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CLEANING AND DRYING APPARATUS

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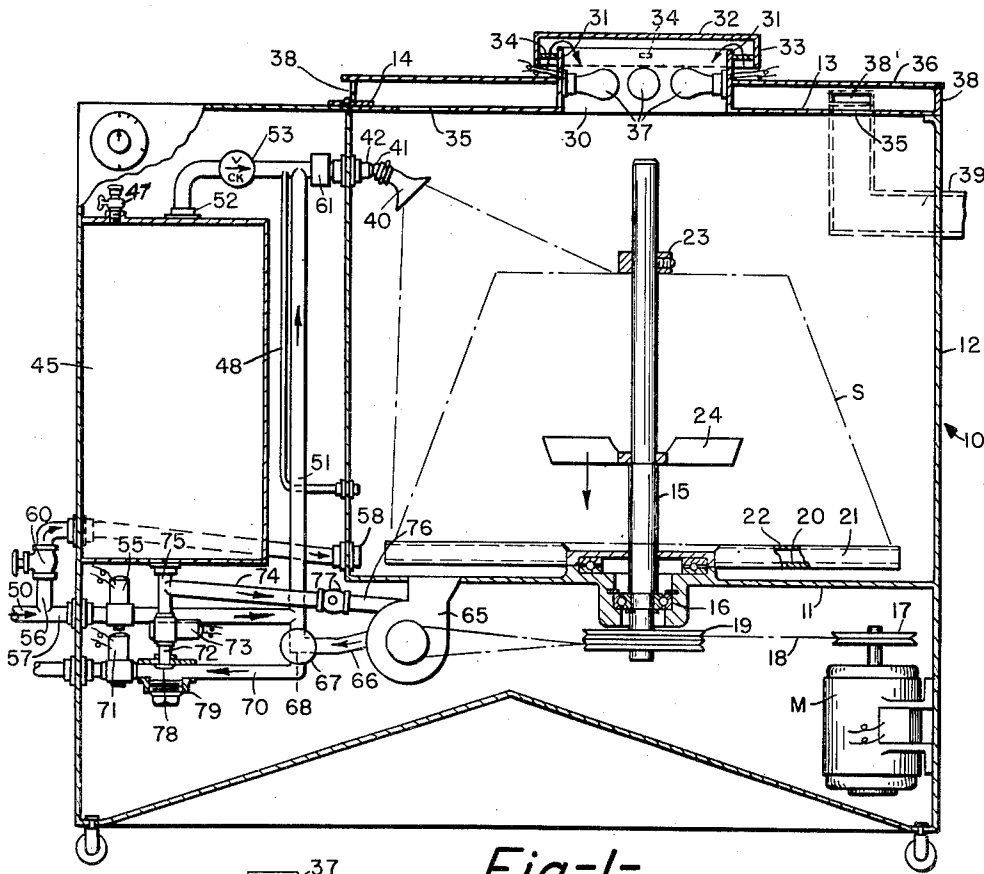


Fig-1-

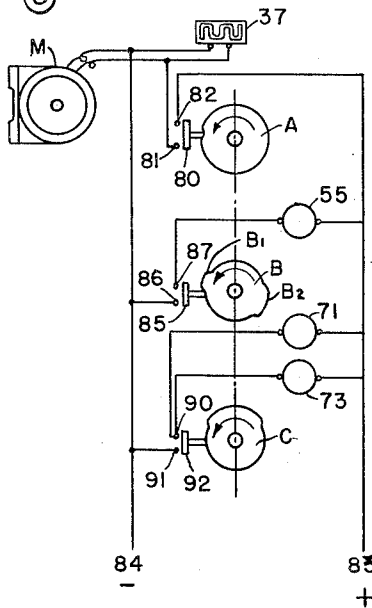


Fig-2-

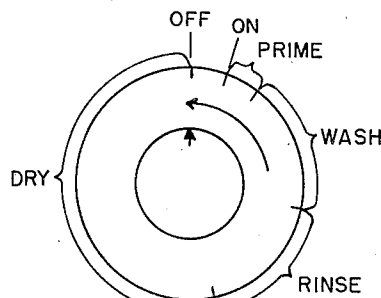


Fig-3-

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CLEANING AND DRYING APPARATUS

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6 Claims. (Cl. 34—58)

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This invention relates to cleaning devices or apparatus and particularly to apparatus for supporting, cleaning and drying any desired articles to be cleaned, and the particular object or article selected for illustration is a lamp shade. It should be understood, however, that the apparatus may be used for supporting and cleaning many other articles, which cannot be immersed and must be dried quickly, by spraying the articles with the cleaning fluid and removing the cleaning fluid by spinning or rotating the article cleaned.

Articles, such as lamp shades, formed of silk or similar textile material, are difficult to clean satisfactorily by the usual cleaning methods since in drying they become streaked and rusted. For this reason most cleaners refuse to clean lamp shades and those who do clean them charge at a high rate because of the amount of hand labor required.

This invention has for its salient object to provide simple, practical, efficient, automatically operable apparatus for easily, quickly and effectively cleaning and drying articles to be cleaned.

Another object of the invention is to provide apparatus of the character described so constructed and arranged that practically no hand labor is required and the articles will be cleaned and dried without streaking.

Another object of the invention is to provide a machine of the character specified, so constructed and arranged that the cleansing fluid can be stored after use and re-utilized for cleaning a plurality of articles, such as shades.

Another object of the invention is to provide cleaning apparatus so constructed and so controlled that the article being cleaned will be automatically cleaned, rinsed and dried after the apparatus has been set in operation.

Further objects of the invention will appear from the following specification taken in connection with the drawings which form a part of this application, and in which

Fig. 1 is a vertical sectional elevation of apparatus constructed in accordance with the invention;

Fig. 2 is a diagrammatic view showing the valve control circuits; and

Fig. 3 is an enlarged elevation of the dial.

In the particular embodiment of the invention illustrated, there is shown a machine comprising a main frame on which is mounted a tank 10 having a bottom 11, side wall 12, and top or cover wall 13, which is hinged at 14 to the wall 12.

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A shaft 15 is mounted in a ball thrust bearing 16 in the center of the bottom 11 and is driven by a motor M and belt and pulley connections 17, 18 and 19.

There is secured to the shaft 15 above the bottom 11, a disk 20, the outer periphery of the disk being spaced from the tank wall 12. Vanes 21 are mounted radially on the disk 20 and function as fan blades when the shaft is rotated.

A shade or other article to be cleaned is mounted on the upper edges of the vanes, these edges being preferably lined or covered with rubber or other cushioning material 22. The shade is held on the vanes by a collar 23 adjustably mounted on the upper end portion of shaft 15. Additional fan blades 24 may be mounted on shaft 15 if desired. The warm air is drawn down through the shade and is forced out through the relatively narrow space between the bottom of the shade and the disk 20. Thus, the air is deflected by the disk and expelled laterally at high velocity. This expedites the drying of the shade.

The top or cover 13 has a central opening 30 and an outwardly extending cylindrical extension 31 surrounding the opening. A cap 32 is mounted above the outer end of extension 31 and has a downwardly extending flange 33 surrounding but spaced from said extension 31. The flange 33 is secured to the part 31 by a plurality of webs 34. The cap 32 is spaced above the outer end of part 31, admitting air beneath the cap into the extension 31 and into the tank or casing 10.

The cover wall 13 has also a plurality of openings 35 adjacent the outer edge thereof and the cover is double walled, having the inner cover wall 13 and an outer wall 36, the two walls surrounding the part 31 at their inner circumference and preferably being connected or enclosed at their outer peripheries by an annular wall 38. The wall 38 has a discharge port or opening 38', to which is connected a discharge pipe or conduit 39. This pipe may discharge the moist air in the room or outside the room, as desired.

Within the extension 31 are mounted a plurality of air heating elements 37 for heating the air drawn into the casing or tank 10 by the rotation of the fan blades or vanes 21 and 24. The warm air dries the shade after it has been washed and rinsed and the moist air passes upwardly along the wall 12 of the tank 10 and out through the openings 35, port 38' and conduit 39. It will be noted that the damp or moist air from the tank 10 is discharged at points spaced from the path of the incoming air.

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Cleaning fluid and rinsing fluid are directed against the shade S or article to be cleaned through a nozzle 40 which is connected through a universal joint 41 to an inlet pipe 42 mounted on the casing or tank wall 12. The nozzle can be adjusted to deliver the spray against the inside or outside of the shade S or against both the inside and outside.

A storage tank 45 is mounted on the main frame or housing and means is provided for by-passing the cleaning solution into the tank 45 so it can be used for repeated washing operations—as hereinafter explained. An air vent preferably controlled by a petcock 47 is provided at the top of tank 45.

The piping connections and valve controls for carrying out the washing or cleansing and rinsing operations are as follows:

Pipe 50 is connected to the hot water main and extends through the casing wall and is connected to a vertical pipe 51 which is connected at its upper end to a pipe 42 which has one end connected to nozzle 40 and its other end connected at 52 to the top of tank 45. A drip pipe 48 connects at its upper end to pipe 42 and at its lower end to the tank 10 for by-passing the cleaning solution which might drip from the nozzle 40 during the drying operation. A check valve 53 is mounted in the pipe 42 between the connection of pipe 51 thereto and the end 52 of the pipe 42. This valve permits flow through pipe 42 to the nozzle but prevents reverse flow into tank 45.

A solenoid controlled valve 55 is connected in pipe 50 to control the flow of water therethrough.

A pipe 56 is connected at 57 to pipe 50 and extends into tank 10 at 58. A manually controlled valve 60 in pipe 56 controls the passage of fluid therethrough.

A heater may, if desired, be mounted on or in the water inlet pipe at any suitable point, to heat the intake water or maintain the desired temperature thereof.

A water pump 65 is connected to the bottom 11 of tank 10 and receives water therefrom and pumps the water through a discharge pipe 66 to a valve casing 67 of a three-way valve 68 having a right angle conduit adapted, when adjusted as shown in Fig. 1, to conduct the fluid from conduit 66 and casing 67 to pipe 51. When valve 68 is rotated 90° in a clockwise direction, pipe 66 will be connected through the conduit in valve 68 to a discharge pipe 70 which may conduct the fluid out of the machine or casing. However, a solenoid controlled valve 71 is connected in the pipe 70 and can be closed to by-pass the cleaning fluid or solution through a pipe 72 to tank 45. A solenoid controlled valve 73 is connected or mounted in pipe 72 and controls the passage of fluid through said pipe 72.

A pipe 74 is connected at 75 to pipe 72 and connects at 76 to the pump 65 for draining the tank 45.

A manually controlled valve 77 is mounted in pipe 74.

In order to prevent lint or other matter from entering the storage tank, a strainer 78 is secured at the inlet end of pipe 72. Access to the strainer may be had by removing a plug 79 in pipe 70.

The cleaning solution, such as a soap and water solution, is placed in tank 10. The cover is then closed and the machine is started. The manual valve 60 is opened and water is allowed to run into the tank 10 and to be fed by the pump 65

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into tank 45 until the tank 45 is full, at which time the solution will escape from the nozzle 40. The filling of the tank is facilitated by opening the petcock 47. The dial is set at "Wash" during the filling of the tank, so that valve 71 will be closed and valve 73 will be open. When the solution escapes through the spray nozzle or from the air vent, the tank 45 is full. Then the valve 60 is closed and the dial is set at "Off."

The machine is stopped and the top is then again opened and the lamp shade or article to be cleaned is secured by nut 23 on the vanes 21, preferably with the large end down.

The cover is then closed and by means of a timing unit and the solenoid valve connections shown diagrammatically in Fig. 2 the following cycle is carried out.

The motor circuit for motor M is closed and remains closed throughout the entire cycle of operation. The motor operates the pump 65 through suitable driving connections, not shown, and spins the shade. The circuit for the heater elements 37 is also closed during the entire cycle.

The timing unit operates a cam A shown in Fig. 2, which closes a switch 80 on contacts 81 and 82, thus closing the circuit to the motor M and heating elements 37. The power line is connected to wires 83 and 84. The solenoid 55 in the water supply pipe 50 is controlled by a cam B in the timing unit and this cam controls a switch 85 which, when closed by cam B, engages contacts 86 and 87. Contact 86 is connected to return wire 84 and contact 87 is connected to wire 83. Cam B has two switch operating portions B1 and B2. This cam is designed to close the switch 85 and energize the solenoid to open the solenoid valve 55 for approximately twenty seconds, then close the valve for two minutes, while the shade is being washed, and again open valve 55 for one minute while the shade is being rinsed.

A third cam C is mounted in the timing unit for controlling the drain outlet valve 71 in pipe 70 and the by-pass valve 73 in by-pass pipe 72 from pipe 70 to tank 45. Valve 71 is normally open and is closed when its solenoid is energized and by-pass valve 73 is normally closed but is opened when its solenoid is energized and the valve 71 is closed.

The circuits for the solenoids of valves 71 and 73 are connected to contact 90 and the other contact 91 controlled by switch 92 operated by cam C is connected to wire 84.

It should be understood that the showing in Fig. 2 is diagrammatic and that the timing unit can be designed in any desired manner to control the solenoid units. Moreover, it will be understood that the cams can be designed to give any desired time intervals for the various operations.

After the rinsing operation, the shade continues to spin or rotate for approximately two minutes and forty seconds, completing the cycle of operation of the timing unit and causing the water to be discharged from the shade by centrifugal force and warm dry air to be drawn into the tank 10 and to contact and dry the shade. The moist air is forced upwardly and out of the tank through openings 35 into the space between the outer and inner cover walls out through discharge opening 38' and conduit 39.

To wash only one shade, the valve 67, as hereinbefore explained, is manually controlled, and if adjusted to the position shown in Fig. 1 the cleaning solution will pass up through pipe 51

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and will not pass to the storage tank 45. When the washing step in the cycle has been completed, the valve 67 is turned 90° in a clockwise direction to connect pipe 66 to drain pipe 70.

When the storage tank 45 is to be emptied, the valve 77 is opened to permit the tank 45 to drain into the pump 65 and be discharged thereby through pipe 66 into drain pipe 70. During the draining operation, the dial is set at "Dry," with the air vent 47 open.

From the foregoing specification it will be clear that after the cleaning solution has been placed in the tank 10 and the shade is mounted therein, the timing unit will take over and the shade will be thereupon washed, rinsed and dried.

Although one specific embodiment of the invention has been particularly shown and described it will be understood that the invention is capable of modification and that changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claims.

What I claim is:

1. In cleaning and drying apparatus, a cleaning tank, a shaft rotatably mounted in the bottom of the tank and extending into the tank, a disk mounted on the shaft in a position spaced from the bottom of the tank, a plurality of fan blades radiating from said shaft above the disk, means for securing an article to be cleaned on the upper edges of said fan blades, a cover for the tank, said cover having an opening for admitting air to the tank, air heating means in the path of the incoming air, means for conducting moist air from the casing, and means for rotating the shaft.

2. In cleaning and drying apparatus, a cleaning tank, a shaft rotatably mounted in the bottom of the tank and extending into the tank, a disk mounted on the shaft in a position spaced from the bottom of the tank, a plurality of fan blades extending outwardly from said shaft above the disk, means for securing an article to be cleaned on the upper edges of said fan blades, a cover for the tank, said cover having a central opening for admitting air to the tank and having openings near its periphery for permitting air to be discharged from said tank, air heating means in the path of the incoming air, and means for rotating the shaft.

3. Cleaning and drying apparatus comprising a tank, a rotatable shaft disposed centrally in said tank, article supporting means in said tank, spaced above the bottom of the tank and mounted on said shaft, the space in the tank above the supporting means being free and unobstructed means for securing an article on said support, a closure for said tank, air circulating means on said shaft, said closure having a central opening for admitting air therethrough into the space in the tank above and around the article supported on said article supporting means and an air outlet opening remote from said air inlet opening, means for heating said air, and means for rotating said shaft.

4. Cleaning and drying apparatus comprising a tank, a rotatable shaft disposed centrally in said tank, article supporting means in said tank, disposed in a position spaced above the tank bottom and mounted on said shaft, the space in the tank above the supporting means being free

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and unobstructed means for securing an article on said support, a closure for said tank, air circulating means on said shaft, said closure having a central opening for admitting air therethrough into the space in the tank above and around the article supported on said article supporting means and a peripheral outlet opening remote from said air inlet opening, means for heating said air, and means for rotating said shaft.

5. Cleaning and drying apparatus comprising a tank, a rotatable shaft disposed centrally in said tank, article supporting means in said tank and mounted on said shaft, the space in the tank above the supporting means being free and unobstructed means for securing an article on said support, a double walled cover for the tank, an air inlet conduit extending centrally through said cover walls for admitting air therethrough into the space in the tank above and around the article supported on said article supporting means, and heating means in said conduit, said cover having an air discharge opening from the space between the walls and the inner wall having an opening adjacent the periphery thereof to admit moist air to the space between the walls.

6. In cleaning and drying apparatus, a cleaning tank, a shaft rotatably mounted in the bottom of the tank, a disk mounted on the shaft and spaced above the bottom of the tank, said disk extending to a position in which its periphery is adjacent the wall of the tank, means on the shaft for supporting an article to be cleaned and dried in a position spaced a relatively small distance above the disk, and means on the shaft for drawing warm air into the tank centrally thereof and for blowing the air laterally against the wall of the tank, and a cover for the tank having air intake and air outlet openings.

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