

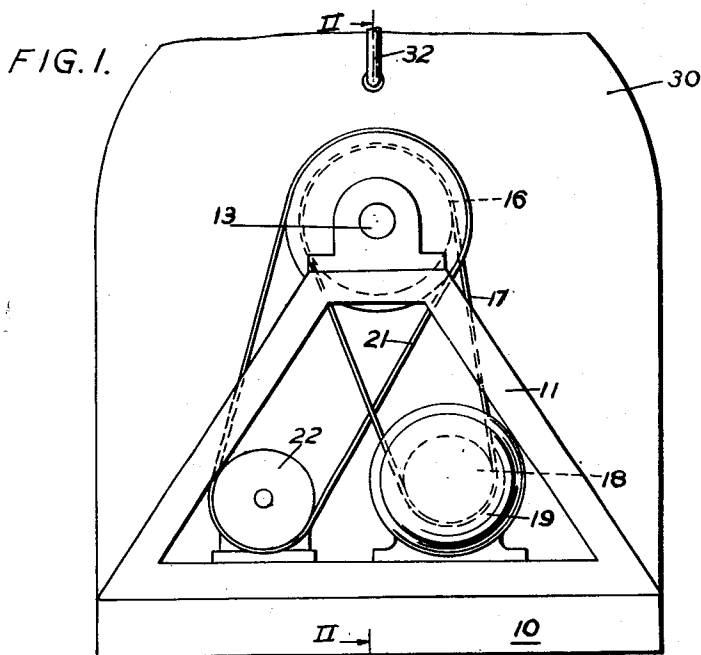
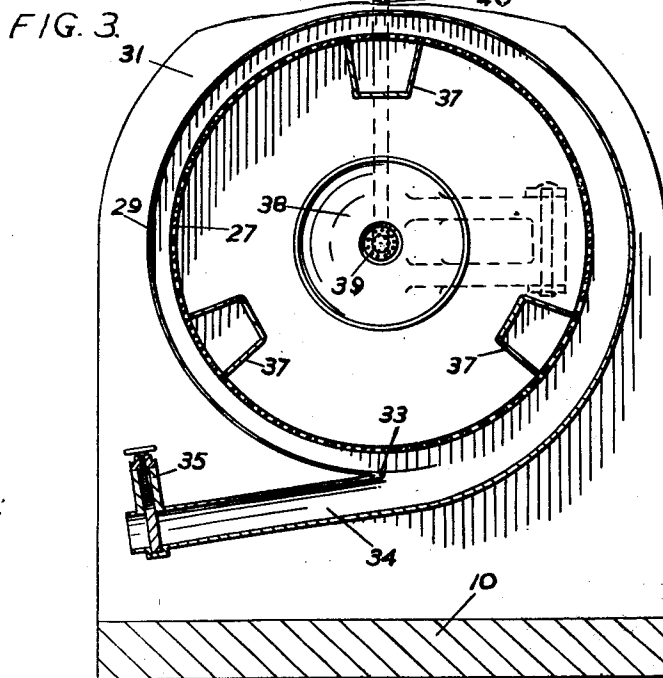
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HYDROEXTRACTOR

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3 Sheets-Sheet 1



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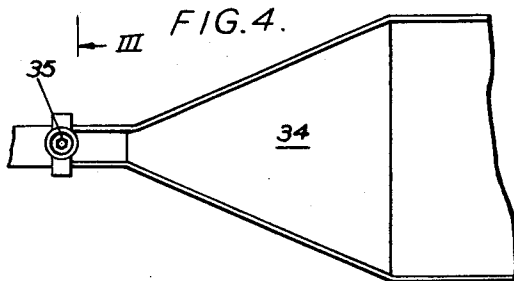
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FIG. 2.



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FIG. 5.

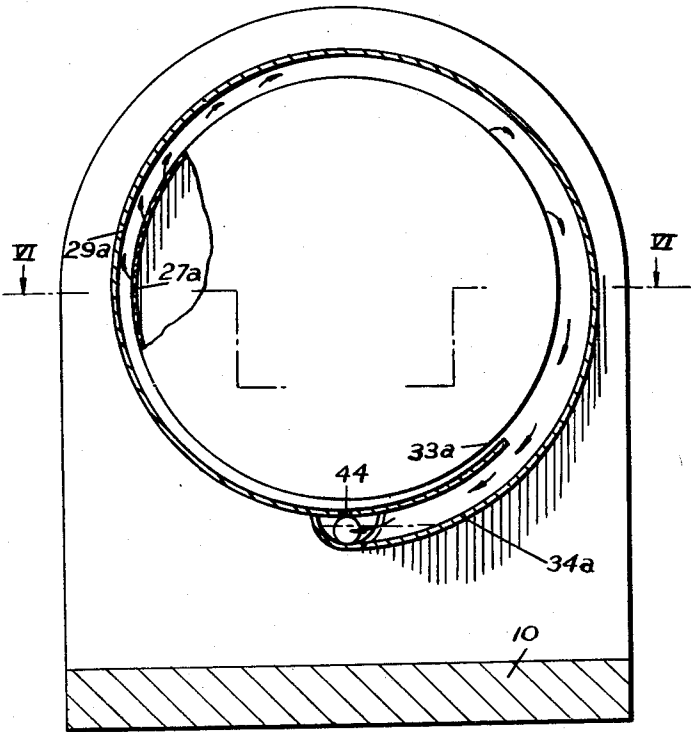
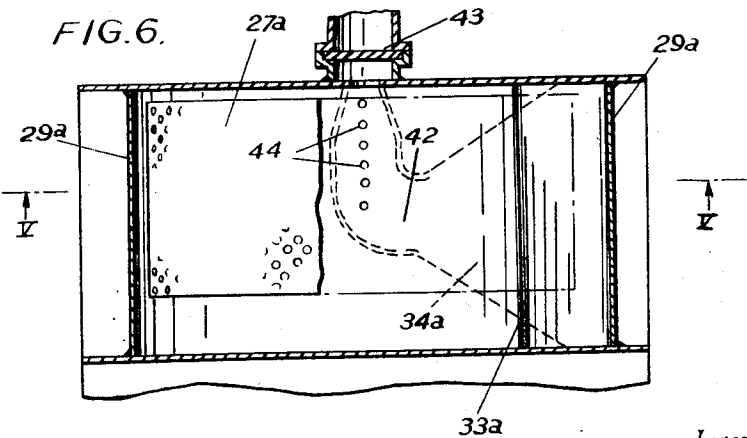


FIG. 6.



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HYDROEXTRACTOR

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3 Claims. (Cl. 210—75)

This invention relates to hydro-extractors for general use in industry, and more particularly to hydro-extractors such as are used in laundries, dry-cleaning installations and so forth for expelling liquids from fabrics by centrifugal action. Extractors for these purposes consist of a drum or basket of perforated metal mounted for rotation at high speed in suitable bearings, and enclosed in a casing which collects the liquid extracted.

In a washing machine for example, the articles to be washed are placed in the drum or basket and rotated at a slow speed, generally first in one direction and then the other alternately, while immersed in the cleaning liquid. When the cleaning operation is finished the casing around the drum or basket is drained, and this drum is then rotated at high speed to act as a hydro-extractor for removing most of the liquid from the cleaned articles. It is the object of this invention to economize in the time and power required for the hydro-extracting operation both in such apparatus, and in hydro-extractors for general use in which the drum or basket rotates about a substantially horizontal axis. The invention includes hydro-extractors used as such alone or when forming part of washing and dry-cleaning or similar installations.

It is noticed that extractors which rotate on vertical axes generally require less time for expelling the liquid to a satisfactory extent than do the extractors which rotate on horizontal axes, and it has for some time past been a desideratum to improve the extracting efficiency of extractors of the horizontal type. Experiments which I have made have shown that at least one reason for the longer time required for effecting the extraction with horizontal extractors is that the liquid tends to be carried around in the casing, jumping over the outlet at its bottom and taking a long time to drain away. I have found that this can be avoided, and the time required for extraction can be substantially reduced, by making the casing of volute form with a tangential outlet channel as wide as the length of the drum and of adequate radial depth to provide a clear catchment space for the liquid. The volute form of casing allows the liquid to form a gradually expanding surface layer in the casing which can be driven round by the rotation of the drum within it, but will all pass into the tangential outlet and so avoid risk of continual rotation due to jumping across the outlet.

It is not found to be satisfactory to insert a baffle in existing types of extractor casings at or about the outlet position as this tends to break up the liquid and to facilitate its travel across the space where the outlet is situated. The increase in the radial spacing of the wall from the drum must be gradual so that the liquid is conducted smoothly to the tangential outlet.

The invention comprises in its principal aspect a hydro-extractor of the type having a perforated drum suitable for use for example, in washing or dry-cleaning operations involving extraction of liquid by centrifugal action, wherein the perforated drum rotates about a substantially horizontal axis and is surrounded by a volute-shaped casing which expands relatively to the drum in its direction of rotation, and leads into a tangentially directed outlet which is as wide as the effective perforated width of the drum, such outlet then contracting gradually to lead into a discharge aperture.

Other features of the invention will be apparent from the following description.

The invention is illustrated by way of example in the accompanying drawings in which:

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Figure 1 is an end view of a washing and hydro-extracting apparatus of the horizontal type.

Figure 2 is a corresponding side view, showing the casing in section, on the line II—II of Figure 1.

Figure 3 is a vertical section on the line III—III of Figure 2.

Figure 4 is a detail plan view of the outlet of the casing.

Figure 5 is a sectional elevation of a modified form of the volute casing, in section on the line V—V of Figure 6.

Figure 6 shows a section on the line VI—VI of Figure 5.

Referring to Figures 1 to 4, the apparatus shown is supported on a base 10 with frames 11 and 12 upon it carrying a shaft 13 in suitable bearings 14 and 15.

The end of shaft 13 is tapered to receive the taper boss 25 of a spider 26 supporting the perforated drum 27 of the washer and hydro-extractor. The boss 25 is tightened on the end of shaft 13 by nut 28.

This shaft 13 also has fixed upon it a pulley 16 driven by belt 17 from pulley 18 on the shaft of the electric motor 19 which drives the drum 27 at high speed during hydro-extraction. Another pulley 20 on shaft 13 is connected to the shaft through a clutch 36 and is driven by belt 21 from pulley 22 on the shaft of a gearbox 23, giving a slow speed drive for drum 27 from a smaller motor 24 used for driving the shaft 13 during the washing operation. This motor 24 may be reversible so that the drum is rotated first in one direction and then in the other alternately during the washing operation.

The drum 27 rotates within a volute-shaped casing 29 supported between end plates 30 and 31 fixed to the base 10. The volute casing has an inlet 32 for the washing liquid in the end plate 30. The volute wall of the casing gradually expands from the division line such as the edge 33, Figure 3, around the drum 27 until it terminates in the tangential outlet 34 which begins with an opening of the full width of the casing or at least of that portion of it which surrounds the perforated portion of the drum. The outlet 34 gradually contracts as seen in Figure 4, to end in a fitting provided with a cock 35 serving to control the outlet of liquid. This cock is closed during washing but is opened fully during draining and hydro-extraction.

The outlet 34 should have a gradual contraction as shown, because it has been found that outflow of liquid is seriously impeded if the contraction is much more rapid. With the construction shown, the effective hydro-extraction is complete in about 3 minutes including the time taken in getting up to full speed of the drum. The clutch 36 is disengaged before power is applied to the hydro-extractor motor 19, so that the shaft 13 rotates freely, and is not impeded by the gearbox connections.

There is no need for a clutch associated with pulley 16, as this pulley and motor 19 offer substantially no resistance to the slow speed rotation of shaft 13 and drum 27 during washing.

The drum 27 is shown as having several abutments or beaters 37 within it, which serve to pick up the articles to be cleaned and to allow them to drop into the cleaning liquid during the slow speed rotation for cleaning or washing. The articles are introduced and removed through a charging door 38 hinged to the end plate 31, and normally closing the open end of the drum which has a projecting flange 41 close to the circumference of the door. The door 38 is shown as including a nozzle 39 connected to a flexible pipe 40 by which rinsing liquid can be sprayed into the interior of the drum 27 during hydro-extraction if desired. This effects centrifugal rinsing of the charge before it is dried by hydro-extraction.

The outlet 34 need not extend in a straight line from the edge 33, but may be curved round the outside of the volute casing and changed in direction so as to discharge liquid at one end of the casing if preferred. The edge 33 from which the outlet starts need not be at the bottom of the casing but can be anywhere around it, as the liquid is thrown out tangentially with such force as to be expelled through a tangential outlet at any position. Figures 5 and 6 show an alternative form of the volute casing to illustrate these differences.

In these figures the drum is marked 27a and the casing 29a, with the edge 33a at a level corresponding with an angle of about 45° from the bottom. The outlet 34a

follows the curvature of the casing 29a and leads into a bend at 42 which diverts the discharging liquid to an outlet valve 43 at the end. Additional outlet apertures 44 are provided at the level of the bottom of the casing 29a for the purpose of draining it through the valve 43, for example when the drum is stationary. The valve 43 is closed while the drum is rotated slowly for washing its contents, but is fully open during hydro-extraction.

The drum 27 may be of any usual type, and may have a number of separate compartments if preferred. Where a valve or cock has been referred to for controlling discharge of liquid from the outlet of the casing, this term is intended to include a gate valve, sluice valve or the like adapted to give a wide or large discharge opening when in its fully opened position.

Any convenient form of slow speed drive may be used with means for disconnecting it during hydro-extraction, and the small motor, gearbox and clutch have only been described as a convenient form of mechanism for this purpose. For instance, a belt tightened for driving by a jockey pulley, and loosened when the drive is to be freed for hydro-extraction, would serve the purpose.

The operation of the drum has been described as applied to a machine for washing, rinsing and then hydro-extracting garments, for example in a laundry, but the use of the drum is precisely equivalent to what has been described if it is employed for dry-cleaning garments. The cleaning liquid is circulated through the drum and its contents while the drum is rotated slowly, until the liquid flows out in a substantially clean condition, whereupon the casing is drained and then the drum is rotated at high speed for say 2 or 3 minutes to extract as much as possible of the solvent by centrifugal action. The hydro-extractor can also be used for any operation of an industrial character in which it is desired to use centrifugal action for extracting liquids from solid matters.

I claim:

1. A machine for the batch treatment of textile materials comprising in combination, a drum mounted for rotation about a substantially horizontal axis and having a perforated cylindrical wall with a smooth external surface, said drum being adapted to retain the materials to be dried inside the drum during its rotation while the expelled liquid passes through the perforations in the wall, driving means for rotating said drum about its axis, a volute-shaped casing surrounding said drum, said casing expanding relatively to said drum in the direction of rotation of said drum to permit the liquid to form a gradually expanding surface layer, and a tangentially directed, unobstructed outlet leading from the bottom of said casing, said outlet contracting gradually from the effective perforated width of said drum to a width to form a discharge aperture, whereby the liquid ejected from the rotating drum is discharged through the said outlet by co-acting tangential and gravitational forces.

2. A machine for the batch treatment of textile materials comprising in combination, a drum mounted for rotation about a substantially horizontal axis and having a perforated cylindrical wall with a smooth external

surface, said drum being adapted to retain the materials to be dried inside the drum during its rotation while the expelled liquid passes through the perforations in the wall, driving means for rotating said drum about its axis, a volute-shaped casing surrounding said drum and formed with an edge extending axially beneath said drum, said casing expanding relatively to said drum from said edge in the direction of rotation of said drum to permit the liquid to form a gradually expanding surface layer, and an unobstructed outlet leading from the bottom of said casing, said outlet extending tangentially beneath said edge and contracting gradually from the effective perforated width of said drum to a width to form a discharge aperture, whereby the liquid ejected from the rotating drum is discharged through the said outlet by co-acting tangential and gravitational forces.

3. A machine for the batch treatment of textile materials comprising in combination, a drum mounted for rotation about a substantially horizontal axis and having a perforated cylindrical wall with a smooth external surface, said drum being adapted to retain the materials to be dried inside the drum during its rotation while the expelled liquid passes through the perforations in the wall, driving means for rotating said drum about its axis, a volute-shaped casing surrounding said drum and formed with an edge extending axially of said drum and displaced away from the lowest point of said casing, said casing expanding relatively to said drum from said edge in the direction of rotation of said drum to permit the liquid to form a gradually expanding surface layer, and an unobstructed outlet leading from the bottom of said casing, said outlet extending circumferentially outside said casing to follow the curvature of said casing and contracting gradually from the effective perforated width of said drum to a width to form a discharge aperture, whereby the liquid ejected from the rotating drum is discharged through the said outlet by co-acting tangential and gravitational forces.

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