Nov. 27, 1928. 1,693,170

S. ALSOP

MIXER

Filed March 30, 1925

Fig. 1.

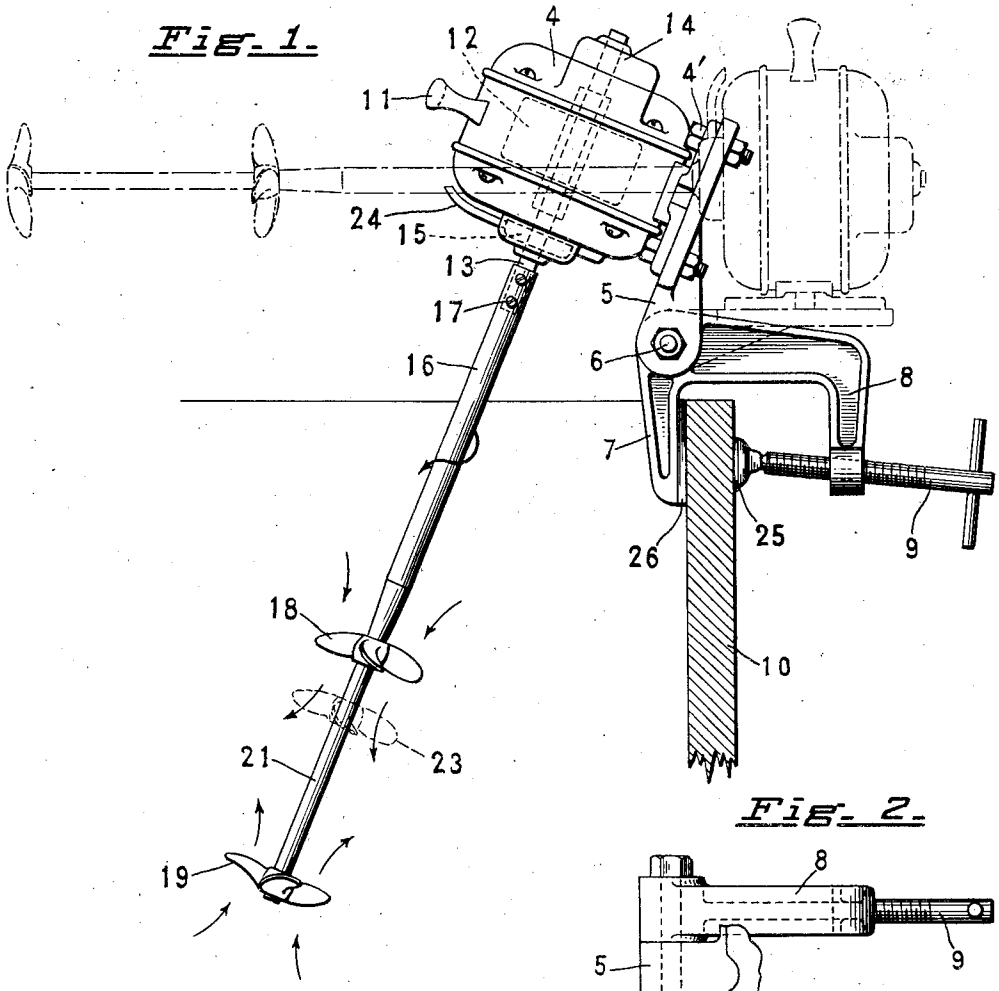


Fig. 2.

Fig. 4.

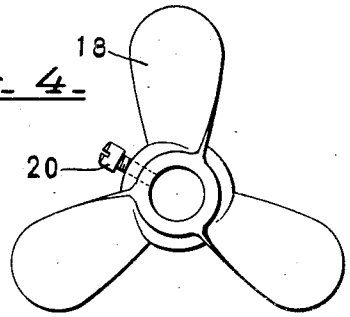
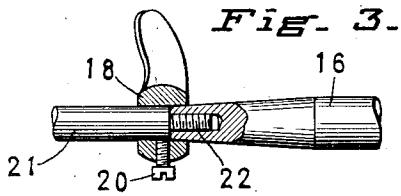


Fig. 3.



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UNITED STATES PATENT OFFICE.

SAMUEL ALSOP, OF NEW YORK, N. Y.

MIXER.

Application filed March 30, 1925. Serial No. 19,263.

My invention relates to mechanism for mixing liquids. The main object is to provide simple and reliable mechanism which can be readily installed and reliably operated.

Another object is to provide a construction of this character which can be electrically driven at various speeds.

Another object is to provide a construction which can be readily applied to any ordinary tank, barrel, crock, or tub, and readily removed or swung out of the way when not in use.

Another object is to provide a construction of this character which can be used for different depths of tanks, etc.

Another object is to provide a construction of this character which can be readily lubricated without danger of dripping oil.

Another object is to provide a construction of this character which can be operated for a long time without over-heating.

Another object is to provide a construction of this character which can be operated with practically no noise or vibration.

In the preferred form I provide a clamp which may be readily attached to the edge of a reservoir or receptacle of any suitable character. To this clamp I hinge a casing of an electric motor. The shaft of this motor is provided with an extension in one or more parts and each part carries one or more propellers suitably designed. The upper propeller is designed to circulate liquid downwardly and the lower propeller is designed to circulate the liquid upwardly so as to effectively mix the liquid to be treated. These propellers are so designed that the upward thrust is greater than the downward thrust so as to tend to lift the shaft and motor armature, thus avoiding wear on the bearings of the motor due to the weight of the parts.

Fig. 1 shows a side view of apparatus embodying my invention as applied to the edge of a tank or reservoir of any suitable construction. This figure also shows in dot-and-dash lines the position of the parts when the motor and shaft are tilted so as to raise the propellers out of the reservoir for cleaning, inspection, or other purpose.

Figs. 2 and 3 are fragmentary sectional views of details of construction.

Fig. 4 is a plan view of a propeller.

The casing 4 of the motor may be of any suitable type preferably detachably secured by bolts 4' to a base 5 having a lug hinged on the bolt 6 which is secured to the clamp 7. The outer arm 8 of the clamp carries an adjustable screw 9 which is adapted to be set up against the outer wall of the receptacle 10 opposite the inner arm of the clamp. By adjusting the bolt or screw 6 the motor casing may be frictionally held in any adjusted position, for instance, in the full line or in the dot and dash lines of Fig. 1 or any intermediate position.

For the purpose of adjusting it and handling the motor and clamp, I prefer to provide a handle or grip member 11 at a convenient place.

The motor may be of any suitable type having a rotatable armature 12 with a shaft 13 having bearings 14 and 15 in the opposite walls of the casing. The shaft extension 16 is suitably secured to the end of the shaft 13, as for instance, by one or more set screws 17. The propellers 18 and 19 are suitably secured to the shaft extension, for instance, the propeller 18 may be secured by a set screw 20. Preferably the extension is formed in two parts, the lower part 21 being provided with a screw threaded upper end 22 adapted to be screwed into a corresponding socket in the part 16. The lower end of the part 16 is preferably tapered somewhat so that when the propeller 18 is slid on to the shaft extension it binds on the tapered end, as shown in Fig. 2. It will thus be seen that the propeller covers the joint between the part 16 and 21. When the propeller 18 is clamped in place by the set screw 20, it will be found that the parts 16 and 21 are effectively locked together by the propeller and set screw 20. The lower propeller may conveniently be screwed on to the end of the shaft extension 21.

By making the upper propeller larger than the lower one, or by giving it a steeper pitch, I insure that the upward thrust be greater than the downward thrust of the shaft. This tends to lift the shaft and armature so as to greatly reduce the friction of the bearings in the motor casing. Either one of the propellers may be adjustable upward and downward on the shaft, and in fact an additional propeller 23, such as indicated by the dotted lines, may be employed if desired either to give additional lifting effect to the shaft or greater stirring or mixing capacity.

To facilitate lubrication of the bearing 15 I may provide a tube 24 which extends away from the shaft so as to not only conveniently permit oiling the lower bearing but to ac-

commodate a slight excess of oil in the bearing 15 or the tube 24 without having the oil run over and drip into the reservoir.

Motors for this character of work will be designed in accordance with the requirements of the work to be performed. For instance, for mixing small quantities of comparatively thin liquids, the motor may be from one-twelfth to one-eighth of a horsepower with high speed motor capable, for instance, of 10,000 R. P. M. For continuous duty on larger quantities of liquid, the motor may be from, say, one-quarter to one-third of a horsepower with a speed of, say, 1750 R. P. M. For mixing heavier liquids, such as paints and varnishes, and mixing ink, glues, dyes, syrups, etc., the motor may be geared down to, say, 440 R. P. M., and used with larger propellers. The invention has been found useful with propellers eight inches in diameter and shafts up to six feet in length for deep tanks. For small-sized tanks such as jugs and barrels, small propellers from two inches to four inches in diameter may be employed.

The directly connected motor eliminates overhead shafting, belting, and exposed gears, and of course saves a great deal of power because it is used only when actually required.

The combination of push and pull propellers agitates the liquid so rapidly that production is increased materially, thus not only saving a great deal of time but reducing the number of tanks and other apparatus ordinarily required and thus materially reducing the cost of installation. It solves the most difficult problems of mixing because the liquids or solids in the bottom of the tank are dislodged and forced to circulate by the agitation created by the differential action of the two or more propellers.

The motor and clamp are so constructed and the weight of the parts so disclosed as to cause as little strain as possible upon the edge of the tank and also so as to make it possible to conveniently lift and carry around the motor and clamp combination without disconnecting them. The importance of this will be appreciated when it is realized that the weight of the clamp, motor, and shaft is sometimes considerable.

By having the motor detachable from the base 5 I can substitute another motor very quickly on the same clamp.

The screw 9 is preferably inclined upwardly so as to hold the clamp more securely in place and prevent it from working loose. I also prefer to provide yielding pads 25, 26 for instance of leather to enable me to grip the receptacle securely without marring it.

I consider that the solid sectional shaft is much preferable to the telescopic shaft for mixing machines as it avoids pockets and the consequent collection of liquids and solids which is most objectionable. The shaft can be extended to any desired length by simply adding a number of sections.

I claim:

1. A mixer comprising, a clamp adapted to be secured to the edge of a liquid reservoir, a motor having a casing hinged to said clamp and a shaft rotatably supported in said casing and tiltable therewith, a number of propellers secured to said shaft and rotatable therewith, the lower propeller being shaped to raise an amount of liquid and the upper propeller being shaped to circulate a larger amount of liquid downwardly.

2. A mixer comprising an electric motor having an armature shaft adapted to extend up and down when operating in a reservoir, an extension carried by said shaft, a number of propellers carried by said extension for circulating liquid upward and downward, the upward thrust on said extension being about sufficient to counteract the downward thrust and the weight of the shaft, extension and propellers.

3. A mixer comprising a two part mixer shaft, one part being exteriorly tapered at the joint, a propeller having a part fitted on said tapered part, a set screw for holding said propeller in place, and means for rotating said propeller normally in a direction such that thrust due to the propeller is up the tapered part.

4. A mixer comprising an electric motor having an armature shaft adapted to extend up and down when operating in a reservoir, an extension carried by said shaft, a number of propellers carried by said extension for circulating liquid upward and downward, the upward thrust of said extension being about sufficient to counteract the downward thrust and the weight of the shaft extension and propellers, the spacing of said propellers being adjustable.

5. A mixer comprising in combination a tapered rotary shaft, means for supporting said shaft within a liquid reservoir, driving mechanism for said shaft, opposed propellers on said shaft, the propeller thrust in the shaft opposed to the force of gravity being larger than the propeller thrust in the opposite direction.

6. A mixer comprising in combination a rotary shaft, means for supporting said shaft within a liquid reservoir, driving mechanism for said shaft, opposed propellers on said shaft, the propeller thrust in the shaft opposed to the force of gravity being larger than the propeller thrust in the opposite direction, whereby axial thrusts in said shaft due to the propellers and to the weight of said shaft and propellers are substantially balanced.

SAMUEL ALSOP.