Dec. 30, 1941. N. KNITTEL 2,268,038

MIXING MACHINE

Filed Nov. 16, 1940

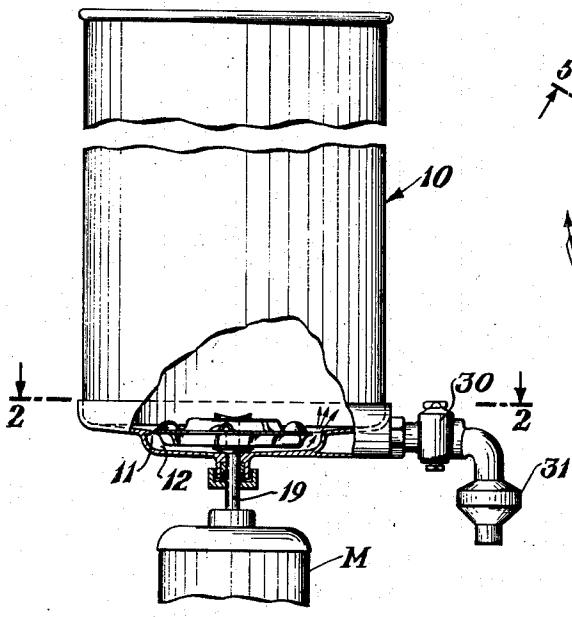


Fig. 1

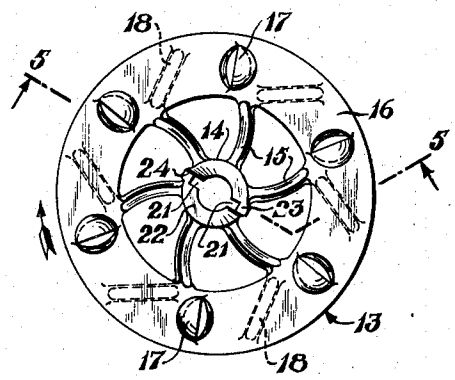


Fig. 3

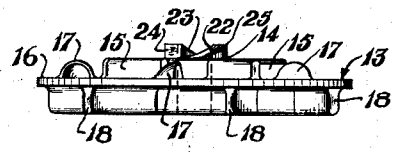


Fig. 4

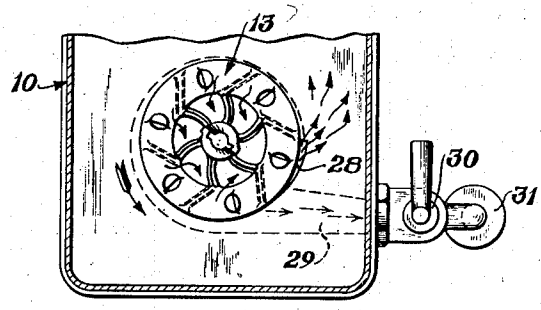


Fig. 2

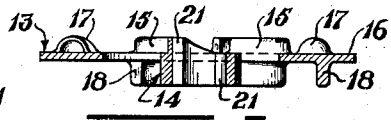


Fig. 5

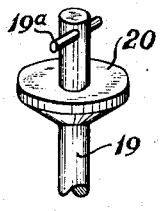


Fig. 6

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MIXING MACHINE

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9 Claims. (Cl. 259—43)

This invention relates to mixers and, more particularly, to a mixer for mixing liquids or for mixing a solid or semi-solid matter and a liquid.

In the past in devices of this character many parts were required, such as baffles or stirring blades, which parts not only make the machine difficult to clean but, generally, such mixers were merely an elaboration upon a stirring operation, which operation is not fully efficient. It is also usual, after mixing, that the mixture be drawn off by gravity or separate pumping mechanism.

It is an object of the present invention to provide a mixing device which will dissolve solid or semi-solids and a liquid by mixing the same and commix liquids in a manner to secure uniform dispersion throughout.

Another object of this invention is to provide a mixing device which has few parts, which parts may be readily removed for cleaning and the machine cleaned quickly and easily.

A further object of the invention is to provide a mixing machine in which the mixed contents may be quickly removed from the machine through operation of the mixing mechanism.

Another object of the present invention is to provide a mixing machine in which the contents are agitated in a container and passed to an auxiliary chamber, there to be forced back into the container, recirculated and mixed.

Other objects of the invention will be obvious or will appear during the course of the following specification.

The objects of the present invention are accomplished by providing a tank which acts as a mixing chamber, said tank having an opening in the bottom thereof, below which is an auxiliary chamber. Within the opening and acting as a cover to the auxiliary chamber is a rotor plate having agitator blades in the central portion thereof, projecting into the tank. Around the blades is a rim having louvres formed therein which extend through the rotor and are in communication with the auxiliary chamber. On the bottom of the rotor and projecting into the auxiliary chamber is a plurality of impeller vanes. The rotor is mounted on a rotatable shaft which may be driven by any desirable means. The auxiliary chamber is in communication with the tank through an opening adjacent the periphery of the rotor. The auxiliary chamber is also in connection with a valve controlled outlet.

Referring to the drawing:

Figure 1 is a side elevational view partly broken away to show the rotor plate;

Figure 2 is a plan view taken on the line 2—2 of Figure 1;

Figure 3 is a plan view of the top of the rotor;

Figure 4 is a side elevational view of said rotor;

Figure 5 is a sectional view taken on the line 5—5 of Figure 3; and

Figure 6 is a perspective view of the connection between the hub of the rotor and the rotatable shaft.

Like numerals refer to like parts throughout the several views.

The invention comprises a container or mixing tank 10, having an opening 11 in the bottom thereof, below which is formed an auxiliary chamber 12.

Within the opening 12 is a rotor plate 13, the periphery of which is closely adjacent the side of the opening 11. The rotor 13 comprises a hub 14 having a plurality of agitator blades 15 extending radially therefrom and projecting upwardly into the tank 10. Formed integrally with said blades at the outer end thereof is an annular rim 16 forming a flat surface between the ends of the agitator blades 15 and the periphery of the rotor. Formed in the surface of the rim 16 are a plurality of louvres 17 which project upwardly from and extend through said rim 16, forming openings between the container 10 and the auxiliary chamber 12.

On the bottom of the rim 16 of the rotor 13 and extending from the inner to the outer edge thereof are formed a plurality of impeller vanes 18 which project into the auxiliary chamber 12.

The rotor 13 is mounted on a rotatable shaft 19 which is driven by any desirable source, such as a motor M, as shown in Figure 1 of the drawing. The drive shaft 19 has a flange 20 formed thereon on which the bottom surface of the hub 14 rests. Adjacent the top of the shaft is a pin 19a which projects from diametrically opposite sides of said shaft.

The hub 14 has diametrically opposite slots 21 adapted to receive the pin 19a, as the rotor is placed on the shaft 19.

The top surface of the hub has two oppositely disposed helically inclined cam surfaces 22 and 23, having shoulders 24 and 25 formed therebetween. When the bottom surface of the hub 14 rests upon the flange 20, the pins 19a project outwardly over the cam surfaces 22 and 23 at their lowest points. By turning the rotor 13 in a clockwise direction, as illustrated in the drawing, so that the higher portion of the inclined cam surfaces are brought into contact with the pins

19a, the rotor is firmly fastened and held in the drive shaft 19.

Formed in the bottom of the tank 10 and in the side wall of the chamber 12 at the periphery thereof is a slot 28 which is in communication with the chamber 12 which forms a port therebetween and the interior of the tank 10. A discharge outlet 29 is connected to the auxiliary chamber 12, said outlet having a valve 30 therein, which is used to open and close said outlet. A strainer 31 may be connected to the outlet side of the valve. If desired a pipe may be fastened to the outlet side of the valve for the purpose of distributing the mixed contents.

When it is desired to use the device of this invention the liquids to be mixed, or the liquids and solids which are to be mixed are placed within the tank 10. The motor M is then started which, as shown by way of example in the drawing, rotates the rotor 13 in a counterclockwise direction. The tank 10 is preferably rectangular or square. Since the action of the rotor tends to whirl the contents of the tank, the corners of the square tank breaks the swirl which helps to break-up and thoroughly mix the ingredients.

As the rotor 13 is rotated, the agitator blades 15 whirl the product in the tank 10 forcing it, through centrifugal force, toward the side of the tank. A portion of the mixture at the bottom of the tank 10 passes downwardly between the agitator blades 15 where it comes in contact with the impeller vanes 18 in the auxiliary chamber 12, such contact causing the product, through centrifugal force, to be forced to the outer edge of the chamber, the impeller vanes 18 at the same time forcefully impelling the product being mixed, out of the auxiliary chamber 12 upwardly through the slot 28 and thence upwardly through the tank 10. In this manner, the product in the tank 10 is not only whirled but the portion at the bottom is passed through the auxiliary chamber 12 and forced upwardly to the top of the mixture in the tank 10, thus causing not only a whirling or stirring of the mixture but a circulation thereof from the bottom to the top of the container 10 thereby assuring a complete and thorough dispersion of all of the mixture in the tank.

The louvres 17 agitate the mixture, chopping or breaking any solid matter with which they come in contact and also pass a portion of the product being mixed into the chamber 12.

The openings provided in the rotor 13 through the louvres 17 prevent excess pressure being built up in the chamber 12 by the impeller vanes 18 and thus prevents overheating of the mixture which is very detrimental to some mixtures, for example, when yeast is being dissolved in water. Any excess pressure is released upwardly through the louvres.

In emptying the tank 10, the valve 30 is opened, the impeller vanes 18 then forcing the mixture which enters the auxiliary chamber 12 between the agitator blades 15 and through the louvres 17 through the outlet 29 serving to pump the mixture from the tank quickly.

When it is desired to clean the mixing device of this invention, it may easily and quickly be done by turning the rotor in a counter-clockwise direction, so that the pins 19a are released from the portions of the cam surfaces 23 and 24 and are brought adjacent the slots 21 in the hub. The rotor may then be lifted from the shaft 19.

It is apparent that the specific illustrations shown have been given by way of illustration and not by way of limitation and that the structure above described is subject to a wide variation and modification without departing from the scope or intent of the invention, all of which variations and modifications are to be included within the scope of the present invention.

What is claimed is:

1. In a mixing machine, a container having an opening in the bottom thereof and an auxiliary chamber position below said opening, a rotor plate rotatably mounted in said auxiliary chamber the periphery thereof registering with the edge of said opening and acting as a cover to said auxiliary chamber, agitator blades on the top of said rotor plate and projecting into said container, a plurality of louvres disposed on the top of said plate and extending therethrough, a plurality of impeller vanes on the bottom of said plate, projecting into said auxiliary chamber, a port in the bottom of said container adjacent the periphery of said rotor connecting said chamber and said container, and means for rotating said plate.

2. In a mixing machine, a rectangular shaped container having an opening in the bottom thereof and an auxiliary chamber positioned below said opening, a rotor plate rotatably mounted in said auxiliary chamber the periphery registering with the edge of said opening and acting as a cover to said auxiliary chamber, agitator blades on the top of said rotor plate and projecting into said container, a plurality of louvres disposed on the top of said plate and extending therethrough, a plurality of impeller vanes on the bottom of said plate, projecting into said auxiliary chamber, a port in the bottom of said container adjacent the periphery of said rotor connecting said chamber and said container, and means for rotating said plate.

3. In a mixing machine, a container having an opening in the bottom thereof and an auxiliary chamber position below said opening, a valve controlled discharge outlet connected to said auxiliary chamber, a rotor plate rotatably mounted between said auxiliary chamber and said container and acting as a cover to said auxiliary chamber, agitator blades on the top of said rotor plate and projecting into said container, a plurality of louvres disposed on the top of said plate and extending therethrough, a plurality of impeller vanes on the bottom of said plate, projecting into said auxiliary chamber, a port in the bottom of said container, adjacent the periphery of said rotor connecting said chamber and said container, and means for rotating said plate.

4. In a mixing machine, a container having an opening in the bottom thereof and an auxiliary chamber position below said opening, a valve controlled discharge outlet connected to said auxiliary chamber, a rotor plate rotatably mounted between said auxiliary chamber and said container acting as a cover to said auxiliary chamber, said rotor comprising an annular rim, agitator blades extending radially between the central portion of said rotor and said rim and projecting into said container, a plurality of louvres disposed on the top of said rim and extending there through, a plurality of impeller vanes on the bottom of said plate projecting into said auxiliary chamber, a port in the bottom of said container adjacent the periphery of said rotor connecting said chamber and said container, and means for rotating said plate.

5. In a mixing machine, a container having an opening in the bottom thereof and an auxiliary chamber position below said opening, a valve controlled discharge outlet connected to said auxiliary chamber, a rotor plate rotatably mounted between said auxiliary chamber and said container acting as a cover to said auxiliary chamber, said rotor comprising a hub and an annular rim, agitator blades extending radially between said hub and said rim and projecting upwardly into said container, a plurality of louvres disposed on the top of said rim and extending therethrough, a plurality of impeller vanes on the bottom of said rotor extending from said hub to the periphery of said rim and projecting into said auxiliary chamber, a port between said chamber and said container adjacent the periphery of said rim and in communication with said chamber, and means for rotating said plate.

6. In a mixing machine, a container having an opening in the bottom thereof and an auxiliary chamber position below said opening, a valve controlled discharge outlet connected to said auxiliary chamber, a rotor plate rotatably mounted between said auxiliary chamber and said container acting as a cover to said auxiliary chamber, agitator blades on the top of said rotor plate and projecting into said container, a plurality of louvres disposed on the top of said plate and extending therethrough, a plurality of impeller vanes on the bottom of said plate projecting into said auxiliary chamber, a hub on said rotor having two oppositely disposed helically inclined cam surfaces on the top surface and diametrically opposite keyways therethrough, a drive shaft having a flange thereon to engage the bottom surface of said hub said drive shaft having diametrically opposite projecting pins adapted to engage said cam surfaces, means for driving said shaft, and a port in the bottom of said container adjacent the periphery of said rotor and in communication with said chamber.

7. A rotor plate adapted to be rotatably disposed in an opening in the bottom of a container having an auxiliary chamber below said opening the periphery of said plate being adapted to register with the edge of the opening said rotor comprising an annular rim, agitator blades projecting from one side of said rotor extending radially between the central portion of said rotor and said rim, a plurality of louvres disposed on the rim of said rotor on the said side thereof and extending therethrough, and a plurality of impeller vanes projecting from the opposite side of said plate.

8. A rotor plate adapted to be rotatably disposed in an opening in the bottom of a container having an auxiliary chamber below said opening the periphery of said plate being adapted to register with the edge of the opening, said rotor comprising a hub and an annular rim, agitator blades projecting from one side of said rotor and extending radially between said hub and said rim, a plurality of louvres disposed on the rim of said rotor on the said one side thereof and extending therethrough, and a plurality of impeller vanes projecting from the opposite side of said plate and extending from said hub to the periphery of said rim.

9. A rotor plate adapted to be rotatably disposed in an opening in the bottom of a container having an auxiliary chamber below said opening the periphery of said plate being adapted to register with the edge of the opening said rotor comprising a hub and an annular rim, agitator blades projecting from one side of said rotor and extending radially between said hub and said rim, a plurality of louvres disposed on the rim of said rotor on the said one side thereof and extending therethrough, a plurality of impeller vanes projecting from the opposite side of said plate, two oppositely disposed helically inclined cam surfaces on the top surface of hub.

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