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MATERIAL TREATING MACHINE

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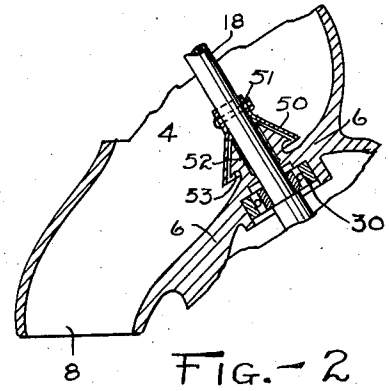


FIG.-2

FIG.-1

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MATERIAL TREATING MACHINE

Application filed June 8, 1927. Serial No. 197,300.

This invention relates to material treating machines such as are used for making emulsions for extraction purposes and the like, and particularly to a machine adapted to serve as a commercial drink mixer or as a domestic appliance for general mixing purposes. Reference is directed to the co-pending application of Walter H. Poesse, Serial No. 197,299, filed June 8, 1927, as showing an example of a machine similar in some respects to the illustrated embodiment of the present invention.

An object is to provide a machine of the character mentioned, which will be simple, compact and easily adapted for cleaning and adjustment.

A further object is to provide a material treating machine, which may be made comparatively light in weight and in which the center of gravity shall be close to the base.

Previous machines, of the type shown, have been made to embody two relatively rotatable members having their adjacent surfaces in close non-contacting relation, these members being the primary material treating elements, and electric motors have been used to drive one of the members past the other at very high speeds, ranging from 10,000 to 15,000 R. P. M. while in operation. In machines wherein the material is fed to the material treating surfaces at least partially by gravity, the practice has been to mount the motor above the material receiving chamber for material to be treated, and to project the armature shaft of the motor downwardly through this chamber and connect it to the rotating member. In such machines, if the material to be treated is fed to the treating surfaces by gravity and delivered therefrom by the same force, this practice necessitated supporting the motor at a considerable distance from the base with the result that the machine was top heavy, both actually and in appearance. With my arrangement the motor may be positioned very close to the base wherefore the machine does not appear top heavy or unbalanced, and the whole machine is considerably lightened in comparison.

A distinguishing feature of my invention is that the material receiving chamber may be detachably secured to the general housing along a plane substantially coincident with the top surface of one or both of the relatively rotating members, whereby, when this material receiving chamber is so detached, the top surfaces may be exposed upwardly in such manner that these surfaces may be easily cleaned without disturbing the relationship of the mixing surfaces. The material receiving chamber may be then cleaned simply by dipping it in a cleansing solution.

Another characteristic of my machine not present in the prior machines of this character, as far as I know, is that the member providing the internal mixing surface is detachably secured to the main housing, a part of which forms the discharge chamber, wherefore the discharge chamber may be easily cleansed. The detachable member is thus easily adapted for fine adjustment between the mixing surfaces since, if screw threads are used to provide the detachability, and the mixing surfaces are conical as shown, a slight turn in one direction of the internally surfaced member brings the mixing surfaces slightly closer together, and a turn in the opposite direction separates the surfaces.

Further objects and features of the invention will become apparent from the following description relating to the accompanying drawings, wherein I have shown my preferred form. The essential novel characteristics are summarized in the claims.

In the drawings, Fig. 1 is a side elevation of a complete machine embodying my invention, the upper portion being broken away and shown in substantially central longitudinal cross section; Fig. 2 is a detail cross sectional view, showing a modified means for preventing liquid in the discharge chamber from following the motor shaft.

Referring in detail to the drawings, 1 is the main frame or support having a base portion 2 adapted to rest on a table or counter, and a hollow portion 3 axially inclined, as shown, and interiorly formed to provide a chamber 4 for receiving and dis-

charging the mixed liquid. The upper end 5 of the portion 3 is machined to receive an annular member 10, partially closing the top of the chamber 4. The bottom wall 6 of the discharge chamber inclines downwardly, and leading from the bottom wall 6 is a discharge spout 8, which may overhang the forwardly extending portion 2*a* of the base, this portion of the base being adapted to support a receptacle such as a drinking glass indicated in broken lines at A. The annular member 10 comprises one of the main mixing elements by reason of having its internal surface 10*a* in close relation to the external and complementarily formed surfaces 20*a* of the rotor 20. Both these surfaces are frusto-conical as shown, this form of mixing elements having been found very efficient and easily adapted for adjustment to vary the distance between the surfaces. The rotor is shown as attached to the upper end of a shaft 17, the latter being an extension of the armature shaft of an electric motor 18.

The motor may be of any type designed for high speed and may be partially supported by a tubular portion 7 extending rearwardly of the support 1 and downwardly from the discharge chamber casting. The bearings for the motor may be formed in such manner as to prevent any shifting of the shaft 18. A suitable bearing, shown at 30, comprises a series of balls seated between the usual inner and outer races, the outer race member being held in a downwardly cupped portion 29 on the lower side of the floor portion 6 of the casing. Suitable means for energizing the motor may comprise a switch 31, having a controlling element 32 to govern it, and in order to control the switch from a convenient point, I provide a lever 33 pivoted as at 34 below the motor housing, the rearwardly extending arm of the lever being arranged to engage the switch controlling part 32 and the forwardly extending arm 35 being positioned horizontally and extending adjacent the glass or container A, whereby the operator may easily throw the switch to "on" position, at the same time he positions the glass under the discharge spout.

The annular member 10 is threaded on its external surfaces at 11 to engage threads in the annular portion 5 of the casing, the lower portion of the member 10 having cylindrical outer surfaces 12 closely adjacent cylindrical surfaces on the casing. The cylindrical surfaces may be engaged by a set screw 14 to hold the member 10 against moving out of place after it is properly adjusted to obtain the desired spacing of the surfaces 10*a* and 20*a*. Because of the axial adjustability of the member 10, the rotor may remain rigid with the drive shaft 17 at all times. This is highly desirable because the provision of axial adjustment between the rotor and shaft increases the weight of the rotating parts. A convenient method of rigidly attaching the rotor to the shaft may comprise a reduced threaded portion 21, engaging internal threads on the rotor and a shoulder 22 adjacent the rotor on which the hub of the rotor seats.

Suitable means such as a jam nut 24 engaging the threads upwardly of the rotor may serve to tightly clamp the rotor against the shoulder 22. To provide for partially disintergrating solids before such solids are passed to the mixing surfaces, I preferably extend the shaft upwardly from the nut 24, as at 25, and the extension may carry any suitable form of projections 25*a*, those shown being formed by a device such as a split cotter pin extending laterally through the extension 25 with the legs bent outwardly to hold the pin in place. The top of the rotor may be provided with projections, such as pins 23 for directing the material toward the mixing surfaces.

The charging, or material receiving chamber comprises, as shown, a cap 36 surmounting the casing portion 5 and closely overlying the laterally extending surfaces at the top of the member 10. The cap 36 has a downwardly extending skirt 37, which may be suitably slotted to form a bayonet lock engagement with the casing portion 5 by reason of one or more pins 38 secured to this casing portion, one for each slot. The inner surface of the cap is preferably formed as at 40 with the surfaces merging into the conical surface 15 on the member 10. The upper end of the cap 36 may be continued upwardly and flared out like a funnel to receive the material. As shown however, a separate member 41 is secured as at 43 to the reduced upper end of the cap 36, a rubber ring being interposed as shown to prevent leakage. The extreme upward end of the container 41 flares outwardly and is open as at 45, and the general plane of the brim is inclined in such manner that the material to be mixed may be thrown into the mixing chamber without any great degree of care.

Suitable means for preventing the mixed material in the discharge chamber from following the shaft 17 may comprise a packing nut 26 embracing suitable packing material 27, the nut being secured to a short tubular extension 28 rising from the floor portion 6 of the discharge chamber.

In place of the packing gland and nut arrangement shown in Fig. 1, I may employ the device shown in Fig. 2, wherein in place of the extension 28, I provide a cone-shaped projection 52 undercut along the floor of the chamber as at 53 and in surrounding and preferably slightly spaced relation to the shaft 17. Fitting over the projection 52 I have shown a metal skirt 50 secured to the

shaft as at 51, and diverging downwardly. Such an arrangement does not impede the rotation of the shaft, but is effective in preventing material within the discharge chamber from following the shaft, because any of the material which is thrown against the shaft is deflected outwardly by the rapidly rotating skirt 50 onto the floor of the discharge chamber, while any portion of the material which would be dammed up by the projection 52 is deflected away by reason of the undercut 53.

Means for preventing the mixed material from leaving the discharge spout in a spray or disk may comprise fins 3*a* formed on the interior of a chamber 4 below the conical surface 10*a*. As the rapidly revolving film of material leaves the mixing surfaces, it tends to spread out in the form of a disc and the fins act as cams against this rapidly whirling stream and cause it to be finally delivered through the discharge spout in a comparatively direct stream. This arrangement is shown, differently adapted in the above mentioned application of Walter H. Poesse.

With the above described arrangement in mind, comparison between my mechanism and arrangements similar to that shown in the above mentioned Poesse application brings out the following contrasts.

A machine having a motor at the top necessarily has the rotor below the motor. Therefore, if material is to be at least partially fed by gravity, the logical arrangement of the receiving chamber for material with reference to the rotating parts calls for the motor shaft or its equivalent, passing downwardly through the receiving chamber or a portion thereof. Now, if the rotating elements are conical, the rotor must necessarily be either moved downwardly in order to separate the mixing surfaces for cleaning or else some means must be provided to raise the internal conical surface supporting member with reference to the rotor. The latter means has certain disadvantages which need not be here discussed in detail. In order to provide for moving the rotor with reference to the shaft, additional rotor parts must be used which increases the inertia of the rotor. Inasmuch as the natural tendency of liquid leaving the relatively rapidly rotating surfaces, is to spread, this spread must be counteracted in some way in order to control the proper discharge of material presumably by a discharge tube or the like. Such discharge tube must therefore either be removed to allow the operator to get at the rotor to lower it, as by a threaded connection, or else some means must be provided operable from some point outside the machine casing to separate the mixing surfaces. Such arrangements have of course advantages but also disadvantages, an example being that the surfaces after separation must be accurately replaced within exceedingly small limits.

With my arrangement, it is never necessary to move either of the mixing surfaces for cleaning purposes because the recesses into which indissoluble material lodges, because it cannot pass between the closely adjacent mixing surfaces, are rendered entirely free and exposed for cleaning as soon as the charging or material receiving means is removed, as previously explained.

In the above description I have used the term "mixing" merely as an example of the class of material treatment of which the machine as arranged is capable of performing. I am aware that by the use of conical as well as other forms of material treating surfaces, planular, spherical, etc., surprising results have been obtained other than simply obtaining homogeneous mixtures. For example, in pharmaceutical work in the extraction of oils from vegetable substances, etc., there is a large field for machines of the character shown. It is not my purpose therefore to limit the scope of my invention to any specific use.

I claim:

1. In a machine of the class described, a hollow casing member in the nature of a cup and having a discharge spout leading laterally from its bottom wall portion, an annular member partially closing the top of the cup and having a circular surface, a rotor having a complementary surface in close relation to the first mentioned surface, means extending through the said bottom wall portion and connected to the rotor for driving it, and means for containing material to be mixed and directing such material toward the said surfaces, said latter means being removable without disturbing the relationship of said surfaces.

2. In a machine of the class described, two members each having a frusto conical surface, the surfaces being in close non-contacting relation, and each member having a laterally extending top surface, means for rotating one member relative to the other at high velocity, tubular means positioned over said members and providing a charging chamber, means to support said tubular means, said tubular means being quickly detachable from the support and arranged when detached to expose said top surfaces.

3. In a machine of the class described, two members each having a circular surface, the surfaces being in close non-contacting relation, and each member having a laterally extending top surface, means for rotating one member relative to the other at high velocity, means positioned over said members, and formed to provide a charging chamber, means to removably support said charging chamber means, said latter means

being separable from its support along a plane substantially coincident with one of said top surfaces, and arranged when separated to leave said circular surfaces undisturbed.

4. In a device of the class described, a pair of members having closely adjacent non-contacting circular surfaces terminating substantially flush with each other at their upper edges, means for rotating one member relative to the other at high velocity including a shaft extending downwardly from one of said members and means for driving the shaft, a discharge chamber for receiving material from such surfaces and surrounding a portion of said shaft, and means positioned above said members and separable therefrom substantially along the plane defined by said upper edges, said means being arranged to receive material to be fed past said non-contacting surfaces.

5. In a mixing machine, a housing, means including an upwardly converging internal frusto conical surface, said means being carried by the housing, a rotor having a surface closely adjacent said frusto conical surface, means for turning the rotor at high speed, a container for material to be fed to said surfaces detachably secured to the housing and positioned above said frusto conical surfaces and having its lower edge normally disposed in a plane coincident with the upper edge of said internal frusto conical surface, and means for minutely adjusting the relation of the rotor and internal surfaces by a turning movement of said first named means.

6. In a machine of the class described, a pair of members having closely adjacent non-contacting surfaces, one being relatively stationary, means drivingly rigid with the other of said members for rotating this member at high velocity, said means being positioned below the rotatable member, means positioned above the rotatable member and adapted to contain material to be mixed, said last named means being removable with relation to said pair of members for cleansing purposes along a plane substantially flush with the upper edge of the stationary member, and means for minutely adjusting one of said first mentioned members relative to the other to vary the distance between said non-contacting surfaces.

7. In a machine of the class described, a housing, a member adjustably and removably secured in said housing and having an internal circular downwardly diverging surface, a rotatable member having a surface closely adjacent said diverging surface, means extending downwardly from said rotatable member, and means associated therewith to revolve the last named means at high speed, and quick detachable means separable from the housing and first named members for receiving and containing material to be mixed said last named means being disposed above said first named member.

8. In a machine of the class described, a housing formed to provide a chamber, means carried by the housing having a circular surface at the top of the chamber, rotatable means disposed in the chamber and having a surface substantially complementary to the first mentioned surface, means for rotating the rotatable means and located below the chamber, means positioned above the said housing and separable therefrom without disturbing the first named means for receiving material to be mixed, and means extending upwardly from the rotatable member into said material receiving means for preliminarily disintegrating solid material before the material is passed to the said surfaces.

9. In a mixing machine, an upwardly extending forwardly inclined housing having a forwardly projecting base adapted to support a container, said housing being formed to provide a discharge chamber with a steeply sloping wall and a discharge spout leading directly therefrom over the base, so as to empty material into a container supported as aforesaid, mixing means supported by the housing comprising a rotor and stator, the stator being disposed at the top of said chamber, a shaft projecting through the chamber for supporting and driving the rotor, and means extending upwardly from the rotor and stator for receiving material to be mixed and conveying the same by gravity to between the rotor and stator.

In testimony whereof, I hereunto affix my signature.

ALBERT R. TEARE.