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H. B. BINGHAM

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AGITATOR

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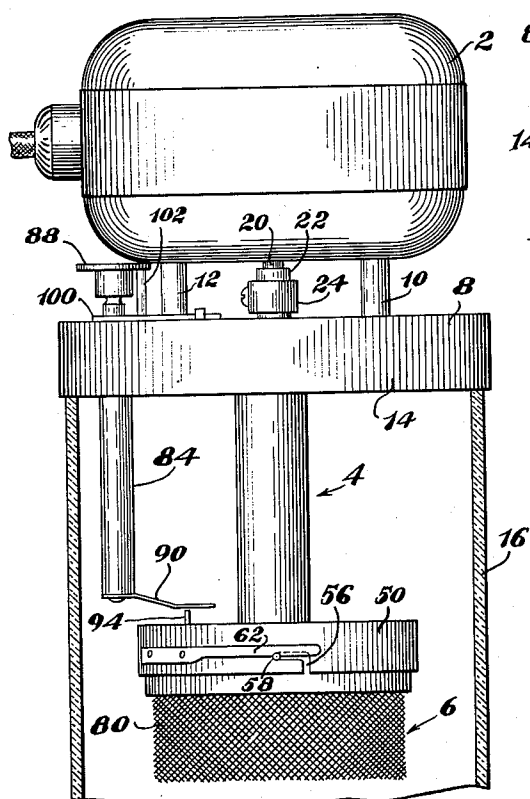


FIG. 1

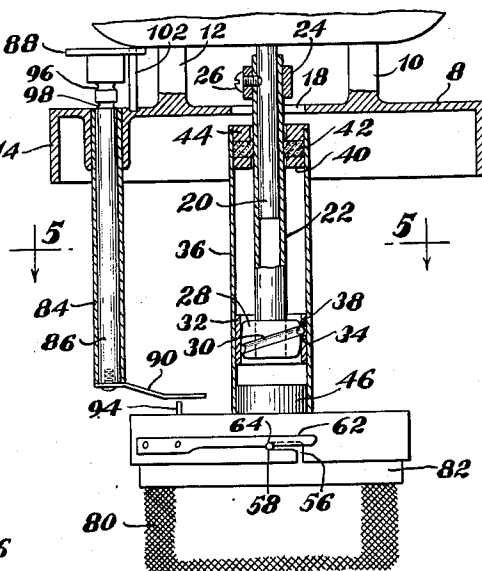


FIG. 2

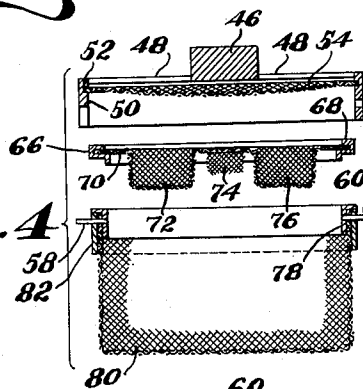


FIG. 4

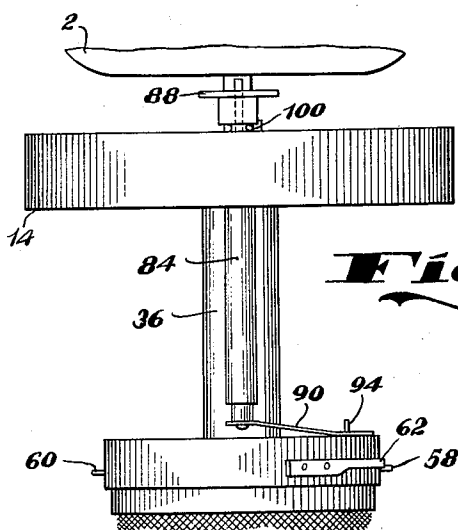


FIG. 3

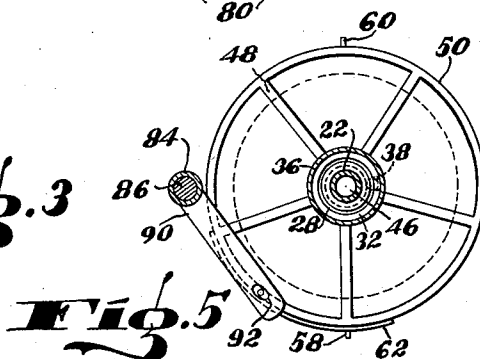


FIG. 5

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AGITATOR

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This invention relates to cleaning and has particular reference to a machine for agitating small parts in cleaning solutions to facilitate the removal of oil, dirt, tarnish, or any other matter that may be affected by the solutions used.

In the jewelry art, and in watchmaking and watch repairing, it is necessary from time to time to clean various small articles or parts. In the typical situation it may involve the cleaning of a ring, a small chain, or the parts of a watch. To clean such articles by hand is a slow laborious task and the results are somewhat uncertain.

Heretofore machines have been designed having a basket in which the parts to be cleaned may be placed, which basket may then be rotated in the necessary cleaning solutions. This has in general proved more or less satisfactory, depending on the particular articles to be cleaned; but in the watchmaking and watch repairing field the prior machines have not been satisfactory, for the reason that the mechanisms used have not always insured a thorough cleaning and in some cases have resulted in breakage or damage to the parts as they are whirled in the submerged basket.

The present invention is an improvement on the cleaning machines now in use and operates so that, during certain of the cleaning operations, the basket in which the various parts are placed will be reciprocated vertically. By this movement of the basket, the parts are in constant agitation in a generally vertical direction at speeds sufficient to cause proper scouring and cleaning.

The invention further consists in the provision of mechanism which will cause not only vertical movement of the basket, but also rotary motion of the basket at such time as it is desired.

Thus, through the use of this invention, the parts may be agitated by an up-and-down basket movement at desired cleaning stages, while they may be rotated at other cleaning stages and at the drying stage. In general, however, it has been found preferable to move the basket up and down vertically during all stages in which the basket is submerged in the successive cleaning and rinsing solutions, and the rotary movement of the basket is relied upon only for drying.

These and other objects of the invention will become more apparent as the description proceeds with the aid of the accompanying drawing, in which

Fig. 1 is a side elevation of the agitating unit mounted in position on a liquid container.

Fig. 2 is a vertical section detail showing the

driving mechanism with the parts arranged to produce rotary motion of the basket.

Fig. 3 is a side elevational detail with the parts arranged to induce vertical reciprocating motion of the basket.

Fig. 4 is an exploded view of the basket construction.

Fig. 5 is a plan view on the line 5-5 of Fig. 2. The invention comprises primarily a motor 2, a driving mechanism 4 and a container or basket 6.

The motor 2 is preferably of the induction type so that if the device is used in the presence of inflammable liquids, there will be no sparking that might induce a fire or explosion. Ordinarily a rheostat or other motor speed control will be used so that the basket speeds, both vertical reciprocating and rotary, may be controlled.

Motor 2 is carried on a base 8 by the supports 10 and 12. A flange 14 depends from base 8 to fit about the upper edges of the containers with which the unit may be used. Such a container is shown at 16 in Fig. 1, and may be of glass large enough to contain a suitable volume of liquid.

Base 8 has a central aperture 18 through which extends shaft 20 of motor 2. A hollow tubular cam shaft 22 is mounted on shaft 20 and affixed against rotation by set screw 26, which extends through collar 24.

The lower end of cam shaft 22 carries a circular cam 28 having extending thereabout a continuous cam track 30, the form of which is clearly shown in Fig. 2. Surrounding cam 28 is a short sleeve 32 having a small hole 34 in its wall. Sleeve 32, in turn, is secured within tube 36 so that there may be no vertical or rotary movement between them. Cam 28, however, is free to rotate within sleeve 32. A small ball 38, the diameter of which is approximately twice the thickness of the wall of sleeve 32, is positioned in hole 34, with the inner half of the ball located in cam track 30. It will be seen from this construction that upon rotation of cam 28 within sleeve 32, tube 36, if restrained from rotation, will be caused to reciprocate vertically.

The upper end of tube 36 is closed by a washer 40, a gasket 42 and a cap 44. There is sufficient clearance, however, to allow cam shaft 22 to rotate. Gasket 42, in engagement with cam shaft 22, provides an oil-tight seal.

The lower end of tube 36 is closed by stud 46, which latter member has extending therefrom a plurality of spokes 48, see Fig. 5, which terminate at and carry rim 50.

Rim 50 in turn supports the necessary basket

structures that hold the parts to be cleaned. This construction is shown in detail in Fig. 4.

Rim 50 is undercut at 52 about its inner circumference to receive a disk of fine screening 54 which acts as a top closure for the basket. The rim 50 at diametrically opposite points is cut, as at 56 in Fig. 2, to receive in locking engagement pins 58 and 60 that in turn carry the suspended baskets. Means for locking the pins in place is afforded by the spring latch 62 resting against the outer circumference of rim 50, which spring is notched at 64 to snap down upon pin 58 when the latter is in proper position.

The basket may be in any convenient form. In the watchmaking and watch repairing field, however, it is customary to make the basket in two parts, the upper being of very fine mesh to receive very small watch parts, while the lower is of coarser mesh wherein may be placed the larger parts.

The upper part of the basket, shown in Fig. 4, has a rim 66 with a crimped down flange 68 that secures the periphery of the upper basket 70 in place. Basket 70 may have a plurality of depressed areas, as 72, 74, and 76, in which may be placed the small parts to be cleaned. Rim 66 fits closely within rim 50 and upwardly against screening 54. The lower part of rim 66 fits within the rim 78 of the lower basket. The upper periphery of the screening of which lower basket 80 is composed is secured about rim 78 by supporting band 82. That is, the upper edge of the basket screening is squeezed tightly between the rim 78 and band 82 so that it cannot fall out under the loads imposed. Pins 58 and 60, already referred to, extend through rim 78 and band 82, further locking the parts together.

From the description just given, it is believed apparent that parts to be cleaned may be placed in the lower basket 80 and the smaller depressed portions 72, 74 and 76 of the upper basket, which in turn may be placed upon the lower rim 78 to close the lower basket. These two nested baskets may then be placed within rim 50 and locked in position by suitable engagement of pins 58 and 60 with the locking mechanism.

Also mounted in base 8 is a depending tube 84, through which extends a rod 86 having at its upper end a finger grip 88 and at its lower end a flexible spring finger 90. The outer end of spring finger 90 has a hole 92 therethrough, which can be seen in Fig. 5. On the upper edge of rim 50 is positioned a pin 94 of a size suitable to pass through hole 92. It is believed apparent that when finger grip 88 is depressed, as shown in Fig. 3, so that pin 94 is locked within hole 92, rotation of rim 50 and all parts associated therewith will be prevented; and conversely, when spring finger 90 has been raised to the position shown in Fig. 2 by upward movement of finger grip 88, rim 50 and all associated parts will be free to rotate.

To insure rod 86 remaining in either up or down position, the upper end thereof is grooved at 96 and 98 to receive a displaceable spring member 100, shown in Figs. 1 and 3, and to prevent rotation of rod 86, finger grip 88 has extending therethrough a vertical pin 102 mounted on base 8, and along which the finger grip may slide.

The construction described accomplishes two results—it permits vertical reciprocation or rotary movement of the baskets, as the operator may elect.

To produce vertical reciprocation, finger grip 75

88 is depressed so that pin 94 extends through hole 92. If the hole and pin are not in alignment, rim 50 is rotated by hand until pin 94 enters hole 92. The motor is then started, causing rotation of cam 28. The cam follower, ball 38, held against rotation about the cam by the restraint of sleeve 32, is caused to reciprocate vertically, carrying with it sleeve 32, tube 36, and, of course, the baskets which are connected thereto. When the baskets are at their lowermost position, pin 94 will still be gripped by spring finger 90, and when the baskets are at their topmost position, spring finger 90 will have been bent upwardly a limited amount, but will, of course, still be in engagement with pin 94. That is to say, as long as rim 50 and associated parts are restrained against rotation, the operation of the motor will cause continuous vertical reciprocation of the baskets. The rate of reciprocation may readily be controlled by the speed of the motor, the two being in direct relation. The basket motion thus produced has been found to result in proper washing or cleaning of the parts, and the unit, being light in weight, may be readily transported from one jar of cleaning solution to the next. That is, there may be, for example, four jars of solution, the first of which may contain a strong cleaning fluid. Vertical reciprocation of the parts therein will remove the oil films, tarnish or other undesirable characteristics. When this has been accomplished, the motor may be stopped and the basket transferred to the next jar, which may contain a rinse. Reciprocation of the baskets will cause removal of the initial cleaning solution from the parts. Thereafter the basket may be transferred to another solution, as, for example, benzine, which will in turn remove the original rinsing material, and finally the basket may be transferred to a fourth solution, as, for example, alcohol, which will remove the benzine and rinsing solutions and put the articles within the basket in condition for final drying.

The basket, with its cleaned articles therein, may then be rotated until drying is completed. Rotation of the basket is accomplished as follows: Finger grip 88 is raised to the position in Fig. 2. This frees pin 94 from the restraining spring finger 90. The motor is set in operation and cam 28 commences revolution. The friction between cam track 30 and the follower 38, induced by the weight of the basket and all associated parts, is such that the basket commences to turn, reciprocating vertically at the same time. Very shortly, however, within a second or two, the rotary speed of the basket will equal that of the motor, so that further vertical reciprocation is entirely eliminated and the only movement of the basket is rotary.

Centrifugal force throws any liquid remaining on the parts in the basket outwardly and in a very short time all will be completely dry. The baskets may then be removed from rim 50 and the cleaned and dried parts removed.

In order to promote long life and ease of operation, the interior of cam shaft 22 and the interior of tube 36 may be filled with oil. This is possible since the construction renders the power-transmitting unit entirely oil-tight and in consequence the came mechanism operates in an oil bath, which materially reduces the friction when rim 50 is restrained. When rim 50 is unrestrained, so that the baskets are rotating, there is no relative movement between the parts within tube 36.

The means shown for restraining rotation of rim 50, which in turn induces vertical reciprocation of the baskets, illustrates only one form of holding the basket against rotation. It is obvious that any arrangement which would prevent rotation of tube 36, permitting at the same time vertical motion thereof, would be equally satisfactory. The form adapted, however, is particularly desirable, because the very considerable flexibility of spring finger 90 does not cause any particular resistance to upward or downward movement of rim 50, and therefore does not put any extra load on cam 28.

I claim:

1. An agitator comprising a motor and a basket to hold the objects to be agitated, means connecting said motor to said basket whereby the latter may be either reciprocated or rotated, said connecting means comprising a circular cam mounted on said motor shaft and having a cam track extending thereabout, a tubular member connected to said basket and surrounding said cam, a follower positioned in said cam track and secured against vertical movement with respect to said tubular member whereby upon rotation of said cam said tubular member and the basket connected thereto will be reciprocated in the direction of said motor shaft, and means for restraining said basket and tubular member against rotation.

2. An agitator comprising a supporting base with means depending therefrom for locating said base on the top of a container with which it may be used, said base having an aperture therethrough, a motor mounted on said base, a driving member connected to said motor through said aperture, and a follower associated with said driving member for converting the rotary motion of said motor to reciprocating motion of said follower, means for preventing rotation of said follower, and a basket connected to said follower.

3. An agitator comprising a motor having a shaft extending downwardly therefrom and a basket having a shaft extending upwardly and axially therefrom, a cam and follower interposed between said motor shaft and said basket shaft, one connected to the motor shaft, the other connected to the basket shaft, means for restraining said basket against rotation while permitting vertical movement, whereby, upon rotation of said motor shaft said basket will be reciprocated vertically, and means for freeing said basket of said restraining means, the friction between said cam and follower being sufficient to cause rotation of said basket when the latter has been freed of said restraining means.

4. An agitator comprising a motor, a shaft driven by said motor, a basket for holding objects to be agitated, said basket having a shaft extending therefrom, said driven shaft and basket shaft being in substantially vertical axial alignment, releasable means for restraining said basket against rotation, a cam and follower, one connected to said driven shaft and the other connected to said basket shaft whereby rotation of said driven shaft will cause vertical reciprocation of said basket so long as said basket is restrained from rotation and whereby rotation of said driven shaft will cause rotation of said basket so long as said basket is unrestrained.

5. An agitator comprising a source of rotary power and a part to be agitated, an inner shaft and a tubular shaft positioned over and coaxially with the inner shaft, one of said shafts con-

nected to said power source for causing continuous rotation thereof, the other of said shafts connected to the part to be agitated, releasable means for restraining said other shaft against rotation, means comprising a cam and follower positioned within said tubular shaft, the cam connected to one shaft, the follower connected to the other shaft, whereby rotation of the shaft connected to said power source will result in reciprocation of said other shaft so long as the latter is restrained against rotation and whereby rotation of the shaft connected to said power source will cause rotation of said other shaft so long as the latter is not restrained against rotation.

6. An agitator comprising a supporting base, a motor mounted thereon, a vertically disposed shaft rotatably driven by said motor, a second shaft coaxial with said driven shaft and telescoped therewith, a basket connected to said second shaft, releasable means for restraining said second shaft against rotation, means interposed between said telescoped shafts for converting the rotary motion of said driven shaft into reciprocating motion of said second shaft so long as said second shaft is restrained against rotation and for transferring the rotary motion of said driven shaft to rotary motion of said other shaft so long as the latter is not restrained against rotation.

7. An agitator comprising a basket for holding objects to be agitated, a shaft extending axially and vertically therefrom, a motor, a vertical shaft driven by said motor and coaxial with said basket shaft, releasable means for restraining said basket shaft against rotation, and means connecting said basket shaft to said motor driven shaft for imparting to said basket reciprocating movement so long as said basket shaft is restrained against rotation and for imparting rotary movement to said basket when the basket shaft is unrestrained.

8. An agitator comprising a first vertical shaft and means for causing rotation thereof, a second shaft coaxial with said first shaft and supporting a basket, releasable means for restraining said second shaft against rotation, a cam and follower interposed between said first and second shafts, one connected to one shaft, the other connected to the other shaft, whereby rotary motion of said first shaft will cause reciprocating movement of said second shaft so long as the latter is held against rotation and whereby rotary motion of said first shaft will cause rotary motion of said second shaft so long as said second shaft is not held against rotation.

9. An agitator comprising a motor, a shaft in vertical position driven by said motor, a basket to hold objects to be agitated having a shaft extending vertically therefrom and coaxial with said driven shaft, a cam mounted on one shaft, a follower mounted on the other shaft, releasable means for preventing rotary motion of said basket shaft whereby rotation of the driven shaft will cause reciprocation of said basket shaft and basket, said cam and follower providing friction drive means for causing rotation of said basket shaft at approximately the same number of revolutions per minute as that of said driven shaft when said basket shaft restraining means is released.

10. An agitator comprising a supporting base having an aperture therethrough, a motor mounted on said base with its shaft in vertical position, a driving member connected to said motor shaft, a follower associated with said

driving member, releasable means for restraining said follower against rotation, the relationship of said driving member and follower being such that so long as said follower is restrained against rotation, rotary movement of said driving member will cause reciprocating motion of said follower, but when said follower is not restrained against rotation, rotary movement of said driving member will cause rotary movement of said follower, and a basket connected to said follower.

11. An agitator comprising a first shaft and a second shaft with their longitudinal axes in alignment, means for causing rotation of said first shaft, a basket connected to said second shaft, releasable means for restraining rotation of said second shaft, and means comprising a cam and follower connecting said first and second shafts for imparting either reciprocating or rotary movement to said second shaft, the type of movement imparted depending solely on whether said second shaft is restrained against rotation.

12. An agitator comprising a source of rotary power, a substantially vertical inner shaft and a tubular shaft larger than said inner shaft positioned over and coaxially with the inner shaft and forming a space therebetween, the inner shaft connected to said source of rotary power, the tubular shaft connected to a basket or the like, means interposed between said inner shaft and tubular shaft for maintaining said shafts in longitudinal relationship and for permitting relative rotary motion therebetween when said tubular shaft is restrained against rotation, said tubular shaft closed at a point below the location of said interposed means and extending upwardly beyond said interposed means, thereby forming an oil reservoir for continuous lubrication of said interposed means.

13. An agitator comprising a basket for holding objects to be agitated, a source of rotary power, a basket in axial alignment with said source of rotary power, means serving the dual purpose of connecting said power source and said basket and inducing reciprocating or rotary movement of said basket, said means comprising a cam rotating in one direction only, and a follower, one attached to said source of rotary power and the other connected to said basket, and releasable means for restraining said basket from rotary movement while permitting axial reciprocation caused by the relative movement between said cam and follower, the relationship between said cam and follower being such that when said restraining means is released, said basket will cease reciprocation and commence rotation.

14. An agitator comprising a motor, a vertically disposed shaft driven by said motor, a basket to hold objects to be agitated, means for connecting said shaft to said basket in vertical alignment and for inducing either vertical reciprocating motion or horizontal rotation of said basket, as desired, said connecting means comprising a cam and follower, one connected to said shaft and rotating continuously in the same direction, the other connected to said basket, and means for restraining said basket against rotation whereby the relative movement between said cam and follower will cause vertical reciprocation of said basket, the frictional relationship between said cam and follower being sufficiently great so that, if said restraining means is removed, said basket will be horizontally rotated.

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