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CENTRIFUGAL WASHER AND DRIER

Filed May 3, 1928

2 Sheets-Sheet 1

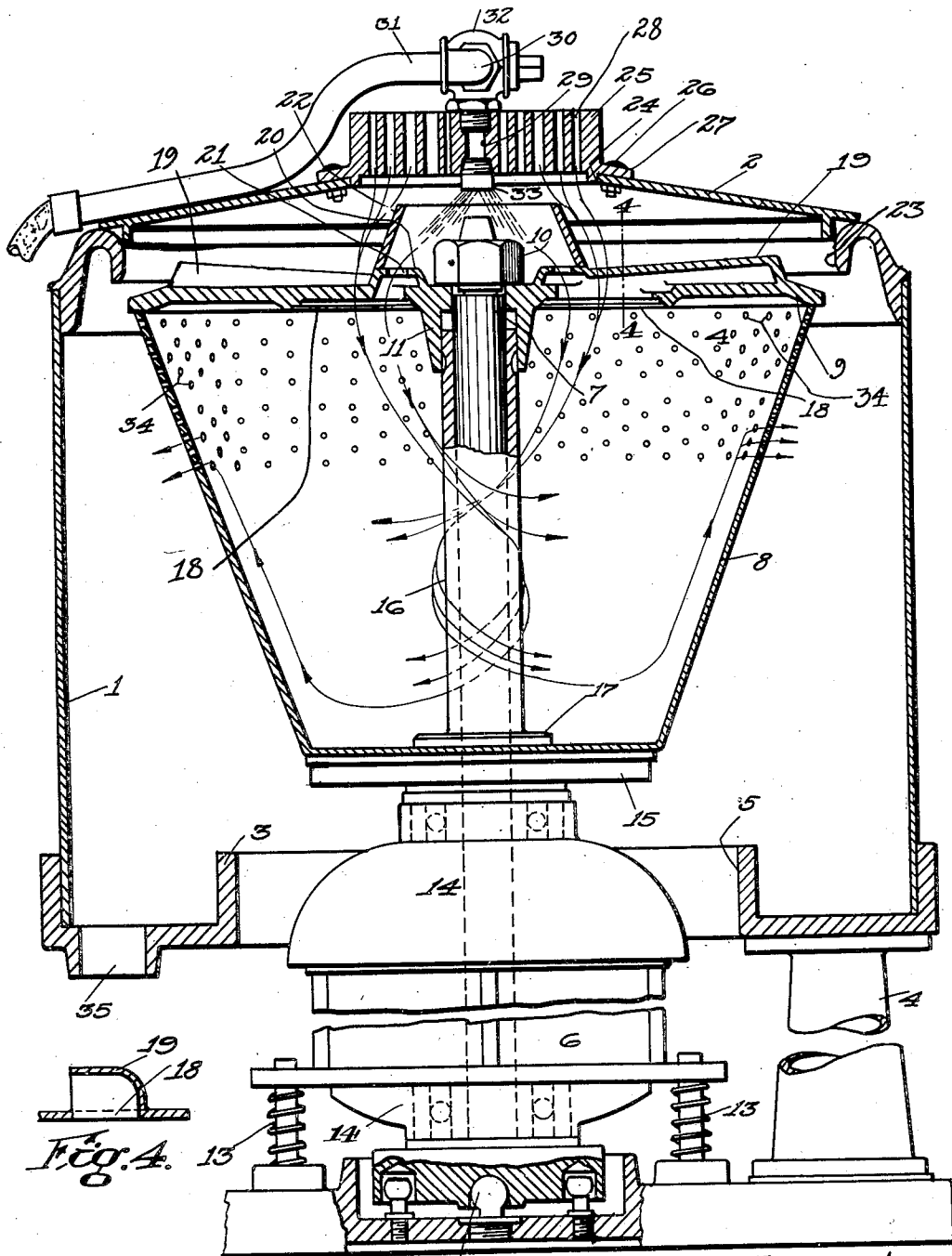


Fig. 4.

Fig. 1.

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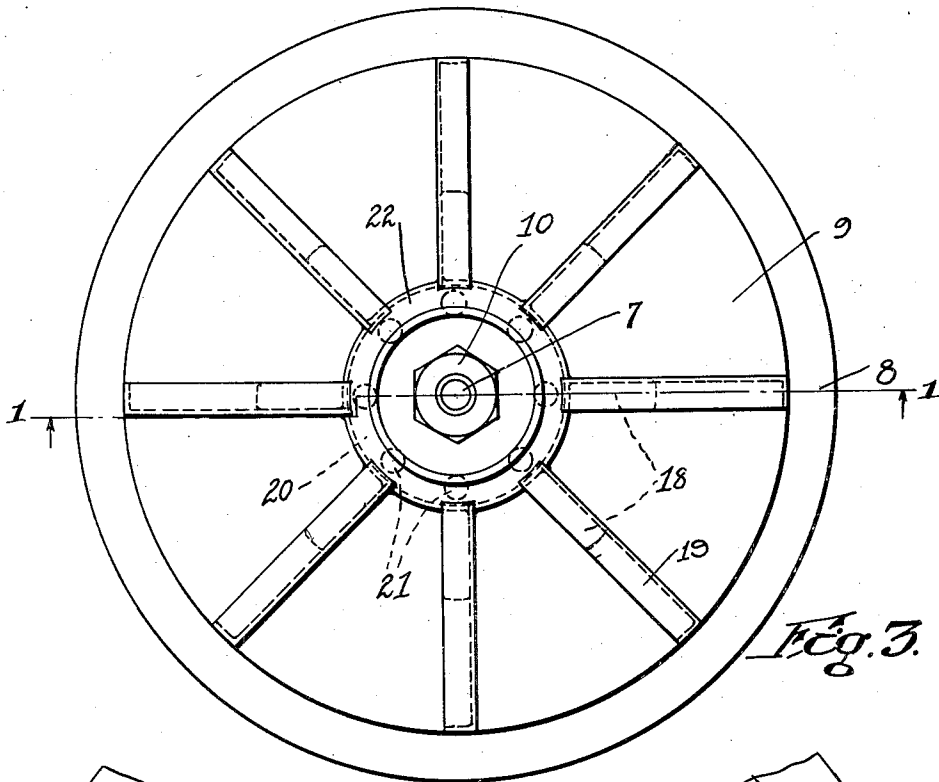


Fig. 3.

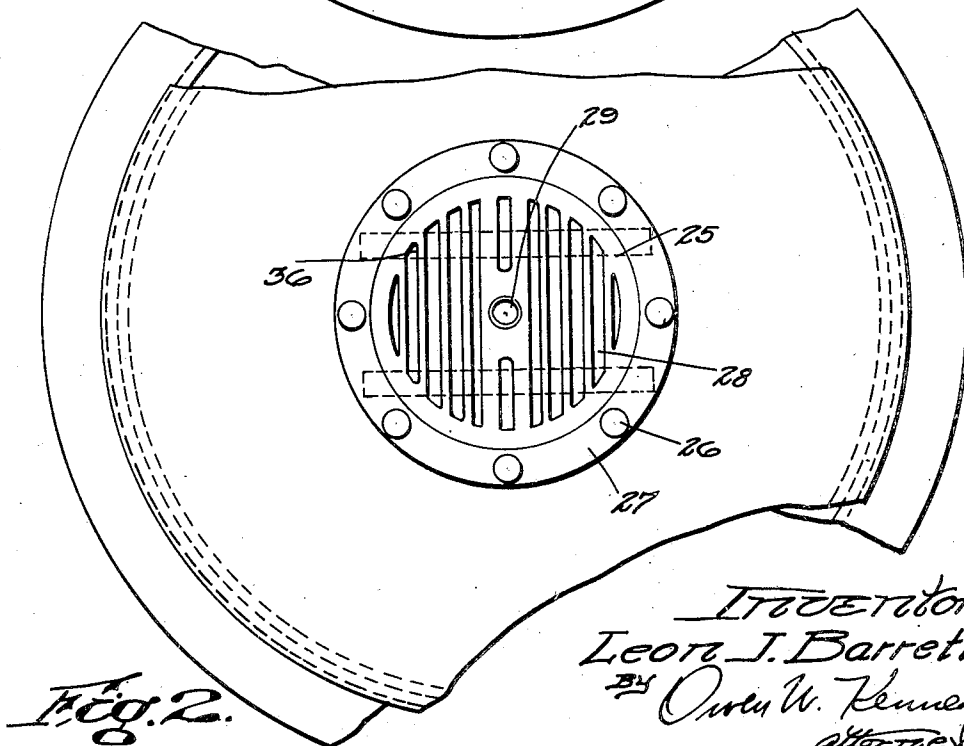


Fig. 2.

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UNITED STATES PATENT OFFICE

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CENTRIFUGAL WASHER AND DRIER

Application filed May 3, 1928. Serial No. 274,916.

My invention relates to a centrifugal machine that is adapted for use as either a washer or drier, or both. When used as a washer, the machine is particularly characterized by the utilization of a blast of air drawn axially into the machine so as to mingle with and impart a swirling movement to a downwardly directed supply of washing solution the result being to force the solution through the articles in the rotating container, from whose rotation the centrifugal effect is derived.

When used as a drier following the complete penetration of the articles in the rotary container with a washing or cleaning solution, the machine is operated with the supply of solution cut off, whereupon a current of air is drawn into the machine and forced through the moist articles so as to dry them within a very short space of time. When functioning as a drier, the machine can be readily adapted to cause the delivery of heated air to the article container to obtain an increased drying effect. The above and other advantageous features of my invention will hereinafter more fully appear, reference being had to the accompanying drawings in which—

Fig. 1 is a vertical sectional view of a machine embodying my invention, the section being taken along the line 1—1 of Fig. 3, looking in the direction of the arrows.

Fig. 2 is a partial plan view of the machine shown in Fig. 1.

Fig. 3 is a plan view of the article container removed from a machine.

Fig. 4 is a fragmentary vertical sectional view on line 4—4 of Fig. 1.

Like reference characters refer to like parts in the different figures.

Referring to Fig. 1, the machine comprises a stationary cylindrical casing 1 having a removable lid 2, the casing being received in an annular base 3 supported above the floor on suitable pedestals 4, only one of which shows. The base 3 provides a central opening 5 within which is received the upper portion of an electric motor 6 having its shaft 7 extending upwardly into the casing. The motor shaft 7 carries a basket or article con-

tainer 8, which provides a cover 9 secured to the container by means of a nut 10 received on the upper end of the shaft 7 and co-operating with a central hub portion 11 of the container 8. The entire rotating unit including the motor 6, shaft 7 and container 8 is pivoted on a ball and socket bearing 12, four springs 13 serving to steady the unit until the motor has brought the container up to speed. The shaft 7 is rotatably mounted in, suitable bearings, not shown, contained within the end frames 14 of the motor 6.

The article container 8 is supported on the shaft 7 by means of a flange 15 rotatable with the shaft, a central vertical sleeve 16, to the bottom flange 17 of which the container 8 is secured, serving to hold the container 8 in axial alinement with the shaft 7. The hub portion 11 of the cover 9 fits over the end of the sleeve 16, so that the container 8, with its cover 9, is substantially integral with the motor shaft 7 and may be driven at high speed by the motor 6.

The cover 9 provides a number of radial slots 18 adjacent to the central hub 11 and extending outwardly for about one-half the radius of the cover 9. As best shown in Fig. 3, each slot 18 is overhung by a scoop shaped vane 19, which, as viewed in plan covers the slot 18 and extends beyond the end thereof near the periphery of the cover 9. As shown in Fig. 4, the edge of each vane 19 is spaced above the surface of the cover 9, so that rotation of the container 8 will cause the several vanes 19 to collect the air and deflect it downwardly through the slots 18 along the axis of the container 8. Due to the high speed of rotation of the container, the air entering the slots 18 will have a whirling motion imparted thereto around the shaft sleeve 16 as indicated by the arrows, the air current being deflected upwardly along the diverging sides of the container 8 when it strikes the base of the container.

The central hub portion 11 of the container cover 9 provides a flange 20 raised above the plane of the cover 9, and this flange 20 provides a number of openings 21 communicating with the inner ends of the slots 18. The flange 20 is surrounded by a frusto-

conical shield 22 the upper portion of which overhangs the openings 21 and extends upwardly into the opening 23 within which is received the lid 2 of the casing 1. There is thus provided a substantially enclosed chamber above the flange openings 21 and surrounding the shaft nut 10 within the walls of the shield 22.

The casing top 2 provides a central opening 24 within which is secured a casting 25 by means of bolts 26 co-operating with a flange 27 of the casting 25. As best shown in Fig. 2, the casting 25 is in the form of a grid and provides a number of slots 28 which are of sufficient area to freely admit air within the casing 1 above the slots 18 in the container 8. When the container is rotated air drawn in through the grid slots 28 in the casting 25 is deflected to the entrance of the fan slots 18 by the outside of the conical shield 22. The central portion of the casting 25 is not slotted, but provides an opening 29, the upper end of which is threaded to receive a pipe coupling 30 from which extends a pipe 31. The pipe coupling 30 provides a suitable valve 32 by means of which fluid may be admitted from the pipe 31 to the opening 29 in the grid casting 25. The lower end of the opening 29 is threaded to receive a nozzle 33 of any desired type which is adapted to deliver the fluid from the pipe 31 in the form of a spreading jet into the space directly above the openings 21 in the flange 20. When the fluid is so delivered by the nozzle 33 the shield 22 confines the liquid and insures that all of it will pass through the flange openings 21 to the inner ends of the air slots 18 in the cover of the container 8.

When the container 8 is rotated at high speed and liquid of some sort is delivered by the pipe 31 through the nozzle 33, the several blasts of air drawn in through the slots 18 by the action of the vanes 19 will mingle with and entrain the liquid as it passes through the flange openings 21 into the air slots 18. The mixture of air and water will then be carried downwardly around the axis of the container with a swirling movement, as indicated by the arrows, and when a portion of the mixture strikes the bottom of the container 8 it will be deflected upwardly along the sides of the container 8 by centrifugal action.

When the container 8 is rotating, the action of centrifugal force will cause articles in the container to arrange themselves around the diverging walls of the container 8, the articles tending to creep up into the proximity of a large number of perforations 34 provided around the upper portion of the container 8. Therefore, the articles will be thoroughly washed by contact with the swirling mixture of air and water, which upon reaching the perforations 34 is discharged from the container, the liquid falling to the base of the cas-

ing 1 from which it may be removed through an opening 35 for being used again if desired. Following the thorough penetration of the articles in the container 8 by either a washing solution or a solution for coating the articles, the supply of solution is shut off by the valve 32 while continuing to rotate the container. When this occurs, the swirling blast of air drawn in through the slots 18 by the vanes 19 will tend to dry the articles in the container 8, the air thoroughly distributing itself through the articles and discharging through the perforations 34. If desired, heated air may be drawn in and one way of conveniently supplying such heated air is by providing the grid casting 25 with electrical heating elements indicated in dotted lines at 36 in Fig. 2. This particular way of supplying heated air to a centrifugal drier forms no part of the present invention, except in so far as it is combined with a supply of liquid to the container 8, and is fully shown and described in my copending application Serial No. 167,179 filed February 10, 1927.

From the foregoing it is apparent that by my invention I have provided a centrifugal machine that is characterized by the fact that when the article container is rotated at high speed, air will be drawn into the machine and a swirling movement imparted thereto within the article container. When the machine is operating as a washer or for coating objects in the container, this swirling air current mixes with the solution being used to distribute it thoroughly through the articles. When used as a drier the swirling air currents effectively remove moisture from the articles which have been washed or coated as the case may be, since a coating solution will be distributed in the same manner as a washing solution.

I claim,

1. In a machine of the class described, a casing having an opening in its top, an article container rotatably mounted in said casing having radial slots in the top thereof, means for supplying liquid through the opening in the top of said casing and directing it downwardly to the inner ends of the slots in the top of said container, and means for rotating said container to cause air to be drawn in through the outer portions of said radial slots simultaneously with the delivery of liquid to the inner portions of said slots whereby to set up a swirling current of air and liquid within said container.

2. In a machine of the class described, a stationary casing having an opening in the top thereof, an article container rotatably mounted within said casing and having a top provided with radial slots each having a vane overhanging the outer portion thereof, means for supplying liquid through the opening in the top of said casing and directing it downwardly to the inner portions of the slots in the

top of said container, and means for rotating said container to cause said vanes to draw air in through the outer portions of said slots downwardly into said container simultaneously with the delivery of liquid to the inner portions of said slots.

5 3. In a machine of the class described, a stationary casing having a top provided with an opening, means for delivering liquid downwardly through the opening in said casing
10 top, an article container rotatably mounted within said casing having a top provided with a number of centrally arranged openings and radial slots communicating with said openings, with each slot having a vane
15 overhanging the same, means carried by the top of said container for directing the liquid delivered through the top of said casing to said openings in the container top, and means
20 for rotating said container to cause said vanes to draw air in through the outer portions of said slots where it mixes with the liquid entering the inner portions of said slots through said openings.

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