Oct. 27, 1964 L. L. BALASSA 3,154,296

FOAM ARRESTOR FOR MIXING MACHINE

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Fig. 2.

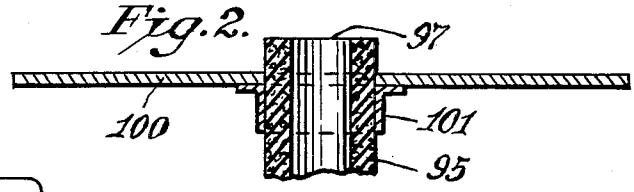
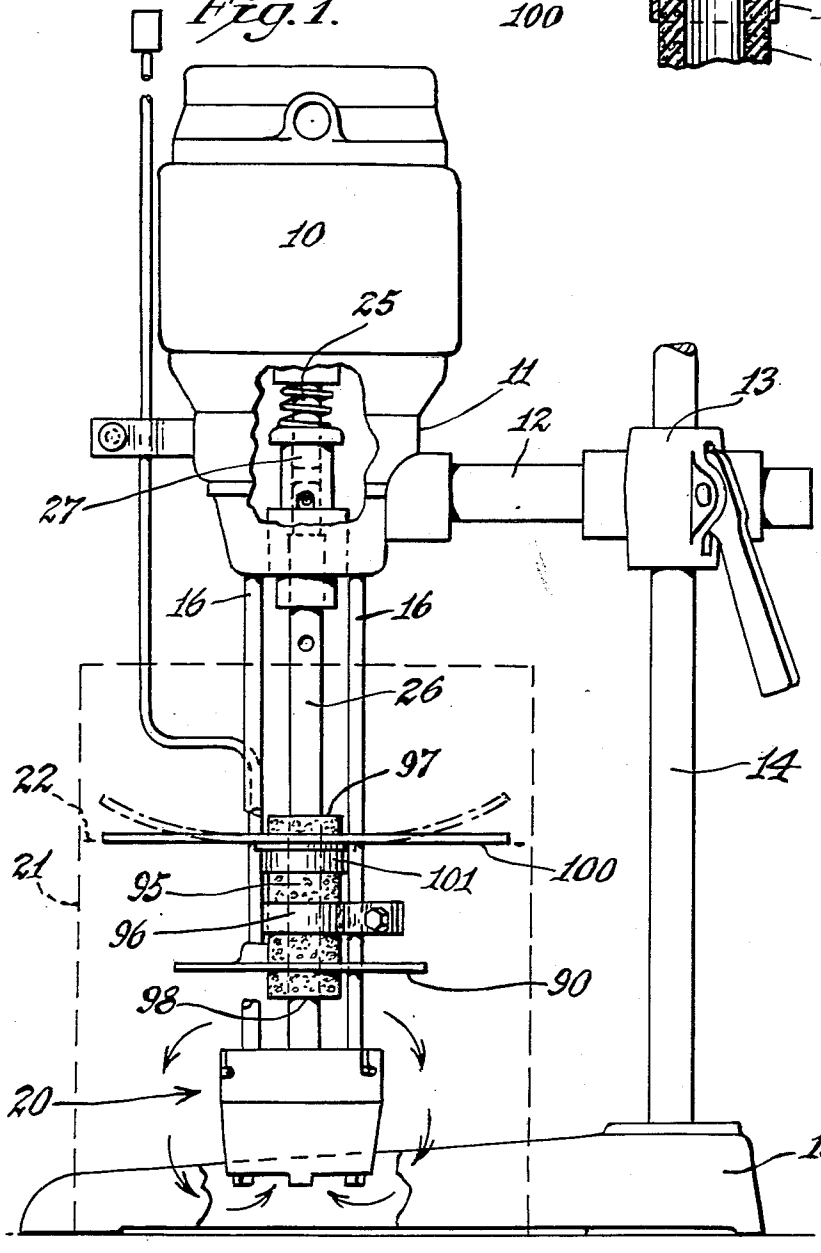


Fig. 1.



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Fig.3.

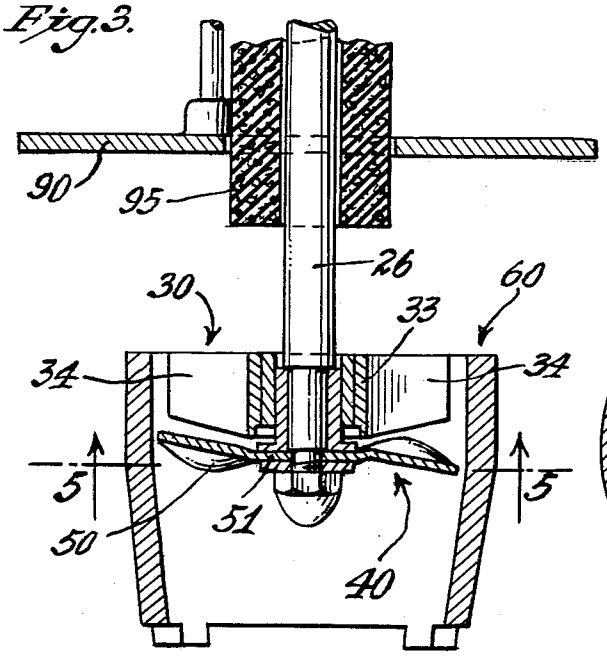


Fig.5.

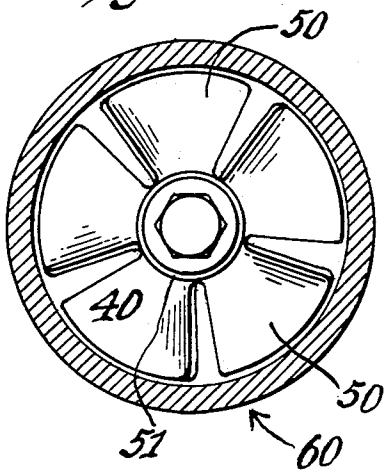
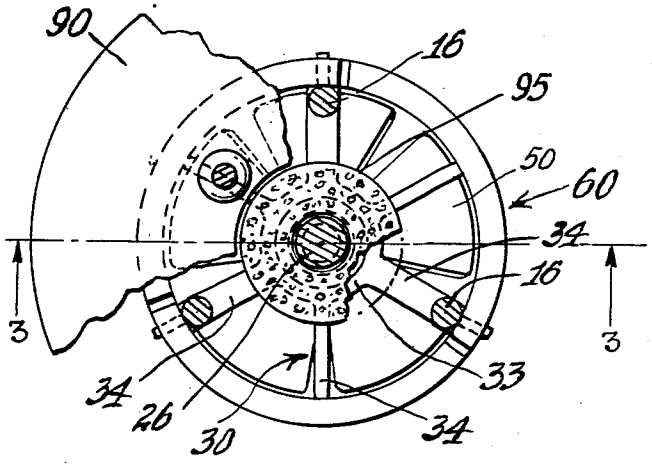


Fig.4.



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United States Patent Office 3,154,296
Patented Oct. 27, 1964

3,154,296

FOAM ARRESTOR FOR MIXING MACHINE

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Filed Jan. 25, 1961, Ser. No. 84,820
4 Claims. (Cl. 259—95)

This invention relates to an improved mixing machine for use in the preparation of liquid emulsions, such as pigment dispersions, and is generally similar to the type of machine shown and described in my co-pending application Ser. No. 84,821, filed January 25, 1961. The invention particularly relates to means needed for mitigating objectionable foaming incidental to the mixing of liquids of low viscosity that are therefore of a watery nature.

It is a primary object of the invention to effectively alleviate such foaming which otherwise interferes with the efficiency of the mixing operation of the machine. Other advantages of the invention are hereinafter set forth in the following speification and accompanying drawings.

Referring to such drawings,

FIG. 1 is a side elevation of a mixing machine showing an embodiment of the invention;

FIG. 2 is an enlarged, fragmentary, sectional view of the foam-arresting structure;

FIG. 3 is an enlarged, sectional view of the operating head of the machine and an associated part of the foam-arresting device;

FIG. 4 is a top plan view of the same; and

FIG. 5 is a sectional view on the line 5—5 of FIG. 3.

Referring to FIG. 1, the mixing machine is shown as having a motor **10**, a motor support **11** adjustably mounted by means of a tubular rod **12**, and bracket **13**, on an upright post **14** anchored in a pedestal **15**. A circular series of guide rods **16** depend from motor support **11**, and are attached at their lower ends to an operating head **20** extending within a container **21** (dotted lines) beneath the top level, indicated in dotted lines **22**, of a fluid solution to be mixed by the machine.

The motor **10** has a drive shaft **25**, and beneath in vertical alignment therewith is a driven mixer shaft **26**. The adjacent ends of said shafts are connected by a suitable crenelated coupling **27**.

Operating head **20** (FIGS. 3 and 4) comprises a stator **30** and a turbine rotor **40** positioned directly below it. Stator **30** is formed with a central hub **33**, and a plurality of radial spokes **34** having their outer ends separated, and within which hub the lower end of shaft **26** is journalled and thereby stabilized. A cylindrical open-ended stator sleeve **60** is detachably secured to the outer ends of suitable spokes **34**, as by the bayonet lock indicated, and provides a housing for the rotor so that the fluid being mixed will surge upwardly through the openings between the spokes, and the head will operate as a closed turbine mixer. By removing the sleeve the head will then operate as an open turbine mixer.

As shown in FIG. 5, rotor **40** consists of a plurality of electric-fan-type flat blades **50** radiating from an integral central disc **51**, and having an angular pitch adapted to rapidly and continuously circulate the liquid solution in the container through stator sleeve **60**, and since the rotor is directly driven by the motor, there is a resulting high degree of turbulence present in the container in order to thoroughly mix its contents. A baffle plate **90** is suitably positioned above operating head **20**, and is effective to deflect horizontally the material surging through the head so that the circulation referred to will be established as indicated by the arrows in FIG. 1.

The high turbulence within container **21** tends to cause the aforesaid objectionable foaming around the revolving mixer shaft, and at the top surface **22** of the liquid.

Means are provided to alleviate such foaming comprising, in part, a ringlike sleeve **95** surrounding a portion of the lower end of mixing shaft **26**. Sleeve **95** is held in a non-rotatable and fixed vertical position by a narrow band **96** which surrounds sleeve **95** and is adapted to be adjustably clamped to one of the rods **16**. Sleeve **95** is advantageously made of open cellular spongelike material, which is capable of containing and substantially immobilizing the liquid within its structure in order to be both self-lubricating with respect to the rotating shaft **26** and to have the effect of suppressing the tendency of the liquid to foam when shaft **26** revolves within it. The liquid contained within cellular sleeve **95** lubricates shaft **26** rotating within sleeve **95** reducing friction and removing heat formed. Sleeve **95** operates to prevent the outer surface of shaft **26** from rotatably disturbing the liquid otherwise exposed to such action, and which is the cause of foaming developing in this region. However, when the head **20** is used as an open turbine mixer, the sleeve **95** will only operate successfully if the container **21** is provided with suitable known baffling arrangements effective to prevent a vortex forming in the liquid being mixed.

Sleeve **95** is effectively positioned in container **21** vertically by moving band **96** up or down the rod **16** to which it is adapted to be clamped so that the upper end **97** of sleeve **95** will be slightly above the normal level of the liquid, and its lower end **98** will be well below the surface of the liquid, but spaced from stator sleeve **60** to provide for the required free circulation therethrough.

Foaming at the upper level **22** of the liquid may also be mitigated by the use of a flat pliable disc **100** operatively mounted to rest on the surface of the liquid and, as indicated in broken lines in FIG. 1, follow its turbulence; and is inherently buoyant or caused to be buoyant particularly at its periphery. It may be secured at its center to the sleeve **95** by a thimble **101** tightly fitted thereto. Disc **100** may be made of pliable buoyant material of which sheet polyethylene plastic is an example, not intended to limit or preclude the use of other suitable materials. It may also be made of pliable material, such as rubber, of a non-buoyant nature, which is rendered buoyant by an added buoyant ring attached to its perimeter, or it may be made to ride loosely along sleeve **95** when suspended by cords secured to its rim depending from the upper edge of container **21** so that it will rest on the surface of the liquid and be free to follow its turbulence. Preferably it is supported in the manner described and shown in the drawings.

Disc **100** blankets the top surface of the liquid and thereby tends to quiet surface turbulence. It also constitutes a shield effective to prevent a supply of air from coming into direct contact with the surface of the liquid, air being a constituent of the foaming action.

It will be understood that other applications of the principles disclosed herein are possible, and therefore are to be considered within the scope of the appended claims.

I claim:

1. A mixing device having low foaming characteristics during mixing of material within a container comprising a mixing head for operation within said container, said mixing head comprising a stator and a rotor, remote drive means for said rotor, a shaft connecting said drive means to said rotor, means for preventing rotation of said stator, and foam arresting means comprising a sleeve of porous, absorbent structure journaled on and shorter than said shaft, and means non-rotatably supporting said sleeve on said shaft and spaced from said shaft ends so that a portion of said sleeve extends above and below the level of the material being mixed.

2. A mixing device for mixing material within a con-

tainer with low foaming action comprising a mixing head for operation within said container, said mixing head comprising a stator and a rotor, remote drive means for said rotor, a shaft connecting said drive means to said rotor, means for coupling said stator to said drive means preventing relative rotation therebetween, and foam arresting means comprising a cylindrical sleeve of open mesh absorbent structure journaled on and shorter than said shaft, said sleeve absorbing said material and being self-lubricating for allowing free rotation between said sleeve and said shaft, and means non-rotatably supporting said sleeve along said shaft and spaced from said sleeve's ends and connected to said stator coupling means, said sleeve being supported so that a portion thereof extends above and below the level of the material being mixed.

3. A mixing device for mixing material within a container with low foaming characteristics comprising a mixing head for operation within said container, said mixing head comprising a stator and a rotor, remote drive means for said rotor, a shaft connecting said drive means to said rotor, and foam arresting means comprising a pliable disc surrounding said shaft and having a surface generally perpendicular to the axis of said shaft, said disc being buoyantly supported on the material being mixed so as to generally float on the surface of said material and being of a diameter slightly smaller than the diameter of said container so as to cover substantially the entire top surface of the material in said container and means preventing rotation of said disc.

4. A low foaming mixing device for mixing material within a container comprising a mixing head for operation within said container, said mixing head comprising a stator and a rotor, remote drive means for said rotor, a shaft connecting said drive means to said rotor for preventing rotation of said stator, and foam arresting means comprising a combination of a cylindrical sleeve of open mesh absorbent structure surrounding a portion of said shaft between its ends and extending above and below the surface level of the material being mixed, means connected to said sleeve for preventing rotation with said shaft, said sleeve absorbing said material for self-lubrication with said shaft, and a pliable disc coupled to said sleeve and lying in a plane perpendicular to the axis thereof, and generally coplanar with the upper surface of said material, said disc having a diameter slightly smaller than the inner diameter of said container and being buoyant with respect to the material being mixed, so that its outer peripheral edge floats on the surface thereof.

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