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CLEANSING BRUSH FOR COLUMNAR EVAPORATOR, AND THE LIKE

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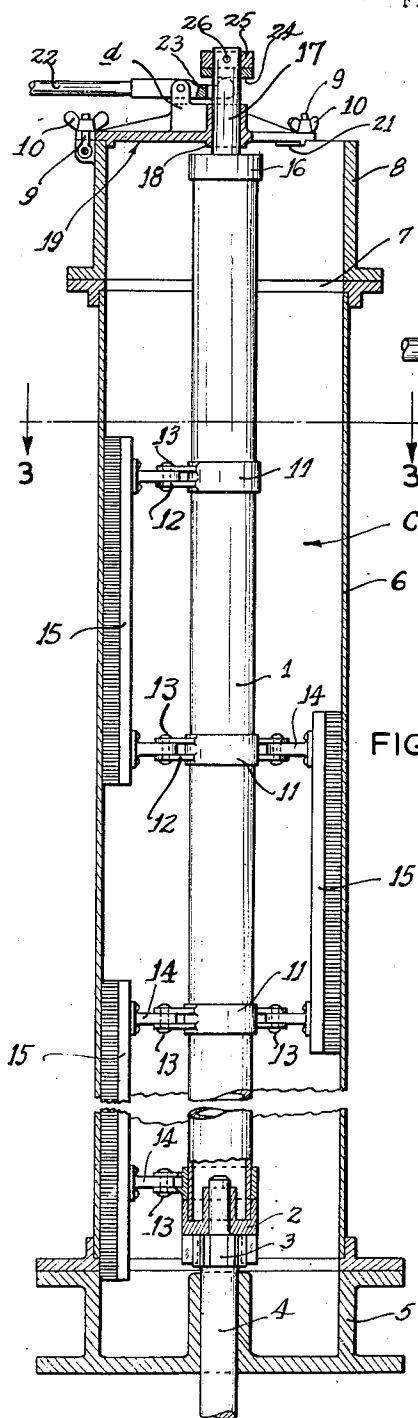


FIG. 1.

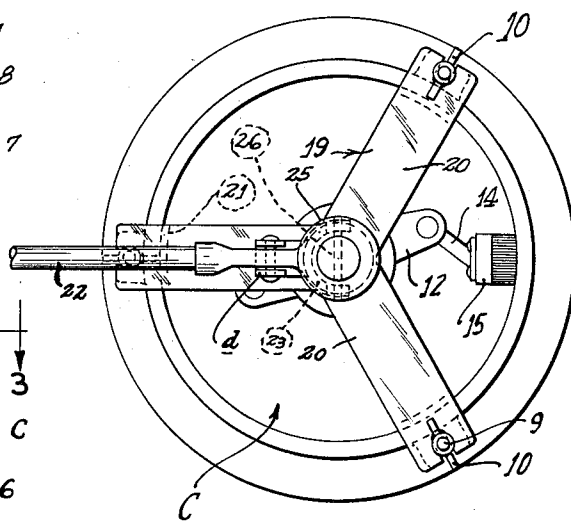


FIG. 2.

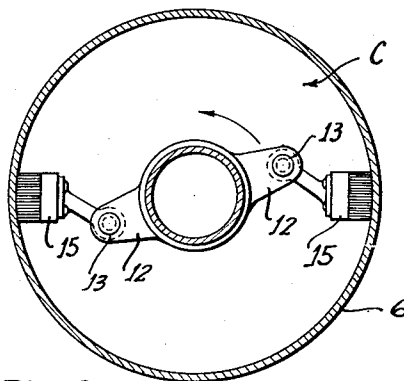


FIG. 3.

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CLEANSING BRUSH FOR COLUMNAR
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2 Claims. (Cl. 15—246)

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This invention relates to certain new and useful improvements in cleansing brush for columnar evaporators and the like and, more particularly, to apparatus for cleaning such devices as are described in my co-pending application, Serial No. 575,512, filed January 31, 1945, relating to Apparatus for Concentrating Liquids, which has matured into Patent No. 2,546,380, granted March 27, 1951. Devices of this type include a power-driven impeller removably disposed within a cylindrical chamber, the inner surfaces of which must be periodically cleaned.

The primary object of this invention is to provide a mechanism for cleansing the interior cylindrical surface of the chamber of such a device, using brushes or other cleansing elements bearing against such interior cylindrical surface under action of centrifugal force.

A further object of this invention is to provide a cleansing mechanism of the class described which can be inserted into and removed from such cylindrical chamber through an opening smaller than the diameter of the chamber.

A further object of this invention is to provide a rotary cleansing mechanism powered by the same power source and coupling, which, in the normal use of the device to be cleansed, is used for driving its impeller.

An additional object of this invention is to impart to the rotary cleansing brushes a variable reciprocating motion simultaneously with rotary motion, more effectively to cleanse the interior surface.

The above and other objects will become more fully apparent from the following specification, which, by way of illustration rather than limitation, sets forth the preferred forms of apparatus constituting embodiments of the present invention, the scope of which is defined in the appended claims.

In the accompanying drawings—

Figure 1 is a side elevational view, partly in section, of a preferred form of cleaning apparatus constructed in accordance with and embodying the present invention;

Figure 2 is a top plan view of the invention mounted in operable position within such device, which device is partly cut away better to show the position of the cleansing brushes therein; and

Figure 3 is a horizontal sectional view taken along line 3—3 of Figure 1.

In its general organization, the preferred form of apparatus shown in the drawings comprises a vertical, preferably tubular, shaft 1 provided at its lower end with a longitudinally splined fe-

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male fitting 2, adapted for complementary engagement with a splined stub shaft 3 projecting from the upper end of the rotary power drive shaft 4, journaled in the center of a circular base 5 of a concentrator C, more specifically described in the aforementioned co-pending application. The concentrator C comprises a cylindrical tube 6 provided at its upper end with an annular horizontal partition plate 7, and a head portion 8 having at its upper margin hinged locking studs 9, each having a wing nut 10.

Affixed to the shaft 1 are a plurality of collars 11 incorporating bifurcated brackets or lugs 12 extending radially outward. Adjacent their outer extremities, the brackets or lugs 12 are drilled vertically to receive pins 13 by which the inner ends of arms 14 are pivotally mounted. It should be understood in this connection that the arms 14 have a length somewhat greater than the radial distance from the center of the pins 13 to the interior wall to be cleansed. Cleansing elements, as brushes 15, are rigidly secured to the outer extremities of arms 14 at such an angle to said arms that when the cleansing mechanism is located within the concentrator C and rotated rapidly such brushes 15 will swing outwardly under centrifugal force and bear fully against such wall. In the embodiment described, the brushes 15 are spaced alternately on opposite sides of the shaft 1 and are of such length as to sweep overlappingly the area to be cleansed with each revolution of the shaft. It is apparent that any number of brushes, one or more, might have been used, each supported by any number of arms, brackets and collars.

At the upper end of the shaft 1, a reduction fitting 16 secures said shaft concentrically to a shaft 17, which, in turn, is rotatably mounted in a bearing 18. When the splined fitting 2 at the lower end of the shaft 1 is seated on the stub shaft 3, reduction fitting 16 is at a distance below bearing 18 less than the length of the engaging splines, permitting the assembly to be raised and lowered without disengaging the splines.

Bearing 18 is an integral part of three-legged spider bracket 19, having legs 20 which extend radially outward from bearing 18. The under side of each leg 20 is provided with a lip 21 adapted to fit snugly within the head portion 8 of the concentrator C thereby aligning the bearing 18 with the vertical axis of the concentrator C. Each of the legs 20 are bifurcated at their outer ends for engagement with the hinged locking studs 9, by which the spider bracket 19 is releasably held in place.

Said spider bracket 19 also includes an upwardly extending, radially slotted lug *d* offset from bearing 18 for rockably supporting lever 22 provided at its outer extremity with a conventional handle (not shown), and at its inner end the lever 22 is provided with a yoke 23, which extends half around shaft 17 and bears, at diametrically opposite points, under and against a bearing surface 24 upon the under face of a collar 25 fixed to the upper end of the shaft 17 by a pin 26.

In operation, the top cap (not shown) of the concentrator C is removed, and the impeller (not shown) of such device withdrawn vertically upward through the top annular opening in partition plate 7. The cleansing brushes 15 are manually swung backward from the direction of rotation and inward along the side of the shaft 1, as shown in dotted lines in Figure 3. In this position, the brushes extend outward from the shaft axis less than the radius of such annular opening, and can then be lowered until the splined fitting 2 on the lower end of shaft 1 engages the splines of, and rests upon, the stub shaft 3. The spider bracket 19 is then fastened down in the manner above described and the main drive (not shown) of the concentrator C set in rotation, causing shaft 1 and all parts mounted thereto to rotate. By centrifugal force, the brushes 15 and arms 14 are thrown outwardly against the interior wall of the concentrator C. The cleansing action of said brushes can be augmented, at the will of the operator of the apparatus, by moving the handle of the lever 22 upwardly and downwardly several strokes from time to time while the shaft is rotating. Pressing said handle downward causes the yoke 23 to bear against and lift the bearing surface 24 on collar 17, thus raising the entire rotating assembly from its seat on the stub shaft 3. The upward movement is limited by the length of the shaft 17 between the reduction fitting 16 and the lower edge of bearing 18, which limitation prevents disengagement of the shaft 1. When such handle is no longer pressed downward, the rotating assembly will seat itself again on the stub shaft 3 by action of gravity. Inasmuch as the brushes 15 move upwardly and downwardly with the rotating shaft 1, repeated movements of said handle while the shaft 1 is rotating will impart to the brushes a scrubbing motion which cleanses more effectively than simple rotary motion.

It should be understood that changes and modifications in the form, construction, arrangement and combination of the several parts of the centrifugal cleansing apparatus may be made and substituted for those herein shown and described without departing from the nature and principle of the present invention. For example, the device to be cleansed need not be cylindrical, but may be of another shape generated by revolving a line about an axis, nor need the axis be vertical.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. For use with process-apparatus including a base upon which is mounted a retort requiring cleaning from time to time and having a power driven rotary stub shaft projecting axially upwardly thereinto, a cleaning device, comprising a vertical shaft, brackets extending outward therefrom, arms thereto attached on a pivot axis

parallel to the shaft axis, cleansing members affixed to the outer ends of said arms, said shaft also having a longitudinally splined fitting at its lower end for extensibly engaging the rotary drive shaft and being adapted for slidable movement along the axis of the retort to be cleansed, through a predetermined reciprocating stroke, a section of annularly reduced diameter at the upper portion of said shaft, a bearing rotatably engaging said reduced section, the lower end of which bearing confines the unreduced shaft section beneath it, thus fixing the greatest length of reciprocation of said shaft, a radially-armed bracket attachable to and removable from the top of the device to be cleansed, said bracket holding the said bearing centrally and aligned on the axis of the cylindrical wall to be cleansed, a radially-extending lever mounted on said bracket, and a collar fixed to said shaft, extending over and bearing upon the inner extremity of said lever, by which means said shaft may be reciprocated.

2. For use with a cylindrical evaporator column having a rotary impeller removably mounted at its lower end on a vertical power driven stub-shaft, a removable brush for cleaning the interior surfaces of the column comprising a shaft, coupling means at the lower end of said shaft for engagement with the stub-shaft of the evaporator column, lugs fixed upon and extending radially outward from said shaft, arms each pivotally attached to the outer end of a lug so as to permit its movement in the plane normal to the shaft axis, brushes affixed to the outer ends of, and extending vertically between, adjacent pairs of said arms, said brushes being spaced alternately on opposite sides of said shaft and being of overlapping length; the distance between the outer faces of the brushes and the pivot point of the arms being greater than the radial distance from said pivot point to the interior cylindrical surface whereby the brushes can be retracted to smaller overall diametral size for insertion into the column and be adapted to swing outwardly under the influence of centrifugal force when the shaft is rotated for scrubbing contact with the inner face of the column, and a spider having a central bearing collar engaging the upper end of the shaft and being adapted for releasable engagement with the upper end of the column so that the bearing collar is substantially concentric with the column.

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