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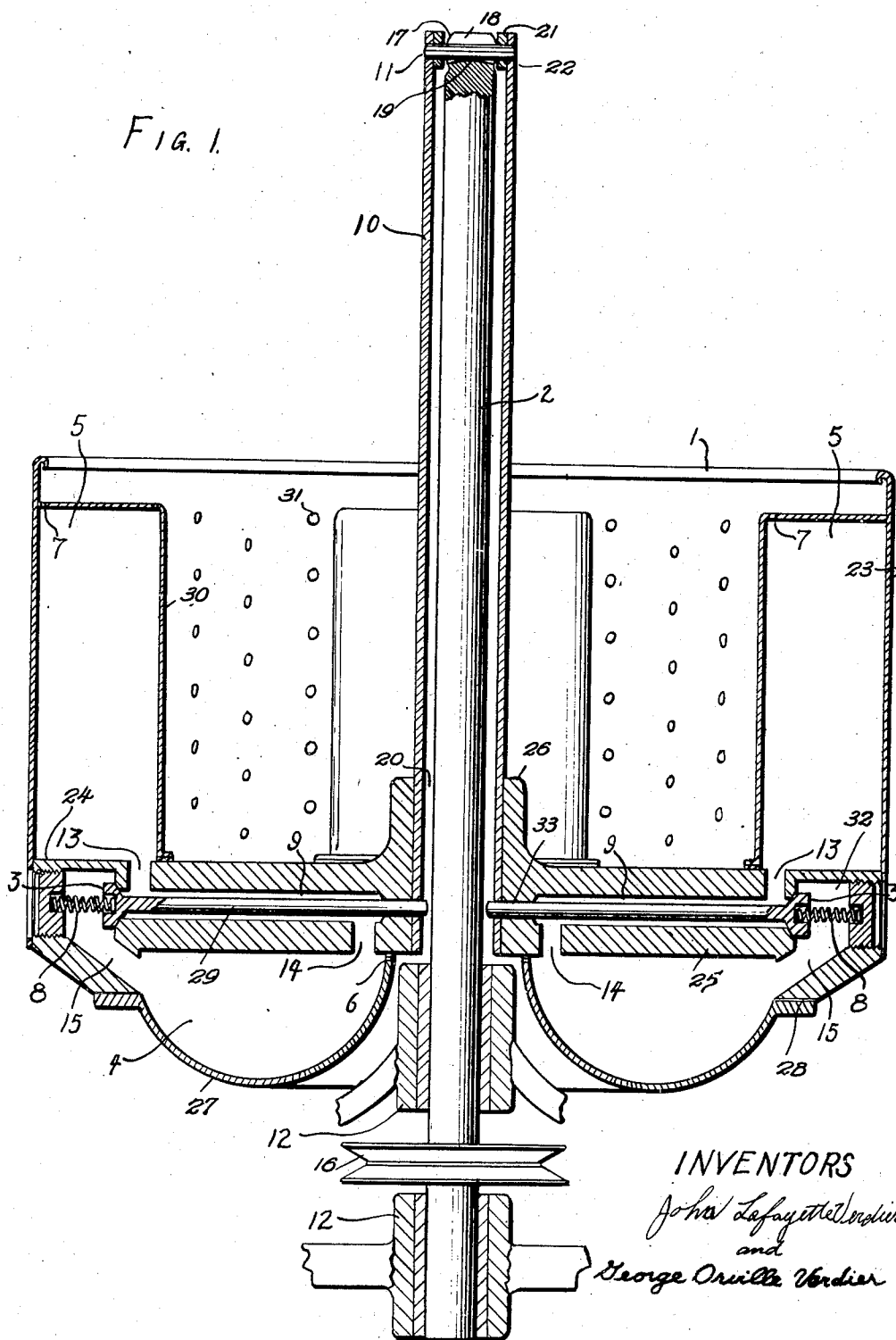
J. L. VERDIER ET AL

2,224,241

ROTARY EXTRACTOR

Filed Feb. 28, 1938

2 Sheets-Sheet 1



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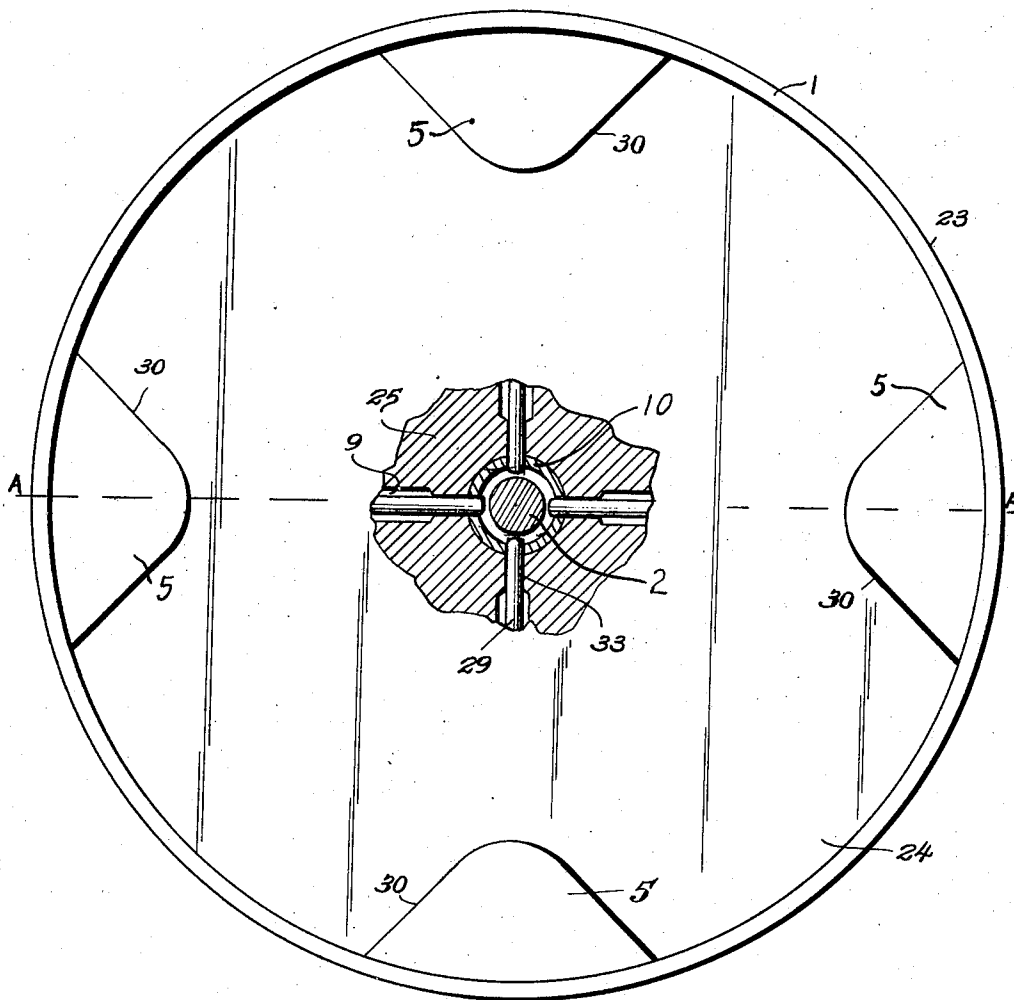
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2 Sheets-Sheet 2

FIG. 2.



INVENTORS

John Lafayette Verdier
George Orville Verdier

UNITED STATES PATENT OFFICE

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ROTARY EXTRACTOR

John Lafayette Verdier and George Orville
Verdier, Sidney, Ohio

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3 Claims. (Cl. 210-63)

This invention relates to improvements in an automatic balancing device, where a liquid is used to balance a rotating basket and more particularly to the type of extractor used in the laundry and home laundry equipment.

With a rotary extractor used for drying clothes, it is difficult to equally distribute the weight, and as a result the basket will vibrate due to the unbalanced condition thereof.

It is therefore an object of the invention to provide a basket of this type with simple means without levers, cams, or resilient cushions which will compensate for unequal loading of the basket, by directing liquid quickly and in proper amount to the lighter side.

Other objects and meritorious features will become apparent as the invention is described in detail and reference is made to the drawings, wherein,

Fig. 1 is a vertical axial section taken on the line A-A of Fig. 2, and Fig. 2 is a top plan view with the central portion broken away in order to more clearly show the inner ends of the stems of the valves which regulate the flow of the compensating fluid.

Like numerals refer to like parts throughout the several views.

Construction

A vertically extending shaft 2 is rotatably supported in bearings 12 and adapted to be rotated by the pulley 16. A spheroidal end 17 is formed on the upper end of the shaft. A transverse slot 18 extends through the end, the bottom of the slot being convex as at 19.

A tubular shaft 10 surrounds the shaft 2 loosely, leaving space 20 therebetween. The top end of the tube is reinforced by the addition of a short sleeve 21, and a pin 11 extends transversely through the tube and sleeve, the pin lying in the slot 18 on the convex bottom 19. The structure represented by numerals 11, 17, 18, 19, and 21 together constitute a universal joint through which the solid shaft 2 may rotate the tubular shaft 10 either while their respective axes are coincident or while the axis of the tube inclines to that of the shaft to a degree limited by the space 20. The universal joint may be broadly designated by the numeral 22.

The basket 1 comprises a cylindrical side wall 23 preferably of sheet metal with a bottom member 24 which may be of cast material in order that it may more conveniently include the thicker portions 25 which contain the valves. The lower end of the tube 10 is firmly secured in a hub 26 extending upwardly from the bottom, whereby rotation of the tube rotates the basket.

A basin like pan 27 is joined to the underside of the bottom member 24, leak tight joints being made between the two parts at 28, the pan there-

by rotating with the basket. The enclosed sump 4, formed between the pan 27 and the bottom member 24, should be kept substantially full of a balancing liquid, preferably water.

Radially disposed in the thicker parts 25 of the bottom member 24 are a plurality of angularly spaced apart valves, each comprising a head 3 with a long stem 29 extending inwardly through the hub 26 and tube 10, the inner ends of the stems almost, but preferably not quite, touching the shaft 2. At their inner ends, where the valve stems pass through the hub and tube, they are fitted closely but slidably, to provide guides 33, but the longer intermediate portions of the stems pass through a hole which is considerably larger than the stems thereby providing a conduit 9 around each stem for the greater portion of its length. A spring 8 holds each valve head 3 on its seat in the bottom member.

Secured to the inside of the wall 23 of the basket are a series of circumferentially spaced receptacles 30 corresponding in number and spacing to the valves, each enclosing a leak tight chamber 5, adapted under certain operative conditions to receive the greater part of the balancing fluid from the sump 4. Those portions of the wall 23 which are intermediate the receptacles 30 are provided with perforations 31.

The pockets 32 which surround each valve head 3 are each connected by a passageway 15 to the sump 4. The conduits 9, which surround the valve stems 29 for the greater part of their length are each connected near their outer ends by a port 13 leading to the chamber 5, and near their inner ends by a port 14 leading to the sump 4. Small air vent holes 6 and 7 are provided for the sump 4 and chambers 5 respectively.

Operation

The clothes or other materials to be dried are placed in the basket. Power is applied to the pulley 16 to rotate the shaft 2, and, through the universal joint 22 and tube 10, the basket is rotated. Due to centrifugal force, the water in the sump 4 immediately moves away from the axis of rotation, away from the passageway 14 and vent 6 and fills the pockets 32 around the valve heads 3.

The water around the valve heads, due to centrifugal force, will be under considerable pressure tending to hold the valves closed, but due to the radial disposition of the valves, the outward centrifugal force due to the weight of the metal valves tending to open them substantially balances the inward force of the water pressure tending to close them. The springs 8 should therefore exert a light pressure to keep the valves closed, in order that a small degree of unbalance in the basket may operate the valves, whereby

compensation for such small unbalance is effected.

Since the clothing or other material being dried is not likely ever to be equally distributed therein, a high side instantly develops in the outer wall of the basket, that is, the normal axis of the basket will swing on the universal joint toward the heavy side whereby the space 20 near the lower end of the tube 10 decreases on the light side.

Decreasing the space 20 on the light side will press the inner end of the stem of that one of the valves 3 which is on the light side against the shaft 2, thereby opening the valve and allowing water under pressure to flow through the valve and through a port 13 into that chamber 5 which is on the light side.

When the unbalance is intermediate two of the receptacles 30 on one side of the basket, the two opposite valves and receptacles will operate together to effect a balance. As the balancing liquid flows from the sump 4 into a receptacle 30, an equal volume of air is drawn in at the vent 6 and expelled from the vent 7.

As soon, however, as the volume of liquid having weight sufficient to compensate for the unbalance of the clothing or other material has passed into the receptacle or receptacles 30 on the light side, the tendency of the axis of the basket to be angularly displaced by the unbalance of the material in the basket will be overcome, the space 20 will become normal, and the valves will close. Rotation with the basket axis coincident with the shaft axis then continued until the moisture in the material is discharged through the perforations 31 in the well known manner.

When the application of power is discontinued and rotation of the basket ceases, the liquid in the chambers 5 will flow downwardly through the port 13, radially inward through conduits 9 and back into the sump 4 through the port 14, air being drawn in at the vent 7 and expelled through the vent 6. Inasmuch as there is now no centrifugal force being generated the liquid readily flows toward the axis in passing through conduits 9.

While we have described an embodiment of the invention whereby the objects set forth are attained, it will be evident that many variants of the structure described may come within its inventive concept, the scope of which is defined in the appended claims.

We claim:

1. In a device of the character described, a solid shaft with axis vertical, bearings for rotatably supporting said shaft, a tubular shaft surrounding the solid shaft loosely above said bearings, a universal joint drivably connecting the two shafts at the upper end, the axis of the tubular shaft being swingable on said joint with respect to the axis of the solid shaft to such an extent as is permitted by the space between the outside of the solid shaft and the inside of the tubular shaft, a perforate basket having a bottom member firmly secured to the swingable end of the tubular shaft, the top of said basket being below said universal joint, a basin-like sump concentrically secured to the underside of the said bottom member, a series of balancing receptacles circumferentially spaced around the periphery of the basket, a series of poppet valves, one for each said receptacle, the valves having heads positioned in the bottom member near the periphery of the basket and long stems extend-

ing radially inward to a point near but not quite touching the shaft, said stems having slidably fitted guides in the bottom member at their inner ends, said bottom member having pockets formed around the heads of the valves with a passageway connecting each pocket to the sump, said bottom member also having a conduit formed around the stem of each valve extending from the valve head to the guide with a port adjacent each valve head connecting the outer end of a conduit to a balancing chamber and a second port adjacent each guide connecting the inner end of a conduit to said sump, said sump and balancing chambers having air vents in their upper portions.

2. In a device of the character described, two normally concentric vertical shafts, the one hollow and surrounding the other with a narrow space therebetween, a universal joint drivably connecting the two shafts at one end, bearings for rigidly supporting one of said shafts for rotation about a fixed axis, the axis of the other shaft being adapted by said universal joint to be inclined with respect to the axis of the first shaft, said inclination being limited by the said narrow space, a perforate basket axially spaced from said universal joint and firmly fixed to the free end of the inclinable shaft, a bottom member for said basket, a sump on the underside of the bottom member, a series of balancing receptacles circumferentially spaced around the periphery of the basket, a valve for each receptacle, the heads of the valves being near the periphery of the basket and each having a long stem extending radially inward to a point near but not bearing against the shaft, slidably fitted guides for said stems at their inner ends, said bottom member having pockets formed around the valve heads with a passageway connecting each pocket to the sump and a conduit around each valve stem extending from the valve head to the guide with a port leading from the outer end of each conduit into a balancing chamber and a second port leading from the inner end of each conduit into the sump.

3. In a device of the character described, two normally coaxial rotatable power transmitting elements one surrounding the other, a universal joint drivably connecting said elements at one end, bearing means for supporting one of said elements for rotation about a fixed axis, the axis of the other element being adapted by said universal joint to be inclinable with respect to the axis of the first element, a perforate basket firmly fixed to the free end of the inclinable element, a bottom member for said basket, a sump on the under side of said bottom member, balancing receptacles circumferentially spaced around the periphery of the basket, a valve for each receptacle, the heads of the valves being near the periphery of the basket and each having a long stem extending radially inward substantially to the fixed element and having slidably fitted guides for said stems, the spaces radially beyond said valve heads being in the form of pockets with a passageway extending from said sump into each pocket, and the spaces radially within said heads each being connected by a port to a balancing receptacle, and means containing passageways from each receptacle radially inward and into said sump at a point near its axis of rotation.

JOHN LAFAYETTE VERDIER.
GEORGE ORVILLE VERDIER.