A cleaning pad system for use on a motorized floor cleaning or polishing machine is described wherein the pad has melamine resin based foam.
MELOMINE FOAM PADS FOR MOTORIZED FLOOR CLEANING MACHINES

RELATED APPLICATION

[0001] The present application claims priority to U.S. Provisional Application Ser. No. 61/152,079 filed Feb. 12, 2009, the entirety of which is hereby incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention relates generally to tools, implements, systems, and methods for cleaning hard surface floors, and more particularly to melamine foam for use on motorized floor cleaning or polishing machines.

BACKGROUND OF THE INVENTION

[0003] Conventional motorized floor cleaning or polishing machines have typically included abrasive floor cleaning/polishing pads that do not conform to floor surface irregularities and therefore do not adequately clean hard surface floors. Tile floors having grout lines can be a problem in themselves, but even floors without grout lines can have depressions and scratches with a similar or even greater impact on cleanliness.

[0004] Further, brush-block attachments also do not adequately clean grouted floors. The grout lines are typically recessed to adjacent tiles and the cleaning action of a moving (rotating) brush does not adequately scrub the surface of the grout lines. Smaller pads or hand held cleaning tools have therefore been required in order to manually clean grout lines between tiles. Existing pads are typically abrasive and can therefore scratch hard surface floors.

[0005] In the cleaning of hard surface floors, even without grout lines, soiled conditions may be particularly problematic. These conditions include but are not limited to, (1) the removal of scuff marks left by shoes on a waxed floor surface, (2) the removal of soil in scratches in the wax on a waxed floor surface, and (3) removal of soil in pits and textures of tile and grouted floors.

[0006] The scuff marks as in (1) or soil as in (2), typically have been repeatedly buffed (or just worn down) into the wax, and are very hard to remove. In conventional prior practice, removal of scuff marks or dirt in scratches has required that the operator of the floor machine must first strip the top coats of wax from the surface using a high pH chemical stripper (known as top scrubbing). The stripper is worked into the wax with an abrasive pad to turn the wax into an emulsification sludge on the floor. This emulsification sludge is quite slippery and can be hazardous. This sludge must be collected by a wet/dry vacuum, or another method, before it has time to dry. Once this is done, the floor technician has removed the layer(s) of wax containing the marks/scratches. Then the operator must clean/neutralize the remaining floor finish, typically by mopping with rinse water containing neutralizer, followed by another fresh water mopping. Now that no wax or only a thin coat remains, and it is dull, the technician must re-coat the floor finish (i.e., apply another layer or two of wax), and then buff the final coat to acquire the desired luster/shine. This procedure is very time consuming, labor intensive, and involves transporting, using, and disposing—of strong chemicals. The procedure may be required several times per year depending on foot traffic and/or building management preferences.

[0007] Conventional practice for removing soil from pits and textures (including grout lines) in tile and grouted floors as in (3), required either the application of chemicals using deck brushes (very time consuming, labor intensive, and involves transporting, using, and disposing—of strong chemicals), or using a floor machine with a typical brush block or stripping pad. The latter process is not very effective in soil removal, and the stripping pad wears down quickly.

[0008] Technicians have tried a variety of hand techniques, including using cleaning erasers, for example a Mr. Clean Brand Magic Eraser marketed by the Procter and Gamble Fabric and Home Care Division, Cincinnati, Ohio. According to the Material Safety Data Sheet, the ingredient name of a Mr. Clean Brand Magic Eraser is Formaldehyde-Melamine-Sodium Bisulfite Copolymer. This material, commonly known as a melamine foam, is also packaged and sold for use under other generic and store brands as a “cleaning eraser”. The melamine foam is made in Germany by BASF chemical company, under the registered name of Basotect. Specifically, an example open cell foam block made for the production of cleaning appliances is identified on the BASF (specifically BASF SE, 67056 Ludwigshafen, Germany) Safety Data Sheet as Basotect V50 1250 mm×1250 mm×500 mm. Cleaning erasers tend to be small and intended for hand-use on small areas. Commercial floor cleaning companies use motorized floor machines over a large area but have resorted to using cleaning erasers by hand on problem areas. Erasers, whether used by hand, or with machinery, tend to wear down rapidly due to uneven pressure of the eraser.

[0009] There is, therefore, a demonstrated need for a cleaning pad structure for use on motorized floor cleaning or polishing machines that can effectively clean a hard surface floor, including a tile floor with grout lines, without scuffing the floor surface and without wearing down quickly.

SUMMARY OF THE INVENTION

[0010] The present invention relates generally to melamine resin based foam for use on motorized floor cleaning or polishing machines.

[0011] In one embodiment a cleaning pad for use on a motorized floor cleaning or polishing machine has a substantially circular melamine foam disk. The disk has a diameter, a thickness, a first scrubbing surface comprised of melamine foam and a second surface spaced from the scrubbing surface by the thickness. The cleaning pad also has a backing disk not of melamine foam that is substantially the same diameter, and a fastener fixedly coupling the backing disk to the second surface.

[0012] In another embodiment a cleaning pad for use on a motorized floor cleaning or polishing machine, has a substantially circular melamine foam disk having a diameter, a thickness, a first scrubbing surface of melamine foam and a second surface spaced from the scrubbing surface by the thickness. A fastener is secured to the second surface. In some embodiment the fastener may be a hook part of a hook and loop system.

[0013] Another embodiment is a floor cleaning system having a melamine foam disk scrubbing portion that is rotationally driven by a rotating member of a floor machine. In exemplary embodiments the rotating member may be a pad driver, or may be an abrasive stripping pad operatively attached to the motorized floor cleaning machine. The melamine foam disk is driven by friction.
Another embodiment is a no-strip method of cleaning a waxed floor using water or a cleaning solution, for example a detergent solution, and a rotary floor machine at low speed driving a circular melamine foam pad to remove dirt from depressions in the waxed floor without stripping off wax prior to doing so.

Another embodiment is a no-strip method of cleaning a waxed floor by using a rotary cleaner and water or a detergent solution and a rotary machine at low speed with a circular melamine foam pad having a polyurethane foam backer attached to the melamine foam. The backer is penetrated by a pad driver of the rotary machine to rotationally drive the melamine foam pad and remove dirt from scratches and grain lines in the waxed floor.

Another embodiment is a method of maintaining a floor having a waxed surface. The method includes, without stripping wax from the floor, securing a disc-like melamine foam pad under a pad driver of a low speed floor cleaning machine and then depositing a liquid on the waxed surface and operating the low speed floor cleaning machine to rotate the melamine foam pad at a low rotation speed on the waxed surface so that the melamine foam pad enters depressions in the floor and moves substantially all the dirt from depressions in the waxed floor surface to the liquid. The method also includes removing the liquid and buffing with a buffing pad.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more clearly understood from the following detailed description of representative embodiments thereof read in conjunction with the accompanying drawings that form a part of this disclosure.

FIG. 1 is a schematic perspective view in partial cut away of a melamine based foam pad structure according to the invention as attached to a rotary motorized floor machine.

FIG. 2 is a partial cross-section as indicated in FIG. 1.

FIG. 2A is an alternate embodiment in a view similar to FIG. 2.

FIG. 3 is a schematic perspective view of a tile floor with grout lines.

FIG. 4 is a partial cross-sectional schematic view, as indicated in FIG. 3.

FIG. 5 is a detail view, as indicated in FIG. 4.

FIG. 5A is the view of FIG. 5 after wax stripping in a way that is old in the art.

FIG. 6 is the view of FIG. 5 after cleaning with a fibrous pad or brush in a way that is old in the art.

FIG. 6A is the view of FIG. 6 after buffing in a way that is old in the art.

FIG. 7 is the view of FIG. 5 with an embodiment of a floor pad of the invention being brought into contact with the floor.

FIG. 7A is the view of FIG. 7 after the rotating floor pad has removed dirt.

FIG. 7B is the view of FIG. 7A after the floor pad is removed and a buffing pad is being brought into contact with the floor.

FIG. 7C is the view of FIG. 7A after buffing of the wax is complete.

FIG. 8 is a partial perspective view of a floor having thin tiles and no grout.

FIG. 9 is a cross-sectional view as indicated in FIG. 8.

FIG. 10 is a detail view as indicated in FIG. 9.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

Whereas melamine resin is disclosed as a binder of fibrous materials and abrasive particles in rotary floor machine pads, for example those described in U.S. Pat. No. 5,685,042 to Demetriades, a melamine foam rotary floor pad has not been used, other than when augmented by surrounding support and scouring brush structure as in Japanese published patent application JP 2008-99768(A) to Morishita. Although melamine eraser pads have shown short lifetimes, experiments have indicated that the current invention, which supports the melamine foam and brings it into contact with the floor at a consistent pressure, results in unexpected longevity.

FIGS. 1 and 2 illustrate the deck of a rotary motorized floor machine 2 having a pad driver 4 with bristles 6 extending from bottom surface 8 that drives a melamine foam floor pad 10. Typical rotational speeds for machine 4 having pads 10 of the invention attached thereto are in the range of from about 150 to about 2000 rpm. The floor pad 10 comprises a melamine foam portion 12, that may be referred to as a scrubbing portion, a backer 14 and a fastener in the form of an adhesive 16. The melamine foam is characterized by a very fine open cell structure that when used with water or cleaning chemical solutions provides superior cleaning results. The foam portion 12 has a side edge 18 a bottom surface 20 a top surface 22 and a thickness 24. The backer has a side edge 26 a bottom surface 28 a flat top surface 30 and a thickness 32. The bristles have a length 34. The bristles are a distance 36 from the bottom surface 20. This distance will change as the floor pad 10 compresses and wears. Although the bristles 6 illustrated flare outward as they leave the bottom surface 8, this need not be the case. The current invention will work with a wide range of pad drivers, some of which for example are solid plastic with pointed protrusions instead of bristles. Surface 30 is flat, and impaled by the bristles 6. It is also contemplated that surface 30 may not be flat, but instead be contoured in a way to better couple to specific pad drivers 4.

In the illustrated embodiment the floor pad 10 covers the central area. Although not shown, the floor pad 10 may have a centrally removable portion, or the like, to provide access to hub hardware at the center of rotation, depending on the style of machine 2 and pad driver 4. Pad drivers come in a variety of forms and configurations, and their attachment to the machine is not a subject of the current application.

Floor pad 10 is substantially circular or oval in shape and may be of substantially any diameter or thickness as needed to apply to a specific floor machine 2 and pad driver 4. Typical ranges of the diameter are from about three inches to about twenty inches. Typical thicknesses of pad 10 range from about one-half inch to about three inches. In one embodiment melamine foam portion 12 has a thickness of about one inch and backer portion 14 has a thickness of about three quarters of an inch. Although the embodiment in FIGS. 1 and 2 has a consistent and uniform adhesive 16, that need not be the case. The adhesive 16 may be formed differently, as long as it sufficiently binds the melamine pad 12 to the backer 14.

In FIG. 2A, another embodiment, a floor pad 100 is illustrated. Floor pad 100 comprises melamine foam portion
12 and a series of hook portions 102 secured to the top surface 22. Hook portion 102 may be secured by adhesive, stitching, or any fastener that is sufficiently strong. The pad driver 4 holds a fibrous pad 104. The fibrous pad 104 has loops that are gripped by the hooks of hook portion 102, commonly understood as the way VELCRO™ works. The fibrous pad 104 need not be abrasive, however it may take the form of one of the variety of abrasive stripping, buffing, and polishing pads that are available to the floor care industry. In embodiment 100, when worn out, hook portion 102 is disposed of with melamine portion 12.

[0039] Conventional hook and loop systems useful in the invention may include those described in U.S. Pat. No. 5,380,313, incorporated by reference herein, or the system known commercially as VELCRO. Other means of securing pad 10 to the portable pad driver 4 of machine 2 may include mechanical fasteners or other means as would occur to the skilled artisan practicing the invention, the specific attaching means not considered limiting of the invention or of the appended claims.

[0040] In yet another embodiment, not illustrated but possible for one of ordinary skill in the art of setting up and operating rotary floor machines to understand, the hook portion 102 may be eliminated allowing the fibrous pad 104 to rest directly on the melamine portion 12. In this embodiment the coefficient of friction between the fibrous pad 104 and the melamine portion 12, and the weight of machine 2, is relied upon to rotate the melamine portion 12. One example of a fibrous pad is a commercially available abrasive stripping pad, varieties of which are supplied by the JonDon company of Roselle, Ill. Adjustment of speeds may make it easier for a friction-only interface as in this embodiment to work, but trade-off with cleaning effectiveness and efficiency may be associated with changing speed.

[0041] Another embodiment contemplated but not illustrated is to have the bristles 106 contact the melamine foam 12 directly, without a backer in between. However this would require additional melamine foam thickness to maintain a comparable distance 36 (FIG. 2) between the bristles 6 and a floor being maintained. It would also require the melamine foam material to have the properties necessary for good floor cleaning, as well as sufficient durability and strength where bristles 6 transmit force to the melamine foam. Other embodiments, for example floor pad 10, having both a melamine foam portion 12 and a backer 14 facilitate the overall optimization of floor pad 10.

[0042] Some aspects of the cleaning actions of pad 10, and its methods of use are now described with reference to FIGS. 3-10. FIGS. 3 and 4 illustrate a floor 38 made of tiles 40 with grout 42 in grout lines 44 between the tiles. The floor has a top surface 45 and a subfloor 46 underneath. The tiles have a top surface 48, side surfaces 50, and a beveled edge 52 between. The grout has a top surface 54. A wax coating 56 on top of the floor comprises multiple applied layers, and for the purposes of this description five layers are illustrated as 58a, 58b, 58c, 58d, and 58e. Various dirt stains and scratches are illustrated. 60 is dirt, 62 is a scuff mark, and 64 is like 60 but located at a grout line 44. 66 is a new scratch, 68 is a scratch that has filled with dirt, and 70 is like 68 but is located at a grout line 44. 72 is dirt that is embedded in the wax, and in the discussion that follows it will be understood how even though it is undesirable, 72 is often present on floors cleaned without the benefits of the current invention. A deeper scratch or gouge 74 is drawn as an example of a real world problem often found in the floor cleaning industry. 74 may typically be caused by dragging or rolling a heavy object across a floor. Whereas a casual observer may think gouge 74 is smooth bottomed, upon close observation gouge 74 will often be found to have more complicated cross-sections, an example of which will be described further.

[0043] Referring to FIG. 5, gouge 74 has two side edges 76, a first bottom 78 and two corners 80 therebetween. A sub-scratch 82 has a second bottom 84. Dirt 86 fills all of gouge 74. The gouge 74 is into the middle wax coat 58c. As substantially described in the background, without the current invention proper cleaning requires stripping (removing) the top three layers 58e, 58d, 58c of wax to remove all of the dirt 86 with them. This is a time consuming task using harsh chemicals and creating chemical waste. It leaves the floor 38 with only 2 layers 58b, 58a of dulled wax (FIG. 5A) so stripping is usually followed by an application and buffing of more wax coats (not shown). In other instances, a superficial cleaning is performed wherein a scrubbing pad or brush block is used to remove the dirt that it can reach, resulting in 74 having less dirt 86, but still not clean (FIG. 6). Then, typically, the surrounding wax layers are buffed to soften and move the nearby wax into the gouge 74, encasing the remaining dirt 86 below the surface 45 (FIG. 6A), forming an ongoing dirty area like 72 (FIG. 4).

[0044] The method of using the floor pad 10 is illustrated in FIGS. 7-7C. The rotating floor pad 10 along with water or a cleaning solution, for example a detergent solution, is used on the floor 38 so that melamine foam portion 12 can deform into gouge 74 to push out the dirt 86. On a macro scale the melamine foam is soft and flexible enough to reach into the corners 80 and down to the second bottoms 84, yet on a small scale, for example, at the contact surface of the melamine portion 12 to the corner 80 and second bottom 84, the melamine is relatively stiff and has sufficient abrasive qualities. After rinsing and drying steps (optional and not illustrated) a rotary buffing pad 88 is used as is well known in the art to smooth the surrounding wax over the gouge 74, as was described relative to FIGS. 6 and 6A previously. However, due to the benefits of cleaning with the floor pad 10, the wax floor does not have encased dirt 72.

[0045] As one skilled in the art would know, small spot waxing and buffing may be done in place of or in addition to buffing the surrounding wax. This addition of wax is done without any stripping, and therefore there are no harsh chemicals and chemical waste.

[0046] Returning to FIG. 4, one skilled in the art can see that by describing above how the floor pad 10 can clean the worse case, gouge 74, it is also understood that the floor pad 10 can clean 60, 64, 68, and 70 in a similar manner because all of those defects have dirt that is less difficult to reach than was the dirt in gouge 74, especially in the corners 80 and second bottoms 84. A scuff mark 62 left by the heel of a shoe is also removed by melamine foam, the same as dirt 60.

[0047] Referring to FIGS. 8-10, a floor 90 having a wax coating over tiles 92 without grout lines is illustrated. An example of such tiles are vinyl composite tiles (VCT) or any tile that is thin and adhered to the subfloor with adjacent tiles butting edges along seams 94. As seen in FIG. 9, the abutting edges have imperfections and gaps 96 into which dirt 86 can accumulate. As demonstrated with reference to FIGS. 3-7D, gap 96 may also be cleaned fully with floor pad 10 in less time and with less effort and waste than without floor pad 10.
Returning to FIGS. 1 and 2, a preferred embodiment of floor pad 10 uses melamine foam portion 12 and backing portion 14 made of polyurethane foam. One such backing foam used successfully is a 45 PPI (pores per inch) reticulated S-grade polyester based polyurethane with a tensile strength of 18 pounds per square inch, of the FilterCrest™ brand. The melamine foam for melamine portion 12 is made in Germany by BASF chemical company, under the registered name of Basotect®. Specifically, an example open cell foam block made for the production of cleaning appliances is identified on the BASF SE (67056 Ludwigshafen, Germany) Safety Data Sheet as Basotect® V3012 2500 mm×1250 mm×500 mm.

Paraphrasing the words of the BASF literature: “Basotect foam works like a very soft sandpaper since Basotect is as hard as glass despite its fine pore structure and flexibility. When moistened, Basotect foam slides easily and rubs dirt off a surface.” Although melamine foam is available in Grey and has been found to clean equally well as white melamine foam, the white version is customarily used for cleaning, while grey is used in other products.

SLM-371, a high-tack; moderate dead load acrylic adhesive coated 2 mils on both sides of a high quality polyester film has been successfully used for adhesive 16. SLM-371 is available from United Foam in Grand Rapids, Mich. Information about SLM-371 is as follows:

<table>
<thead>
<tr>
<th>SLM 371 Typical Values</th>
<th>Imperial</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unwind Adhesive Thickness:</td>
<td>2.0 mils</td>
<td>0.03 mm</td>
</tr>
<tr>
<td>Peel Adhesion (PSTC-3, ASTM - D 3330)</td>
<td>70 oz/inch</td>
<td>766 N/meter</td>
</tr>
<tr>
<td>Temperature:</td>
<td>220° F.</td>
<td>105° C.</td>
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<td>Minimum continuous use</td>
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<tr>
<td>Release Liner:</td>
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</tbody>
</table>

The cleaning pad of the invention described herein can be configured for use with conventional motorized floor scrubbing/polishing machines. The cleaning pad readily conforms to floor surface irregularities and applies enough pressure over the surface of the floor contacted by the pad, which results in even cleaning action over the entire floor surface. Scuff marks are easily removed, which may obviate the need for the floor to be top scrubbed and re-waxed. The floor is substantially cleaner because of the application of even pressure over the surface area of the pad. Using the invention, a brighter/shiner floor finish is obtained as an end result, all with minimum chemical use, labor time, and facility downtime required for allowing coats of new wax to dry. This greatly reduces the number of top scrubs and re-coats per year that would otherwise be required for proper floor surface maintenance.

The melamine based foam pad structure according to the invention demonstrates improved efficiency over prior art methods using melamine based foam in that the melamine based foam is longer lasting and resists disintegrating or crumbling away, as prior art melamine erasers break down quickly on tile and grouted surfaces. Because the pad applies pressure substantially uniformly and conforms to surface irregularities, it can effectively clean hard surface floors comprising tile and grout lines without scratching the floor surfaces.

The invention therefore provides a foam pad structure comprising melamine foam for use on motorized floor cleaning or polishing machines. It also provides a method of cleaning floors without first stripping the wax. It is understood that modifications to the invention may be made as might occur to one with skill in the field of the invention within the scope of the appended claims. All embodiments contemplated hereunder that achieve the benefits of the invention have therefore not been shown in complete detail. Other embodiments may be developed without departing from the spirit of the invention or from the scope of the appended claims.

What is claimed is:

1. A cleaning pad for use on a motorized floor cleaning or polishing machine, comprising:
   a substantially circular melamine foam disk having a diameter, a thickness, a first scrubbing surface comprised substantially exclusively of melamine foam and:
   a second surface spaced from said scrubbing surface by the thickness;
   a backing disk not of melamine foam having substantially the same diameter; and
   a fastener fixedly coupling the backing disk to the second surface.

2. The cleaning pad of claim 1 wherein the fastener is an adhesive.

3. The cleaning pad of claim 2 wherein the backing disk is a foam.

4. The cleaning pad of claim 3 wherein the backing disk is a polyurethane foam.

5. The cleaning pad of claim 4 wherein the backing disk is at least ¼ inch thick.

6. A cleaning pad for use on a motorized floor cleaning or polishing machine, comprising:
   a substantially circular melamine foam disk having a diameter, a thickness, a first scrubbing surface comprised substantially exclusively of melamine foam and:
   a second surface spaced from said scrubbing surface by the thickness;
   a fastener secured to the second surface.

7. The cleaning pad of claim 6 wherein the fastener is a hook part of a hook and loop system.

8. The cleaning pad of claim 6 wherein the thickness is at least ¼ inch.

9. A floor cleaning system comprising a scrubbing portion that is substantially exclusively a melamine foam disk rotationally driven by a rotating member of a floor machine.

10. The floor cleaning system of claim 9 wherein the rotating member is a pad driver.

11. The floor cleaning system of claim 9 wherein the rotating member is an abrasive stripping pad operatively attached to said motorized floor cleaning machine and wherein said melamine foam disk is disposed against said stripping pad, whereby said melamine foam disk is held to said stripping pad by friction at the interface of said melamine foam disk and said stripping pad.

12. A no-strip method of cleaning a waxed floor comprising:
   using water or a detergent solution and a rotary floor machine at low speed driving a circular melamine foam
pad to remove dirt from depressions in the waxed floor without stripping off wax prior to doing so.

13. A no-strip method of cleaning a waxed floor by using a rotary machine comprising:
without first stripping wax, using a cleaning fluid and the rotary machine at low speed with a circular melamine foam pad having a polyurethane foam backer attached to the melamine foam, said backer penetrated by a pad driver of the machine to rotationally drive the melamine foam pad and remove dirt from scratches and grout lines in the waxed floor.

14. The method of claim 13 wherein the cleaning fluid is water.

15. The method of claim 13 wherein the cleaning fluid is a detergent solution.

16. A method of maintaining a floor having a waxed surface comprising:
without stripping wax from the floor, securing a disc-like melamine foam pad under a pad driver of a low speed floor cleaning machine; depositing a cleaning liquid on the waxed surface; and operating the low speed floor cleaning machine to rotate the melamine foam pad at a low rotation speed on the waxed surface so that the melamine foam pad enters depressions in the floor and moves substantially all the dirt from depressions in the waxed floor surface to the liquid;
removing the cleaning liquid;
buffing the wax surface with a buffing pad.