June 28, 1960 H. Z. GRAY 2,942,285

COMPOSITE CLEANING ARTICLE AND METHOD OF MANUFACTURING SAME

Filed July 17, 1956

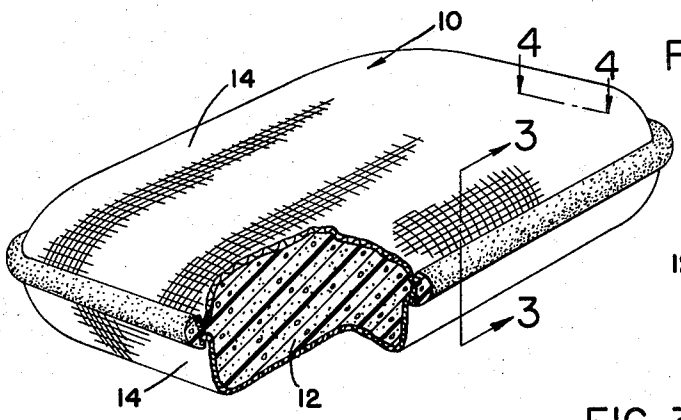


FIG. 1

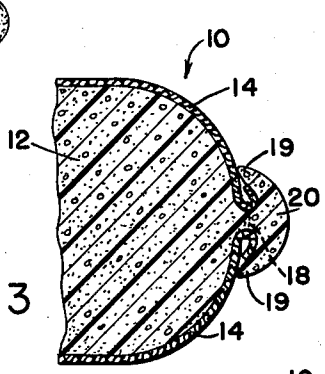


FIG. 3

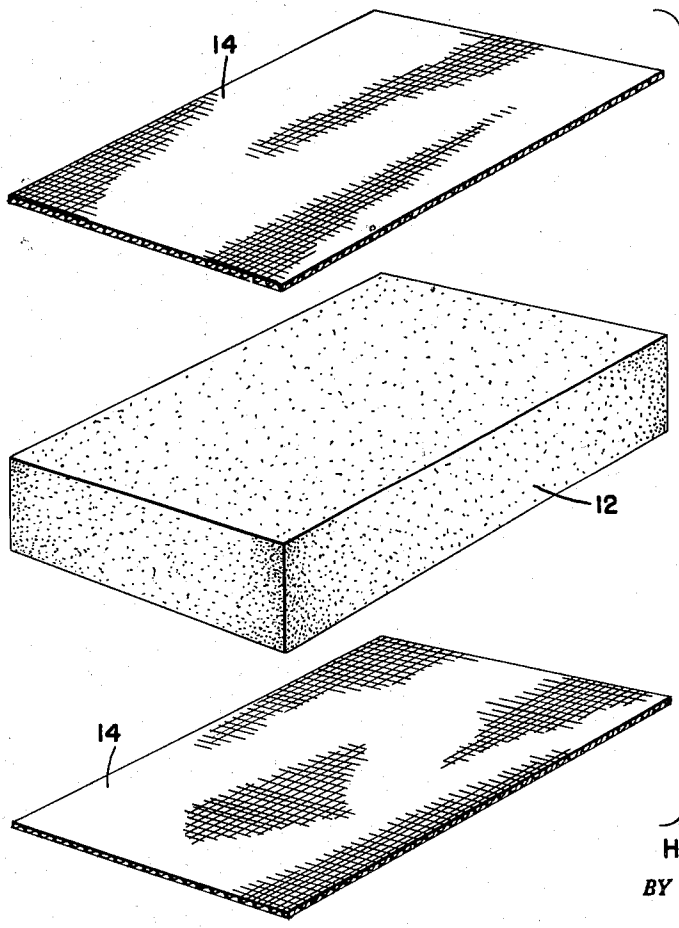


FIG. 2

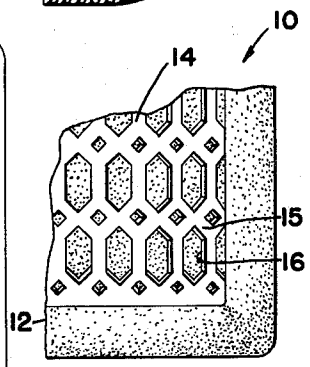


FIG. 4

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COMPOSITE CLEANING ARTICLE AND METHOD OF MANUFACTURING SAME

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7 Claims. (Cl. 15—209)

The present invention relates to a composite cleaning article and to a method of manufacturing same. More particularly the invention relates to such article having a body of polyurethane foam and a mesh covering of a synthetic fiber or resin, preferably nylon.

The article of the invention is primarily intended for use in cleaning vehicle windshields and in household cleaning chores which require the presence of water, a soap or detergent, and an abrasive surface to obtain an effective cleaning action. Such chores include the scrubbing of floors, the cleaning of pots, pans, charcoal grills, etc. However, the cleaning device is also useful for washing walls, cleaning windows, wiping off tables, and other such chores requiring only a mild abrasive action.

It is therefore an object of the invention to provide an article which is satisfactory for use in all cleaning and scrubbing chores which require the presence of water, a soap or detergent, and an abrasive surface.

Another object is to provide such an article in a form which will retain its structural integrity over long periods of use, and which is water-retentive, non-flammable and resistant to soaps, detergents, acids, alkalis, rot, mildew, oils, greases, and most common reagents.

A further object is to provide a novel method of manufacturing such an article.

These and other advantages of the invention will be apparent in view of the following detailed description of the invention when considered with the attached drawing.

In the drawing:

Fig. 1 is a perspective view, with one corner broken away, showing the form and structure of a cleaning article according to the invention;

Fig. 2 is an exploded view showing the body and mesh covering prior to fabrication;

Fig. 3 is an enlarged fragmentary section taken through the edge of the article, substantially as indicated on lines 3—3 of Fig. 1; and

Fig. 4 is an enlarged fragmentary plan view taken substantially as indicated on lines 4—4 of Fig. 1.

The novel article, indicated in its entirety by the numeral **10**, is shown in a generally rectangular shape. It will be understood, however, that the invention is not to be limited to the specific form shown, but that it may be embodied in square, round or other suitable symmetrical shapes.

The body **12** of the article is formed of the resilient type, as distinguished from the rigid or semi-rigid types, of polyurethane foam by conventional and known techniques. This resilient type of foam has an interconnecting cell structure which is water-retentive while retaining high strength. The foam material is readily cut into the desired body shape and is non-flammable and resistant to soaps, detergents, acids, alkalis, rot, mildew, oils, greases and most common solvents.

Polyurethane foam materials, as described herein, are also often described as polyester foams, polyester isocyanate foams, isocyanate foams, polyether foams or polyester urethane foams.

The covering **14** of the article is in the form of a web or mesh of synthetic fiber having regularly spaced and alternating strands **15** and interstices **16** (see Fig. 4). A nylon fiber mesh is preferred because of nylon's high tensile strength (65,000 to 114,000 p.s.i. at 21° C. and 65% R.H.), its high retention of strength when wet (85 to 90% of tensile), and its resistance to soaps, detergents, weak acid, alkalis and common solvents. However, other synthetic fibers such as a polyester ("Dacron") or an acrylic ("Orlon") possessing substantially the same physicals when in mesh form could also be used.

Referring to Fig. 2, the article **10** as shown in Fig. 1, is formed by interposing a rectangular foam body **12** between rectangular layers of the synthetic fiber mesh covering **14**. The composite block of covering-body-covering is then subjected to a fastening operation.

Referring to Fig. 3, the mesh layers are fastened to each other and to the foam body by stitching or sewing preferably with nylon or "Orlon" thread, indicated at **18**. The stitching may be done by hand or by a sewing machine, and the thread readily passes through the polyurethane foam without tearing or ripping it. The area of stitching is located inwardly of the edges of the block and causes the sides of the block to assume the curved shape indicated in Figs. 1 and 3. The stitching also takes place a sufficient distance inwardly of the edges to cause the formation of inwardly directed flange-like portions or ears **19** of the foam material, which protect and conceal the stitching, and to further cause the formation of a circumferential bead **20** of foam material which provides means for readily gripping the article.

The composite article **10** is ideally suited for household and other cleaning chores, will present a pleasing appearance and will retain its form over long periods of use. The polyurethane foam body **12** is water-retentive and will not crumble when used, as do the natural or cellulose type of sponges after a short period of use. It has also been found that the polyurethane foam responds to pressure in a non-linear stress-strain curve which is in the shape of an ogive. Thus, while resistant to slight pressures, the foam compresses deeply and suddenly to the bottoming point at higher pressures. This property is extremely valuable when cleaning the interiors of small irregularly shaped objects and it ensures uniform contact of the article **10** at all points with the object being cleaned.

The synthetic fiber mesh covering **14** is sufficiently abrasive that, in the presence of a soap or detergent and water supplied from the foam body, an effective cleaning action is obtained. However, the mesh covering is sufficiently "non-abrasive," far less so than for example, steel wool, that soft surfaces will not be scratched.

While I have illustrated and described a preferred embodiment of my invention, it will be apparent that the invention is not limited thereto, and that changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the subjoined claims.

What is claimed is:

1. A composite cleaning article comprising a polyurethane foam body interposed between layers of a synthetic fiber mesh covering which provide scrubbing surfaces on the article, said body and layers being fastened together inwardly of the periphery thereof a sufficient distance to allow said foam body to extent beyond the edges of said layers and provide a bead of said foam around the circumference of said article, said bead also protecting the edges of said layers.

2. A composite cleaning article comprising a substantially rectangular block of polyurethane foam interposed between substantially rectangular layers of a synthetic

fiber mesh covering which provide scrubbing surfaces on the article, said block and layers being stitched together inwardly of the periphery thereof a sufficient distance to allow said foam body to extend beyond the edges of said layers and form a bead of said foam around the circumference of said article, which bead also protects the edges of said layers.

3. A composite cleaning article comprising a substantially rectangular block of polyurethane foam interposed between substantially rectangular layers of a nylon mesh covering which provide scrubbing surfaces on the article, said block and layers being stitched together inwardly of the periphery thereof a sufficient distance to allow said foam body to extend beyond the edges of said layers and form a bead of said foam around the circumference of said article, which bead also conceals the edges of said mesh.

4. An article for cleaning purposes comprising, a body of polyurethane foam, abrasive layers of a synthetic fiber mesh covering opposite sides of said body to provide scrubbing surfaces therefor, and, means for fastening said layers to said body inwardly of its edges so that a bead portion of foam is formed on said body, which bead portion extends circumferentially around said article to protect and conceal said fastening means and the edges of said layers.

5. The method of forming a composite cleaning article which comprises interposing a body of polyurethane foam between two layers of a synthetic fiber mesh to provide scrubbing surfaces on the article, and stitching said layers and foam together inwardly of the edges thereof a sufficient distance to provide a peripheral bead of said foam which extends beyond the edges of said layers and conceals said stitching.

6. The method of forming a composite cleaning article which comprises interposing a body of polyurethane foam between two layers of a nylon mesh covering to provide scrubbing surfaces on the article, and securing said layers and foam together inwardly of the edges of the body a sufficient distance to provide a peripheral bead of said foam which extends beyond the edges of said layers, conceals said securing means and provides a hand gripping area on said article.

7. A composite cleaning article comprising a body of polyurethane foam, and an abrasive layer of nylon mesh secured only inwardly of its edges to at least one side of said body in compact relation thereto to provide a scrubbing area on said article, said foam being extended beyond the edges of said mesh to provide a bead which protects the edges of said mesh.

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