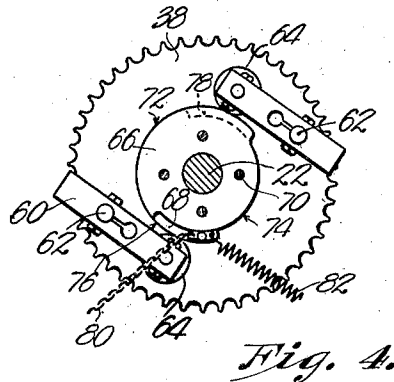
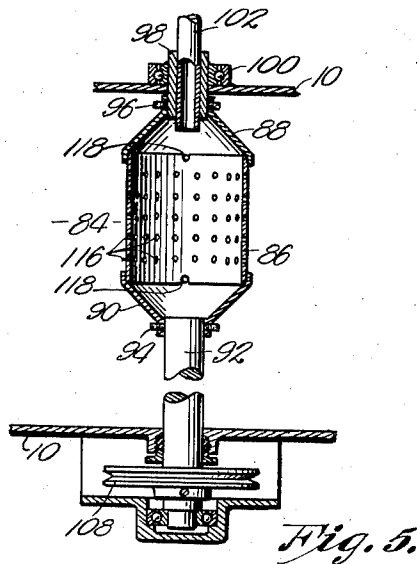
P. MARSHALL

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FEED MIXER

Filed Feb. 9, 1940

2 Sheets-Sheet 2



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2,237,787

FEED MIXER

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Application February 9, 1940, Serial No. 318,124

5 Claims. (Cl. 259—23)

This invention relates to mixing machines and the primary object is to provide such equipment with novel and unique apparatus for introducing into a relatively dry material, a quantity of liquid so that the resulting product will be desirable as respects uniformity of mix and the coating of the said relatively dry particles to a predetermined desirable degree.

One of the important aims of the present invention is to provide mixing equipment for feeds or the like, with which it is desired to mingle a certain amount of an ingredient in a liquid or semi-liquid form.

Another object of this invention is to provide a feed mixer of conventional type with unique means for forcibly injecting molasses or the like into a mass of relatively dry feed, through the employment of centrifugal force and through the use of specially formed injecting apparatus that attains the desired end without the employment of a high pressure pump, and through the use of a rotatable bowl, the annular side of which is provided with a plurality of perforations by means of which the liquid is converted into fine streams that are outwardly directed to impinge upon and coat the particles constituting the mass of feed.

Another aim of this invention is the provision of means of the aforementioned character for injecting in a special manner a supply of molasses into a mass of feed, said injecting means being located in a special place within the conventional feed mixer so that as the beaters of the latter lift the feed and convert it into a loose travelling body, the molasses is introduced thereinto.

A yet further object of this invention is the provision in a feed mixer of conventional type, means for periodically advancing the feeding elements within the hopper, said means comprising a combination of parts including specially arranged dogs, ratchet and sprocket wheels and relatively movable cam plates, all of which cooperate to cause the dogs to remain in engagement with the ratchet wheel for predetermined lengths of time during which the feeding elements are operated and between which times the latter are inactive.

This invention has for another object, the provision of means for periodically actuating certain parts of a feed mixer, which means is rugged, durable, inexpensive to manufacture, easy to manipulate, so that the periods of activity may be lengthened or shortened to suit conditions.

The following specification will reveal to one

skilled in the art, minor objects of the invention in addition to those set down above. The preferred manner of constructing a feed mixer in accordance with the invention has been illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevational view of a feed mixer made in accordance with the present invention, parts being broken away for clearness.

Figure 2 is an end view of the feed mixer.

Figure 3 is an enlarged fragmentary detailed sectional view taken on line III—III of Fig. 2.

Figure 4 is a cross sectional fragmentary detailed view taken on line IV—IV of Fig. 3, looking in the direction of the arrows; and

Figure 5 is a vertical fragmentary sectional view through the liquid injection means that is disposed within the mixing drum.

While the following specification relates to the illustrated embodiment of the invention as seen in the accompanying drawings, it is obvious that advantages may arise if mixing machines for materials other than feed are supplied with the novel parts contemplated by this invention. Describing the feed mixer therefore, is but one manner of disclosing the invention in workable form and reference to the attached drawings reveal a combination of parts which result in the art of mixing materials.

Much of the feed mixer illustrated is of conventional type in that a frame 8 is usually employed to support a mixing drum 10, having a shaft 12 therein with beaters 14 extending radially therefrom. Also, mixing drum 10 usually supports a hopper 16 connected as at 18 through the medium of a duct so that feed may be deposited in mixing drum 10 as screw 20 is operated by turning shaft 22. The relatively dry feed is fed into hopper 16 from bin 24 at rates of speed determined by the operator.

In the instance shown, shaft 12 is rotated by motor 26, which is joined to shaft 12 through the medium of pulleys 28 and 30 over which pass a number of belts 32. When the feed is mixed, as will hereinafter be set down, the same is ejected from drum 10 through a chute 34 having the conventional gate 36 therein. This chute and gate 34 and 36 respectively, is arranged so that sacking may be accomplished with a maximum amount of speed.

When introducing molasses or other liquids to feeds or other relatively dry material passing through mixing drum 10, it is desirable, if not necessary, to feed the material through duct 18 at a given rate of speed. The means for periodically moving screw 20 is clearly illustrated in the

accompanying drawings and comprises a sprocket wheel 38 joined to motor 26 by way of sprocket chain 40, sprocket pinion 42 mounted upon stub shaft 44, pulley 46 likewise mounted upon shaft 44, pulley 48 secured to shaft 12, belt 50 and then members 28, 30 and 32. When the machine is in operation, motor 26 is constantly running and therefore, sprocket wheel 38, which is freely mounted upon shaft 22, continually turns about the axis of this shaft 22.

A ratchet wheel 52 keyed as at 54 to shaft 22 is immediately adjacent one side of sprocket wheel 38. A pair of dogs 56 pivotally mounted upon sprocket wheel 38 is yieldably urged toward ratchet wheel 52 by springs 58 periodically engaging the wheel when arms 60 are allowed to move to one end of their path of travel as hereinafter described.

Each dog 56 is secured to a stub shaft 62 that passes through sprocket wheel 38. An arm 60 secured to stub shaft 62 has a roller 64 on the free end thereof which engages the cam faces formed on cam plates 66 and 68 respectively.

Cam plate 66 is secured as at 70 directly to the end of hopper 16 and has a relatively high face 72 and a low face 74. The movable cam plate 68 likewise has faces of similar nature and the length of relatively high face 76 of cam plate 68 is the same as the length of cam face 72 on plate 66. The length of relatively low face 78 on cam plate 68 is the same as low face 74 on plate 66. The lengths of the low and the high faces of these two plates 66 and 68 respectively, are such as to cause movement of arm 60 and therefore, dogs 56 toward and from ratchet 52 at any desired rate of speed commensurate, of course, with the rate of speed of motor 26.

Cam plate 69 is loosely mounted on shaft 22 in juxtaposition with cam plate 66 and adjacent to the other side of sprocket wheel 38. Movement of plate 68 is accomplished through the medium of a chain, cable or other element 80 that extends to within easy reach of the operator.

A spring 82 yieldably maintains plate 68 at one end of a path of travel that may be determined, and which permits the dogs to operate normally when feeds of given characteristics are being treated. The movement of plate 68 about the axis of shaft 22 will lengthen the relatively high face 72 of plate 66 and therefore, cause arm 60 to be held out a greater period of time. When the arms are thus held at the outer end of their path of travel, dogs 56 will not be in engagement with ratchet 52.

The means for introducing liquid into the relatively dry feed which enters drum 10 through duct 18 is clearly shown in Figs. 1 and 5. This means comprises a rotatably mounted bowl, generally indicated by the numeral 84, but which comprises a perforated cylindrical side wall 86 disposed with its axis in a vertical position and closed at the upper and lower ends by heads 88 and 90 respectively. The lower head is fastened directly to drive shaft 92 through the medium of a set screw or the like 94, while upper head 88 is fastened in position by set screws or the like 96.

A boss 98 extending upwardly from head 90 engages a roller or ballbearing 100 and accommodates one end of feed pipe 102 which extends to a source of supply, not here shown.

A pump may be employed to pass molasses or other liquids through pipe 102, and a meter 104 may be furnished to indicate to the operator the

quantity of liquid that has passed through pipe 102.

Drive shaft 92 is connected to motor 106 through the medium of pulley 108, belt 110 and pulley 112. Motor 106 is mounted upon slotted plate 114 so that adjustment may take place and a separate switch to control the circuit for this motor should be provided. In practice, it has been found that the speed of rotation of bowl 84 should be about 3,000 R. P. M.

The size of perforations 116 in wall 86 may be altered and because of the high speed developed, means such as the slot and pin arrangement 118, should be established to insure a unitary bowl structure as regards wall 86 and heads 88 and 90.

If it is necessary or desirable to replace or service perforated cylinder 86, head 90 may be slipped along shaft 92 and cylinder 86 removed.

The liquid which passes into bowl 84 through pipe 102 is not under pump pressure, and in fact, may enter bowl 84 through the action of gravity. The centrifugal force exerted will throw the attenuated streams of liquid outwardly from cylinder 86 and against the relatively dry and fluffy mass of feed, after the latter has been lifted by beaters 14.

The position of bowl 84 should be above the center of drum 10 so that the result just set down may be attained. The closed nature of bowl 84 is such as to establish a force at the same time the liquid is directed toward the materials being coated, and therefore, a pump is not necessary to generate pressure prior to the time the liquid is broken into relatively fine streams or globules. The elimination of a pump may therefore occur and the molasses fed directly into bowl 84 through the action of gravity.

It will be apparent to one skilled in the art that the principles involved and described in the foregoing specification may be incorporated in mixing machines having physical characteristics other than that illustrated and likewise the concepts may be introduced into structure forming a part of machines designed to mix materials other than those specified. It is desired, therefore, to be limited only by the scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A feed mixer of the character described comprising a horizontally disposed drum having a plurality of rotary beaters therein movable about a horizontal axis; a hopper in communication with the drum; means having parts in the hopper for feeding material therefrom into the drum at selected rates of speed; a hollow, rotatable bowl in the drum provided with perforations in the side wall thereof; means for spinning the bowl about a vertical axis for directing material therefrom in horizontal paths above the bottom of the drum; and a pipe for supplying liquids to the bowl as the same is spinning, said beaters serving to mix with feed such material as falls by gravity to the bottom of the drum.

2. A feed mixer of the character described comprising a horizontally disposed drum having a plurality of rotary beaters therein movable about a horizontal axis; a hopper in communication with the drum; means having parts in the hopper for feeding material therefrom into the drum at selected rates of speed; a hollow, rotatable bowl in the drum provided with perforations in the side wall thereof; means for spinning

the bowl about a vertical axis for directing material therefrom in horizontal paths above the bottom of the drum; and a pipe for supplying liquids to the bowl as the same is spinning, said beaters serving to mix with feed such material as falls by gravity to the bottom of the drum, said bowl being disposed in the upper portion of said drum for movement about a vertical axis whereby to force liquid into the material after the same has been thrown upwardly by the beaters.

3. A feed mixer of the character described comprising a drum having a plurality of rotary beaters therein; a hopper in communication with the drum; means having parts in the hopper for feeding material therefrom into the drum at selected rates of speed; said feeding means comprising a shaft, a feed screw on the shaft, a ratchet keyed to the shaft, a sprocket wheel having connection with a motor freely mounted on the shaft, a dog on the sprocket wheel movable to and from engagement with the ratchet, an arm having a roller thereon operably joined to the dog, and a pair of cam plates in engagement with the roller for periodically moving the dog toward and from the ratchet.

4. In a feed mixer of the kind described having a hopper and a screw therein for moving material therefrom, means for periodically actuating said screw comprising a shaft rigid with the screw; a ratchet rigid with the shaft; a sprocket wheel having connection with a motor freely mounted on the shaft adjacent to the ratchet; a dog on the sprocket wheel movable to and from engagement with the ratchet; an arm having a roller thereon operably joined to the dog; a cam

plate secured to the hopper having a face over which the roller rides as the sprocket wheel is rotated; another cam plate in juxtaposition to the first mentioned cam plate and freely mounted on the shaft; and manually operable means for changing the relative positions of said cam plates connected to the said freely mounted cam plate whereby to periodically move the dog toward and from the ratchet at predetermined rates of speed.

5. In a feed mixer of the kind described having a hopper and a screw therein for moving material therefrom, means for periodically actuating said screw comprising a shaft rigid with the screw; a ratchet rigid with the shaft; a sprocket wheel having connection with a motor freely mounted on the shaft adjacent to the ratchet; a dog on the sprocket wheel movable to and from engagement with the ratchet; an arm having a roller thereon operably joined to the dog; a cam plate secured to the hopper having a face over which the roller rides as the sprocket wheel is rotated; another cam plate in juxtaposition to the first mentioned cam plate and freely mounted on the shaft; and manually operable means for changing the relative position of said cam plates connected to the said freely mounted cam plate whereby to periodically move the dog toward and from the ratchet at predetermined rates of speed, said cam plates each having a high face and a low face on the edge thereof, the movement of said free cam face serving to lengthen or shorten the combined length of the high faces whereby to lengthen or shorten respectively the interval in which the dog is in engagement with the ratchet.

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