Aug. 14, 1962 W. N. KEMNITZ 3,048,876

FLOOR CLEANING APPARATUS

Filed Sept. 8, 1960 4 Sheets-Sheet 1

Fig. 1.

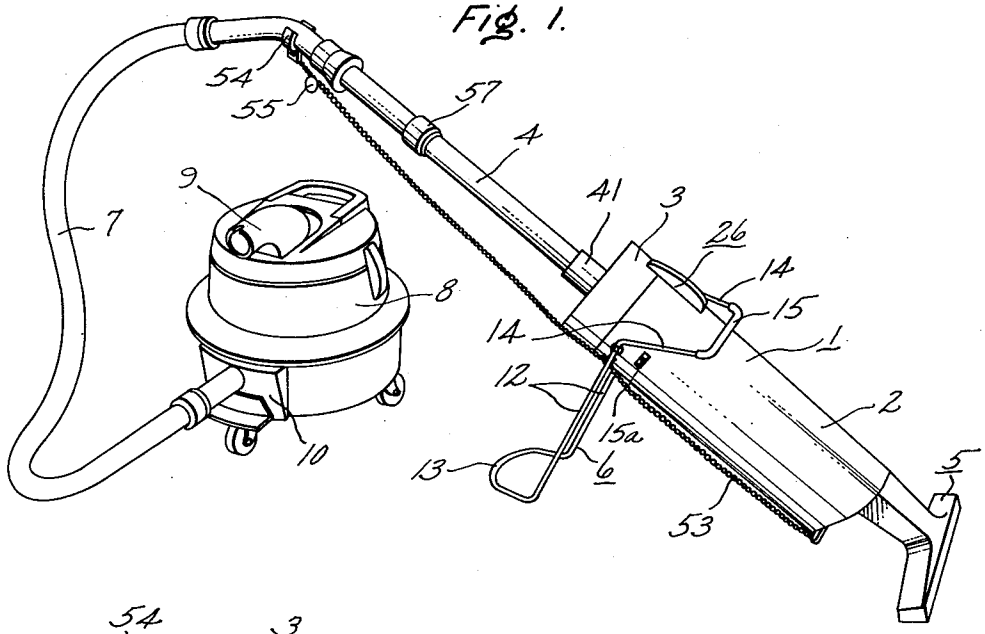
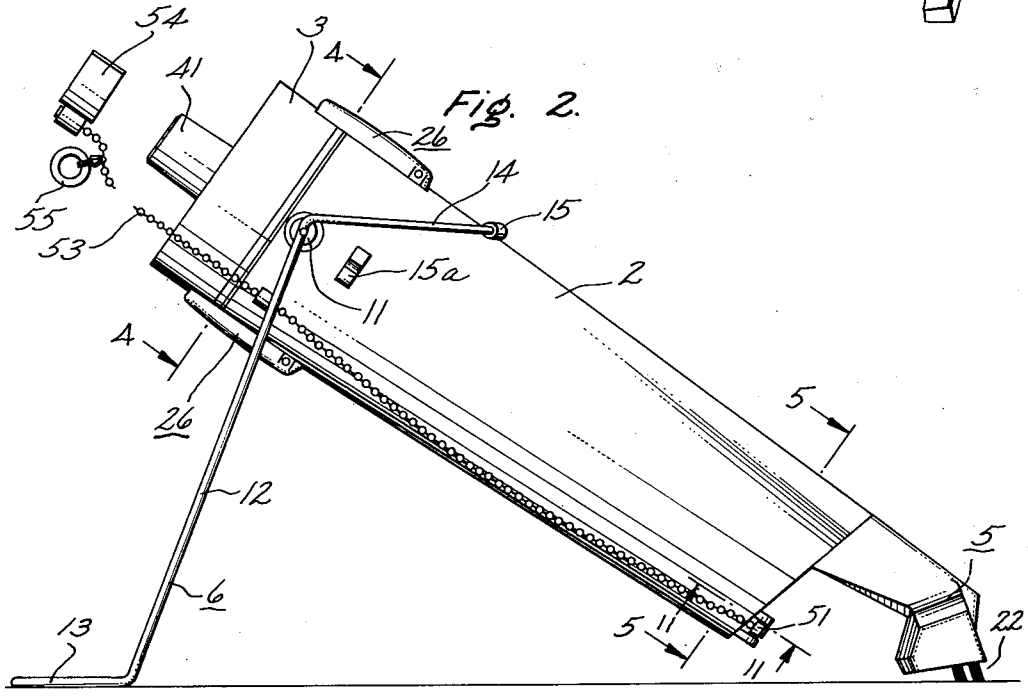


Fig. 2.



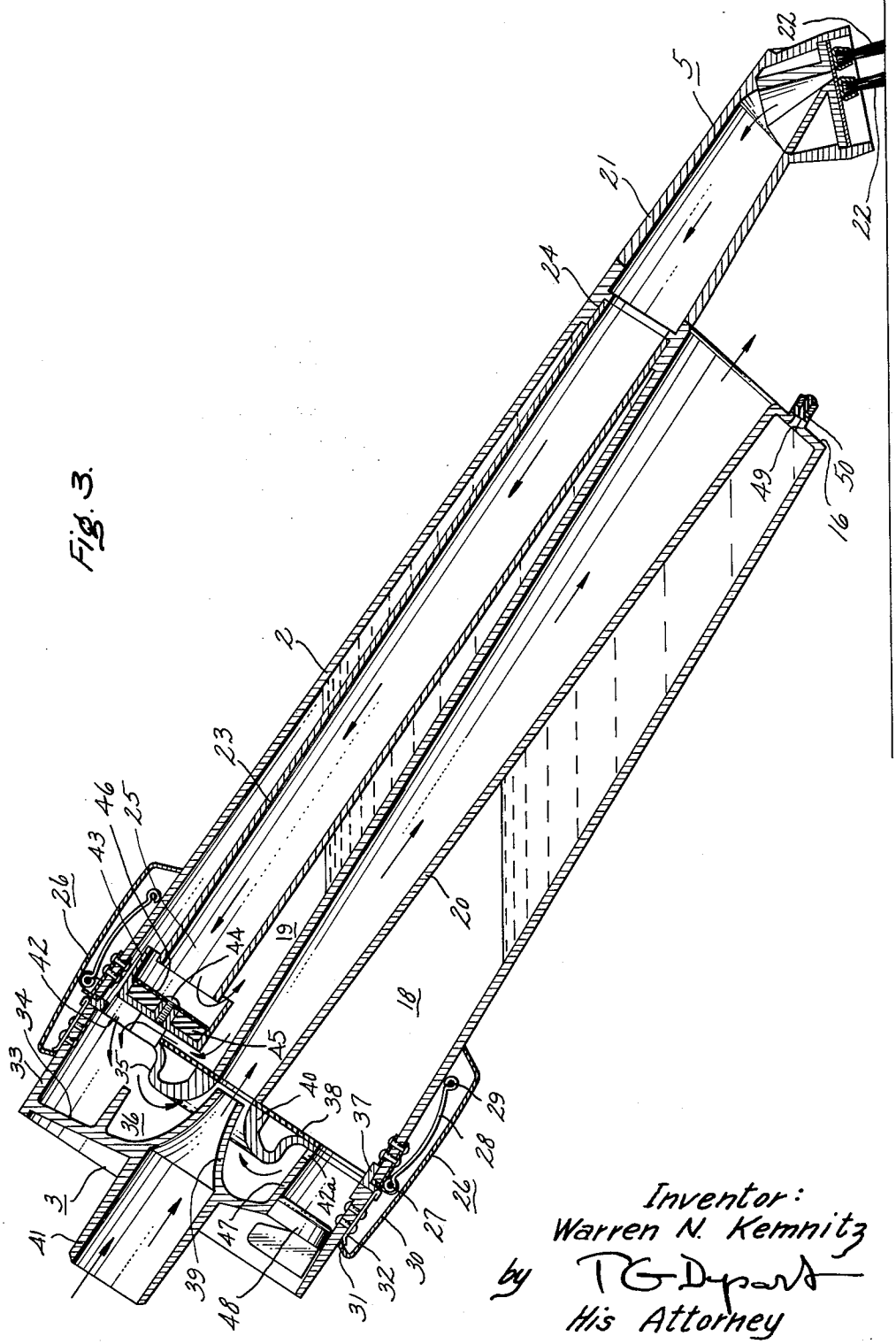
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FLOOR CLEANING APPARATUS

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Fig. 3.



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FLOOR CLEANING APPARATUS

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FIG. 4.

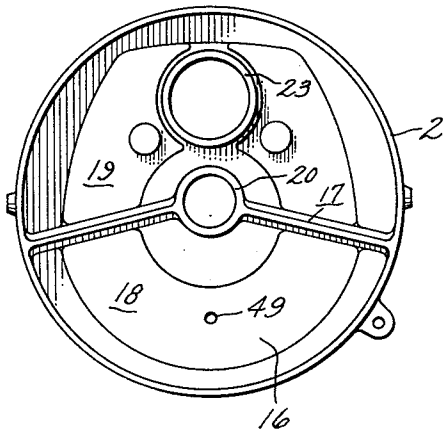


FIG. 5.

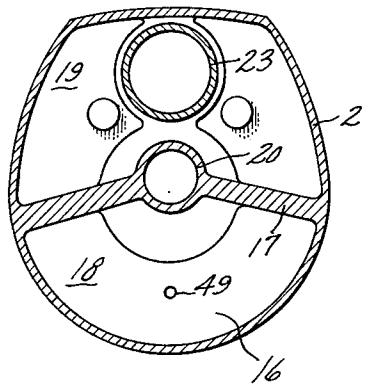
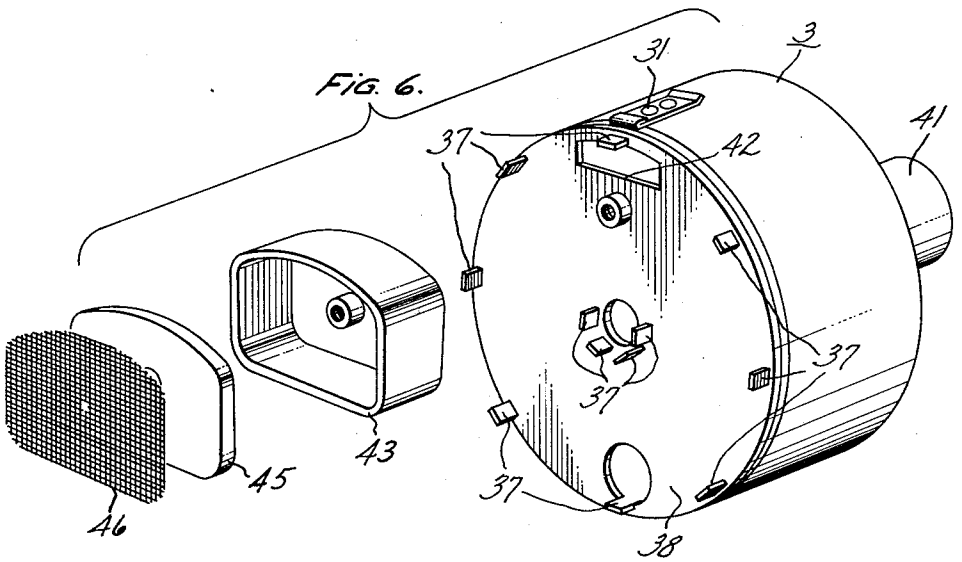


FIG. 6.



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FLOOR CLEANING APPARATUS

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Fig. 7.

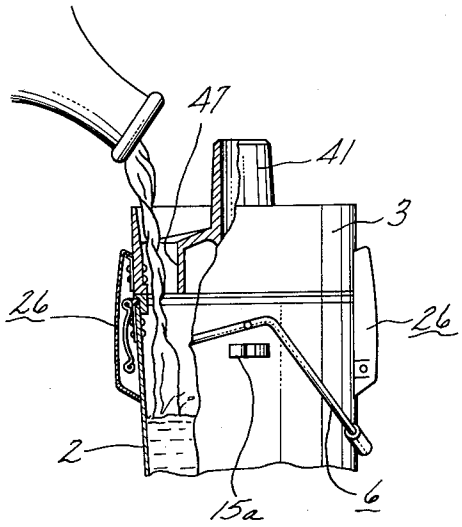


Fig. 8.

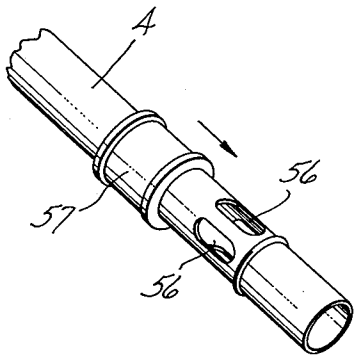


Fig 9.

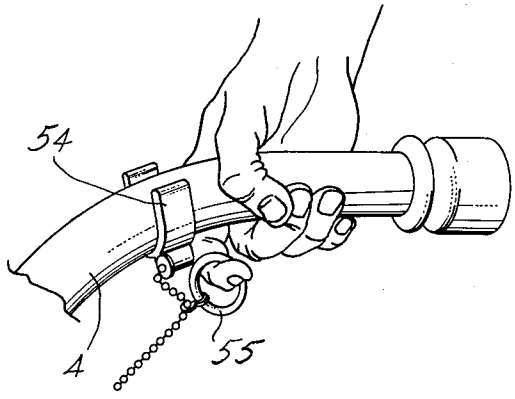


Fig 10.

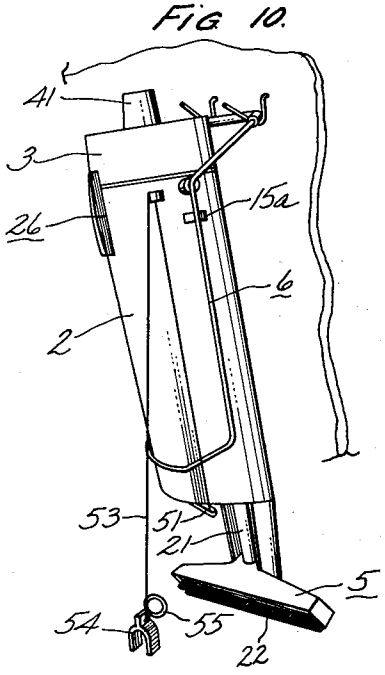
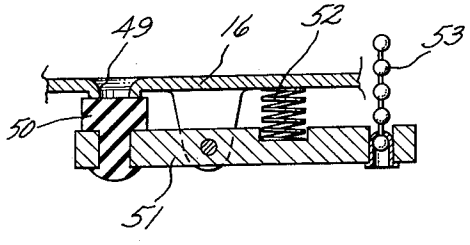


Fig. 11.



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United States Patent Office 3,048,876 Patented Aug. 14, 1962

3,048,876

FLOOR CLEANING APPARATUS

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Filed Sept. 8, 1960, Ser. No. 54,794
9 Claims. (Cl. 15—321)

This invention relates to floor cleaning apparatus, and more particularly to an appliance adapted to spread a cleaning liquid on a floor and thereafter remove the liquid from the floor at the conclusion of scrubbing operations.

The usefulness of conventional vacuum cleaners in cleaning floor surfaces has heretofore been limited to those situations in which removal of dry material without scrubbing in the presence of liquid is all that is required. While a vacuum cleaner suction nozzle equipped with a brush could conceivably be used to scrub a wet floor, the nozzle could not be used to remove cleaning liquids from floor surfaces for the reason that such devices employ porous dirt-retaining bags incapable of holding liquids, and also because the introduction of water or water vapor into the casing of a vacuum cleaner may cause electrical short circuits and shock hazards.

In response to the need for apparatus adapted to aid in cleaning those floor surfaces which require scrubbing with liquids, various floor scrubbing machines have been proposed during the last fifty years. While some of these have included suction means for removing liquids used in cleaning operations, they have in general been large in size and too expensive for ordinary household use. All of these devices, insofar as I am aware, are provided with an integral electric motor connected to a suction fan, and thus must be designed so as to prevent entrance of moisture into the space in which the motor and the electrical components are mounted.

The present invention has as its principal object the provision of an improved floor cleaning appliance which is simple in construction, light in weight, inexpensive as compared with known floor washing machines, and effective in performing floor cleaning operations involving the use of water.

Another object of my invention is to provide a floor cleaning appliance which derives its motive power from the blower outlet of a conventional vacuum cleaner.

Another object of the invention is to provide an improved floor cleaning appliance adapted to store and discharge cleaning liquid, to be usable as a scrubbing device, and to remove cleaning liquid from the floor by suction produced by compressed air.

Still another object of my invention is to provide an improved floor cleaning appliance which not only removes cleaning liquids from the floor but also directs a stream of air on the floor so as to hasten the drying process.

Further objects and advantages of the invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out which particularity in the claims appended to and forming a part of this specification.

Briefly stated, in accordance with one aspect of this invention, there is provided a floor cleaning appliance comprising a tubular housing having a partition therein forming a clean liquid reservoir and a used liquid reservoir, a suction nozzle and scrubbing brush secured to the housing and arranged to rest on the floor during operation, a tube extending from the suction nozzle into the used liquid reservoir, air ejector means including an ejector nozzle arranged to direct a stream of air against the floor and a low pressure chamber communicating with the used liquid reservoir, a conduit in communication with the ejector nozzle adapted to be connected to a

source of compressed air, and manually operable means associated with the clean liquid reservoir for discharging liquid onto the floor.

For a better understanding of my invention, reference may be made to the following description and the accompanying drawings in which:

FIG. 1 is a perspective view of a floor cleaning appliance constructed in accordance with my invention and connected to the blower outlet of a conventional canister type vacuum cleaner.

FIG. 2 is a side elevation view of the floor cleaning appliance shown in FIG. 1.

FIG. 3 is a vertical cross-sectional view of the appliance shown in FIG. 2.

FIG. 4 is a cross-sectional view taken generally along the line 4—4 in FIG. 2, showing the housing as it appears when the lid is removed.

FIG. 5 is a cross-sectional view taken generally along the line 5—5 in FIG. 2.

FIG. 6 is an exploded perspective view of the lid of the appliance.

FIG. 7 is a fragmentary side elevation view, partly in section, illustrating the manner in which cleaning liquid is poured into the appliance.

FIG. 8 is a fragmentary perspective view showing the suction control means on the wand of the appliance.

FIG. 9 is a fragmentary perspective view showing the liquid discharge control means on the handle portion of the appliance.

FIG. 10 is a perspective view showing the appliance supported on a wall when not in use.

FIG. 11 is a fragmentary cross-sectional view taken along the line 11—11 in FIG. 2.

Referring to the drawings and in particular to FIG. 1, there is shown therein a floor cleaning appliance, generally designated by the numeral 1, comprising a generally tubular housing 2, a lid 3, a tubular wand 4 connected to the lid, and a suction nozzle 5. The appliance may be supported on the floor on a combined handle and stand member 6 during intervals when it is not in use, and is supplied with compressed air through a flexible hose 7 connected at one end to wand 4 and at its other end to the blower outlet of a conventional canister type vacuum cleaner 8. It will be understood that vacuum cleaner 8 is provided with a motor and fan unit arranged to produce suction in suction nozzle 9 and to direct a stream of compressed air through the blower outlet in lower side wall portion 10. It will also be understood that any of the various types of vacuum cleaners having a blower outlet may be utilized as a source of compressed air for operating the floor cleaning appliance of my invention.

Stand member 6 is mounted on housing 2 by means of a pair of diametrically opposite pivot elements 11 for pivotal movement about an axis parallel to the longitudinal axis of the nozzle 5, and is formed from an elongated wire arranged in a closed loop surrounding the housing. A pair of parallel leg portions 12 connected by a foot portion 13 form the stand section of the stand member, while the handle section thereof is formed by a pair of parallel arm portions 14 extending from pivot elements 11 away from leg portions 12 but at a substantial angle thereto, and a a handle portion 15 connecting arm portions 14. Foot portion 13 is formed so as to cooperate with nozzle 5 in supporting the appliance in a stable position on the floor, and is also curved so as to conform to the configuration of housing 2 when pivoted into the position shown in FIG. 10. In the latter position, in which leg portions 12 engage a pair of catch members 15a formed on housing 2, it will be seen that arm portions 14 extend away from the housing and handle portion 15 is spaced from housing 2 so that it may perform its intended function. Thus, stand member 6 is movable about pivot elements 11 between

the position shown in FIG. 2 in which handle portion 15 engages the housing and foot portion 13 is positioned so as to support the appliance, and the position shown in FIG. 10 in which foot portion 13 engages the housing and handle 15 is spaced therefrom, so that the appliance may be conveniently carried or supported on wall-mounted hooks.

Referring to FIGS. 3, 4 and 5, it will be be seen that tubular housing 2 is open at its upper end, and is provided with a bottom wall 16 and a longitudinal partition 17 forming a clean water reservoir 18 and a dirty water reservoir 19. An ejector discharge tube 20 extends generally along the longitudinal axis of housing 2 and is formed as an integral part of partition 17, the flat wall portions of the partition extending radially from tube 20 to the side walls of the housing 2. Housing 2 and the parts located therein are made of any suitable material, such as metal or molded plastic, as are lid 3 and nozzle 5.

Neck portion 21 of the nozzle 5 is secured to tubular housing 2 in the bottom portion thereof by suitable means such as cement. These parts are so arranged that the mouth of the suction nozzle overlies the floor upon which the appliance is supported during operation, nozzle 5 being supported thereon by a pair of parallel rows of scrubbing bristles 22 secured to the lower surface of the nozzle. A suction tube or standpipe 23 extends longitudinally within dirty water reservoir 19 of housing 2, the lower end thereof being secured in a circular boss 24 which defines an opening in the bottom wall 16 of the housing communicating with the interior of nozzle 5. Suction tube 23 is somewhat shorter than housing 2, and thus its upper end 25 terminates below the upper end of the housing.

Lid 3 is removably secured to the open end of the tubular housing 2 by means of a pair of pivoted spring clamps 26 of well known design. Each clip 26 includes a pivot pin 27 secured to housing 2, and a pivot spring 28 mounted thereon and also attached to a pivot pin 29 carried by fastening element 30. A lip portion 31 of fastening element 30 is arranged to engage a flanged bracket 32 secured to lid 3. Thus, when the parts are in the position shown in FIG. 3, lid 3 is firmly secured to the end of housing 2, but may be easily released by pulling on element 30 so as to pivot spring 28 away from the housing and to disengage latch 31 from bracket 32.

Lid 3 comprises a generally circular side wall 33 and a pair of spaced end walls 34 and 35 which form a chamber 36 within the lid. Peripherally spaced guide fingers 37 project from wall 35 and are arranged to engage the inner surfaces of the upper end of tubular housing 2. In order to seal the joints between lid 3 and the upper end of housing 2, and to provide an air-tight passageway between the low pressure chamber in the lid and discharge tube 20, a gasket 38 is secured to the outer surface of wall 35. Lid 3 also includes an air ejector nozzle 39 in spaced axial alignment with discharge tube 20 and surrounded by the chamber formed by walls 33, 34 and 35. Wall 35 is formed with a circular lip 40 therein defining an opening concentric with and somewhat larger than the small end of nozzle 39, and these parts are arranged to function as an air ejector to produce a partial vacuum in chamber 36 when compressed air is supplied to the ejector nozzle. Compressed air is supplied to ejector nozzle 39 through a conduit 41 in communication therewith and arranged to be connected to tubular wand 4, which in turn is connected to the blower side of cleaner 8 through hose 7. Low pressure chamber 36 surrounding ejector nozzle 39 is in communication with discharge tube 20 and also with reservoir 19 through an opening 42 in wall 35, and thus when compressed air is supplied to nozzle 39, a partial vacuum is created in reservoir 19 and likewise in suction nozzle 5. Under these conditions, air movement paths, as indicated by the arrows in FIG. 3, are established and suction is applied to nozzle 5, while at the same time air is ejected from the open end of discharge tube 20 onto the floor adjacent nozzle 5. Chamber 36 is also in communication with reservoir 18 through a vent hole 42*a*, so that a partial vacuum is produced therein whenever suction is applied to nozzle 5.

In accordance with my invention, suction nozzle 5 is adapted to pick up solutions of detergent and water after floor cleaning operations, and in order to make sure that such solutions remain within reservoir 19 and are not carried into the low pressure chamber within lid 3, a baffle member 43 is mounted on wall 35 of the lid by means of screw 44 in a position overlying the end of tube 23. It will be understood that as the air stream from the suction nozzle emerges from tube 23 into the relatively large space in reservoir 19 its velocity decreases, and the entrained water droplets fall out within the reservoir. Thus, liquid entrained in the air picked up by suction nozzle 5 will be retained within reservoir 19 and may be emptied therefrom at the convenience of the operator. Preferably, an anti-foam pad 45 is mounted within baffle 44 and held in place by a screen member 46, so as to minimize the possibility that detergent foam might obstruct the end 25 of suction tube 23. Anti-foam pad 45 may consist of a mixture of seven parts of polyethylene glycol 6000 monostearate and three parts of a silicone consisting of 95 parts by weight of a trimethylsilinol chain-stopped diamethylpolysiloxane and five parts by weight of a finely divided fumed silica, or any other suitable material having foam suppressing qualities.

Lid 3 also is provided with a filler opening 47 provided with a stopper 48 to facilitate the filling of clean water reservoir 18 without removing the lid. A discharge opening 49 in bottom wall 16 of housing 2 is provided to permit clean water to be deposited onto the floor to be cleaned, and as shown in FIG. 11, a valve member 50 cooperates with opening 49 so that the discharge of water from reservoir 18 may be controlled by the operator. However, since reservoir 18 communicates with low pressure chamber 36 through vent 42*a*, liquid cannot be discharged from the reservoir when suction is applied to nozzle 5, the partial vacuum in the reservoir being sufficient to prevent flow through opening 49 regardless of the position of valve 50. As shown in FIG. 11, valve 50 is mounted on the end of a rocker arm 51 pivotally mounted on wall 16 in the housing, and is biased to its closed position by spring 52. A cord or chain 53 secured to the opposite end of lever 51 extends along housing 2 and wand 4 to a supporting clip 54 secured to the handle portion of the wand. As shown in FIG. 9, ring 55 secured to the portion of chain 53 which is held by clip 54 may be actuated by a finger of the operator to shift valve 50 between its open and closed positions.

In order to permit the operator to control the production of suction in suction nozzle 5, the mid-portion of wand 4 includes vent openings 56 which are arranged to cooperate with a cover member such as a collar 57 slidably mounted on wand 4 for movement between a first position covering the vent openings and a second position in which the openings are uncovered. Thus, compressed air supplied by the blower outlet of vacuum cleaner 8 may be directed to ejector nozzle 39 through wand 4 or may be vented to the atmosphere through vent openings 56. It will, of course, be understood that when collar 57 is in the first position suction is produced in nozzle 5 by the action of air ejector nozzle 39 and the air ejector means associated therewith, while movement of the collar to the second position terminates the air flow through nozzle 39 which produces suction in nozzle 5.

In operation, wand 4 is first connected to conduit 41 on lid 3 of the appliance, with collar 57 in its open vent position, and on hose 7 is connected to the blower outlet of a vacuum cleaner as illustrated in FIG. 1. A mixture of clean water and detergent (preferably of the low-sudsing type) may be added through filler opening 47 in

lid 3 either before or after wand 4 is attached thereto, or alternatively reservoir 18 may be filled by completely removing lid 3 from housing 2. After the appliance has been assembled and filled with cleaning liquid, and stand 6 has been placed in the position shown in FIG. 10, it is moved across the floor to be cleaned supported on brush bristles 22, the handle portion of wand 4 being supported by one hand of the operator. Ring 55 is actuated so as to open valve 50 and discharge the desired quantity of liquid on the floor, after which the valve is closed and the appliance is moved back and forth over the floor so as to distribute the water and scrub the floor by means of brush 22. Since the suction in nozzle 5 may be controlled by collar 57, vacuum cleaner 8 may be turned on as soon as the appliance is ready for use, although it will be understood that suction is used only during the drying operation now to be described.

Upon completion of the scrubbing operation, collar 57 is shifted to its closed vent position with cleaner 8 energized, so as to apply suction to nozzle 5 and the nozzle is moved over the area of the floor which has been cleaned. The dirty cleaning liquid is thus picked up by suction nozzle 5, and at the same time the blast of air discharged from discharge tube 20 strikes the floor surface and hastens the drying process. After use of the appliance in this manner, dirty water reservoir 19 may be emptied by removing lid 3 and inverting housing 2 so as to pour out all remaining liquid in both reservoir 19 and reservoir 18. The parts may then be reassembled so that the appliance may be stored in the position shown in FIG. 10.

While I have shown and described a presently preferred embodiment of my invention, I do not desire the invention to be limited to the particular construction disclosed, and I intend by the appended claims to cover all modifications within the true spirit and scope of my invention.

What I claim is:

1. A floor cleaning appliance comprising a housing forming a liquid reservoir, a suction nozzle secured to said housing, floor scrubbing means secured to said suction nozzle arranged to rest on a floor surface during operation, a tube communicating with said nozzle secured to said housing, said tube having an opening within said reservoir, air ejector means secured to said housing, said ejector means including an ejector nozzle, a discharge tube in axial alignment with said ejector nozzle, and a low pressure chamber communicating with said reservoir, said discharge tube being positioned so as to direct a stream of air against a portion of said floor surface adjacent said scrubbing means, and means for supplying compressed air to said ejector nozzle.

2. A floor cleaning appliance comprising a housing forming a liquid reservoir, a suction nozzle secured to said housing, floor scrubbing means secured to said suction nozzle, a tube communicating with said nozzle secured to said housing, said tube having an opening within said reservoir, air ejector means secured to said housing, said ejector means including an ejector nozzle, a discharge tube in axial alignment with said ejector nozzle, and a low pressure chamber communicating with said reservoir, conduit means in communication with said ejector nozzle adapted to be connected to a source of compressed air, said conduit means including a tubular wand supported in fixed relation to said housing in communication with said ejector nozzle, said wand having at least one vent opening therein, and a cover member mounted on said wand for movement between a first position covering said vent opening and a second position in which said vent opening is uncovered, whereby compressed air may be directed to said ejector nozzle or vented to the atmosphere.

3. A floor cleaning appliance comprising a housing forming a liquid reservoir, a suction nozzle secured to said housing, floor scrubbing means secured to said suction nozzle arranged to rest on a floor surface during operation, a tube communicating with said nozzle secured to said housing, said tube having an opening within said reservoir, air ejector means secured to said housing, said ejector means including an ejector nozzle, a discharge tube in axial alignment with said ejector nozzle, and a low pressure chamber communicating with said reservoir, said discharge tube being positioned so as to direct a stream of air against a portion of said floor surface adjacent said scrubbing means, and conduit means in communication with said ejector nozzle adapted to be connected to a source of compressed air.

4. A floor cleaning appliance comprising a generally tubular housing having an upper end and a bottom wall, a partition in said housing forming first and second reservoirs therein, a suction nozzle secured to said housing adjacent its bottom wall, floor scrubbing means secured to said suction nozzle arranged to rest on a floor surface during operation, a tube communicating with said nozzle secured to said housing, said tube having an opening within said first reservoir, air ejector means secured to said housing adjacent its upper end, said ejector means including an ejector nozzle, a discharge tube in axial alignment with said ejector nozzle, and a low pressure chamber communicating with said first reservoir, said discharge tube being positioned so as to direct a stream of air against a portion of said floor surface adjacent said scrubbing means, conduit means in communication with said ejector nozzle adapted to be connected to a source of compressed air, means associated with said second reservoir for discharging liquid therefrom, and manually operable means for controlling said liquid discharging means.

5. A floor cleaning appliance comprising a generally tubular housing having an upper end and a bottom wall, a partition in said housing forming first and second reservoirs therein, a suction nozzle secured to said housing adjacent its bottom wall, floor scrubbing means secured to said suction nozzle arranged to rest on a floor surface during operation, a tube communicating with said nozzle secured to said housing, said tube having an opening within said first reservoir, air ejector means secured to said housing adjacent its upper end, said ejector means including an ejector nozzle, a discharge tube in axial alignment with said ejector nozzle, and a low pressure chamber communicating with said first reservoir, said discharge tube being positioned so as to direct a stream of air against a portion of said floor surface adjacent said scrubbing means, conduit means in communication with said ejector nozzle adapted to be connected to a source of compressed air, said conduit means including an elongated wand secured at one end to said housing, said wand having a handle portion adjacent its other end, means associated with said second reservoir for discharging liquid therefrom, and manually operable means including an actuator carried by said wand for controlling said liquid discharging means.

6. A floor cleaning appliance comprising a generally tubular housing having an open upper end and a bottom wall, a partition in said housing forming first and second reservoirs therein, a suction nozzle secured to said housing adjacent its bottom wall, floor scrubbing means secured to said suction nozzle arranged to rest on a floor surface during operation, a tube communicating with said nozzle secured to said housing, said tube having an opening within said first reservoir, a lid secured to the upper end of said housing, said lid having air ejector means therein including an ejector nozzle and spaced wall portions forming a low pressure chamber surrounding said ejector nozzle, one of said wall portions having an opening therein communicating with said first reservoir, another of said wall portions having a vent therein communicating said said second reservoir, an ejector discharge tube carried by said housing positioned in axial alignment with said ejector nozzle, said discharge tube being positioned so as to direct a stream of air against a portion of

said floor surface adjacent said scrubbing means, conduit means in communication with said ejector nozzle adapted to be connected to a source of compressed air, means associated with said second reservoir for discharging liquid therefrom, and manually operable means for controlling said liquid discharging means.

7. A floor cleaning appliance as defined in claim 1 in which said means for supplying compressed air to said ejector nozzle includes a tubular wand supported in fixed relation to said housing in communication with said ejector nozzle and adapted to be connected to a source of compressed air, said wand having at least one vent opening therein, and a collar mounted on said wand for movement between a first position covering said vent opening and a second position in which said vent opening is uncovered, whereby compressed air may be directed to said ejector nozzle or vented to the atmosphere.

8. A floor cleaning appliance comprising a generally tubular housing having a bottom wall and open at its upper end, a longitudinal partition in said housing forming first and second liquid reservoirs therein, a suction nozzle secured to and extending from said housing adjacent its bottom wall, said suction nozzle having an elongated suction inlet therein, an elongated floor scrubbing brush secured to said suction nozzle adjacent said suction inlet, a suction tube extending from said suction nozzle to the interior of said first liquid reservoir, said suction tube extending longitudinally within said tubular housing and terminating in an open end portion spaced below the upper end thereof, a lid removably secured to the upper end of said tubular housing, said lid having air ejector means therein including an ejector nozzle aligned with the longitudinal axis of said tubular housing and spaced wall portions forming a low pressure chamber surrounding said ejector nozzle, one of said wall portions having an opening therein communicating with said first liquid reservoir, a baffle mounted on said lid and positioned in said first liquid reservoir so as to overlie the open end portion of said suction tube, an ejector discharge tube in said tubular housing positioned in axial alignment with said ejector nozzle, said discharge tube extending entirely through said tubular housing so that when said suction nozzle is supported in its operative position on a floor air discharged from said discharge tube impinges on said floor adjacent said suction nozzle, conduit means in communication with said ejector nozzle adapted to be connected to a source of compressed air, and a manually operable liquid discharge valve on said tubular housing in communication with said second liquid reservoir.

9. A floor cleaning appliance comprising a generally tubular housing having a bottom wall and open at its upper end, a longitudinal partition in said housing forming first and second liquid reservoirs therein, a suction nozzle secured to and extending from said housing adjacent its bottom wall, said suction nozzle having an elongated suction inlet therein, an elongated floor scrubbing brush secured to said suction nozzle adjacent said suction inlet, a suction tube extending from said suction nozzle to the interior of said first liquid reservoir, said suction tube extending longitudinally within said tubular housing and terminating in an open end portion spaced below the upper end thereof, a lid removably secured to the upper end of said tubular housing, said lid having air ejector means therein including an ejector nozzle aligned with the longitudinal axis of said tubular housing and spaced wall portions forming a low pressure chamber surrounding said ejector nozzle, one of said wall portions having an opening therein communicating with said first liquid reservoir, a baffle mounted on said lid and positioned in said first liquid reservoir so as to overlie the open end portion of said suction tube, an ejector discharge tube in said tubular housing positioned in axial alignment with said ejector nozzle, said discharge tube extending entirely through said tubular housing so that when said suction nozzle is supported in its operative position on a floor air discharged from said discharge tube impinges on said floor adjacent said suction nozzle, a tubular wand attached at one end to said lid in communication with said ejector nozzle and adapted to be attached to its other end to a source of compressed air, a liquid discharge valve positioned on the bottom wall portion of said tubular housing in communication with said second liquid reservoir, and manually operable means carried by said wand for actuating said discharge valve.

References Cited in the file of this patent

UNITED STATES PATENTS

1,739,600	Loth	Dec. 17, 1929
2,175,645	Replogle	Oct. 10, 1939
2,191,717	Jeffery	Feb. 27, 1940
2,607,067	Minerley	Aug. 19, 1952
2,653,342	Bonin et al.	Sept. 29, 1953
2,914,791	Wells	Dec. 1, 1959
2,986,764	Krammes	June 6, 1961

FOREIGN PATENTS

283,173	Great Britain	Jan. 31, 1929
569,799	Germany	Feb. 8, 1933
779,512	Great Britain	July 24, 1957
1,157,138	France	Dec. 23, 1957