April 3, 1928.

1,665,065

W. W. MALLOY

CENTRIFUGAL MACHINE

Filed Oct. 18, 1926

2 Sheets-Sheet 1

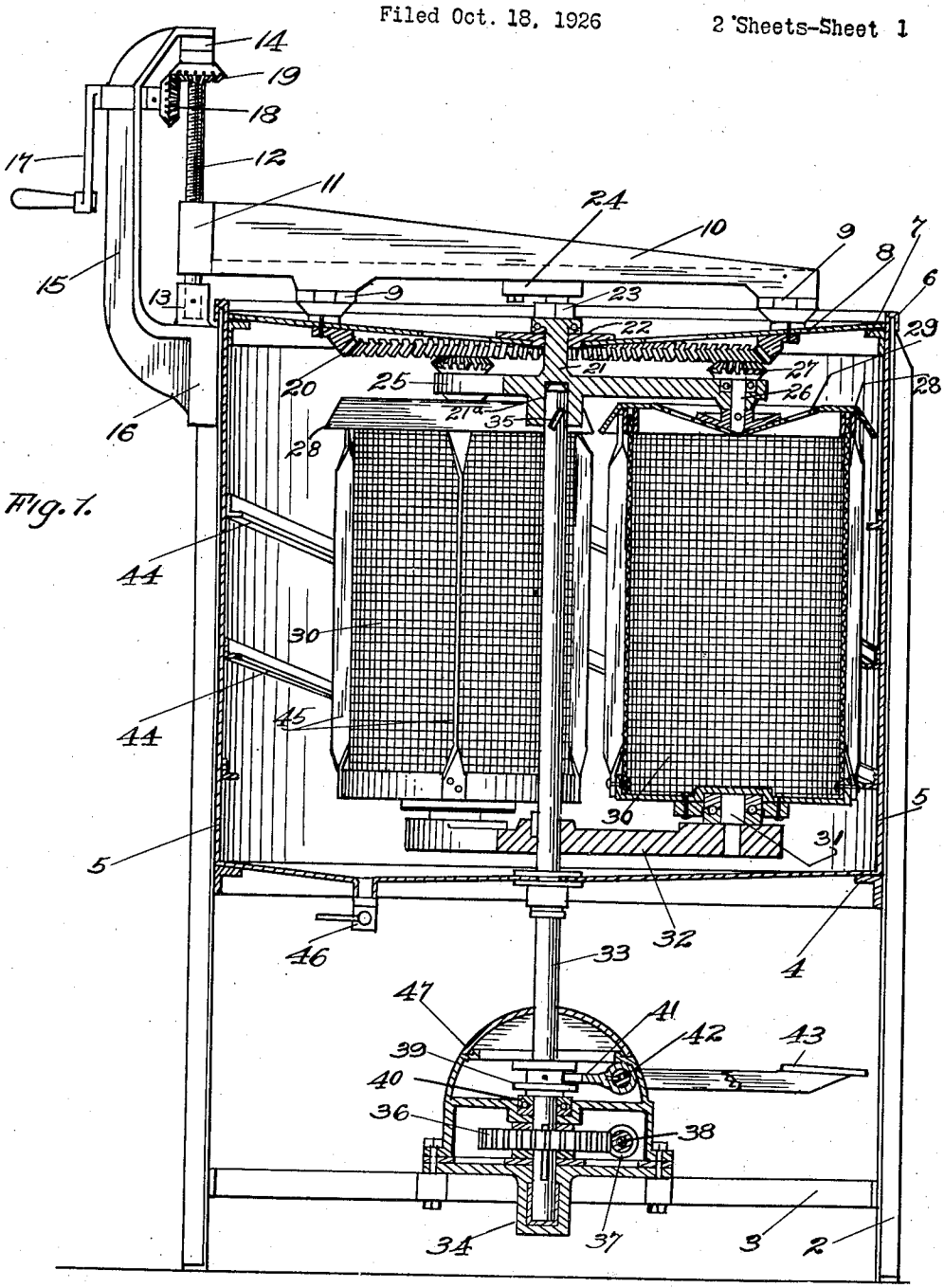

Fig. 1.

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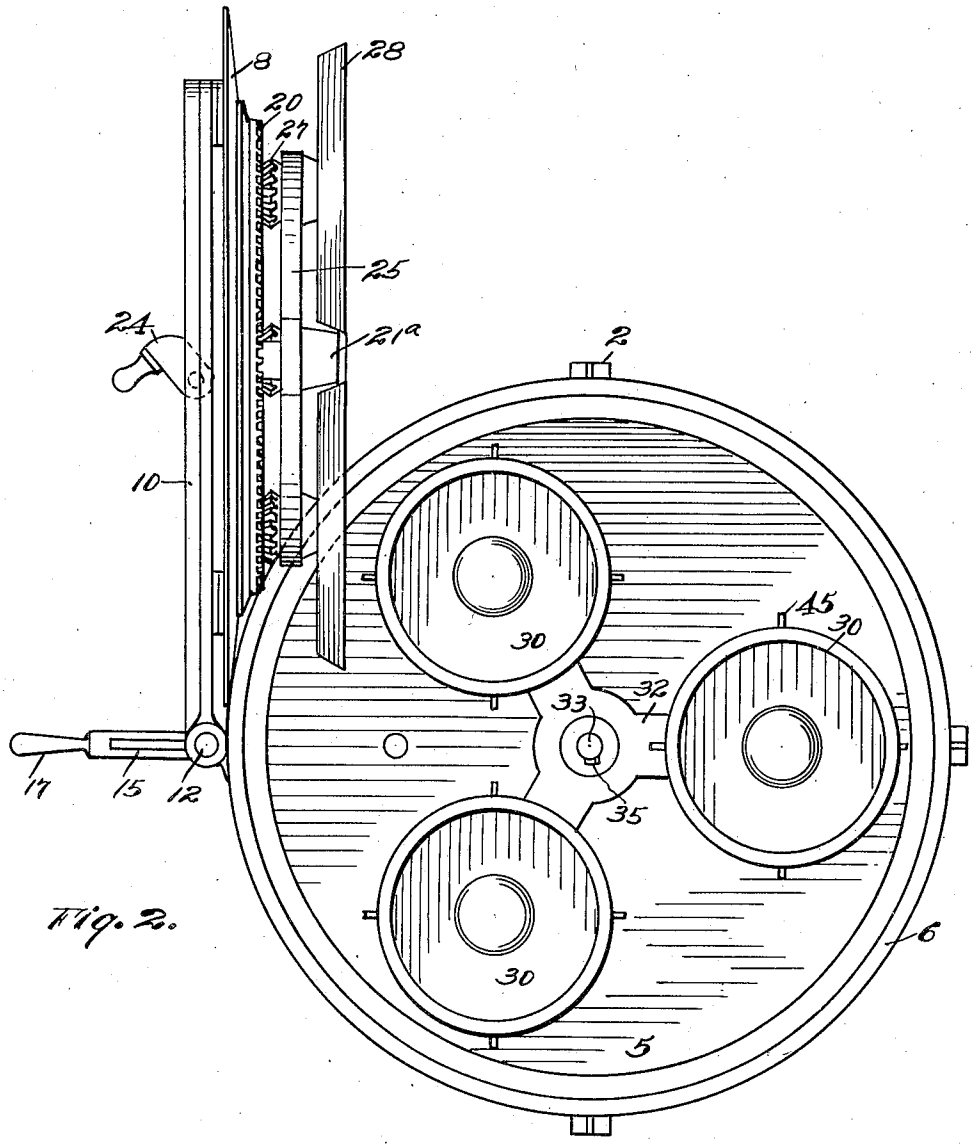

Fig. 2.

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UNITED STATES PATENT OFFICE.

WILLIAM W. MALLOY, OF SAN PEDRO, CALIFORNIA.

CENTRIFUGAL MACHINE.

Application filed October 18, 1926. Serial No. 142,352.

This invention relates to machines whereby the principle of centrifugal force is employed to effect the washing of various materials, or the straining of juices or liquids from a pulp or other mass.

An object is to provide means for sweeping the mass or body of material, to be washed or strained, in a circular orbit and to provide for the free gyration of the mass on a vertical axis therethrough while the mass is being whirled along its orbit.

A further object is to provide means for the positive rotation of the mass on its vertical axis while it is whirling along its horizontal orbit.

Another object is to provide orbitally whirling containers or receivers in a vessel and provide means for causing a flow of liquid up the wall of the vessel and then to overwash into the tops of the receivers so that when the machine is used as a washer the washing liquid will have a constant shower effect on and through the mass in the receivers.

A further object is to provide a simple, compact, substantial and quiet running machine. In this connection, an object is to provide a machine in which all of the operating parts, in normal running of the machine, have only a circular motion, an object being to obtain a machine free from vibrations ordinarily set up by reciprocating and oscillating mechanical movements.

Numerous additional objects, advantages and features will be made manifest in the following specification of an embodiment of the invention; it being understood that modifications, variations and adaptations may be resorted to within the spirit, scope and principle of the invention.

Figure 1 is a vertical section of the machine.

Figure 2 is a plan showing the machine cover swung out and up.

The machine has a simple, strong and light-weight frame of stock iron legs 2 and cross-bars 3, and a shelf ring 4 on which is disposed a tank or vessel 5 fitted within the legs 2, which are disposed around the ring. The rim of the vessel is rolled out, over the top ends of the legs, at 6 to give a smooth edge finish, and within and just below the rim of the vessel there is provided a flange 7 on which may be lowered and supported a perforated dished cover 8. The cover is hung, diametrically, on hinges 9 provided on an arm or crane 10 having its hub 11 threaded upon a screw 12 which is journalled in lower and upper bearings 13—14 provided by a bracket 15 whose base 16 is attached to a leg 2.

On the bracket is mounted a hand-crank 17 having a bevel gear 18 meshing with a companion gear 19 which is secured on the screw 12. By this means the screw may be rotated to raise or lower the crane 10 to lift or apply the cover and to jam the cover down on the seat 7. When the cover is raised to a position just above the rim 6, the crane and the cover may be horizontally swung from over the vessel. Then the cover may be tilted to vertical position on its hinges 9, as shown in Fig. 2.

Secured to the lower face of the cover is a large ring-gear 20 and in the center of the cover is a stub-shaft 21, turning in a bearing 22 fixed on the top of the cover 8. The upper end of the stub-shaft has a collar or nut 23 carried by the bearing and the lower end of the shaft is provided with a socket 21^a. A holding-down wedge 24 is pivoted on the crane to be swung to and from position over the top end of the stub-shaft.

The stub-shaft 21, carries, below the cover 8, a stout head spider 25, here having three arms which have spindles 26 whose upper ends have gears 27 to engage, when desired, with the fixed gear-ring 20. Fixed on the lower ends of the spindles 26 are dished caps 28 apertured at 29 for the downflow of liquid to respective upright receivers 30 having foraminous walls of cylindrical form for containing the material to be treated.

The receivers 30 are turnably mounted on vertical axles 31 coaxial with spindles 26 and fixed in the arms of a lower spider 32 which is secured on a main or sun-shaft 33 whose lower end is stepped in a bottom bearing 34 and whose upper end is telescopic in the upper socket 21^a of stub-shaft 21. The upper end of the shaft 33 has a driving key 35 set at a slight angle so as to have a downward thrust action in and upon the upper spider 25. Splined on the shaft 33 is a gear 36 meshing with a worm (or screw) 37 whose shaft 38 is driven by a suitable motor, not shown.

Fixed on the shaft 33 is a grooved collar

39 normally resting on an antifriction bearing 40 which takes the load of the running parts. A shift yoke 41, on rock-shaft 42, engages the collar 39. By means of a pedal 43 the yoke may be swung up so that, when desired, the pinions 27 can be meshed with the ring-gear 20. This, it will be seen, will cause the receivers 30 to spin on their own axes when and while the shaft 33 is turning and is whirling the receivers 30 in their common orbit by the spiders 25, 32.

Fixed on the inner surface of the vessel 5 is a series of helical tracks 44 forming elevators for the water (or other liquid) which may be whipped around in the vessel as a consequence of the rotation of the receivers by the spiders. The momentum of the liquid will cause it to be thrown high along the tracks 44 and eventually tumbled over onto the caps 28, whence it may again flow into the receivers 30, to pass through the contents thereof with a further washing action.

The receivers 30 are normally free to turn on their bearings 31 while their caps 28 are held down in place by the upper spider 25; the pinions 27 running under and clear of the ring-gear 20. When the shaft 33 is running the receivers 30 are whirled around in their orbit and centrifugal force acts on any liquid in the material in the receivers to drive the liquid outward. It is desirable to cause a change of the position of the contents in the receivers whilst they are traveling their orbit, and for this purpose each receiver has external fins 45 whose function is to impinge against the liquid in the vessel and by reaction cause the receivers to oscillate on their own axes and thereby cause a commotion of the contents, so that when used as a laundry washing machine the combined commotion and centrifugal force will cause effective and rapid water flow through the material.

Fruit juices and other liquids may be effectively extracted by the present machine.

After a suitable period of orbital motion of the free receivers, the machine is stopped and the wedge 24 is retracted from over the shaft 21. The pedal 43 is then depressed and the receivers and their pinions 27 are raised until the latter intermesh with the ring-gear 20. When the spiders are again turned by the shaft the pinions will be rotated by reaction of the stationary ring-gear and the contents of the receivers quickly exhausted of liquid, which may drain off through the drain cock 46.

Should any liquid work over the perforated cover 8 it may freely flow back into the tank or vessel.

A suitable housing 47 is provided to cover the lower lift and gear mechanism.

What is claimed is:

1. In a centrifugal machine, a set of upper and lower spiders and means for driving the spiders, a set of vertical foraminous receivers supported by and between the spiders for rotation in an orbit, the upper spider having a set of covers for the receivers, and means on the receivers for causing a reactionary rotation of the receivers.

2. In a centrifugal machine, a set of upper and lower spiders and means for driving the spiders, a set of foraminous receivers supported by and between the spiders for rotation in an orbit, the upper spider being provided with caps to engage the receivers, and means for lifting the upper spider and the caps to uncover the receivers.

3. In a centrifugal machine, a set of foraminous receivers, a lower support for carrying the receivers in an orbit, a spider having caps for the receivers, a vessel, in which the receivers sweep, a cover for the vessel and to which the spider is attached, a crane carrying the cover, and means for raising and lowering the crane.

4. In a centrifugal machine, a set of orbitally travelling receivers, a vessel in which they sweep, a cover for the vessel, a ring-gear fixed on the cover, a set of pinions for the receivers and which normally run clear of the ring-gear, and means for elevating the receivers to mesh their pinions with the ring-gear; whereby to obtain centrifugal action by the spinning of the receivers.

5. In a centrifugal machine, a vessel, a set of receivers mounted therein on driving means for orbital motion, fins on the receivers to cause rotation thereof by liquid reaction, and liquid elevating and overwashing tracks in the vessel to throw liquid upward toward the tops of the receivers.

6. In a centrifugal machine, a vessel, a set of receivers mounted therein and for orbital rotation on a driving means, a set of caps for the receivers, a cover for the vessel, means connecting the caps to the cover, a pivotal crane to which the cover is hinged, and means to raise and lower the crane; whereby the cover can be tilted out of the way when carried to one side by the crane.

7. In a centrifugal machine, a vessel and a supporting frame therefor, a cover for the vessel, a main central sun-shaft journalled vertically in the vessel and having a spider above the bottom of the vessel, a set of rotary foraminous receivers mounted vertically on the spider, a top bearing on the cover to slidably receive the shaft end, a drive mechanism, below the bottom of the vessel, for the shaft, means for effecting a rotation of the receivers on their own axes, and means for lifting the said shaft and the receivers to connect the latter to the said means.

8. In a centrifugal machine, a vessel and a supporting frame therefor, a cover for the vessel, a main central sun-shaft jour-

nalled vertically in the vessel and having a spider above the bottom of the vessel, a set of rotary foraminous receivers mounted vertically on the spider, a top bearing on the cover to slidably receive the shaft end, a drive mechanism, below the bottom of the vessel, for the shaft, means for effecting a rotation of the receivers on their own axes, and means for lifting the said shaft and the receivers to connect the latter to the said means; said shaft and top bearing having means for reacting downward on the top bearing.

WILLIAM W. MALLOY.