Oct. 22, 1940. G. W. DUNHAM 2,219,177

CENTRIFUGAL EXTRACTOR

Filed April 25, 1936

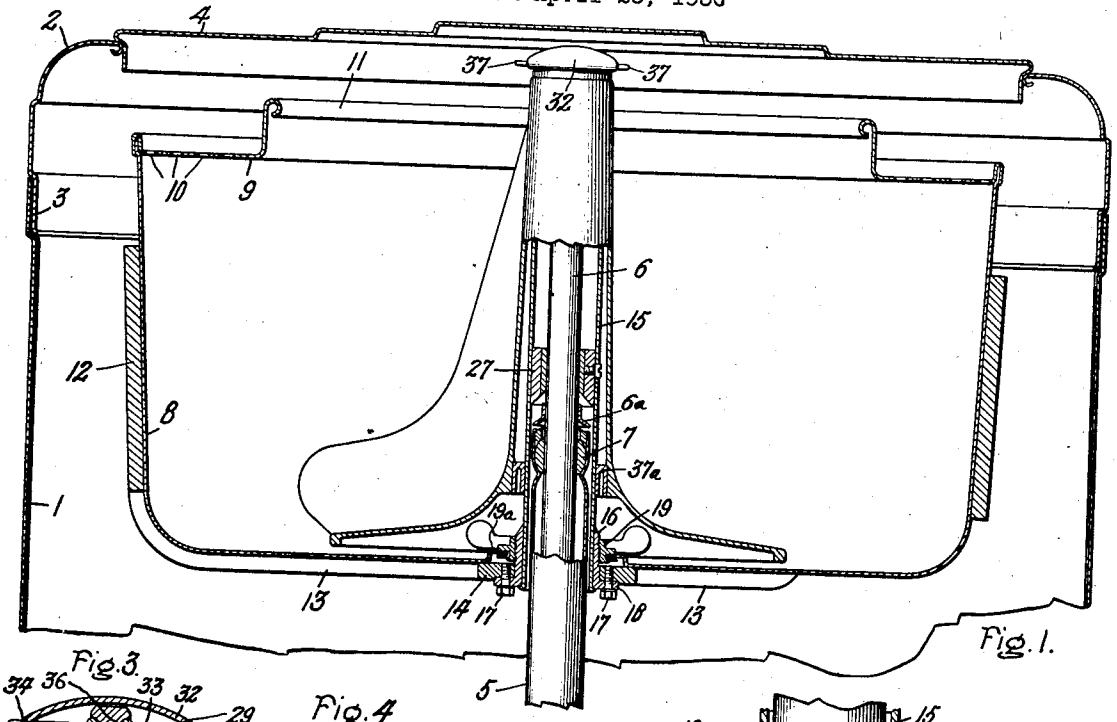


Fig. 1.

Fig. 3.

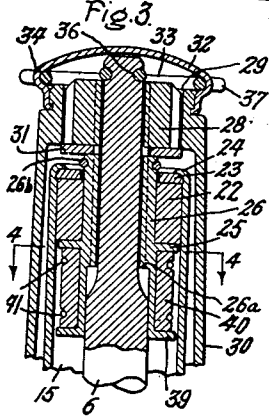


Fig. 4.

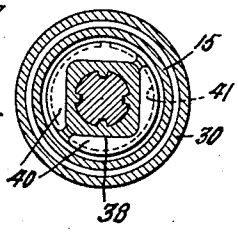


Fig. 2.

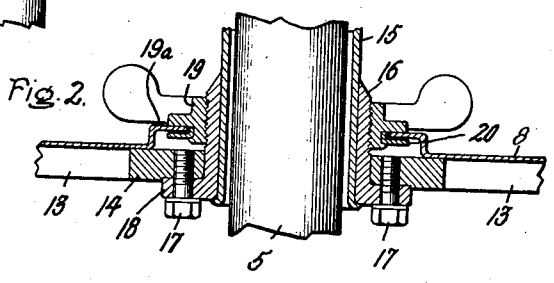


Fig. 5.

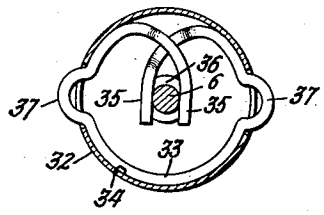


Fig. 6.

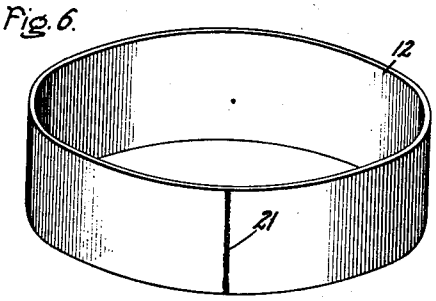
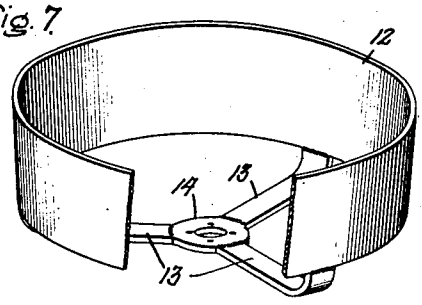


Fig. 7.



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UNITED STATES PATENT OFFICE

2,219,177

CENTRIFUGAL EXTRACTOR

George W. Dunham, Westport, Conn., assignor to General Electric Company, a corporation of New York

Application April 25, 1936, Serial No. 76,419

11 Claims. (Cl. 68—23)

The present invention relates to centrifugal extractors such as used for drying clothes, and particularly to the construction of the rotatable receptacle for receiving the clothes or other material to be dried.

The object of my invention is to provide an improved construction and arrangement in centrifugal extractors of this type, and for a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and the claims appended thereto.

In the accompanying drawing, Fig. 1 is a fragmentary sectional elevation of a washing machine having a rotatable receptacle embodying my invention for extracting liquid from the clothes; Fig. 2 is an enlarged view of a portion of Fig. 1, showing the manner of securing the receptacle to the carrier; Fig. 3 is a sectional view taken from the upper end of the driving shaft and showing the arrangement for supporting and driving the agitator and the receptacle; Fig. 4 is a sectional view taken on line 4—4 of Fig. 3; Fig. 5 is a sectional view showing the arrangement for holding the agitator on the driving shaft; and Figs. 6 and 7 are perspective views showing the manner of making the carrier for supporting the rotatable receptacle.

Referring to the drawing, I have illustrated my invention applied to a washing machine of the type shown in my application, Serial No. 61,635, filed January 31, 1936. This machine is provided with an outer casing or tub 1, the lower end of which is broken away. The upper end of the tub is partially closed by an annular cover 2 having a flange 3 which fits within the upper end of the tub. A cover 4 which rests on the inner edge of the annular cover 2 completes the enclosure of the upper end of the tub. During the normal use of the machine only the cover 4 need be removed. It is necessary to remove the cover 2 only when the carrier, composed of parts 12 to 18, inclusive, is to be removed for any reason, such as reducing the weight to be handled in delivery or servicing.

From the bottom of the tub 1 extends a sleeve 5 through which extends a vertical shaft 6. Suitable means, for example, those shown in my above application, may be provided for supporting the lower end of the sleeve and the shaft. The shaft is guided in the sleeve by a sleeve bearing 7 having a spherical seat in the sleeve which permits alignment of the bearing with the shaft. The sleeve 5 projects a considerable distance above the water level in the tub 1, so that there is no tendency for water to leak around the shaft 6. Any water which may flow down shaft 6 is deflected beyond the upper end of the sleeve by a collar 6a secured to the shaft.

Around the shaft 6 is a receptacle 8 for receiving liquid and material to be washed. This receptacle is made from relatively thin and noncorrosive metal, such as aluminum, so that it is quite light. The side walls of the receptacle are imperforate and are tapered so that as the receptacle is rotated liquid will be discharged over its upper edge. At the upper edge of the receptacle is an annular guard ring 9 which keeps the clothes within the receptacle while extracting. The guard ring is provided with perforations 10 through which the liquid can be discharged during extracting. The top inner edge of the guard ring is provided with a beaded flange 11 which presents a smooth surface to the clothes when loading and unloading and to the hands when lifting the receptacle.

The receptacle is supported on a carrier having annular re-enforcing walls 12 surrounding the side walls of the receptacle and having spaced radial arms 13 connecting the walls 12 to a disk 14 to which is secured a hub 15. The manner of securing the hub to the disk 14 is shown in Fig. 2. In this arrangement a sleeve 16 is suitably fixed to the lower end of the hub, and screws 17 are threaded through a flange 18 on the sleeve into tapped holes in the disk 14. The receptacle is secured to the carrier by means of a nut 19 threaded on the sleeve 16 which engages a flange 19a on the receptacle. The nut is provided with a circular flange 20 which extends underneath the flange 19a. The purpose of the flange 20 is to lift the receptacle from the carrier when the nut is unthreaded. This insures the easy release of the receptacle from the carrier. With this construction, the carrier is not subject to the corrosive action of the washing solution and can therefore be made of a relatively cheap material, such as galvanized steel or cast iron, while the receptacle, which must be made of relatively expensive noncorrosive material, can be very light. The receptacle can therefore be easily removed for cleaning. Another advantage of this construction is that the spacing of the arms 13 to the carrier is sufficient to permit easy access to the bottom and side walls of the tub 1 when the receptacle 8 is removed. This facilitates the cleaning of the tub. Another advantage of this construction is that the annular re-enforcing walls 12, which are relatively heavy, increase the mass of the receptacle and thereby diminish the amplitude of gyration due to unbalanced distribution of load within the receptacle.

Figs. 6 and 7 illustrate one method of making the carrier. In accordance with this method, a flat strip of steel is bent in the form of a cylinder, and the abutting ends are joined by a weld 21. This cylinder is then placed in a forming die which forms the walls of the cylinder so as to produce the required taper. This die also sizes the walls to a perfectly circular shape and may stretch the walls so as to secure uniform diameter. After this operation, the disk 14 is located at the center of the walls 12, and the radial arms 13 are welded to the disk 14 and to the lower edge of the walls 12. The assembly thus formed is then struck in a straightening die to correct such distortion as may have occurred in welding. Due to this method of construction, the walls 12 are of uniform diameter and the disk 14 is perfectly centered with respect to the walls. This method of construction reduces variations in dimensions due to variations of manufacture to a minimum. The manufacture of the carrier is completed by truing the flange 18 and bolting the flange to the disk 14.

The carrier is rotatably supported on the upper end of the vertical shaft 6 by a combined sleeve and thrust bearing 22 which is held in the upper end of the hub 15 by a washer 23 arranged between the bearing and a spun-over portion 24 of the hub. The lower edge of the bearing 22 bears on a flange 25 of a sleeve 26 which is splined on the shaft 6. The inner surface of the bearing 22 bears on the sleeve 26. The weight of the carrier and receptacle is transmitted from the bearing 22 through flange 25 to a shoulder 26a on the shaft 6. The lower end of the hub 15 is guided on the shaft 6 by a sleeve bearing 27 which is secured to the inside of the hub. With this arrangement, the carrier and receptacle are rotatably supported on the shaft 6 and the shaft 6 is normally free to rotate relative to the hub 15. When the carrier is removed from the shaft 6, a snap ring 26b holds the sleeve 26 and the parts assembled thereon in fixed relation to the hub 15 so that these parts are removed as a unit. This allows bearing 27 to be of minimum diameter, so reducing the friction loss, and permits the whole carrier assembly to be lifted off the shaft 6 without disturbing any of the parts.

The splined end of the shaft 6 projects beyond the sleeve 26 and has a nut 28 fitting thereon which fits within a complementary opening 29 in the hub of an agitator 30 and provides a positive driving connection. The weight of the agitator is carried on the upper end of the sleeve 26 through a thrust washer 31. The upper end of hub 15 and the agitator extend above the normal water level in the receptacle, but during washing water is sometimes splashed over the upper end of the agitator. In order to prevent this water from leaking around the shaft 6 a cap 32 is secured over the upper end of the agitator. Within this cap is carried a wire spring 33 of the configuration shown in Fig. 5. This spring normally occupies the position shown in Fig. 5 in which the sides of the spring fit within a groove 34 in the cap, and in which the arms 35 of the spring fit within an annular groove 36 in the upper end of the shaft 6. When in this position the agitator is securely held on the shaft. When the agitator is to be removed, the ears 37 of the spring are pressed inward, thereby spreading the arms 35 clear of the groove 36, so that the agitator may be lifted from the upper end of the shaft. The arms 35 have sufficient resilience so that they will be forced apart by the upper end of the shaft when the agitator is replaced. The lower end of the agitator is guided on the hub 15 by a bearing 37a.

The arrangement for connecting the shaft 6 to the receptacle during extracting is the same as that shown in my application, Serial No. 61,635, filed January 31, 1936. In accordance with this arrangement, the lower end of the sleeve 26 is provided with a squared portion 38 between the flange 25 and a flange 39. Between these flanges are clutch shoes 40 which are held against the squared surface by split rings 41 when the shaft 6 is oscillated at the required speed for washing. Therefore, during this oscillation of the shaft, the receptacle will not be connected to the shaft and the agitator will oscillate in the receptacle. When the clothes are to be dried, the shaft 6 is rotated. As soon as the speed of rotation exceeds a few hundred R. P. M., the centrifugal force acting on the clutch shoes 40 causes the shoes to be thrown outward. When the shoes make contact with the inner surface of the hub 15, the friction between the shoes and the hub causes the shoes to be displaced relative to the squared cam surface 38. This displacement causes the shoes to be wedged between the cam surface and the hub, thereby completing a positive driving connection between the shaft and the receptacle. This driving connection is dependent upon the torque transmitted through the shaft 6, so that when the torque is removed the shoes may be easily returned to their normal position against the squared surface 38. Any suitable arrangement may be used for selectively oscillating or rotating the shaft 6, for example, the arrangement shown in my application, Serial No. 14,255, filed April 2, 1935.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a centrifugal device, a receptacle, a carrier for the receptacle having a hub extending through the bottom of the receptacle, fastening means on the hub for removably securing the receptacle to the carrier, means on the fastening means extending beneath the receptacle for lifting the receptacle from the carrier as the fastening means is released, and means for supporting the carrier for rotation.

2. In combination, a rotatable receptacle including a hub, a vertical shaft, a sleeve removably supported on the shaft, a thrust bearing between the hub and the sleeve for rotatably supporting the receptacle on the sleeve, and means for holding said sleeve and said hub in assembled relation whereby the hub and sleeve may be lifted from the shaft as a unit.

3. In combination, a rotatable receptacle including a hub, a vertical shaft, a sleeve removably supported on the shaft, a thrust bearing between the hub and the sleeve for rotatably supporting the receptacle on the sleeve, a sleeve bearing carried by said hub below said sleeve for guiding said hub on said shaft, and means for holding said sleeve and said hub in assembled relation whereby the hub and sleeve may be lifted from the shaft as a unit.

4. In combination, a rotatable receptacle including a hub, a vertical shaft, a sleeve removably supported on the shaft, a thrust bearing between the hub and the sleeve for rotatably supporting the receptacle on the sleeve, clutch means carried between said sleeve and said hub for effecting a driving connection between the shaft and the receptacle, and means for holding said sleeve and said hub in assembled relation

whereby the hub, sleeve, and clutch means may be lifted from the shaft as a unit.

5. In combination, a rotatable receptacle adapted to receive liquid and material to be washed and including a hub, a vertical shaft, a sleeve removably supported on said shaft, a thrust bearing between said hub and said sleeve for rotatably supporting the receptacle on the sleeve, washing means in said receptacle, means including said shaft for operating said washing means, means for effecting a driving connection between said shaft and said receptacle whereby said receptacle is rotated to extract liquid from the material contained therein, and means for holding said sleeve and said hub in assembled relation whereby the hub and sleeve may be lifted from the shaft as a unit.

6. In combination, a rotatable receptacle adapted to receive liquid and material to be washed, and including a hub, a vertical shaft, a sleeve removably supported on said shaft, a thrust bearing between said hub and said sleeve for rotatably supporting the receptacle on the sleeve, washing means in said receptacle, means including said shaft for operating said washing means, clutch means carried between said sleeve and said hub for effecting a driving connection between said shaft and said receptacle whereby said receptacle is rotated to extract liquid from the material contained therein, and means for holding the sleeve, hub, and clutch means in assembled relation whereby these parts may be lifted from the shaft as a unit.

7. In combination, a receptacle, a carrier for the receptacle having a hub, means for removably supporting the receptacle on the carrier, a vertical shaft, a sleeve removably supported on the shaft, a thrust bearing between the hub and the sleeve for rotatably supporting the carrier on the sleeve, and means for holding said sleeve and said hub in assembled relation whereby the hub and the sleeve may be lifted from the shaft as a unit.

8. In combination, a receptacle, a carrier for the receptacle having a hub, means for removably supporting the receptacle on the carrier, a vertical shaft, a sleeve removably supported on the shaft, a thrust bearing between the hub and the sleeve for rotatably supporting the carrier on the sleeve, a sleeve bearing carried by said hub below said sleeve for guiding the hub on the shaft, and means for holding said sleeve and said hub in assembled relation whereby the hub and the sleeve may be lifted from the shaft as a unit.

9. In combination, a receptacle, a carrier for the receptacle having a hub, means for removably supporting the receptacle on the carrier, a vertical shaft, a sleeve removably supported on the shaft, a thrust bearing between the hub and the sleeve for rotatably supporting the carrier on the sleeve, clutch means carried between said sleeve and said hub for effecting a driving connection between the shaft and the carrier, and means for holding said hub, sleeve and clutch means in assembled relation whereby the hub, sleeve and clutch means may be lifted from the shaft as a unit.

10. In a combined washing and drying machine, a tub, a receptacle therein for receiving clothes to be washed and centrifugally dried, washing means for agitating the liquid and clothes in the receptacle, a carrier for the receptacle having an open top through which the receptacle is inserted, means for rotatably supporting the carrier above the liquid level in the tub during centrifugal drying whereby the liquid in the receptacle is stored in the bottom of the tub, said carrier having sufficient mass to serve as a balance weight during centrifugal drying and having openings normally covered by the receptacle permitting access to the tub for cleaning when the receptacle is removed from the carrier, driving means for selectively operating the washing means and rotating the carrier for centrifugal drying, and releasable means for non-rotatably fastening the carrier and receptacle whereby the receptacle may be removed from the tub without removing the carrier and its supporting and driving means.

11. In a combined washing and drying machine, a tub, a receptacle therein for receiving clothes to be washed and centrifugally dried, a carrier for the receptacle having a hub projecting through the bottom of the receptacle and having spaced radial arms extending from the hub beneath the receptacle and connected to annular walls on the carrier surrounding the receptacle side walls, said carrier having sufficient mass to serve as a balance weight during centrifugal drying and said radial arms being spaced apart sufficiently to permit access to the tub for cleaning when the receptacle is removed, means for rotatably supporting the carrier above the liquid level in the tub during centrifugal drying whereby the liquid in the receptacle is stored in the bottom of the tub, an agitator in the receptacle, shaft means extending upward from the bottom of the tub for operating the agitator for washing and for rotating the carrier for centrifugal drying, and releasable means for non-rotatably fastening the carrier and receptacle whereby the receptacle may be removed from the tub without removing the carrier and its supporting and driving means.

GEORGE W. DUNHAM.