J. C. ALEXANDER.

EMULSIFIER.

APPLICATION FILED MAY 19, 1910.

994,554.

Patented June 6, 1911.

3 SHEETS—SHEET 1.

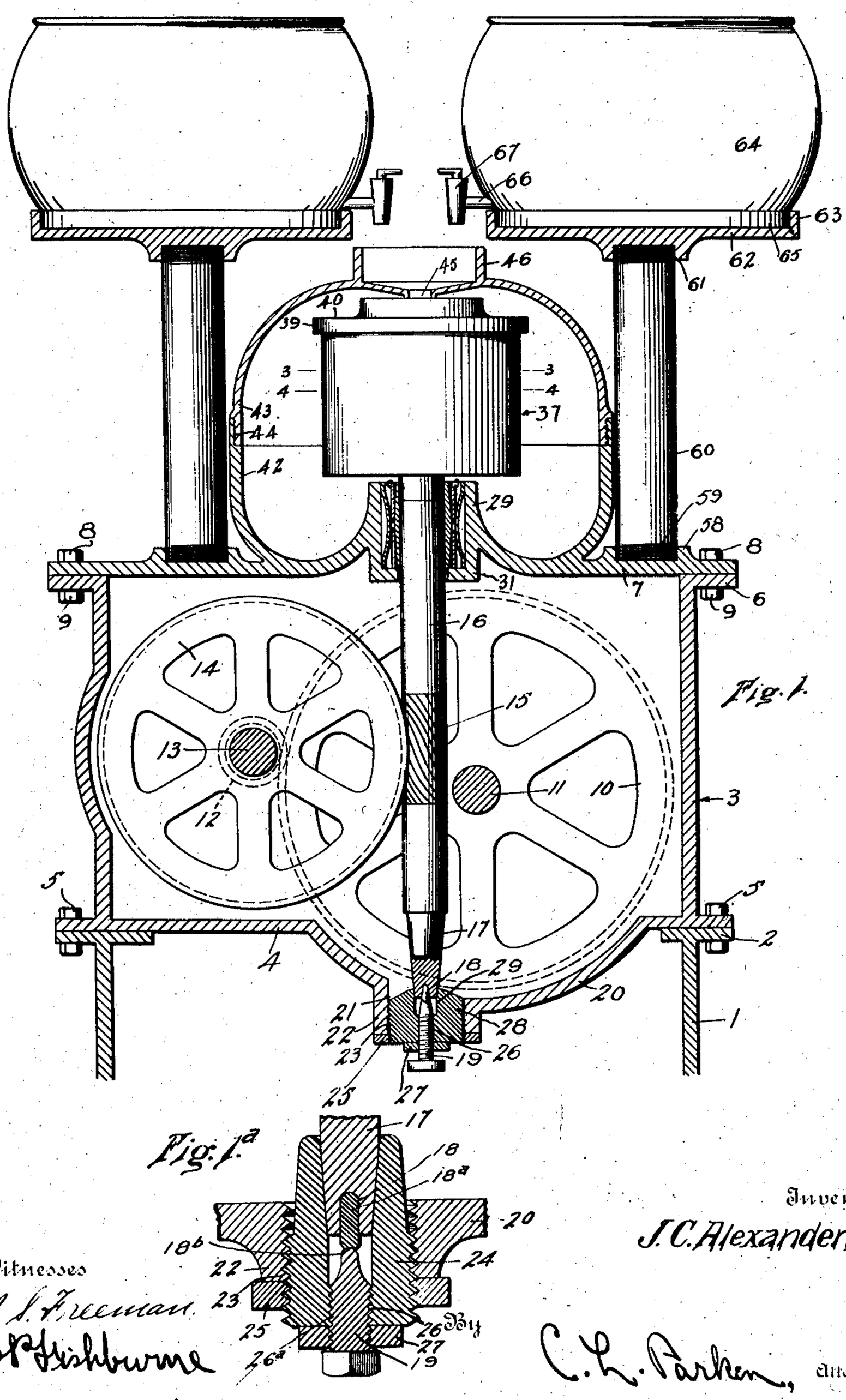

Fig. 1.

Fig. 1a

Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

Witnesses

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3 SHEETS—SHEET 3.

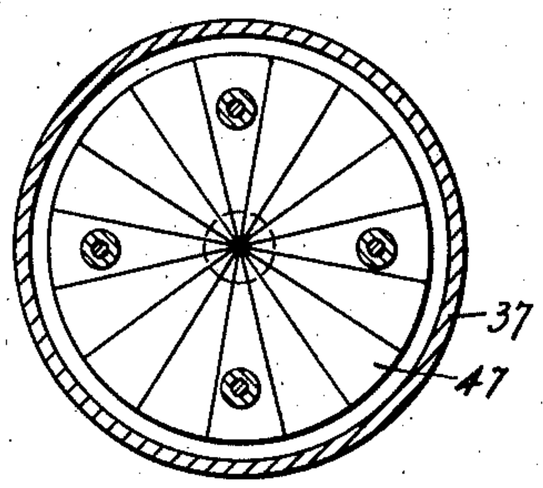

Fig. 3.

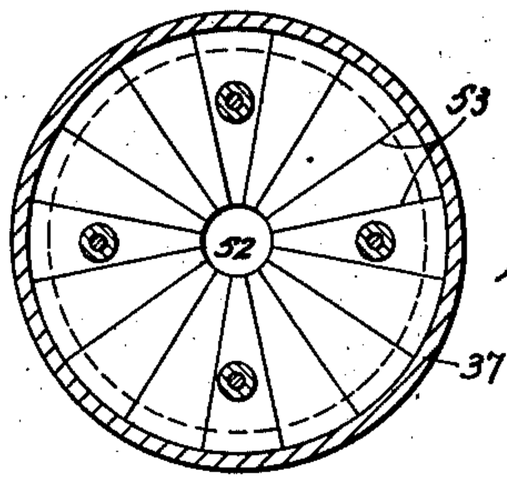

Fig. 4.

Fig. 7.

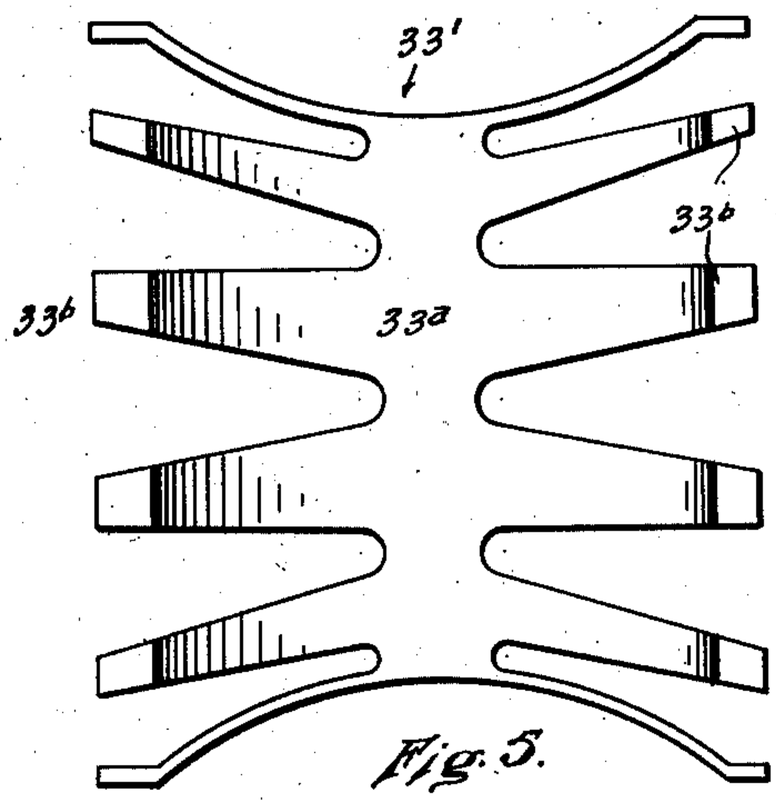

Fig. 5.

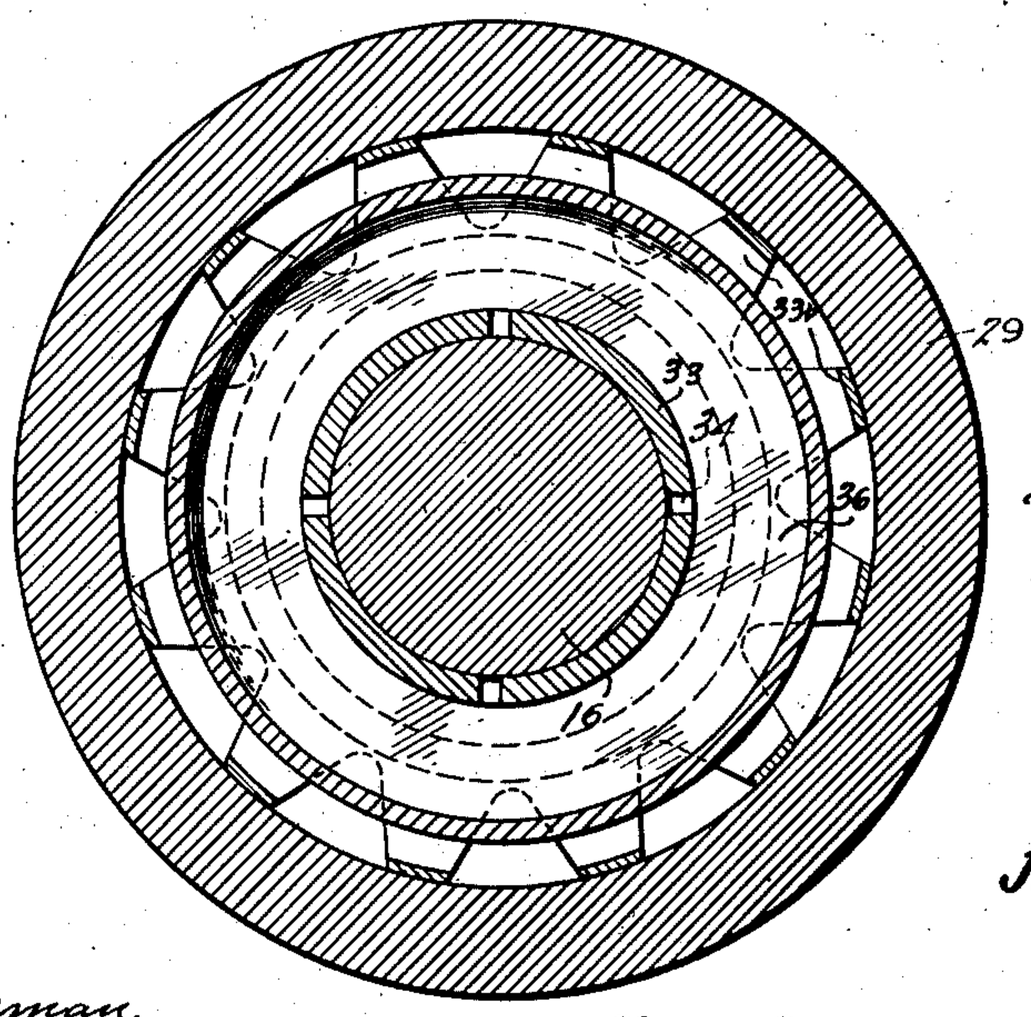

Fig. 6.

Witnesses

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UNITED STATES PATENT OFFICE.

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EMULSIFIER.

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Application filed May 19, 1910. Serial No. 562,164.

To all whom it may concern:

Be it known that I, JAMES C. ALEXANDER, a citizen of the United States, residing at Roseburg, in the county of Douglas and State of Oregon, have invented certain new and useful Improvements in Emulsifiers, of which the following is a specification.

My invention relates to a centrifugal machine for intermittently mixing fluids.

An important object of this invention is to provide a device of the above character, which will intermittently mix fluids in an expeditious and continuous manner.

A further object of this invention is to provide a novel form of bearing for the spindle of the mixing bowl, which will permit of the proper running of the spindle and be adjustable for the purpose of taking up wear.

Other objects and advantages of my invention will be apparent hereinafter.

My invention consists generally in the arrangement and combination of parts to be hereinafter described.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same, Figure 1 is a central vertical section through the device, parts being shown in side elevation. Fig. 1ª is an enlarged view of the bearing for the lower end of the spindle 16, as shown in Fig. 1. Fig. 2 is an enlarged central vertical section through the mixing bowl and associated members. Fig. 3 is a horizontal sectional view taken on line 3—3 of Fig. 1. Fig. 4 is a similar view taken on line 4—4 of Fig. 1. Fig. 5 is a side view of a spring member to be hereinafter referred to. Fig. 6 is a horizontal sectional view taken on line 6—6 of Fig. 3. Fig. 7 is a fragmentary vertical section taken through one of the mixing plates, showing the corrugations formed upon the same.

In the drawings illustrating a preferred embodiment of my invention, the numeral 1 designates a suitable base or support, which is provided at its upper end with a horizontally arranged flange 2. Upon this flange 2 is arranged a casing 3, which has its lower end closed by means of a bottom 4, which as illustrated, is preferably formed integral with the same. This bottom is secured to the flange 2 by means of bolts 5 as shown. The upper end of the casing 3 is formed open and is provided with an outwardly extending flange 6, which is adapted to receive thereon a cover 7. This cover is detachably and rigidly secured to the flange 6 by means of bolts 8, which carry upon their screw-threaded ends nuts 9 as shown.

Within the casing 3 is arranged a driving pinion 10, which is rigidly mounted upon a horizontally disposed shaft 11 suitably journaled through the walls of the casing 3. This shaft extends through and beyond one of the walls and may be rotated at a desired speed by any suitable means. The pinion 10 meshes with a smaller pinion 12, which is rigidly mounted upon a suitably journaled horizontally disposed shaft 13, which is arranged within the casing 3 as shown. The shaft 13 has rigidly mounted thereon a relatively large worm-gear 14, which meshes with a worm 15 formed upon a vertically arranged spindle 16 as shown. This spindle 16 is mounted approximately centrally within the casing 3 and has its lower end reduced to form a frusto-conical portion 17. This frusto-conical portion is provided as shown with a cylindrical opening 18, adapted to receive a friction member 18ª, which has its lower end concaved as shown at 18ᵇ, to receive the upper reduced end of an adjustable bearing screw 19. The bottom 4 of the casing 3 is shown as formed with a curved portion 20 to allow sufficient space for the pinion 10. This curved portion is provided with a circular opening 21, which is shown as being surrounded by a cylindrical flange 22. This cylindrical flange is internally screw threaded as at 23 for the reception of an external screw threaded annular bearing 24, which is provided as shown with a clamping ring 25. The annular bearing 24 is provided centrally thereof with an axial opening 26, within which are formed screw threads 26ª for engagement with the screw threaded portion of screw 19. The screw 19 is accordingly vertically adjustable in order that the spindle may be raised or lowered when necessary, to compensate for the wear between friction member 18ª and screw 19. The screw 19 is provided upon its screw threaded portion as shown with a clamping ring 27, which engages the annular bearing 24 and locks the screw 19 in a desired position. The upper portion of the axial opening 26 of the annular bearing 24, is formed frusto-conical as shown, for the reception of the frusto-conical portion 17 of the spindle 16. By the

contruction above described it will be obvious that the spindle is securely supported yet free to rotate with a minimum of friction.

The cover 7 has formed substantially centrally thereof an upstanding cylindrical housing 29. The upper end of the cylindrical housing 29 is formed open, while the lower end of the same is closed by a head 31, which is provided at its center with a circular opening 32. The spindle 16 extends through the opening 32 and the housing 29 as shown, and is journaled within said housing in a manner to be described. The spindle 16 is journaled through a sleeve or bearing 33, which is preferably formed of bronze or any other suitable material. This sleeve is disposed within the housing 29 and is shown as tapering from its center toward its ends. Each end of the sleeve 33 is shown as being provided with longitudinal slots 34, which are preferably four in number, and allow the ends of said sleeve to be brought into proper engagement with the spindle 16, when such adjustment is necessary, which is caused by the wearing away of parts by friction. The sleeve 33 is screw threaded as shown at 35, for engagement with clamping rings 36, which when screwed up upon the sleeve 33 will cause its ends to suitably engage the spindle 16 as above described. Attention is called to the fact that there is an annular space 36^a between the clamping rings 36 and the housing 29, which will permit of said rings being moved laterally, as will be hereinafter apparent.

Within the housing 29 is arranged a spring member designated as a whole by the numeral 33′, which comprises a cylindrical body portion 33^a, upon which are formed outwardly bent spaced strips 33^b. The strips 33^b forming pairs of the same extend in opposite directions to engage the inner surface of housing 29 near its lower end and center, as clearly illustrated in Fig. 2. The cylindrical body portion 33^a of the spring member 33′ engages the clamping rings 36 as shown, and thereby tends to hold the bearing sleeve 33 in its proper concentric position with relation to the housing 29, yet said spring member 33′ will be sufficiently resilient to permit of slight lateral movements of the spindle 16 when first started, until the spindle attains its full or proper speed, when it will automatically retain its vertical position as a top does.

The spindle 16 has its upper end reduced as shown at 36^b, which reduced portion is preferably formed cylindrical and provided at its upper end with a semi-cylindrical cut out portion 36^c. A cylindrical mixing bowl 37 is arranged above and concentric with relation to the spindle 16. This mixing bowl is provided with a bottom 37^a, which has a downwardly extending tubular portion 37^b formed centrally thereon, which is adapted to be removably arranged upon the reduced portion 36^b. The bottom 37^a of the mixing bowl 37 is provided centrally thereof with a screw threaded opening 37^d, within which is arranged a screw 38^a, which in turn is provided with a semi-cylindrical extension 38^b. This extension 38^b is adapted to fit within the cut out portion 36^c and prevent the rotation of the mixing bowl 37 upon the spindle 16. The upper end of the bowl 37 is formed open and externally screw threaded as at 38, for engagement with a downwardly extending flange 39 of a suitable cover 40. It is to be understood that the cover 40 may be secured upon the bowl 37 in any desired manner. This cover is shown as being provided centrally thereof with an opening 41 for a purpose to be hereinafter described.

The cover 7 has formed upon its upper surface a cylindrical collecting receptacle 42, which is concentric with relation to the bowl 37. This collecting receptacle is provided as shown with a suitable cover 43. This cover 43 is provided centrally thereof with a supply pipe 45, which extends through the opening 41 to within the mixing bowl 37. The cover 43 is further provided with a circular upstanding flange 46, which is concentric with relation to the pipe 45 and forms together with a portion of cover 43, a funnel for supplying material to within the mixing bowl 37.

Within the mixing bowl 37 are arranged a plurality of horizontally disposed superposed plates 47 and 48, which are retained in spaced relation with each other as shown, by means of projections 49, which are preferably formed at diametrically opposite points upon the lower surfaces of the plates 47 and 48 as shown. These projections 49 are disposed in vertical rows as shown, and are provided with registering openings 50, for the reception of pins 51. These pins have their lower ends provided with heads 51^a, which are arranged within the openings 50 upon the lowermost plate 47, as shown. These heads 51^a are provided with projections 51^b, which are adapted to be removably arranged within openings 51^c formed within the upper surface of said lowermost bottom 37^a. The pins 51 extend as shown through the uppermost plate 47 and are screw threaded as shown at 52^a, for engagement with nuts 52^b. The uppermost plate 47 is provided at its center with a bracket 52^c, which is provided with an aperture 52^d.

By the construction above described it is obvious that the plates 47 and 48 are normally locked together by means of the pins 51, and that these plates may be separated from each other for the purpose of cleansing the same. It is to be understood that the plates 47 and 48 when locked together may be readily removed from within the bowl

37, by the operator inserting a hook or the like into the aperture 52[a] and accordingly elevating said plates. The plates 47 and 48 are alternately arranged and the plates 48 are provided centrally thereof with openings 52. The plates 47 and 48 may preferably have their surfaces corrugated or provided with radially arranged ribs 53. See Fig. 7. The plates 47 have a circumference somewhat smaller than the internal surface of the bowl 37, whereby an annular space 54 is provided, which permits of fluids passing from the upper plate 47 to the lower plate 48. The plates 48 have a circumference approximately equal to the internal surface of the bowl 37 as shown, whereby the periphery of said plates 48 fits snugly within the bowl 37.

The fluids when fed to the plates 48 travel inwardly and pass through the openings 52 to the plates 47. The mixing bowl is provided at its bottom and preferably at diametrically opposite points with discharge openings 55, which are adapted to deliver the contents of the bowl 37 into the collecting receptacle 42. This collecting receptacle is provided at one side with a discharge pipe 56, which is to have communication with a suitable receptacle for collecting the liquids discharged from the machine.

The cover 7 is provided upon opposite sides of the collecting receptacle 42, with upstanding annular flanges 58, which are internally screw-threaded for the reception of the screw-threaded ends 59 of tubular supports 60. The tubular supports 60 have their upper ends externally screw-threaded as shown at 61 for engagement with trays 62 as shown. These trays are horizontally arranged and provided with peripheral upstanding flanges 63. Upon the trays 62 are arranged suitable receptacles or bowls 64, which are provided with reduced bases 65 adapted to fit snugly within the flanges 63 of the trays. Each of the bowls 64 is provided near its base 65 with a discharge pipe 66, which carries upon its free end a stop-cock 67, for controlling the same. This stop-cock 67 is disposed to deliver material within the flange 46 as shown.

As clearly shown in Fig. 2, the collar 33 is provided upon its inner surface and at its center with a groove 68, within which is arranged a section of felt or suitable fibrous material designated by the numeral 69. A pipe 70 passes through a suitable opening 71 in the housing 29 and delivers oil upon the upper clamping ring 36. This oil travels inwardly toward the spindle 16 and a portion of the same passes between collar 33 and said spindle and finally to the section of felt 69. This section of felt absorbs the oil or lubricant and constantly supplies the same to the spindle 16. The oil is fed to the pipe 70 from an oil cup 71[a], which as shown is suitably connected to the upper end of said pipe 70. An annular cover 73 is suitably connected as at 74 to the wall of the collecting receptacle 42, and closes the upper end of the housing 29, to prevent any of the lubricants from passing into the collecting chamber 42 from said housing 29.

In the operation of the machine the liquids to be mixed are placed in the separate bowls 64, and the proper amount of each liquid permitted to flow through the stop-cock 67 and to the funnel formed by the flange 46. These liquids are first fed into the funnel formed by the flange 46 and then together pass through the pipe 45 and upon the uppermost plate 47 within the mixing bowl. The mixing bowl is now being rotated at a high speed and this causes the liquids to travel toward the periphery of the plate 47, until they reach the opening 54 when the same will fall upon the plate 48. It is thus seen that the liquids are made to travel in a horizontal plane upon the plate 47 and at the same time being subjected to the action of the corrugations formed upon this plate, which will tend to thoroughly mix the same. As more of the liquids are fed upon the plate 48, the liquids previously fed upon the same will be forced inwardly toward the opening 52, until they reach said opening, when the liquids will be deposited centrally upon the next lower plate 47. The mixture of the liquids then travels upon this plate 47 in a similar manner as before described, and the operation is continued alternately from the plate 47 to the plate 48, until the mixture reaches the bottom of the mixing bowl, when it will be discharged through the openings 55 into the collecting receptacle 42. The liquids after having been thus passed through the mixing bowl are thoroughly mixed. The liquids then pass from the collecting receptacle 42 by way of pipe 56 to any suitable form of collecting receptacle.

Having fully described my invention, I claim:

1. In an emulsifier of the character described, a mixing bowl provided near its lower end with discharge means, means to feed material within the upper portion of said mixing bowl, a plurality of spaced superposed plates arranged within said bowl, said plates being so constructed that material is made to travel in opposite direction upon alternate plates, during the downward movement of such material toward said discharge means, and means to rotate said bowl.

2. In an emulsifier of the character described, a mixing bowl provided with discharge means near its lower end, a plurality of spaced superposed plates arranged therein, one of the plates being constructed to permit of the passage of material down-

wardly near its periphery, another of the plates being so constructed that material is permitted to pass downwardly near the center of the same, whereby such material is made to travel in one direction upon one plate and in a reverse direction upon the other plate, during the travel of such material toward the discharge means, means to feed material to the upper plate, and means to rotate said bowl.

3. In an emulsifier of the character described, a mixing bowl provided with discharge means near the lower end thereof, a plurality of spaced superposed plates disposed within said bowl above the discharge means, alternate plates having greater diameters so that the same engage the wall of said bowl, the plates with the greater diameters being provided substantially centrally thereof with openings formed therethrough, whereby material is made to travel in opposite directions upon alternate plates, means to lock said plates together and detachably connect the same with said bowl, means to rotate said bowl, and means to collect the discharge from said bowl.

4. In an emulsifier of the character described, a mixing bowl provided with discharge means near its lower end, a plurality of superposed spaced approximately horizontal plates arranged within said mixing bowl above the discharge means, alternate plates having greater diameters so that the same engage the wall of said bowl, the plates with the greater diameters being provided substantially centrally thereof with openings formed therethrough, whereby material is made to travel in opposite direction upon alternate plates, means to lock said plates together and detachably secure the same to said bowl for rotation therewith, means to feed material upon the uppermost plate, means to rotate said bowl, and a collecting receptacle surrounding said bowl for receiving the discharge form the same.

5. In an emulsifier of the character described, a mixing bowl, a spindle connected therewith, a collecting receptacle surrounding said mixing bowl, said mixing bowl being provided with discharge means near the lower end thereof, a plurality of spaced superposed plates arranged within said bowl, alternate plates having greater diameters so that the same engage the wall of said bowl, the plates with the greater diameters being provided substantially centrally thereof with openings formed therethrough, whereby material is made to travel in opposite directions upon alternate plates, means to detachably lock said plates together and detachably secure the same to said bowl, and means to rotate said spindle.

6. In an emulsifier of the character described, a collecting receptacle, a spindle to coöperate therewith, a mixing bowl removably mounted upon said spindle and removably mounted within said collecting receptacle, said mixing bowl being provided near its lower end with discharge means, a plurality of superposed spaced plates arranged within said bowl above said discharge means, alternate plates having greater diameters so that the same engage the wall of said bowl, the plates with the greater diameters being provided substantially centrally thereof with openings formed therethrough, whereby material is made to travel in opposite directions upon alternate plates, a plurality of bolts to detachably lock said plates together, said bolts being provided with means whereby the same may have detachable connection with said bowl, means to rotate said spindle, and said collecting receptacle extending above said bowl for forming means to hold material to be fed to the upper portion of said bowl.

7. In an emulsifier of the character described, a collecting receptacle, a spindle to coöperate therewith, a mixing bowl disposed within said collecting receptacle and removably mounted upon said spindle, said mixing bowl being provided near its lower end with discharge means, a plurality of superposed spaced plates arranged within said mixing bowl above said discharge means, alternate plates having greater diameters so that the same engage the wall of said bowl, the plates with the greater diameters being provided substantially centrally thereof with openings formed therethrough, whereby material is made to travel in opposite directions upon alternate plates, means to retain said plates in such spaced relation, a plurality of bolts to lock said plates together, the lower end of said bowl being provided with recesses, said bolts being provided with extensions adapted to fit within said recesses, means to rotate said spindle, and means to feed material to the upper end of said bowl.

8. In an emulsifier of the character described, a spindle, a bowl connected with said spindle and provided near its lower end with discharge means, a plurality of superposed spaced plates arranged within said bowl, alternate plates having different diameters and provided with openings formed therethrough, means to feed material into said bowl upon the uppermost plate to cause the same to travel in opposite directions upon alternate plates, and gravitate toward said discharge means, and means to rotate said spindle.

9. In an emulsifier of the character described, a spindle, a bowl connected with said spindle and provided near its lower end with discharge means, a plurality of superposed spaced corrugated plates arranged within said bowl, alternate corrugated plates having different diameters and

provided with openings formed therethrough, means to feed material into said bowl upon the uppermost plate to cause the same to travel in opposite directions upon alternate corrugated plates and gravitate toward said discharge means, and means to rotate said spindle.

10. In an emulsifier of the character described, a mixing bowl provided with discharge means near the lower end thereof, a plurality of plates arranged within said mixing bowl, said plates being of such a character that material is made to travel in opposite directions on alternate plates, during the downward movement of such material toward the discharge means, and means to rotate said mixing bowl.

11. In an emulsifier of the character described, a mixing bowl provided near its lower end with discharge means, a plurality of plates arranged within said mixing bowl, alternate plates having greater diameters so that the same engage the wall of said bowl, the plates with the greater diameters being provided near their centers with means to permit the passage of material through the same, whereby such material is made to travel in opposite directions upon alternate plates and downwardly toward the discharge means, means to feed material to the upper portion of said bowl for engagement with said plates, and means to effect the rotation of said bowl.

12. In an emulsifier of the character described, a mixing bowl provided near the lower end thereof with discharge means, superposed spaced plates arranged within said bowl above said discharge means, one of the plates having a sufficiently small diameter so that a space is provided between the periphery of said plate and the side of said bowl, the other plate being of greater diameter so that the same engages the side of said bowl to prevent the passage of material therebetween, the plate with the greater diameter being provided near its center with an opening formed therethrough, and means to effect the rotation of said bowl.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES CHRISTIAN ALEXANDER.

Witnesses:
L. A. SANCTUARY,
A. T. BESTUL.