

Liquid Mixer

Field of Invention

5 This invention related to viscous material mixer such as are mainly used for mixing two or more liquid and in particular to such mixers design for light or medium duty mixing. The application of liquid mixture is known.

10 Background of the Invention

Conventional such mixer is power by motor or by some combustion engines, which only provide an uniform rotational movement. In another prior art, the bottle container is put in
15 between the two revolving solid bars. The bottle container will turn as the solid bar is turning and the liquid inside the bottle will be mixed. However, there are some drawbacks, as the liquid is not well mixed if the viscosity of the liquid is very high. The liquid will stick on the wall of the bottle
20 and this cause the liquid is not completely or perfectly mixed. Besides, the speed of such rotation has to be limited to low speed in order to keep the bottle turning steadily.

The present invention, however, makes two opposing rotational
25 movements with one motor and a set of gearing system. In addition, this invention allows the system to be tilted at any desired angle easily. The combination of two different direction centrifugal force and gravitational force by tilting the system to certain angle will ensure a well perfect mixture
30 even though the material has extremely high viscosity.

Besides, this invention is portable, user friendly and the maintenance is low for its novel design. There is no

limitation in the number of bottle allowed for the operation of this machine at one time.

Summary of the Invention

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It is the objective of present invention to provide a well mixing system for high viscosity liquid to the application in the industry. This objective is accomplished in accordance with the invention of present new design of producing two
10 different direction centrifugal forces and tilting angle while rotating. The different liquid materials are put into a bottle container before utilizing this novel machine to mix them perfectly.

15 Present invention consists of a *direct current* (DC) motor with a circular solid flange fixed on to the extruded shaft of the motor to create planetary rotation for the container fix at the well design room. This planetary rotational movement generates centrifugal force acting to the liquid mixture in
20 the container. At the same time there is another turning movement, which is spinning of the bottle at its own axis. Such turning motion again generates another force acting at different direction (roll-back) onto the mixture inside the bottle. As the total effect of these two forces, the liquid
25 mixtures in the bottle are pushed to one end of the bottle. Rubbery surface such as o-ring is employed at the outer surface of the main spools, which is fixed to the shaft. Such rubbery surface will have good contact to the outer wall of the bottle and thus force the bottle to turn at its own axis
30 as the motor is operating.

A plurality of smaller rubbery guidance spools is employed around the main spool. These multiple guidance spools have the function of holding the bottle in the container room and also

to cause the bottle to spin at its own axis. Since the whole piece part is assembly as one piece, the whole assembly piece is tilted to any desired angle with an adjustable solid frame. Such tilting mechanism is commonly known. When the machine is
5 operated at certain speed at certain tilting angle, three forces are acting to the liquid mixture inside the bottle. These three forces are acting at different direction. Therefore, this tremendously increase the effectiveness of mixing different liquid especially when the liquid has very
.0 high viscosity. Perfect stirring will be achieved when these three forces acting simultaneously to the liquid mixture.

In another embodiment, a set of gearing system is employed to control the speed of the spinning on own axis of the
5 container. This is significant when some liquid mixture require different force to produce perfect mixing. The different speed is produce by utilizing a set of gearing system, which will be the other embodiment of this invention.

10 **Brief Description of the Drawings**

Figure 1 is a side elevation of the embodiment.

Figure 2 is the top view of the embodiment,

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Figure 3 is the top view of the embodiment where is locking-flange is turned to lock the container.

Figure 4 is the side elevation of the whole assembly with
30 solid frame at certain tilting angle.

Figure 5 is the perspective view of the whole machine.

Figure 6 is the exploded view of the gearing system of the second embodiment.

Detail Description of the Preferred Embodiments

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The preferred embodiment of this invention will be described in detail with reference to the attached drawings. All figures are schematic and not necessarily to scale and illustrate only details essential to the understanding of the invention while
10 other details have been omitted. In all figures the same reference numerals are used to designate identical or corresponding parts.

Reference is first made to Figure 1, which illustrates the
15 side elevation view of the mixing machine. In order to better illustrate the present invention, many components are not shown in the figure and only main critical embodiment is shown and describe in details.

20 The motor (101) is a direct current electric motor with a long drive shaft (102) extruded out from one edge of said motor. The other edge of the motor is connected with some wire (103) for electrical connection purposes as shown in figure 4. The main shaft (102) has the function of supporting the whole
25 assembly and act as the common center axis for the main piece part of this invention. A piece of circular solid base flange (104) is locked onto the extruded shaft (102) in such that the flange (104) will spin when the motor (101) is on. A main spool (105) is employed on top of the base flange (104). The
30 main spool (105) is locked on the shaft (102) same as the base flange (104). Therefore, when the motor is operated, the base flange (104) and the main spool (105) will spin. Rubbery surface such as o-ring (106) is employed at the outer radius of the main spool (105). The function of this o-ring (106) is

to create good grip to the liquid container. Plurality of guidance spools (107) are arranged around the main spool (105). These guidance spools (107) are rolling-free in movement. In other words, these guidance spools are independent from the rotational movement of shaft. There is a rubbery surface (108) at the outer radius of the guidance spool as well to have the same function as the o-ring (106). This rubbery surface at the outer radial of the spools make the job of putting in or taking out of liquid container easy. The guidance spools (107) are located some distant away to provide a room (109) to place the liquid container. Each room (109) is corresponding to one liquid container. The number of container required for machine operation is free upon the needs of the user.

A guide-flange (110) is located on top of the main spool (105) and guidance spools (107). The main spool (105) and guidance spools (107) are sandwiched in between the base flange (104) and the guide-flange (110). The base flange (104), the main spool (105) and the guide-flange (110) are locked on the shaft (102) and will spin together with the shaft when the motor is operated. However, the guidance spools (107) are capable of spinning freely without any connection to the shaft (102). Multiple of through holes (111) on the guide-flange (110), which well align with the room (109), is made to act as the guidance of putting in the liquid container. A locking-flange (112), which is similar to the guide-flange (110), is employed on the following top of the guide-flange (110). A bearing is employed to connect the locking-flange (112) and the shaft (102). This locking-flange (112) can be turned with certain limited angle to lock the container firmly in the room (109). This is shown clearly in Figure 3.

Figure 2 shows the top view of the whole assembly. The container is slotted into the room (109), the main spool (105)

and guidance spools (107) will grip on the container. When the motor (101) is operating at high speed, the container will not thrown out which may be hazardous especially if the material inside the container is chemically reactive or harmful to human. The locking mechanism as shown in Figure 3 is another enhancement of the safety precaution.

With reference to Figure 4 and 5, the whole assembly is tilted to certain angle. This is accomplished with the whole assembly is screwed to a solid frame (113). The solid frame (113) is then screwed to two extruded support (114) from the base (115). This base consists of a control panel (116) that has a switch (117) to control the power on off, a speed controller (118) to control the spinning speed of the machine, and a timer to set the time require to mix different liquid material. There is another value added feature, the buzzer (not shown) that will beep when the time is up.

In another preferred embodiment, a set of gearing system is employed to produce different speed between the planetary movement and the on axis spinning of the container. This is required as different liquid material may require different force to produce perfect mixing and the force required is generated from combination of the planetary and spinning speed as well as the tilting angle.

With reference to Figure 6, a set of gearing system is employed to generate different speed of own-axis rotational movement. The setup is basically the same as the first embodiment. There is an additional gearing system, which comprise of different gears to change the speed of the main spool.

A Gear-A (120) is locked onto the shaft (102) extruded from the motor. Gear-A (120) will spin at the same speed as the shaft (102) when the motor is operating. Three or more units of smaller Gear-B (121) is employed to the gear-A (120) as shown in Figure 6. An internal gear (122) is then inserted to wrap around the gear-B (121). The outer surface of the internal gear (122) is covered with some rubbery surface. This can be multiple o-ring (106) seated partially in a groove at the outer surface of internal gear (122). With such invention, the spinning speed of the internal gear (122) will be different dependent on the number of tooth in the each set of gear. In addition, such orientation will cause the liquid container to have own axis spinning at preferable speed while the planetary rotational movement is depending on the speed of the drive shaft (102). Multiple of guidance spools (107) are located around the gear set at the same plane of the gear set. This guidance spools (107) have the function of preventing the liquid container to drop out while the machine operating. Furthermore, this guidance spools (107) and the internal gear (122) will create good grip and room for the liquid container.

Claims

1. A liquid mixer comprising of:
a motor with extruded driving shaft;
5 a base flange attached to said extruded shaft;
a main spool attached to said extruded shaft;
multiple of guiding spools located around said main spool;
a support for this rotary mixer in which this supporting frame
is design in such that tilting is allowed;
10 a guiding flange with multiple through hole act as the exit
guidance for the liquid container to be slotted into the well
designed bottle container room; and
a locking flange to enhance the griping of the liquid
container in which when the machine is operated, the container
15 will have planetary rotation, own axis spinning and tilting
effect to create stirring process inside the container.
2. The mixer according to claim 1, in which the main spool
comprises of a set of gear system to differentiate the speed
20 of the planetary rotation and the own axis spinning of the
bottle container.
3. The mixer according to any of claim 1 to 2, wherein the
gear set consists of a gear attached to the shaft while at
25 least three secondary gears sandwich in between another outer
gear.
4. The mixer according to any of claim 1 to 3, wherein the
spinning speed of the main spool dependent on the size and
30 tooth of the gear and the orientation of the gear setting.
5. The mixer according to claim 1, wherein the supporting
frame is adjustable in angle and such tilting in angle has no
obstacle to the operation of the machine.

6. The mixer according to claim 1, wherein the motor is an electric motor with speed controller and timer to control the speed and timing of the mixing process.

5 7. The mixer according to any of claim 1 to 6, wherein the surface of the main spool and the guiding spools is rubbery to enhance the gripping of the container.

10 8. The mixer according to claim 7, in which the outer surface of the spools consists of one or multiple o-ring to perform good grip of the container.

15 9. The mixer according to claim 1, wherein the locking flange consists of a bearing to allow some turning to further lock the container from being thrown out when operating in high speed.

20 10. The mixer according to any of claim 1 to 9, in which the number of container allowed for operation at one time is unlimited, where the machine capable of operating with single container or plurality of container.