Oct. 16, 1934. A. H. ADAMS ET AL 1,977,419

MIXER

Filed March 4, 1931 2 Sheets-Sheet 1

Fig. 2

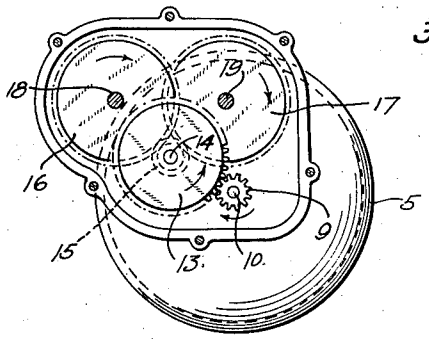
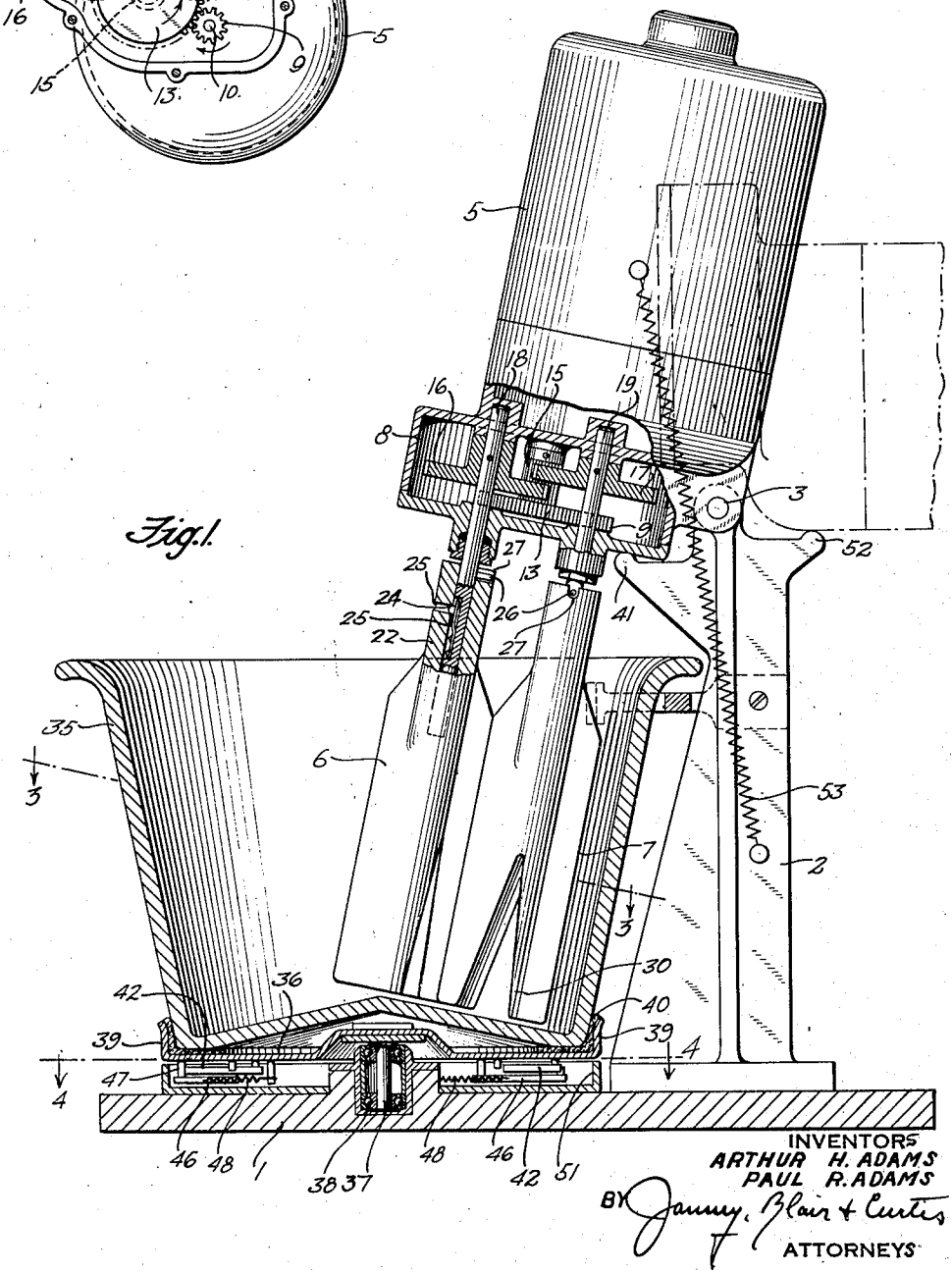


Fig. 1



INVENTORS
ARTHUR H. ADAMS
PAUL R. ADAMS
BY Janney, Blair & Curtis
ATTORNEYS

Oct. 16, 1934. A. H. ADAMS ET AL 1,977,419

MIXER

Filed March 4, 1931 2 Sheets-Sheet 2

Fig. 3.

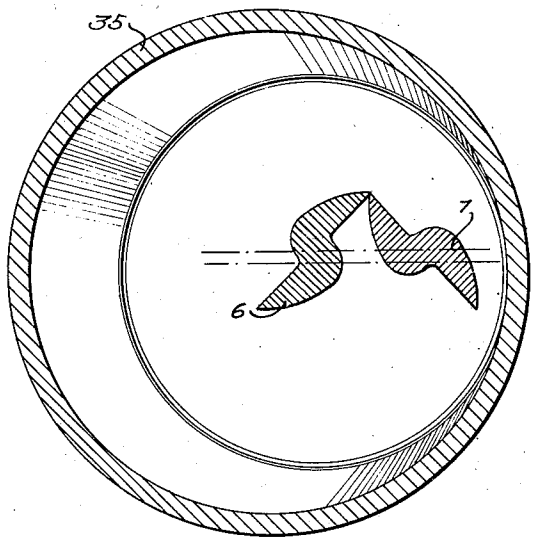
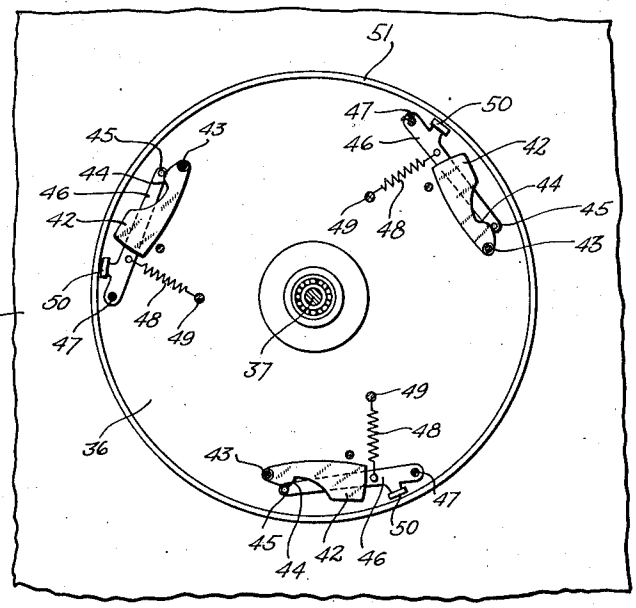


Fig. 4.



INVENTORS
ARTHUR H. ADAMS
PAUL R. ADAMS
BY Janney, Blair & Curtis
ATTORNEYS

Patented Oct. 16, 1934

1,977,419

UNITED STATES PATENT OFFICE

1,977,419

MIXER

Arthur H. Adams, New York, and Paul R. Adams, Yonkers, N. Y.

Application March 4, 1931, Serial No. 519,976

9 Claims. (Cl. 259—84)

This invention relates to mixers, beaters and the like and particularly such as are adapted for use in households, restaurants and hotels in the mixing of food products.

One object of the invention is to provide a device or machine of this general character which is simple and durable in construction, easily operated, capable of quickly and efficiently performing a wide range of mixing or beating operations on a large variety of materials and which will insure a thorough treatment of the entire mass.

Another object is to prevent the collection of the material under treatment upon the surface or surfaces of the paddle, blades or agitating members.

These and other objects, general and particular, will be best understood by reference to the accompanying drawings showing an illustrative embodiment in which:

Fig. 1 is a side elevation partially in section of a mixing machine constructed in accordance with the principles of the invention;

Fig. 2 is a bottom plan view of the reduction gearing with the cover plate removed;

Fig. 3 is a sectional view substantially on the line 3—3 of Fig. 1, and

Fig. 4 is a sectional view substantially on the line 4—4 of Fig. 1.

Referring particularly to Fig. 1 of the drawings, the reference numeral 1 indicates a base plate upon which is mounted an upright standard 2 having at its upper end a pivotal joint or hinge 3 which forms the connection with the operating mechanism. This mechanism in the present instance comprises an electric driving motor 5 and a pair of paddles 6 and 7 driven thereby through the medium of suitable reducing mechanism enclosed in a gear box 8. The motor may be secured in any suitable manner upon the top of this gear box and the latter connected to the standard 2 by the joint 3.

Referring to Fig. 2, this reducing mechanism comprises a pinion 9 on the motor shaft 10 which meshes with a gear 13 fixed on a short shaft 14 upon which is also attached a pinion 15. The pinion 15 forms the common driving medium for duplicate gears 16 and 17 respectively secured upon shafts 18 and 19 carrying the paddles 6 and 7. For this reason the shafts 18 and 19 will be rotated in the same direction and the paddles will revolve at the same speed, thus maintaining the same angular relation to each other.

Again referring to Fig. 1, the paddles 6 and 7 may be mounted upon their respective shafts 18 and 19 in any suitable manner but for convenience they are provided with a readily detachable connection which is only shown for the paddle 6 as the description thereof will apply equally to the other paddle. The paddle is provided with a hollow shank 22 which fits about the lower extremity of the shaft 18 and on a cutaway portion of this shaft is fastened a flat spring 23 having at its upper end a stud or pin 24 which is forced by the spring into a radial hole 25 in the shank when the stud and hole are brought into registration. This acts as a latch to retain the paddle on the shaft. The paddle may be detached by forcibly pulling the paddle longitudinally of the shaft. A pin as 26 is inserted in a hole provided for the purpose in the shaft and a slot as 27 formed in the upper end of the shank of the paddle so that when the paddle is slid upon the shaft, this pin will enter and lie within the slot and thus form a key to resist driving torque.

The paddles may be of any suitable shape but it is desirable that the material being mixed, beaten or agitated thereby should not be permitted to accumulate upon the surface of the same and particularly on the rear face. To this end we have provided a form and arrangement thereof which causes the paddles each to act as a wiper or scraper of the other as they rotate. While it will be recognized that this may be accomplished more or less satisfactorily by various other forms of paddle, we prefer to use a paddle which has substantially the cross section shown in Fig. 3 of the drawings. It will be evident that when these paddles rotate, each longitudinal edge thereof will move over and act to wipe the corresponding back face of the opposite paddle although it is advisable that a slight clearance be provided between the blades. The edges of the blades may be made more or less sharp so that they coact to perform a sort of cutting or clipping action on the material being treated and this aids in securing efficient mixing. This is of particular value in the making of certain kinds of pastry in which a fat as lard is to be chopped into small particles in a bath of flour but without the flour being worked into the fat. After its initial chopping action on relatively hard materials, the machine will rapidly produce a thorough and intimate mixing and kneading.

The blades are preferably arranged at substantially right angle to each other and this relation is maintained at all times by the gear-

ing previously described. To further prevent accumulation of material on the paddles during the operation of the machine, the lower extremity of each of the paddles may be bifurcated as at 30. This eliminates any dead spot at the axis of rotation and permits the mass to squeeze through the opening thus formed. This opening is also of assistance in the beating of such materials as eggs or cream. The bifurcating of the paddles in this manner facilitates stripping of the paddles to permit use of the same machine to beat or mix different substances and saves materials.

Referring again to Fig. 1, the material to be mixed, beaten or agitated is placed in a receptacle or bowl 35 which in the present instance is of the free rotating type. In other words, rotation of the bowl is provided by the driving action of the paddles exerted through the medium of the material being treated. In order to permit the bowl to thus rotate sufficiently freely, the same may be supported upon a turntable as 36 mounted on a spindle as 37 operating in a suitable antifriction bearing as 38 in the base 1. This turntable may be provided with an upturned edge as 39 which will serve to hold the bowl in proper position thereon. A ring 40 of rubber or other suitable material may be inserted between the bowl and the turntable to prevent relative rotation.

Still referring to Fig. 1, the bowl is preferably arranged off center relative to the axis of rotation of the paddles so that when the parts are in operative position, as shown, the paddle 7 just clears the side wall of the bowl. Where the side wall of the bowl is flaring, the operating mechanism should preferably be tilted to the proper angle to establish this relative position of the paddle and wall. A stop as 41 or other suitable means may be provided to limit the downward swing of the paddles when the parts are to be brought into operative position. When the side wall is flaring, the bottom of the bowl 35 is preferably conical in form so that the clearance at the end of the paddle 7 will be small, as this insures complete stirring of the material within the bowl. Not only are the paddles 6 and 7 shown off center in the bowl and their axes eccentric therein, but the plane of the two axes passes on one side of the axis of the bowl, and on that side that gives the paddle nearest the bowl wall a slight downward wiping action on that wall.

In order to prevent too rapid rotation of the bowl, suitable braking mechanism may be provided. Any suitable form of resistance may be used for this purpose but in the machine shown we have embodied a centrifugal brake mechanism which may be adjusted to provide automatic speed regulation. In the present instance this acts in connection with the turntable and a convenient form is illustrated in Fig. 4. Here three independent brake mechanisms substantially equally spaced about the periphery of the turntable are shown, but as they are alike in construction only one will be described.

A weighted lever 42 is pivotally connected to the under face of the turntable 36 at 43 and this lever is provided with a cam face as 44 which engages a pin 45 carried by an arm 46 which in turn is pivotally connected to the under side of the turntable at 47. Both the arm 46 and the lever 42 are normally held in inactive position by a spring 48 which connects the arm with a pin 49 projecting from the under face of the turntable. The arm 46 carries a brake shoe 50 which is adapted to engage the inner surface of a stationary brake drum 51 when the arm swings outwardly. The action of centrifugal force on the weighted lever 42 causes the arm 46 to swing outwardly against the action of the spring 48. The speed at which the brake mechanism will become operative may be varied by adjusting the tension of this spring 48. The retarding of the bowl substantially in the manner described, makes it possible to provide a differential speed between the bowl wall and the paddle coacting therewith. Unless the bowl is retarded, it will, particularly with stiff materials, shortly travel at a velocity as though geared to the paddle 7. This gives only a chopping action against the bowl wall and wiping action is practically eliminated.

Referring again to Fig. 1. When inactive, the operating mechanism is normally in its raised position or that indicated in dot and dash lines in this figure, the motor shaft being substantially horizontal and the casing resting upon a stop 52 on the standard 2. This enables the bowl 35 containing the mixture to be placed substantially as indicated on the turntable 36. To start the mixing or beating operation, the operating mechanism is swung downwardly on the hinged joint 3 into the substantially vertical position shown in solid lines in the drawings, and this movement is arrested at the proper point by the stop 41. The motor is then started and the mixing proceeds until the material in the bowl has been sufficiently treated. The operating mechanism is then swung on the joint 3 to its raised or horizontal position and the bowl may be readily removed from the turntable. A spring as 53 may be provided to yieldingly hold the driving mechanism in its extreme positions, the spring acting on the over center principle. The flaring sides of the bowl facilitate the movement of the operating mechanism into and out of such bowl and also enable the joint 3 to be placed nearer to the axis of rotation of the bowl than would otherwise be possible.

The offset arrangement of the paddles as described and their tilting position acts to cause these paddles to wipe the material on the flaring wall downwardly toward the bottom of the bowl and thus a more complete scavenging of the inside of the bowl is secured. This also acts to prevent the depositing of a ring of unmixed material around the inside of the bowl near the top of the paddles.

The rotation of the paddles in the same direction tends to prevent large amounts of the material becoming jammed between them which might be sufficient to overload the motor or break some part, and this is of particular value when the mass contains relatively hard material such as cold butter, potatoes, turnips and the like. This direction of rotation has a further advantage in that it provides greater safety for the operator. The form and arrangement of the paddle in the bowl also acts to prevent spattering of the material.

As many as possible embodiments may be made of the above invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

We claim:

1. In a mixing machine, a plurality of beaters

located in proximity, and means for rotating said beaters in the same direction, a freely rotating bowl, and means to limit the speed of bowl rotation.

2. In a mixing machine, a pair of paddles at right angles to each other rotating in the same sense and each symmetrical about its axis, the width of the paddles and the separation of the axes being such that their edges nearly meet four times per revolution, a bulged shape on the trailing side of each paddle half such that the edge of the mating paddle substantially follows it during part of a revolution, and a substantially flat or undercut shape on the advancing side of each paddle half, such that the edge of the mating paddle does not follow it during another part of a revolution, whereby a mass of the material to be mixed is gathered by the advancing sides, and subjected to pressure and to a clipping action, and whereby the trailing sides of the paddles are cleaned of adhering material.

3. In a mixing machine, two paddles rotating in the same direction with their blades substantially at right angles, a bulging shape on the trailing sides of said paddles, and a relatively reentrant shape on the advancing side of said paddles.

4. In a food mixer, paddles rotating in the same sense, a pivotally supported bowl rotated in the same sense through the material therein by each of said paddles, and a governor to limit the rotating speed of said bowl.

5. In a food mixing machine, a series of adjacent rotatable paddles, means to rotate said paddles in the same direction at the same speed, on said paddles straight acute angled edges more forward pointing than trailing, axes of rotation for said paddles so positioned that one of said straight acute angled edges of one paddle passes closely to an edge of an adjacent paddle four times in each rotation of said paddles, whereby a clipping action between said edges of adjacent paddles occurs four times per rotation.

6. In a mixer for materials, paddles having straight edges and a flattened S-shaped cross section symmetrical about the axis of rotation, adjacently rotating at the same speed in the same sense, the cross sections of adjacent paddles being constantly in a 90° relation; a bulging shape on the trailing surfaces of each said paddle and beginning at the straight edges of the latter, such that it is closely followed and scavenged of adhering material by a straight edge of an adjacent one of said paddles; a radial or scooping shape on the advancing surfaces of each said paddle, and beginning at the straight edges of the latter, such that it is closely approached only at the edge by a straight edge of an adjacent one of said paddles.

7. In a mixer, a pivotally mounted freely rotatable bowl rotated by the friction of materials therein, a paddle rotating not centrally therein, edges on said paddle that come near to the wall of said bowl at one side, and a centrifugal governor operatively connected to the bowl to retard the rotation of said bowl whereby said edges on said paddle pass over the wall of said bowl with a scraping action.

8. In a food mixer, a bowl rotatable by the friction of materials therein, straight-edged paddles adjacently rotating in identical sense within said bowl, to act upon materials therein, having a substantially flattened S-shaped section, having the convex shape of the S-section on their trailing surfaces, and having such mutual relations that the straight edge of one of said paddles closely follows the convex shape of another of said paddles.

9. In a food mixer, a bowl rotated by the friction of materials therein, straight edged paddles adjacently rotating in identical sense within said bowl to act upon materials therein, having substantially a flattened S-shaped section, having the reentrant shape of the S-section on their advancing surfaces, and having such mutual relations that each straight edge of one of said paddles passes closely by each straight edge of an adjacent one of said paddles to perform a clipping action on materials in said bowl.

ARTHUR H. ADAMS.
PAUL R. ADAMS.