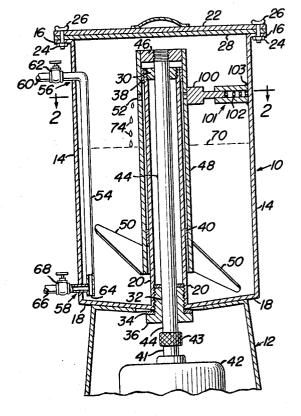
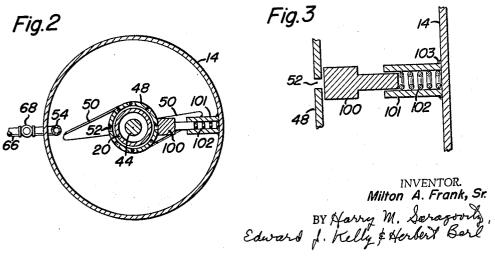
Fig.l





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3,263,969 Spindle stabilizer Milton Adam Frank, Sr., 508 N. Market, Frederick, Md. Filed Sept. 2, 1964, Ser. No. 394,089 4 Claims. (Cl. 259–108)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment to me of any royalty thereon.

This invention relates to a spindle stabilizer for use with a leak-proof blender for handling pathogenic materials such as that disclosed in Patent No. 2,774,576.

The aforementioned patent discloses a blender which 15 overcame the leakage and cleaning problems associated with the then existing blenders. This blender comprises a closed blender cup having a centrally disposed spindle therein. The spindle was comprised of an outer rotatable sleeve carrying the mixing blades thereon, an inner fixed 20 sleeve, and a drive shaft connected to said outer sleeve and extending down through the inner sleeve where it exited from the bottom of the cup to a power source. Appropriately located sleeve bearings prevented leakage. Port holes located near the top of the outer sleeve caused 25liquid that rose between the outer and inner sleeves to be expressed before reaching the junction of the outer and inner sleeves. While this blender overcomes the aforementioned leakage difficulties, the spindel assembly has a tendency to vibrate when certain materials are 30 mixed, which causes the drive shaft to press against the bearing surfaces causing overheating and burning out of the bearings.

It is an object of this invention therefore to provide means for stabilizing the spindle assembly against such 35 vibration.

The above and other objects will become apparent from the following description and by reference to the accompanying drawings in which:

FIGURE 1 is a cross section of a side view of the 40blender and stabilizer;

FIGURE 2 is a cross section of the top view of the blender and stabilizer; and

FIGURE 3 is a cross section of the stabilizer assembly itself.

In the drawings, the blender generally comprises the cup 10 and base 12 which are removably secured together in any conventional manner. Cup 10 has cylindrical side walls 14 having a flange 16 formed at its upper end, and bottom 18 having an upwardly extending 50 portant feature of this invention. By positioning the inner cylindrical sleeve 20 formed thereon. Removable cup lid 22 is secured to flange 16 with sealing gasket 28 compressed therebetween by nuts 24 and bolts 26. Cup 10 and lid 22 form a closed container. Sleeve 20 extends upwardly into the interior of the cup 10 to a point short 55 imparted by the rotation of sleeve 48, the liquid exof lid 22, and supports a bushing 30 within its upper end. Bushing 30 may be threadedly secured to sleeve 20, as illustrated, or secured in an equivalent manner. Within its lower end, sleeve 20 supports a bushing 32, with gasket 34 compressed between flange 36 of the bushing 32 and $_{60}$ the underside of the bottom 18. Bushing 32 may be threadedly secured to sleeve 20 or secured in an equivalent manner. At its upper end, sleeve 20 supports a bushing 38 on its outer side, and at a point approximately one-third its length from the bottom of the cup, sleeve 65 20 supports another bushing 40 on its outer side. Bushings 38 and 40 may be secured to sleeve 20 in any wellknown manner.

Within the base 12 is housed a conventional power source 42 which includes a driven shaft 41 which acti-70vates drive shaft 44 through a conventional coupling 43, which is detachable. Drive shaft 44 is positioned

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within inner sleeve 20, being slidably supported by bushings 30 and 32, and extends upwardly into the cup 10 to a point beyond the termination of sleeve 20. At its upper end, drive shaft 44 is connected to a collar 46 which in turn supports downwardly extending cylindrical sleeve 48. Outer sleeve 48 extends concentrically around sleeve 20 and is slidably supported by bushings 38 and 40. Sleeve 48 extends downwardly to a point short of the bottom 18, and carries cutting blades 50 at its lower end. Blades 50 are conventional macerating and blending blades. Sleeve 48 has a series of port holes 52 formed around its periphery in a horizontal plane which passes through a point which is near its upper end. These port holes 52 permit liquid which rises between inner sleeve 20 and outer sleeve 48 during mixing to be expelled before reaching the junction of the inner and outer sleeves where it might leak into the interior of the inner sleeve 20 and from there out of the bottom of the cup, which is the very problem to be overcome.

Transfer of material into and out of the cup 10 is accomplished by eduction tube 54, with upper and lower legs 60 and 66, respectively. Upper leg 60 projects through the wall 14 at point 56 and has a control valve 62 mounted thereon. Lower leg 66 projects through wall 14 at point 58, and has a control valve 68 mounted there-

on. Opening 64 communicated with both the upper and lower legs of tube 54.

The stabilizer assembly of this invention comprises a cylindrical plunger 100 which is shaped to fit into hous-

ing 101 which is secured upon wall 14 of cup 10. The housing 101 may be secured to the cup wall by any suitable means, such as welding, as indicated at 103. The plunger 100 is urged against outer sleeve 48 of the spindle assembly by means of compressive coil spring 102.

The plunger is preferably constructed of Teflon (polytetrafluoroethylene) because of this material's well known low friction properties. Plunger 100 has a flat face in contact with sleeve 48. If an arcuate surface is used, undue wear and heating with subsequent destruction of the plunger takes place. By using a flat surface, less area is presented into contact with outer sleeve 48, thus reducing friction. It was also discovered that with a flat surface urged against the rotating outer sleeve 48, a rotation is imparted to the plunger, which is free to rotate $_{45}$ in its housing 101, thus yielding a dynamic friction as opposed to a static friction, which results overall in less

frictional forces acting upon both the plunger face and outer sleeve 48. The vertical positioning of the plunger is also an im-

plunger opposite ports 52 in outer sleeve 48, the overflow of liquid rising in the space between sleeves 48 and 20 and expressed from said ports aids in lubricating the plunger face. Due to the high speed of rotation of plunger 100 pressed from ports 52 is rapidly moved over the entire face of the plunger by centrifugal force. This not only aids in thoroughly lubricating the plunger face, but also assures that the plunger will not prevent liquid from flowing out of ports 52 when they are positioned opposite the plunger face.

In operation, cup 10 is placed upon base 12 and drive shaft 44 connected to driven shaft 41 through coupling means 43. The liquid material 70 to be mixed is introduced into the closed blender container formed by cup 10 and lid 22 via the upper leg 60 of eduction tube 54 by opening valve 62 and closing valve 68. The depth of the liquid may be as desired up to about two-thirds of the cup depth. After the desired depth is obtained, valve 62 is closed. Power source 42 is actuated and blending commences. Liquid seeping past bushing 40 and up be-

tween sleeves 20 and 48 by capillary action will get no

further than port holes 52, where it will be expressed therefrom, as indicated in FIGURE 1 by droplets 74. Plunger 100, urged against outer rotating sleeve 48 by compressive coil spring 102, eliminates most of the vibration of the spindle assembly, which is otherwise supported 5 only at the bottom of the blender cup. The rotation of outer sleeve 48 imparts a rotation to plunger 100, which causes liquid expressed from port holes 52 when in contact with the plunger face to move out over the entire plunger face. This liquid then acts as a lubricant for the 10plunger face-outer sleeve interface. When the blending is completed, the power source 42 is inactivated and the blended material removed from the closed blender container by opening valve 68.

The spindle stabilizer described has been highly suc- 15 cessful in operation. In tests run with the stabilizer in place in the blender, the spindle assembly was effectively stabilized against vibration under conditions where such vibration would have resulted without the stabilizer.

While the foregoing description describes one form of 20 structed of polytetrafluoroethylene. my invention, it is obvious that minor modifications may be made thereto, and is not intended to be limiting upon the invention as claimed. For example, it is obvious that more than one stabilizer may be positioned around the periphery of the blender bowl in the horizontal plane run- 25 ning through port holes 52. The stabilizer or stabilizers may be located in a plane above or below that of port holes 52 as the lubricating properties of Teflon by itself is sufficient without the addition of liquid expressed from the port holes. Plunger 100 may be threadably secured 30 into housing 101. Other modifications within the scope of the appended claims will be obvious to those in the art.

I claim:

1. A blender comprising the combination of: a closed container; a spindle assembly centrally located within said container and comprised of an inner fixed sleeve, an outer rotatable sleeve carrying mixer blades thereon, a plurality of port holes located at the upper end of said outer sleeve, a drive shaft connected to said outer sleeve and extending down through said inner sleeve and through the bottom of said container and connectable to an exterior power source; and at least one plunger means urged against said outer rotatable sleeve of the spindle assembly at a point opposite said port holes in said outer sleeve to reduce vibration of the spindle assembly.

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2. The blender of claim 1 wherein said plunger has a flat face in contact with said spindle assembly and is rotatable.

3. The blender of claim 2 wherein said plunger is constructed of polytetrafluoroethylene.

4. The blender of claim 1 wherein said plunger is con-

References Cited by the Examiner UNITED STATES PATENTS

2,774,576 12/1956 Frank _____ 259-8

FOREIGN PATENTS

755,128 9/1933 France.

WALTER A. SCHEEL, Primary Examiner.

ROBERT W. JENKINS, Assistant Examiner.