

March 23, 1937.

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DRY CLEANING APPARATUS

Filed May 19, 1934

2 Sheets-Sheet 1

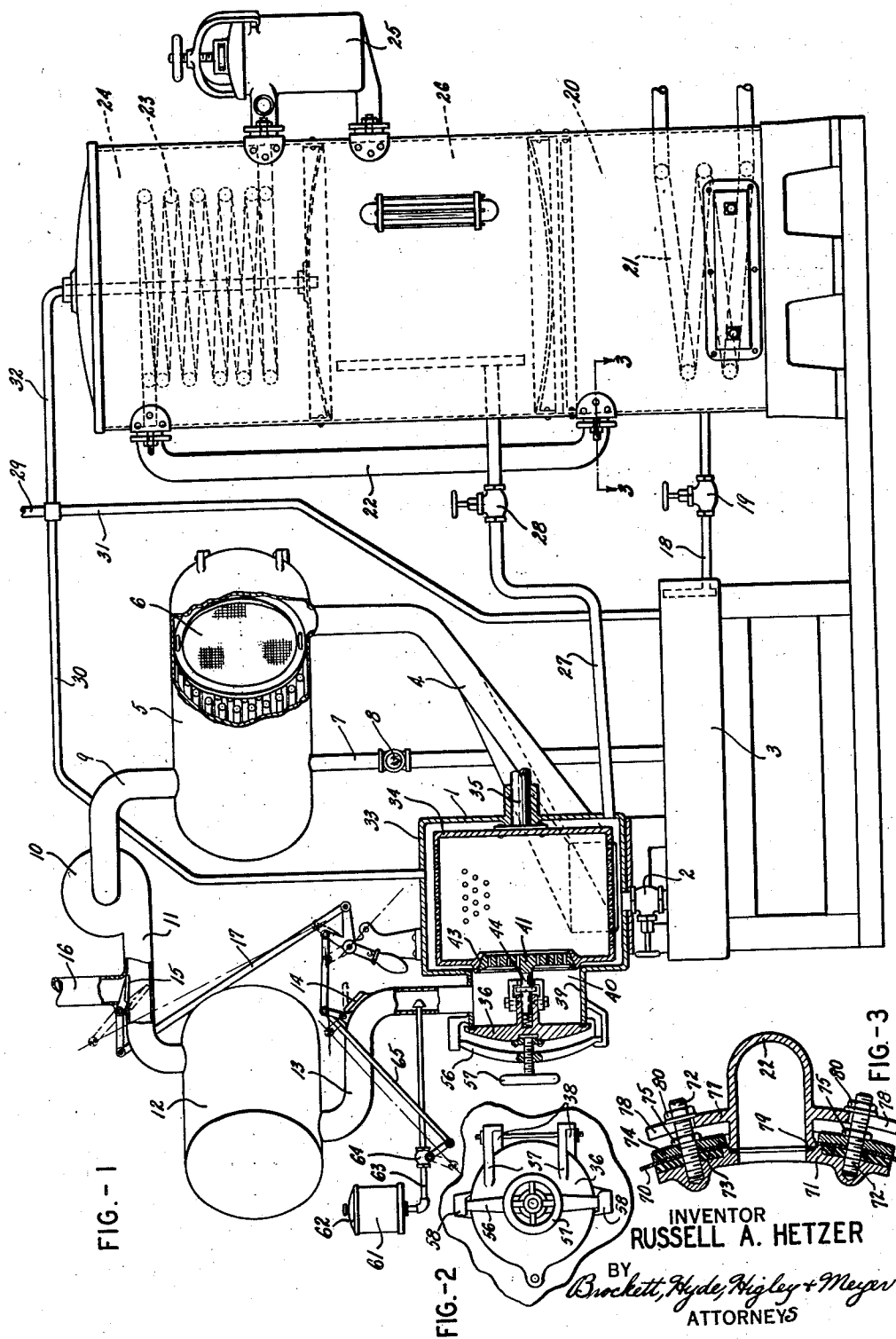


FIG. 1

FIG. 2

FIG. 3

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2 Sheets-Sheet 2

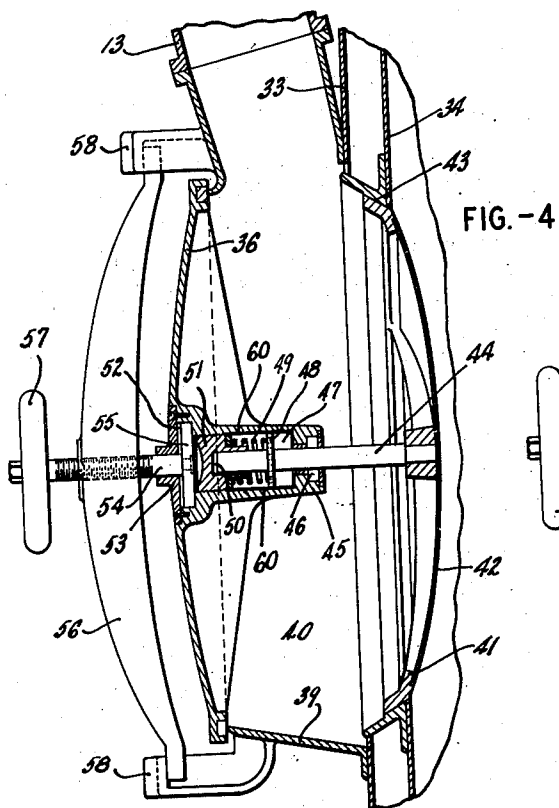


FIG. -4

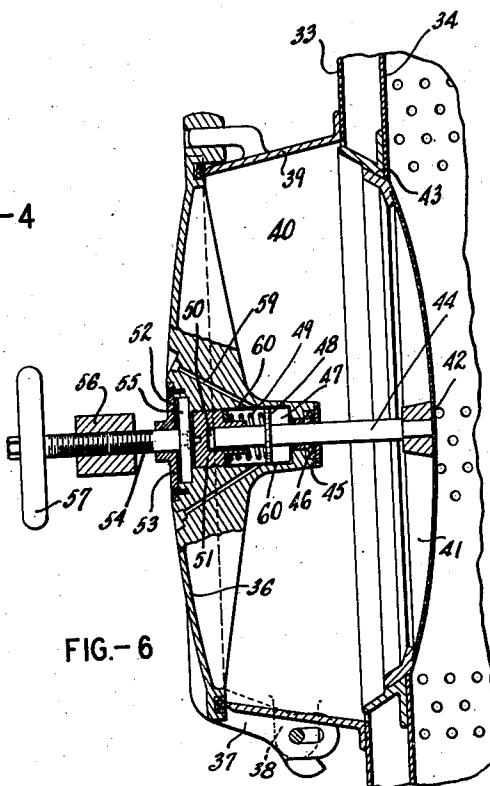


FIG.-6

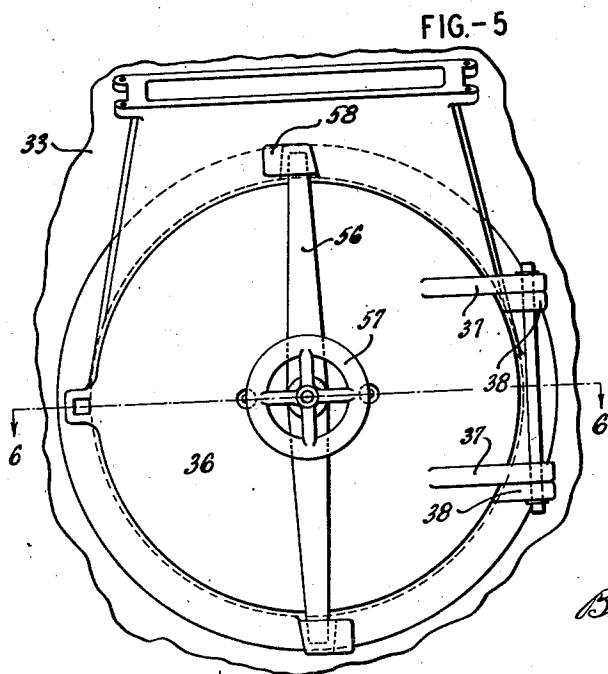


FIG.-5

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DRY CLEANING APPARATUS

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Application May 19, 1934, Serial No. 726,460

10 Claims. (Cl. 68—38)

This invention relates to dry cleaning apparatus of that type in which the work to be cleaned is cleaned, dried and deodorized in a single apparatus or system.

One object of the invention is to improve the general construction of that unit of the apparatus in which the work is subjected to the various steps in the treatment or, in other words, to the washing machine, and more particularly, to provide an improved type of such machine in which the doors of the outer stationary tub and rotating cylinder are connected and move as a unit for opening and closing the device and in closed position permit rotation of the door of the rotatable drum while the door of the tub is non-rotatable.

A further object of the invention is to provide, in dry cleaning mechanism of this kind, a washing unit with coupled or connected doors of the character described, the inner or drum door being foraminous or perforated together with means for introducing the air supply to the space between the two doors so that it may be delivered to or discharged from the center of the rotating drum with most efficient results.

A further object of the invention is to provide, in dry cleaning apparatus of this kind, means for introducing moth preventive or moth-proofing material during operation of the apparatus in the customary manner.

A further object of the invention is to provide an improved type of conduit connection to those portions of the apparatus which contain the volatile detergent for more readily repairing and replacing gaskets and the like.

Other objects of the invention are in part obvious and in part will appear more in detail hereinafter.

In the drawings, which represent one suitable embodiment of the invention, Fig. 1 is an elevation with parts of the apparatus shown more or less diagrammatically and with portions of the apparatus broken out or in sectional elevation to expose interior parts; Fig. 2 is a detail end view of the washing unit from the left in Fig. 1; Fig. 3 is a detail section on the line 3—3, Fig. 1; Fig. 4 is a detail sectional elevation, corresponding to Fig. 1, but on a larger scale, illustrating the door construction; Fig. 5 is an end elevation from the right in Fig. 4; and Fig. 6 is a detail sectional plan view on the line 6—6, Fig. 5.

Taken as a whole, the dry cleaning system or apparatus illustrated in the drawings is of the same general type and construction illus-

trated in my prior application for dry cleaning apparatus filed March 16, 1932, Serial No. 599,127, and now Patent Number 1,993,407, of March 5, 1935, to which reference may be had for a more complete description where desirable or necessary. In actual practice, however, the present system will usually be made in smaller form and with more compact arrangement than in my prior application referred to.

The system comprises a washing machine or unit 1 draining by way of the valve and conduit 2 to a sump 3, the chamber within the washing unit communicating by a conduit 4 with one end of a condenser 5 in which are screens 6. Condenser 5 drains into the sump by way of a conduit 7 and valve 8. The gas chamber in the condenser communicates by conduit 9 with a fan 10 delivering by way of a conduit 11 into a suitable air heater 12 which on its discharge side communicates by pipe 13 with the washing unit 1. 14 is an air inlet valve to conduit 13 while 15 is a two position valve at the entrance to an exhaust pipe 16, the two valves 14 and 15 being connected by links and levers, generally marked 17, so coupling them that when in the full line position, Fig. 1, air is repeatedly circulated through the circuit, while in the dotted line position fresh air enters at valve 14 and passes through the washer, condenser and fan and is discharged through the pipe 16.

The liquid detergent collected in the sump 3 is conducted by way of pipe 18 and valve 19 to a renovating unit shown at the right in Fig. 1. This renovating unit is generally similar to that shown in my prior application before referred to. It comprises a boiler 20 suitably heated in any manner as by steam pipes 21, and the gas space which communicates by way of a conduit 22 with coils 23 in a condenser 24, said coils delivering through a water trap 25 to a storage chamber or reservoir 26 from which the reclaimed volatile detergent may be delivered by way of a pipe 27 and valve 28 to the chamber of the washing unit 1.

Preferably, the system is operated with a suitable volatile detergent, preferably non-inflammable, such as trichlorethylene, carbon tetrachloride, or the like, and is open or of the vented type with communication to the atmosphere at all times to avoid wide or dangerous fluctuations of pressure within the system. As illustrated, the system is vented by way of a pipe 29 open to atmosphere and communicating by branches 30, 31 and 32 with the chamber in the washing unit 1, with the sump 3 and with

the reservoir 26. In operation, the work having been inserted into the washing unit, a charge of detergent is supplied thereto from the reservoir 26, the valve 28 is closed and the washing operation proceeds, following which the detergent is drained to the sump 3 and the detergent vapors are circulated from the washer to the condenser, thence to the fan and to heater 12 until the work is thoroughly dried, following which air is admitted at valve 14 and conducted to the washer, thence to the condenser and fan and discharged to the atmosphere, for deodorizing purposes. The detergent withdrawn from the sump is then conducted to the boiler, is there evaporated and conducted to the condenser 24 from which it is delivered to the reservoir 26 for reuse.

According to the present invention, the washing or treating unit is of special form, particularly as to the arrangement of its doors and the vapor or gas circulating conduit connection thereto. As illustrated in Figs. 1, 4, 5 and 6 the washing unit comprises a stationary outer tub or casing 33 in which is mounted a rotatable foraminous drum or work container 34, the axis of rotation of which is horizontal. Said drum is provided at one end with a driving shaft 35 connected for operation to any suitable source of power (not shown).

At that end of the drum opposite its driving shaft are located the doors for the outer tub and drum, both of which are circular and arranged concentric with the drum axis. The two doors are secured together to swing together or as a unit back and forth between open and closed position. As illustrated, the door 36 for the tub is provided with arms 37 pivoted on a vertical axis on brackets 38 carried by the tub or casing. Said door seats against the end edge of a tubular or cylindrical extension 39 from the tub wall within which is a chamber 40 to the upper portion of which is connected the conduit 13. The drum door, marked 41, in elevation is circular, and its inner surface 42 is bulged or substantially of spherical form, so that it projects into the drum chamber. Its outer edge is formed as a tapered or spherical surface 43 to fit a corresponding surface around the edge of the door opening, the arrangement being such that the door is self accommodating to its seat to insure ability of the drum door to rotate freely notwithstanding minor errors in alinement, and the drum door as a whole, when closed, presents a smooth surface to the work with no cracks or crevices in which portions of the work might become caught.

Drum door 42 is mounted on the inner end of a rod 44 entering a hub or boss 45 on the tub door. The rod extends through a suitable packing 46 into a chamber 47 within which said rod is provided with a collar 48 preferably perforated and beyond which is a compression spring 49. The outer end of the rod works in an opening 50 within the spring pilot portion of a plug 51 threaded into the hub 45 and removable from its outer end. Beyond said plug the tub door is provided with a shallow cavity 52 closed by a disc or plate 53 in which rotates a shaft 54 having a head 55 within the cavity, and the outer portion of which is threaded to receive a locking bridge member 56, shaft 54 being provided on its outer end with an operating handle 57. The outer ends of the bridge member 56 cooperate with holding lugs 58 on the tub wall, and the hub 45

may be provided with one or more lubricating ports or channels 59 communicating with the chamber 47, for the purpose of supplying lubricant thereto, while the walls of chamber 47 may also be provided with longitudinal grooves 60 to reduce any piston or retarding effect of the collar 48, which, as stated, is perforated for the same purpose.

The axis of the pivotal mounting of door 36 on the tub is located in a plane normal to the drum axis and substantially midway between the tub and drum doors, as shown in Fig. 6.

Fig. 4 shows the parts in closed position. The doors have been swung inwardly to their seats upon the drum and tub respectively. Spring 49 is compressed. The arms of bridge 56 are held beneath the locking projections 58 and the screw shaft 54 has been rotated to force the tub door firmly to its seat. In this position the drum door prevents escape of the work but nevertheless the drum may be rotated freely for washing or extracting operations. At the same time, the drum door is perforated with a large number of small holes, so that when vapors are circulated in the manner described, the gas or vapor current coming from conduit 13 enters the chamber 40 and passes directly through the openings in the drum door to the chamber within the drum, and so on, although obviously the direction of flow may be the reverse from the chamber in the drum to conduit 13 and so on. For unloading and reloading the washer, the handle 57 is rotated to release the pressure on the tub door, the bridge 56 is rotated to release its arms from latching engagement with the lugs 58, and the two doors together are swung out as a unit, providing full and clear access to the drum chamber. During this motion, due to the location of the axis on which the doors swing, the inner door clears all stationary parts of the tub and passes out through the opening for the tub door.

For the purpose of treating the fabrics or garments with a moth preventive or moth-proofing substance, I provide a vessel 61 having a removable cover 62, by removing which the moth preventive material in the form of powder, finely divided crystals or the like may be introduced into receptacle 61. By moth preventive or moth-proofing substances is meant those substances which will either kill moths or drive them away from fabrics, such as those which may be purchased commercially or those which are described in Bulletin No. 1353 published by the United States Department of Agriculture in 1923. Said receptacle communicates by way of a pipe 63 having a valve 64 with the conduit 13 and the operating arm for valve 64 is connected by a link 65 with the linkage connecting valves 14 and 15. The arrangement is such that when said valves 14 and 15 are in the full line position, Fig. 1, valve 64 is closed, but when said valves 14 and 15 are moved to the dotted line position, valve 64 is open. Consequently, during the deodorizing operation, when fresh air is passed over the fabrics for scavenging therefrom the last traces of detergent, a quantity of the moth-proofing material flows by gravity and by the suction effect of fan 10 from the vessel 61 into conduit 13 and is distributed over and upon the fabrics being treated.

Fig. 3 illustrates a special form of connection from conduit to tank which may be utilized in various portions of the apparatus and, in the present system, is shown as utilized at those

points where conduit 22 connects respectively to the boiler 20 and condenser 24 and at the points where the water trap 25 communicates with condenser 24 and reservoir 26. Such connections necessarily include a gasket or gasket material in contact with the detergent. These detergents cause rather rapid deterioration of the gasket material, requiring frequent removal thereof. In the arrangement shown the joint between the conduit and vessel is arranged as follows:—

Within the tank, whose wall is indicated at 10, is located a plate 71 tapped to receive two studs 72 and provided with an annular seat to receive a gasket or washer 73 which lies against the inner surface of the tank wall. With these parts in place, as described, a gasket or washer 74 is applied to the outer surface of the tank and the joint is tightened by screwing down nuts 75. The end of the conduit, such as the conduit 22, is provided with a flange 77 slotted at 78 for application to the studs 72 over nuts 75. The inner end of said conduit is applied to a washer 79 lying in an annular seat of the plate 71, and the conduit, when inserted to the position shown, is secured tightly to produce a sealed joint by screwing up nuts 80. With this arrangement, upon deterioration of any packed joint of this kind, the parts may be disassembled and the washers and gaskets readily renewed from the outside of the vessel without the usual necessity for full access to the chamber within the tank.

What I claim is:

1. A work treating device of the character described comprising a stationary casing having an opening, a drum rotatable therein having an opening substantially concentric with its axis of rotation, a seat disposed around the opening in said drum, a closure for the opening in said casing and a closure for the opening in said drum, said closures being mounted to move as a unit between open and closed position, the closure for said drum being rotatable and yieldingly mounted with respect to the casing closure, whereby when the unit is closed the drum door will be forced into engagement with the drum seat and will rotate therewith.

2. A work treating device of the character described, comprising a stationary casing having an opening, a perforate drum rotatable therein having an opening substantially concentric with its axis of rotation, a closure for the casing opening, a perforate closure for the drum opening, said closures being spaced from each other, a conduit communicating with the space between said closures and through the drum closure with the drum chamber, and a conduit connected to the casing wall and communicating through the drum perforations with its chamber, whereby air may be caused to flow from conduit to conduit by way of the drum chamber and thus into intimate contact with the work in said drum:

3. Apparatus of the character described in claim 2 in which the closure for said drum is yieldingly and rotatably mounted with respect to the closure for said casing.

4. A work treating device of the character described comprising a stationary casing, a perforate drum rotatable therein, a supply conduit leading into said casing and a discharge conduit leading therefrom and communicating with the supply conduit to form a closed circuit, whereby air may be circulated from conduit to conduit and thereby through the work and perforate drum, valve controlled openings in said conduits whereby air from the atmosphere may be forced

through the work in said drum and passed to the atmosphere, a receptacle containing a moth-proofing substance, communicating means between said receptacle and the supply conduit, valve means for normally closing communication between the receptacle and the supply conduit, and means controlled by the operation of said air valves for opening communication between said receptacle and the supply conduit when the supply conduit is open to atmosphere, whereby the moth-proofing substance may be drawn through the supply conduit when air from the atmosphere is forced through said drum.

5. A work treating device of the character described comprising a stationary casing, a perforate drum rotatable therein, a closure for said drum and a closure for said casing, said closures being spaced from each other and the inner closure being perforated, a supply conduit leading into the space between the closures, a discharge conduit leading from the casing and communicating with the supply conduit to form a closed circuit for the circulation of air from conduit to conduit, valve controlled openings in said conduits whereby air may be forced from the atmosphere through the work and passed to the atmosphere for deodorizing the fabric when said valves are open, a receptacle containing a moth-proofing substance, communicating means between said receptacle and the supply conduit, valve means for closing said communicating means, and means controlled by the operation of said air valves for opening communication between said receptacle and the supply conduit when the supply conduit is open to the atmosphere, whereby when air from the atmosphere is drawn through the supply conduit moth-proofing substance will be drawn from the receptacle and forced through the perforations in the drum closure upon the work in said drum.

6. A work treating device of the character described, including a stationary casing, a cylindrical foraminous drum rotatable therein on a horizontal axis, a closure unit therefor including casing and drum door members of circular form mounted to move together as a unit between open and closed positions and which in closed position are substantially concentric with the drum axis, said two door members being spaced from each other, a conduit connected to the space between said doors, and a conduit connected to the casing wall, for circulation of air from conduit to conduit and thereby through the work and rotatable drum.

7. Apparatus of the character described in claim 6, in which the drum door is yieldingly mounted with reference to the casing door, thereby to accommodate itself to the opening in the drum.

8. Apparatus of the character described in claim 6, in which said door members are pivoted to the casing upon an axis which lies in a plane substantially parallel to the door members and substantially midway between them.

9. A work treating device of the character described comprising a stationary casing having an opening, a drum rotatable therein having an opening substantially concentric with its axis of rotation, a closure seat surrounding said opening, a closure for the opening in said casing and a closure for the opening in said drum, the closure for said drum being rotatably and yieldingly mounted with respect to the casing closure when the doors are closed so that the drum door will

be forced into engagement with the drum seat and will rotate therewith.

10. A work treating device of the character described comprising a stationary casing having an opening, a closure for said opening, a drum rotatable in said casing having an opening substantially concentric with its axis of rotation,

a seat surrounding the drum opening, a closure for said drum opening rotatably mounted with respect to said casing closure, and means associated with the casing door for yieldably forcing the closure for the drum into engagement with the seat. 5

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