(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 149 705**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **84106989.1**

(22) Date of filing: **19.06.84**

(51) Int. Cl.⁴: **A 47 L 13/16**
A 47 L 17/08, A 47 L 1/15

(30) Priority: **22.12.83 IT 2432483**

(43) Date of publication of application:
31.07.85 Bulletin 85/31

(84) Designated Contracting States:
AT BE CH DE FR GB LI LU NL SE

(71) Applicant: **F.I.L.P.A. S.r.l.**
Via dei Mille 1 - 1/A - 1/B - 1/C
I-20098 S. Giuliano Milanese (MI)(IT)

(72) Inventor: **Mantica, Mario**
Via P. Solaroli 7/5
Milan(IT)

(74) Representative: **de Dominicis, Riccardo et al,**
de Dominicis & Partners S.a.s. Via Brera, 6
I-20121 Milano(IT)

(54) A roughened cleaning sponge particularly for delicate surfaces, and manufacturing method therefor.

(57) A roughened cleaning sponge, particularly for easily scratched surfaces, such as stainless steel surfaces, surfaces coated with thin layers of a plastic material, motor vehicle windshields, and the like, which comprises a core (2) of a sponge-like materiale covered with an outer roughening fabric (3). Both the core (2) of a sponge-like materiale and the roughening fabric (3), the latter being a knit tubing, are formed form a thermoplastic plastics. The crosswise seams are pressure heat sealed to define a stiff heat sealed band (4) having scraping side and corner portions (4a). A reliable and durable envelope is thus provided for the sponge-like core (2). Manufacturing begins with the formation of a basic blank (6) of some length from which individual sponges (1) are fabricated by heat sealing and severing along the heat sealed end bands (4) thereof.

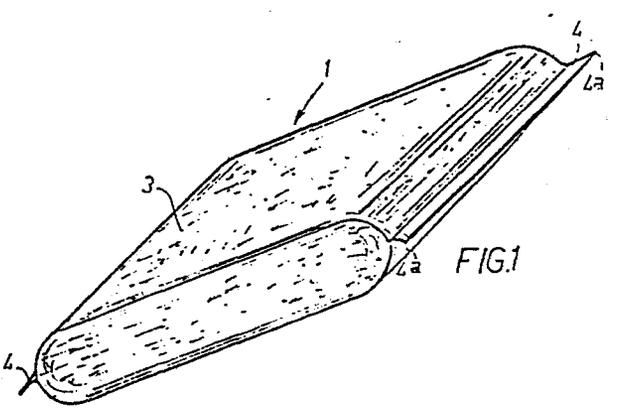

FIG.1

EP 0 149 705 A2

F.I.L.P.A. S.r.l.
Via dei Mille 1 - 1/A - 1/B - 1/C
20098 S. GIULIANO MILANESE (MI), Italy

"A ROUGHENED CLEANING SPONGE PARTICULARLY FOR DELICATE SURFACES, AND MANUFACTURING METHOD THEREFOR"

This invention relates to a roughened cleaning sponge particularly for delicate surfaces, and to a method of manufacturing it.

The roughened sponge of this invention is particularly useful for cleaning scratch vulnerable surfaces, such as the surfaces of stainless steel objects, or objects coated with a thin layer of plastics like cooking pots and pans, or motor vehicle windshields. Such objects, in fact, while having inherently hard surfaces, are

quite vulnerable to scratching since this would jeopardize their proper use or operation.

It is a well known fact that scratches on stainless steel pots and pans or non-adherent plastic coatings, additionally to marring their appearance, may encourage food sticking during the cooking process, while in the instance of a windshield, any scratches are liable to interfere with a clear view, especially when driving in the rain or fog.

On the other hand, such objects do require periodic cleaning, and occasionally also removal of hard or stuck deposits.

For such cleaning purposes as specified above, either felt-like rags are currently utilized or sponges incorporating scraping fillers, e.g. diamond powders, as well as roughened sponges including a core of a sponge-like material and a roughening outer cover for kitchen applications, and those same abrasive filled sponges and known hard rubber scrapers for windshield cleaning applications.

It has been found in actual practice that prior sponges including abrasive fillers may indeed originate much feared scratches, whereas felt type rags may lack fretting ability and above all, owing to their substantially two-dimensional nature, do not lend themselves to the application of a large flat surface against the object to be cleaned. Such rags are, in fact, held rolled up in one hand, so that the surface to be cleaned is only engaged in practice by the crests of the individual folds thus formed ir the rag.

Another disadvantage of such rags, as well as of prior abrasive

filled sponges, is that they can present no stiff side or corner edge. Thus, they cannot be useful to carefully clean, for example, the peripheral corners of pot and pan bottoms, and any other areas having corners, ridged or recesses, such as the handles of pots and the like cooking utensils. Nor are known scrapers in the form of hard rubber blades, for cleaning windshields, devoid of problems. The same, in fact, where provided as individual cleaning tools both for scraping purposes and for wiping away washing water from a windshield, and form, therefore, primarily scraping and not cleaning tools, as against sponges, rags, and the like. Not even the sponge strip sometimes associated with the same can provide accurate cleaning, because the sponge strip is supported, like the hard rubber blade, in a rigid strip-like structure which cannot accomodate the windshield crowning. Further, the provision of a handle on such scrapers makes them unwieldy.

The cited prior sponges including a roughened covering are essentially of two types. A first sponge type comprises a core formed from a non thermoplastic foamed material and a fabric portion, also formed from non-thermoplastic materials, which is wrapped and sewn around the core. This construction has the disadvantage of involving manual processing and being time consuming. The roughened sponges of the second type comprise a sponge-like core of a non-thermoplastic material and a fabric covering of a theromoplastic material. The fabric is here in the form of a tubing. Manufacture provides for manual introduction of

the sponge-like insert into its outer sheath and sealing of its ends. The sealing is practically of a linear type and of somewhat limited strenght owing to the small amount of thermoplastic material avilable for the purpose, in practice just that provided by the yarns of the roughening fabric. In addition to being slow to manufacture, such prior sponges tend in use to open up at the sealed ends which are constantly under stress from the sponge core tending to expand.

As mentioned above, such prior sponges with outer roughening fabrics lack any stiff side or corner edges.

It is a primary object of this invention to provide a roughened cleaning spongen, which can retain unaltered its original shape, even after prolonged use, and incorporates a scraping means of its own.

Another object of this invention is to provide a method of manufacturing sponges according to the invention, which can afford a fast sponge production rate without waste, the sponges obtained with this method requiring no further processing or finishing steps.

Starting from a cleaning sponge of the general type outlined hereinabove and comprising a core of a sponge-like material, which is covered externally with a roughening fabric covering, the objects of this invention are achieved by that the inventive sponge has the following characteristics:

a) the sponge-like material core comprises a thermoplastic plastics;

b) the roughening fabric covering also comprises a thermoplastic plastics, the fabric covering blank being provided in tubular form;

c) the crosswise closures are obtained by heat sealing in the form of a strip-like band; and

d) the heat sealed end strip-like bands have their respective front side and outward corners stiffly shaped.

According to the invention, the fabric tubing is a knit fabric, that is having a smooth weft and warp yarns projecting therefrom into loops of a given lenght and only protruding from one side with respect to the weft, a portion of the loops being cut off to provide two respective scraping piles. Said cut off portions of the loops amounting approximately to 40% of the total loop number.

Furthermore, according to the invention, the projecting loops are arranged to protrude inwardly of the tubular fabric blank.

Also according to this invention, the heat sealed end bands or strips have a crosswise dimension in the range from about 2 to 10 mm, this sealing providing for a compacting sealing application of compression under heat to both the thermoplastic material of the roughening fabric and thermoplastic material of the sponge-like core.

Advantageously, the width of said sealed strips would be about 7 mm. According to a further aspect of the invention, the outer edges of the heat sealed strips stand out of the roughened sponge longitudinal sides, in the finished condition of the sponge, thus affording full access ability to the remotest of the ares or corners

to be cleaned.

In actual practice, good results have been achieved by using a sponge core and roughening fabric which result in a heat sealed edge about 1 mm thick.

The method of this invention, for the manufacture of roughened cleaning sponges according to other aspects of the invention, distinguishes itself by the use of a sponge-like thermoplastic plastics core as an elongate sectional blank and of a tubular roughening fabric covering with inwardly projecting loops, and is characterized by that it comprises the following processing steps:

A) insertion of the roughening fabric through a lining tubing;

B) turing said tubular fabric out by backfitting said fabric over said lining tubing substantially for the full lenght thereof;

C) severing of the tubular fabric at the opposed end of the lining tubing to the end thereof where the tubular fabric has been inserted therethrough, and withdrawal from within said lining tubing of the tubular fabric present therein;

D) introduction through said lining tubing, and substantially for the full lenght thereof, of a core sectional or extruded blank formed from a sponge-like material, and severing of the same to separation;

E) simultaneous withdrawal form the lining tubing of both the outer tubular fabric and sponge-like material core located internally to said lining tubing, thereby said core is positioned within said tubular fabric with its loops outwards and a continuous starting

blank of considerable lenght, e.g. five meters long, is formed; and F) separation from said blank of individual sponges by means of a wide strip-like heat sealed band produced under thrust and compressione, followed by severing along the heat sealed band midline to separate a completed cleaning sponge from said continuous starting blank.

Furthermore, according to the invention, on the half-jaws of the heat sealing head, the heat sealing receptacles or impressions are such as to form, during the heat sealing process, outer end corner edges which protrude from the longitudinal sides of the finished cleaning sponge.

In addition to incorporating to the roughened cleaning sponge a scraping means of compact configuration, which means also functions, advantageously, as a sealing means for the sponge itself, an advantage of this invention proposal resides in the provision of an extremely siple and rapid manufacturing procedure which requires no finishing steps for the manufactured sponges.

As for the number of the opened, or cut off, loops, excellent results have been obtained with a number of cutt off loops on the order of 40% of the loop total.

A further advantage of the sponges of this invention is that optimum filling of the roughening fabric with the sponge core is achieved, which positively avoids the formation of void pockets between the sponge and covering such as would result in unwanted wrinkles on the sponge surface in use.

This solid filling of the tubular fabric is achieved quite simply and easily through the use of the cited assembling lining tubing.

Further features, advantages, and details of the roughened sponge and related manufacturing method, according to the invention, will be more readily understood from the following description, with reference to the accompanying drawings, which illustrate schematically a preferred embodiment of the invention, and where:

Figure 1 is a perspective view of a roughened cleaning sponge incorporating a scraping means, according to this invention;

Figure 2 is a plan view of the same;

Figure 3 is a side elevation view of the sponge of Figure 1;

Figure 4 is a front view of the same;

Figure 5 is a sectional view taken along the line V-V in Figure 3;

Figure 6 is a sectional view taken through the tubular fabric employed for a roughening fabric;

Figure 7 is a longitudinal section view through a lining tubing or hose for sleeving and assembling the fabric, shown during a fabric sleeving step;

Figure 8 is a sectional view similar to Figure 7, with the roughening fabric sleeved;

Figure 9 is a sectional view similar to Figures 7 and 8 showing a sponge sectional blank introduced through the lining tubing;

Figure 10 is a similar sectional view taken through the lining tubing or hose, showing a starting blank already assembled at the

leading portion thereof;

Figure 11 is a longitudinal section view through the completed starting blank; and

Figure 12 is a theoretical cross-sectional view illustrating the material displacement during the making of heat sealed end bands.

Making reference to the drawing figures, some of which are drawn to different scales, similar parts are designated with the same reference characters.

This cleaning sponge is generally indicated at 1 and comprises, in a manner known per se, a core 2 of a sponge-like or expanded material, and an outer fabric covering with roughening functions, indicated at 3.

According to the invention, both the sponge core 2 and roughening fabric 3 are formed from a thermoplastic plastics, that is one accepting heat sealing or ultrasonic welding. The thermoplastic material, both for the roughening fabric and sponge core, is selected to simultaneously provide for heat sealing of the ends and the formation of a scraping means directly from the materials utilized, without involving any insert or supporting elements.

The fabric employed is a tubular or hose fabric with looped warp yarns, or knit fabric, which loops, in the preferred embodiment indicated, are arranged to face inwards as shown in Figur 6. In a preferred example, polyester yarn has been used for the weft and polypropylene yarn for the warp, the yarns having a diameter on the order of 0.2 mm, while the loops had a height of about 3 mm

and a lenght between the loop legs of about 1 mm. The number of opened, or cut off, loops amounted to about 40% of the loop total. The height of the sponge core was 2.5 mm.

In this way, and as explained hereinafter, it has been possible to form a good heat sealed band with scraper functions. That heat sealed band has a considerable width, e.g. a width of 7 mm, and a thickness adequate to provide, on the side, optimum scraping rigidity, and on the other side, a favorable flexing ability in use of the sponge.

With the dimensions specified above, a favorable thickness on the order of about 1.3 mm and end displacements of the material are achieved, said displacements resulting in the formation of end corner edges or flaps which stand slighty proud of the sponge longitudinal sides as clearly brought out by Figur 2. The heat sealed band is indicated at 4, and 4a designates the projecting end corner edges, while 4b designates the projecting end flaps and 4c the front scraping side. Owing to the very nature of the heat sealing process, the value specified should be regarded as an average value because thickness deviations may, of course, occur along the lenght of the sealed band 4.

The materiale displacements which result in the formation of the corner edges 4a and flaps 4b, protruding laterally, are accomplished forcibly on heat sealing through the use of correspondingly shaped receptacles or impresions in the heat sealing jaws, or alternatively, by changing the pressure value selected

therefor.

According to the invention, for the manufacture of the proposed sponges, a preassembled blank of a considerable lenght, e.g. 5 m, is first provided.

The same is prepared using a lining tubing, indicated at 5. First the tubular fabric 3 is inserted therethrough, and then the tubular fabric is reversed onto the outer surface of the lining tubing 5, as shown in Figure 7. At this point, the tubular fabric 3 is severed at the opposed end 5b of the lining tubing 5 to the inlet end 5a, and the fabric portion is withdrawn from the interior of the tubing 5. Thus, the condition of Figure 8 is established. At this point, the sponge sectional blank 2, in the form of an elongate sectional blank, is inserted through the lining tubing 5, as shown in Figure 9, and the same is severed at the end 5a of the tubing. As brought out by the Figures, the loops of the fabric 3 will now be facing outwards. By grasping with one's hands, at the end 5b, both the fabric 3 and initial portion of the sponge sectional blank 2, a pulling force is applied to simultaneously withdraw from the lining tubing 5 both the outer fabric 3 and inner sponge sectional blank 2, which is automatically positioned within said fabric, as shown in Figur 10. The starting blank formed by the fabric 3 and sponge core 2 is indicated at 6 in Figure 11.

Shown schematically at 7 in Figur 12 are the lines of action of heat sealing jaws for the formation of the sealed bands 4. Indicated at 8 are the areas of fabric material 3 and sponge material 2 which ,

during the heat sealing step, are displaced and compressed into the sealed bands 4. The same may be produced either as single or double seams, or even simultaneously on two adjacent sponges. In the latter case, the common band, of double the thickness, will be separated by means of a blade element or the like.

It may be appreciated from the foregoing that with the teachings of this invention it becomes possible to effectively achieve the objects thereof, both in conncetion with the composite construction sponge and manufacturing method it discloses.

In practicing the invention, it will be possible to replace the materials specified above with other thermoplastic materials such as, for the weft yarn, polyamides, Nylon, Algodon, polyethylene, polypropylene, raffia, and the like, while for the warp yarn, polyethylene, Nylon, polyester, Algodon, etc., may be used, and deviations form the specified dimensions may be made without departing from the scope of this invention. Substantial to the same is the incorporation to the sponge with roughened covering of scraping means as well, which advantageously provide for the sponge sealing. All this without involving any additional finishing steps.

Heat sealing could be replaced by an ultrasonic or any other suitable sealing process.

it is also contemplated, of course, by the invention that sponges may be provided with sealed bands having differen profiles, as indicated in Figures 13, 14, or sponges be provided with

peripherally extending sealed bands, as shown in Figure 15, or with intermediate sealed spots, as shown in Figure 16, or in the form of a padded element, etc.

The manufactruing method could be automated by replacing the manual withdrawal of the fabric and sponge core from the lining tubing with some automatic withdrawal procedure, again without departing from the invention scope.

All of the features that may be inferred from the specification, claims, and drawings are regarded as essential to this invention, both individually and in any desired combination thereof.

F.I.L.P.A. S.r.l.
Via dei Mille 1 - 1/A - 1/B - 1/C
20098 S. GIULIANO MILANESE (MI), Italy

CLAIMS

1. A roughened cleaning sponge particularly for delicate surfaces, comprising a core formed from a sponge-like material covered on the outside by a roughening fabric covering, and characterized in that:

a) the sponge-like material core (2) comprises a thermoplastic plastics;

b) the roughening fabric covering (3) also comprises a thermoplastic plastics, said fabric (3) having a tubular configuration; and

c) the heat sealed strip-like end bands (4) have their respective

front side and two outward corners stiffly shaped and adapted to act as scrwping means.

2. A roughened cleaning sponge according to Claim 1, characterized In that said fabric (3) is a knit fabric, that is formed with a smooth weft wherefrom warp yarns stand out with loops of a given lenght only protruding from one side of the weft, some of said loops being cut off to form each two scraping piles, said cut off loops amounting to about 40% of the loops total.

3. A roughened cleaning sponge according to claims 1 and 2, characterized in that said heat sealed end strips (4) have a crosswise dimension in the 2 to 10 mm range, in the course of the heat sealing process, a displacing compression and compaction being applied to the thermoplastic plastics of both said fabric (3) and spoge-like core (2) to form a rigid heat sealed band affording at the same time the required flexibility of application.

4. A roughened cleaning sponge according to claims 1 and 3, characterized in that said heat sealed end bands (4) have a widthwise dimension of about 7 mm.

5. A roughened cleaning sponge according to one or more of the preceding claims, wherein the outer cornerd edges (4a) or side flaps (4b) of the heat sealed bands (4) protrude laterally from the longitudinal sides of the completed sponge.

6. A roughened claining sponge according to one or more of the preceding claims, wherein the thickness dimension of said heat sealed bands is on the order of about 1.3 mm.

7. A method of producing roughened cleaing sponges particularly for scratch vulnerale surfaces as claimed in one or more of the preceding claims, characterized in that it comprises the following steps:

A) insertion of the roughening fabric (3) through a lining tubing (5) to emergence form the opposite end (5b) to the inlet end (5a);

B) turning said tubular fabric (3) inside out by backfitting said fabric over the outer surface of said assembly lining tubing (5) substantially for the full lenght thereof;

C) severing of the fabric (3) in the proximity of the opposed end (5b) of the lining tubing to the inlet end (5a), and subsequent withdrawal from within said lining tubing (5) of the tubular fabric (3) present therein;

D) introduction through said lining tubing (5), substantially for the full lenght thereof, of an extruded sectional core (2) of a sponge-like material, and severing of the same (2) to separation;

E) simultaneous withdrawal from said lining tubing (5) of both said outer tubular fabric (3) and sponge-like material core (2) from said lining tubing (5), thereby said core (2) is positioned within said tubular fabric (3) with rougheneing loops now facing outwardly and a continuous starting blank (6) of considerable lenghts, e.g; five meters long, is formed;

F) separation from said starting blank (6) of individual composite construction sponges (1) by means of a wide strip-like heat sealed band (4) produces under thrust and compression.

8. A method according to claim 7, wherein during the heat sealing step, a heat sealed band shared by two successive composite sponges (1) is formed, said heat sealed band being then severed by means of a cutting member or the like.

9. A method according to claims 7 and 8, characterized in that, on the half-jaws of the heat sealing head, the heat sealing recesses or impressions, if any, are configured, or the heat sealing pressure set, such as to cause, during the heat sealing step, a displacement of thermoplastic material to form protruding outer end corner edges (4a) and end flaps (4b) from the longitudinal sides of completed sponges.

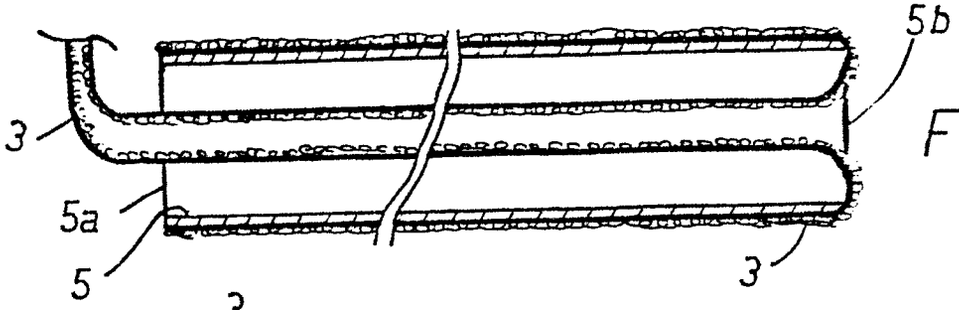

FIG. 7

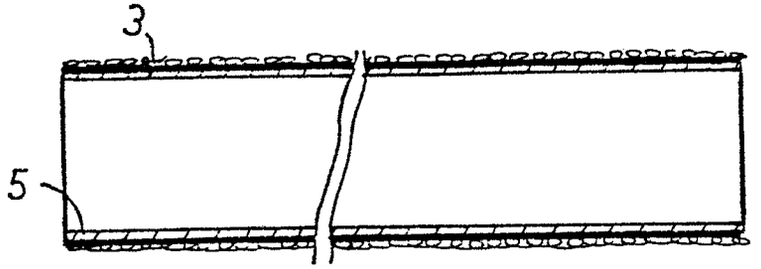

FIG.8

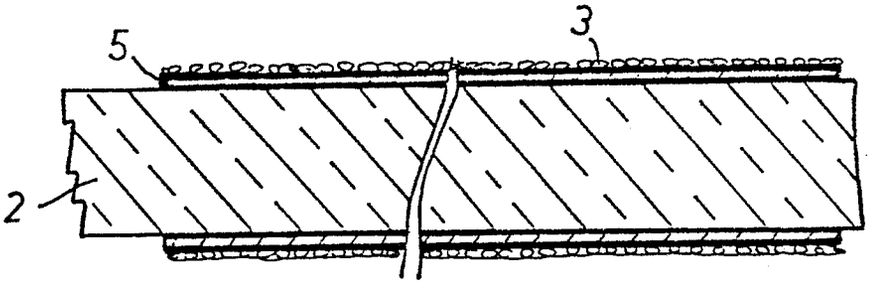

FIG.9

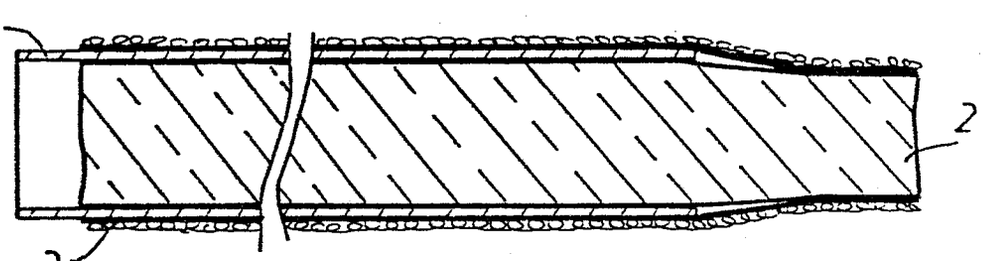

FIG.10

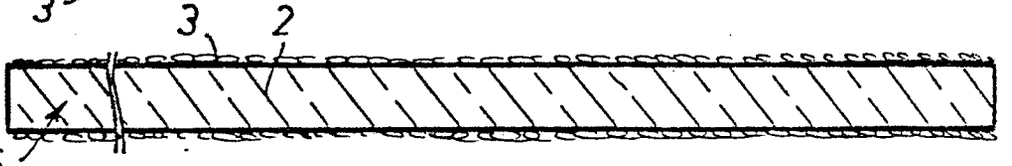

FIG.11

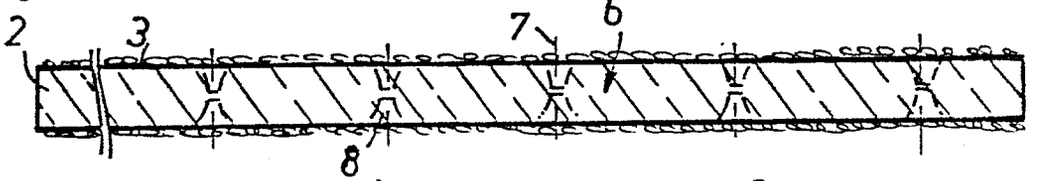

FIG.12

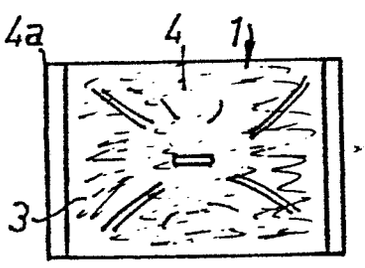

FIG.16

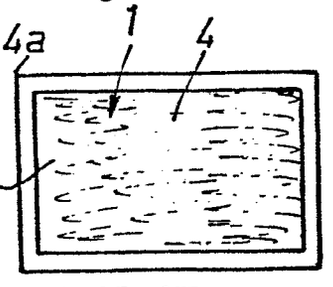

FIG.15

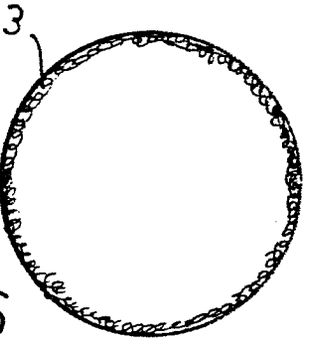

FIG.6

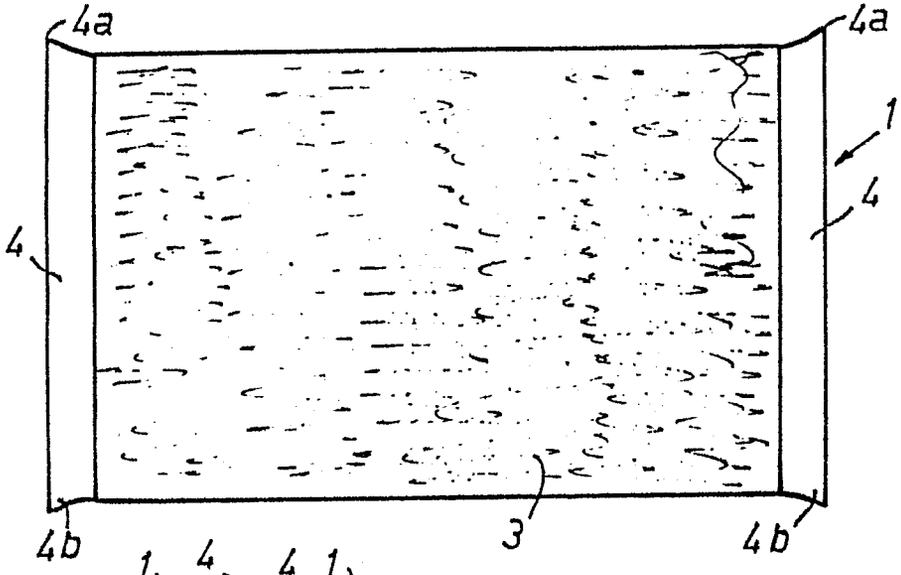

FIG. 2

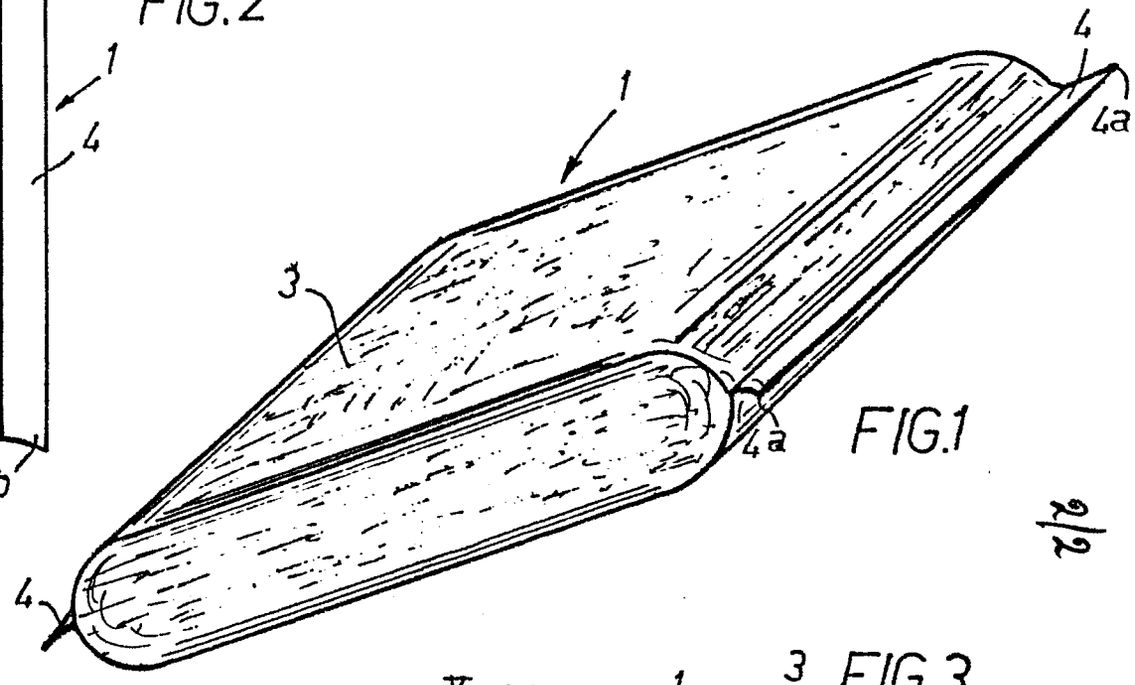

FIG. 1

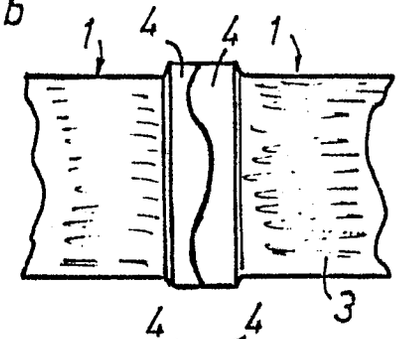

FIG. 14

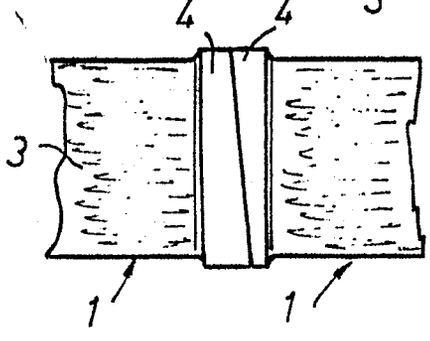

FIG. 13

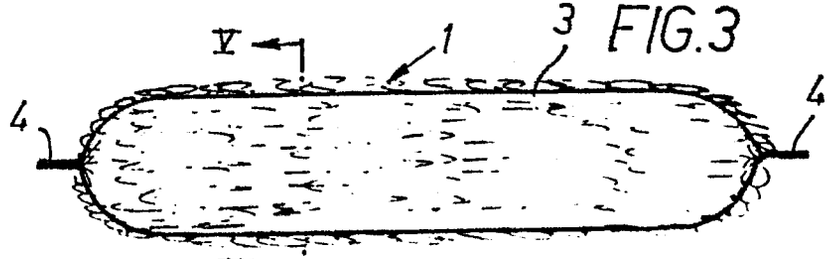

FIG. 3

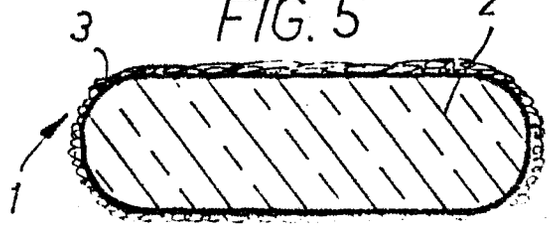

FIG. 5

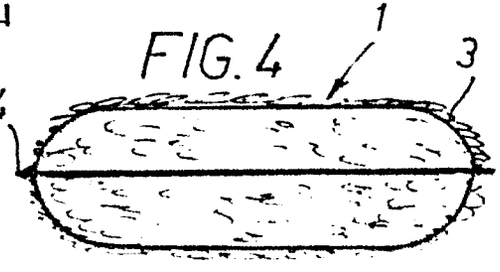

FIG. 4

2/2

0149705