

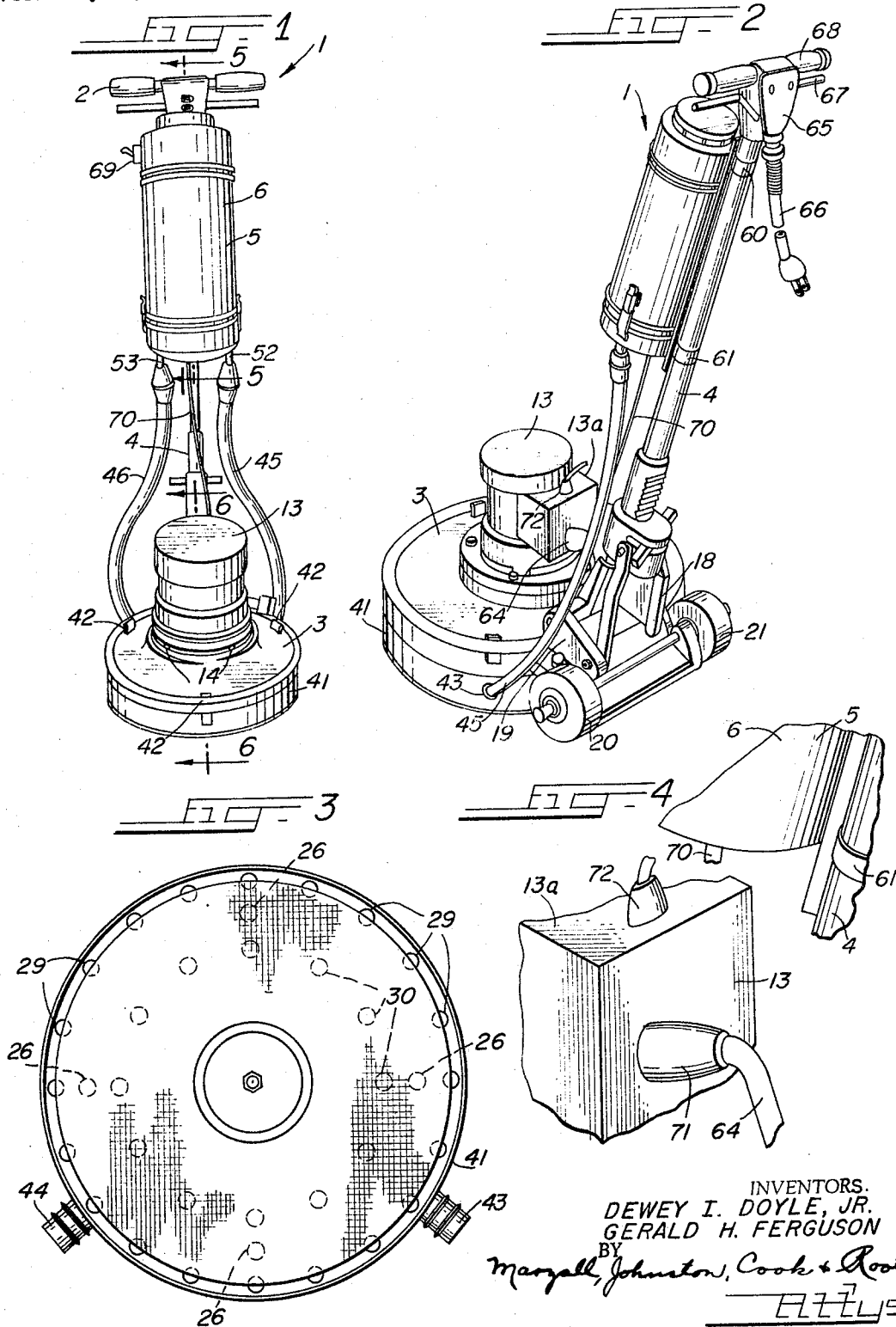
Aug. 9, 1966

D. I. DOYLE, JR., ETAL
FLOOR TREATING MACHINES

3,264,674

Filed May 20, 1964

2 Sheets-Sheet 1



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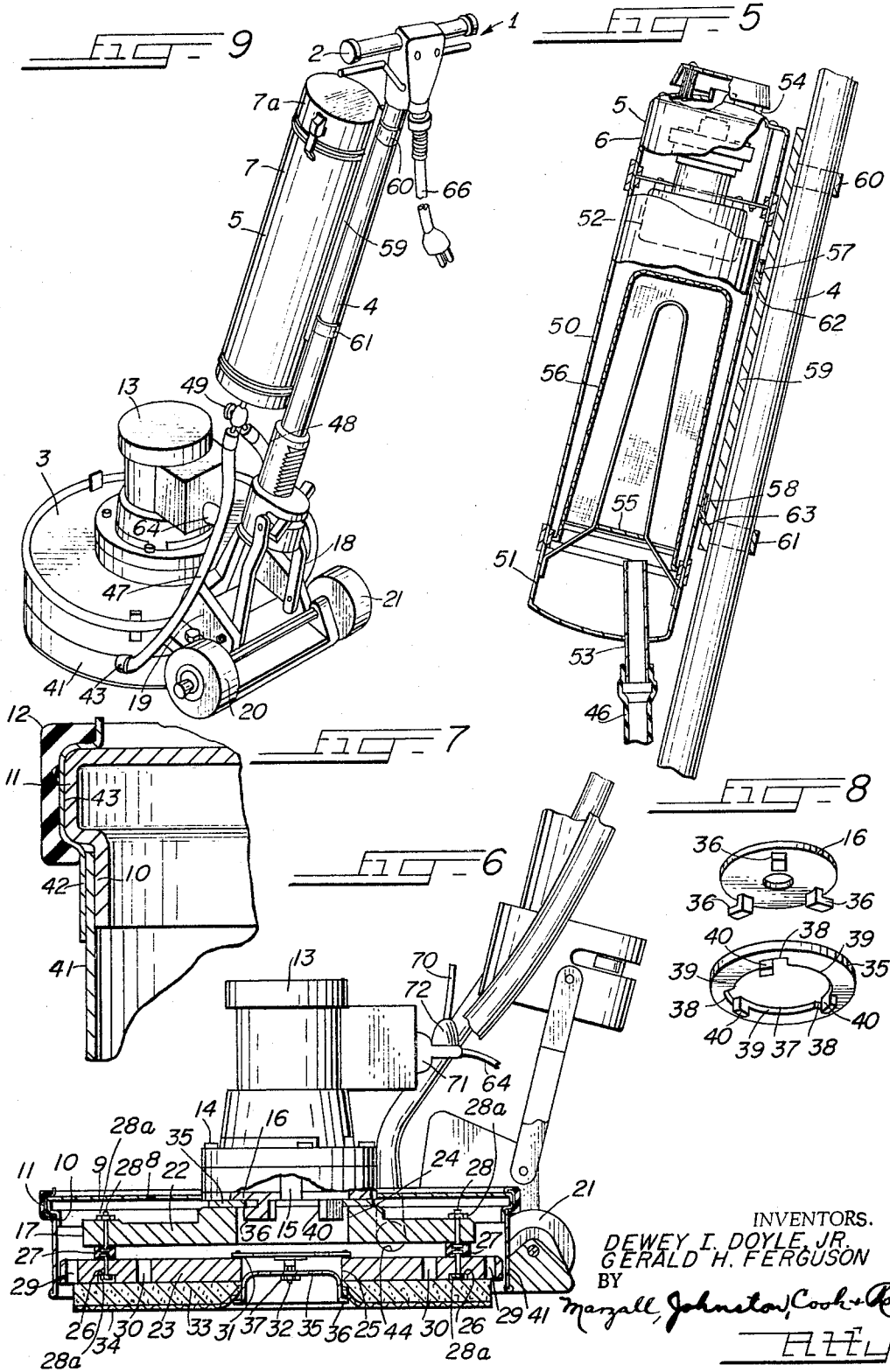
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FLOOR TREATING MACHINES

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This invention relates to floor treating machines.

A primary object of the present invention is to afford a novel floor treating machine which may be used for abrading, polishing, sweeping, and scrubbing floors.

Another object of the present invention is to afford a novel floor treating machine of the aforementioned type which is effective and efficient in operation on floors having relatively rough surfaces, such as, for example, concrete floors, and the like, as well as on floors having relatively smooth surfaces.

In recent years, the small "spike" heels, which are so popular in ladies' shoes, have created a serious maintenance problem for floors, the heels commonly causing indentations in floor coverings such as vinyl tile, rubber tile, asphalt tile, cork, and the like. It is an important object of the present invention to afford a novel machine for resurfacing such floor coverings, which have been marred and indented by such heels, or the like, and which machine is operable to effectively remove such indentations and restore a lustrous smooth finish to the floor covering.

Abrading machines, polishing machines, and scrubbing machines for floors have been heretofore known in the art. However, such machines as have been heretofore known in the art have commonly had several inherent disadvantages, such as, for example, being difficult and tiring to handle during operation; requiring more than one operator; not effectively picking up dust and dirt during abrading or polishing operations; not being capable of effectively operating close to walls; being so constructed that they marked or marred the floors on which they were operated; or not being capable of ready conversion for use in one type of floor treating operation to another, and the like. It is an important object of the present invention to overcome such disadvantages.

Another object of the present invention is to afford a novel floor treating machine of the aforementioned type which is effective to efficiently pick up dust and dirt from the floor during abrading, polishing, and buffing operations.

Another object is to afford a novel machine wherein the working element thereof, such as, for example, the abrading unit, the polishing unit, or the scrubbing unit may be quickly and easily removed and replaced in converting the machine for different types of operation.

Another object is to afford a novel floor treating machine of the aforementioned type, embodying a novel supporting unit for holding the floor treating member, such as, for example, the abrading member, or the polishing member, and the like.

A further object is to afford a novel machine of the aforementioned type embodying a novel supporting member which may be used for interchangeably holding different types of floor treating members, such as, for example, sand paper, abrading pads, polishing pads, scrubbing pads, and the like.

Another object is to afford a novel floor treating machine of the aforementioned type, wherein the parts thereof are so constituted and arranged that during abrading and polishing operations, and the like, the floor covering surface being treated is effectively vacuum cleaned in a novel and expeditious manner.

An object ancillary to the foregoing is to afford a novel

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machine of the aforementioned type wherein the air beneath the machine, during a polishing or abrading operation, is agitated in a novel and expeditious manner to afford an effective sweeping and cleaning action.

Yet another object is to afford a novel floor treating machine of the aforementioned type wherein the floor treating members thereof are firmly but yieldingly held in a novel and expeditious manner.

A further object is to afford a novel floor treating machine of the aforementioned type which embodies a novel skirt portion for enclosing the working element, and which skirt portion is constituted and arranged in a novel and expeditious manner.

Another object is to enable the skirt portion of such a machine to be readily mounted on and removed from the remainder of the machine in a novel and expeditious manner.

A further object is to afford a novel floor treating machine of the aforementioned type which is practical and efficient in operation, and which may be readily and economically produced commercially.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principles thereof and what we now consider to be the best mode in which we have contemplated applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

FIG. 1 is a front view of a floor treating machine embodying the principles of the present invention;

FIG. 2 is a rear perspective view of the machine shown in FIG. 1;

FIG. 3 is a bottom plan view of the base portion of the machine shown in FIG. 1;

FIG. 4 is an enlarged, fragmentary detail perspective view of a portion of the machine shown in FIG. 2;

FIG. 5 is a fragmentary, detail sectional view taken substantially along the line 5—5 in FIG. 1;

FIG. 6 is a fragmentary, detail sectional view taken substantially along the line 6—6 in FIG. 1;

FIG. 7 is an enlarged, fragmentary, detail sectional view of a portion of the machine shown in FIG. 6;

FIG. 8 is an exploded perspective view of a portion of the machine shown in FIG. 6; and

FIG. 9 is a rear perspective view, similar to FIG. 2, but showing the parts of the machine arranged for a scrubbing or scouring operation.

A floor treating machine 1, embodying the principles of the present invention, is shown in the drawings, to illustrate the preferred embodiment of the present invention. The floor treating machine 1 embodies, in general, a body portion 2, including a base 3 and an elongated handle 4, mounted on and projecting upwardly from the base 3, and a working fluid feeding unit 5 mounted on the handle 3, FIGS. 1, 2, and 9, for feeding working fluid, such as, for example, air or washing liquid through the base 3 for a purpose which will be discussed in greater detail presently.

The working fluid feeding unit 5 embodied in the machine 1 may be of different types, such as, for example, an elongated vacuum unit 6, shown in FIGS. 1, 2, 4, and 5, or an elongated liquid reservoir or tank 7 shown in FIG. 9. In general, the vacuum unit 6 is used during "dry" operation of the machine 1, such as, for example, during dry abrading, and polishing operations; and the tank 7 is used during "wet" operation of the machine 1, such as, for example, during wet abrading, and scrubbing, or scouring

operations. The operation of the machine 1, with the various types of working fluid feeding units 5, will be discussed in greater detail presently.

The base 3 of the floor treating machine 1 includes a substantially inverted cup-shaped housing 8, FIGS. 1, 2, 6, and 9, having a round, substantially flat top wall 9 and an annular flange 10 projecting downwardly from the peripheral edge of the top wall 9, FIG. 6. The lower edge portion of the flange 10 is offset radially inwardly from the upper edge portion thereof to thereby afford a radially outwardly projecting rib 11 at the junction of the top wall 9 with the flange 10, FIGS. 6 and 7. An annular bumper strip 12, made of suitable material such as, for example, soft rubber, or the like, is removably mounted on the rib 11 in enclosing relation thereto, and affords a pad or bumper for protecting walls, and the like, from damage by reason of the base 3 being bumped thereagainst during operation of the machine 1.

The base 3 also includes an electric motor 13 mounted on the top wall 9 of the housing 8, and secured thereto by suitable means such as bolts 14. The motor 13 includes a drive shaft 15, which extends downwardly through the top wall 8, a drive coupling plate 16 being mounted on and secured to the lower end portion of the drive shaft 15 for rotation therewith, FIG. 6.

The base 3 also includes a working unit 17, which, in the assembled floor treating machine 1, is connected to the drive shaft 16 for rotation thereby, the working unit 17 being so disposed in the housing 8 as to operatively engage the portion of the floor being treated during operation of the machine 1, as will be discussed in greater detail presently.

The elongated handle 4 may be of any suitable type, but is preferably of the type disclosed in the D. I. Doyle, United States Patent No. 3,100,903, issued August 20, 1963. It is operatively connected by suitable linkage 18 to a mounting bracket 19 which is mounted on the top wall 9 of the housing 8 and projects rearwardly therefrom, FIGS. 2, 6, and 9. Two wheels 20 and 21 are also rotatably mounted on the bracket 19 in position to afford support for the machine 1 when the latter is being transported from one location to another.

The working unit 17 includes an upper supporting disk 22 and a lower supporting disk 23. The disks 22 and 23 are circular in shape, and have openings 24 and 25 extending through the axial center thereof, respectively. The upper disk 22 is of a smaller diameter than the lower disk 23, and the disks 22 and 23 are disposed in axial alignment with each other. The lower disk 23 has four countersunk openings 26 extending therethrough, FIGS. 3 and 6, the openings 26 being equally spaced from each other around the disk 23, and spaced inwardly from the outer peripheral edge thereof. Four shock absorbers or cushions 27, made of suitable resilient material, such as, for example, rubber, are disposed between the supporting disks 22 and 23, with each shock absorber 27 disposed in axial alignment with a respective one of the openings 26. Each of the shock absorbers 27 have two bolts 28 mounted therein and projecting therefrom through one of the openings 26 and through the upper disk 22, respectively. Nuts 28a are mounted on the bolts 28, and clamp the disks 22 and 23 to respective opposite sides of the shock absorbers 27, the shock absorbers 27 holding the disks 22 and 23 in vertically spaced, substantially parallel relation to each other.

The lower supporting disk 23 is substantially flat, and has a plurality of holes or openings 29 extending vertically therethrough in inwardly spaced relation to the outer peripheral edge portion thereof. The openings 29 are preferably equally spaced around the lower supporting disk 23 and are disposed outwardly of the openings 26. The lower supporting disk 23 also has a plurality of other holes or openings 30 extending vertically therethrough, the openings 30 being preferably equally spaced around the disk 23 and disposed inwardly of the openings 26.

A mounting plate 31 is mounted on the upper face of

the lower supporting disk 23 between the disks 22 and 23, in spanning relation to the opening 25. A bolt 32 is secured to the lower face of the mounting plate 31 and extends downwardly therefrom through the opening 25 along the axis of the supporting disk 23, for a purpose which will be discussed in greater detail presently.

A resilient annular pad 33 is mounted on the lower face of the lower supporting disk 23, in axial alignment therewith, and an annular shaped working disk 34 is mounted on the lower face of the pad 33 in axial alignment therewith. The pad 33 and the working disk 34 preferably have the same inside and outside diameters, with the inside diameters thereof preferably being the same as the diameter of the opening 25 in the lower supporting disk 23. A clamping plate 35 of substantially inverted cup shape, and having a radially outwardly projecting flange 36 on the bottom edge portion thereof, is mounted on the bolt 32 and is releasably secured thereto by suitable means such as a nut 37. When the clamping plate 35 is disposed in normal operative position on the bolt 32 it is effective to firmly clamp the inner peripheral edge portions of the pad 33 and the working disk 34 against the lower face of the lower supporting disk 23, FIG. 6, with the lower edge portion of the clamping plate 36 being disposed above the lowermost portion of the working disk 34 a sufficient distance to insure that the clamping plate 36 will not engage the floor during operation of the machine 1.

The pad 33 and the working disk 34 are of such size, and are so disposed on the supporting disk 23 of the assembled working unit 17 that the outer edge portions of the pad 33 and the working disk 34 overlap the openings 29, but terminate in radially inwardly spaced relation to the outer edge portions of the openings 29, as shown in FIG. 6. Preferably, the pad 33 and working disk 34 extend half way across the openings 29.

The pad 33 may be made of any suitable resilient material, but preferably it is permeable and made of a suitable non-metallic material, such as, for example, non-woven synthetic fiber bonded together with resin, such pads being readily available on the market and known in the trade as scouring pads. With such construction of the pad 33, a firm, but resilient mounting is afforded for the working disk 34 on the lower supporting disk 23, and the pad 33 being non-metallic there is no danger of it causing rust spots.

With the pad 33 and the working disk 34 being so mounted on the lower supporting disk 23, either or both of them, may be quickly and easily removed from the pad holder 22-23 by removing the nut 37 and the clamping plate 35 to thus free the pad 33 and the working disk 34 for removal from the lower supporting disk 23. A new pad 33 and working disk 34 may then be quickly and easily mounted on the holder 22-23 by disposing them in proper stacked relation on the lower face of the lower supporting disk 23, again mounting the clamping plate 35 on the bolt 32, and securing it in clamping engagement with the working disk 34 by means of the nut 37.

The working disk 34 of the novel machine 1 may be any suitable type of floor treating member, such as, for example, an abrading member, a polishing member, a scouring member or the like. Preferably, the working disk 34 is pervious in construction. For example, when the working disk 34 comprises an abrading member, it is preferably constructed from the sheets of screen-like abrading material readily available on the market. However, if desired, the working disk 34 may be made of impervious material, such as, for example, sheets of sand paper, and the like, without departing from the purview of the present invention, the flow of working fluid through the machine 1 during operation of the latter being such that the machine 1 operates efficiently even when the working disk 34 is constructed of impervious material, as will be discussed in greater detail presently.

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The working unit 17 includes a driven coupling plate 35, which is mounted on the upper face of the upper supporting disk 22 for connecting the working unit 17 to the drive coupling plate 16 for rotation by the motor 13. The drive coupling plate 16, FIGS. 6 and 8, includes three equally spaced, substantially L-shaped lugs 36 projecting downwardly away from the motor 13. The driven coupling plate 35, FIGS. 6 and 8, is substantially annular in shape, having an inner peripheral edge portion 37 which is interrupted by three equally spaced, radially outwardly projecting slots 38. Each of the slots 38 define one end of a respective arcuate-shaped segment 39 of the inner peripheral edge portion 37 of the driven coupling plate 35, and the other end of each of the segments 39 is defined by a respective lug 40 which projects downwardly therefrom, FIG. 8. The lugs 36 and the slots 38 are of such size, and are so disposed on their respective coupling plates 16 and 35, respectively, that, in coupling the working unit 17 to the drive shaft 15 of the motor 13, the working unit 17 may be moved upwardly into position wherein the upper face of the coupling plate 35 is disposed in abutting engagement of the lower face of the coupling unit 16, the lugs 36 being inserted through respective slots 38. The working unit 17 may then be rotated in a counterclockwise direction, as viewed in FIG. 8, to thereby move the clamping plate 35 into position wherein the lugs 36 supportingly underlie respective ones of the segments 39, and the lugs 40 at the other ends of the respective segments 39 are disposed in abutting engagement with respective lugs 36, to thereby afford an effective driving connection between the drive shaft 15 and the working unit 17 for rotation of the latter in a clockwise direction, as viewed in FIG. 8. Removal of the working unit 17 from the drive shaft 15 may be as readily accomplished, the working unit 17 being manually rotated in a clockwise direction into position wherein the slots 38 are again aligned with the lugs 36, and the working unit 17 may then be axially withdrawn from the coupling plate 16. The opening 24 in the center of the upper supporting disk 22 is of such diameter as to freely receive the lugs 36 and 40 therein, FIG. 6.

The base 3 of the floor treating machine 1 also includes an annular skirt 41 removably mounted on the outer peripheral edge portion of the housing 2 in depending relation thereto. The skirt 41 is preferably made of a resilient, hard material such as, for example, stainless steel sheeting, or the like, and has three spring clips 42 mounted on the outer face of the upper edge portion thereof, and projecting upwardly therefrom, FIGS. 1, 6, and 7. The clips 42 are relatively thin and are made of a suitable resilient material, such as, for example, spring steel or stainless steel, or the like, and the upper end portion of each clip 42, which projects above the skirt 42, has a radially inwardly opening recess 43, which is complementary in transverse cross-sectional size and shape to the rib 11 on the housing 8, FIGS. 6 and 7. The clips 42 are equally spaced around the periphery of the skirt 41, and are so disposed on the skirt 41 that the skirt 41 may be quickly and easily mounted on the housing 8 by first removing bumper 12 and then axially moving the skirt 41 onto the flange 10 of the housing 8 into position wherein the clips 42 snap onto the rib 11. Thereafter, the bumper 12 may again be placed on the rib 11, the clips 42 being sufficiently thin as to permit such mounting of the bumper 12 on the rib 11 with little deformity of the bumper 12. The skirt 41 may be equally as readily removed from the housing 8, by first removing the bumper 12 and then pulling the skirt 41 off from the housing 8 in an axial direction, and the bumper 12 may then be again replaced on the rib 11.

The skirt 41 extends downwardly from the flange 10 of the housing 8 in encircling relation to the working unit 17. It is of such a vertical width that the lower edge portion thereof projects downwardly below the wheels 20 and 21, FIG. 6, and downwardly below the

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lower face of the lower supporting disk 23. The working unit 17 is of such a thickness that when it is disposed in operative position in the housing 8, and the machine 1 is disposed in position to operate on a floor, with the working disk 34 resting on the portion of the floor to be treated, the housing 8 is so supported by the working unit 17 that the lower edge portion of the skirt 41 is supported thereby in relatively closely adjacent, upwardly spaced relation to the floor. Preferably, during the operation of the machine 1, the spacing of the skirt 41 relative to the floor being treated is in the nature of one-eighth of an inch. The spacing of the lower edge portion of the skirt 41 may be adjusted by the operator, by tightening or loosening the bolts 28, tightening of the bolts 28, compressing the shock absorbers 27 to thereby lower the skirt 41 toward the floor to be treated, and loosening of the bolts 28 permitting the shock absorbers to expand, to thereby raise the skirt.

It will be remembered that the pad 33 is preferably relatively resilient. The resiliency of the pad 33 lessens the vibrations transmitted to the supporting disk 23 caused by the working disk 34 engaging rough spots on the floor surface being treated, and also assists in insuring that the working disk 34 will engage rough spots in the portion of the floor being treated in such a manner as to effectively operate thereupon. However, the pad 33 is sufficiently rigid and unyielding that it is effective during operation of the floor treating machine 1 to support the lower edge of the skirt 41 in upwardly spaced relation to the floor being treated.

Two tubular coupling members or nipples 43 and 44 are mounted in, and open through respective opposite sides of the rear portion of the skirt 41, FIG. 3, in such position that they open into the housing 8 above the lower supporting disk 23, FIG. 6. When the floor treating machine 1 is in assembled condition, the working fluid feeding unit 5 thereof, such as, for example, the vacuum unit 6, shown in FIGS. 1, 2, and 5, and the tank 7, shown in FIG. 9, is suitably connected to the nipples 43 and 44 for feeding working fluid through the housing 8. Thus, for example, with the machine 1 assembled in the manner shown in FIGS. 1-8, wherein the vacuum unit 6 is mounted on the handle 4, the nipples 43 and 44 are connected by suitable vacuum hoses or conduits 45 and 46 to the lower end portion of the vacuum unit 6, so that during operation of the machine 1, when the vacuum unit 6 is operating, it is effective to draw air inwardly under the skirt 41, and upwardly through the housing 8 and the hoses 45 and 46 into the vacuum unit 6. On the other hand, when the working fluid feeding unit 5 comprises the tank 7, as shown in FIG. 9, the nipples 43 and 44 may be connected through suitable hoses 47 and 48, respectively, and a suitable valve 49 to the lower end portion of the tank 7, so that when the valve 49 is open, liquid from the tank 7 may be fed downwardly therefrom through the valve 49, the hoses 47 and 48, and the nipples 43 and 44 into the housing 8.

The vacuum unit 6 may be of any suitable type available on the market, but is preferably of the type disclosed in the copending United States patent application of Dewey I. Doyle, Dewey I. Doyle, Jr., and Patrick Doyle, Serial No. 198,155, filed May 28, 1962. The vacuum unit 6 shown in the drawings includes an elongated housing 50, FIG. 5, having a removable lower end portion 51, and a motor 52 mounted in the upper end portion. The hoses 45 and 46 are connected by suitable coupling nipples 52 and 53 into the lower end portion 51 of the housing 50, and the motor 52 is effective to draw air upwardly through the hoses 45 and 46 and the nipples 52 and 53 into the housing 50, for discharge to the atmosphere through the upper end portion 54 of the housing 50. The nipples 52 and 53 are directed toward a baffle plate or deflector plate 55 disposed in a downwardly opening filter bag 56 mounted in the housing 50, the deflector plate 55 being effective to deflect moisture and particles of material dis-

charged from the nipples 52 and 53 downwardly toward the bottom of the housing 50. In the operation of the vacuum unit 6, all of the air drawn therethrough by the motor 52 passes through the bag 56 so that the dust and other entrained material therein remains in the lower portion of the housing 50. With this construction, the dust and other foreign material picked up by the vacuum unit 6 and collected in the housing 50 may be quickly and easily removed therefrom by removing the lower end portion 51 of the housing 50 for dumping, and, if necessary, removing the bag 56 for cleaning, or replacement.

The housing 50 of the vacuum unit 6 includes two mounting straps 57 and 58, made of suitable material such as steel, and projecting rearwardly from the rear face of the housing 50. A mounting plate 59 is mounted by suitable brackets 60 and 61 on the handle 4, and has two substantially L-shaped mounting brackets 62 and 63 mounted on, and projecting forwardly from the front face thereof. The mounting brackets 62 and 63 are so disposed on the handle 4 that when the housing 50 of the vacuum unit 6 is disposed in operative position on the handle 4, the brackets 62 and 63 project upwardly between the mounting straps 57 and 58 and the housing 50 in position to support the vacuum unit 6 on the handle 4. With this construction, the housing 50 may be quickly and easily removed from and mounted on the handle 4 by moving the housing 50 upwardly and downwardly, respectively, relative to the handle 4 in position to disengage the mounting straps 57 and 58 from the brackets 62 and 63, and to engage the mounting straps 57 and 58 with the mounting brackets 62 and 63, respectively. The tank 7, is also removably mountable on the mounting plate 59. Preferably, the tank 7 has straps, not shown, constituted and arranged in the same manner as the straps 57 and 58 on the vacuum unit 6, and is of substantially the same size and shape as the housing 50, so that it is completely interchangeable with the vacuum unit 6 on the handle 4. The tank 7 has a removable top 7a so that it may be refilled, as desired, without removing it from the handle 4 of the machine 1.

The motor 13 of the machine 1, shown in the drawings, includes a junction box 13a through which it is connected by a suitable electrical conduit 64, FIGS. 2, 4, 6, and 9, to one side of an electric switch 65 mounted on the upper end portion of the handle 4, the conduit 64 preferably extending from the junction box 13a through the handle 4 to the switch 65. The other side of the switch 65 is connected to a suitable electric conduit 66 which may be connected to a suitable source of electric power, not shown, such as, for example, the usual plug-in wall socket to be found in factories, office buildings, residences, and the like. The switch 65 includes a finger-actuated control member 67 preferably disposed closely adjacent to the hand grip 68 of the handle 4, so that during operation of the machine 1 the operator may readily control the operation thereof without removing his hands from the hand grip 68.

The motor 52 of the vacuum unit 6 shown in FIGS. 1 to 8, inclusive, preferably is connected through a control switch 69, FIG. 1, and a suitable electric conduit 70, having a plug 72 thereon, FIGS. 1, 2, and 4, to junction box 13a, through which it is connected to the conduit 64. The switch 69 is preferably disposed at the upper end portion of the vacuum unit 6 so as to be readily accessible to the operator during operation of the machine 1.

With this construction, during operation of the machine 1, and with the switch 69 in "on" position, the operator may control the operation of both the motor 13 and the motor 52 by actuating the control member 67 of the switch 65. However, if during operation of the machine 1, the operator should desire to operate the motor 13, and, therefore, the working unit 17, without operating the vacuum unit 6, such as, for example to check the depth of cut being effected by the working disk 34, he may

readily move the control member of the switch 69 to "off" position to thereby disconnect the motor 52 from its source of electric power and stop operation of the vacuum unit 6. Subsequently, when the operator again desires to have the vacuum unit 6 in operation, he may readily move the control member of the switch 69 to "on" position without interrupting operation of the machine 1.

In the operation of the novel floor treating machine 1, when it is being used for dry abrading, polishing, or buffing operations, the working fluid feeding unit 5 comprises the vacuum unit 6. At this same time, the working disk 34 of the working unit 17, comprises an abrading or polishing disk or pad. During such a floor treating operation, the working unit 17 is rotated by the motor 13 on the housing 8 to thereby abrade or polish the portion of the floor on which the working disk 34 is disposed. At the same time, the vacuum unit 6 being in operation, air is drawn upwardly under the lower edge portion of the skirt 41 and passes upwardly through the housing 8 and the conduits 45 and 46 into the housing 50 of the vacuum unit 6, to thereby pickup any dust or dirt on the portion of the floor over which the housing 8 is disposed. During such an operation, most of the air passing upwardly from the lower edge portion of the skirt 41 to the connecting nipples 43 and 44 passes between the outer peripheral edge portion of the lower supporting disk 23 and the adjacent portion of the skirt 41, and through the uncovered portions of the openings 29.

The open area afforded by the openings 29 and the space between the lower supporting disk 23 and the skirt 41 is preferably sufficiently restricted that the velocity of the air flowing upwardly past the lower supporting disk 23 is relatively high, so that it is highly effective to draw dust, dirt, abrading material, and the like, upwardly from the floor surface being treated into the vacuum unit 6. For example, using a vacuum unit 6 of the type capable of feeding air into the housing 50 at a rate of eighty cubic feet per minute, and with the housing 8 of such size that the diameter of the skirt 41 is between 15 and 17 inches, it has been found that so constructing the working unit 17 that the space between the skirt 41 and the outer peripheral edge of the lower supporting disk 23 is one-half inch, and the diameter of the openings 29 is five-eighths of an inch, with twenty of the openings 29 being spaced approximately one and one-half inches from each other, and with the pad 33 and the working disk 34 extending half way across the openings 29, the air flow through the housing 8 is highly effective and efficient in picking up foreign materials from the floor surface being treated.

In addition to the relatively high velocity of the air passing the lower supporting disk 23, the openings 29 cause an agitation and turbulence in the air flow through the housing 8 which is effective to create a sweeping action which is efficient in picking up such foreign material and feeding it into the conduits 45 and 46 for passage to the vacuum unit 6.

During such operation of the vacuum unit 6, a portion of the air drawn through the housing 8 may also pass upwardly through the openings 30. However, the amount of air passing through the openings 30 is relatively small, even when the pad 33 and the working disk 34 are made of porous material, because of the tendency of the pad 33 and the working disk 34 to clog up with the material being abraded from the floor surface. However, the openings 30 serve other important functions, as will be discussed in greater detail presently.

In some instances in the treating of floors, it is desirable to perform what is commonly known as a "wet abrading" operation, the portion of the floor surface being treated being wet by water, or the like, during the abrading operation. The novel floor treating machine 1 is well adapted for such operations. To convert the machine 1 from a dry abrading operation to such a wet abrading operation, the vacuum unit 6 may be removed from the

handle 4 and replaced with the tank 7. Then, with the machine 1 operating, the valve 49 may be actuated into the desired "open" position, to permit liquid to flow at the desired rate from the tank 7 downwardly through the hoses 47 and 48 into the housing 8. The nipples 43 and 44 being disposed above the lower supporting disk 23, and the outer peripheral edge portion of the supporting disk 23 being disposed relatively closely adjacent to the skirt 41, a portion of the water flowing through the hoses 47 and 48 into the housing 8 flows on to the upper face of the lower disk 23 and thus downwardly through the openings 29 and 30. The liquid flowing downwardly through the openings 30 tends to maintain the center portion of the pad 33 wet at all times, to thus afford a "self-cleaning" type of operation.

If it is desired to effect a scrubbing operation with the machine 1, this may be readily accomplished by removing the working unit 17 and the skirt 41, and replacing the working unit 17 with a brush, not shown, of the type shown in the aforementioned United States Letters Patent No. 3,100,903, the brush having a suitable driven coupling plate, such as the coupling plate 35, for attachment to the drive coupling plate 16. During such a scrubbing operation, water may also be fed from the tank 7 through the valve 49 and the hoses 47 and 48 into the housing 8, to thereby wet the surface underlying the housing 8, and being operated on by the brush so disposed in the machine 1.

With the machine 1 constructed in the herein disclosed manner, it may quickly and easily be converted from a "dry" process machine to a "wet" process machine, and vice versa.

Also with the machine 1 constructed in the aforementioned manner, the working unit 17 may be quickly and easily removed and replaced, and the working disk 34 may be quickly and easily changed. Also, it will be seen that the working disk 34 may be readily changed from one type of disk to another, such as, for example, from an abrading element to a polishing element, and the like.

Also, with the novel machine constructed in the aforementioned manner, the skirt 41 affords an enclosure for the working element 17 which is, at all times, spaced the desired predetermined distance from the outer peripheral edge of the working element 17.

In addition, the skirt 41 of the machine 1 affords an effective guard for preventing foreign objects from being poked into engagement with the working unit during operation of the machine 1, and it affords an effective splash guard for preventing splashing of liquid from the machine 1 during operation thereof in a "wet" process.

Also, it will be seen that the present invention affords a novel floor treating machine wherein the hand grip 68 is effectively insulated from vibration of the lower supporting disk 23, so that the machine 1 may be used on relatively rough floor surfaces, and the like, without subjecting the operator to excessive vibration.

In addition, it will be seen that the present invention affords a novel machine wherein the spacing of the skirt 41 from the floor surface being treated may be quickly and easily adjusted by the operator, and is effectively maintained during operation of the machine.

Thus, while we have illustrated and described the preferred embodiment of our invention, it is to be understood that this is capable of variation and modification, and we therefore do not wish to be limited to the precise details set forth, but desire to avail ourselves of such changes and alterations as fall within the purview of the following claims.

We claim:

1. A floor treating machine comprising

- (a) a base,
- (b) an elongated handle operatively connected to said base and projecting upwardly therefrom,
- (c) said base comprising

- (1) a housing of substantially inverted cup-shape,
 - (2) a motor mounted on said housing,
 - (3) an annular skirt removably mounted on the outer peripheral edge portion of said housing and depending therefrom, and
 - (4) a working unit
 - (a') removably mounted in said skirt in spaced relation thereto, and
 - (b') releasably connected to said motor for rotation thereby around the axis of said skirt during operation of the machine,
 - (d) said working unit comprising
 - (1) upper and lower supporting disks disposed in axially aligned relation to each other,
 - (2) spaced resilient means disposed between said disks in position to yieldingly hold said disks in vertically spaced relation to each other,
 - (3) clamping means operatively connected to said disks for holding said disks in engagement with respective opposite sides of said resilient means,
 - (4) a resilient disk-shaped pad mounted on the bottom face of said lower disk,
 - (5) a working disk mounted on the bottom of said pad in position to
 - (a') operatively engage such a floor and
 - (b') support said skirt in upwardly spaced relation to said floor during operation of the machine, and
 - (6) means mounted on said lower disk for releasably clamping said working disk to said pad, and
 - (e) said lower disk
 - (1) extending radially outwardly of said pad, and
 - (2) having a plurality of spaced openings extending substantially vertically therethrough and radially outwardly of said pad,
 - (f) means removably mounted on said handle for providing a flow of working fluid vertically through said openings and between said working unit and said skirt,
 - (g) said lower disk being disposed in radially inwardly spaced relation to said skirt throughout the periphery of said lower disk so as to restrict the flow of working fluid between said lower disk and said skirt.
2. A floor treating machine as defined in claim 1, and in which
- (a) said means for providing a flow of working fluid comprises a vacuum unit for drawing air upwardly between said working unit and said skirt and upwardly through said openings.
3. A floor treating machine as defined in claim 1, and in which said means for providing a flow of working fluid comprises means for feeding liquid into said housing in position to flow downwardly between said working unit and said skirt and through said openings.
4. A floor treating machine as defined in claim 1, and in which said upper disk is of a smaller diameter than said lower disk.
5. A floor treating machine as defined in claim 1, and in which said lower disk has a plurality of other spaced openings therethrough spaced inwardly from said first-mentioned openings, and inwardly from the outer peripheral edge of said pad and of said working disk.
6. A floor treating machine as defined in claim 1, and in which said means for providing a flow of working fluid is operatively connected to said skirt above said lower supporting disk for providing a flow of said working fluid through said skirt.
7. A floor treating machine comprising
- (a) a body portion having an annular depending skirt portion,
 - (b) a disk-shaped working unit disposed in said skirt portion in axial alignment therewith,
 - (c) said working unit comprising

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- (1) two substantially inflexible disk-shaped supporting members disposed in vertically spaced relation to each other,
 - (2) resilient separator means disposed between said supporting members,
 - (3) a resilient pad mounted on the lower face of the lowermost one of said supporting members,
 - (4) said lowermost supporting member extending radially outwardly of said pad,
 - (5) a working disk mounted on the lower face of said pad in position to operatively engage a floor to be treated during operation of the machine in position to support said skirt portion in upwardly spaced relation to said floor,
 - (d) said lowermost supporting member having a plurality of spaced openings extending substantially vertically therethrough and radially outwardly of said pad,
 - (e) means disposed on the axis of said skirt and operatively connected to said supporting members for rotating said working unit around said axis, and
 - (f) means supported by said body portion for providing a flow of working fluid vertically through said openings and between said working unit and said skirt,
 - (g) said lowermost supporting member being disposed in radially inwardly spaced relation to said skirt portion throughout the periphery of said lowermost supporting member so as to restrict flow of working fluid between said lowermost supporting member and said skirt.
8. A floor treating machine as defined in claim 7, and in which
- (a) said means for providing a flow of working fluid comprises a vacuum unit for drawing air upwardly

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- between said working unit and said skirt and upwardly through said openings.
9. A floor treating machine as defined in claim 7, and in which
- (a) said means for providing a flow of working fluid comprises means for feeding liquid into said skirt downwardly onto said lowermost one of said supporting members.
10. A floor treating machine as defined in claim 7, and in which
- (a) said lowermost supporting member has other spaced openings extending substantially vertically therethrough in radially inwardly spaced relation
 - (1) to said first-mentioned openings, and
 - (2) to the outer periphery of said pad.

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