July 27, 1965 E. F. HILL 3,197,181

BLENDER

Filed Nov. 15, 1960 2 Sheets-Sheet 1

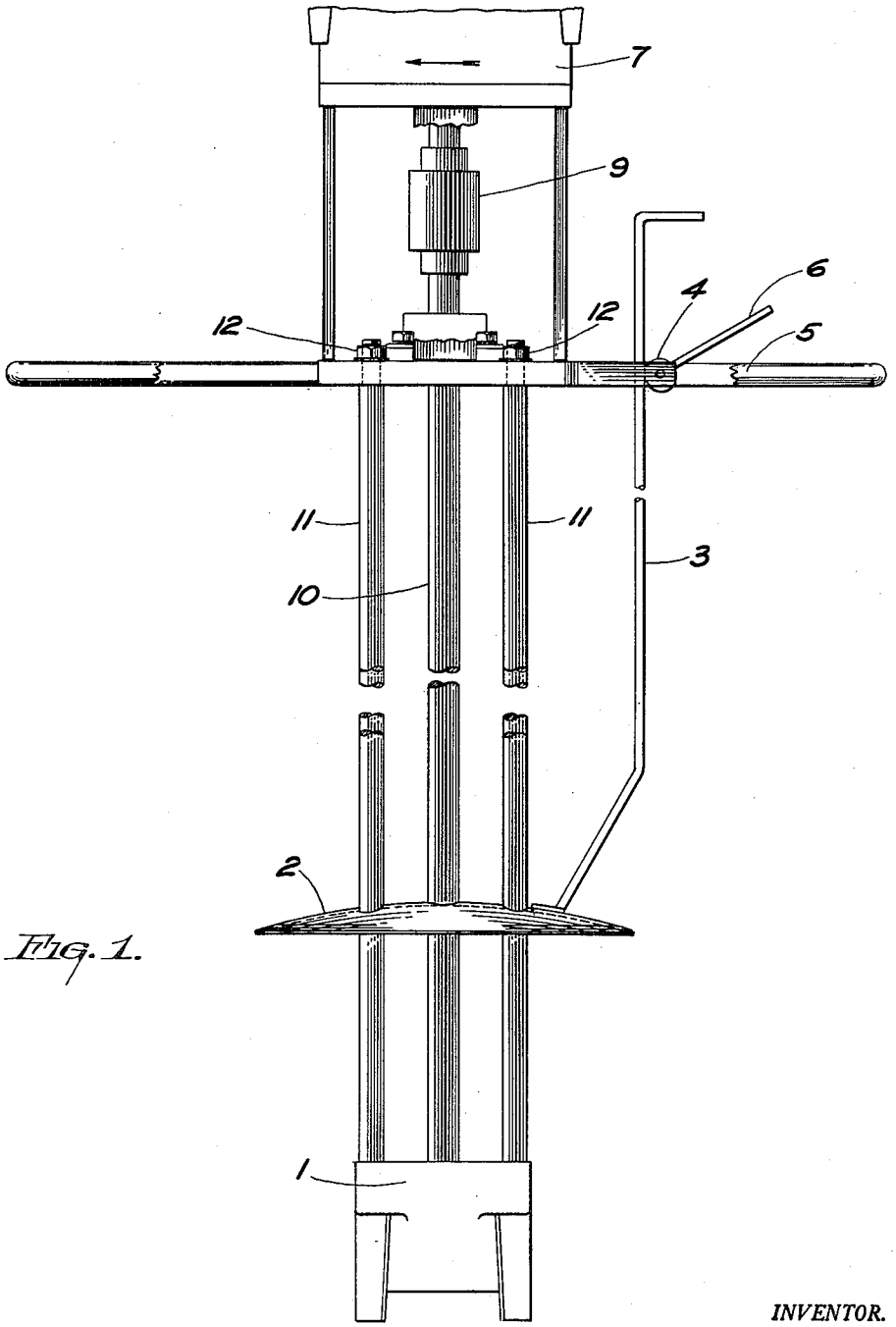


Fig. 1.

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Filed Nov. 15, 1960 2 Sheets-Sheet 2

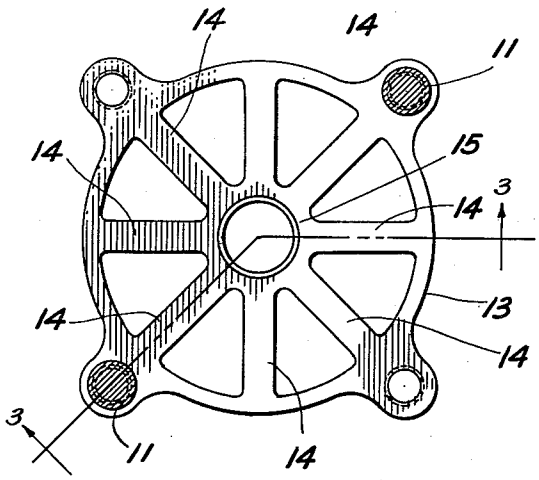


Fig. 2.

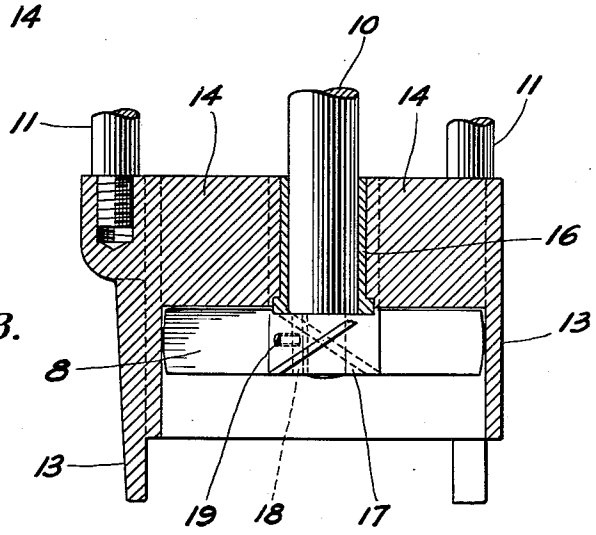


Fig. 3.

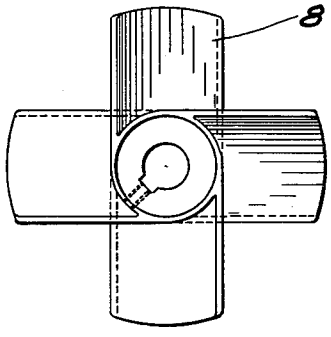


Fig. 4.

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BLENDER

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5 Claims. (Cl. 259—95)

My invention relates to a blender for mixing, blending and homogenizing constituents such as a pigment in a liquid vehicle.

In blending constituents together to obtain a relatively homogeneous mixture, it is usually necessary to agitate the mixture thoroughly in order to obtain a uniform dispersion of the constituents. Consequently, it is conventional to agitate the components with a rotatable blade which is rotated at high speed. Blending its achieved by turbulence created in the constituents by the action of the blade. However, in many cases, it is not possible to achieve sufficient turbulence to mix the constituents, particularly where one of the constituents is heavier than the other.

It is an object of my invention to provide a device for more effectively blending constituents.

It is another object of my invention to provide a device which can blend heavy and difficult to mix constituents as well as light and easy to mix constituents.

It is still another object of my invention to provide a device in which the blending or mixing action can be adapted to the constituents being mixed.

Another object of my invention is to provide a device for blending or mixing constituents in which the turbulence in the mixture is substantially greater than in known devices.

And still another object of my invention is the provision of means in my blender for regulating or adjusting the turbulence which can be achieved in the mixing of constituents.

These and further objects of my invention will appear as the specification progresses.

Since blending action depends upon creating a turbulence among constituents to be blended, e.g. a pigment in a liquid, it is conventional to rotate a blade among the constituents to agitate and create turbulence in the constituents. Due to the turbulence which is created, a more or less homogeneous dispersion of the constituents is obtained. Various refinements of this principle have been employed to blend various constituents.

However, I have found that relatively heavy constituents are difficult to mix in this manner alone. Consequently, I have found that in order to increase the turbulence, the mixture of constituents should be divided into smaller portions in which the turbulence can be more easily increased.

Thus, in accordance with the invention, I employ a hollow tubular member which is divided into several longitudinal chambers by longitudinal radial partitions. Further, in accordance with the invention, means, such as a propeller, are provided for dispersing the constituents into these chambers where the turbulence is greatly increased because the mass of constituents is divided into several smaller portions. In order to further enhance the mixing action, a deflector plate is provided outside the tubular member and in the path of the moving constituents so that heavier particles are deflected and subjected to further agitation.

The invention will be described with reference to the accompanying drawing in which:

FIG. 1 is an elevational view in section of the blender,

FIG. 2 is a top view of the mixing chamber assembly;

FIG. 3 is a sectional view along the line 3—3 of FIG. 2; and

FIG. 4 is a plan view of the propeller.

The blender as shown in FIG. 1 comprises a mixing chamber 1, the details of which are shown in FIGS. 2, 3, and 4, into which the mixture to be blended or homogenized is drawn and expelled toward a slightly concave baffle plate 2, the position of which, relative to the mixing chamber assembly, is adjustable by means of a handle which is locked in place by a cam 4 located in a fixed partition 5 and rotated by a lever 6. Supported by partition 5 is a motor 7 which drives propeller 8 via a coupling 9 and a shaft 10. Four rods 11 secured to plate 5 by nuts rigidly support the casing 13 in which the propeller is housed and which together with the propeller constitute the propeller assembly chamber.

The mixing chamber formed by an outer hollow tubular member on casing 13 is divided into two portions. The lower portion, as seen in FIG. 3, houses the propeller while the upper portion is divided into eight sectors by eight radical partitions 14 which extend between the wall of the casing 13 and a central bore 15 formed by a hollow sleeve member or bushing 16 in which the shaft 10 is journalled as shown in FIG. 2.

The propeller comprises four blades mounted on a hub 17 which is locked to the shaft by a key 18 and a set-screw 19 and countersunk to fit over the bushing. Each of the blades is inclined at an angle of about 30° from the horizontal axis and clears the partitions in the upper portion and the outer wall by about 0.005 inch to insure shearing action.

In order to blend a batch of constituents, the blender is placed in a chamber containing the constituents and the baffle plate lowered to a distance of a few inches from the top of the mixing chamber. The motor is then energized and the propeller draws the constituents up into the mixing chamber where they are thoroughly blended by the agitation of the propeller forcing the constituents against the partition after which they are expelled and strike the baffle plate. Heavier; unmixed paricles are reflected back into the mixing chamber while the blended mixture is dispersed in the container by the baffle plate.

While I have described my invention in connection with a specific embodiment and particular applications, the invention is not limited thereto but is defined by the appended claims which should be construed as broadly as possible.

What I claim is:

1. A device for mixing a viscous liquid comprising a chamber divided transversely into upper and lower portions, the upper portions constituting a stator and comprising a plurality of radial vanes having open spaces therebetween, said lower portion housing a propeller means and said lower portion being otherwise unobstructed, said propeller means comprising a plurality of blades and an upwardly extending drive shaft mounting said blades on its lower end for rotation therewith, said blades extending parallel to the lower surface of said stator and closely contiguous thereto throughout the entire extent of the upper edge of said blades, whereby the liquid is sheared and forced through said stator to homogenize the same.

2. A device for mixing a viscous liquid comprising a chamber divided transversely into upper and lower portions, the upper portion constituting a stator and comprising a plurality of radial vanes having open spaces therebetween, said lower portion housing a propeller means and said lower portion being otherwise unobstructed, said propeller means comprising a plurality of blades and an upwardly extending drive shaft mounting said blades on its lower end for rotation therewith, said blades extending parallel to the lower surface of said stator and closely contiguous thereto throughout the entire extent of the upper edge of said blades, each of said blades being inclined transversely at an angle with said lower surface of the stator of about 30° to insure shearing

action when said liquid is drawn into the lower portion of said housing and expelled through said stator.

3. A device for mixing a viscous liquid comprising a chamber divided transversely into upper and lower portions, the upper portion constituting a stator and comprising a plurality of radial vanes having open spaces therebetween, said lower portion housing a propeller means and said lower portion being otherwise unobstructed, said propeller means comprising a plurality of blades and an upwardly extending drive shaft mounting said blades on its lower end for rotation therewith, said blades extending parallel to the lower surface of said stator and being spaced throughout the entire length of the upper edge of said blades from the lower surface of the stator a distance of about 0.005 inch, each of said blades being inclined transversely at an angle with said lower surface of said stator of about 30° to insure shearing action when said liquid is drawn into the lower portion of said housing and expelled through said stator.

4. A device for mixing a viscous liquid comprising a chamber divided transversely into upper and lower portions, the upper portion constituting a stator and comprising a plurality of radial vanes having open spaces therebetween, said lower portion housing a propeller means and said lower portion being otherwise unobstructed, said propeller means comprising a plurality of blades and an upwardly extending drive shaft mounting said blades on its lower end for rotation therewith, said blades extending parallel to the lower surface of said stator and closely contiguous thereto throughout the entire extent of the upper edge of said blades whereby the liquid is sheared and forced through the stator to homogenize the same, and a moveable concave deflector spaced from the upper surface of said deflector, and means including said drive shaft to moveably position and support the deflector relative to the stator.

5. A device for mixing a viscous liquid comprising a chamber divided transversely into upper and lower portions, the upper portion constituting a stator and comprising a plurality of radial vanes having open spaces therebetween, said lower portion housing a propeller means and said lower portion being otherwise unobstructed, said propeller means comprising a plurality of blades and an upwardly extending drive shaft mounting said blades on its lower end for rotation therewith, said blades extending parallel to the lower surface of said stator and being spaced throughout the entire length of the upper edge of said blades from the lower surface of the stator a distance of about 0.005 inch, each of said blades being inclined transversely at an angle with said lower surface of said stator of about 30° to insure shearing of the liquid when the liquid is drawn into the lower portion of the housing and expelled through the stator, a concave deflector spaced from the upper surface of the stator, means including said drive shaft to support the deflector relative to the stator, and cam locking means for fixedly positioning the deflector relative to the stator.

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