J. FRAME.

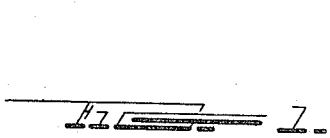
MIXER.

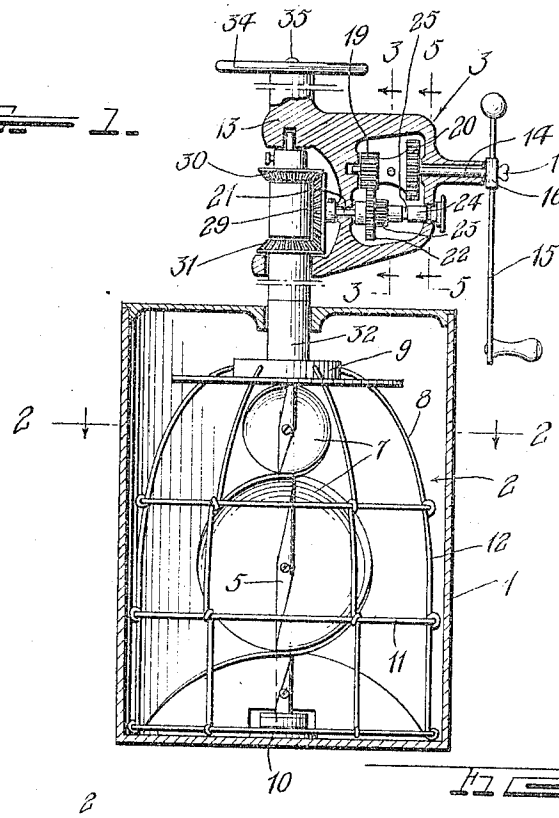
APPLICATION FILED JAN. 5, 1916.

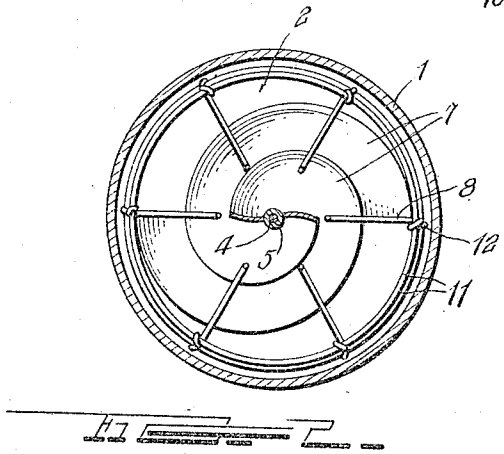
1,247,655.

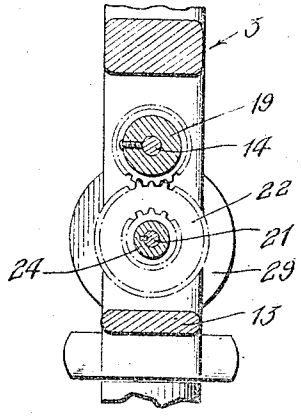
Patented Nov. 27, 1917.

2 SHEETS—SHEET 1.









INVENTOR

John Frame.

WITNESSES

Roland D. Booth.

W. E. Walk Jr.

BY

Richard Evans.

ATTORNEY

J. FRAME.

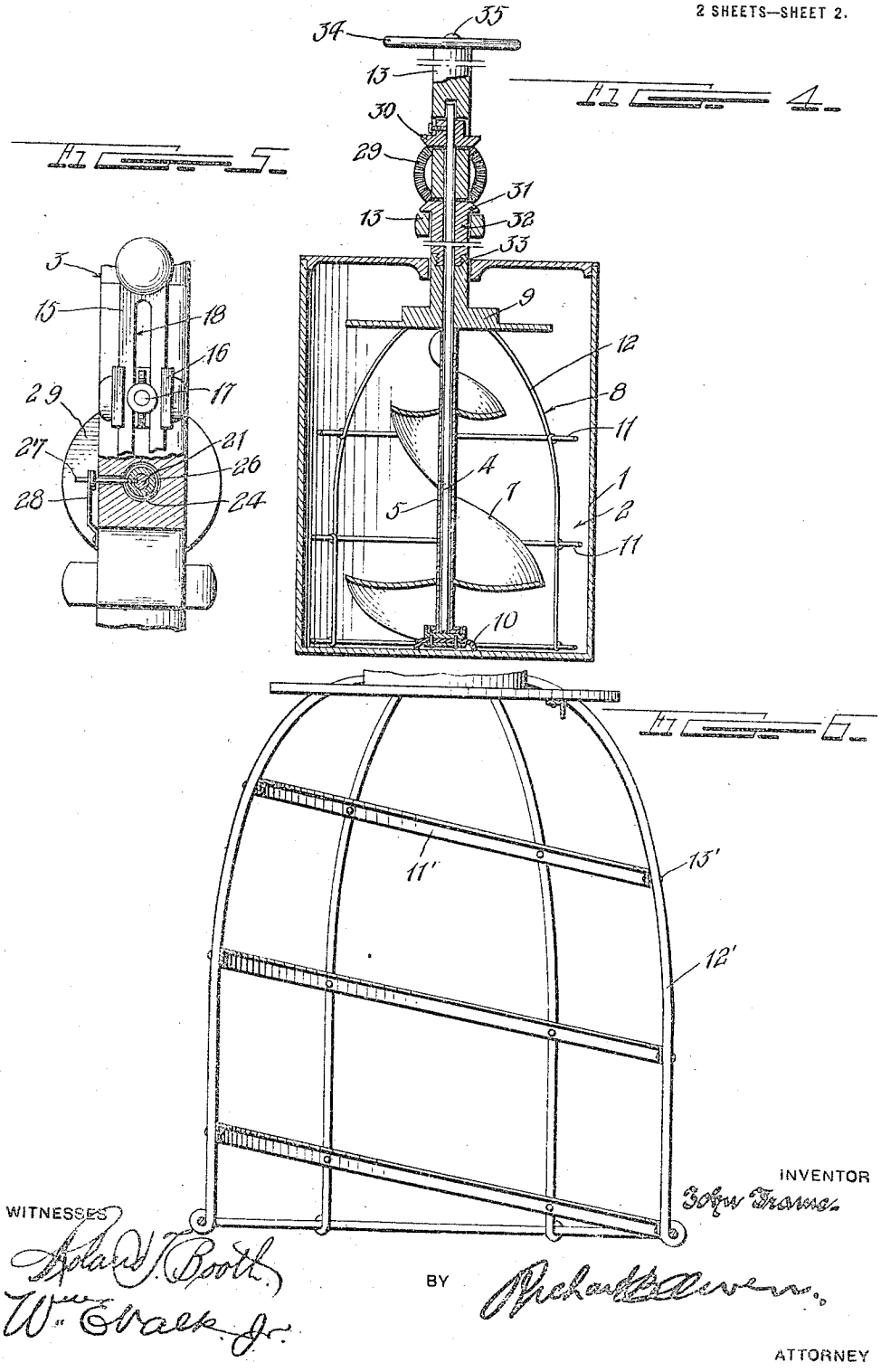
MIXER.

APPLICATION FILED JAN. 5, 1916.

1,247,655.

Patented Nov. 27, 1917.

2 SHEETS—SHEET 2.



WITNESSES

Roland J. Booth

W. E. Crack Jr.

INVENTOR

John Frame.

BY Richard Eaton & Co.

ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN FRAME, OF SEARSPORT, MAINE.

MIXER.

1,247,655. Specification of Letters Patent. Patented Nov. 27, 1917.

Application filed January 5, 1916. Serial No. 70,511.

To all whom it may concern:

Be it known that I, JOHN FRAME, a citizen of the United States, residing at Searsport, in the county of Walde and State of Maine, have invented certain new and useful Improvements in Mixers, of which the following is a specification.

My invention relates to mixers of a construction utilizing oppositely rotatable elements and contemplates an improved construction, combination and arrangement of parts to be hereinafter more particularly described and claimed.

In the drawings annexed:

Figure 1 is a longitudinal sectional view of my improved mixer.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged section on the line 3—3 of Fig. 1.

Fig. 4 is a view somewhat similar to Fig. 1.

Fig. 5 is an enlarged section on the line 5—5 of Fig. 1, and

Fig. 6 illustrates a modified type of cage.

Like numerals of reference designate like or corresponding parts throughout the several views.

Referring now to the drawings by numerals, 1 designates a suitable container, 2 as an entirety the mixing mechanism, and 3 as an entirety the operating mechanism, the latter, the operating mechanism 3 being located without the container for coöperation with said mixing mechanism 2.

The mixing mechanism 2 in its preferred embodiment comprises a vertical shaft 4, a shaft-tube or sleeve 5 fixedly secured to the shaft for rotation therewith, a plurality of spirally arranged trough-like mixing blades 7, a cage 8, a deflector plate 9 and a vacuum cup 10, the latter, the cup 10 being mounted upon the lower extremity of the sleeve or tube 5 for positive engagement with the bottom of the container 1 that said sleeve 5 and the shaft 4 inclosed therein may be mounted to rotate on a true vertical axis. The blades 7 (of which there may be any number) are either made integral with or fastened to the sleeve 5. The cage 8, as illustrated in Figs. 1, 2 and 4 comprises a plurality of circular bands 11 and a plurality of longitudinally extending strips 12, the latter, the strips 12 encircling the circular bands 11 to provide in substance a frame or cage which, in practice, is so associated with the deflector plate 9 as to rotate therewith in a direction counter to the direction of rotation of the blades 7 hereinbefore described. The shaft 4, the sleeve or tube 5 and the blade 7 rotate as a unit.

Coming to a description of the operating mechanism 3, 13 designates a casting movable vertically with respect to the container 1 for a purpose hereinafter disclosed. A shaft 14 is mounted in the casting 13, said shaft being equipped with an adjustable crank 15. A bracket 16 is mounted at one end of the shaft 14, to afford, with a set screw 17, a means whereby the crank 15, subsequent to adjustment, is held against movement. Screw 17 is arranged to operate in a slot 18 of said crank. Shaft 14 is further provided with gears 19 and 20, the former, gear 19, being comparatively small.

A second shaft 21 is mounted on the casting 13 in parallelism with the shaft 14, this latter shaft affording a support for gears 22 and 23, gear 22 being designed for co-meshing engagement with the gear 19 and gear 23 for co-meshing engagement with the gear 20, the former gears, when in mesh, providing for a high speed rotation of the mixing mechanism 2 and the latter gears, when in mesh, providing for a low speed rotation of the mixing element 2. Movement of the gears 22 and 23 respectively into and out of meshing engagement with the gears 19 and 20 is effected by longitudinal movement of a sleeve 24 inclosing the shaft 21. Sleeve 24 although movable longitudinally of the shaft 21 is designed to rotate with said shaft. Circular grooves 25 and 26 are formed in the sleeves 24, said grooves with a coöperating spring pressed pin 27 affording a lock means whereby the sleeve is held against longitudinal movement when adjusted. When gear 23 is in mesh with gear 20 pin 27 is arranged to operate in groove 25. When gear 22 is in mesh with gear 19, pin 27 is arranged to operate in groove 26. The spring associated with the pin 27 is designated 28.

An operating bevel gear 29 is mounted on the shaft 21 for meshing engagement with bevel gears 30 and 31 mounted respectively upon the shaft 4 and a sleeve 32, the former, gear 30 imparting to said shaft a rotary movement in one direction and the latter, gear 31 imparting to said sleeve a rotary movement in the opposite direction. Sleeve 32 is made up of separable sections joined

as indicated at 33. The deflector 9 to which the cage 8 is attached is preferably an integral part of the lower section of the sleeve 32. A hand wheel 34 is fastened as at 35 to the casting 13, the purpose of said wheel to be hereinafter particularly described.

The operation of the mixer is as follows:—

When crank 15 is turned, the blades 7 turn in one direction and the cage 8 in the opposite direction. As blades 7 revolve, the material on the bottom of the container 1 is scooped up and by reason of the peculiar construction of the blades 7 forced to climb toward the deflector 9. At the same time material is being elevated, centrifugal force comes into play and some of the material is thrown from the spiral in an outward and upward direction with due regard to the direction imparted to it by the rotation of the blades. The material thrown by the blades by centrifugal force meets the cage, which is revolving oppositely, at a sharp angle and thereby is more or less broken up, the outmoving material, at the same time, meeting a downward current with which it is forced to co-mingle. Such of the material as does not fly from the blades by centrifugal force is carried up the incline of blades and is thrown against the deflecting plate 9 with an upward and outward motion due to the speed of elevation and centrifugal force. The material is then carried to the side of the vessel or container 1 and flows down the sides due to force of gravity as well as the "push" it receives from the material being forced up the blades. On its way down the sides of the container 1 the material is thoroughly whipped by the revolving cage 8.

Considerable importance is attached to the shape and pitch of the blades 7. Fig. 4 shows the trough-like form of the lower parts of the blades, since the mixing fluids or semi-fluids the materials would have a different specific gravity and the heaviest material would naturally be the lowest. When mixing is first started the lower part of the blades would pick up the heaviest material and if speed of rotation was high, then most of the material would simply fly or be thrown from the blades. To avoid this action, the blades are made trough-like or hook-shaped to thus restrain the outward movement of heavy materials causing said materials to climb the blades. The lighter materials would be on top of the heavy materials and as the heavy materials fill the trough or groove the lighter material could be thrown off and immediately mixed with the down coming current by the whipping and commotion caused by the opposite rotation of the cage 8. The curvature of the blades 7 is greatest at the lower part thereof, gradually fading out as the blades ascend, the several blades being straight or flat at the top of the spiral helices as it may be termed. It will be observed that the sharp or forward lower end of the blades run almost parallel with the bottom of the container 1, thus allowing the material to be picked up easily. The pitch or slope of the blades gradually increases, being almost horizontal at the lower end of the blades and nearly perpendicular at the top thereof. The result of this is that, considering the trough or hook shaped veins, there is not a great tendency at the bottom to throw the materials away from the blades but there is a strong tendency at the top of the spiral to throw the materials outward and thus tend to increase the speed of circulation and execution of the cycle.

As the blades rotate there is formed more or less of a vacuum back of the revolving blade at the bottom of the container. This vacuum tendency causes an eddy current which tends to stir up the sediment left by the clearance between the lower extremity of said blades and bottom of container 1. The result is that what might otherwise remain on the bottom of the container is picked up and put in circulation so that all parts of the material get a thorough whipping, beating and mixing.

The mixer is intended for mixing fluids, semi-fluids, dry material, etc., paste, oils, etc., as well as for kitchen uses, it being understood that the construction and materials used may be varied to suit the particular demand. The pitch of the blade, the number of revolutions or turns, as well as the hook-shape of the blades would naturally vary with different construction, for instance, for heavy mixing, the construction of the cage 8 is somewhat different from that illustrated in the preferred type of device. As illustrated in Fig. 6, the circularly extending ribs or portions 11′ of the modified form are of an angular formation in cross section and arranged spirally, as shown, the several bands or strips 11′ being fastened as at 13′ to longitudinally extending strips 12′ of the cage. This angle iron, as suggested, is spiral in shape and put on in such a direction or position that as the cage is revolved oppositely to the blades, the action of the angle iron is to create a downward current along the sides of the vessel 1. This downward flow at the sides added to the upward thrust given the materials by the blades results in increased circulation of the entire material and consequently a more thorough mixing thereof.

From the foregoing, taken in connection with the accompanying drawings it is evident that the contents of the container 1 may be removed by bodily lifting the operating mechanism 3 and the mixing mechanism 2 therefrom; that the vacuum cup 10 serves as a means whereby the shaft 4 is held in

a vertical plane, the vacuum cup being fastened to the bottom of the container 1 by pressure exerted on the hand wheel 34; and that by reason of the deflector plate 9, the vertically moving material within container 1 will be directed again toward the sides of the container and thence downward and against the centrifugally thrown material, the thus conflicting currents or movement of the material causing a thorough mixing or whipping action to result.

In reduction to practice, I have found that the form of my invention, illustrated in the drawings and referred to in the above description, as the preferred embodiment is the most efficient and practical; yet realizing that the conditions concurrent with the adoption of my device will necessarily vary, I desire to emphasize the fact that various minor changes in details of construction, proportion and arrangement of parts may be resorted to, when required, without sacrificing any of the advantages of my invention, as defined in the appended claim.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

In a mixer, a cylindrical container, a central vertical shaft therein, blades twisted spirally around said shaft, a cage inclosing said blades and mounted for rotation, said cage including a plurality of vertically extending, horizontally spaced members, means for rotating the cage and shaft in opposite directions, and a rib twisted spirally around the cage connecting the members, said rib being twisted in a direction corresponding to the blades whereby when the cage and blades are rotated in opposite directions, current may be created in the liquid in opposite directions.

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

JOHN FRAME.

Witnesses:
A. H. NICHOLS,
JAS. A. COLSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."