I. S. MERRELL.

AGITATOR.

APPLICATION FILED JULY 2, 1919.

1,375,406. Patented Apr. 19, 1921.

FIG. 1.

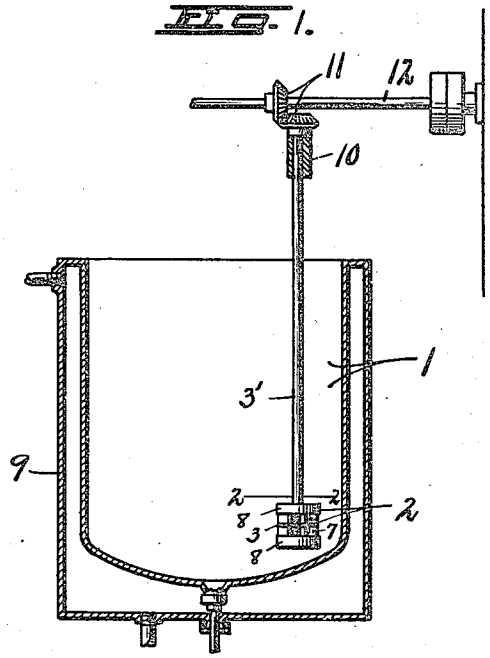


FIG. 2.

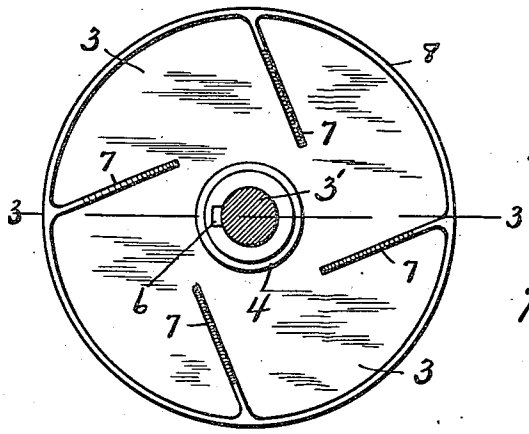
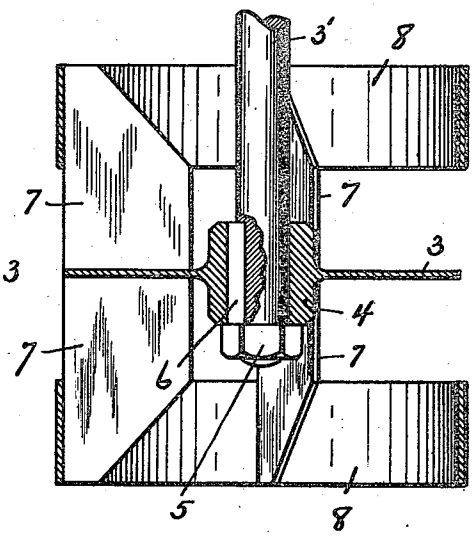


FIG. 3.



INVENTOR

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UNITED STATES PATENT OFFICE.

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AGITATOR.

1,375,406. Specification of Letters Patent. Patented Apr. 19, 1921.

Application filed July 2, 1919. Serial No. 308,339.

To all whom it may concern:

Be it known that I, IRVING S. MERRELL, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Agitators, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in apparatus for agitating and mixing the contents of tanks, vats and the like.

Certain substances or solids, such as powdered milk produced by the spraying process, are capable of complete solution in liquid, but enter into such solution more or less readily and require thorough mixing and agitation and under certain conditions the application of heat simultaneously with agitation may be desired. Further, it may be desirable to mix various substances incapable of partial or complete solution and my invention is designed for creating a maximum agitation for various purposes and without the use of large and clumsy instrumentalities. The apparatus has been found peculiarly effective in mixing milk powder and water, perhaps by reason of the formation of a vortex preventing the continued existence of floating masses of powder upon the surface of the liquid.

I have produced an agitator having a double axial intake and radial centrifugal throw combined with a general rotary movement of the liquid as produced by bodily rotation of the agitator.

The other objects and advantages relate to the details of formation, construction and arrangement of parts of the agitator as will more fully appear from the following description taken in connection with the accompanying drawings in which:

Figure 1 is an elevation partly in section of a tank combined with an agitator of my invention.

Fig. 2 is a section on line 2—2, Fig. 1.

Fig. 3 is a section on line 3—3, Fig. 2.

The tank —1— shown is merely illustrative of any tank or vat in which the mixing operation is adapted to take place and may be of any desired form and shape and preferably the agitator is positioned near the bottom of the tank and eccentrically of the axis thereof and preferably near a wall thereof, as I find by this position the most effective agitation is produced. The axis of the agitator —2— may be substantially parallel with the axis of the tank and, as shown, the agitator is rotated by a vertical shaft —3'— supported in any suitable way either in connection with or independently of the tank and as shown the agitator and its supporting driving means are entirely independent of the tank. In the use of a substantially cylindrical tank, the agitator is preferably positioned near the bottom of the tank and adjacent the wall thereof and in the case of tanks of other form and shape, as square, rectangular, etc., the agitator should be placed near the wall thereof to effect the maximum agitation. The agitator itself is of peculiar form and construction and embodies a plate —3— having a concentric journal —4— adapted to be mounted upon the shaft —3'— as by driving fit and secured thereon as by nut —5— and keyed thereto by key —6— for simultaneous positive rotation therewith. The plate —3— carries oppositely extending vanes or blades —7— disposed at substantially right angles to the plate and preferably the respective vanes upon opposite sides of the plate and extending in opposite directions therefrom are alined with each other and such vanes may perhaps preferably lie in chords of the plate to effect a maximum centrifugal throw of the liquid. As shown, each side of the plate is provided with four vanes —5—, those upon one side extending vertically upwardly therefrom and those upon the other side extending downwardly therefrom, respective vanes upon opposite sides of the plate being in alinement and as to the vanes upon one side of the plate, their vertical planes are either parallel or perpendicular to each other. Such an arrangement is not, however, essential but embodies the preferred form of the agitator.

The end portions of the vanes upon each side of the plate are connected by a substantially circular band or collar —8— which may as shown be of a width substantially equal to one-half the length of the vanes and the ends of the vanes connected to the ring or band may have their inner corner portions removed so as to taper upwardly from the plane of the lower edge of

the band to the plane of the upper edge of the band. The agitator, as described, may be cast in a single piece if desired or may be formed of separate sections secured together in any suitable manner and the entire structure may, perhaps, preferably be tinned over if the agitator is to be used in the treatment of milk or milk products.

The result of the construction shown is that upon rotation of the agitator when positioned in the manner shown in Fig. 1, a rotary movement of the entire body of liquid is produced in the tank by the bodily rotation of the agitator and at the same time an axial suction is produced, drawing the liquid downwardly into the space within the ring —8— by reason of the radial and outward centrifugal throw of the liquid within the agitator as effected by vanes —7—. There is on the other hand below the plate —3— an upward suction, drawing the liquid into the space within the lower band —8— by reason of the radial outward centrifugal throw of the adjacent vanes —7—. The result is that the agitator produces a double axial suction, the one downwardly toward plate —3—, and the other upwardly toward plate —3— combined with the double radial centrifugal throw of the liquid sucked within the agitator and ejected outwardly by vanes —7—. It is found that this agitator in its rapid rotation produces a vortex which sucks the elements to be mixed downwardly into the agitator from which such elements are thrown outwardly and agitated and commingled. The result is that it is impossible for quantities of powder, as milk powder, to mass together and remain in floating position upon the surface of the liquid. All portions of the liquid are drawn into and through the agitator and are thoroughly combined.

The tank —2— may be provided with a jacket —9—, if desired, for receiving and heating or cooling fluid.

The shaft —3'— may be supported and guided in any suitable stationary mounting as that shown at —10— and may be driven in any suitable way as by beveled gearing —11— and shafting —12—.

It will be noted that the agitator rotates about a vertical axis and may be and preferably is supported independently of the tank and without penetration of the wall thereof and that it combines an upward and a downward suction with a double intermediate centrifugal throw of the liquid at the same time that the liquid is bodily rotating within the tank.

The agitation of the liquid and the constant relative movement of the particles thereof effected by such upward and downward suction combined with the centrifugal outward throw of the liquid caused by the rotor, quite uniformly subjects all parts of the liquid to actual contact with the heating surface increasing the efficiency of the transfer of heat from the treating surface to the liquid as compared with the ordinary stirring apparatus which causes substantially only a continuous bodily rotation of the liquid in the same direction.

Although I have shown and described a specific apparatus and particular form and arrangement of the parts thereof, I do not desire to limit myself to the details of the same as various changes and modifications may be made without departing from the scope of this invention as set forth in the appended claims.

What I claim is:—

1. The combination with a tank of an agitator adapted for rotation about a substantially vertical axis and arranged within and eccentrically of the tank and closely adjacent a portion of the side wall of the tank, said agitator comprising means for producing outward radial throw of liquid drawn axially from opposite directions.

2. The combination with a tank of an agitator adapted for rotation about a substantially vertical axis and arranged within and eccentrically of the tank and closely adjacent a portion of the side wall of the tank, said agitator comprising duplicate parts separated by a plate for producing outward radial throw of liquid drawn axially from opposite directions toward said plate.

3. An agitator comprising a central plate and vanes projecting in opposite directions from opposite sides thereof, and bands of less width than the vertical extension of the blades, spaced from the plate and extending around and connecting the outer vertical edges of the plate, said blades tapering vertically from the plate to partially define a funnel.

4. The combination with a tank of an agitator adapted for rotation about a substantially vertical axis and arranged eccentrically of the tank and near the juncture of the side wall with the bottom wall of said tank, said agitator comprising means for radially ejecting liquid admitted through an axial inlet.

5. The combination with a tank of an agitator adapted for rotation about a substantially vertical axis and arranged eccentrically of the tank and near the juncture of the side wall with the bottom wall of said tank, said agitator comprising means for producing radial throw of the liquid drawn axially from opposite directions.

6. The combination with a tank of an agitator adapted for rotation about a substantially vertical axis and arranged eccentrically of the tank and near the juncture of the side wall with the bottom wall of said tank, said agitator comprising substantially duplicate parts for producing a similar radial

centrifugal throw of liquid drawn axially from opposite directions.

7. An agitator comprising a central plate and vanes projecting in opposite directions from opposite sides thereof, said vanes lying in chords of the plate and having their upper ends tapered.

In witness whereof I have hereunto set my hand this 26th day of June, 1919.

IRVING S. MERRELL.

Witnesses:
E. A. THOMPSON,
H. E. CHASE.