United States Patent

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[54] **RUG CLEANING AND RINSING DEVICE**
7 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **15/322,** 15/321, 15/377, 15/385
[51] **Int. Cl.** **A47l 11/30**
[50] **Field of Search** 15/302, 320–322, 381, 383, 385

[56] **References Cited**

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ABSTRACT: A surface cleaning device has a housing with an annular channel which is continuously opened on its inner face and positioned adjacent the outer peripheral edge of a rotor. The underside of the rotor is provided with a spray and a plurality of nozzles adjacent its peripheral edge with the spray communicating with a cleaning liquid and the nozzles communicating through passages to the outer periphery of the rotor, so as to be in continuous communication with the annular channel. A vacuum is applied through the annular channel to the nozzles to pick up liquid discharge upon the surface by the spray.

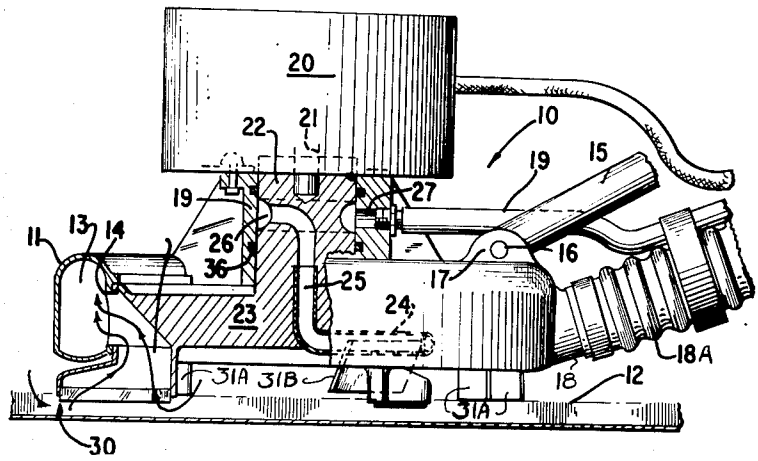


FIG. 1

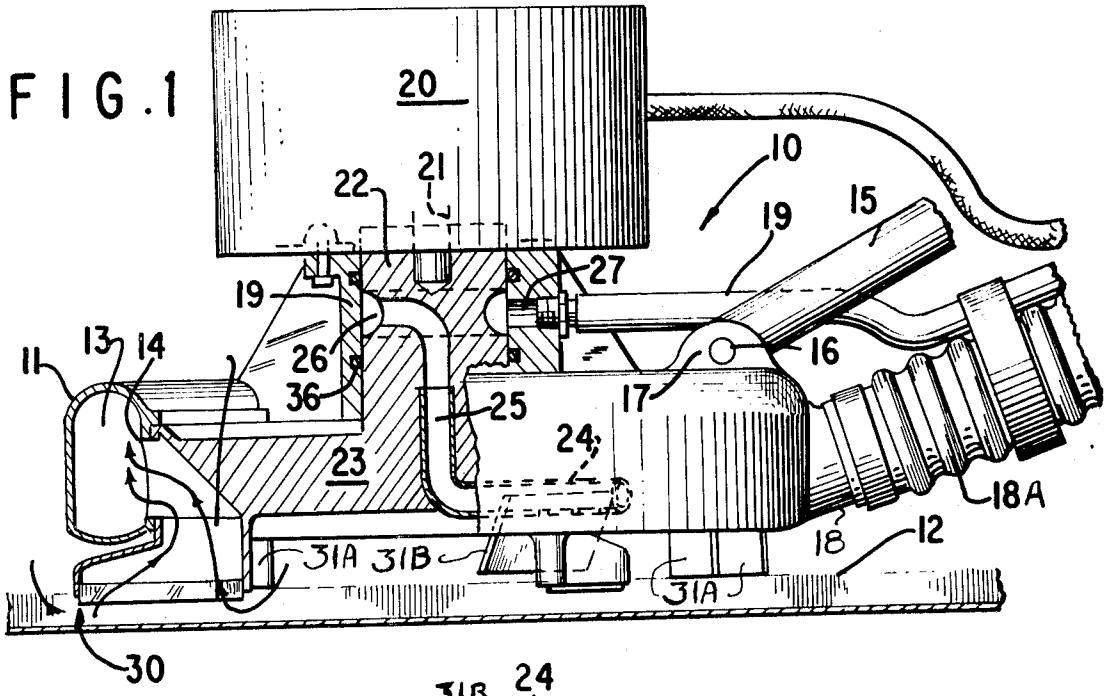
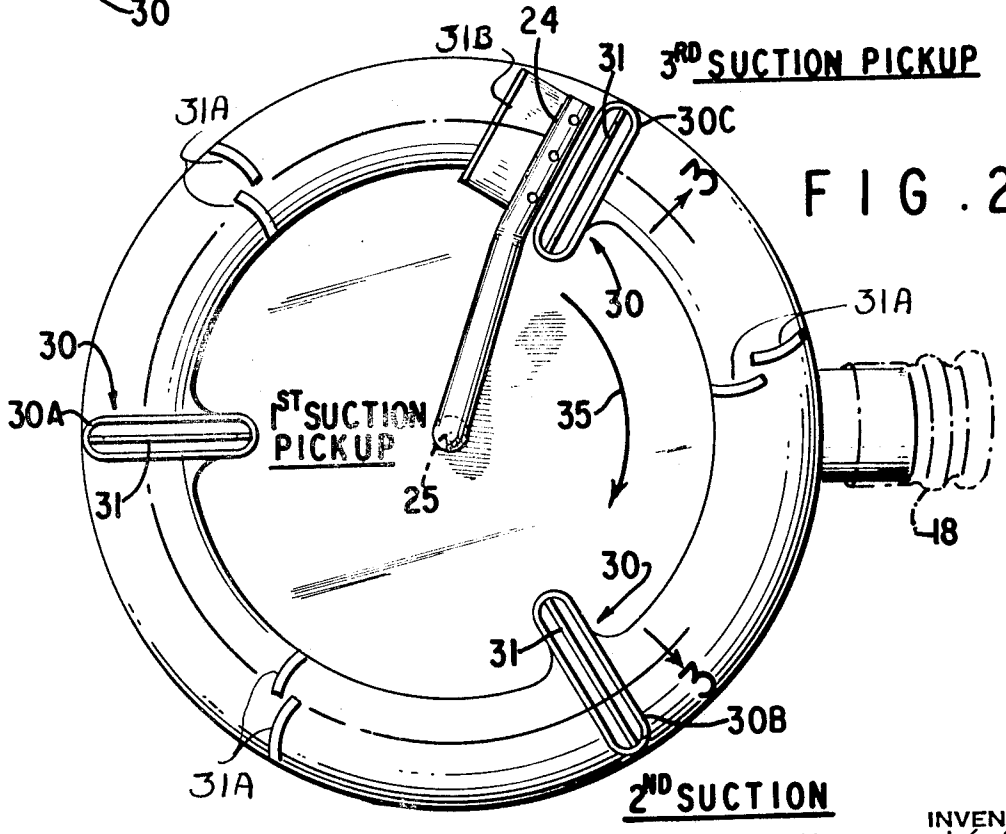


FIG. 2



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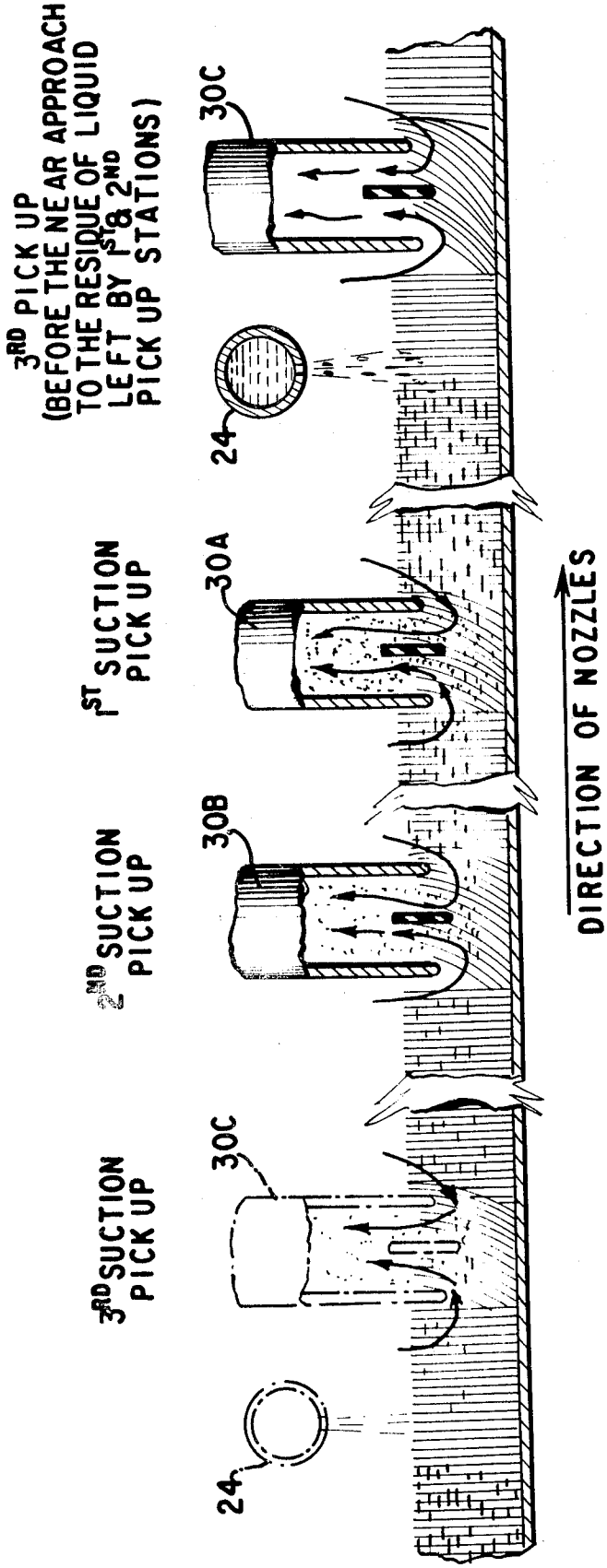


FIG. 3

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RUG CLEANING AND RINSING DEVICE

In the cleaning of floors and floor coverings such as rugs, carpeting and the like, some form of cleaning liquid is generally applied to the surface, the surface is then scrubbed with the cleaning liquid, and the cleaning liquid, together with dirt which it has loosened from the surface, is picked up by means of a vacuum or sponges. Various forms of equipment have been devised for carrying out the above cleaning process. The equipment is moved over the surface to be cleaned and while moving, applies a cleaning solution to the surface, scrubs the surface with the cleaning solution and picks up the solution by means of a vacuum. A common structure of such devices comprises a rotary member, the underside of which is provided with nozzles for spraying cleaning or rinsing liquid upon the surface, brushes for scrubbing the surface with the liquid, and nozzles for applying a vacuum to the surface to pick up the liquid. Previously known devices of this nature have not been completely satisfactory since a considerable amount of detergent and dirt remained on the soft floor covering surface after the cleaning was completed. One of the reasons for not being satisfactory was caused by gravitational penetration of the dirt and detergent mixture. Repeated cleaning resulted in rapid buildup of detergent which in turn caused rapid resoiling due to adherence of dirt to said residual detergent.

Other prior art forms of such cleaning devices employed such an arrangement of spray nozzles and vacuum nozzles that the dwell time of the liquid on the surface was under the control of the operator. The dwell time thus depended largely upon the speed in which the operator moved the device over the surface.

It is one of the objects of the present invention to provide an improved cleaning and rinsing device for the on-location cleaning of floor surface coverings.

It is another object of the present invention to provide a cleaning and rinsing device wherein the dwell time of the liquid sprayed upon the surface is predetermined and independent of the skill of the operator.

It is another object of the present invention to provide a surface cleaning and rinsing device having a simple yet effective arrangement of passages for applying a cleaning or rinsing liquid through a spray nozzle on a moving rotor and for applying a suction to suction nozzles also mounted on the rotor.

According to one aspect of the present invention, a surface cleaning and rinsing device comprises a circular housing which is positioned substantially parallel to the surface being cleaned. The housing is provided with an annular channel whose inner circumferential face is continuously open and is adjacent the outer peripheral face of a rotor mounted for rotation within the housing. A spray nozzle is positioned on the underside of the rotor adjacent to the outer periphery thereof and is connected through passage means in the rotor to a source of cleaning or rinsing liquid. A plurality of nozzles are also positioned on the underside of the rotor spaced along the outer periphery thereof and are connected by passages within the rotor to the outer peripheral edge of the rotor so that the nozzles are continuously communicating with the annular channel in the housing. The annular channel is connected to a source of a vacuum so that a suction is established in the nozzles as they rotate to extract liquid sprayed upon the surface to be cleaned. A single spray nozzle is used and is positioned immediately behind a vacuum nozzle so that the next succeeding nozzle makes the initial pickup of liquid on the surface. Thus, the dwell time is fixed and is determined by the time required for the next succeeding nozzle to arrive at the spot on the surface which has been sprayed with liquid.

Other objects, advantages and features of the present invention will become apparent from the accompanying description and drawings, which are merely exemplary.

In the drawings:

FIG. 1 is a side elevational view of the cleaning device according to the present invention with a portion thereof being shown in vertical section;

FIG. 2 is a bottom plan view of the device shown in FIG. 1 and illustrating the relative positions of the suction and spray nozzles; and

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2 and arranged linearly so as to disclose a developed representation of the action of each pickup nozzle with respect to the spray nozzle.

Proceeding next to the drawings wherein like reference symbols indicate the same parts throughout the various views, a specific embodiment of the present invention will be described in detail.

As may be seen in FIGS. 1 and 2, a surface cleaning and rinsing device is indicated generally at 10 and comprises a substantially circular housing 11 which is disposed substantially parallel to a surface which is to be cleaned which, in the present embodiment of the invention, is considered to be a rug 12. The housing 11 is provided in its interior with an annular channel 13 positioned at the outer periphery of the housing 11 and provided with a continuous opening 14 in its inner circumferential face.

On the upper surface of the housing 11 a handle 15 is pivotally mounted at 16 to brackets 17.

The annular channel 13 is connected to a vacuum source by means of a tubular extension 18 extending outwardly thereof and to which a conventional tank vacuum cleaner may be attached by means of a hose 18A.

At the central portion of the top surface of the housing 11 there is a tubular extension 19 upon which is mounted an electric motor 20. The motor 20 has an output shaft 21 which is keyed in a suitable manner to a shaft portion 22 of a rotor 23 rotatably mounted within the housing 11. The rotor has on its undersurface a spray nozzle 24 which is positioned adjacent the outer periphery thereof and actually extends under the annular chamber 13 of the housing as may be seen in FIG. 2. The spray nozzle 24 is connected by means of a passage 25 to an annular groove 26 formed in the shaft portion 22 of the rotor. The groove 26 communicates through an opening 27 in the tubular extension 19 of the housing to a flexible conduit or hose 28 extending from a source of cleaning or rinsing liquid. Since the annular groove 26 is in continuous communication with the source of liquid through the opening 27, it can be seen that this liquid will be continuously discharged through the spray nozzle 24 under the control of a valve (not shown) which may be opened on demand by the operator.

Also mounted on the underside of the rotor 23 is a plurality of suction pickup nozzles 30A–C and stabilizing fins 31A which act as additional squeegees. The suction nozzles 30 are elongated in shape and extend radially of the rotor 23. The pickup nozzles 30 are similarly positioned at the outer periphery of the rotor 23 so that the pickup nozzles 30 and the spray nozzle 24 move along the same circular path.

The spray nozzle 24 is positioned immediately behind the pickup nozzle 30C so that the nozzle 30A will make the initial pickup of liquid discharged from the spray nozzle 24.

Each suction nozzle 30 has a radially extending blade 31 mounted therein which acts as a squeegee as the pickup nozzles move over the rug surface 12.

Each nozzle 30 is connected to a passage 32 which opens at the outer peripheral edge 33 of the rotor 23. Since the outer peripheral edge 33 of the rotor is adjacent the continuous opening 24 in the annular chamber 33, it can be seen that the suction nozzles 30 are in continuous communication with this annular chamber and, thus, to a source of suction.

During the operation of the device according to the present invention, the rotor 23 will rotate in the direction indicated by the arrow 35, as shown in FIG. 2. With further reference to FIG. 3, it can be seen that as the spray nozzle 24 discharges liquid upon the rug 12, a duration of time will elapse before the first pickup nozzle 30A is moved onto the spot where the discharge of the liquid first occurred. Thus, the dwell time during which the liquid acts upon the rug surface is determined by the speed with which the rotor rotates and the spacing between the first suction pickup 30A and the spray nozzle

24. This dwell time is independent of the movement of the device over the surface and also independent of the skill of the operator. The blade **31** acts as a squeegee and squeezes liquid from the pile of the rug to facilitate the pickup of this liquid by the suction nozzles. Spray shield **31B** also ma be used.

In order to seal the annular groove **26** with respect to the liquid circulating therein, a pair of spaced seals **36** of conventional style may be provided, as shown in FIG. **1**.

The inner circumferential face of the annular chamber **13** may be shaped, as shown at **37** and **38** in FIG. **1**, to provide bearing surfaces for the outer peripheral surface of the rotor **23**. These bearing surfaces also provide a vacuum seal so that the suction does not escape from the channel, and a high percentage of the suction is available to act through the pickup nozzles **30**.

Thus, it can be seen that the present invention provides a cleaning device for surfaces through which either a cleaning liquid or a rinsing liquid, such as water can be applied onto the surface and then picked up by means of suction nozzles. The duration of time that the liquid remains upon the surface is determined by the construction of the device and is wholly independent of the skill of the operator of the speed with which the device is moved over the surface.

It will be understood that various details of construction and arrangement of parts may be made without departing from the spirit of the invention except as defined in the appended claims.

What is claimed is:

1. In a surface cleaning and rinsing device, the combination of a circular housing disposed substantially parallel to a surface to be cleaned and having an annular channel therein, the inner circumferential face of said annular channel being continuously open, a rotor mounted for rotation within said housing and having its outer peripheral edge adjacent the annular channel opening, spray means on the underside of said rotor adjacent the outer periphery thereof, passage means within said rotor for communicating said spray means with a source of cleaning liquid, a plurality of nozzles on the underside of said rotor space along the outer periphery thereof, passage means within said rotor extending from each of said nozzles to the outer peripheral edge of said rotor so that the nozzles continuously communicate with said annular channel, and means for connecting said annular channel to a vacuum source so that a suction is established in said nozzles as they rotate to extract liquids sprayed on the surface to be cleaned.

2. In a surface cleaning and rinsing device as claimed in claim **1** and comprising a radially extending blade within each nozzle engageable with the surface being cleaned.

3. In a surface cleaning and rinsing device as claimed in claim **2** wherein said nozzle has an elongated opening extending radially of the rotor.

4. In a surface cleaning and rinsing device as claimed in claim **3** wherein said blade is positioned in the center of each nozzle opening.

5. In a surface cleaning and rinsing device as claimed in claim **1** wherein said spray means is positioned immediately behind a nozzle with respect to the direction of rotation of the rotor so that the next succeeding nozzle makes the initial pickup of liquid discharged by the spray upon the surface being cleaned.

6. In a surface cleaning and rinsing device as claimed in claim **1** wherein said nozzles and spray means are movable along the same circular path.

7. In a surface cleaning and rinsing device as claimed in claim **1** wherein said annular channel is stationary within said housing and is adjacent to the outer periphery thereof.

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