

- [54] **CLEANING APPARATUS**
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- [73] Assignee: **Chaska Chemical Company, Inc.**, Savage, Minn.
- [22] Filed: **Nov. 16, 1972**
- [21] Appl. No.: **307,043**

744,466 2/1956 Great Britain..... 15/345

Primary Examiner—Edward L. Roberts

Related U.S. Application Data

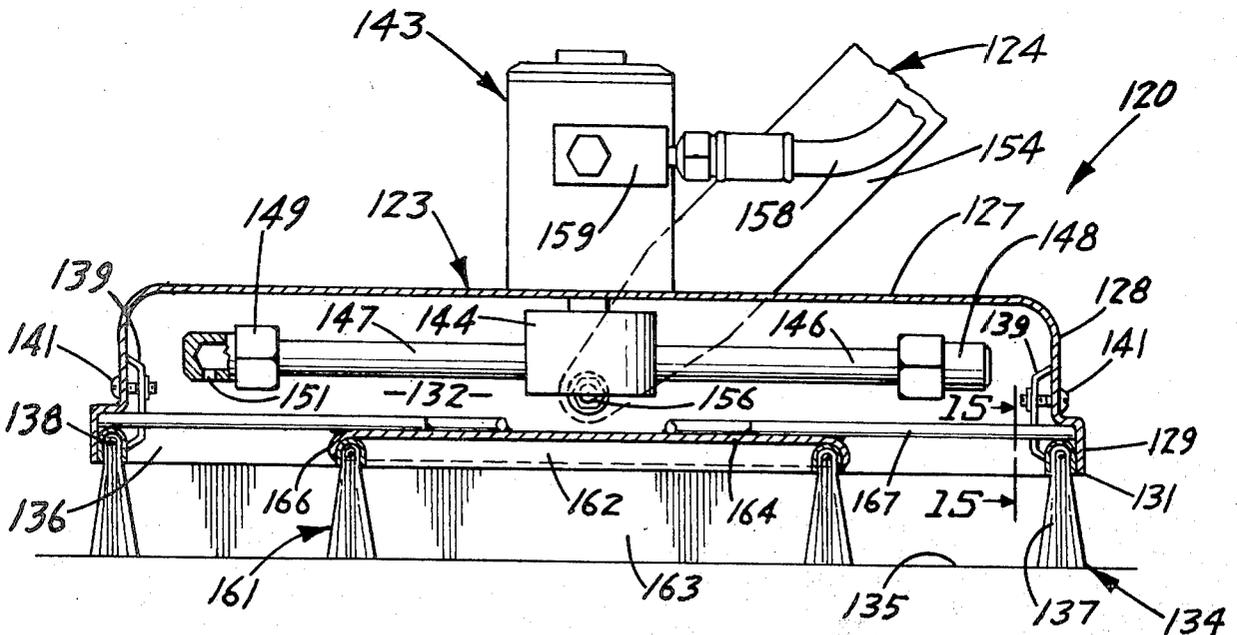
- [63] Continuation-in-part of Ser. No. 222,836, Feb. 2, 1972.
- [52] U.S. Cl..... **401/289**, 15/50 R, 239/251
- [51] Int. Cl..... **A47I 13/10**
- [58] Field of Search 15/29, 50 R, 97; 239/251; 401/289

[57] **ABSTRACT**

A cleaning apparatus having a pan-shaped housing carrying brushes engageable with a surface to be cleaned. Mounted on the top of the housing is a spinner assembly having a body containing a longitudinal passage. A tubular shaft rotatably mounted in the passage carries tubular arms located within the housing. The fluid flows from the hollow shaft into the housing and is discharged through the orifices in nozzles mounted on the ends of the arms. The shaft has a head located in a chamber at one end of the passage. The diameter of the head is larger than the diameter of the passage and is dynamically balanced by the flow of fluid under pressure through the passage and chamber into the hollow shaft. A guard carrying a center brush attached to the housing protects the arms and nozzles of the spinner assembly.

- [56] **References Cited**
- UNITED STATES PATENTS**
- 2,612,648 10/1952 Lagant..... 15/50 R
- 3,222,707 12/1965 Allenbaugh..... 15/345
- FOREIGN PATENTS OR APPLICATIONS**
- 10,796 5/1911 Great Britain..... 15/345

12 Claims, 17 Drawing Figures



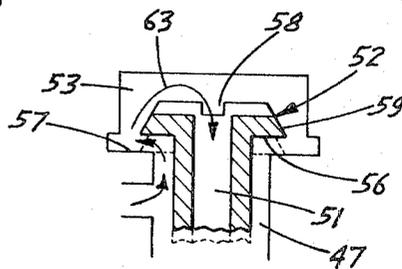
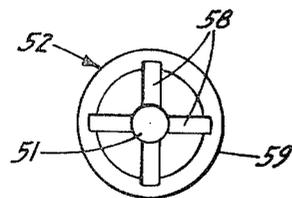
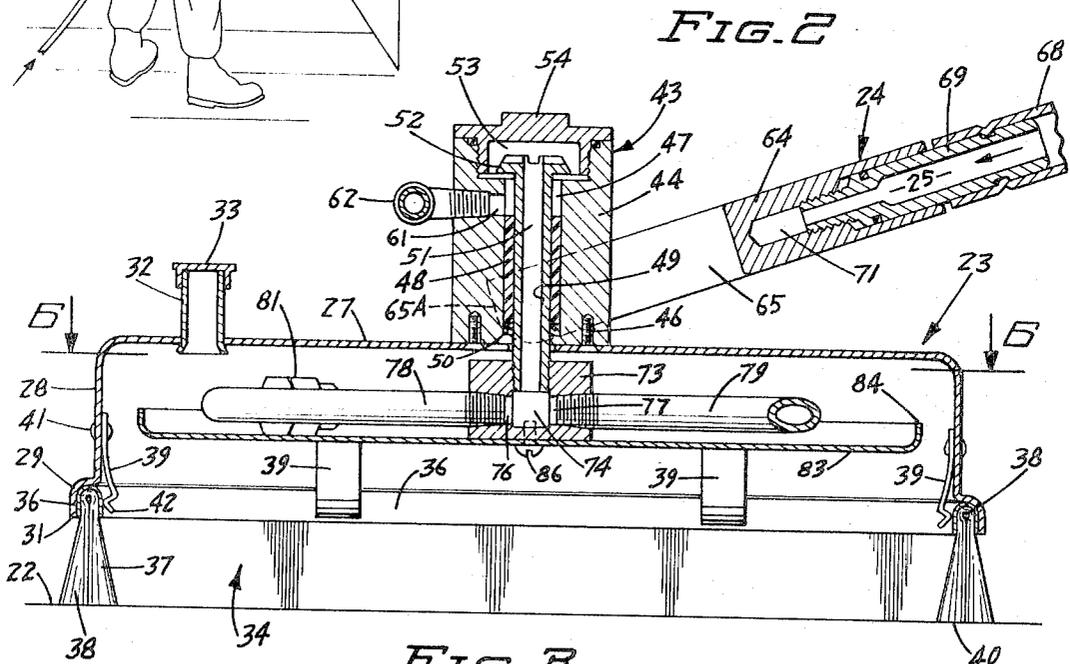
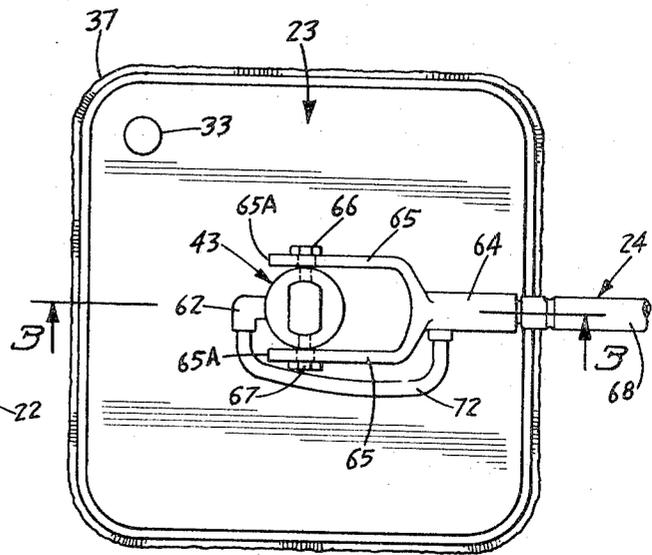
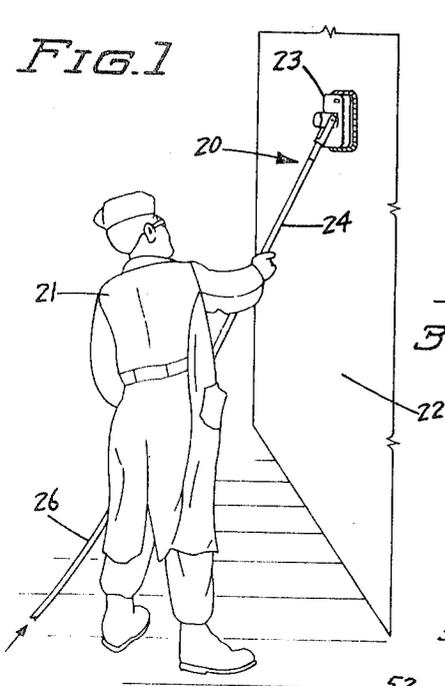


FIG. 5

FIG. 4

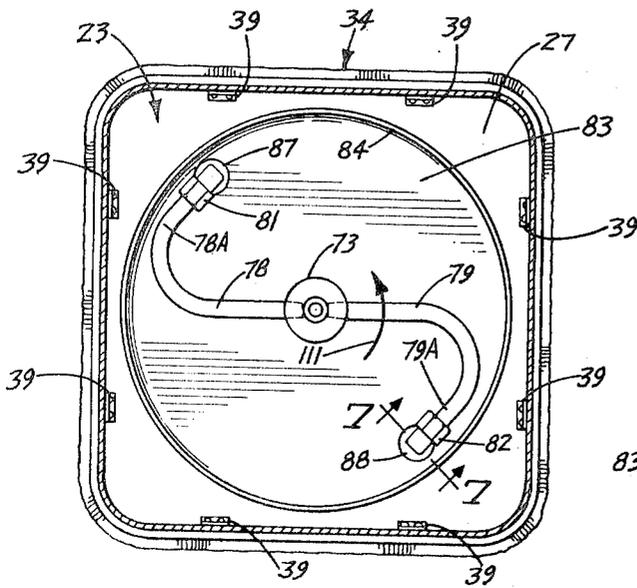


FIG. 6

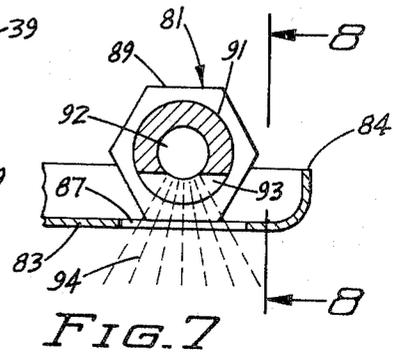


FIG. 7

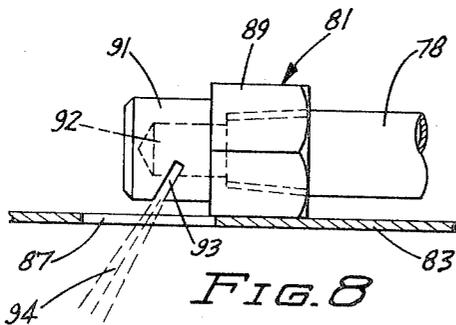


FIG. 8

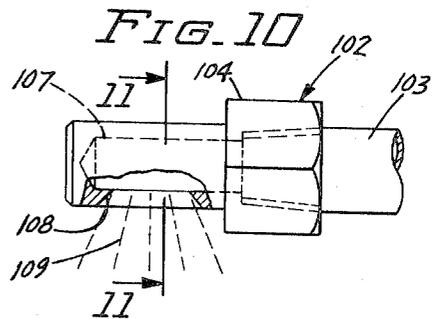


FIG. 10

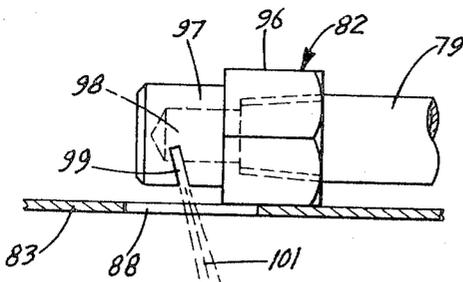


FIG. 9

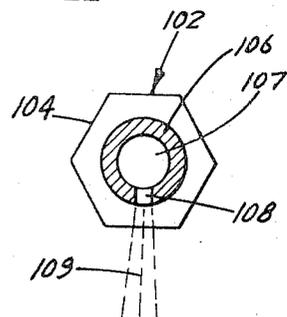


FIG. 11

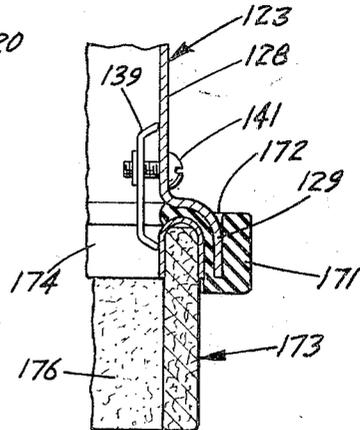
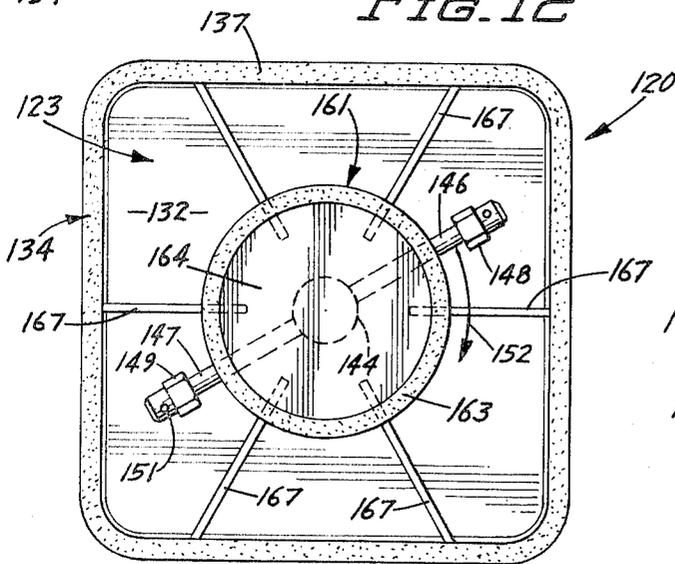
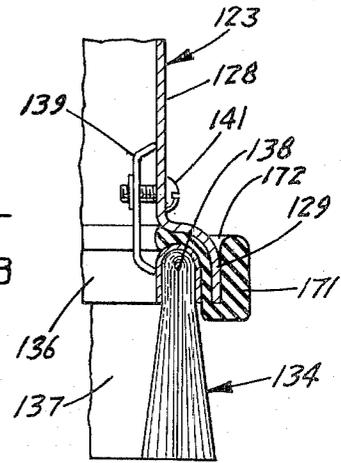
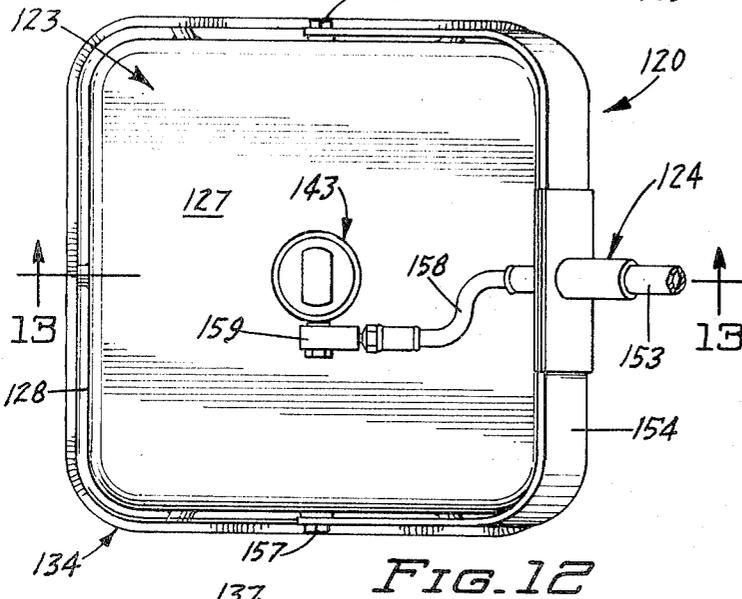
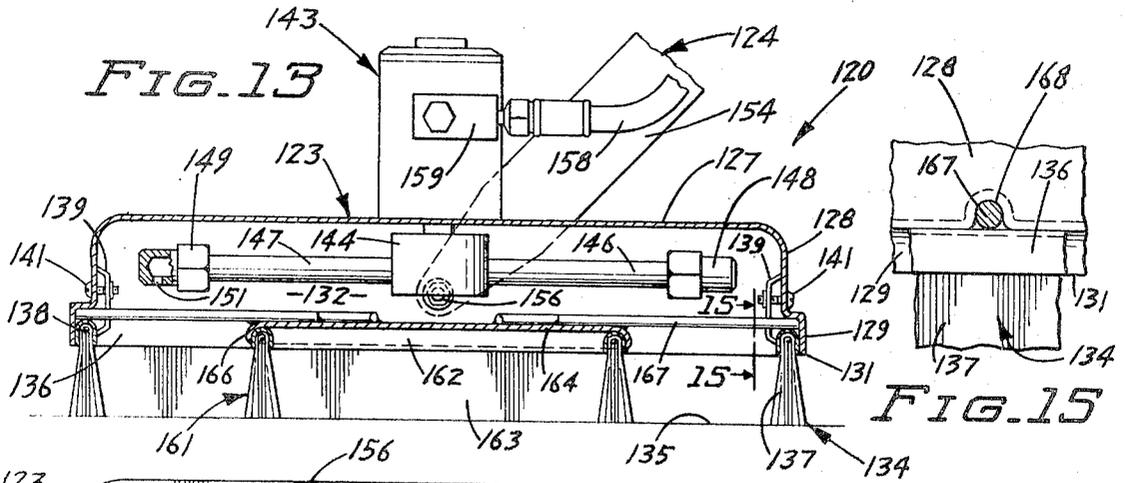


FIG. 14

FIG. 12

FIG. 16

FIG. 17

CLEANING APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION:

This application is a continuation-in-part of U.S. application Ser. No. 222,836 filed Feb. 2, 1972.

BACKGROUND OF THE INVENTION:

High fluid pressure cleaning equipment utilize hand-operated guns having nozzles for directing cleaning solutions to the surfaces to be cleaned. A portable cleaning apparatus having hand-operated nozzles is disclosed by Poppitz in U.S. Pat. No. 3,433,415. The guns are manually moved to distribute the cleaning fluid, as water, in the cleaning operation. These nozzles do not have a continuous rotary cleaning action and are not used in conjunction with a brush or pad to scrub the surface to be cleaned. In most cleaning operations it is desirable that a high pressure fluid jet cleaning action be used in connection with mechanical scrubbing.

The spinner assembly for mounting the rotating members of the cleaner on a housing must be freely rotatable and withstand high pressures without leakage. Swivel joints, as shown by Comlossy et al in U.S. Pat. No. 2,963,304 are used in fluid lines to provide relative movement of separate parts of the equipment. The swivels have considerable frictional resistance to rotation of the parts and substantial longitudinal thrust on the bearings. It has been found that these types of swivel joints are not suitable for use with the spinner assemblies on the cleaner apparatus of the invention.

SUMMARY OF THE INVENTION:

The invention broadly relates to an apparatus for discharging fluid under pressure to a specific location. The apparatus is used with a housing and includes a body mounted on the housing. The body has a longitudinal passage rotatably carrying a shaft means. The shaft means has a longitudinal passage and a head located in the chamber open to the passage in the body. The head is subjected to fluid under pressure in opposite longitudinal directions to dynamically balance the shaft means on the body. The shaft means is connected to a fluid discharging means which rotates the shaft means and discharges fluid under pressure. The fluid discharging means includes nozzles having nipples. Slots or holes in the nipples provide fluid discharge openings for directing jet streams of cleaning fluid onto the surface to be cleaned. Brushes or scrubbing pads are mounted on the housing to provide scrubbing action on the location that is being cleaned.

IN THE DRAWINGS:

FIG. 1 is a perspective view of the cleaner of the invention used by an operator to clean an upright wall;

FIG. 2 is an enlarged top plan view of the cleaner of FIG. 1;

FIG. 3 is an enlarged sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is an enlarged view of the top end of the spinner apparatus with the housing in outline;

FIG. 5 is an enlarged top view of the head on the rotatable shaft of the spinner apparatus;

FIG. 6 is a reduced sectional view taken along the line 6—6 of FIG. 2;

FIG. 7 is an enlarged sectional view taken along the line 7—7 of FIG. 6;

FIG. 8 is a sectional view taken along the line 8—8 of FIG. 7;

FIG. 9 is a side elevational view similar to FIG. 8 showing a modified nozzle;

FIG. 10 is a side elevational view partly sectioned similar to FIG. 8 showing a further modification of a nozzle;

FIG. 11 is a sectional view taken along the line 11—11 of FIG. 10;

FIG. 12 is a top plan view of a modification of the cleaner shown in FIGS. 1—11;

FIG. 13 is an enlarged sectional view taken along the line 13—13 of FIG. 12;

FIG. 14 is a bottom plan view of the cleaner of FIG. 12;

FIG. 15 is an enlarged sectional view taken along the line 15—15 of FIG. 13;

FIG. 16 is an enlarged sectional view of the housing and brush unit of the cleaner of FIG. 13 provided with a resilient bumper; and

FIG. 17 is a sectional view similar to FIG. 16 with the brush replaced with a scrubbing pad.

Referring to FIG. 1, there is shown a portable cleaner, indicated generally at 20, used by an operator 21 on an upright wall 22. The cleaner 20 functions to dispense high pressure fluid, as water, onto the surface of the wall 22 and mechanically scrub the wall 22 to effect a cleaning operation. The cleaner 20 is usable to clean other surfaces, as ceilings, floors and outside surfaces of trucks and buses, highway signs, buildings, swimming pools, and the like. The cleaner 20 is a portable unit that can be readily moved by the operator and used in numerous places, including but not limited to food processing, meat packing, dairy processing, and the like. The discharge end of the cleaner 20 has a cleaning head or housing 23 connected to the end of an elongated tubular handle 24. The handle 24 has a continuous passage 25 connected to a supply of cleaning fluid, as water under pressure, with an elongated flexible hose or tube 26. Suitable control valves (not shown) can be employed with the handle to control the discharge of cleaning fluid from the housing 23. The hose 26 can be connected to a central cleaning system or a portable cleaning apparatus as shown in U.S. Pat. No. 3,433,415.

Housing 23 is a generally square, pan-shaped member having a substantial flat top wall 27 joined to a continuous side wall 28. The housing can have other shapes, as rectangular, circular, triangular, hexagonal or octagonal. The lower or outer edge of the sidewall 28 terminates in an outwardly directed lip 29 having a continuous bottom edge 31. The bottom edge 31 lies in a generally horizontal plane, as shown in FIG. 2, whereby the bottom edge 31 of the housing is located at a generally uniform and close distance to the surface 22 which is being cleaned. A drain tube 32 is secured to one corner of the top wall 27. The tube 32 is closed with a cap 33. When the cleaner is being used to clean a ceiling or other surface wherein the cleaner is in the inverted position, the cap 33 is removed and a drain hose is connected to the tube whereby the fluid in the housing is drained therefrom. The drain tube 32 is a short tubular nipple that projects through a short hole in the top wall 27 and is retained therein by expanding an end portion of the tube.

A generally square brush assembly indicated generally at 34 is positioned adjacent the inside of the lip 29. Brush assembly 34 comprises a generally U-shaped back 36 clamped about fibers or bristles 37 turned over a core 38, as a wire. The bristles 37 diverge outwardly and have substantially the same length so that the bottom ends 40 lie in substantially the same horizontal plane of the surface of the wall 22. A plurality of downwardly directed clips or fingers 39 are secured with fasteners 41 to the side wall 28. The lower ends of the clips 39 engage the back 36 of the brush assembly and retain the brush assembly 34 in the inner peripheral groove formed by the lip 29. Each clip 39 has a downwardly and inwardly directed finger 42 which permits the brush assembly 34 to be snapped into the groove formed by the lip 29. The fingers 42 permit the brush assembly 34 to be removed, as they bias and hold the back 36 in engagement with lip 29. Bristles 37 are of substantially uniform length, and thereby hold housing 23 at a generally uniform and close distance from the surface 22. In addition, brush assembly 34 confines the high pressure cleaning fluid to the immediate surface to be cleaned.

Mounted in the center portion of top wall 27 is a spinner assembly indicated generally at 43. Cleaning fluid under pressure is supplied to the spinner assembly through the passage 25 in the elongated handle 27. Spinner assembly 43 has a short, upright cylindrical body 44. The lower end of body 44 is attached to the top of wall 27 with a plurality of fasteners 46, as bolts or the like. Body 44 has a central longitudinal passage 47. An elongated sleeve bearing 44 is located in a substantial portion of the passage 47. An elongated tubular shaft 49 is rotatably mounted on bearing 48. The bearing 48 preferably is made of plastic material, as Nylon, and has self-lubricating characteristics with respect to the material of the shaft 49. An annular seal 50 surrounds shaft 49 adjacent the lower end of bearing 48. Shaft 49 has a longitudinal passage 51 for carrying the cleaning fluid under pressure into the inside of the housing 23. Secured to the upper end of shaft 49 is an enlarged head 52. The head 52 is located in an enlarged chamber 53 at the upper end of housing 44. Chamber 53 is open to the top of passage 47. A plug or cap 54 is threaded onto the top of housing 44 to close the top of chamber 53. As shown in FIG. 4, head 52 has an annular flat bottom surface or face 56. The outer peripheral portion of surface 56 faces a flat annular surface 57 on the body 44. The surfaces, when in engagement with each other, as shown in broken lines, limit the axis movement of the shaft in passage 47. The surface area of annular bottom face 56 is substantially larger than the cross sectional area of shaft 49 whereby the pressure of the fluid in chamber 53 acting on head 52 longitudinally balances the shaft in housing 44.

As shown in FIGS. 3, 4 and 5, the top of head 52 has a plurality of radial grooves 58 leading to the center passage 51. The outer peripheral face 59 of the head has an upwardly and inwardly tapered shape to permit free flow of cleaning fluid through the passage.

The upper portion of body 44 has a lateral bore 61 accommodating an elbow pipe fitting 62. The cleaning fluid under pressure flows through fitting 62 and into the passage 47 via bore 61. The fluid moves upwardly in passage 47 and places an axial upward force on the head 52. This fluid under pressure will separate the bottom surface 56 of the head from its engaging surface 57

of body 44. The flowing fluid adjacent surface 57 serves as an annular fluid thrust bearing reacting against longitudinal movement of shaft 49. The fluid flows through chamber 53 and into shaft passage 51. The grooves 58 insure that there is a flow of fluid into the passage 51 even when the upper surface of the edge engages the plug 54. The forces of the fluid under pressure in passage 47 acting in an upward direction against the head are substantially equal to the forces in the chamber 53 acting downwardly on the head. These opposite fluid forces on head 52 will dynamically balance shaft 49 longitudinally of body 44 and permit substantially free rotation of shaft 49 on bearing 48. Shaft 49 has a substantial surface in bearing engagement with sleeve bearing 48. The fit between shaft 49 and bearing 48 is a rotational close fit sufficient to prevent leakage of fluid from the spinner assembly.

Referring to FIGS. 1 and 2, handle 24 has a yoke or generally Y-shaped member 64 pivotally connected to body 44 of the spinner assembly. The yoke 64 has bifurcated arms 65 located on opposite sides of the body 44 and are pivotally secured thereto with separate pivot bolts 66 and 67. Arms 65 have outer ends 65A that engage top wall 27 when the arms are in an upright position. Thus, handle 24 is only free to move about 90°. An elongated rigid pipe or tube 68 is connected to the upper end of handle 64 with a coupling 69. Tubes of varying lengths can be connected to yoke 64. The yoke has a chamber 71 which receives the fluid under pressure from pipe 68. A flexible hose or tube member 72 is connected to the fitting 62 and the member 64 to provide a path for the flow of fluid under pressure to the body 44 of the spinner assembly.

As shown in FIG. 2, a hub 73 located under the top wall 27 is mounted on the lower end of the shaft 49. Hub 73 has a central passage 74 threaded to receive the threaded lower end of shaft 49. Hub 73 has a pair of oppositely directed lateral bores 76 and 77 accommodating outwardly projected tubular arms 78 and 79. As shown in FIG. 6, the arms 78 and 79 have outer end sections 78A and 79A, respectively, that are turned to a circumferential direction.

Nozzles 81 and 82 are attached to the outer ends of arms 78 and 79. Each nozzle has a fluid discharge opening or orifice operable to direct a jet curtain of fluid under pressure in the direction of the open side of the housing 23. Located adjacent the outer side of arms 78 and 79 is a circular guard plate 83 covering the arms and nozzles. The outer peripheral edge of guard plate 83 has a section 84 turned toward the top wall 27, thereby providing a rounded corner to avoid the possibility of cutting or scarring objects that are cleaned. A plurality of fasteners 86, as bolts or the like, attach the plate 83 to the bottom of hub 73. Plate 83 has a pair of holes 87 and 88, as shown in FIG. 6, aligned with outer end portions of the nozzles 81 and 82 so that the nozzles can discharge cleaning fluid under pressure from the housing 23.

Nozzle 81, as shown in FIGS. 7 and 8, is a one-piece member having a body 89. The outer peripheral surface of the body 89 has a hexagonal shape to accommodate a wrench. Axially projected from one side of the body 89 is a cylindrical neck or nipple 91. An axial passage 92 extends through the body 89 and into nipple 91. The portion of the body 89 surrounding passage 92 is threaded to accommodate the threads on the end of arm 78. The discharge orifice of nozzle 81 is a trans-

verse slot 93 in nipple 91. As shown in FIG. 7, slot 93 extends from the outer surface of the side of the nipple into nipple 91 and is open to passage 92. The size of the discharge opening is controlled by the width and depth of the slot 93. As shown in FIG. 8, the slot 93 is inclined rearwardly and downwardly at an angle of approximately 30 degrees with respect to the horizontal or longitudinal axis of passage 92. The jet 94 of cleaning fluid is discharged as a substantially flat curtain of high pressure fluid at an angle from nozzle 81 through opening 87 toward the surface to be cleaned. The angular discharge of the cleaning fluid provides nozzle 81 with a horizontal force component which rotates the arms 78 and 79, the hub 73 connected to the arms, and the shaft 49 connected to the hub in the direction of arrow 111 shown in FIG. 6. The angle of inclination of jet 94 can be changed to vary the tangential force component of the jet of cleaning fluid.

Referring to FIG. 9, nozzle 82 is similar in construction to nozzle 81. This nozzle has a body 96 carrying a cylindrical neck or nipple 97. A passage 98 extends through the body and into the nipple. A slot 99 in nipple 97 provides an angular discharge orifice for jet 101 of cleaning fluid. The slot 99 is inclined in a forward and downward direction at an angle of approximately 15°. The angle of inclination as well as the depth of the slot can be changed to increase the size of the discharge opening. The inclined jet 101 is a generally flat curtain of high pressure fluid having a retarding tangential force component that is opposed to the force component of the jet 94 from nozzle 81. However, the angle of inclination of slot 99, being closer to the vertical, will provide the jet 101 with a tangential force component that is substantially less than the tangential force component of the jet 94 of the cleaning fluid. The forwardly directed jet 101 will strike the cleaning surface at a forward incline or angle to loosen, cut into and peel off any foreign material on the surface. The force of jet 101 is proportional to the speed of the jet. The speed of the jet is increased by the amount of speed of rotation of arms 78 and 79, thereby aiding in peeling the foreign material from the surface to be cleaned.

Referring to FIGS. 10 and 11, there is shown a modification of the nozzle indicated generally at 102. Nozzle 102 is attached to a tube 103 for delivering fluid under pressure to the nozzle. Nozzle 102 is a one-piece member having a base or body 104 having a hexagonal outer configuration to receive a wrench to turn the nozzle onto the tube 103. Extended axially from one side of the base 104 is a cylindrical neck or nipple 106. An axial passage 107 extends through the base 104 and into the nipple 106. The nipple 106 has a longitudinal slot 108 in the outer sidewall extended to the passage 107 providing the nipple with a discharge orifice for directing a jet 109 of fluid from the nozzle. The jet 109 is substantially flat curtain of high pressure fluid. The slot 108, as shown in FIG. 11, is in vertical alignment with the longitudinal center axis of the passage 107. The size of jet 109 can be varied by varying the length of slot 108. Slot 108 may be formed in the nipple 106 with a rotating cutting tool, as a disc cutter.

In use, fluid under pressure is delivered by pipe 68 to yoke 64. The fluid can be water, air, a mixture of air and water, cleaning liquids, and the like. The flexible hose 72 carries the fluid from the yoke 64 to the spinner assembly 43. The handle 24, being pivotally mounted on the spinner assembly 43, can be moved rel-

ative to the housing 23 so that the brush assembly 34 can be maintained on the surface to be cleaned. The fluid under pressure enters the passage 47 below the head 52. The fluid flows from passage 47 around head 52 and into chamber 53 longitudinally balancing the shaft in body 44. The fluid in chamber 53 flows downwardly into shaft passage 51 which is open to the central passage 74 in hub 73. The lateral bores 76 and 77, being open to the central passage 74, deliver the fluid under pressure to arms 78 and 79. The fluid is carried by arms 78 and 79 to the discharge nozzles 81 and 82. Nozzle 81, having a downwardly and rearwardly directed slot 93 forming a discharge opening, directs the fluid in a relatively wide, flat pattern at an angle onto the surface to be cleaned. This angular orientation of the discharged jet of cleaning fluid provides the arm with a tangential force component that drives the arms and hub in the direction of arrow 111 in FIG. 6.

The nozzle 82, as shown in FIG. 9, has a forwardly inclined discharge slot 99, which directs the jet 101 of cleaning fluid in a forward direction. This forwardly directed jet of cleaning fluid peels foreign material from the surface to be cleaned. The rotary jet cleaning action of the fluid functions in cooperation with the brush assembly 34 to clean the wall 22 as the cleaning apparatus is moved over the wall.

The handle 24 can be pivotally mounted on the side wall 28 of the housing in lieu of body 44. A movable or swivel connector can be used with a flexible hose to connect the handle to the body so that fluid can flow from the handle to the body. A short handle can be fixed to the body or housing whereby the cleaner can be moved with one hand.

Referring to FIGS. 12-14, there is shown a modified cleaner indicated generally at 120 useable by an operator to clean a surface, as a floor, wall, ceiling or the like. The cleaner functions to dispense a high pressure fluid, as water, onto the surface and mechanically scrub the surface to effect a cleaning operation. Cleaner 120 is a portable unit that can be readily moved by the operator and used in numerous places including but not limited to food processing, meat packing, dairy processing, vehicle washing, aircraft cleaning, and like places.

Cleaner 120 has a cleaning head or housing 123 connected to an end of an elongated handle 124. Handle 124 includes an elongated tubular section containing a control valve (not shown). The end of the handle is connected to a hose leading to a source of cleaning fluid under pressure, such as a central cleaning system or a portable cleaning apparatus as shown in U.S. Pat. No. 3,433,415.

Housing 123 is a generally pan-shaped member having a substantially flat top wall 127 joined to a continuous sidewall 128. The lower portion of sidewall 128 has an outwardly offset continuous lip 129 terminating in a bottom edge 131. Bottom edge 131 lies in a generally horizontal plane, as shown in FIG. 13. Housing 123 encloses a space 132 and has an open end defined by the bottom edge 131.

A generally square first scrubbing or brush assembly indicated generally at 134 is located adjacent the inside of lip 129. Brush assembly 134 functions to provide a scrubbing action on surface 135 to be cleaned, as shown in FIG. 13. Brush assembly 134 is a linear unit extended around the sidewall 128 forming an extension thereof. Brush assembly 134 comprises a generally U-

shaped back 136 clamped about fibers or bristles 137. The bristles are turned over a core 138, as wire, and are retained in place by the U-shaped back 136. Bristles 137 diverge outwardly and have substantially the same length so that the bottom ends of the bristles lie in substantially the same horizontal plane as surface 135.

Brush assembly 134 is held in assembled relation with housing 123 by a plurality of spaced downwardly directed clips or fingers 139. Fasteners 141, as bolts, secure the clips to side wall 128. Clips 139, in conjunction with fasteners 141, function as clamps to hold the back 136 of the brush assembly in engagement with lip 129.

A spinner assembly indicated generally at 143 is mounted on the center portion of the top wall 127. Spinner assembly 143 is identical in construction with spinner assembly 43 shown in detail in FIG. 3. Spinner assembly 143 has a rotatable hub 144 located in chamber 132. A pair of tubular arms 146 and 147 are secured to hub 144. As shown in FIG. 14, arms 146 and 147 are elongated members that are diametrically opposed to each other. Additional arms can be secured to hub 144. Mounted on the outer ends of each of the arms are nozzles 148 and 149. Each nozzle has at least one hole 151 providing an outlet passage or orifice for the cleaning fluid. The hole is angularly disposed with respect to the horizontal plane, as shown in FIGS. 13 and 14, whereby on discharge of cleaning fluid under pressure from the nozzles the arms 146 and 147, together with hub 144 rotate in the direction of arrow 152. Holes 151 are cylindrical whereby the discharging liquid has a cone-shaped pattern. The holes 151 can be slots, as shown in the nozzles of FIGS. 7-11. Nozzles 148 and 149 discharge fluid under pressure through the annular space between the brush assemblies 134 and 161 hereinafter described in detail.

Handle 124 comprises an elongated tube 153. Tube 153 can be in separate sections and have varying lengths. One of the sections of the tube may incorporate a control valve for regulating the flow of fluid under pressure through the handle. The lower end of tube 153 is connected to a generally inverted u-shaped member or handle yoke 154. The lower ends of yoke 154 extend adjacent opposite sides of the housing 123 and are pivotally attached thereto with pivot fasteners 156 and 157, such as bolts or screws. As shown in FIG. 13, the pivotal axis of the fasteners 156 and 157 is generally aligned with the bottom of hub 144. A flexible hose 158 connects the end of elongated tube 153 with the spinner assembly 143 to deliver fluid under pressure from the handle to the spinner assembly. A connector or coupling 159 is secured to spinner assembly 143 and is used to connect hose 158 to the spinner assembly. Flexible hose 158 permits handle 124 to pivot approximately 180° relative to housing 123.

As shown in FIGS. 13 and 14, a second brush or scrubbing assembly, indicated generally at 161 is located below hub 144 within the perimeter of the first scrubbing assembly. Second brush assembly 161 is a circular or ring unit having a generally U-shaped back 162 carrying fibers or bristles 163. The bristles are spaced inwardly from the first brush assembly. The back 162 is mounted on a generally flat plate 164. Plate 164 has a turned in outer peripheral edge 166 which forms a flange to yieldably hold the circular back 162 in assembled relation with plate 164. A plurality of circumferentially spaced radially directed rods 167 are

secured to the top of plate 164. The rods 167 extend across the space between the brush assemblies 134 and 161 and have outer ends located in grooves 168 formed in the upper portions of lip 129. As shown in FIG. 15, groove 168 accommodates rod 167. The back 136 of brush assembly 134 holds rod 167 in the groove. Brush assembly 161 is axially of concentricity located with respect to the axis of rotation of hub 144. The outer peripheral edge of brush assembly 161 is spaced from the inner side of brush assembly 134 providing an annular passageway for the fluid discharged from the rotating nozzles 148 and 149. Fibers 163 have relatively uniform length and terminate in a lower edge that engages the surface 135. The second brush assembly can be removed by removing the first brush assembly 134.

Referring to FIG. 16, there is shown the housing 123 equipped with a resilient bumper 171 of rubber, synthetic or other resilient material. Bumper 171 has a generally U-shaped configuration and has a groove 172 accommodating lip 129. Bumper 171 is held on lip 129 by clamping action of the back 136 which is forced toward lip 129 by clip 139. The resilient bumper acts as a guard or shield to prevent the housing, and particularly flange 129, from marring, scratching or cutting surfaces adjacent the surface being cleaned as well as the surface being cleaned.

Referring to FIG. 17, there is shown the housing 123 equipped with resilient bumper 171. Brush assembly 134 has been replaced with a pad assembly indicated generally at 173. Pad assembly 173 has a generally inverted U-shaped back 174 positioned about the upper portion of a continuous fibrous scrubbing member 176 of synthetic fibers, as Nylon or the like. The synthetic fibers provide the cleaner with a refined scrubbing action adaptable for cleaning the outer surfaces of aircraft. The synthetic material can vary in length and thickness. The second brush assembly 161 can be replaced with a fibrous member the same as pad assembly 173.

In use, the second brush assembly 161 and plate 164 function as a guard or shield to prevent sharp obstructions or corners from interfering with the rotational movement of arms 146 and 147. The second brush assembly provides additional scrubbing means for increasing the mechanical scrubbing action on surface 135. The second brush assembly 161, being spaced inwardly from the first brush assembly 134, confines the cleaning fluid to the space between the brush assemblies 134 and 161 and thereby increases the concentration of the cleaning action and size of the jet pattern of cleaning fluid on surface 135.

The spinner assembly can be used without the housings 23 and 123 or brush assemblies 34, 134 and 161 to discharge fluid, as water, to a desired location. Also, the nozzles can be used with other fluid discharge means. Other modifications and changes in structure may be made without departing from the invention. The invention is defined in the following claims.

The embodiments of the invention in which an exclusive property or privilege are claimed are defined as follows:

1. A cleaning apparatus comprising: housing means having a top wall and a continuous side wall surrounding a chamber having an open end, spinner means mounted on the top wall, said spinner means having rotatable means located in said chamber for discharging fluid under pressure through the open end of the hous-

ing, a first scrubbing assembly mounted on said sidewall and extended outwardly therefrom, a second scrubbing assembly located within the perimeter of the first scrubbing assembly and spaced inwardly therefrom, said rotatable means discharging the fluid between the first scrubbing assembly and the second scrubbing assembly.

2. The cleaning apparatus of claim 1 wherein: the first scrubbing assembly is first brush means mounted on a portion of the sidewall of the housing and the second scrubbing assembly is second brush means located within the area surrounded by the first brush means.

3. The cleaning apparatus of claim 1 wherein: the first and second scrubbing assemblies have fibrous material.

4. The cleaning apparatus of claim 1 including: resilient bumper means mounted on the sidewall.

5. The cleaning apparatus of claim 1 wherein: the second scrubbing assembly is a circular member.

6. The cleaning assembly of claim 1 including: plate means carrying the second scrubbing assembly and rod means attached to the plate means, said rod means mounted on the sidewall to hold the plate means and second scrubbing assembly in assembled relation with the housing.

7. The cleaning assembly of claim 6 wherein: the first scrubbing assembly engages the rod means to hold the

rod means in engagement with the sidewall, and means to hold the first scrubbing assembly in assembled relation with the sidewall.

8. The cleaning assembly of claim 7 wherein: the sidewall has grooves to accommodate the outer ends of the rod means, said first scrubbing means holding the outer ends of the rod means in said grooves.

9. The cleaning assembly of claim 1 including: plate means having an outer peripheral flange, said flange engageable with the second scrubbing assembly to hold the second scrubbing assembly on the plate means.

10. The cleaning assembly of claim 1 including: a handle and means pivotally connecting the handle to opposite sidewall portions.

11. The cleaning assembly of claim 1 including: resilient bumper means mounted on the outer edge of the sidewall, said first scrubbing assembly engageable with the bumper means to hold the bumper means on the sidewall.

12. The cleaning apparatus of claim 1 wherein: the rotatable means of the spinner means includes tubular arm means and nozzle means mounted on said arm means for discharging cleaning fluid through the open end of the housing between the first scrubbing assembly and second scrubbing assembly.

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