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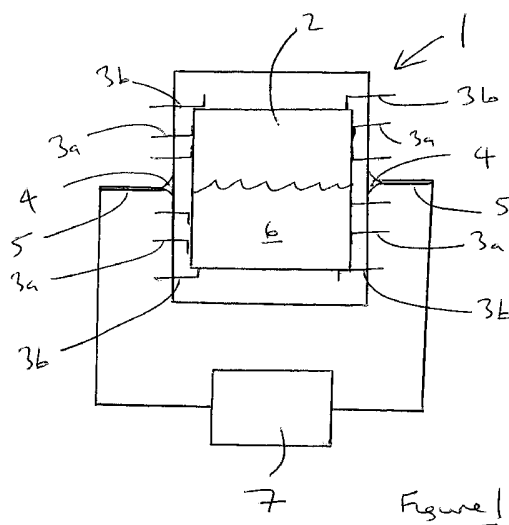
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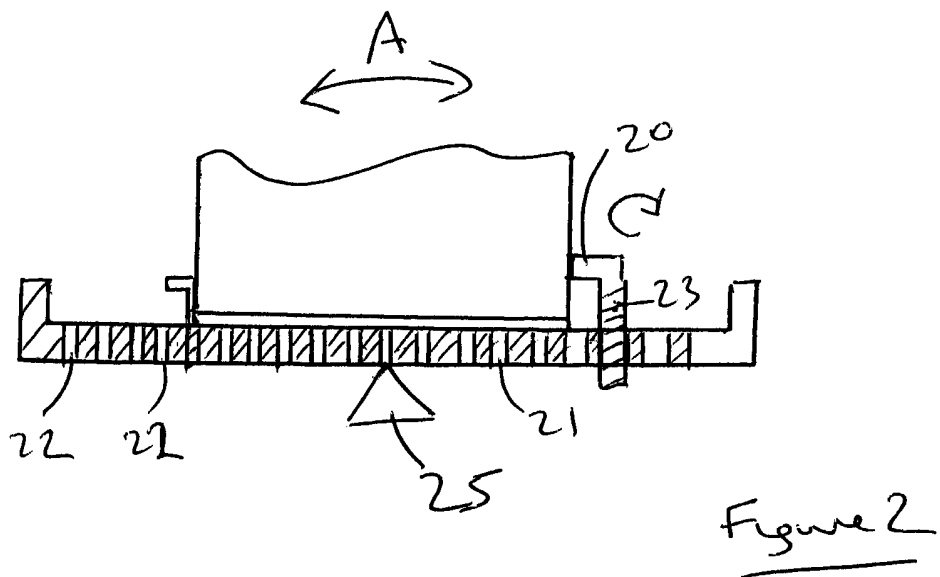
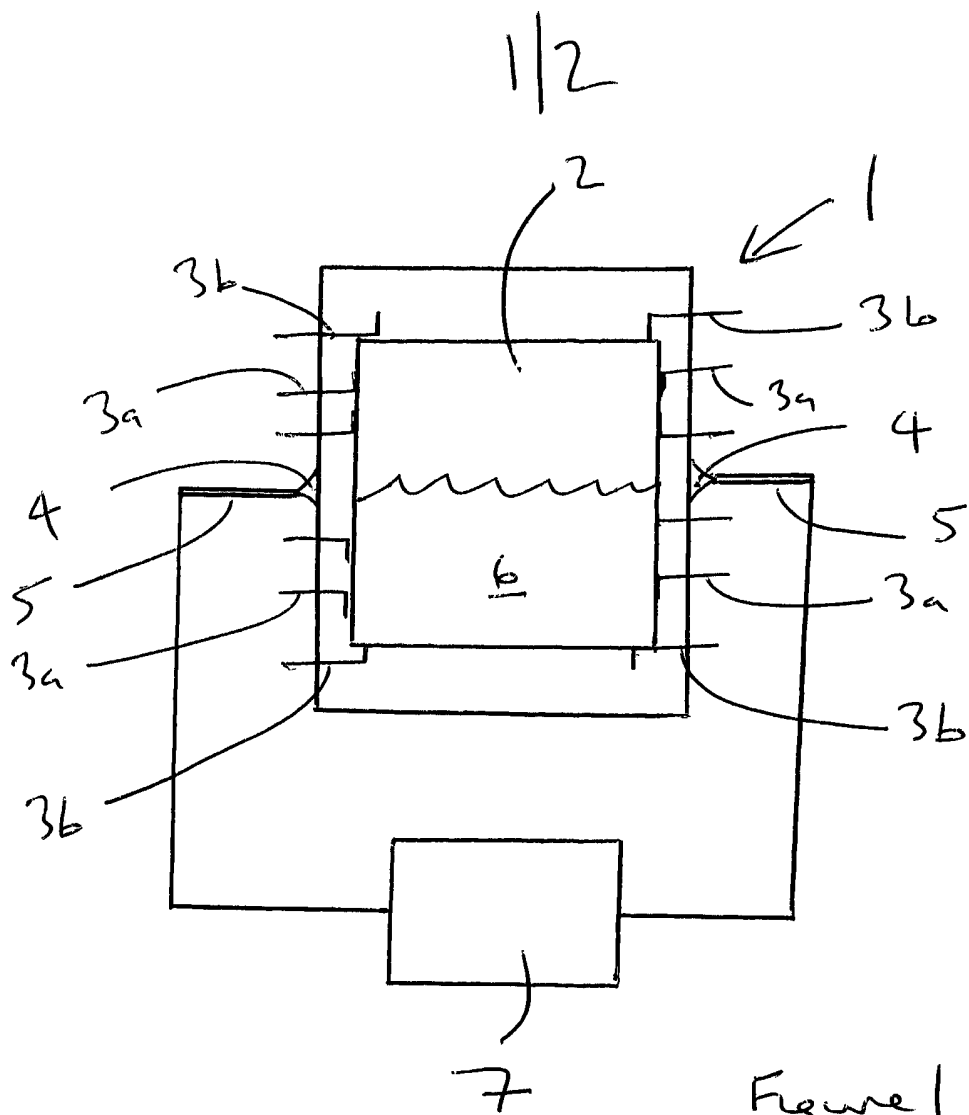
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Other: **Online: EPODOC, WPI**

(54) Abstract Title: **Fluid Mixer**

(57) A mixer for a container 2 including a partial volume of fluid 6; the mixer comprising a cradle 1 formed between end members 4, the cradle arranged to hold the container and having a pivot whereby it can be rotated and tilted in order to mix the fluid within the container. The mixer is particularly for use in mixing tins of paint. The cradle may be shaped to allow the container to slide within it, whereby the container comes to an abrupt halt upon striking an end member for shock mixing. Alternatively, the cradle may be provided with locator elements 3 which extend within the cradle in order to securely locate different sizes of containers.



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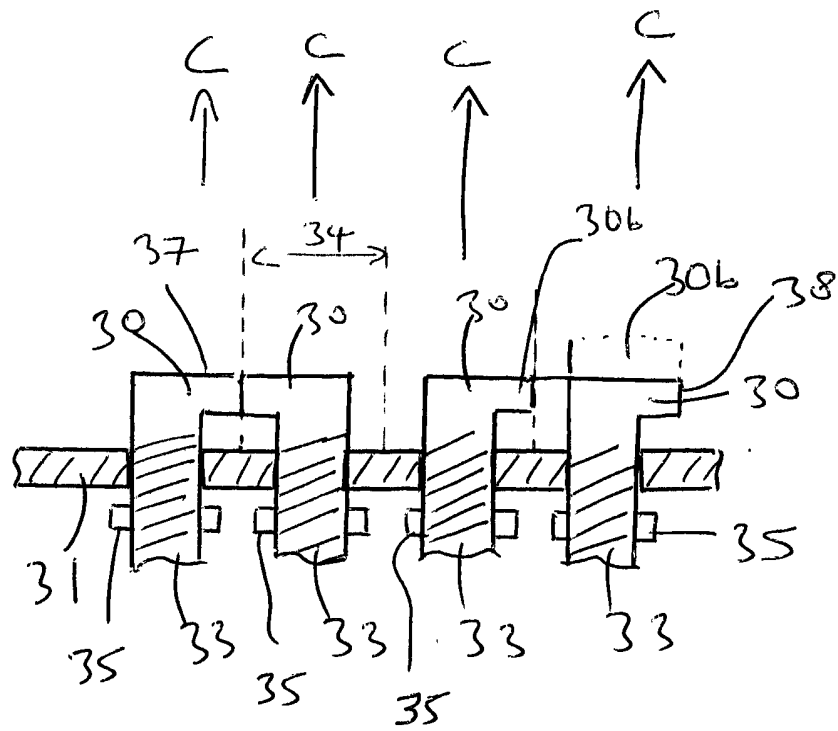


Figure 3

Fluid Mixer

5 The present invention relates to fluid mixers and more particularly to mixing fluids such as paint stored for considerable periods of time in order to achieve a more homogeneous distribution of fluid composition after settling.

10 A number of fluids utilised for painting and other DIY activities essentially comprises suspension of solids or emulsions or mixtures of partially immiscible fluids. In such circumstances over a period of time these fluids settle leading to a non homogeneous distribution within the fluid. In such circumstances, remnant cans of paint, etc gradually deteriorate over time, not so much with respect to their actual practical applicability as a paint but more with respect to the consistency of the colour of that paint throughout
15 the fluid volume. It will be appreciated that paints are generally batch tested for consistency of colour, but if the paint should settle over a period of time it is possible for that distribution to be disturbed in the paint can leading to slight variations in colour matching. In order to attempt to mix paint within a tin, it is typical to tilt and shake the tin or even introduce a stirrer in the form of a stick
20 to mix up the paint. Neither of these approaches is ideal.

In accordance with the present invention there is provided a fluid mixer for a container generally including a partial volume of fluid, the mixer comprising a cradle formed between end members, the cradle arranged to
25 allow confinement of a container for fluid, the cradle having a pivot whereby the cradle can be rotated and tilted for oscillation of the container confined within the cradle.

30 Normally, the container comprises a plurality of elongate members or an elongate sleeve in order to define a perimeter within which a container is confined.

Typically, the container is shaped to allow a container to slide in the cradle as it is rotated and tilted, whereby the container comes to an abrupt halt upon striking an end member for shock mixing.

5 Generally, at least one end member is removable to allow entry of a container within the cradle.

Typically, rotation and tilt of the cradle is achieved by a handle attached to a spindle at the pivot for the cradle.

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Alternatively, rotation and tilt of the cradle is achieved by driving an electric motor for rotation of a spindle attached to the pivot of the cradle.

15 Generally, the spindle is driven by a power train between the motor and the spindle. Possibly, the power train allows variation in rotation to facilitate mixing. Such variations may include alteration in speed of rotation. Additionally, such variations may include abrupt reversing of rotation and tilt to facilitate mixing. Possibly, location of a container within the cradle is achieved through locator elements which extend into the cradle in order to securely
20 locate a container. Possibly, these locator elements comprise a screw thread for adjusting position and a contact for abutment upon a container whereby collective action of the locator elements ensures position of the container within the cradle at least whilst that cradle is rotated or tilted.

25 Embodiments of the present invention will now be described by way of example and with reference to the accompanying drawings in which

Fig. 1 is a schematic illustration of a fluid mixer for containers in accordance with the present invention;

30

Fig. 2 is a schematic illustration of a second embodiment of the present invention; and,

Fig. 3 is a schematic illustration of locator members in accordance with the present invention.

5 As indicated above, generally fluid such as paints and varnishes tend to settle over long periods of time. This settling of the contents of the fluid result in a non homogeneous mix and therefore inconsistent result when applying that fluid as a paint coating, etc. Nevertheless, these fluids are generally stored in containers such as tins or plastic tubs with lids or other
10 closures such that the actual fluid does not rapidly deteriorate or mature beyond acceptability for use.

 The present invention particularly relates to fluids which are stored in cans or tins or plastic tubs but which settle over prolonged periods of time. In
15 such circumstances and referring to Fig. 1 providing a schematic depiction of a fluid mixer in accordance with the present invention, it will be seen that a cradle 1 is provided which defines a containment volume for a container 2 secured by locating elements 3. The cradle 1 has pivots 4 which allow rotation and tilt of the cradle 1 when turned about spindles 5 extending from
20 the pivots 4. In such circumstances it will be appreciated that any fluid 6 within the container 2 will be mixed by a sloshing motion as the cradle 1 is rotated about the pivots 4 through spindles 5.

 Clearly, the process by which the cradle 1 is rotated will be
25 instrumental with respect to the degree of mixing in order to achieve a homogeneous dispersion in the fluid 6. In such circumstances it is possible to provide for at least one of the spindles 5 to incorporate a handle (not shown) in order to allow rotation of the cradle 1 for mixing of the fluid 6. Alternatively, the spindles 5 may be coupled to an electric motor 7 in order to turn the cradle
30 1 and therefore container 2 containing the fluid 6. By use of an electric motor or other powered mechanism it will be appreciated that a controller may be arranged to vary the speed of rotation of the cradle, the period of time of such

rotation and possibly introduce rapid oscillation variations in the speed of rotation as well as abrupt halt and rotation and possibly reverses in rotation in order to create "sloshing" within a fluid 6 for mixing.

5 The present invention comprises a cradle 1 which is specifically designed to accommodate a wide range of container 2 sizes. It will be appreciated that it is important to closely confine the container 2 within the cradle 1 to achieve optimum mixing effect with respect to a fluid 6. Unfortunately, fluids such as paints are supplied in a number of different sized
10 containers which although normally of a cylindrical nature can be oval or square or rectangular in cross section and of differing lengths. Normally, it is not acceptable to allow the container to move once confined within the cradle 1 as the container lid may become detached releasing the fluid 6 within the container 2. In such circumstances in accordance with the present invention,
15 locator elements 3 are provided which extend inwards of the cradle 1 in order to confine the container 2. In order to accommodate different sizes of container these locator elements as illustrated typically take the form of L-shaped members which are secured to the side and through the cradle 1 with screw threads. By having L-shaped ends it will be understood that a
20 positional range is provided for engagement with the container 2 over the turn range of the L-shaped foot. In such circumstances by provision of a plurality of spaced apertures normally with screw threads in the side walls of the cradle 1 it is possible to ensure that a container 2 can be supported and confined by locator elements 3 closely by positioning the locator elements through the
25 apertures in the side wall of the cradle closest to the actual necessary side for confinement of the container 2 and then by rotation of the L-shaped foot members engage that container robustly. Typically, some locator elements 3a will engage the side of the container 2 whilst other locator elements 3b will engage end parts of the cradle 1. In such circumstances the container 2 is
30 securely located within the cradle 1 and therefore cannot move as the cradle 1 is rotated/tilted.

Normally, ends 8 of the cradle 1 will be closed by closure members, but in order to facilitate access, at least one of these closure members will be removed. Alternatively, the ends 8 may be open to allow a container 2 simply to be placed within the cradle 1 and then the appropriate locator elements
5 brought into contact with that container 2 for positional location. As indicated typically a plurality of holes will be provided in the sides of the cradle 1 and the locator elements brought into association with the container as required.

Fig. 2 illustrates a second embodiment of the present invention in
10 which a see-saw cradle 21 is provided. In such circumstances the see-saw cradle 21 is mounted upon a pivot 24 to allow a tilting rotation in the direction of arrowhead A. This tilting rotation may be achieved as indicated previously by a manual action or through use of an appropriate driver such an electric motor and drive mechanism. In any event, as previously, a container (not
15 shown) is robustly located between locator elements 23 which again can rotate about a screw thread such that L-shaped feet 20 of the locators 23 can be turned into close engagement with a container (not shown). The see-saw cradle 25 includes a number of positions for apertures 22 which accommodate locators 23. In such circumstances the locator foot size 20 is
20 determinant as to the range of possible positions for engagement by that foot where the container for securing location of the container during tilt motions for mixing of fluids within the container. In such circumstances the container is rigidly secured by close confinement by the locating members 23.

25 Fig. 3 provides a representative illustration of a section of cradle 31 incorporating a number of locator members 33 to achieve container confinement within the cradle 31. Thus, the locator members 33 include a screw thread extending through an aperture 32 in the cradle 31 wall in order that the locator members can move in the direction of arrowheads C whilst
30 rotation of the L-shaped foot 30 of each locator element 33 allows adjustment of that foot for input and impingement upon a container in the range defined by 34 in Fig. 3. In such circumstances, relatively close confinement of a

container can be achieved by a number of locator elements 33 such that they can engage with that container. In such circumstances the container is robustly held for the relatively violent rotation and tilting action to mix the fluid with little or no clearance gap between the locator members 33 and the container.

It will be appreciated that most containers for fluids such as paint and varnish are formed from relatively thin metal or plastic material. In such circumstances if a high pressure forcing grip was applied to the container then the container is either liable to puncture or at least flex during rotation or tilt and so may become dislodged. By provision of accurate peripheral definition through the locator elements 33, the container is closely confined within the cradle such that aggressive rotation and tilt can be performed in order to achieve mixing.

In Fig. 3 it can be seen that lock elements 35 may be provided which are secured upon the screw thread of the elements 33. The purpose of these lock elements 35 is to provide an indication as to the notional necessary position of the locator element for a particular size of container. It will be appreciated that if it is known that a particular size of container is to be used then the lock elements 35 can be positioned appropriately and therefore rapid inward movement of the locator elements performed to approximate the necessary peripheral definition through the L-shaped feet 30 to constrain that container. Similarly, when releasing the container these lock elements will provide a history as to the necessary position for return if that container should be re-confined within the cradle for subsequent operations.

Although described through use of screw threads, it will be understood that other forms of positioning may be used such as interference blocks for inward position, that is to say in the direction of arrowhead C whilst still allowing rotation of the foots 30 to accommodate particular container positions. It will be understood that the L shaped feet are particularly required

with respect to engagement of the ends of the container. Furthermore, by provision of locator elements in accordance with the present invention the ends of the cradle can be open as it is not necessary to provide securing means which extend inwardly from those end locations.

5

By a combination of aperture positions for locator elements and those locator elements having L shaped feet which can rotate to include the full range of potential positions for a container, it is possible to closely continue that container irrespective of its size whilst ensuring the lid is retained. Again referring to Fig. 3 it will be noted that the rotational range of the feet 30 extends in the ranges between broken lines 36 and that therefore a container can be located by engagement with these feet over the full range of positions by one of the locator elements 33 whilst other locator elements are brought into engagement with the sides of that container.

15

It will be appreciated that the actual dimensions of the feet 30 may be adjusted as required by operational performance. In one position it will be appreciated that the length 37 of the foot 30 is important with respect to the range of potential positions through rotation as well as the abutment surface for engagement against a side of a container. The depth 38 indicates when engaging the end of a container the abutment surface against that container. Furthermore, it will be understood by appropriate choice of rotation of two feet 30a, 30b, it is possible to create an effective corner element to secure container position.

25

Although described principally with respect to paint and other emulsion type suspension which may settle, it will be understood that the present invention could also be utilised with respect to materials held in buckets such as mastic materials and even ready made mortars and plasters etc. These ready made solutions are generally distributed in lightweight containers formed from thin material or plastics and so an aggressive gripping device may puncture or at least dent the container.

30

The present invention utilises close confinement rather than compressing the engagement to ensure container position in the mixer device.

5

The locator elements may be formed from a plastics material or a metal. Modifications to the present invention will be appreciated by those skilled in the art including the number and spacing of locator elements in order to achieve robust positioning of the container for tilt and rotation and therefore mixing of a fluid within the container. It will be understood that it is the literature and collective effect of the locator elements which ensures good containment of the fluid container for mixing.

10

Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

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CLAIMS

1. A fluid mixer for a container generally including a partial volume of fluid,
5 the mixer comprising a cradle formed between end members, the cradle arranged to allow confinement of a container for fluid, the cradle having a pivot whereby the cradle can be rotated and tilted for oscillation of the container confined within the cradle.
- 10 2. A mixer as claimed in claim 1 wherein the container comprises a plurality of elongate members or an elongate sleeve in order to define a perimeter within which a container is confined.
- 15 3. A mixer as claimed in claim 1 or claim 2 wherein the container is shaped to allow a container to slide in the cradle as it is rotated and tilted, whereby the container comes to an abrupt halt upon striking an end member for shock mixing.
- 20 4. A mixer as claimed in any of claims 1, 2 or 3, wherein at least one end member is removable to allow entry of a container within the cradle.
- 25 5. A mixer as claimed in the preceding claim wherein rotation and tilt of the cradle is achieved by a handle attached to a spindle at the pivot for the cradle.
6. A mixer as claimed in any of claims 1 to 4 wherein rotation and tilt of the cradle is achieved by driving an electric motor for rotation associated with a spindle attached to the pivot of the cradle.
- 30 7. A mixer as claimed in claim 6 wherein the spindle is driven by a power train between the motor and the spindle.

8. A mixer as claimed in claim 7 wherein the power train allows variation in rotation to facilitate mixing.

5 9. A mixer as claimed in claim 8 wherein variations may include alteration in speed of rotation.

10. A mixer as claimed in claim 8 or claim 9 wherein variations may include abrupt reversing of rotation and tilt to facilitate mixing.

10 11. A mixer as claimed in any preceding claim wherein location of a container within the cradle is achieved through locator elements which extend into the cradle in order to securely locate a container.

15 12. A mixer as claimed in claim 11 wherein these locator elements comprise a screw thread for adjusting position and a contact for abutment upon a container whereby collective action of the locator elements ensures position of the container within the cradle at least whilst that cradle is rotated or tilted.

20 13. A fluid mixer for a container generally including a partial volume of liquid substantially as hereinbefore described with reference to the accompanying drawings.

25 14. Any novel subject matter or combination including novel subject matter disclosed herein, whether or not within the scope of or relating to the same invention as any of the preceding claims.

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Application No: GB0424404.2

Examiner: Heather Webber

Claims searched: 1 - 14

Date of search: 23 January 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1, 2, 4, 6, 7, 11 & 12	GB 1586476 A (PRITCHARD) see whole document
X	1, 2, 4 - 7, 11 & 12	US 3090604 A (WHEELER) see whole document
X	1, 2, 4 - 7, 11 & 12	US 5050996 A (ALLEN) see whole document
X	1 - 4, 6, 7, 11 & 12	US 4422768 A (SOLOMON) see whole document
X	1, 2, 4, 6, 7, 11 & 12	US 3415495 A (GRUBELIC) see whole document
X	1, 2, 4 - 7	US 4265548 A (HALL) see whole document
X	1, 2, 6 - 10	US 3542344 A (OBERHAUSER) see whole document
X	1 & 6 - 10	US 6322243 B1 (BULL) see whole document

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X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

12

B1C

Worldwide search of patent documents classified in the following areas of the IPC

B01F

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI