United States Patent

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[54] SELF-SUPPORTING ROTARY BRUSH

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[52] **U.S. Cl.** .....**15/24,** 15/50 C

[51] **Int. Cl.** **A46b 13/04**

[58] **Field of Search**.....15/23, 24, 50 C, 49 C, 97, 15/98, 103

[56] **References Cited**

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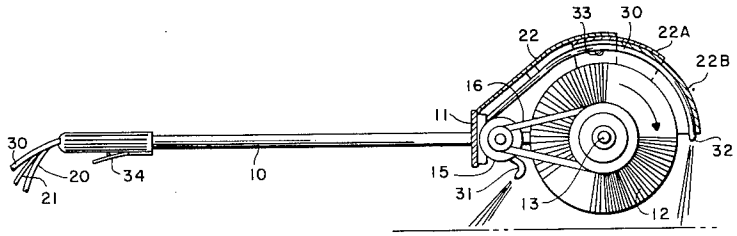
[57] **ABSTRACT**

Disclosed is a hydraulically powered rotating brush mounted in a supporting handle. A shroud disposed over said brush and spray nozzles depending from the supporting handle are adapted to direct currents of air and washing fluid onto the surface being washed and assist in supporting the weight of the device during operation.

4 Claims, 2 Drawing Figures



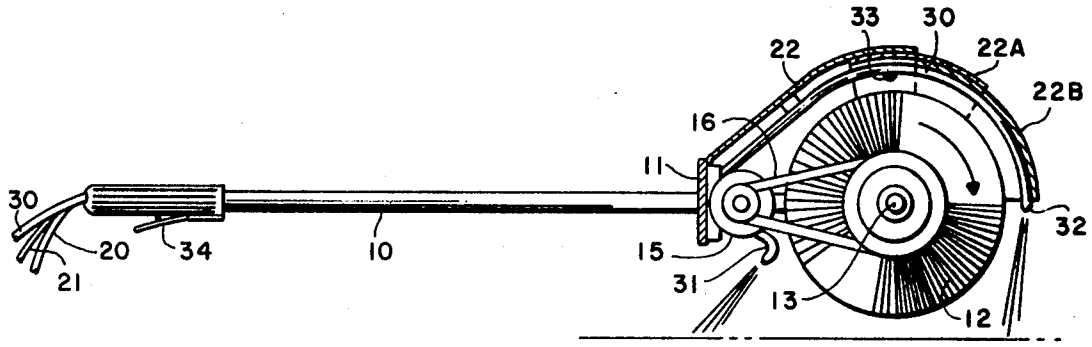


FIG. 1

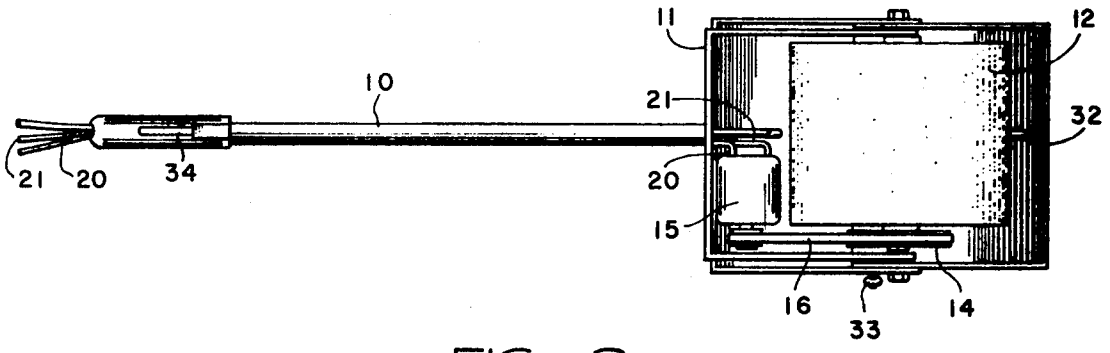


FIG. 2

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SELF-SUPPORTING ROTARY BRUSH

This invention relates to rotary brushes and the like, and more particularly to self-levitating hydraulically powered rotary scrub brushes.

Many relatively large vehicles such as trucks, trains, buses, airplanes and the like, because of non-uniform shapes and sizes, are difficult to clean with completely mechanized cleaning and washing equipment. For example, mechanized washing stations for trucks and automobiles generally employ scrubbing and spraying apparatus adapted to conform to the shape of the average vehicle and therefore fail to thoroughly clean all surfaces of irregularly shaped vehicles. Also because of their peculiar dimensions, aircraft are particularly difficult to wash with mechanized equipment. Therefore, cleaning of large vehicles is generally done by manual scrubbing with a hand brush. Obviously the time consumed in manually scrubbing large vehicles makes their cleaning expensive and time consuming.

In order to alleviate many of the problems encountered in manually scrubbing such vehicles rotary powered brushes have been employed. However, the use of such brushes is somewhat limited because the physical size and weight of most mechanical brushes makes their use inconvenient. A heavy mechanical brush supported on the end of a long handle is usually difficult to control and quickly tires the operator.

It is therefore an object of this invention to provide a powered scrub brush which is not only lightweight and easy to use but is substantially self-supporting. A further object is to provide a mechanical brush which automatically scrubs and washes a surface while supporting its own weight, thereby allowing the operator to use the brush for extensive periods of time without becoming excessively tired. A further object is to provide a powered self-supporting scrub brush which may be used with ease on large irregularly-shaped vehicles and the like to scrub and clean vertical, horizontal and curved surfaces.

Briefly, in accordance with the present invention, a hydraulically powered rotary scrub brush is provided which includes a rotating brush powered by a hydraulic motor. A shroud or hood is provided to cover the brush and downwardly and rearwardly projecting spray nozzles included through which washing fluid such as water and the like may be ejected. The downwardly projecting nozzles assist in supporting the weight of the scrub brush during operation. Furthermore, through the rotation of the brush within the shroud or hood, a downwardly projecting water and air current is created which substantially assists in supporting the rotating brush above the surface being cleaned.

A particular advantage of the invention is a provision of a self-supporting powered scrub brush which may be readily handled with ease and requires substantially no lifting when operating over horizontal or inclined surfaces.

Other objects, features and advantages of the invention will become more readily understood from the following detailed description taken in conjunction with the appended claims and attached drawing in which

FIG. **1** is an elevational view partially in section of the preferred embodiment of the invention and

FIG. **2** is a bottom plan view of the preferred embodiment of the invention.

Referring now to FIG. **1** there is illustrated a scrub brush comprising a handle **10** attached to a brush-supporting frame **11**. Frame **11** is generally U-shaped, the base being attached to the handle and the sides comprising a pair of substantially parallel spaced-apart members projecting in the same general plane as the handle **10**. Rotatably journaled within the frame **11** between the parallel members is a cylindrical scrub brush **12**. Scrub brush **12** is mounted on a shaft **13** which supports the brush **12** and a pulley **14**. Pulley **14** is mechanically driven by a hydraulic motor **15** through interconnecting drive belt **16**.

Hydraulic motor **15** may be any conventional hydraulic drive motor, preferably of lightweight construction, and is

mounted on frame **11**. The hydraulic motor **15** is powered by fluid circulated therethrough by means of the fluid transmission lines **20** and **21**. Fluid transmission lines **20** and **21** pass through handle **10** and are interconnected with a source (not shown) of hydraulic fluid under pressure. Conventional hydraulic sources may be used to power the motor such as a conventional hydraulic oil pump or water pump.

Attached to frame **11** and covering substantially the upper one-half of the brush is a semi-cylindrical hood or shroud **22**. Shroud **22** generally conforms to the cylindrical shape of the brush and is adapted to cover the upper half of the brush while exposing the lower half of the brush during operation.

Washing fluid such as water, acid or detergent is sprayed on to the surface being washed through washing fluid transmission line **30**. Line **30** passes through handle **10** and terminates in nozzles or jets **31** and **32**. Nozzle **31** is positioned near the lower edge of the shroud to the rear of the scrub brush and is positioned to eject washing fluid downwardly and rearwardly of the rotating brush in a direction away from shroud **22**. Nozzle **32** is affixed to the forward end of shroud **22** and preferably spaced approximately midway between the sides thereof at the forward end of the shroud. Nozzle **32** ejects the washing solution downwardly and slightly rearwardly directly in front of the rotating brush **12**.

Shroud **22** is preferably a multi-sectional articulated shroud composed of two or more sections adapted to telescopically collapse along the curvature of the brush. Shroud sections **22***a* and **22***b* are rotatably secured to shaft **13** and adapted to telescope into the shroud **22** as desired. In this manner shroud **22** can be telescoped rearwardly to expose the forward portion of the brush as well as the lower portion of the brush, thereby allowing the brush to be used to wash a surface which terminates at an obstruction such as an upperwardly extending wall or the like. In this manner the brush may be used to scrub in corners formed by the intersection of two substantially flat or curved surfaces such as the fuselage and wing sections of an aircraft or the like without changing the position of the brush. Fluid transmission line **30** is therefore flexible to allow nozzle **32** to remain fixed near the forward terminus of shroud **22** regardless of the position of the forward section **22***b* of shroud **22**.

The articulated sections of shroud **22** are adjustably positioned by conventional means such as bolt **33** and suitable grooves or the like. Suitable valves for controlling the flow of fluid through lines **20**, **21** and **30** may be incorporated within handle **10** and activated by suitable control means such as lever **34**.

The device is operated by placing the brush **12** on the surface to be scrubbed and forcing cleaning fluids such as water, detergent and the like through line **30**. The fluid passing through line **30** and exiting through nozzles **31** and **32** impinges on the surface to be washed, thus providing a lifting action to levitate the brush and suspend it over the surface being washed. Hydraulic fluid is forced through lines **20** and **21** to power hydraulic motor **15** which rotates the brush in the direction of the arrow shown in FIG. **1**. By rotation of the brush air and water is drawn into the shroud **22** and forced downwardly by the impeller action of the brush **12**. The flow of air and water from the shroud by the force of brush **12** further aids in lifting the brush from the surface.

It will be observed that in this manner the brush **12** will be maintained in contact with the surface being washed, but the weight of the apparatus is partially supported by fluid from jets **31** and **32**. The apparatus is also partially supported by the air currents formed by rotation of brush **12** within shroud **22**.

In the preferred embodiment brush **12** may be from 6 to 12 inches in length or larger and approximately 24 inches in diameter. The brush is preferably a long bristle polyester scrub brush. Hydraulic motor **15** is driven by hydraulic oil under approximately 1,000 p.s.i. and drives the brush at approximately 700 to 1,000 r.p.m. Water is forced through washing fluid line **30** by an external source (not shown) under pressure of approximately 600 p.s.i. at a rate of approximately 4 gals. per minute.

In the configuration as shown in FIGS. **1** and **2** the brush has a handle of approximately 6 feet and an overall length of approximately 8 feet. When constructed from suitable lightweight structural materials such as aluminum or the like the device will have a dead weight of approximately 8 to 10 pounds. However, when operated under the conditions set forth above the brush will be levitated above the surface being washed by the downward current of air and water from the shroud impelled by the brush and the downwardly and rearwardly projecting spray from nozzles **31** and **32**. Therefore, the workman need not lift the brush but merely guide it over the surface to be scrubbed. In this manner substantially horizontal surfaces may be washed very rapidly without the exertion of substantial amounts of energy by the workman. Furthermore, inclined surfaces may be washed in the same manner since the downwardly projecting air current and nozzles assist in levitating the brush above inclined surfaces in the same manner.

In order to assist in levitation of the apparatus when washing near vertically inclined surfaces, at least one of the nozzles may be aimed to direct washing fluid slightly rearwardly. Preferably the nozzle **31** located between the brush **12** and the operation is aimed to direct fluid downwardly away from the shroud **22** and rearwardly away from the brush **12**. The spray ejected therefrom therefore will assist in lifting the apparatus when washing surfaces inclined from the horizontal.

While particular reference has been made to a hydraulic motor which is driven by oil under pressure, it will be recognized that motor **15** may also be water-driven. For example, motor **15** may be adapted to be driven by the same fluid which is used as the washing fluid. Washing fluid may therefore be pumped through motor **15** and recirculated through the pressure device. In an alternative embodiment, washing fluid may be pumped through the motor **15** and then allowed to exit through suitable spray nozzles to be used in the washing operation.

Utilizing the apparatus of this invention one workman can effectively wash a large commercial aircraft in approximately

4 hours. Since approximately 10 hours of manual labor would be required to accomplish substantially the same results with conventional brushes, vast amount of time saving is realized by use of the apparatus of this invention.

It is to be understood that although the invention has been described with particular reference to the specific embodiment thereof, the form of the invention shown and described in detail is to be taken as a preferred embodiment of same and that various changes and modifications may be resorted to without departing from the spirit and scope of the invention.

What is claimed is:

1. A cleaning apparatus comprising:

a. a tubular handle affixed to a frame having two substantially parallel spaced-apart members,

b. cylindrically-shaped brush means rotatably journaled within said frame between said parallel members,

c. a shroud attached to said frame and covering a portion of said brush means, one end thereof extending in a plane opposite said handle,

d. fluid conducting means passing through said tubular handle and terminating in a plurality of nozzles, each of said nozzles being adapted to direct fluid passing therethrough in a direction away from said shroud, and

e. means for rotating said brush means comprising a hydraulic motor mounted on said frame and powered by fluid circulated through said handle under pressure.

2. The apparatus set forth in claim **1** wherein one of said nozzles is affixed to said shroud at the end thereof opposite said handle and another of said nozzles is affixed to said frame between said brush means and said handle.

3. The apparatus set forth in claim **2** wherein said nozzle mounted between said brush and said handle directs fluid in a direction away from said shroud and away from said brush means.

4. The apparatus set forth in claim **1** wherein said shroud comprises a plurality of sections, at least one of which is adapted to a telescope within another section thereof.

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