

Aug. 31, 1937.

R. M. STRONG ET AL

2,091,532

MIXING DEVICE

Filed March 29, 1935

3 Sheets-Sheet 1

FIG. 1.

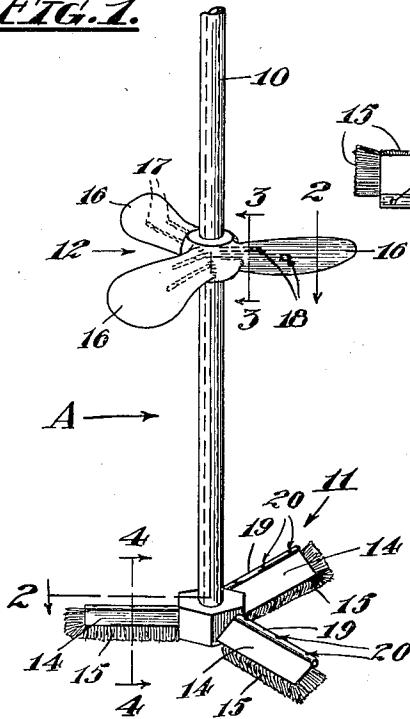


FIG. 2.

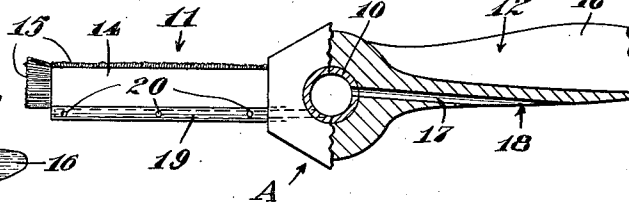


FIG. 3.

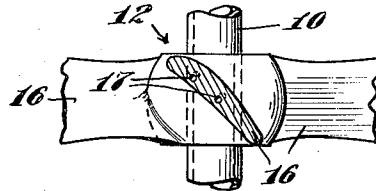


FIG. 4.

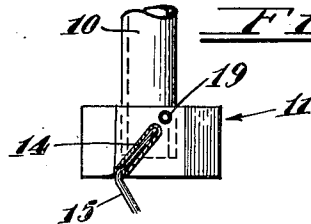


FIG. 5.

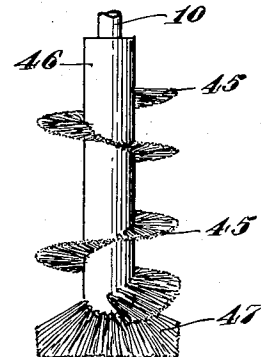
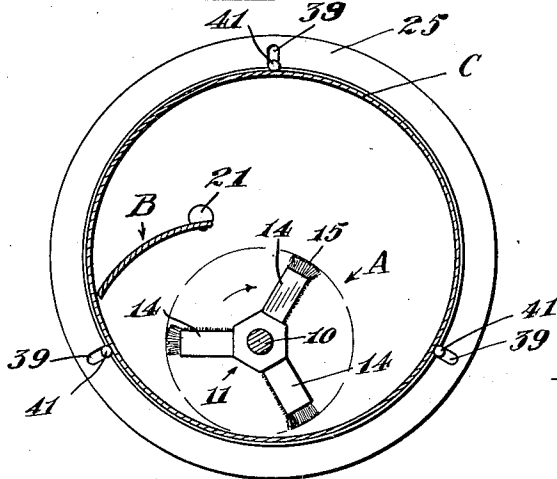


FIG. 6.



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3 Sheets-Sheet 2

FIG. 7.

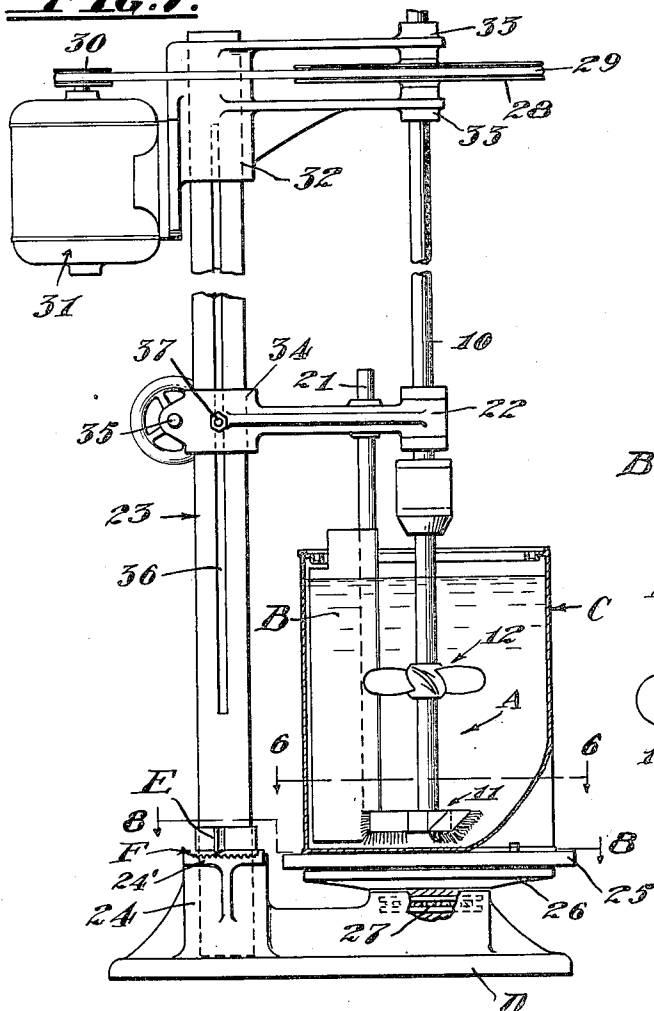


FIG. 9.

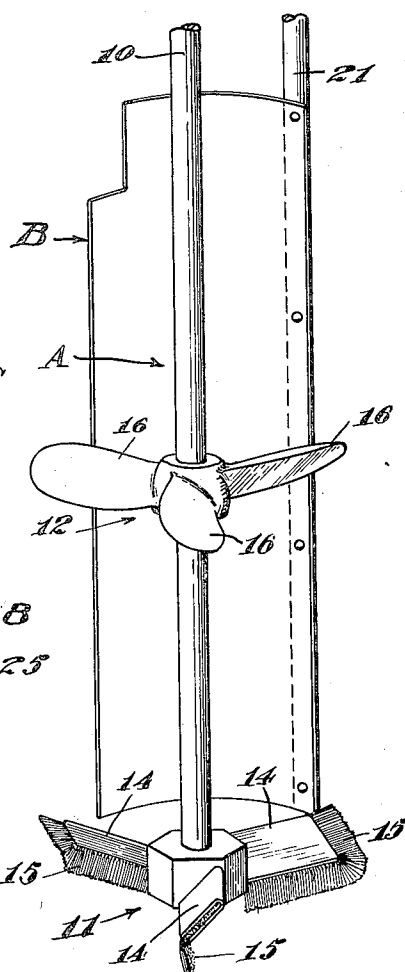
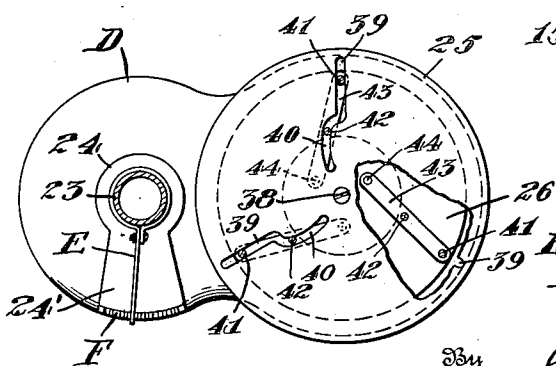


FIG. 8.



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3 Sheets-Sheet 3

Fig. 10.

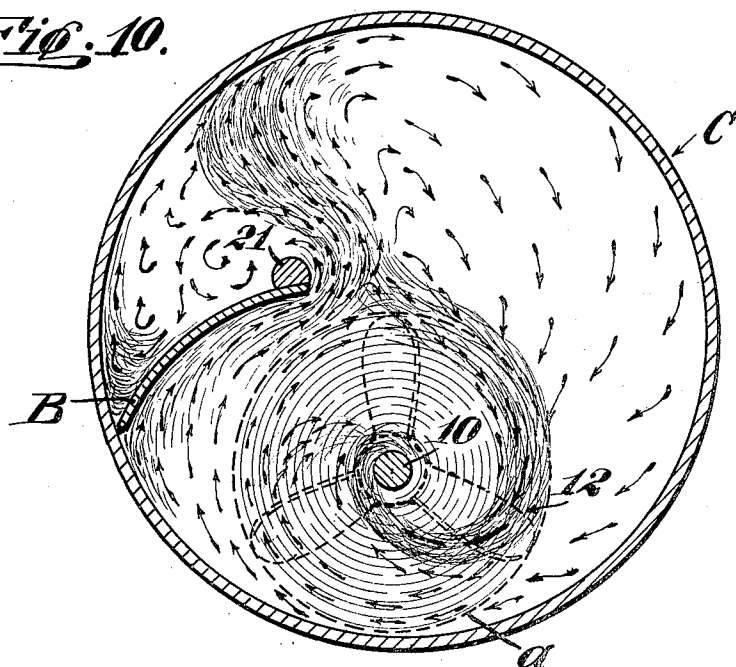
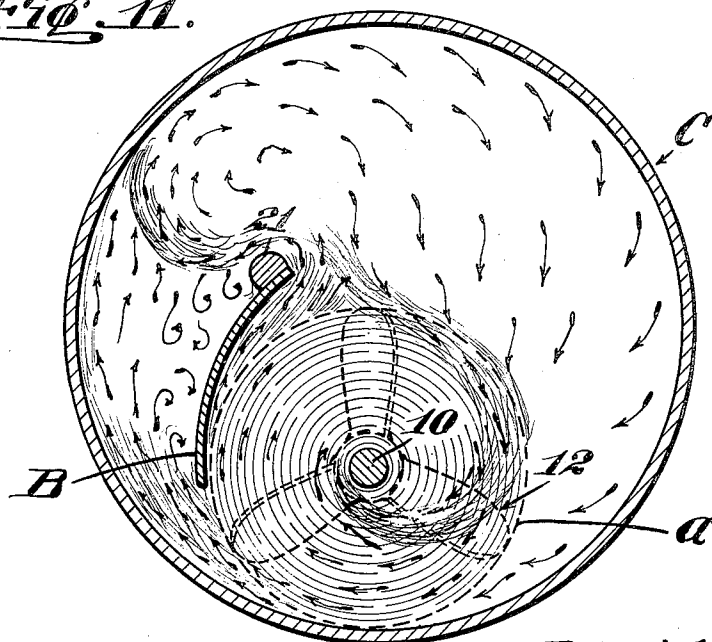


Fig. 11.



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UNITED STATES PATENT OFFICE

2,091,532

MIXING DEVICE

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Application March 29, 1935, Serial No. 13,650

10 Claims. (Cl. 259—85)

This invention relates to a mixing machine and more particularly pertains to a mixer for effecting the agitation and intermixture of fluids and more especially of liquids and pastes containing 5 comminuted solids, such as paints and the like.

An object of the invention is to provide a mixer of the above character adapted to effect rapid agitation within the body of a liquid being mixed without mass rotation and which during 10 operation will produce a rapid flow of interweaving and counter currents and the formation of a multiple of vortices in the materials being mixed so as to effect speedy and thorough agitation and intermixture of the materials 15 without splash and with minimum surface upheavals, whereby the mixer is rendered especially applicable for use in mixing the contents of substantially filled open topped containers without causing splash or overflow of liquid from the 20 container.

Another object is to provide a mixing machine which is adapted to prevent the settling of solids on the bottom of the container and to break up and dislodge accumulated comminuted solids in 25 the lower portion of the container, and also disintegrate masses of pastes contained in the liquid in a highly efficacious and speedy manner.

Another object is to provide a mixing device which is adapted to be positioned within con- 30 tainers, such as paint buckets and tanks and when operated therein effects rotation of the container, or assists in such rotation in a fashion to insure the entire content of the container being presented to and disturbed and acted on by a 35 revolting agitator thus insuring thorough admixture of the entire content of the container.

Another object is to provide a mixer including a revoluble agitator and a baffle arranged to intercept and deflect currents created by the agi- 40 tator, and to co-operate with the agitator in creating interweaving currents and folds in a fashion to effect rapid and thorough intermixture of materials being worked.

Another object is to provide an arrangement 45 whereby the baffle will serve as an adjustable governor to regulate the speed of rotation of the container carrying the materials being mixed.

Another object is to provide a mixer which is so formed as to permit the introduction of fluids 50 into a mass being worked where it is desirable to subject the mass to the action of gases or other fluid.

With the foregoing objects in view together with such other objects and advantages as may 55 subsequently appear the invention is carried into

effect by the employment of the constructions, arrangements and instrumentalities hereinafter set forth in the specification and claims and illustrated by way of example in the accompanying 5 drawings, it being understood, however, that the invention is subject to modification and accordingly various changes may be made in the features herein set forth coming within the meaning and scope of the appended claims.

In the drawings:

Fig. 1 is a perspective view of the agitating 10 element;

Fig. 2 is a detail in horizontal section and plan view taken on the line 2—2 of Fig. 1;

Fig. 3 is a view in section and elevation taken 15 on the line 3—3 of Fig. 1 as seen in the direction indicated by the arrows;

Fig. 4 is a view in section and elevation taken on the line 4—4 of Fig. 1 as seen in the direction 20 indicated by the arrows;

Fig. 5 is a view in elevation illustrating a modified form of the agitating element;

Fig. 6 is a plan view and horizontal section taken on the line 6—6 of Fig. 7;

Fig. 7 is a view in elevation with parts broken 25 away showing the invention as applied;

Fig. 8 is a horizontal section and plan view as seen on the line 8—8 of Fig. 7 with portions broken away;

Fig. 9 is a perspective view of the agitating 30 element and its associated baffle as removed from the container;

Fig. 10 is a diagrammatic horizontal section and plan view depicting the combined action of 35 the agitator and baffle in effecting interweaving of currents and folds in a fluid being worked and showing the baffle as positioned to effect maximum retardation of rotation of the fluid container;

Fig. 11 is a diagram similar to that of Fig. 10 40 showing the baffle as disposed to permit accelerated rotation of the container.

Referring to the drawings more specifically A indicates generally an agitating element which as here shown embodies a stem 10 on which is 45 mounted a plurality of propeller mixing units 11 and 12 here shown as two in number with the unit 11 mounted at one end of the stem and the unit 12 disposed on the stem in suitable 50 spaced relation to the unit 11. The unit 11 embodies a plurality of radially extending laterally inclined blades 14 disposed with their inclination in corresponding directions and so arranged that when rotated horizontally in a liquid in one 55

direction they will act to impel the liquid engaged thereby in an upward direction.

The blades 14 are preferably rectangular in outline and are provided with a series of prongs 15 which are preferably flexible and are adapted to effect a scouring, brushing, and agitating action and whereby in operation they will serve to dislodge and disintegrate settled comminuted solids and also break up bodies of paste in the mass being worked.

The prongs 15 may be carried and arranged on the blades 14 in any suitable fashion but in order to act on the bottom and side walls of a cylindrical container are mounted to project from the lower and end edges of the blades, and at the lower outer corners of the blades have their outer ends arranged to form a right angled margin. The prongs 15 are preferably formed of metal and constitute teeth or bristles which may vary in character according to the nature of the materials to be worked.

The unit 12 embodies a plurality of radially extending curved propeller blades 16 which are laterally inclined in corresponding directions and disposed with their lateral inclinations extending in a direction opposite the inclination of the blades 14 of the unit 11, and whereby on rotating of units 11 and 12 with the unit 11 moving in a direction to effect an upward flow of liquid the unit 12 will effect a downward or counter flow of the liquid.

Where it is desirable to distribute fluids into a liquid the stem 10 is tubular and the blades 18 are formed with longitudinally extending passages 17 communicating with the interior of the stem and terminating in outlet openings 19 intermediate the ends of the blades, and associated with each of the blades 14 is a tube 19 extending along the upper edge of the blade and communicating with the interior of the stem 10 and which tube is formed with a series of outlet openings 20 at suitable intervals along the length thereof. By this arrangement fluids may be forced under pressure into a volume of liquid in which the propeller units are submerged.

Associated with the agitator element A is a baffle B, here shown as in the form of a plate of arcuate cross section carried on a shaft 21 extending parallel with the stem 10 and disposed a short distance outwardly from the circular path of travel of the ends of the blades of the propeller mixing units 11 and 12. While the baffle may be of various dimensions it is preferably of a length to extend from adjacent the bottom of the container to a point above the rim thereof, and is preferably of a transverse width approximating the diameter of the path of travel of the ends of the blades of the propeller units although manifestly this width may be increased or diminished within limits, and may be varied relatively to the diameter of the agitator element and to the diameter of the container as occasion may require. In any instance the width of the baffle should be less than the diameter of the interior of the container. The baffle is designed to extend transversely in spaced relation to the path of travel of the ends of the blades to one side of the agitator element and presented to the advancing or leading edges of the blades in such fashion that in operation it will serve to deflect the flow of liquid directed thereagainst tangentially or diagonally to the angle of incidence of the liquid impacting thereon under the urge of the propeller units. The baffle is adjustable to vary its position relative to the agitator element; such

adjustment being effected by turning the shaft 21 in its mounting on a supporting bracket 22.

As here shown the stem 10 of the agitator A and shaft 21 of the baffle B are supported on the bracket 22 to depend therefrom whereby the agitator and baffle are adapted to be inserted downwardly through the open upper end of a container C and arranged with the stem 10, shaft 21 and baffle B on the latter disposed vertically and with the propeller blades 11 and 12 extended horizontally within the contents of the container. The container C may be of any suitable construction but is preferably cylindrical in shape and of a diameter exceeding the diameter of the circular path of travel of the ends of the propeller blades plus the distance between such path of travel and the baffle B, whereby the agitator A and baffle B may be disposed in the container, as shown in Figs. 6, 7, 10 and 11, with the center or axis of the container off-set relative to the axis of the agitator stem 10 and with the path of travel of the outer ends of the propeller blades disposed close to the inner periphery of the container as indicated by the broken line *a* in Figs. 10 and 11. On thus positioning the agitator and baffle in the container the teeth or bristles 15 will brush the inner surface of the cylindrical side walls of the container as indicated in Fig. 6, while the outer vertical margin or leading edge of the baffle B may be disposed to either slidably contact the inner periphery of the container as shown in Fig. 10 or be positioned in spaced relation thereto as shown in Fig. 11.

The bracket 22 and container C may be supported in any desired manner, and likewise the stem 10 may be rotated in any suitable fashion, but as here shown the bracket 22 is carried on a standard 23 erected on a base D and the container C is supported on a table 25 carried on a revoluble disk 26 supported on ball bearings 27 carried by the base D.

The upper end of the stem 10 is fitted with a grooved pulley 28 engaged by a belt 29 leading from the drive wheel 30 of an electric motor 31 supported on a sleeve 32 carried on the upper end of the standard 23. Brackets 33 extend from the sleeve 32 in which the upper end portion of the stem 10 is journaled and longitudinally slidable.

The bracket 22 is adjustable longitudinally of the standard 23 to permit rising and lowering of the agitating element and baffle and for which purpose the bracket 22 is carried on a split sleeve 34 encircling the standard 23 and fitted with a clamp screw 35 whereby the sleeve may be caused to grip the standard 23 at any desired position thereon. As a means for holding the sleeve 34 against turning on the standard 23 the latter is formed with a longitudinally extending groove 36 into which a set screw 37 on the sleeve 34 extends. The standard 23 is turnable axially on the base D to swing the agitator element A and baffle B to various positions relative to the axis of the table 25; the lower end of the standard being pivoted in an upstanding collar 24 on the base. As a means for holding the standard against free turning in the collar 24 and yet permit slight yieldably opposed turning thereof, a plate spring E is fixed on the standard and projects radially therefrom with its outer end portion engaged in one of a series of notches in a rack F formed on the upper face of a bracket 24' projecting horizontally from the upper margin of the collar 24.

Means are provided for clamping containers C of various sizes on the table 25 and automatically

centering the container in axial alignment with the axis of rotation of the disk 26. For this purpose the table 25 is pivotally connected to the disk 26 by a pivot pin 38 projecting axially of the disk 26 and formed on the table 25 is a series of three slots 39 the outer end portions of which extend radially relative to the axis of the pivot pin 38. The slots 39 are spaced equi-distant apart and each of the slots engages a pair of spaced pins 41 and 42 carried by links 43 disposed between the table 25 and disk 26; the inner ends of the links being pivoted at 44 to the disk 26 adjacent to the axis thereof and extending diagonally of the radii of the disk.

The several pins 41 and 42 are spaced equi-distant apart and are arranged with the pins 41 disposed in the radial outer end portions of the slots 39, while the pin 42 will be disposed in the inner end portions 40 thereof, which inner end portions 40 are curved to provide clearance to allow for transverse movement of the pins 42. The pins 42 project slightly above the upper surface of the table 25 while the pins 41 project a short distance above the upper faces of the pins 42, each set of pins 41 or 42 being adapted to engage the lowering marginal portions of containers C of various diameters.

In the application and operation of the invention, a container C is positioned on the table 25 with the lower margin thereof within the space bound by either the pins 41 or 42 whereupon the table 25 is turned to cause the pins 41 and 42 to advance inwardly in the slots 39 to bring the pins adjacent to and spaced outwardly from the lower margin of the container into engagement therewith. The three pins moving inwardly in corresponding lengths of paths of travel act to centralize the container on the table.

The bracket 22 is then lowered from an elevated position on the standard 23 to dispose the agitator element and baffle B interiorly of the container as shown in Figs. 6 and 7 and with the axis of the agitator element off-set from the center of the container as before described.

The materials to be mixed may be placed in the container C either before or after positioning of the agitating element and baffle B in the container. The stem 10 is then rotated thereby causing the propeller units 11 and 12 to act on the liquid content of the container as before stated; the propeller unit 11 causing an upward flow of liquid from the lower portion of the container while the propeller unit 12 effects a downward counter flow of the liquid thereby bringing the upper and lower portions of the mass forcibly together in opposing vortices.

The propeller unit 12 is adjustable longitudinally on the stem 10 and is arranged so as to be disposed in a well submerged position below the surface of the liquid in the container, and in acting to effect downward flow of the liquid serves to cause the surface portion of the liquid to flow downwardly without undue turbulence and free of splash. The agitator element being placed off center in the mass being mixed and eccentric to the axis of the container C will exert thrusts on the mass such as to effect rotation of the container, table 25, and disk 26. The speed of rotation of the container may be varied by varying the extent of eccentricity of the agitator element which is accomplished by turning the standard 23 on the base D; the spring E being yieldable under sufficient torque applied to the standard to ride over the teeth of the rack F

into engagement with selected notches between the teeth.

Rotation of the container may also be effected at least in part by the brushing of the prongs 15 against the side wall of the container or on materials adhered thereto during rotation of the agitator element.

Rotation of the container carries the mass content thereof therewith so as to move the mass into the zone of action of the agitator element. In this manner the propeller units and baffle B are caused in effect to advance continuously through the body of liquid along the inner periphery of the container which with the ascending, descending and laterally directed currents occurring throughout the volume of liquid under treatment insures a highly rapid and thorough intermixture of the materials being worked.

An important feature of the invention resides in the provision of the baffle B, since it serves to produce a predetermined localized zone of violent action in the mass under treatment and prevents rotation of the mass in its entirety; the baffle also acting to deflect currents directed thereagainst by the propeller inwardly toward the axial center of the container from the inner edge of the baffle, and where the outer edge of the baffle is disposed close to the inner periphery of the container acts to inwardly deflect the stream or current of the liquid which tends to follow or traverse the inner cylindrical surface of the container; thus breaking up any vortex that might form in the mass as a whole.

The baffle also serves as a brake to retard rotation of the container since it is imposed in the path of flow of the liquid following the side wall of the container, and thereby impedes such flow; the baffle then acting as an automatic governor of the speed of rotation of the container. This braking action of the baffle may be varied by changing the position of the baffle, since the greater the distance of the outer edge of the baffle from the side wall of the container the more rapid the rotation of the container, and conversely the closer the outer edge of the baffle to the side wall of the container the slower the rotation of the latter.

The action of the baffle B in co-operation with the revolving propeller blades 12 of the agitator element is depicted diagrammatically in Figs. 10 and 11, in which the direction of flow at the surface of a liquid being worked is indicated by arrows.

In Fig. 10 the baffle B is shown as disposed with its outer vertical margin in close proximity to the inner periphery of the cylindrical side wall of the container, in which position the baffle will act on rotation of the propeller blades either during rotation of the container or while the latter is stationary to deflect the liquid contiguous the container side wall inwardly toward the center of the container; the propeller blades 12 rotating in a direction to set up a vortex in the liquid in which the swirls or folds of the liquid on the side of the vortex presented toward the baffle B pass in a direction leading from the outer or leading edge of the baffle toward the inner or trailing edge thereof. In this fashion a flow of the liquid is directed by the revolving blades along the wall of the container toward the outer edge of the baffle which flow effects an impelling action on the container by reason of the frictional contact of the flowing liquid with the cylindrical side wall of the container such as to advance the side wall toward the leading edge

of the baffle and thus effect rotation of the container. Since the rotative effect of the flowing liquid on the container is governed by the peripheral length of the contact of the flowing liquid with the container side wall it follows that when the outer edge of the baffle is in close proximity with the inner periphery of the container such as to intercept and deflect the flow of current along the inner periphery of the container and cut off such flow close to the propeller, the rotative effect on the container will be reduced to a minimum such that the container will then turn at a comparatively slow speed.

When it is desired to increase the speed of rotation of the container the baffle is swung inwardly as shown in Fig. 11 so as to allow a current or stream of the liquid impelled by the propeller to pass between the outer edge of the baffle and the container side wall, thus increasing the length of peripheral contact of the flowing liquid and the container wall thereby imparting a greater rotative force to the latter.

It has been found that the greater the thickness or mass of the wall of liquid passing between the outer edge of the baffle and the container wall the greater the speed of rotation of the container and accordingly by varying the distance between the outer edge of the baffle and the inner periphery of the container side walls the speed of rotation of the container with a liquid of given density and propeller blades of given pitch and speed may be varied from a minimum to a maximum, which is highly advantageous in working materials of various densities since the container may be rotated at higher speed with thick liquids than with thin liquids.

When the baffle is disposed with its outer edge close to the container side wall as shown in Fig. 10 such as to cut off the flow of liquid to the back of the baffle around its leading edge, a negative zone is created in the liquid rearward of the baffle which is characterized by the formation of an open space or void in the surface portion of the liquid back of the baffle, the depth of which varies according to the speed of the propeller and density of the liquid under treatment. The liquid, which in the absence of the baffle would occupy such space, is deflected by the baffle toward the center of the container and leaves the trailing edge of the baffle with a highly accelerated flow in a general radially outward direction toward the container side wall; a portion of the deflected liquid on leaving the trailing edge of the baffle being directed spirally downward rearward of the baffle in a state of rapid agitation and then moving forward into the advancing mass along the container wall. Another portion of the deflected liquid moves in downwardly directed swirls or folds spiraling in a direction opposite that of the vortex formed by the propeller. This reversed spiral flow merges into major eddies moving toward the container walls from the inner end of the baffle influenced by the rotation of the container, whereupon a mass flow of the body of liquid lying to the side of the center of the container opposite that occupied by the propeller is effected in the direction of rotation of the container and into the vortex formed by the propeller A. A multiplicity of interweaving currents and folds is thus created at the trailing end of the baffle B.

A similar action occurs when the baffle is disposed with its outer edge spaced in relation to the container side walls as shown in Fig. 11 but an open space or void of lesser degree is formed

rearward of the baffle since the liquid passing between the outer edge of the baffle and the container side wall rushes into such space, and likewise the agitation at the inner edge of the baffle is decreased to the extent of the lessened volume of liquid directed around such edge. During this circulation as depicted by the arrows in Figs. 10 and 11 the lower propeller 11 directs cross currents in an upward direction which intermingle with the descending currents induced by the propeller 12 such as not only to effect rapid and thorough intermixture but serves to prevent excessive downward displacement of the surface portion of the liquid. This with the action of the baffle serves to obviate excessive upheavals or splash on the surfaces of the liquid being worked and permits circulation of the liquid being agitated at high speeds without appreciably elevating the normal level of the liquid in the container.

In this fashion the raising of the level of a liquid and mass rotation thereof around a vortex as would occur by the action of the rotating blades as commonly practiced is avoided by the provision of the baffle, and a more rapid and thorough intermixture of materials being worked is accomplished.

By the provision of the flexible prongs 15, comminuted solids contained in the liquid will be prevented from accumulating on the bottom of the container, and in event that such accumulation has taken place before starting of the mixing operation, as where paints have been allowed to stand a considerable time undisturbed in the container, the prongs will then effect breaking up and dislodging of such solid particles and with the action of the blades 14 and 16 insure their thorough distribution throughout the liquid.

In like fashion the prongs serve in assisting in the breaking up of bodies of paste either contained in a liquid to be mixed or added thereto during the mixing operation.

By the provision of the plate spring E a yieldable connection is afforded between the revoluble mounting of the container C and the agitator element A and baffle B whereby in event of the presence of obstructions on the container side wall, such as dents, which strike the outer ends of the blades or the outer edge of the baffle, the agitator and baffle may move inwardly under the thrust of such obstruction and ride over the latter; the standard 23 then turning in its socket support 24 under the torque applied thereto by inwardly horizontal pressure imposed upon the blades or baffle by such obstruction; the spring E yieldably opposing such turning movement and acting to restore the agitator and baffle to their normal position after riding over the obstruction.

In some instances it may be desirable to form the lower propeller unit 11 in the form of a brush as shown in Fig. 5, that is with a spiral arrangement of bristles 45 on a head 46 carried on the lower end of the stem 10, and then providing a rectangular arrangement of bristles 47 at the lower end of the head adapted to work into the corner at the intersection of the bottom and side walls of a container.

While the mixer has been described as used in effecting intermixture of liquids, it is also applicable for use in mixing pastes especially pigments ground in liquids, and is likewise highly effective in intermixing dry powders such as dry "kalsomine" as in tinting operations.

While we have shown and described specific

constructions and arrangements it will be understood that the invention may be otherwise carried into effect and accordingly we do not limit ourselves to the exact construction and arrangement shown but may employ such changes and modifications as occasion may require coming within the meaning and scope of the appended claims.

We claim:

1. In a mixing machine, a revoluble table, a cylindrical container on said table, a stationary baffle arranged in said container, said baffle having vertical side margins and being arranged with one vertical margin thereof contiguous the inner periphery of the container and with its other margin proximate the center of the container, a revoluble stem extending vertically into said container eccentric to the axis thereof, a plurality of propeller units on said stem each of which embodies a series of horizontally extending laterally inclined blades; said stem and blades being arranged with the path of travel of the outer ends of said blades contiguous the inner periphery of said container and proximate to but spaced from said baffle; said baffle and blades co-operating to direct fluid in said container inwardly from adjacent side walls thereof toward the center of the container and around the inner edge of said baffle toward the container side wall.

2. In a mixing machine, a revoluble table, a cylindrical container on said table, a baffle arranged in said container, said baffle having side margins one of which is vertical and being arranged with the vertical margin thereof contiguous the inner periphery of the container and with the other margin proximate the center of the container, said baffle having a width less than the diameter of the container, a revoluble stem extending into said container eccentric to the axis thereof, a plurality of propeller units on said stem each of which embodies a series of blades, said stem and blades being arranged with the path of travel of the outer ends of said blades contiguous the inner periphery of said container and proximate to but spaced from said baffle, the blades on adjacent propeller units being inclined in opposite directions relative to each other; said baffle and blades co-operating to direct fluid in said container inwardly from adjacent side walls thereof toward the center of the container and around the inner edge of said baffle toward the container side wall.

3. In a mixing machine, a revoluble table, a cylindrical container on said table, a baffle arranged in said container, said baffle having side margins one of which is vertical and being arranged with the vertical margin thereof contiguous the inner periphery of the container and with the other margin proximate the center of the container, a revoluble stem extending downwardly into said container eccentric to the axis thereof, a series of propeller blades on the lower end of said stem, said stem and blades being arranged so that the path of travel of the outer ends of said blades will be proximate to the inner periphery of said cylinder, and proximate to but spaced from said baffle, and a series of flexible elements on said blades arranged to contact the bottom wall and inner periphery of said container at the juncture thereof, and a second series of propeller blades on said stem spaced upwardly from said first named blades arranged to form a vortex in fluid in said container adjacent said baffle; said blades and baffle co-acting to direct fluid in said container from adjacent the side

walls thereof toward the center of the container and around the inner edge of said baffle toward the container side wall.

4. In a mixing machine, a revoluble table, a cylindrical container on said table, a baffle arranged in said container with one vertical margin thereof contiguous the inner periphery of the container, an adjustable support for said baffle for varying the position of the vertical margin of the baffle relative to the inner periphery of the container, a revoluble stem extending downwardly into said container, a series of propeller blades on the lower end of said stem, said stem and blades being arranged so that the path of travel of the outer ends of said blades will be proximate to the inner periphery of said cylinder and proximate to but spaced from said baffle, and a series of flexible elements on said blades arranged to contact the bottom wall and inner periphery of said container, and a second series of propeller blades on said stem intermediate the height of said container; said baffle and blades co-operating to direct fluid in said container inwardly from adjacent side walls thereof toward the center of the container and around the inner edge of said baffle toward the container side wall.

5. In a mixing machine, a revoluble table, a cylindrical container on said table, a baffle arranged in said container with one vertical side margin thereof contiguous the inner periphery of the container and with its other side margin proximate the center of the container, a revoluble stem extending into said container eccentric to the axis thereof, a plurality of propeller units on said stem each of which embodies a series of blades; said stem and blades being arranged with the path of travel of the outer ends of said blades contiguous the inner periphery of said container and proximate to but spaced from said baffle, the blades of said last named propeller unit being inclined in a direction opposite the blades of the first named unit; said baffle and blades co-operating to direct fluid in said container inwardly from adjacent side walls thereof toward the center of the container and around the inner edge of said baffle toward the container side wall.

6. In a mixing machine, a revoluble table, a cylindrical container on said table, a baffle arranged in said container with one vertical side margin thereof contiguous the inner periphery of the container and with its other side margin proximate the center of the container, a revoluble stem extending into said container eccentric to the axis thereof, a plurality of propeller units on said stem each of which embodies a series of blades; said stem and blades being arranged with the path of travel of the outer ends of said blades contiguous the inner periphery of said container and proximate to but spaced from said baffle, the blades of said last named propeller unit being inclined in a direction opposite the blades of the first named unit, said stem and the blades of each of said units being tubular with the interiors of the blades communicating with the interior of the stem the blades lowermost units being formed with upwardly opening outlets and the blades of the second unit being formed with downwardly opening outlets; said baffle and blades co-operating to direct fluid in said container inwardly from adjacent side walls thereof toward the center of the container and around the inner edge of said baffle toward the container side wall.

7. In a mixing machine, a freely revoluble table,

a container on said table having an open upper end, a standard, a bracket on said standard, a revoluble stem carried on said bracket and extending downwardly into said container in off-set relation to the axis thereof, a series of horizontally extending laterally inclined blades on said stem for forming a vortex in fluid in said container, a shaft depending from said bracket into said container, a baffle on said shaft arranged in said container adjacent the path of travel of the outer ends of said blades, said baffle being arranged with its outer margin proximate the inner periphery of said container to intercept a flow of liquid influenced by said blades to direct fluid inwardly toward the center of the container and outwardly from the inner margin of said baffle toward the container side walls and acting to retard rotation of the container under the urge of liquid displaced by said blades.

8. In a mixing machine, a freely revoluble table, a container on said table having an open upper end, a standard, a bracket on said standard, a revoluble stem carried on said bracket and extending downwardly into said container in off-set relation to the axis thereof, a series of horizontally extending laterally inclined blades on said stem for forming a vortex in fluid in said container, a shaft depending from said bracket into said container, a baffle on said shaft arranged in said container adjacent the path of travel of the outer ends of said blades, said baffle being arranged with its outer margin proximate the inner periphery of said container to intercept a flow of liquid influenced by said blades to direct fluid inwardly toward the center of the container and outwardly from the inner margin of said baffle toward the container side walls and acting to retard rotation of the container under the urge of liquid displaced by said blades.

mate the inner periphery of said container to intercept a flow of liquid influenced by said blades to direct fluid inwardly toward the center of the container and outwardly from the inner margin of said baffle toward the container side wall, and acting to retard rotation of the container under the urge of liquid displaced by said blades, said bracket being supported for swinging movement to vary the position of said stem and shaft in said container, and spring means yieldably opposing swinging movement of said bracket.

9. In a mixing machine, a freely revoluble container for materials to be mixed, a vertical rotary stem extending downwardly into the container, propeller blades on said stem projecting laterally therefrom and being transversely inclined for creating a vortex in materials being worked, a baffle extending downwardly into said container in proximity to the path of travel of the outer ends of said blades alongside the latter with its outer margin contiguous the container side wall, said baffle being independent of said container and projecting above and below the surface of materials in said container, said baffle co-acting with said blades on rotation of the stem to direct a fluid in the container inwardly toward the center of the container and around the inner margin of the baffle toward the container side wall.

10. The structure called for in claim 9 in which the baffle is moveable to dispose the outer edge thereof in various spaced relations to the container side wall and also moveable vertically for adjustment relative to the bottom of the container.

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