Oct. 24, 1961 C. S. MILLER 3,005,219

SCRUBBER

Filed May 26, 1959 2 Sheets-Sheet 1

FIG. 1

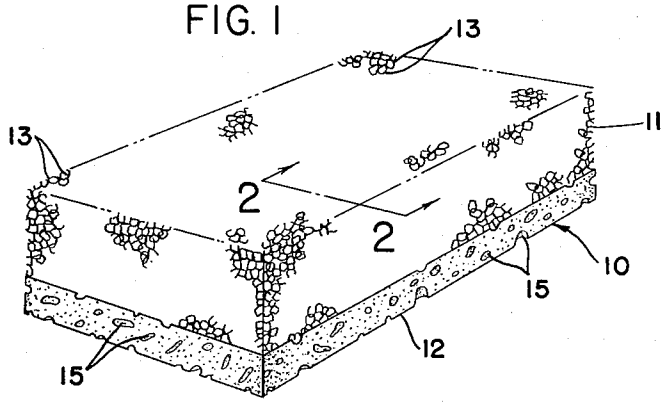


FIG. 2

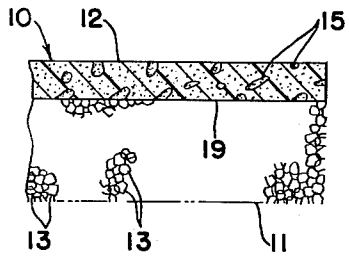


FIG. 3

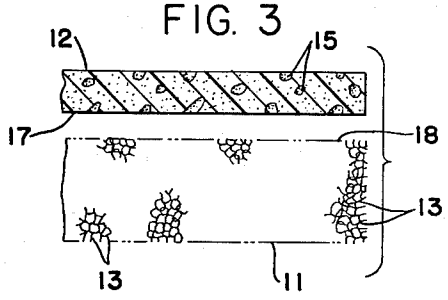
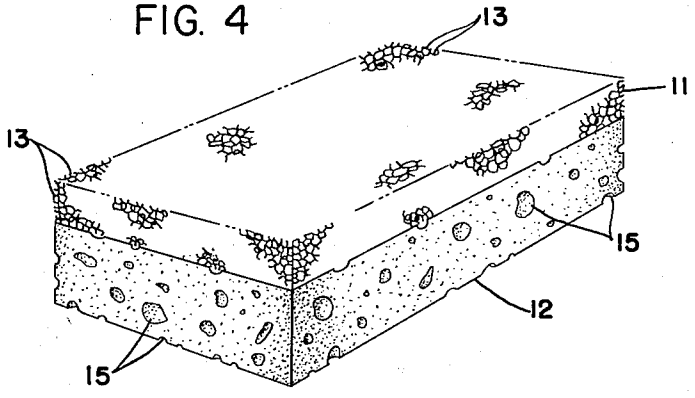


FIG. 4



Oct. 24, 1961 C. S. MILLER 3,005,219

SCRUBBER

Filed May 26, 1959 2 Sheets-Sheet 2

FIG. 5

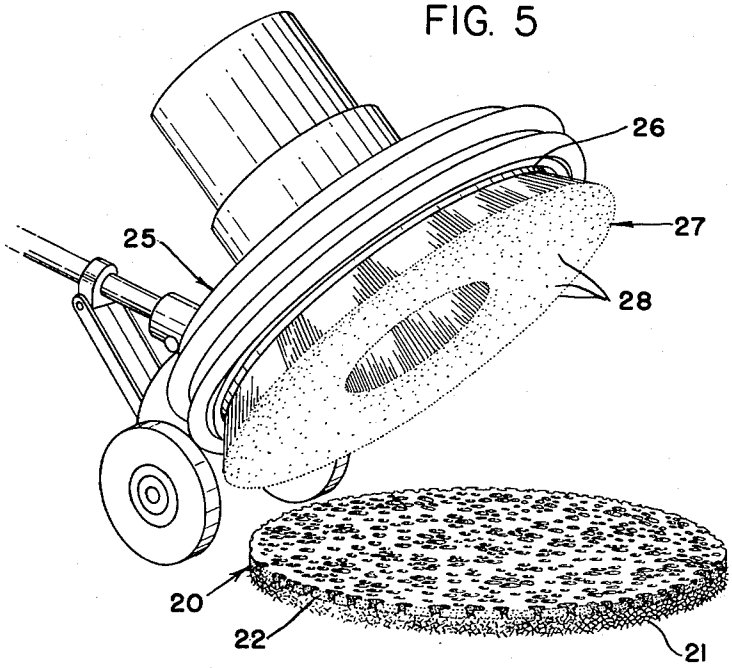


FIG. 6

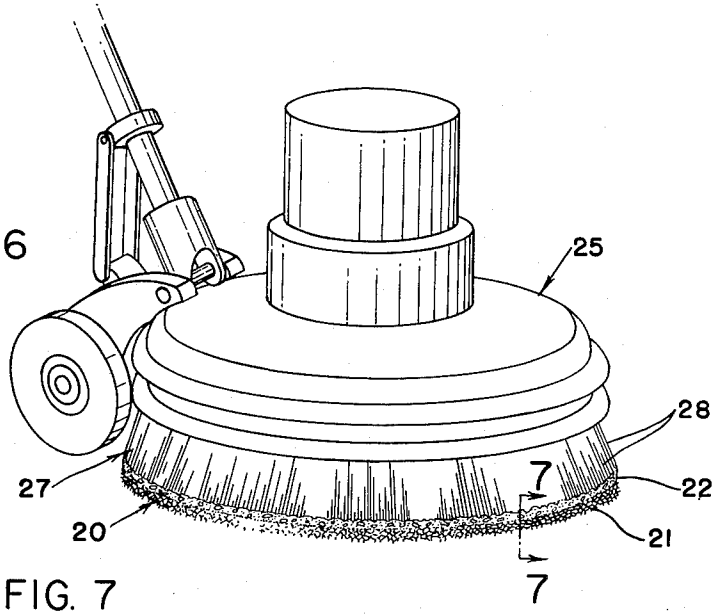
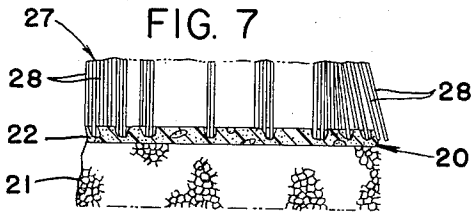


FIG. 7



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3,005,219

SCRUBBER

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4 Claims. (Cl. 15—98)

This invention relates to a novel and improved scrubber, and particularly to a scrubber for use in connection with mechanically and electrically operated floor scrubbers, as well as for use in the hand scrubbing of soiled surfaces.

An object of this invention is to provide a composite scrubber that is superior in wearing qualities, has a longer service life and is odorless, rotproof, non-allergic, sanitary and does not hold dirt.

A further object is to provide a composite scrubber that is superior when used in connection with a mechanical or electrical floor brush scrubber.

Still another object of this invention is to provide a composite scrubber than can be held in the hand of the user while cleaning any soiled surface.

Other objects will be apparent from the following specification and annexed drawing in which

FIG. 1 is a view in perspective of the composite scrubber of this invention;

FIG. 2 is a fragmentary sectional view taken on line 2—2 of FIG. 1;

FIG. 3 is a view showing the two slabs of the scrubber separated for application of adhesive prior to the assembly of the composite scrubber;

FIG. 4 is a view in perspective of another embodiment of this invention;

FIG. 5 is a view in perspective of a circular composite slab about to be applied to the rotating brush of a conventional electrically operated brush scrubber;

FIG. 6 is a view in perspective of the circular composite slab applied to the rotating brush of a conventional electrically operated brush scrubber; and

FIG. 7 is a fragmentary sectional view taken on line 7—7 of FIG. 6.

The scrubber **10** of this invention is a composite slab construction consisting of two porous polyurethane slabs **11** and **12**, each having distinctly different structural characteristics one from the other. One of the slabs **11** is a reticulated slab which as shown in the drawing is a fully skeletal network of intertwining, interlocking polyurethane thread-like filaments **13** having relatively large communicating interstices, or open spaces, substantially uniformly distributed throughout the slab, and in which the polyurethane occupies only a very small part of the volume of the slab **11**. The other slab **12** is made up of gas-blown polyurethane having cells **15** or open spaces, of varying sizes and shapes, some large elongated cells, and many minute cells, distributed irregularly throughout the slab **12**, the distribution and varying sizes of cells **15** being similar to that of a natural sponge, and in which a higher percentage of the volume of the slab is polyurethane.

For convenience in description in the specification and claims, the polyurethtane reticulated slab **11** consisting of the fully skeletal network of thread-like polyurethane filaments **13** is referred to as the polyurethane "retiform" slab **11** and the gas-blown polyurethane slab **12**, consisting of cells of various sizes and shapes distributed irregularly throughout the slab, is herein referred to as the polyurethane "sponge" slab **12**. It is well known that the polyurethanes are hydrophobic, or water repelling, and hence do not absorb water or hold water in any considerable amount in the spaces between the filaments of

the polyurethane retiform slab **11** or in the cells of the polyurethane sponge **12**.

Polyurethane, even in the fully skeletal meshed-thread form in which it is present in the retiform slab **11**, is strong, tough and highly abrasion-resistant and at the same time has a high degree of resiliency, and hence is particularly well adapted for use in scrubbing soiled surfaces of every kind in that its service life is almost limitless. It has been found by applicant, however, that the composite structure **10** made of the composite polyurethane fully skeletal retiform slab **11** and the polyurethane sponge slab **12** are much more efficient than either one of these slabs alone. One of the difficulties to be overcome in producing this composite structure **10** is to secure a joinder of the two slabs **11** and **12** into an indestructible unitary composite structure **10** that would be permanent when exposed to acids, alkalis, oils, solvents, modern detergents and the like at the high temperatures often employed in scrubbing operations with mechanical scrubbers.

Applicant has been able to overcome such difficulties by the use of a novel adhesive composition, which not only joins the two slabs **11** and **12** into a unitary composite slab **10**, in which the union is as strong as the polyurethane of the slabs **11** and **12**, but also forms a joinder through which fluids may pass from one slab to the other.

The following adhesive has been found to meet the severest requirement as a joinder between the two polyurethane slabs of the composite scrubber of this invention:

Adhesive recipe

Ingredients:	Parts by wt.
Multranil-176 (20% sol. of polyanil in ethyl acetate and acetone)	10.0
Arochlor 1254 (polychlorinated polyphenol)	1.0
Mondur CB75 (75% polyisocyanate and 25% ethyl acetate)	1.0
Ethyl glycol monoethyl ether acetate ($CH_2COOCH_2CH_2OC_2H_5$)	3.0

For joining the slabs **11** and **12** into a truly unitary composite structure **10** having interconnecting cells, coat the two polyurethane surfaces to be joined with a film of the adhesive, but without forming a film over the cells or interstices. Thus, as shown in FIG. 3, coat the under surface **17** of the slab **12**, and the upper surface **18** of the slab **11**. This may be done by means of a roller on which is a film of the adhesive or, by pressing the surfaces **17** and **18** against a plate on which is a film of the adhesive so that the adhesive contacts only the polyurethane that lies in the plane surfaces **17** and **18** to be joined. After the solvent has evaporated the adhesive coated surfaces **17** and **18** are pressed together and permitted to set, or cure, at room temperatures for at least an hour. A union **19** between the two slabs **11** and **12** is formed that is stronger than the materials of either of the two slabs **11** and **12**, and joinder is invisible.

In a preferred form of this invention, there is employed a circular composite scrubber **20**, shown in FIGS. 5, 6 and 7, made up of a fully skeletal polyurethane retiform slab **21** having the same characteristics as the retiform slab **11**, as above described, and an irregularly distributed cellular polyurethane sponge slab **22** having the same characteristics as the sponge slab **12**, as hereinabove described, the two slabs **21** and **22** being united into a unitary scrubber **20** in the manner described above for the union of the two polyurethane slabs **11** and **12** in connection with composite scrubber **10**.

A mechanical rotary brush scrubber **25**, shown in part in FIGS. 5 and 6, has a rotating annular brush holder

26 in which is clamped an annular bristle brush 27, having the bristles 28. To mount the circular composite scrubber 20 on the rotary brush scrubber 25, it is only necessary to raise the brush 27, as by tilting back the scrubber 25, as shown in FIG. 5, and bring the brush 27 down squarely on the scrubber 20, the bristles 28 penetrating the sponge slab 22 for a short distance to removably unite, but with adequate firmness during the operation of the scrubber 25, the scrubber 20 to the brush 27. To remove the scrubber 20, it is only necessary to raise the brush 27 and pull off the composite scrubber slab 20 from the bristles 28.

While there have been described above what are considered to be preferred embodiments of the invention of this application, it is evident that various modifications can be made in the specific structures which have been herein disclosed without departing from the purview of this invention, and that such modifications and substitutions may be made therein without departing from the scope of this invention as defined in the appended claims.

What is claimed is:

1. In a machine designed to clean generally flat surfaces and having an annular rotatable member with an annular pad-contacting portion lying in a plane normal to the axis of rotation and means for delivering cleaning liquids through the central opening in said annular member to a cleaning pad, in combination, a disc-shaped reversible polyurethane cleaning pad consisting essentially of two polyurethane discs and an intermediate means for uniting the two polyurethane discs into a unitary construction having two flat parallelly disposed outer circular polyurethane cleaning surfaces, one disc being a retiform fully skeletal network of intertwining, interlocking, highly resilient, tough, abrasion-resistant, high tenacity polyurethane thread-like filaments providing relatively large and substantially uniformly distributed channels throughout the said polyurethane retiform disc, the other disc being a gas-blown polyurethane sponge having cells of varying sizes and shapes distributed irregularly throughout the polyurethane sponge disc, and the intermediate uniting means being perforate to permit liquids to pass freely therethrough from one disc to the other; whereby in operative position the cleaning pad may have the flat outer surface of either the polyurethane retiform disc or the polyurethane sponge disc in contact with the area being cleaned and the cleaning liquid passes freely from the central opening in said annular rotating member through the cleaning pad to the area being cleaned without substantial absorption of the cleaning liquid in the polyurethane cleaning pad.

2. In a machine for cleaning generally flat surfaces having an annular brush rotatable on its axis and having bristles with their free ends terminating substantially in a plane normal to said axis and having means for delivering liquids through the central opening in said annular brush, in combination, a disc-shaped reversible cleaning member comprising three distinct liquid pervious portions consisting essentially of two discs and an intermediate layer uniting the two discs into a unitary construction having two flat outer circular cleaning surfaces; one disc being a retiform fully skeletal network of intertwining, interlocking, highly resilient, tough, abrasion-resistant, high tenacity polyurethane thread-like filaments providing relatively large and substantially uniformly distributed communicating channels throughout the polyurethane retiform disc; the other disc being a gas-blown polyurethane sponge structure having cells of varying sizes and shapes distributed irregularly throughout the polyurethane sponge disc, the intermediate layer being perforate to permit liquids to pass freely therethrough from one disc to the other, said cleaning member being held in operative position with respect to said annular brush solely by the contact of the said free ends of the bristles with a flat outer circular surface of the cleaning member, whereby in operative position the flat outer surface of either the polyurethane retiform disc or the polyurethane sponge disc may be placed in contact with the bristles of the brush to rotate the said cleaning member with the flat outer surface of either the polyurethane retiform disc or the polyurethane sponge disc in contact with the area being cleaned and whereby the cleaning liquid passes freely from the central opening in the rotating brush through the cleaning member to the area being cleaned without substantial absorption of the cleaning liquid by the ploy urethane cleaning member.

3. In a substantially non-absorbent reversible polyurethane cleaning pad, two polyurethane slabs and a perforate intermediate layer uniting the two slabs in a plane substantially parallel to the surfaces of the cleaning pad, one slab being a retiform fully skeletal network of intertwining, interlocking, highly-resilient, tough, abrasion-resistant, high tenacity polyurethane thread-like filaments providing relatively large and substantially uniformly distributed communicating channels throughout the polyurethane retiform slab, the other slab being a gas-blown polyurethane sponge structure having cells distributed throughout the polyurethane sponge slab, the perforate intermediate layer providing intercommunicating passageways between the channels of the polyurethane retiform slab and the cells of the polyurethane sponge slab.

4. The reversible cleaning pad as defined in claim 3 wherein the intermediate layer consists essentially of a flexible solidified adhesive formed from a liquid mixture comprising (1) a 20% solution of polyanil in ethyl acetate and acetone, (2) polychlorinated polyphenol, (3) 75% of polyisocyanate with 25% ethyl acetate, and (4) ethyl glycol monoethyl ether acetate.

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