June 24, 1958 A. ARTINO 2,840,358

MIXING DEVICE

Filed May 24, 1957

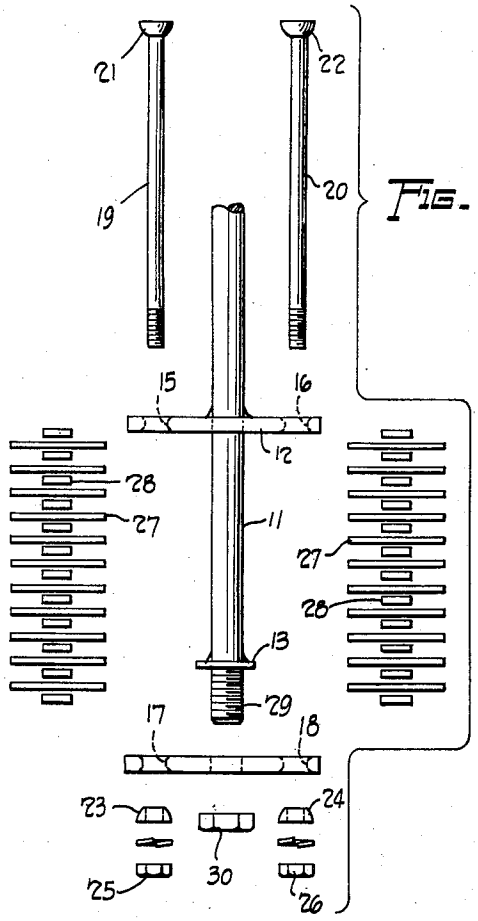


FIG. 3

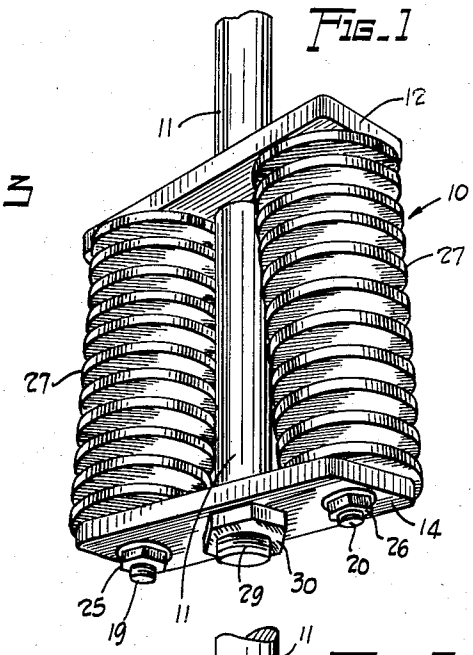


FIG. 1

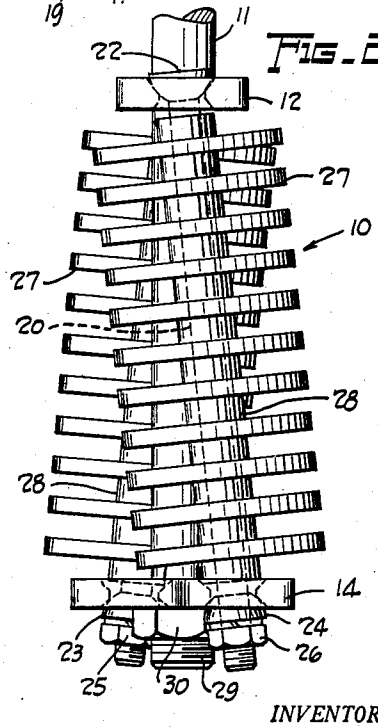


FIG. 2

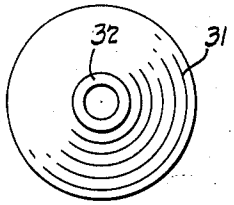


FIG. 5

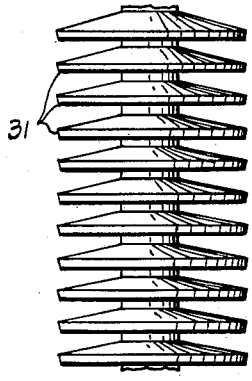


FIG. 4

INVENTOR.
ANTHONY ARTINO

BY
Sanford Schwarmacher
ATTORNEY.

United States Patent Office

2,840,358

Patented June 24, 1958

2,840,358

MIXING DEVICE

Anthony Artino, Cleveland, Ohio

Application May 24, 1957, Serial No. 661,323

3 Claims. (Cl. 259—130)

This invention relates to agitating devices and particularly to a rotating stirrer for viscous or semi-solid materials.

Conducive to a better understanding of the invention it may be well to point out that it is common practice to use motor driven stirring devices, having a plurality of spaced parallel discs secured to a rotary shaft. The spinning discs are supposed to suck the liquid to be mixed inward and then throw it outward due to the action of the spinning edges of the discs.

However in the mixing of viscous liquid such as heavy petroleum products, greases, tars, soaps, etc., a great frictional drag is exerted by the viscous materials on the impeller discs, which slows down the action or requires greatly increased power for the proper operation of the mixer. Furthermore, with such viscous liquids the interstices between the discs tend to become clogged with the heavy mixture and for all intents and purposes the impeller becomes a solid post.

Likewise, the drag of the fluid against the impeller discs causes a wide vortex to be formed which retards the mixing action.

The primary object of this invention, therefore, is to provide a mixer head having two revolving multidisced impellers positioned at an angle to one another and to their center of revolution, whereby intersecting fluid flow lines are created which act to reduce all vortex forming forces to a minimum.

Another object is to provide a device of the type stated whose discs are free to rotate on their axes, so as to afford minimal frictional opposition to the movement of fluid passing therebetween.

A further object is to provide a device of the type stated that is capable of functioning effectively in liquids of any viscosity, and even in semi-solids.

These and other objects of the invention will become apparent from a reading of the following specification and claims, together with the accompanying drawing, wherein:

Figure 1 is a perspective view of a mixing device made in accordance with my invention;

Figure 2 is a side elevation of the same;

Figure 3 is an exploded view of the device;

Figure 4 is a side elevation of an alternate form of the device having conically shaped discs: and

Figure 5 is a top plan view of one of the conical discs.

Referring more particularly to the drawing there is seen the mixer head that is the subject of this invention broadly indicated by reference numeral **10**.

The device comprises a driver shaft **11**, adapted to be connected directly at its upper end to a driving motor, not illustrated, or to a flexible motor driven shaft.

The bottom end **29** of the shaft **11** is threaded, as seen in Figure 3.

A flat bar **12** is welded to the shaft **11**. The bar **12** has two spaced holes **15** and **16**, at the ends thereof. Each hole is countersunk at the top and bottom to form a semi-circular seat.

A collar **13** is welded to the shaft **11** immediately above its threaded end **29**. And a lower bar **14** is swivelly mounted on the shaft **11**, against the lower face of the collar **13**. The bar **14** is held in place by a nut **30**. The bar **14** also has two holes **17** and **18**, similarly countersunk as those of the upper bar **12**, and similarly spaced. The two bars **12** and **14** act as a yoke to support two, headed impeller shafts **19** and **20** which are mounted in the holes **15**, **17** and **16**, **18**, respectively. Each shaft **19** and **20** has a threaded lower end and a semi-spherical head **21**, and **22**, respectively, adapted to seat in the holes **15** and **16**, respectively, of the upper bar **12**. The shafts **19** and **20** are held in place by means of nuts **25** and **26** which bear against semi-spherical washers **23** and **24** which are seated in holes **17** and **18**, respectively, of the lower bar **14**.

Reference numerals **27** indicate a plurality of flat discs which are co-axially mounted on the impeller shafts **19** and are spaced apart in parallel relation by collars **28**. Both the discs **27** and the collars **28** are free to rotate on impeller shafts **19** and **20**.

In assembling the mixer head **10**, the lower yoke bar **14** is swivelled with relation to the upper yoke bar **12** until the two impeller shafts **19** and **20** assume the angular inclination to each other and the shaft **11**, as illustrated in Figures 1 and 2. The nut **30** is then tightened, as are the nuts **25** and **26**, thus locking the various elements together into a rigid structure.

In operation, it will be evident that upon rotation of the shaft **11**, the two impeller shafts **19** and **20** together with their co-axially supported discs **27** will revolve about the shaft **11** in a plane angularly inclined to its center of rotation. At the same time the several discs **27** are free to rotate on their own axes, that is the longitudinal axes of the impeller shafts **19** and **20**, upon which they are mounted.

When the device **10** is immersed in a viscous fluid it will be evident that the spaced and parallel discs **27** on each impeller shaft **19** and **20** will cut angularly opposed paths through the mixture, whereby all flow lines of the mixture created by one set of discs will run counter to those created by the other set of discs. These opposing flow lines effectively counteract any tendency for a vortex to be formed, thereby rendering the mixing action more efficient than that attainable with any prior art devices.

Furthermore it will be apparent that any frictional drag between the disc surfaces and the fluid being mixed will cause the discs to rotate freely on their axes, thus facilitating the break-up and mixing action of the discs, since their rotation acts to facilitate the flow of the fluid into and out of the spaces between them.

The diameter and spacing of the discs **27** may be varied to suit fluids of varied viscosity. The greater the viscosity the greater the spacing and diameter of the discs.

Similarly the angular inclination of the impeller shafts **19** and **20** may be adjusted by swiveling the lower yoke bar **14** in relation to the upper yoke bar **12**.

An alternate form of the device is illustrated in Figures 4 and 5 wherein the discs **31** are conical in shape. Each disc **31** has a flat seat portion **32** at its apex which bears against the spacer collars **28**. The conical surfaces are set at an angle of between 15° and 20°. These collars and discs are also mounted free on the impeller shafts as are the flat discs **27**. It has been found that in some applications, such conically shaped, freely rotating discs will effect a better mixing action.

The device as described provides a mixing head having an eccentric effect, while at the same time being perfectly balanced with relation to its center of rotation. Furthermore the freely rotating discs are self-cleaning, which assures maximum mixing efficiency with the most viscous and tacky compounds.

It will now be clear that there is provided a device which accomplishes the objectives heretofore set forth. While the invention has been disclosed in its preferred form; it is to be understood that the specific embodiment thereof as described and illustrated herein is not to be considered in a limited sense as there may be other forms or modifications of the invention which should also be construed to come within the scope of the appended claims.

I claim:

1. Mixing apparatus adapted to be immersed in a body of fluid materials to be mixed, comprising in combination, a drive shaft having a yoke mounted thereon including two spaced impeller shafts mounted laterally of each side of the drive shaft, at an angle thereto and to each other, and a plurality of coaxial, parallel and uniformly spaced conical disc impeller elements mounted on each of said impeller shafts; each of said conical disc elements being independently free to rotate on its impeller shaft.

2. Mixing apparatus adapted to be immersed in a body of fluid materials to be mixed, comprising in combination, a drive shaft having a yoke mounted thereon including two spaced impeller shafts mounted laterally of each side of the drive shaft, at an angle thereto and to each other, and means for varying the angular disposition of the impeller shafts between adjusted positions, and a plurality of coaxial parallel and uniformly spaced flat disc impeller elements mounted on each of said impeller shafts; each of said disc elements being independently free to rotate on its impeller shaft.

3. Mixing apparatus adapted to be immersed in a body of fluid materials to be mixed, comprising in combination a drive shaft having a yoke mounted thereon including two spaced impeller shafts mounted laterally of each side of the drive shaft, at an angle thereto and to each other, and means for varying the angular disposition of the impeller shafts between adjusted positions, and a plurality of coaxial, parallel and uniformly spaced conical disc impeller elements mounted on each of said impeller shafts; each of said conical disc elements being independently free to rotate on its impeller shaft.

References Cited in the file of this patent

UNITED STATES PATENTS

2,355,539	Lawton	Aug. 8, 1944
2,413,793	Sharp	Jan. 7, 1947