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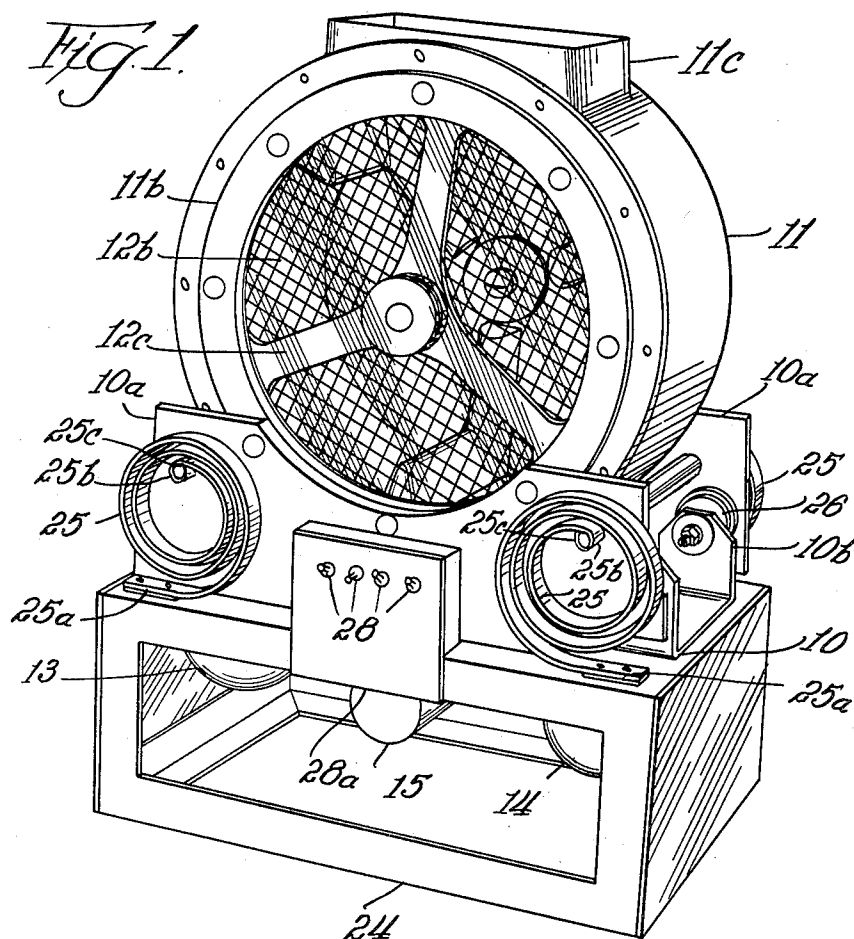
P. W. DOUGLAS

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MACHINE FOR CLEANING TEXTILE FABRIC ARTICLES

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2 Sheets-Sheet 1



INVENTOR
PEYTON W. DOUGLAS
BY *J. P. Keiper*
Atty

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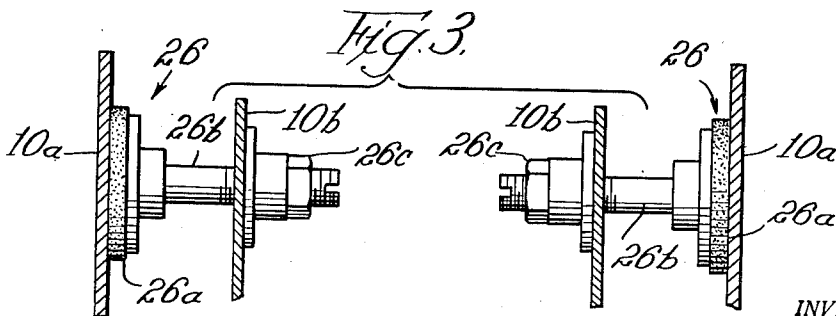
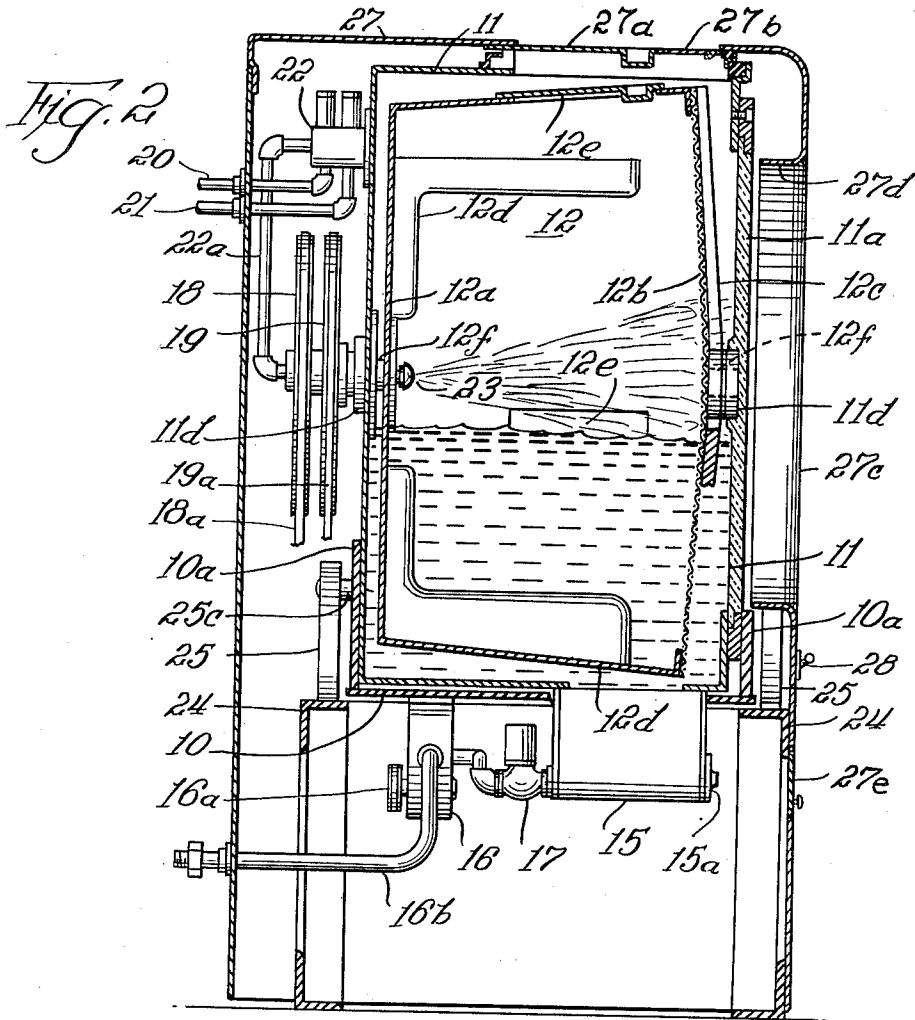
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INVENTOR.
PEYTON W. DOUGLAS
BY *E. O. Keiper*
Atty

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MACHINE FOR CLEANING TEXTILE FABRIC ARTICLES

Peyton W. Douglas, Syracuse, N. Y.

Original application February 23, 1945, Serial No. 579,453. Divided and this application November 14, 1952, Serial No. 320,380

6 Claims. (Cl. 68—24)

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This invention relates to machines for cleaning textile fabric articles, and more particularly to such machines including provisions for supporting the movable parts in such a manner as to facilitate inspection of the articles during the cleaning process.

Many machines for cleaning or washing textile fabric articles include provisions for agitating or rotating an article container within a cleaning fluid chamber at relatively low speeds for cleaning, followed by draining the chamber and rotating the article container at a high speed, that is, spinning the articles for centrifugally drying them.

There has been the problem in machines of the type described of inspecting articles during the cleaning process to determine the progress of the cleaning cycle, the condition of the cleaning fluid, etc. In general, the necessary supporting provisions of the article container have either directly concealed the interior of the article container or have interfered with the provisions for inspecting the interior.

It is an object of the invention, therefore, to provide a new and improved machine for cleaning textile fabric articles including provisions for overcoming the above-mentioned limitations on machines of the prior art.

It is another object of the invention to provide a new and improved machine for cleaning textile fabric articles, including provisions for continuously inspecting the articles, and the cleaning fluid during the cleaning process.

In accordance with the invention, a machine for cleaning textile fabric articles comprises a cleaning fluid chamber, a rotatable article container disposed within the chamber, driving means for the container, and a supporting base. The machine also includes a plurality of thrust-taking springs disposed approximately symmetrically about the center of gravity of the chamber and constituting the sole supporting means between the base and the chamber. Preferably, the machine includes also a plurality of friction dampeners interposed between the chamber and the base and disposed to damp the motion of the chamber in a plane parallel to the planes including the lines of thrust of two of the supporting springs. The term "rotatable" is used herein and in the appended claims as applied to the article container to indicate a container subject to continuous rotation in one direction or oscillatory rotation.

Further in accordance with the invention, in a machine for cleaning textile fabric articles a

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rotatable article container comprises a drum-like member having imperforate side walls, an imperforate first end wall, a foraminous second end wall, a supporting spider secured to the second end of the member, and supporting bearing elements mounted in the first end wall and in the spider. The term "foraminous" is used herein and in the appended claims to refer to an article in the form of a grid, mesh, screen, perforated sheet, or equivalent.

Further in accordance with the invention, in a machine for cleaning textile fabric articles a cleaning unit comprises a cleaning fluid chamber including at least one transparent end wall and a rotatable article container of the type described, together with complementary bearing elements disposed in the end walls of the chamber and rotatably supporting the container.

For a better understanding of the invention, together with other and further objects thereof, reference is had to the following description taken in connection with the accompanying drawings while its scope will be pointed out in the appended claims.

Referring now to the drawings, Fig. 1 is a perspective view of a machine embodying the invention for cleaning textile fabric articles and shown without a housing cabinet; Fig. 2 is a cross-sectional view of the apparatus of Fig. 1; and Fig. 3 is a detailed view of the friction dampeners of the apparatus of Figs. 1 and 2.

Referring now to Figs. 1 and 2 of the drawings, there is represented a machine embodying the invention for washing or cleaning textile fabric articles. This machine comprises a unitary chassis made up of a frame 10 having upstanding side walls 10a between which are supported a cleaning fluid chamber 11, a rotatable article container 12 disposed within the chamber, and driving means, such as motors 13 and 14, depending from and secured to the frame 10, and all additional conventional accessories, such as a drain 15, a pump 16, a solenoid-operated control valve 17, etc. The cleaning fluid chamber 11 may be conventional in general form and is shown as comprising a cylindrical drum-like member having one end wall 11a of glass or transparent thermo-setting plastic material, such as a vinyl chloride commercially available as "Vinylite." The end wall 11a is secured to the drum 11 by a suitable retaining ring 11b. The chamber 11 is also provided with an upstanding throat 11c through which the articles to be cleaned may be inserted and removed.

The rotatable article container 12 is constructed

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in the form of a frusto-conical drum-like member having imperforate side walls and an imperforate end wall 12a of smaller diameter, the end wall 12b of larger diameter being in the form of a wire mesh or other foraminous sheet secured to the side walls of the container 12 by means of a supporting spider 12c having an annular outer periphery secured to the container 12. Disposed within the container 12 are a plurality of agitators or impellers 12d for tumbling the articles within the container during the cleaning process. The container 12 is also provided with a number of sliding doors 12e disposed peripherally about the side walls to facilitate insertion and removal of articles whenever any of the several doors 12e stops in registry with the throat 11c of the cleaning fluid chamber. The article container 12 is also provided with supporting bearing elements, such as the journals 12f, one mounted on the end wall 12a of smaller diameter and the other mounted on the spider 12c. Complementary bearing elements, for example sleeve bearings 11d, are mounted on the end walls of the cleaning fluid chamber 11 and rotatably support the article container 12 within the chamber.

The unitary chassis comprising the cleaning fluid chamber 11 and the frame 10 also includes the conventional accessory elements of a cleaning machine of this type. In addition to the driving motors 13, 14, drain 15, drain pump 16 and drain valve 17 it includes other conventional accessory elements necessary for operation of the machine. For example, in order to drive the shaft 12f of the article container at a relatively low speed during cleaning and at a relatively high speed during spinning or drying, one of the motors, for example the motor 13, is connected through a speed-reducing pulley on a jack shaft (not shown) to a driving pulley 18 by means of a V-belt 18a or equivalent driving means while the other motor 14 is connected to drive the container 12 at high speed through a direct V-belt drive 19a to a driving pulley 19. Interposed between the pulleys 18 and 19 is an overrunning clutch which permits high speed operation of the container 12 without driving the low speed pulley 18 and its associated motor at the higher speed. This two-speed drive comprises one of the features of the invention disclosed and claimed in my copending application Serial No. 579,452, filed February 23, 1945, now abandoned.

In order to introduce cleaning fluid, for example water of the proper temperature, into the chamber 11, there are provided a hot water connection 20 and a cold water connection 21 leading to a solenoid-operated mixing valve 22 having an outlet connection 22a which connects through a suitably packed bore through the shaft 12f to a nozzle 23. The drain pump 16 connected to the drain 15 through the valve 17 is driven by a pulley 16a from one of the motors, for example the low-speed motor 13, and is provided with an outlet connection 16b leading to an external drain hose or pipe. Thus, the units 11-23, inclusive, comprise a single, rigid, unitary structure including all the essential elements of a cleaning machine, the only relative motion being the rotation of the article container 12 through one or the other of the pulleys 18 or 19 by means of its associated motor.

The cleaning machine of the invention also includes a supporting base or frame 24 for resiliently supporting the unitary chassis just described. For this purpose there are preferably provided a plurality of planar spiral thrust-taking

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springs 25 disposed approximately symmetrically about the center of gravity of the cleaning fluid chamber 11 when containing the usual amount of cleaning fluid and the usual charge of articles to be cleaned, the springs 25 constituting the sole supporting means between the base 24 and the chassis and, therefore, the chamber 11 thereon. Specifically, the chamber 11 has a substantially rectangular section at its plane of support, the base 24 is rectangular and surrounds the chamber 11 and its supporting chassis, and one of the springs 25 is disposed at each of the corners of this section of the chamber 11. The base or external end 25a of each of the springs 25 is attached to the base 24 while the nucleus or internal end 25b is attached to the container 11 as by a pivot pin 25c.

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The springs 25 are planar; that is, being of spiral form, their principal dimension lies in one plane. Considering each of the springs as ideally lying in a plane, the springs all lie in parallel planes, the two front springs lying in one plane and the two rear springs in a second plane. This form of resilient mounting imparts to the chassis and to the cleaning fluid chamber 11 a freedom of motion primarily in different directions in a plane parallel to the planes of the springs 25.

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In order to limit the movement of the chassis and the cleaning fluid chamber 11 in directions other than in a plane parallel to the planes of the springs 25 and to retard or damp the movements thereof in this plane, particularly when the rotatable article container is passing through its critical speed, there are provided a plurality of friction dampeners 26 interposed between the chamber 11 or the chassis and the base 24 and disposed to damp the motion of the chassis in such plane, which is also a plane parallel to the plane including the lines of thrust of the front and rear pairs of springs. The details of two of the friction dampeners are represented in Fig. 3 from which it is seen that each of the dampeners 26 comprises a friction disk 26a, which may be of a material similar to conventional automobile brake blocks. Each of the disks 26a is adjusted to bear upon and make a frictional engagement with one of the side panels 10a of the chassis frame 10 or a plate-like member supported therefrom, the pressure of the disk 26a on the member 10a being adjusted by means of a threaded stud or shaft 26b threaded in an auxiliary frame member 10b and locked in its adjusted position by means of a lock nut 26c. The member 10b is effectively a relatively stiff leaf spring and is effective primarily to provide the necessary force between the friction surfaces of the damper and secondarily to permit low-amplitude oscillations or movements of the chassis 10 in directions transverse to its normal plane of oscillation, as sometimes results from rotational oscillation of the chamber 11 about a vertical axis.

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The cleaning machine described above is adapted to be disposed in a suitable enclosing housing 27. The housing 27 is provided with a sliding top door 27a adapted to register with one of the peripheral sliding doors 12e of the article container 12 and having an inner door 27b through which soap or other detergent material may be introduced into the cleaning fluid chamber 11 without opening the door 27a. The housing 27a is also provided with a circular opening 27c surrounded by an inwardly extending flange 27d and registering with the transparent end wall 11a of the cleaning fluid chamber 11, whereby the operation of the machine may be inspected

during the cleaning process. If desired, a series of control switches 28 may be mounted on a panel 28a and extend through the front of the casing 27 to control the various devices of the cleaning machine, for example, the washing motor 13, the spinning motor 14, the solenoid mixing valve 22, and the solenoid drain valve 17. There is also provided a swinging door 27e registering with a cleanout tray 15a of the drain 15 to permit removal of the tray 15a for cleaning and removal of articles trapped therein.

It is believed that the operation of the cleaning machine of the invention will be understood from the foregoing description. In brief, however, articles to be cleaned may be inserted in the container 12 and water of moderate temperature, for example about 90° F., may be admitted through the mixing valve 22 and the nozzle 23 until the chamber 11 is filled to an appropriate level. The articles may then be allowed to soak for an appropriate interval, for example ten minutes, whereupon the drain valve 17 and the drain pump 16 are operated to drain the soaking water from the chamber 11. The drain valve is then closed and water of a higher temperature, for example 140° F., admitted to the chamber 11 to an appropriate level and soap or other suitable detergent is introduced through the door 27b. The washing motor 13 is operated to rotate the article container 12 for the washing cycle, which may be of a period of from five to twenty minutes, depending upon the nature and condition of the articles being cleaned. The drain pump 16 and drain valve 17 are then operated to release the washing water from the container and one or more batches of rinsing water may be introduced and successively drained. The rinsing of the articles is facilitated by the particular arrangement of the nozzle 23 and the foraminated end wall 12b of the article container. The nozzle 23 is effective to flush any dirty suds from the surface of the articles within the container 12 and from the end wall 12b and into the drain 15, thus preventing the collection or depositing of such dirty suds upon the articles or other parts of the machine.

After washing and rinsing as described, the drain valve 17 and drain pump 16 are operated and the article container 12 is rotated at high speed by spinning the motor 14 to spin-dry the articles in the container 12. The articles may then be removed in a damp state for further drying or ironing or other treatment.

With the construction described, it is to be noted that all of the relatively moving parts and all the essential elements of the cleaning machine form a part of a single, rigid, unitary chassis and that this chassis is supported as a whole from the base 24. As a result, any vibration due to the rotation of the article container 12 results in a vibration of the unitary chassis as a whole, rather than relative vibration between different components thereof, thus minimizing strains on the several operating parts.

Further, by mounting the interior chassis at the four points symmetrically spaced about the approximate center of gravity of the chamber 11, the vibration is confined substantially to a median plane through the machine parallel to the planes of the supporting springs 25. However, the vibration in this plane is damped and limited by the friction dampeners 26. It is noted that the chassis including the cleaning fluid chamber 11 has a complete freedom of motion in all directions in this particular plane and sim-

ilarly that the dampeners 26 substantially uniformly dampen the vibratory motion in all directions in this plane while limiting any incidental vibratory motion which might tend to arise in any other plane. Preferably, the unit is constructed with relatively soft springs proportioned to support the load imposed upon them. Pressure on the friction surfaces of the dampeners 26 is best adjusted by experiment to the minimum necessary substantially to limit the vibratory motion of the chamber 11 when the article container 12 is passing through its critical rotational speed. For example, each of the springs 25 may be of stock spring material, 1 inch wide, ¼ inch thick and approximately 8 inches in diameter, each spring being 2½ turns, as illustrated. The result of this particular construction is a minimum of vibration of the unit as a whole and a substantial freedom of the unit from vibration in other than the single vertical plane.

Further, the registration of the opening 27c in the housing 27 with the transparent end wall 11a of the cleaning fluid chamber 11 and the wire-mesh end wall 12b of the article container 12 enables the user to inspect the progress of the washing cycle and to gauge the development of suds, it being well known that the best washing action is accomplished with a minimum of suds.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit or scope of the invention.

What is claimed is:

1. In a machine for cleaning textile fabric articles, a rotatable article container comprising, a frusto-conical drum-like member having imperforate side walls, an imperforate end wall of smaller diameter, a foraminous end wall of larger diameter supporting bearing elements mounted on said end walls, and fluid inlet means at said imperforate end wall located axially of said container.

2. In a machine for cleaning textile fabric articles, a rotatable article container comprising, a frusto-conical drum-like member having imperforate side walls, an imperforate end wall of smaller diameter, a foraminous wall of larger diameter, a supporting spider secured to said larger diameter end of said member, supporting bearing elements mounted on said smaller diameter end wall and on said spider, and fluid inlet means at said imperforate end wall located axially of said container.

3. In a machine for cleaning textile fabric articles, a rotatable article container comprising, a frusto-conical drum-like member having imperforate side walls, an imperforate end wall of smaller diameter, an end wall of larger diameter of wire mesh, a supporting spider secured to said larger diameter end of said member, supporting bearing elements mounted on said smaller diameter end wall and on said spider, and fluid inlet means at said imperforate end wall located axially of said container.

4. In a machine for cleaning textile fabric articles, a rotatable article container comprising, a frusto-conical drum-like member having imperforate side walls, an imperforate end wall of smaller diameter, a foraminous end wall of larger diameter, a supporting spider secured to said larger diameter end of said member, supporting journals mounted on said smaller diameter end wall and on said spider, and fluid in-

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let means at said imperforate end wall located axially of said container.

5. In a machine for cleaning textile fabric articles, a cleaning unit comprising, a cleaning fluid chamber including at least one transparent end wall, a rotatable frusto-conical drum-like article container disposed within said container and having imperforate side walls, an imperforate first end wall, a foraminous second end wall, a supporting spider secured to said second end of said container, bearing elements mounted on said first end wall and on said spider, complementary bearing elements mounted on the end walls of said chamber and rotatably supporting said container, and fluid inlet means at said first end wall located axially of said container.

6. In a machine for cleaning textile fabric articles, a cleaning unit comprising, a cleaning

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fluid chamber including at least one transparent end wall, a rotatable frusto-conical drum-like article container disposed within said container and having imperforate side walls, an imperforate end wall of smaller diameter, a foraminous end wall of larger diameter, a supporting spider secured to said larger diameter end of said container, and bearing elements mounted on said smaller diameter end wall and on said spider, complementary bearing elements mounted on the end walls of said chamber and rotatably supporting said container, said foraminous end wall of said container being disposed adjacent said transparent chamber end wall, and fluid inlet means at said imperforate end wall located axially of said container.

No references cited.