This invention relates to fabric cleansing machines by which I intend to include both laundry machines and dry cleaning apparatus, and to include both washing and centrifugal-extracting apparatus, regardless whether the machine combines the two functions or is restricted to one only thereof. Among the objects of the invention are the provision of a simple and compact device whereby clothing or other fabrics can be washed or dry-cleaned quickly, rapidly, and conveniently and the excess liquid removed centrifugally, all without putting the hands in the liquid; the provision of an improved machine of this character particularly devised for small size, low price, and rapid production; the provision of an improved and simplified driving mechanism; the provision of new and simplified means for attaching the casing to the base and mechanism in such wise as to produce a tight joint without straining; the provision of a new and improved arrangement of parts for dry cleaning; the provision of a combined cleaning and extracting machine having new and improved facilities for eliminating both grit and scum; while further objects and advantages of the invention will become apparent as the description proceeds.

In the drawings accompanying and forming a part of this specification I have illustrated a preferred embodiment of my invention although it will be understood that these drawings are merely illustrative and not limiting. Fig. 1 is a vertical sectional view through a complete washing and extracting machine containing my improvements with the parts in extracting positions; Fig. 2 is a view of the same machine partly in elevation and partly in section; Fig. 3 is a horizontal sectional view corresponding to the line 3—3 of Figs. 1 and 2; Fig. 4 is a horizontal sectional view corresponding to the line 4—4 of Fig. 1; Figs. 5 and 6 are enlarged views of the gearing shown in Fig. 1 showing the parts first in extracting position as in Fig. 1 and second in washing position as in Fig. 2; Fig. 7 is an enlarged detail view illustrating the preferred joint between the tub bottom and bearing sleeve; Fig. 8 illustrates the same machine having a modified form of container therein; and Fig. 9 illustrates one mode of using the machine shown in Fig. 8.

The improved machine comprises a liquid holding casing 1 which is made preferably of enameled steel, though copper or aluminum can of course be used, and a base part 2 also preferably made as an enameled steel stamping though generally of heavier gauge than the casing. The casing 1 has an upright side-wall, circular in horizontal section and having a bottom portion which is preferably bulged upwardly and frustroconically shaped as shown and formed at its center with a flat circular part 4 centrally apertured as indicated at 5. Between the elevated portion 3 and the side-wall portion an annular flat bottom region 6 is provided to rest upon the base and to define internally an annular trough adapted to catch buttons, nails, and other accidental hard objects.

The base is formed with a flat annular portion 7 matching the portion 6 and is preferably formed inside this portion with a slightly elevated portion 8 also terminating in a flat circular portion 9 centrally apertured at 10 for the operating mechanism. Outside the portion 7 the base is formed with a depending skirt or housing 11 to conceal the mechanism. In the present embodiment a pressed sheet-metal bottom-member 12 is inserted into this base to complete the enclosure of the mechanism and to this bottom-member are secured feet 13 of soft rubber, preferably hollow as shown at 14 and having a corrugated wall 15, the former exhibiting a suction-cup action on the supporting surface, and the latter affording increased flexibility and sound insulation.

The casing and base are secured by any suitable form of fastenings engaging the portions 6 and 7 thereof, these in the present embodiment comprising bolts 16 traversing these portions and supplied with nuts 17 and seal-proof rubber washers 18.

Rigidly secured to the base is an upright hollow sleeve 20 which traverses the aperture 5 and rises into the casing 1, and to provide a leak-proof joint at this point while at the same time avoiding any such strain upon the metal bottom as shall distort the parts and crack the enamel, I employ a clamp joint, one form of which is shown in Fig. 7. Projecting through the aperture 5, the externally threaded body 21 of a coupling spud having at one end a flange 22 overlapping the portion 4 and at the other end a nut 23 screwed on the spud, with packing washers 24 on opposite sides of the portion 4. The interior of this assembly is hollowed out at its upper part to form a cavity in which is received a soft packing 25 clamped against the exterior of the sleeve 20 by means of the threaded gland-nut 26, thus enabling the casing to be applied and the joint to be tightened at the very end of the assembling operation, after the entire mechanism...
has been put together and tested, and this without imposing any such strain on the enamelled metal as might, in the course of time and vibration, lead to cracking of the enamel.

The sleeve 20 is rigidly secured to the base, as by having its lower end provided with a flange 30 and applied to the upper surface of the portion 19 concentrically with the aperture 10, being bolted through the sheet-metal to the upper part 31 of the gear-casing whose lower part 32 constitutes a kind of box. The portion 31 is formed with a vertical bearing-seat 37, leaving an opening 34 which fits into the chamfered lower end 35 of the sleeve 20 so as to hold the parts in line. Rotatably journaled inside the sleeve 33 is the elongated hub 36 having at its lower end the toothed clutch-head 37 and having at its upper end a supporting washer 38 held in place in any suitable manner by the snap ring 39. Journaled inside this hub member is the vertical shaft 40 to which is rigidly secured below this clutch-head a companion clutch-head 41 formed with complementary teeth at its upper end and a tapering portion 42 depending therefrom. The lower end of the shaft 40 is shown as reduced in size as at 43 (though this is immaterial), and projecting through the bottom face of the gear box 32 into another housing 44 in which is a cam 45 mounted on a horizontal cam-shaft 46 whose outer end projects through the front wall of the base 2 and is provided with an operating handle 47. The lower end of the extension 43 may well be provided with an antifriction ball 48 inset in a socket and adapted to engage the cam 45 in rolling relation since this engagement will sometimes occur when the shaft is rotating at considerable speed.

Journaled in the gear box 32 on a horizontal axis is a drive shaft 50 on which are mounted two spiral gears, 51 and 52, generally of unequal pitch and here also of opposite inclination. One of these spiral gears meshes with a companion gear 53 journaled on a fixed stud 54 carried by the gear box at one side of and parallel to the shaft 46 and having an eccentric pin 55 connected by a pitman 56 with an arm 57 projecting from the clutch member 37. Loosely screwed about the shaft extension 43 is a spiral gear 58 meshing with the other spiral pinion 52 and itself locked out to form a conical cavity 59 complementary to the conical portion 42 of the clutch element 41.

One extremity of the shaft 50 projects outside of the gear box where it is provided with a belt pulley 60 connected by a belt 61 with a driving pulley 62 carried by the shaft 63 of the electric motor 64. In the preferable form of the device this motor is secured to the exterior of the gear box by means of a horizontal rod 65 parallel to the shafts 50 and 51 and engaging aperture ears 66 carried by the motor-frame and gear-box respectively, tension being maintained on the belt by means of a suitable spring 67 interposed between some part of the casing and some part of the motor-frame. The member 68 to which this spring is attached is preferably made of insulating material, such as insulating washers and sleeves 68 being interposed between the shaft 55 and ears 66, the motor is entirely insulated from the rest of the mechanism, this being especially important in view of the dry-cleaning work hereafter described.

The upper end of the sleeve 20 is provided with a bushing 70 in which is journaled the upper end 75 of the shaft 40, the shaft being elsewhere loose within the sleeve 20 for convenience in manufacturing. Above the bushing 70 the shaft 40 terminates in a fluted or prismatic portion 71 to which is applied the complementary shaped socket 72 formed at the upper end of a hollow vertical sleeve 73 which depends from the exterior of the sleeve 20, being, in this embodiment, provided at its lower end with a bushing 74 which engages the exterior of said sleeve 20 in steady relation.

Carried by the lower end of this sleeve 73 is the circular bottom 75 of the fabric-container, said bottom having an upper surface which in its preferred form is deeply corrugated as shown in Figs. 2 and 3. The margin of said plate is defined by a circular depending flange 76 which extends to a lower level than the summit 4 of the elevation with which the casing-bottom is provided. Firmly secured to the exterior face of the flange 76 is the outer wall 77 of the container, said wall defining a surface of revolution concentric with the shaft 40 and preferably also flaring towards the bottom to a greater diameter than at the top. The upper margin of this wall is rolled inwardly as shown at 78 to strengthen and finish the same, and is also formed adjacent to its lower part and again adjacent to its upper part with liquid circulation apertures 79 and 80, respectively. I have also shown the flange 76 as interrupted by notches 81, one at the bottom of each of the corrugations, the better to assist the discharge of the liquid contents.

In addition I have shown the sleeve 73 as provided with projections or blades 82 projecting radially therethrough, these in the present embodiment being three in number and projecting sufficiently close to the side wall to define a plurality of substantially separate compartments. It will be understood that the corrugations of the bottom and the blades just described and comprising the agitator of the device may be omitted without entire loss of washing function. A removable cover 83 is provided for the top of the casing, and a removable set screw 84 is shown for securing the container rigidly to the shaft 40. For draining the machine any suitable device can be employed, that here illustrated consisting of a flexible hose 85 having one end attached to an outlet neck 86 secured to the bottom of the casing, its free end being held in elevated position by a suitable clip 88 (see Fig. 3) whenever a discharge of liquid from the tub is to be prevented. The side of the base 2 is provided with a dial plate 89 concentric with the shaft 40 and containing suitable instructions relative to the position of the lever 47, which determines the mode of operation of the machine, being held in an adjusted position by a spring-pressed button 90 carried by the lever and engaging suitable sockets 91 formed in the plate. When this lever is turned to the left as shown in Fig. 2, the shaft 40 and its clutch member 41 are elevated as shown in Fig. 6 so as to cause the latter to engage the oscillating member 37. This results in a vigorous oscillation of the container and its contents, the fabric contents thereof being thereby slapped gently against the blades 82, while the corrugated bottom produces a vertical shaking of the liquid. Dirt and sand work their way up through the corrugations and are discharged by way of the notches 81, while the outward currents produced by the blades 82 carry scum and other things out through the apertures 79 into the quieter sur-
rounding liquid, where the heavy parts settle into the trough 6 and the lighter portions collect at the top of the liquid as shown at 82 above the apertures 80 which permit the re-entrance of the circulating liquid.

At the end of the washing operation the hose 85 is lowered and the liquid contents of the casing discharged, with or without stopping the oscillating movement by shifting the lever 47 to the "off" position, which corresponds to a location of the clutch-head 41 intermediate the two members with which it cooperates. As soon as the casing has been sufficiently emptied this lever may be moved to the "dry" position whereupon the container is rapidly rotated.

The sleeve 73 taken with its bottom plate and such blades and/or corrugations as are employed may be looked upon as an agitator, and the wall 77 as a device for confining the fabrics to the top thereof and for preventing their working their way underneath the same as a result of the agitation of the liquid caused by the corrugated bottom of the bottom plate.

In Fig. 8 I have illustrated the same casing as employed with a slightly different container as devised more particularly for dry-cleaning purposes. In this modification the sleeve 28 and shaft 40 appear as before, but the container comprises a double-walled receptacle carried by the sleeve 39A which surrounds the sleeve 28 and is attached to the shaft 40. The outer wall of this container has a circular, imperforate, bottom-portion 100 and an upwardly-sloanted, circular, imperforate, outer-wall 101, while the inner-wall comprises a perforated bottom-portion 102 spaced from and concentric with the portion 100, and a perforated-portion 103 spaced from the portion 101 and likewise coaxial with the shaft 40, but rising to a higher level than the wall 101, and having its upper part curved inwardly as shown at 104 to prevent accidental escape of fabrics while still leaving an adequate working opening 106. Suitable blades or vanes 105 are carried by the interior of the container, which in the present embodiment is made of such height as to leave space in the casing I below the same sufficient for the accommodation of the entire liquid contents of the container. The same outlet hose 85 can be employed as heretofore described.

This arrangement is particularly devised for use with dry-cleaning fluids which are sometimes toxic and sometimes inflammable and always both volatile and explosive. The fabrics to be cleaned are placed in the container and sufficient of the dry-cleaning liquid is introduced therein, for example two gallons. The imperforate nature of the outer wall 101 prevents any substantial escape of the liquid even during the splashing consequent upon the oscillating movement, while permitting grit and sand to escape readily through the apertures of the inner wall. Upon rotating the container rapidly the liquid is ejected over the top of the wall 101, the major part of the grit and sand being left behind in the bottom wall. Even though the wall 101 be quite steep, the spacing of the wall 103 therefrom still allows the ready escape of the liquid from the clothings. The cover 83 being now removed and the garments taken out, the container can be removed and refilled with the dry-cleaning fluid as shown in Fig. 9, merely by placing the container in a sink while the casing stands on the sink board, after which a new charge of fabrics can be dry-cleaned.

In the present embodiment the inner and outer walls of this container are made readily separable, the portions 102-103 constituting a separate shell resting removable inside the outer shell, being spaced therefrom by suitable stops 109 and rotated therewith by suitable fingers 107. This enables the removal of the interior shell with the fabrics if desired and also enables the removal of grit, sand and lint from the space between the two, while a knob 108 formed at the upper end of the sleeve 39A enables the entire container to be handled as a unit whenever desired.

While I have particularly devised this machine to be made in small size for use as a supplemental washing machine and for operation with small quantities of dry-cleaning fluid, it will be understood that I do not limit myself to any given sizes nor to any features of construction, arrangement, design or mode of operation herein described since all the features herein can equally well be used on a larger machine, and I do not limit myself to any of such details herein shown except as specifically recited in my several claims, which I desire may be construed broadly each independently of limitations contained in other claims.

Having thus described my invention what I claim is:

1. In a machine for cleansing fabric articles, a casing for detergent liquid, a vertical shaft 30 journaled in the bottom of said casing, driving mechanism beneath said casing and for oscillating said shaft, a one piece agitator having a socket for engaging said shaft, said agitator having blades extending outwardly from the socket thereof and also having a circular corrugated bottom plate, and a shell surrounding and attached to said agitator.

2. In a machine for cleansing and extracting fabric articles, in combination, a casing, a container mounted therein upon a vertical axis, said container having a circular corrugated bottom plate with upstanding vanes extending outwardly from the container axis and a downwardly and outwardly slanted perforated side wall defining a surface of revolution about said axis, at least a part of the perforations being located in the lower part of said side wall and means for selectively rotating and oscillating said container about said axis.

3. In a fabric cleansing machine, in combination, a casing for detergent liquid, a container for the fabrics located inside said casing upon a vertical axis and comprising a circular bottom member and a side-wall portion rigidly secured thereto, said side-wall defining a surface of revolution about said axis and flaring downwardly and having liquid discharge apertures at its lower part, in combination with means inside said container comprising upstanding vanes carried by the bottom member of said container and extending outwardly from the container axis to a point adjacent to the side-wall thereof for agitating said fabric and liquid and means for oscillating and rotating said container about said axis.

4. In a fabric cleansing machine, in combination, a casing for detergent liquid, a container for fabrics mounted inside said casing upon a vertical axis, said container having a perforated side-wall flaring downwardly and outwardly from its top to its bottom and defining a surface of revolution about said axis, in combination with centrally located outwardly extending liquid agitating vanes mounted inside said con-
tainer and fixed to move therewith and means comprising a single shaft for oscillating and rotating said container about said axis.

5. In a fabric cleansing machine, a container mounted on a vertical axis and having a central sleeve and apertured side walls downwardly and outwardly flared and defining a surface of revolution about said axis which is smaller at the top than at the bottom, agitator blades extending outwardly from said sleeve, a bottom plate connected to the bottom of said sleeve and side-walls and means for selectively oscillating and rotating said container about said axis, said side walls having apertures at their level of greatest diameter.

6. In a fabric cleansing and extracting machine, a casing for detergent liquid, a container for the fabrics located on a vertical axis inside said casing in a position to be partially immersed in the liquid contents of said casing, a shaft journaled in the bottom of said casing coaxial with said container and adapted for attachment thereto, said container having a side wall formed as a surface of revolution about said axis and tapering inwardly towards its upper end, said container having a central sleeve with outwardly extending agitator elements fixed in place thereon and having its side wall formed with liquid circulation apertures at various heights in such tapering portion, and means for alternately rotating and oscillating said shaft.

7. In a fabric cleansing machine, a vertical shaft, a central sleeve secured to said shaft, a container for the fabrics carried by said sleeve and comprising tapered apertured side walls defining a surface of revolution coaxial with said shaft, agitator blades fixed in position on said sleeve and extending therefrom to a point adjacent to said side walls, means for alternately rotating and oscillating said shaft about a vertical axis, and a shell surrounding said side wall and spaced therefrom to define an annular liquid reservoir in which said side wall is at least partially immersed during the washing operation, said side wall having apertures therein substantially throughout its height.

8. In a fabric cleansing machine, in combination, a casing having its bottom higher at the center than at the sides, a container mounted in said casing on a vertical axis having a circular bottom spaced above the casing bottom, the bottom of said container having a depending, circular, marginal flange which extends to a level below that of such elevated central portion, an upwardly extending apertured side wall carried by said circular bottom and defining a surface of revolution concentric with said axis, agitating elements fixed inside said container and extending outwardly from the axis thereof and terminating short of said side wall, means for oscillating said container and with it said agitating members, and drainage provisions in the bottom of said casing at a point near the outer edge thereof.

9. In a fabric cleansing and extracting machine, a container having a circular bottom concentric to a vertical axis and having its center higher than its sides, and also having a side-wall defining a surface of revolution about the same axis and flaring downwardly and having liquid discharge apertures where it meets said bottom, agitating means located inside said container and movable therewith, said agitating means comprising vanes extending outwardly from the center of said container, and mechanism for alternatively rotating and oscillating said container about said axis.

10. In a machine for cleansing and extracting fabric articles, in combination, a double-walled container mounted on a vertical axis, the outer wall having an imperfecto bottom and an imperfecto upwardly slanted side defining a surface of revolution about said axis, and the inner wall having performances in its bottom and spaced from said outer wall, means for selectively oscillating and rotating said container about its axis, and damper means inside said inner wall for agitating the fabric and liquid during such oscillation.

11. In a laundry machine, in combination, a support, a vertical sleeve fixed on said support and rising therefrom, a casing having its bottom resting on said support, said bottom having an aperture therein through which said sleeve loosely projects, means for securing said casing to said support at a distance from said sleeve, and means carried by said casing bottom for preventing leakage between the same and said sleeve, said last means including a packing surrounding and frictionally engaging the sides of said sleeve and a gland-nut surrounding said sleeve, the exterior of said sleeve being cylindrical throughout the region which traverses the casing bottom whereby slight relative axial movements between the apertured portion of said casing and said sleeve may take place to relieve the casing bottom of strains that might be set up by reason of thermal expansion or contraction occasioned by changes in the temperature of the casing or its support or otherwise.

12. In a laundry machine, in combination, a support, a vertical sleeve fixed on said support and rising therefrom, a casing having its bottom resting on said support, said bottom having an aperture therein through which said sleeve loosely projects, means for securing said casing to said support at a distance from said sleeve, and a clamp-joined securing said casing bottom to said sleeve in leak-proof relation, said joint comprising a soft-packing surrounding said sleeve and two recessed, relatively movable nuts operatively threaded together and engaging said packing, one of said nuts being secured to the casing bottom, and said sleeve having a cylindrical external surface at the place where it is engaged by said packing whereby slight relative axial movements between the apertured portion of said casing and said sleeve may take place to relieve the casing bottom of strains that might be set up by reason of thermal expansion or contraction occasioned by changes in the temperature of the casing or its support or otherwise.

13. In a laundry machine, in combination, a support, a vertical sleeve fixed on said support and rising therefrom, a casing having its bottom resting on said support, said bottom having an aperture therein through which said sleeve projects, means for securing said casing to said support at a distance from said sleeve, a threaded metal element loosely surrounding said sleeve and having a flange portion tightly clamped to the bottom of said casing adjacent to said aperture, said element having a recess and a threaded portion coaxial with said sleeve, a gland-nut surrounding said sleeve and engaging said threaded portion and soft packing in said recess between said element and said gland-nut, frictionally engaging the sides of said sleeve whereby slight relative axial movements between the apertured portion of said casing and
said sleeve may take place to relieve the casing bottom of strains that might be set up by reason of thermal expansion or contraction occasioned by changes in the temperature of the casing or its support or otherwise.

14. In a laundry machine, a liquid holding casing having an aperture in its bottom, a support for said casing, an upright member immovably fixed with respect to said support and projecting loosely through the aperture of said casing, means for securing said casing to said support, and a sealing member detachably secured to the casing bottom and frictionally engaging the sides only of said upright member in leak-proof relation at the place where it traverses the aperture in the bottom of said casing.

15. In a laundry machine, a liquid holding casing having an aperture in its bottom, a support for said casing, an upright member immovably fixed with respect to said support and projecting loosely through the aperture of said casing, means for securing said casing to said support, and a seal carried by the bottom of said casing comprising a gland nut and associated packing means frictionally engaging the sides only of said upright member in leak-proof relation at the place where it traverses the aperture in the bottom of said casing.

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