May 30, 1950 J. E. BRIGGS 2,509,957

MACHINE FOR LIQUID CLEANING OF UPHOLSTERED ARTICLES, FABRICS, RUGS, CARPETS, ETC

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Fig. 1.

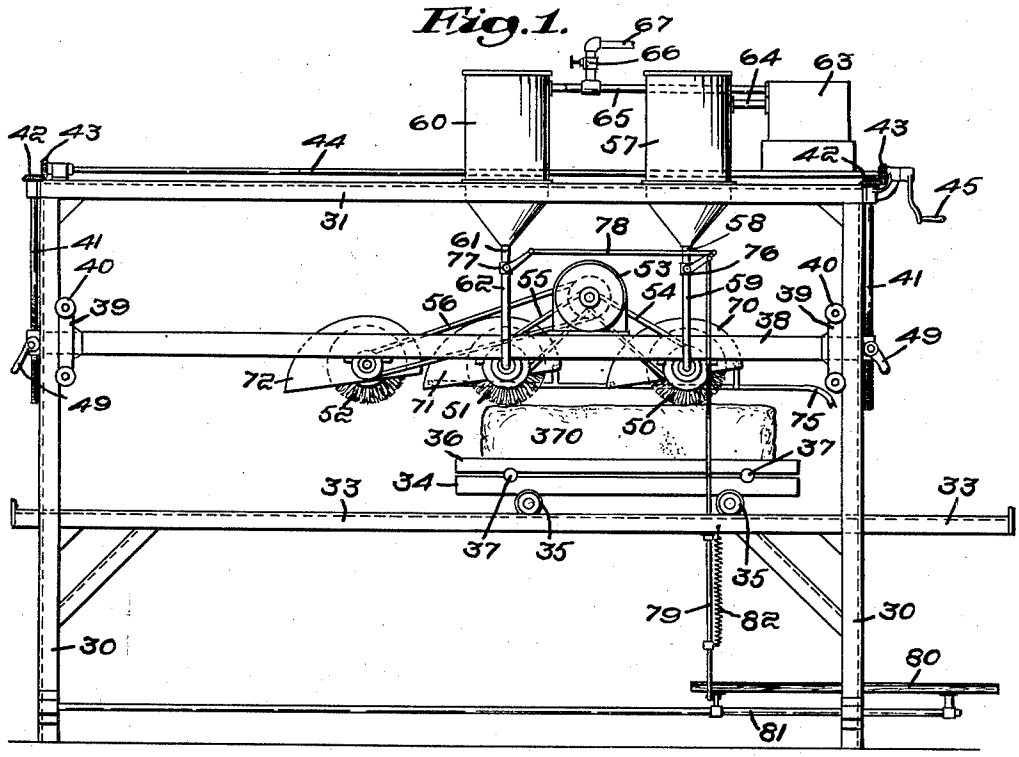


Fig. 6.

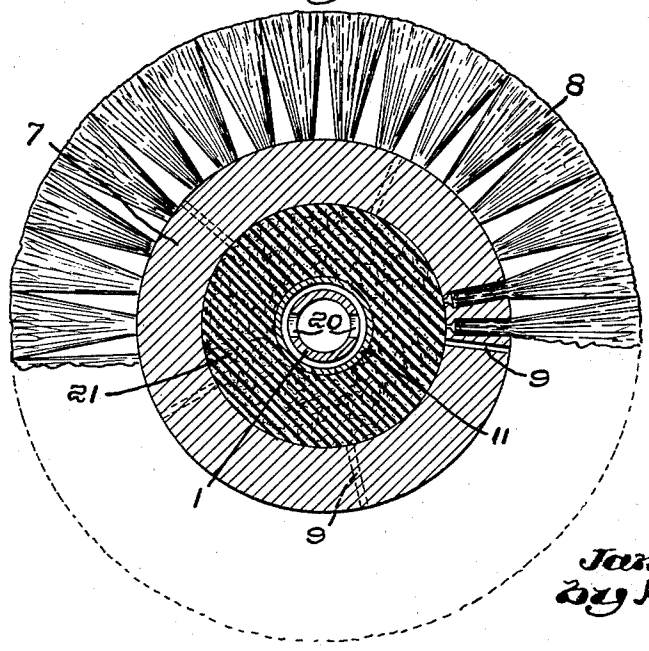
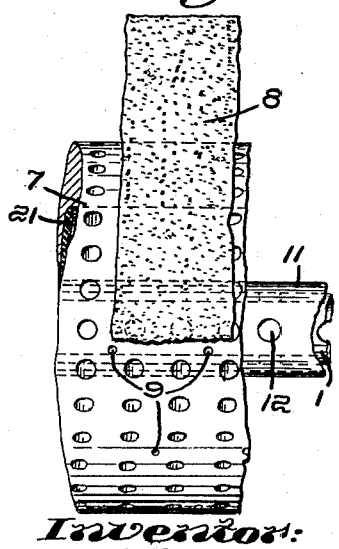


Fig. 7.



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Fig. 2.

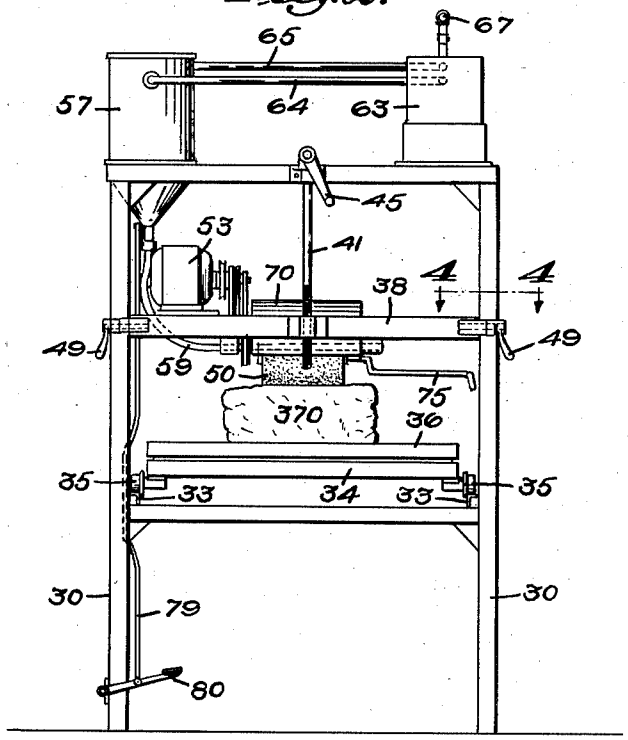


Fig. 4.

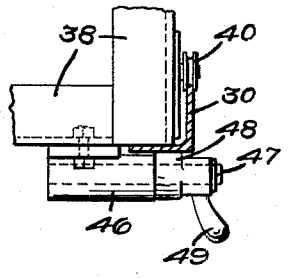
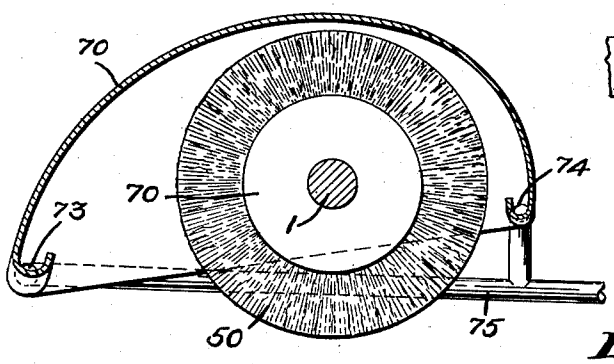


Fig. 3.



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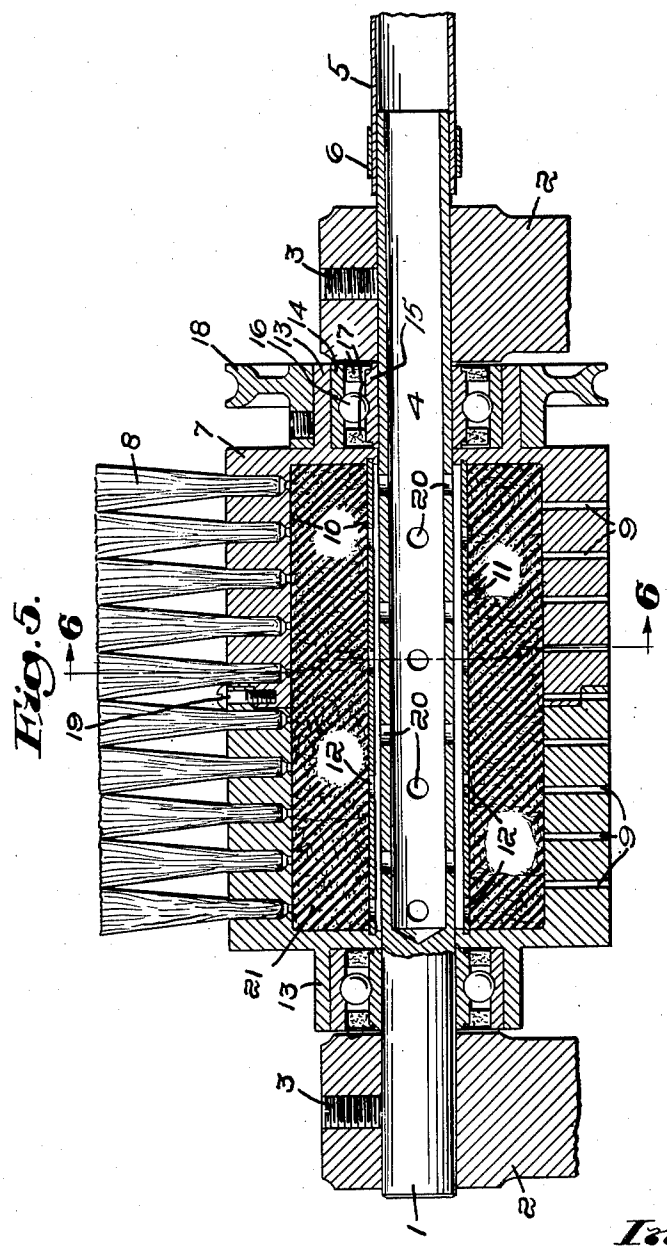


Fig. 5.

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Fig. 8.

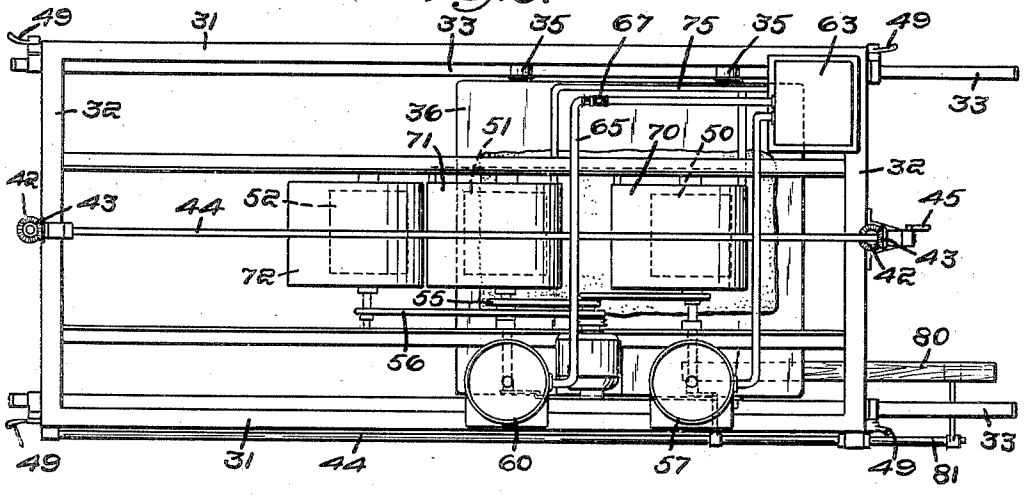
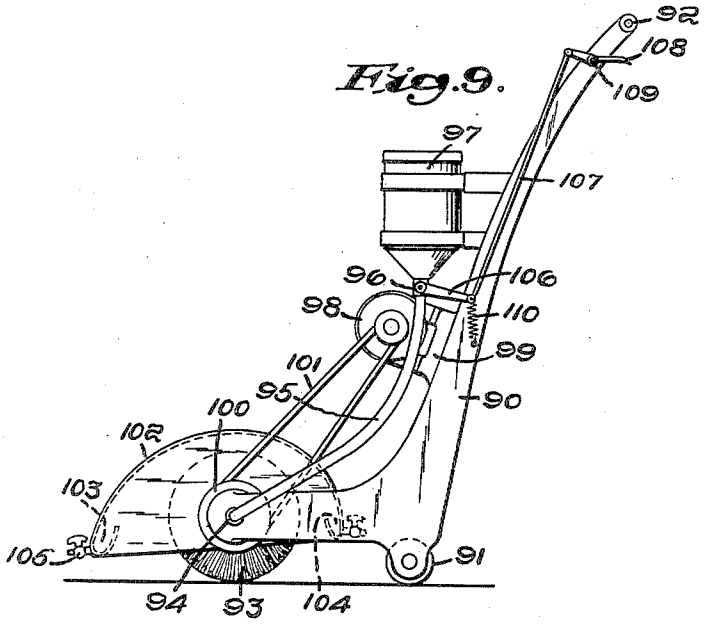


Fig. 9.



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Patented May 30, 1950

2,509,957

UNITED STATES PATENT OFFICE

2,509,957

MACHINE FOR LIQUID CLEANING OF UPHOLSTERED ARTICLES, FABRICS, RUGS, CARPETS, ETC.

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Application June 11, 1946, Serial No. 675,931

3 Claims. (Cl. 15—40)

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This invention relates to machines for cleaning a wide variety of articles and fabrics, such for example as upholstered car and bus seats, pile fabric, plain or coated fabric, rugs, carpets in place on the floor, by means of a cleaning liquid applied thereto. While the machines of this invention are particularly designed for the use of a foam or bubble cleaning, non-inflammable liquid, comprising suitable synthetic detergents, they are also useful for applying any suitable soap solution, solvent cleaning liquid, water, or other liquid.

The object of the invention is to provide such a machine in which the cleaning liquid is fed to and supplied from a cylindrical rotating brush and in which the feed and supply of the cleaning liquid is efficiently controlled.

The object of the invention is further to provide such a machine in which either one or a plurality of brushes may be embodied to enable, for example, a cleaning liquid and a rinsing liquid and a dirt remover to be successively used or in any desired combination.

The object of the invention is further to provide suitable means for disposing of excess liquid thrown out by the brush.

These and other objects and features of the invention will appear more fully from the accompanying description and drawings and will be particularly pointed out in the claims.

The invention is disclosed in two illustrative embodiments, one a relatively large machine such as might be employed for the cleaning of upholstered car seats, and another a relatively small hand-operated truck machine such as would be employed for cleaning a carpet in place on the floor, but it will be understood that these are but illustrative of types of machines in which the invention may be embodied.

In the drawings: Figs. 1 to 8 inclusive illustrate the larger type of machine and Fig. 9 the smaller, both of which embody a brush of the type illustrated in Figs. 5, 6, and 7.

In the drawings:

Fig. 1 is a side elevation of the larger machine.

Fig. 2 is a right-hand end elevation.

Fig. 3 is a side elevation to illustrate an arched casing for the brush.

Fig. 4 is a detail in transverse section taken on the line 4—4 of Fig. 2.

Fig. 5 is a view in transverse cross section of the brush mechanism.

Fig. 6 is a view in cross section taken on the line 6—6 of Fig. 5.

Fig. 7 is a detail in plan view of a portion of the brush and its mounting.

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Fig. 8 is a top plan view of the construction shown in Figs. 1 and 2.

Fig. 9 is a side elevation of the hand truck type of machine.

The principal feature of the invention relates to the brush mechanism shown chiefly in Figs. 5, 6, and 7. This mechanism comprises a fixedly supported chambered shaft. This shaft 1 is shown supported at its ends in suitable supports 2 and locked in place by set screws 3. One end of the shaft is solid or closed, and the remainder of the shaft is open providing the chamber 4. A suitable tube 5 through which the liquid is fed is connected to the chamber of the shaft, and for that purpose is shown as secured at 6 over the open end of the shaft.

The brush is mounted for rotation concentrically of the shaft around the chambered portion thereof. This brush presents a hollow cylindrical hub 7 with bristles 8 secured in and projecting radially from the outer cylindrical peripheral wall and with a plurality of perforations 9 extending through this wall between the bristles. The annular chamber 10 of the hub is provided with a central cylindrical core 11 spaced from the shaft and provided with a plurality of perforations 12. The entire hub with its core is preferably made of stainless steel.

The hub of the brush is preferably mounted for rotation on the shaft 1 by means of sealed ball bearings at each end. For this purpose, the hub at each end is provided with a cylindrical flange 13, and between this flange and the shaft are the race-ways of the ball bearing, the raceway 14 being attached to the flange and the raceway 15 being attached to the shaft, with the balls 16 interposed between the race-ways and with felt packings 17 between the race-ways at each side of the balls, thus sealing the bearing from outward passage of liquid and inward passage of oil.

The brush is endwise reversible upon the shaft, and this is desirable to prevent the bristles from becoming set angularly if the brush were always rotated in one direction. Upon one of the flanges 13 is secured a pulley 18, by means of which power may be applied for rotating the brush.

The brush may be made of any suitable diameter and length. In order to enable the assembling of the core 11, the hub of the brush is preferably divided into two sections overlapping at their meeting ends and locked together by set screws 19.

The shaft chamber wall is perforated at 20 opposite the interior of the brush hub. The cleaning liquid is supplied under pressure either re-

sulting from gravity or pressure applied thereto by compressed air or otherwise. In order to prevent a free flow of the cleaning liquid out through the hub to the bristles which would be undesirable, an important feature of the invention resides in a liquid-retarding filler 21 with which the chamber of the brush hub is packed. This term "retarding" is used herein as defining that quality of filler which enables it to store up and hold the liquid until released by centrifugal or other force. When a cleaning liquid of the foam or bubble type is employed, this filler is preferably composed of a synthetic sponge such as the cellulosic sponges manufactured by the Dupont Company. When the cleaning liquid is a solvent, this filler must be of a material which will not be attacked by the solvent, such as for example, a felt, and when water is used, any sponge-like material may be employed. With this liquid-retarding filler, the pressure of the liquid fed to the brush may be readily controlled so that the liquid is forced through the filler and discharged from the periphery of the brush to the bristles at the rate required for efficient and rapid cleansing. When the pressure on the fluid is released, the flow of liquid at once ceases and the liquid is retained in the filler ready for immediate discharge when the pressure is re-applied.

With this understanding of the principle of the brush and its operation, its embodiment in the larger type of machine such as may be employed for the cleaning of upholstered car seats is disclosed particularly in Figs. 1, 2, 3, 4, and 8 of the drawings, but it will be understood that this is but illustrative of one type of such a large machine. As illustrated, the machine is shown as comprising a frame having suitable uprights 30, longitudinal girders 31, transverse girders 32, and suitable braces. A pair of tracks 33 are mounted on the frame and extend longitudinally thereof, and are extended outward to the right of the frame. A truck 34 provided with wheels 35 is mounted to slide fore and aft on these tracks and is provided with a table 36 mounted to be moved or adjusted transversely of the truck on the balls 37. The article to be cleaned is here indicated as an upholstered railroad car seat 370, which is placed on the table 36. The operator stands at the right between the tracks 33 and may, therefore, move the car seat on the truck fore and aft, and shift it transversely as required by the cleaning operation.

There are illustrated in this machine three brushes, one for supplying the cleaning liquid such as the foam or bubble cleaner, the next for supplying water or other rinsing liquid, and the third a dry brush for giving the final dirt removing action after the rinsing has been effected. But it will be understood that any arrangement may be employed with either a single brush or any two of the brushes being employed.

These brushes are shown mounted upon a frame 38 which may be adjusted vertically on the frame to bring it to the right height for action upon the article to be cleaned. Any suitable means may be employed for this purpose. As illustrated, the frame 38 at each end is provided with heads 39 carrying rollers 40 riding on the uprights 30. The frame is conveniently shown as adjusted vertically by means of vertical shafts 41 journaled in the main frame and screw threaded at their lower ends in the brush frame. These shafts are provided at their upper ends with pinions 42 engaging pinions 43 on a longitudinal shaft 44 journaled at the top of the main

frame and operated by a suitable handle 45. Thus, by rotating the handle 45, the brush frame is adjusted vertically. When adjusted to the proper height, it is locked in position by suitable clamping members. A simple form of clamping mechanism is provided at each corner of the brush frame and is illustrated in detail in Fig. 4, wherein the upright 30 is of angle iron. The adjacent corner of the frame 38 is shown with the rollers 40 riding on the edge of the upright 30. A bracket 46 is secured to the corner of the frame 38 and carries a shaft or stud 47 on which is journaled a cam 48 and a handle 49. Consequently, by turning the cam, the flange of the upright 30 will be locked between the frame 38 and the cam.

The three brushes shown mounted on the brush frame are indicated generally as 50, 51, and 52. With the particular set-up illustrated, the brushes 50 and 51 have the construction previously described in connection with Figs. 5, 6, and 7, while the brush 52 is a simple rotary brush. The shafts for the three brushes are shown mounted on the frame 38. This frame also has mounted thereon an electric motor 53 for driving the brushes. As illustrated, the shaft of the motor is provided with pulleys from which a driving belt 54 extends to the pulley of the brush 50, a driving belt 55 to the pulley of the brush 51, and a driving belt 56 to the pulley of the brush 52. The brush 52, the purpose of which is to remove any loose dirt or foreign substances and give a final finish to the cleaning operation is shown, and preferably is, driven at a much higher speed than the other two brushes.

The brush 50 is assumed to be supplied with a bubble or foam cleaning liquid. For that purpose a tank 57 is shown mounted on the top of the main frame. This tank has a nozzle 58 at the bottom connected by a flexible tube 59 to the chambered shaft of the brush just as the tube 5 is shown connected to the shaft 4 in Fig. 5. Water is assumed to be supplied to the brush 51, and for that purpose a tank 60 is shown mounted on the top of the main frame. This tank also has at the bottom a nozzle 61 connected by a flexible tube 62 to the hollow shaft of the brush 51.

The liquids fed to the brushes 50 and 51 must be fed under pressure. This pressure may be simply the result of gravity if the head on the liquid is sufficient, but it may be necessary to provide additional pressure. For that purpose, the tanks 57 and 60 are represented as closed tanks. A motor-driven air compressing pump of any suitable construction is indicated at 63 mounted on the main frame and connected by pipes 64 to the tank 57 and 65 to the tank 60. Where water is employed, as in the tank 60, the pressure may be obtained from a water supply system, and for that purpose a valve 66 is shown in the pipe 65 with a connection 67 to such a water system, with the valve so operating as to connect either the air compressor or the water supply system to the tank 60.

In order to confine and dispose of liquid or dirt thrown off the work by the rotating brushes, an arched casing or hood is mounted over the upper portion of each brush, the hoods for the three brushes 50, 51, and 52 being indicated at 70, 71, and 72 respectively. These hoods may each be of the same construction and the one for the brush 50 is illustrated more in detail in Fig. 3. The casing is here shown in cross section, and it will be seen that its front edge is bent up to form an inwardly facing trough 73 and that a

similar trough 74 is formed at the rear edge. These troughs with a large machine would be insufficient to hold the water or dirt for any appreciable period, and consequently they are arranged to slope downward to one side, and at their lower ends are connected to a pipe 75 which may discharge at any suitable point.

It is important in preventing wastage or oversupply to the article being cleaned that the cleaning liquids should only be forced through the brushes when the brushes are acting upon the work. Therefore, to control the feed of the cleaning liquids, valves under the control of the operator of the machine are provided. As illustrated, a valve 76 is located in the nozzle 58 of the tank 57 and a valve 77 in the nozzle 61 of the tank 60, and these valves have handles connected by a rod 78. A rod 79 is mounted vertically in the main frame and is connected at the upper end to one valve handle and at the lower end to a treadle 80 provided with a pivotal shaft 81 mounted on the main frame. A spring 82 connected at the upper end to the frame and the lower end to the rod 79 acts normally to maintain the valves closed, while depression of the treadle 80 opens the valves. This treadle extends along side of the operator's position so that the operator has complete control of the supply of the feeding of the liquids to the work.

The operation of this type of machine will be apparent. If, for example, a number of upholstered car seats are to be cleaned, the brush frame is first adjusted to and locked in the proper height. The operator then standing at the right between the tracks 33 places a seat on the table 36 of the truck, pushes it beneath the brushes, at the same time pressing on the treadle 80, and slides the seat back and forth as required, shifting the table 36 sideways whenever necessary. If the bubble or foam cleaning liquid is fed to the brush 50, the rapid rotation of the brush forms a foamy suds which is worked into the surface and cleans the article. This foam or suds is then rinsed off by the brush 51, and then the surplus water or dirt is removed mechanically by the fast running brush 52. But as pointed out, either one or any two of the brushes may be employed and any suitable cleaning liquid may be employed. Whatever cleaning liquid is employed, the retarding filler with which the interior of the brush is packed enables an efficient control of the liquid preventing it from running or dripping out when the machine is standing idle or is not operating upon the work, and enabling an even controlled amount to be applied to the work being cleaned.

While an electric motor is shown mounted on the brush frame for rotating the brushes, any suitable means conveniently located may be employed for that purpose.

The liquid tanks and air compressor are also shown, as is preferable, mounted on the main frame, but this is not essential and they may be elsewhere located.

With some types of liquid retarding filler, the perforated core of the brush hub may not be necessary, but it is usually undesirable for the filler to rotate in engagement with the perforated chambered shaft.

While the brush frame is shown vertically adjustable on the main frame, it will be understood that the relative vertical adjustment between the brush frame and the work support may be otherwise obtained to enable the brush properly to engage the work.

While, as previously pointed out, the invention is particularly desirable for employment in a

large type of machine, such as that just described, for handling large quantities of work, it is highly useful in small types of machines such, for example, as may be employed for cleaning rugs and carpets on the floor either in commercial use or domestic use. An example of such an application of the invention is illustrated in Fig. 9. This shows in side elevation a simple hand truck, the frame 90 of which is provided at the bottom with casters or rollers 91 and at the top with a hand rail 92. The brush 93 is of the same construction as shown in Figs. 5, 6, and 7 and mounted in the side frames 90. The hollow or chambered shaft 94 of the brush is shown connected by the tube 95 to the nozzle 96 of a tank 97 mounted at a high point on the frame 90. An electric motor 98 mounted at 99 on the frame drives the pulley 100 of the brush through the belt 101. An arched hood or casing 102 of the construction already described is mounted over the upper part of the brush on the frame 90 and is provided at its front and rear edges with the inwardly facing troughs 103 and 104. With this type of device these troughs must be sufficiently large to hold a substantial amount of dirt and liquid thrown off from the work. They may be emptied from time to time, and for that purpose valves 105 are provided. The feed of the liquid to the brush is also, as in the case of the larger machine, controlled by the operator. The valve in the nozzle 96 has its arm 106 connected by a link 107 to a lever 108 fulcrumed at 109 on the frame adjacent the hand rail 92. A spring 110 connecting the arm 106 to the frame 90 acts normally to maintain the valve closed. The operator of the machine by operating the lever 108 holds the valve open as required.

This machine, when the tank 97 is filled with the foam or bubble cleaner or other suitable liquid cleaner, may be readily propelled over the carpet by the operator grasping the hand rail 92. The motor 98 connected to a source of electric energy just as is the ordinary vacuum cleaner rotates the brush 93, and when the operator opens the valve by manipulating the lever 108, the cleaning liquid forced down by gravity is fed as required to the brush. The whole operation is readily controlled by the operator moving the apparatus back and forth as rapidly as may be desired, and at all times controlling the feed of the liquid. After using the cleaning liquid, the tank may be filled with water and the surface rinsed off.

With either type of machine the number of passages of the brushes over the work will depend upon the amount of cleaning necessary for the particular article. With the larger machine, the operator may move the article past the brushes once or a plurality of times as required, and with the smaller type of machine, it may be moved once or a plurality of times over the surface to be cleaned. With the foam or bubble cleaning liquid, which these machines are well adapted to use, it is necessary that the brush supplying the foam or bubble cleaning liquid rotate fairly rapidly with respect to the work being cleaned.

Consequently, the brush must be driven at a speed such that it will rotate with respect to the work so as to work the liquid into the surface and produce the foam or suds necessary for the cleaning operation. Consequently, the brush should be driven at a speed to cause its periphery to move faster than any normal relative move-

ment which may take place between the brush and the work.

The invention presents, either in machines of large commercial type or small type for domestic use, a highly efficient mechanism for effecting the cleaning operation with the use of a cleaning liquid.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A machine for liquid cleaning of upholstered articles, fabrics, rugs, carpets, etc., comprising a rotatably mounted cylindrical bristle brush having an interior chamber packed with a liquid retarding filler and perforated to permit passage of the liquid released by the filler from the chamber to the bristles, a second cylindrical bristle brush having the same construction as the first brush mounted to rotate in parallelism with the first brush to act upon the work following the action of the first brush, means for feeding a cleaning liquid under pressure to the filler of the first brush during the rotation thereof, means for feeding a rinsing liquid under pressure to the filler of the second brush during the rotation thereof, a third cylindrical bristle brush mounted to rotate in parallelism with the other brushes to act upon the work following the action of the second brush, thereby to remove dirt and liquid mechanically therefrom, and means for rotating the brushes with the third at a higher speed than the second.

2. A machine for liquid cleaning of upholstered articles, fabrics, rugs, carpets, etc. comprising a fixedly-supported chambered shaft; means connected to the shaft for supplying cleaning liquid under pressure to the chamber of the chambered shaft; a brush having a hollow cylindrical hub surrounding the chambered shaft, bristles projecting from the periphery of the hub, perforations extending through the hub peripheral wall between the bristles, and a cylindrical perforated core; the said brush mounted for rotation concentrically of the shaft with the core spaced from the shaft; perforations through the wall of the chambered shaft opposite the hub interior; and a liquid retarding filler in the hub interior.

3. A machine for liquid cleaning of upholstered articles, fabrics, rugs, carpets etc., comprising a frame, a cylindrical bristle brush rotatably and horizontally mounted on the frame, means for feeding a cleaning liquid to the brush, means for rotating the brush, an arched casing mounted on the frame over the upper portion of the brush and provided at its front and rear edges with inwardly facing troughs inclined downward toward one side, and a drain connected to the lower end of each trough.

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