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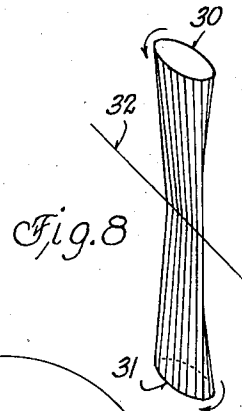
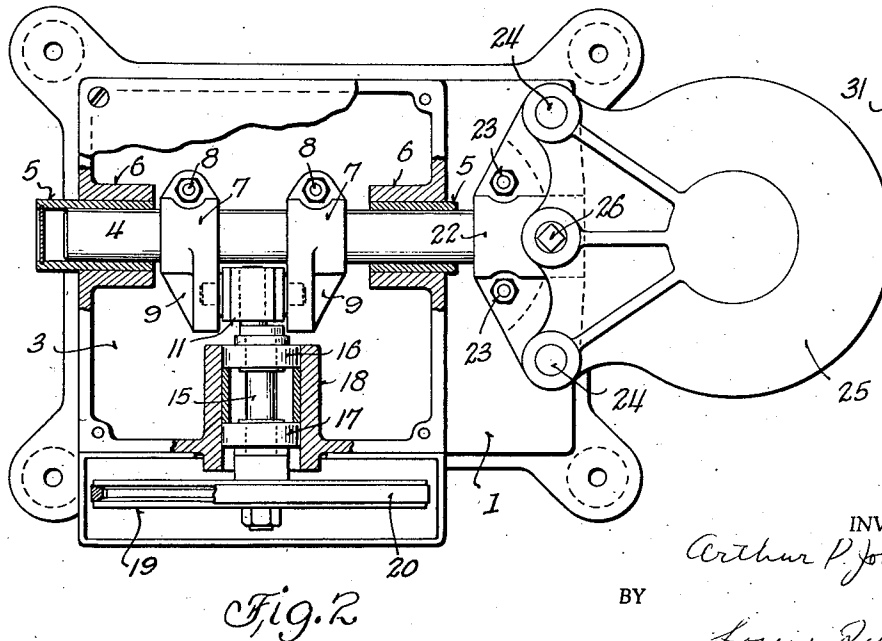
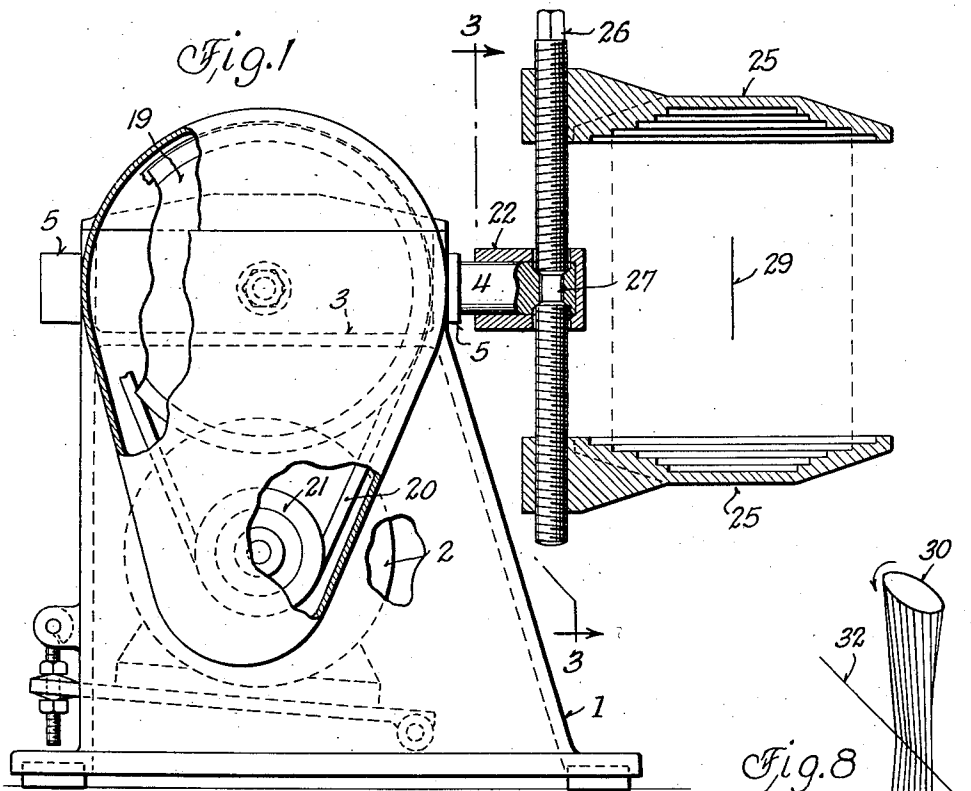
A. P. JORGENSEN

2,109,233

PAINT AND LIQUID MIXER

Filed Nov. 16, 1936

2 Sheets-Sheet 1



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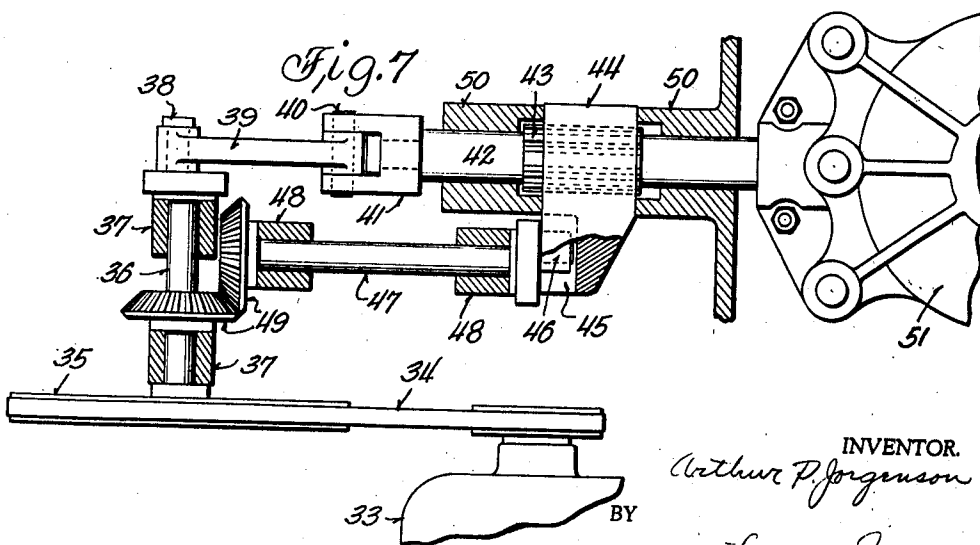
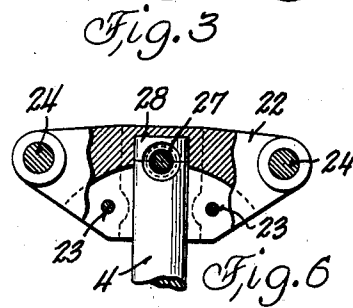
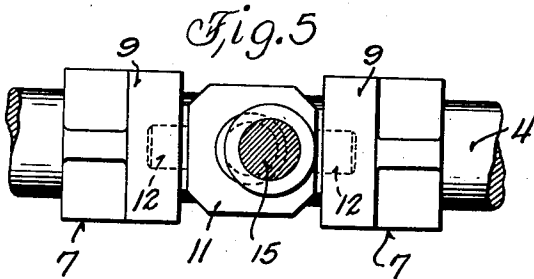
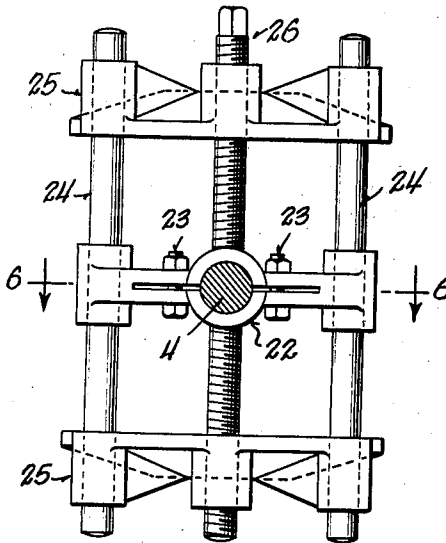
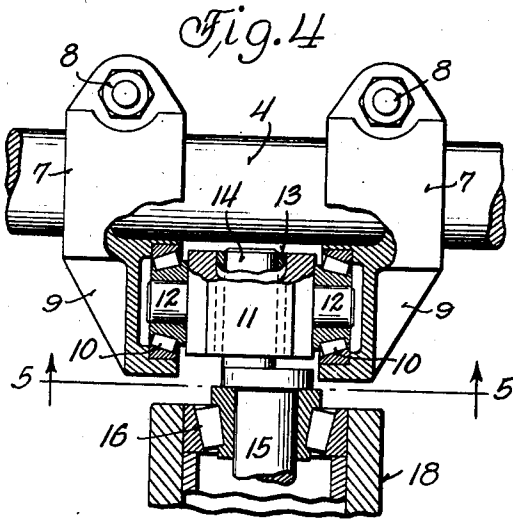
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2 Sheets-Sheet 2



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PAINT AND LIQUID MIXER

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REISSUED

Application November 16, 1936, Serial No. 110,987

7 Claims. (Cl. 259-72)

This invention relates to paint or other liquid mixing apparatus. It resides in a novel means for compelling a liquid container to execute an agitating or mixing movement, which movement in itself is novel and of enhanced effectiveness, never having been heretofore availed of for mixing or agitating of liquids. The apparatus of this invention comprises a shaft mounted in bearings permitting endwise and rotary reciprocation thereof with clamping means on said shaft for securing a liquid container thereto, and means acting upon said shaft causing the same to oscillate endwise and at the same time to execute a rotary reciprocation about an axis parallel to the direction of said endwise reciprocation. The motion induced is such that an imaginary radius emerging from said shaft sweeps a surface which may be defined as that class of conoid in which the generating line moves along a given line and a given curve while remaining parallel to a given plane.

A number of forms of apparatus have been proposed and used for agitating or mixing the contents of a container by shaking it without opening it. In some of these a cylindrical can, for example, is caused to roll first in one direction and then in another by placing the can horizontally upon a pair of spaced, horizontal rollers with appropriate driving means. In other forms the can is clamped to a bracket which is caused to rock to and fro and in some forms to execute a vertical bobbing movement while rocking, the entire movement, however, being parallel to a given plane. Other forms of apparatus have also been used, all of which, however, imposed straight line or mono-planer movement.

The machine of this invention, however, produces a movement distinctly different from that heretofore employed and produces results not heretofore achieved. The peculiar movement produced by the machine of this invention results in an extremely thorough agitation. Paint which has been permitted to stand and settle for several years can through the use of the machine of this invention be brought back into proper condition for use in a very few minutes.

The machine of this invention and the manner in which it operates is best described by reference to the accompanying drawings wherein

Fig. 1 is a side elevation of a form of machine of this invention, parts being shown broken away and parts being shown in section;

Fig. 2 is a plan of the machine shown in Fig. 1, parts being shown broken away and in section;

Fig. 3 is a rear elevation of the clamping

means of this invention as seen through the plane 3-3 of Fig. 1;

Fig. 4 is a plan view in detail of the crank, cross-member and lever arm employed to communicate movement to the main shaft of the machine shown in Figs. 1 and 2;

Fig. 5 is an elevation in section viewed through the plane 5-5 of Fig. 4;

Fig. 6 is a plan view in section with parts broken away viewed through the plane 6-6 of Fig. 3;

Fig. 7 is a plan view, with parts shown broken away, of another form of the machine of this invention;

Fig. 8 is a view showing the path of movement of a radial element passing through the container.

As shown in Figs. 1 and 2, the machine of this invention is mounted upon a base casting 1, which is in the form of a roughly rectangular structure having a large box-like space below in which a motor 2 is mounted. The base 1 is divided into two compartments by the diaphragm 3 shown in dotted lines in Fig. 1. The diaphragm 3 forms in the top of the base member 1 a relatively shallow rectangular tray adapted to hold a liquid lubricant and in which are mounted the main parts of the motion-producing mechanism.

The motion-producing mechanism mounted in the tray above the diaphragm 3 acts upon the main shaft 4. The main shaft is mounted for movement in bushings 5, 5, which are securely held in place in the base 1 by the bosses 6, 6. A pair of rocker arms 7, 7, are secured to the shaft 4, as shown, and held firmly in place by the clamping bolts 8, 8. The rocker arms 7, 7, are shown more in detail in Figs. 4 and 5. On the inner side of the extension 9, 9, of the rockers 7, 7, and facing one another are bearing housings in which roller bearings 10, 10 are held.

Movement is imparted to the shaft 4 through a cross-block 11, the projecting pins 12, 12 of which are mounted to turn in the bearings 10, 10. At right angles to the axis of the pins 12, 12 is the journal 13 in which the crank-throw 14 of the crank 15 turns and slides. The crank 15 is in turn mounted in bearings 16 and 17, shown clearly in Fig. 2 and more in detail in Fig. 4. The bearings 16 and 17 are securely held in place in a boss 18 formed as a part of the base 1. As shown clearly in Fig. 2, the shaft 15 projects outwardly from the base 1 and carries a sheave 19 by which it is driven. The sheave 19 is driven

by a belt 20, which passes about a pulley 21 mounted on the drive shaft of the motor 2.

From the apparatus as above described it may be observed that upon rotation of the shaft 15 under the influence of the motor 2 the crank-throw 14 causes the cross-block 11 to execute uniform circular motion. At the same time the cross-block 11 being confined to a radial excursion, in as far as vertical displacements thereof are concerned, slides back and forth upon the crank-throw 14. The motion of the cross-block 11, which is imparted through the bearings 10 to the rocker-arm 7, causes the shaft 4 to oscillate lengthwise and at the same time to execute an oscillating radial movement about its principal axis. This movement of the shaft 4 is communicated to a clamp shown on the right hand side of Figs. 1 and 2, and more in detail in Figs. 3 and 6.

The clamp, which is secured to the shaft 4, is composed of a central spreader 22, which is clamped in place upon the shaft 4 by the bolts 23, 23, the center being slotted as indicated in Figs. 3 and 6 to permit the clamping action. Firmly secured to the central spreader 22 are the vertical guide rods 24, 24, which pass through the ends of the spreader and are securely locked in place by means not shown. Mounted to slide upon the vertical guide rods 24, 24 are the cup-shaped jaws 25, 25. The jaws 25, 25 have depressions in their faces formed in stepwise fashion, as shown clearly in Fig. 1. Each of the succeeding circular steps is adjusted in dimension to the diameter of standard containers, for reasons which will be more fully explained below.

Control of the cup-shaped jaws 25, 25 is effected through the clamping-screw 26, which carries a wide groove 27 near its center, on either side of which are disposed screw-threads of right- and left-hand sense. The clamping screw 26 is held in place against endwise movement by engagement with the groove 27 of the recessed end of shaft 4, as shown clearly in Figs. 1 and 6. A recessed plug 28 further assists in holding the clamping screw 26. In assembling the clamping screw 26 with the shaft 4 and the center spreader 22, the plug 28 is first inserted into the central spreader 22. The screw 26 is then passed downwardly through the opening provided therefor in the spreader 22, entrance being possible by reason of the extra clearance provided as illustrated in Fig. 1. The spreader 22 carrying the screw 26 is then forced onto the shaft 4 until the parts assume the relationship shown in Figs. 1 and 6, after which the clamping screws 23, 23 are tightened to secure the assembly in place. The jaws 25, 25 are then simultaneously drawn into place by rotation of the screw 26.

In operating the apparatus above described, a can of paint, for example, is clamped in place between the jaws 25, 25, as illustrated by the dotted line in Fig. 1. The motor 2 is then placed in motion, causing the container clamped between the jaws 25, 25 to be moved in the manner above described. The movement executed can be better understood by referring to Fig. 8, in which is shown a perspective view of the surface swept by a segment of the axis of the can, for example, the segment 29 illustrated in Fig. 1. It will be noted that the ends of the segment pursue roughly elliptical paths 30, 30, while the center of the segment moves in a straight line 32. The shape of the surface swept may be described as a conoid. It will be noted that the elliptical paths 30 and 31 are in opposite direc-

tions and it is believed that this gyration of the two ends of the can in opposite directions has a bearing upon the thoroughness of the agitation obtained. For this reason it is advantageous to have oppositely approaching jaws 25, which will hold the can undergoing treatment approximately evenly disposed on either side of the shaft 4. However, at times advantageous results may be obtained although the container undergoing treatment is not evenly disposed on both sides of the shaft 4 and consequently the explanation above given, by way of theory only, is not insisted upon nor is it necessary in order to follow the directions herein given. The imposed agitation produced by the apparatus of this invention is caused by endwise and rotary reciprocation combined. For convenience, this movement will be referred to herein as endwise and coaxial rotary reciprocation.

In Fig. 7 is shown another form of apparatus of this invention which may at times be preferred for the production of the novel movement. Fig. 7 shows a motor 33 which drives a sheave 35 through a belt 34. Sheave 35 in turn is mounted upon a shaft 36 which turns in bearings 37, 37. The shaft 36 carries at its outer end a crank-throw 38 which engages the connecting-rod 39. The connecting-rod 39 is carried in the forked journal 40 formed as a part of the swivel block 41. The swivel block 41 in turn is mounted upon the main shaft 42 by means of a swivel connection which permits the shaft 42 to execute rotary movement free of the influence of the swivel block 41, but at the same time being confined to follow the endwise oscillation of the block 41 caused by the crank 38 and connecting-rod 39. The shaft 42 carries a splined portion 43 upon which the rocker-arm 44 is mounted, making a sliding splined connection therewith. The end of the rocker-arm 44 is slotted as shown at 45 to receive the end of a crank-throw 46 carried upon the shaft 47. The shaft 47 is mounted to rotate in bearings 48, 48 and is driven through a pair of bevel gears 49, the driving member of the latter being mounted upon shaft 36.

The shaft 42 is mounted in bearings 50, 50, which permit both endwise and rotary reciprocation of said shaft. Secured to the shaft 42 is a clamp 51 having oppositely approaching cup-shaped jaws of the type described above in connection with the other figure. This apparatus in operation executes simultaneous endwise and rotary oscillation imparting to a container carried in the clamp 51 a movement of the same nature as described in connection with Fig. 8 of the drawings.

That which I claim to be my invention and wish to secure by Letters Patent is as follows:

1. In an apparatus for agitating, the combination comprising a shaft mounted for endwise and coaxial-rotary reciprocation, means for securing a material container thereto, a pair of rocker-arms secured to said shaft, a uniformly rotating drive shaft having an eccentric portion, and a cross-block engaging the ends of said rocker-arms and the eccentric portion of said drive shaft, whereby uniform circular motion of said drive shaft is communicated in the form of endwise and coaxial-rotary reciprocation to said reciprocable shaft.

2. In an apparatus for agitating, the combination comprising a shaft mounted for endwise and coaxial-rotary reciprocation, means for securing a material container to said shaft, a crank shaft having a throw mounted for rotation with its axis

at right angles to the axis of said reciprocable shaft and intersecting the same, a cross-block journaled on the throw of said crank shaft, trunnions on said cross-block, rocker arms mounted upon said reciprocable shaft and engaging said trunnions, a supporting base upon which said crank shaft and reciprocable shaft are mounted and a tray mounted on said base for retaining lubricant in contact with said cross block crank throw and trunnions.

3. In an apparatus for agitating, the combination comprising a shaft, means mounted on said shaft for affixing a material container thereto, and means acting on the shaft for causing conoidal revolving movement of any radial element of the container extending perpendicularly from the projected axis of the shaft.

4. In an apparatus for agitating, the combination comprising a shaft, means mounted on said shaft for affixing a material container thereto, and means acting on the shaft for causing conoidal revolving movement of any radial element extending from the axis of the shaft through the container.

5. In an apparatus for agitating, the combination comprising a shaft, means mounted on said shaft for affixing a material container thereto, a uniformly rotating driving shaft, and means interposed between said driving shaft and said

first-mentioned shaft for causing conoidal revolving movement of any radial element extending from the axis of the first-mentioned shaft through the container.

6. In an apparatus for agitating, the combination comprising a shaft, means mounted on said shaft for affixing a material container thereto, a rocker arm secured to said shaft, a drive shaft transversely mounted with respect to said first-mentioned shaft and having an eccentrically disposed portion engaging said rocker arm for causing conoidal revolving movement of any radial element extending from the axis of the first-mentioned shaft through the container.

7. In an apparatus for agitating, the combination comprising a shaft, means mounted on said shaft for affixing a material-container thereto, a second shaft having an eccentrically-mounted member thereon acting upon said first-mentioned shaft to cause it to oscillate endwise, and a third shaft having an eccentrically-mounted member thereon also acting upon said first-mentioned shaft to cause the same to oscillate radially and in conjunction with said second shaft to cause conoidal revolving movement of any radial element extending from the axis of the first-mentioned shaft through the container.

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