Oct. 30, 1962 J. A. KRAFT ETAL 3,061,280

APPARATUS FOR MIXING FLUENT MATERIAL

Filed April 6, 1959 2 Sheets-Sheet 1

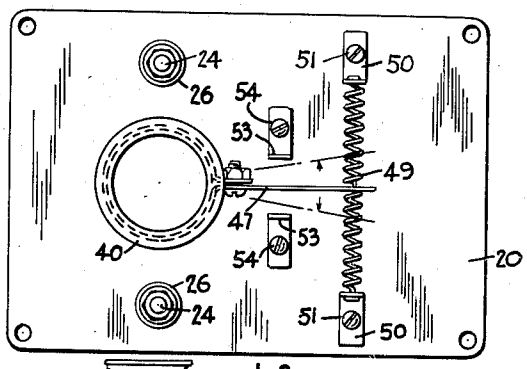

FIG.2.

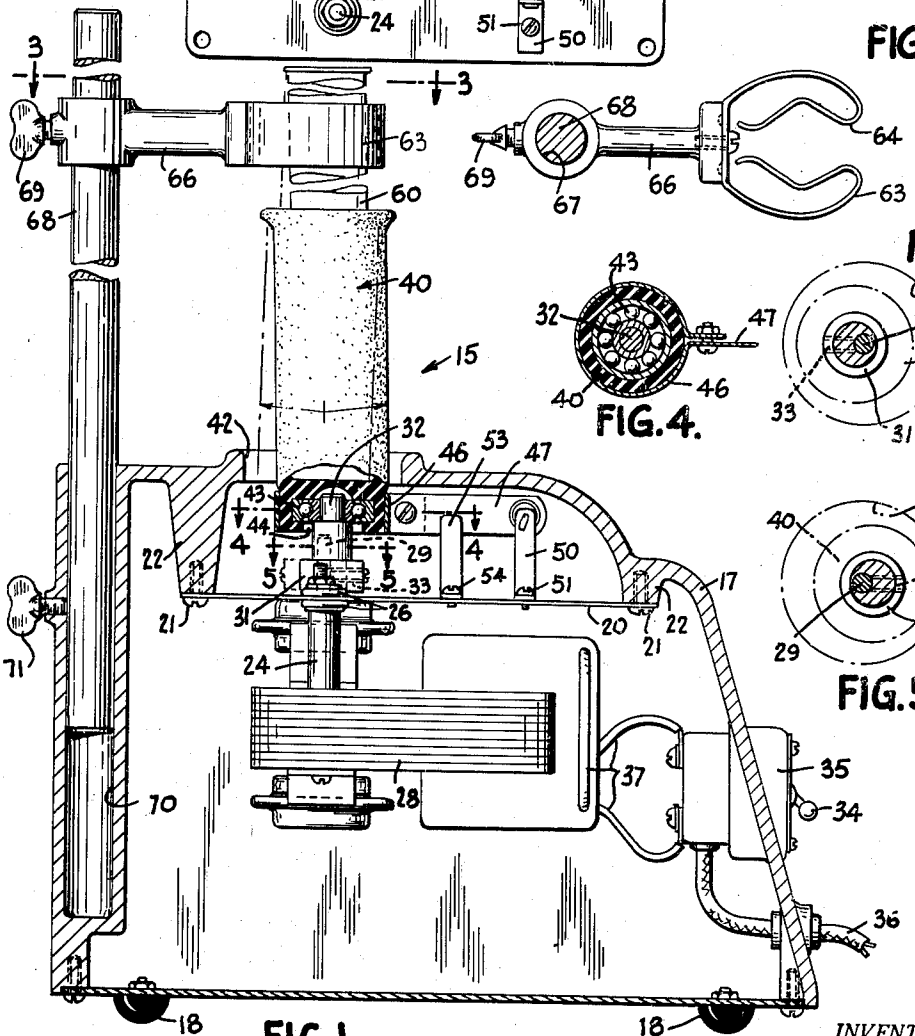

FIG.1.

FIG.3.

FIG.4.

FIG.6.

FIG.5.

INVENTORS.
JACK A. KRAFT.
HAROLD D. KRAFT.

BY

Carey Freeman
ATTORNEY.

Oct. 30, 1962 J. A. KRAFT ETAL 3,061,280

APPARATUS FOR MIXING FLUENT MATERIAL

Filed April 6, 1959 2 Sheets-Sheet 2

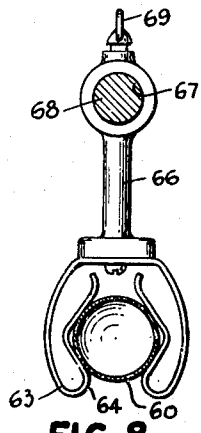

FIG. 8.

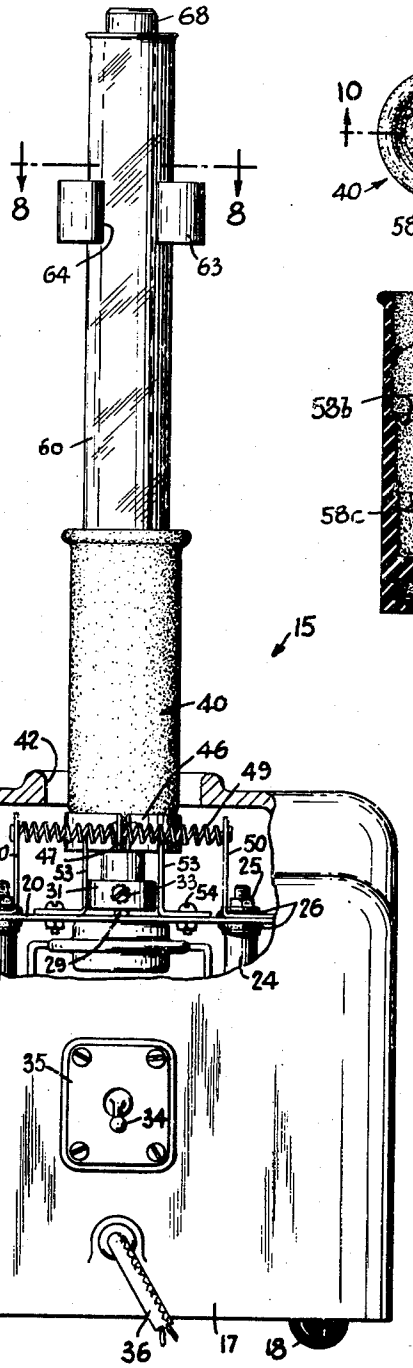

FIG. 7.

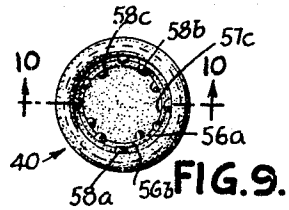

FIG. 9.

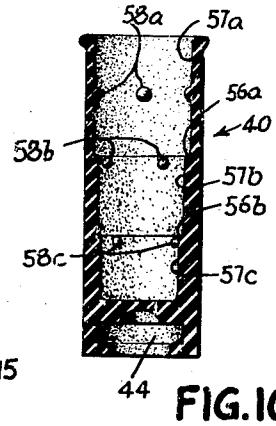

FIG. 10.

INVENTORS.
JACK A. KRAFT.
HAROLD D. KRAFT.

BY

ATTORNEY.

United States Patent Office 3,061,280
Patented Oct. 30, 1962

3,061,280

APPARATUS FOR MIXING FLUENT MATERIAL

Jack A. Kraft and Harold D. Kraft, Flushing, N.Y., assignors to Kraft Scientific Corp., Queens, N.Y., a corporation

Filed Apr. 6, 1959, Ser. No. 804,500
8 Claims. (Cl. 259—72)

This invention relates to mixing apparatus and, more particularly, to apparatus for mixing various types of fluent material.

The proper mixing of certain materials is sometimes absolutely necessary, particularly when mixing various types of chemicals. The problem is more acute when it is necessary to mix small quantities of fluent chemical materials, such as in a laboratory, where large complex mixing machines are not practical. It is, therefore, an object of the present invention to provide a relatively compact and highly efficient mixing device which will properly and completely mix various types of fluent materials at a relatively high speed and in a simple and efficient manner.

Another object of the present invention is to provide a table top type fluent material mixer that requires a minimum amount of space, power, and specialized skill for its proper operation.

An additional object of the present invention is to provide a mixing device of the above type in which test tubes may be conveniently inserted and removed with one hand during the operation of the apparatus.

A further object of the present invention is to provide fluent material mixing apparatus particularly suited for mixing fluent material within small containers, such as test tubes, which will readily accommodate various sizes of test tubes without adjustment or use of adapters.

A more specific object of the present invention is to provide a high speed fluent material mixing device having an eccentrically mounted dynamic mounting for receiving one lower end of a laboratory test tube and a relatively static mounting substantially universally pivotally supporting the opposite upper end of the test tube, and which is particularly efficient for mixing protein bound iodine with water.

All of the foregoing and still further objects and advantages of this invention will become apparent from a study of the following specification, taken in connection with the accompanying drawing, wherein:

FIG. 1 is a longitudinal cross-sectional view of a mixing device made in accordance with the present invention, in operative use.

FIG. 2 is a top plan view of certain portions of a dynamic mounting forming a part of the present invention.

FIG. 3 is a fragmentary cross-sectional view taken along line 3—3 of FIG. 1, showing an upper static mounting forming another part of the present invention.

FIG. 4 is a transverse cross-sectional view taken along line 4—4 of FIG. 1, showing certain bearing portions of the dynamic mounting.

FIG. 5 is a transverse cross-sectional view taken along line 5—5 of FIG. 1, showing the eccentric mounting of the dynamic bearing forming a part of the present invention, in one partially rotated position.

FIG. 6 is a view similar to FIG. 5, showing the bearing in another partially rotated position.

FIG. 7 is a front elevational view, with parts broken away, of the machine shown in FIG. 1.

FIG. 8 is a transverse cross-sectional view taken along line 8—8 of FIG. 7, showing the static mounting releasably secured in the upper end of a test tube within.

FIG. 9 is a top plan view of a resilient cup forming a part of the dynamic mounting of the apparatus.

FIG. 10 is a longitudinal cross-sectional view taken along line 10—10 of FIG. 9.

Referring now to the drawing, and more particularly to FIGS. 1 and 2 thereof, a mixing machine 15 made in accordance with the present invention is shown to include a main housing 17 having resilient pads 18 for supporting it upon a stationary object, such as the top of a table or work bench. Screws 21 releasably secure a mounting plate 20 upon depending bosses 22 within the interior of the housing 17.

As is more clearly shown in FIG. 7 of the drawing, the mounting plate 20 supports a motor 28 by means of depending posts 24 secured thereto by nuts 25 and cushion type washers or grommets 26. This motor 28 has a vertical shaft 29 upon which a collar 31 is eccentrically secured by means of a set screw 33. The eccentrically mounted collar 31 includes a concentric center pin 32 which serves to drive the dynamic mounting, in a manner hereinafter more fully described.

A switch 35 having a manually operated toggle lever 34 controls the operation of the motor 28 which is supplied with electrical energy through leads 37 from a main source of electrical energy 36. Thus, in response to energization of the motor 28, the rotating motor drive shaft 29 is operative to eccentrically rotate the collar 31 and the centrally mounted pin 32 thereof.

With further reference now to FIGS. 4, 9, and 10, a resilient cup 40 is mounted within an enlarged opening 42 at the top of the housing 17 and has a ball bearing assembly 43 secured within a downwardly opening recess 44 thereof, such as by an annular band 46. This band 46 serves to clamp the ball bearing assembly 43 in place within the recess 44 of the cup 40, with the drive pin 32 of the collar 31 mounted within the inner race of the ball bearing assembly. It will thus be recognized that in response to energization of the motor 28, the eccentric movement of the pin 32 is transmitted through the ball bearing assembly 43 to the lower end of the resilient cup 40, to thus drive this lower end of the cup eccentrically within the enlarged opening 42 of the housing and constituting what we term a dynamic mounting. An arm 47 integral at one end with and extending radially outwardly from the annular band 46 serves to prevent rotation of the resilient cup 40 concentrically about its longitudinal axis. The outer free end of the arm 47 is mounted upon a central portion of an elongated coil spring 49 that is secured at its opposite ends to L-shaped brackets 50 mounted upon the plate 20 by screws 51. As is clearly shown in FIG. 2 of the drawing, concentric rotation of the resilient cup 40 about its own longitudinal axis is yieldably resisted by the spring 49, while fixed brackets 53 secured to the plate 20 by screws 54, serve to positively limit such rotational movement between predetermined fixed limits. The limiting of the rotational movement of the cup 40 about its own longitudinal axis by the positioning spring 49 and fixed stops 53 enables the operator to insert or remove fluent material receiving vessels, such as test tubes 60, with a simple twisting action with one hand.

Referring now more specifically to FIGS. 9 and 10 of the drawing, the resilient cup 40 of the dynamic mounting is shown to have an inner stepped wall defining longitudinally spaced apart annular shoulders 56*a*, *b* that define three discrete cup portions 57*a*, *b*, *c*, each such portion being adapted to receive the lower end of a test tube of a different size. In order to prevent the formation of a partial vacuum upon the insertion of the test tube to the cup 40, radially inwardly extending protuberances 58*a*, *b*, *c* are integral with the inside wall of each one of the test tube receiving portions 57*a*, *b*, *c* of the cup 40, thus enabling the test tubes to be easily inserted and removed during use.

A spring type clamp 63 having an outer end opening 64 of self-adjustable size to provide a static mounting for accommodating the upper ends of test tubes 60 of different sizes therein, is mounted upon the outer end of the rigid support arms 66. This arm 66 includes a central bore 67 that slidably receives a rigid rod 68 therethrough to form a substantially static stationary mounting for the upper end of the fluent material containing test tube being driven. The post 68 is received within a vertical longitudinal bore 70 of the housing 17 and is adjustably secured therewithin by means of a manually releasable thumb screw 71. A similar thumb screw 69 carried by the arm 66 controls the position of the arm 66 relative to the post 68.

In actual use, such as when mixing one cc. of semi-solid protein bound iodine with 10 cc. of water, all of which may be placed within the test tube 60, the motor 28 is preferably set to rotate at approximately 2400 r.p.m., under load. The lower end of the test tube 60 is inserted into the proper portion 57*a*, *b*, *c* of the resilient cup 40 of the dynamic mounting, while the static mounting clamp 63 is adjusted so as to engage the upper extremity of the test tube. It will thus be recognized that in response to energization of the motor 28, the dynamic mounting will drive the lower end of the test tube eccentrically about the motor drive shaft at a relatively high rate of speed and through a relatively small radius of rotation. The upper static mounting 63 thus functions as a yieldable universal coupling for simply retaining the upper end of the test tube in a relatively stationary position while the opposite lower end thereof is spun by the resilient cup of the dynamic mounting which resists radially outward movement with an elastic snapping action. It has been found that this device is especially effective for mixing chemicals of the type described in a relatively short period of time and in a thorough and uniform manner. However, it is also contemplated that the types of fluent materials, such as paints, powders, and liquids may also be efficiently mixed with apparatus based upon the teachings of the present invention.

While this invention has been described with particular reference to the construction shown in the drawing, it is to be understood that such is not to be construed as imparting limitations upon the invention, which is best defined by the claims appended hereto.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. Apparatus for use with a fluent material-containing vessel for mixing material contained in said vessel, said apparatus comprising in combination, a fluent material storage vessel having an upper and a lower end, a base, a drive motor having a drive shaft supported within said base with said drive shaft in a substantially vertical position, a dynamic mounting eccentrically carried upon said drive shaft, said dynamic mounting having support means for releasable engagement with the lower end of a fluent material containing vessel, a static mounting carried by said base for releasably securing the opposite upper end of the fluent material containing vessel in a substantially fixed position during eccentric movement of said dynamic mounting and lower end of the vessel carried upon said shaft, and yieldable positioning means carried by said base and said dynamic mounting, restraining said dynamic mounting against concentric rotation.

2. Apparatus for mixing fluent material as set forth in claim 1, wherein said yieldable positioning means comprises an arm having one end integral with and extending radially outwardly from said dynamic mounting, and spring means acting against the opposite end of said arm resisting concentric rotational movement thereof.

3. Apparatus for mixing fluent material as set forth in claim 2, further comprising fixed stops at opposite sides of said arm positively limiting said concentric rotation of said dynamic mounting therebetween.

4. Apparatus for mixing fluent material as set forth in claim 1, wherein said dynamic mounting includes a resilient upwardly opening cup, a bearing carried by the lower end of said cup, and an eccentric pin secured to said drive shaft rotatably received within said bearing.

5. Apparatus for mixing fluent material as set forth in claim 4, wherein the interior of said cup includes an inside wall having a plurality of protuberances frictionally receiving the lower end of the vessel and maintaining it in spaced relationship with said inside wall of said cup.

6. Apparatus for mixing fluent material as set forth in claim 5, wherein the inside diameter of said cup decreases along the length of said inside wall from said outer open end to the opposite lower end thereof.

7. Apparatus for mixing fluent material comprising in combination, a base, a fluent material storage vessel having an upper and a lower end, a dynamic mounting supported by said base for receiving said lower end of said vessel, motor drive means for eccentrically rotating said mounting relative to said base, said motor having a drive shaft, and a static mounting receiving the opposite upper end of the storage vessel for securing it in substantially stationary position during said eccentric rotation of said dynamic mounting with the lower end of the storage vessel, said dynamic mounting including an upwardly opening resilient cup slidably receiving the lower end of said vessel within the upper end thereof, a bearing carried by the opposite lower end of said cup and a pin secured eccentrically to said motor drive shaft rotatably received within said bearing.

8. Apparatus for mixing fluent material comprising in combination, a base, a fluent material storage vessel having an upper and a lower end, a dynamic mounting supported by said base for receiving said lower end of said vessel, motor drive means for eccentrically rotating said mounting relative to said base, said motor having a drive shaft, and said dynamic mounting including an upwardly opening resilient cup slidably receiving the lower end of said vessel within the upper end thereof, a bearing carried by the opposite lower end of said cup and a pin secured eccentrically to said motor drive shaft rotatably received within said bearing.

References Cited in the file of this patent

UNITED STATES PATENTS

982,156	Miltz	Jan. 17, 1911
2,480,502	Nieder	Aug. 30, 1949
2,779,510	Wilson et al.	Jan. 29, 1957
2,828,949	Paladino et al.	Apr. 1, 1958
2,846,201	Mermelstein	Aug. 5, 1958