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(54) **MOP HEAD AND PROCESS FOR PRODUCING IT**

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Description

This invention relates to a novel head for a mop, that is to say a cleaning device comprising a handle and a plurality of elongate absorbent elements mounted at one end thereof for the purpose of cleaning surfaces such as floors, and also to a process for producing the mop head. By the term "head" is meant that part of the mop which comprises the elongate strip elements and the means by which they are held together at one end and attached to the mop handle.

In the extensive known art of mops the most common method by which the collection of elongate absorbent strip elements are secured to the mop handle is by first clenching a collection of the strip elements together by some kind of clamping means to form a core of the strip elements and then attaching, possibly releasably, the core to the mop handle via the clamping means. The generally best known arrangement of strip elements forming the core is for them to be packed together at an end region thereof in a substantially parallel fashion, with the thus-formed generally cylindrical core section being tightly held together by some kind of clamping device which simultaneously provides the means by which the clamped core can be attached to the handle. The clamping means may take the form of an external clamping ring which exerts its clamping action principally by radially inwardly directed pressure and frictional engagement with the ends of the strip elements, or alternatively it may be invasive, for example one or more pins or spokes extending through the material of the clamped core section to provide the necessary tensioning, clamping and handle-mounting capability.

In other known forms of mop head constructions, the strip elements are clenched together not at their ends, but in a central region, for example so as form a star-like array of strip elements, thereby leaving each of the two diametrically opposite portions of each strip element available for mopping use. This alternative construction, however, is generally less preferable than the cylindrical arrangement discussed above, for reasons of constructional complexity and durability. More recently this shortcoming has been ameliorated to some extent by the employment of a partial moulding technique as a means of securing the star-like array of strip elements together and uniting them with a socket portion of the head into which can be mounted the end of the mop handle. This construction of mop head still however suffers from not wholly satisfactory mopping effectiveness, primarily as a result of the uneven distribution of strip material within the mop head.

A more advanced technique of forming a mop head is disclosed in EP-A-0259279. Here a plurality of individual parallel strips of the absorbent material are clenched together at an end region thereof which is then placed in a mould and a body of plastics material is injection moulded around the end region of the core and in so doing partially impregnates and bonds together

the clenched end portions of the strips. Once cooled and hardened, the thus formed integral plastics core having the strip elements bonded therein and extending freely therefrom can be readily anchored by any suitable form of mechanical connection to the end of the mop handle.

Whilst in this process the manner of anchoring of the strip elements to the head is improved, there is still a problem of the plastics moulding material being liable to leakage from the mould by seeping along the absorbent material of the strips and into what will form the free and flexible strip element regions available for mopping. Not only does this result in wastage of plastics moulding material, but it is detrimental to the mopping effectiveness of the free strip elements, not only as regards mechanical flexibility but also as regards water absorbency. Whilst it might be possible to alleviate this problem to a certain extent by constricting the bundle of strip elements at the site at which impregnation by the plastics moulding material is desired to be terminated, such a technique does not lend itself to practical simplicity and economics of manufacture, especially on a large industrial scale.

What we have now surprisingly found is that practical applicability of an integral head moulding technique, in which a plastics head is moulded around the end of a core of strip elements, can be optimised by use of a specially prepared core of mop strip elements in which the end regions of the strip elements around which the plastics head moulding will be formed have been subjected to a calendering process. The resulting compact, relatively high density end region of the core greatly reduces and may even prevent seepage of the plastics moulding composition through the strips into the free, mopping sections thereof.

Accordingly, in one aspect the present invention provides a method of producing a mop head, comprising forming a core of elongate absorbent strip elements and around an end portion thereof moulding a body of plastics material to form a means by which the core can be mounted on a mop handle, characterised in that prior to formation of the core, an end zone of the material of the strip elements, around which the plastics material is moulded, is subjected to a calendering process.

In a second aspect the present invention provides a mop head comprising a core of elongate absorbent strip elements having moulded around an end portion thereof a body of plastics material which forms a means of attaching the core to a mop handle, wherein the absorbent material of the strip elements has previously been subjected to a calendering process in an end zone thereof, around which the plastics material is moulded.

As used herein, the term "calendering" means a process in which the absorbent strip material is subjected to, either in a separate post-production step or as part of the manufacturing process, compression and/or densification as a result of pressure, usually rolling pressure, applied in a direction substantially transverse

to the opposed surfaces of the material, and optionally also by the action of heat, thereby reducing the thickness of the material, increasing its density and reducing its internal volume in the calendered region.

Calendering, as an industrial process, is well known per se in various technical fields, for example textiles, paper and paper-based products, and may be a hot or a cold calendering process. It will generally be carried out by passing the region or regions of material in question between two contra-rotating rollers whose hard, rotating surfaces are separated by a distance less than the normal thickness of the uncalendered material.

Accordingly, in preferred embodiments of the invention the calendering process comprises pulling or driving the absorbent strip element web material between two contra-rotating rollers. One or both of the rollers may have patterned and/or profiled surfaces so as to produce a desired textured surface, or non-uniform cross-sectional profile, of the resulting calendered web. The surfaces of the rollers are separated by a distance smaller than the normal thickness of the uncalendered web material. By way of example, a typical uncalendered web thickness of approximately 2.5mm may be used, with the fully calendered thickness being reduced to approximately 0.7mm. The rollers may or may not be heated, as desired or as necessary, depending for example on the material of the web to be calendered. Heating of the roller(s) may for example be necessary in order to "activate" the thermoplastic fibre component of a preferred web material (as referred to further below), in order to permanently set the material in its calendered condition.

Thus, in the preferred calendering process, as the material passes between the rollers it is compressed and preferably also heated so that the desired reduction in its thickness and internal volume, and increase in its density, are achieved. Generally, the rate at which the material is fed between the rollers, the distance between the rollers, and the temperature of the rollers may all be as desired or as necessary, according to the material to which the calendering process is being applied and the degree of calendering required.

The degree of calendering is preferably not uniform over the whole longitudinal extent of the calendered region of the material forming the strip elements of the core. It is preferred that the depth of the calendering changes smoothly over at least part of the calendered zone in the longitudinal direction of the resulting core, so that no sharp transition exists between calendered and uncalendered regions. Such transition(s) would otherwise tend to result in lines of weakness in the strips of the finished mop head.

Preferably, during the moulding process fluid plastics material seeps along and/or within the absorbent strip material in the end region of the core. In typical instances, it has been found that known calendering techniques applied to the absorbent material from which the mop strip elements are made (e.g. a homoge-

neous blend of viscose fibres and thermoplastic (such as polypropylene) fibres) do not entirely prevent impregnation of fluid plastics moulding material into the strip material, but that such calendering does reduce the seepage of fluid moulding plastics material through the calendered web structure sufficiently to realise the advantages of the present invention. Typically, seepage of the plastics moulding composition along and between adjacent strips in the end region of the core predominates and bonds the strips together by a fusing or welding-like action, to securably anchor the strip elements together in the core end region. Impregnation of the absorbent strip material by the plastics moulding composition may also occur, but if so, will generally do so only a minor degree, owing to the generally compact nature of the core interior.

A further advantage associated with the invention which stems from the use of a calendering process applied to the end zone of the core of strip elements is that the calendered zone forms in the assembled core prior to moulding a compacted section of reduced dimensions, especially thickness in a direction transverse to the longitudinal axes of the strips, which provides a region which enables the core to be gripped more rigidly and thus more securely by the body of plastics material moulded around it.

Preferably, the calendered end zone of the core extends beyond the limit of the body of plastics material to be moulded around it, such that the portions of the strip elements which flex most during use for mopping are also part of the calendered end zone. These portions of the material are subject to maximum stresses in use and calendering assists in decreasing their tendency to be damaged such as by tearing and also to decrease their rate of wear. Thus, in preferred embodiments of the invention, the strip element material is calendered in an end zone which extends a short distance, e.g. a few centimetres, e.g. 0.1 to 1 or 2, or possibly up to 3 or 4 centimetres, beyond that which is contained with the moulded body of plastics material once formation of the mop head is complete.

In preferred practical embodiments of the invention, in order to improve the adhesive bonding of the moulded plastics material to the top surface of the core of strip elements, its surface area is enhanced by virtue of its having been subjected also to a cutting process wherein the upper edge or edges of the material from which the core is formed are non-linear, especially serrated or pinked.

According to preferred embodiments of the present invention, a single, especially rectangular, web of absorbent material is used to form the core, of which a zone along one edge, especially a long edge, is calendered so as to form the calendered end zone of the core once the web is rolled up into a coil about an axis transverse to the direction of the said one edge. In order to form the plurality of elongate strip elements of the finished mop head, the web of absorbent material is cut by

way of a plurality of slits extending from its edge opposite to the said one edge (at which the calendered zone is situated) to a line within the calendered zone or (less preferably) adjacent the limit of the calendered zone. Most preferably the slits extend into the calendered zone a short distance, such as a distance from about 10 to about 60% of the calendered zone width.

Whilst the above coiled core of a single web of material is most preferred, in alternative embodiments, a plurality of single, discrete elongate strips of absorbent material may be used instead. In such embodiments each strip has an end portion which is calendered, so that the collective bundle of strips when brought together in parallel and coterminous relationship form a collective calendered end zone to that which is exhibited by the coiled, single web of strip material in the most preferred embodiments referred to above.

In the preferred embodiments of the invention employing a single coiled web of absorbent strip material, the coil is preferably wound under at least a small degree of tension, preferably at least a moderate degree of tension, in order to fully take advantage of the reduced thickness of the material in the calendered zone. In the light of the wound coil's consequent tendency to unwind prior to moulding of the plastics material around its end portion, it is preferred in the method of the invention that prior to application of the moulding plastics material and preferably during the formation of the core itself, means are provided for preventing unwinding of the coil. This is preferably by the application of binding means, for example adhesive which is applied to the web material at selected regions immediately prior to or as it is wound to form the coil. Alternatively the binding means may be any suitable type of mechanical clamping arrangement, such as an external securement and/or constriction ring applied to the outside of the coil once it is formed. The former binding means is preferred over the latter, for practical simplicity and economics of manufacture.

In addition to, or possibly as an alternative to, any means such as those defined above for preventing unwinding of the coil of absorbent web material, the calendering process applied to the end zone of the core is not necessarily of even degree and/or regularity over the zonal area, and it may be irregular or patterned such that when the coil is rolled up a "keying" effect is produced, whereby protrusions on an inner surface of one portion of the end region of the strip are brought into register with, and thereby engage with, corresponding recesses in the opposite surface of the strip at a site spaced from the first and which is brought into abutment therewith upon coiling up of the strip material. This keying effect may help to prevent the layers of strip material sliding past one another once it is coiled and to also assist in maintaining the compact nature of the strip when coiled up ready for moulding of the plastics material around the end portion thereof.

According to the present invention, the plastics

material used to form the core moulding may be of any suitable material known in the art. Thermoplastic polymeric materials commonly known in the art for injection moulding are preferred, for example polypropylene, polyethylene, though any suitable material may be employed, such as is already known in the art of moulding of mop heads.

In particularly preferred embodiments of the invention, the body of plastics material moulded around the end portion of the core includes, preferably on the side opposite to that from which extend the mop strip elements, an integral attachment portion, especially a socket, e.g. a socket comprising a screwthread or bayonet fixing, for direct connection to the end of a mop handle.

In this manner a complete, unitary mop head can be produced in what is essentially a single moulding operation and which can be mounted directly on a mop handle. In this way, replacement or refill mop heads can be produced simply, quickly and cheaply, and which avoid the disadvantages of known mop head refill systems which are both expensive to manufacture and less simple to use.

However, in alternative, and for the most part less favoured, embodiments of the invention, other, known means of attachment of a mop head core may be used in the context of the present invention. These include for example various forms of interference mounting mechanism, where the moulded plastics body of the core is clamped or locked inside a housing or sleeve provided as a permanent or removable fixture on the end of the mop handle.

In further alternative forms, there may be provided at the time of moulding of the body of plastics material around the end portion of the core, one or more lugs, detents or clip elements, which may be non-invasive or invasive with respect to the absorbent material of the core itself, which provide the necessary mechanical attachment sites in the finished core once the plastics moulding around the end portion thereof is finished. Examples of mechanical attachment systems for use in this context are well known per se in the art of known mops, brushes, brooms and the like.

Preferred embodiments of the present invention will now be described in detail with reference to the accompanying drawings, in which:

Figure 1, comprising Figures 1(a), (b) and (c), shows the principal stages in the production of a mop head in accordance with the present invention, which are, respectively, (a) a calendered, slitted web of absorbent strip material, (b) the web in the process of being rolled up on itself to form a coil ready for the moulding of a body of plastics material around its upper end portion, and (c) the finished mop head;

Figure 2 is a perspective view in more preferred detail of a partially rolled up web of material such as

that shown in Figure 1(a), in substantially the same condition as the partially rolled up web shown in Figure 1(b);

Figure 3, comprising Figures 3(a) and (b), shows schematically the stages in the formation of the

core of absorbent strip elements, starting from a single rectangular web of calendered material;

Figure 4, comprising Figures 4(a), (b) and (c), shows schematically the principal stages in the moulding operation in the manufacture of the mop head, starting from the core of strip elements as produced by the steps shown in Figure 3;

Figure 5 is an exploded view of an alternative construction of mop head, still in accordance with the invention; and

Figure 6 is a part-cross-sectional view of the assembled mop head shown in Figure 5.

Referring firstly to Figure 1, a rectangular web 1 of absorbent mop strip element material, such as is already known in the art, for example a homogeneous blend of viscose fibres and polypropylene fibres comprises three zones 2, 3, 4 characterised as: an end zone 2 which has been subjected to a full calendering process; an uncalendered zone 3; and a transition zone 4 between the fully calendered and uncalendered zones 2, 3, respectively. Preferably, at least part of the transition zone 4 is also subjected to a certain depth of calendering, but preferably such that there is a smooth transition in calendering depth traversing the transition zone 4 between the fully calendered zone 2 and the uncalendered zone 3, as is seen more clearly in Figure 2 and described further below.

To form a plurality of strip elements 11 the web 1 is cut so as to have a plurality of slits 10 extending from the lower edge 1a of the web 1 to a line substantially parallel to the upper edge 1b of the web 1 but spaced therefrom so as to lie within the calendered zone 2. The line at which the slits terminate is preferably spaced from the upper edge 1b by a distance approximately 45% of the width of the calendered zone 2.

The calendering process applied to the end zone 2 of the web 1 may be of any suitable known procedure, as is already known in the art of textiles, paper or certain paper products. Briefly, the zone of the web 1 to be calendered is pulled or driven between a pair of contra-rotating rollers whose pressing surfaces are separated by a distance less than the natural thickness of the web 1, thereby calendering the zone passed therebetween to effect a compression, densification and reduction of internal volume of the web structure. The surfaces of the rollers are heated for example to a temperature of approximately 140°C, which is preferred in the case of the preferred composition of strip material as mentioned hereinabove.

Starting with the calendered, cut web as shown in Figure 1(a), the web is wound up on itself about an axis generally parallel to the longitudinal direction of the cut

strips 11 which will form the elongate mop strip elements in the finished mop head. The thus produced coil 5 is shown almost completely wound in Figure 1(b). The winding of the coil may be effected manually or by an automated process and may if desired be assisted by the use of a pin or spigot inserted into the top of the coil and about which the length of web can be wound with greater ease and accuracy. Binding means are preferably provided to secure the coil 5 in its wound up condition, as will be described further below.

After the coil 5 of strip elements has been formed (so as to constitute what has been referred to herein as a "core"), a body of plastics material 12 is moulded around the top end portion of the calendered zone 2 of the coil 5, so as to form an integral head attachment having the mop strip elements securely bonded therein and extending generally parallel therefrom, as shown in Figure 1(c). The moulded plastics body 12 comprises an integral socket 20 for attachment directly onto a mop handle (not shown) and any suitable additional means, e.g. a screw threaded or bayonet fitting, may be provided on or in or associated with the socket 20 to assist that securement of the mop head to the handle, as will be well understood by persons skilled in the art.

Turning to Figure 2, here there is shown in more detail the partially wound core of calendered, cut absorbent material web 1, showing as before calendered zone 2, uncalendered zone 3 and transition zone 4. As seen in Figure 2, the transition zone 4 is contoured on both sides of the web so as to present oppositely inclined gently curved ramp surfaces bridging the calendered zone 2 and uncalendered zone 3. Alternatively, the transition zone 4 may be contoured on only one side of the web, preferably the outer surface when coiled, to present a single curved ramp surface on one side of the web only and a planar surface on the other side thereof.

Also shown in Figure 2 is an optional irregular calendering pattern formed in the calendered zone 2, comprising regions 8 of greater thickness separated by regions 9 of reduced thickness, these respective regions on opposite surfaces of the web intermingling with each other as the web is wound into a coil 5, thereby helping to prevent the coil from unwinding.

Desirably the top edge 1b of the web 1 is cut, e.g. pinked or crenellated, so as to present a non-flat top surface of increased surface area at the top of the finished coil 5. This will assist the secure bonding of plastics moulding material around the top of the coil during the subsequent stages of manufacture, as described further below.

In a particularly preferred form of mop head core, the outer surface of the calendered zone 2 will be even and smooth, in order to create a more effective seal against the moulding members of the moulding apparatus, in which the integrally moulded head is ultimately formed.

The tightness of the winding of the coil may be selected as desired or as necessary according to the

required physical properties of the finished mop head and also for example the openness of the structure of the absorbent web material and/or the depth of calendaring in the calendared zone 2 thereof. Generally the coil will be wound so as to be quite tight, though the exact winding tension may vary from case to case.

Figure 3 shows in more detail the principal stages in the manufacture of the mop head core starting from an uncut web 1 of the absorbent material which has already been calendared in an end zone 2 and pinked along its upper long edge 1b.

The uncut calendared web 1 is fed, for example from a supply roll (not shown), from left to right as shown in the Figure along a bed and passes beneath a cutting roller 100 having mounted thereon a plurality of longitudinal parallel cutting blades 102. The blades 102 cut slits 10 in the web 1 as the roller 100 is rotated by a drive mechanism (not shown). The longitudinal extent of the cutting blades 102 is such that the upper limit of the cut slits 10 terminates in the calendared end zone 2, as already described above in relation to Figure 1.

After the calendared web has been cut, it passes beneath an adhesive-applying roller 112 driven by and supplied with adhesive from drive means/adhesive supply means 110. The roller applies a strip or band of for example hot melt adhesive 7 to the web material, in order to hold the coil tightly wound once the web is rolled up on itself. The position, thickness and width of the adhesive binding strip 7 may be selected so as to give optimum binding action, yet not be detrimental to the absorptivity of the web material, which will be important in the moulding of the plastics body around the end of the rolled up core.

As shown in Figure 3(b) the web is finally rolled up on itself and formed into a tight, bonded coil by rollers 120 and rolling guide means 130, 140. Suitable practical apparatuses for carrying out this step are well known in the art and shown only schematically in the Figure. Once the coil of the desired size has been rolled up, the web is cut for example by guillotine means (not shown) and the finished coil separated from the conveyed web ready for application to the moulding stage of the process which will now be described with reference to Figure 4.

Figures 4(a), (b) and (c) show the principal steps in the moulding operation of the process, in which a body of plastics material 12 is moulded around the end of the core 5 to form the finished integral mop head.

The moulding apparatus comprises a moulding head 140 defining a moulding chamber between two or more moveable moulding members 150 and moulding bed 156. The moulding members 150 are mutually moveable between an open position as shown in Figure 4(a) and a closed position as shown in Figure 4(b). In the open position the core 5 is insertable into the mould and the finished moulded head is removable therefrom (Figure 4(c), whilst in the closed position the core 5 is clamped between neck parts 151 of each of the mould-

ing members 150. Recessed portions 152 of each of the moulding members 150 define the radially outward limit of the moulding chamber within which the moulded plastics body of the head will be formed by injection of fluid moulding composition.

The moulding members 150 are each shaped at their neck and recessed portions 151, 152 respectively so as to provide the desired shape of the plastics moulding in the finished head. Conveniently the moulding chamber defined between the moulding members 150 and moulding bed 156 has a circular cross-section by virtue of the moulding members 150 in combination defining a cylindrical space between their recessed portions 152. A similar cylindrical space of smaller transverse dimensions is formed between the neck portions 151 of the members 150, to define the clamping portion of the moulding head which grips the core 5 during the moulding process and which may assist in the prevention of leakage of moulding fluid from the mould, especially by seepage through the absorbent strip elements of the coiled core.

Communicating with the interior of the moulding chamber via conduit 145 is supply chamber 160 from which the plastics moulding composition is supplied and injected into the moulding chamber during the moulding operation.

Formed in the moulding bed 156 and disposed equi-radially around the supply conduit 145 is a cylindrical channel 158 which will form in the finished head moulding a socket for the attachment of the completed head to a mop handle.

As shown in Figure 4(a), the first stage in the moulding operation is the insertion of the core 5 into the moulding head 140 and the bringing together of the moulding members 150 so as to define the moulding chamber around the end portion of the core 5 and to clamp the core in position ready for injection of the plastics moulding composition. The orientation of the apparatus as shown in the Figure is preferred, for ease of handling of the core during the procedure.

With the moulding members 150 in their closed position as shown in Figure 4(b), plastics, e.g. polypropylene, moulding composition 170, e.g. in the form of a hot melt fluid, is injected from the supply chamber 160 into the moulding chamber via conduit 145. The moulding composition 170 fills the moulding chamber, coating, encasing and possibly also impregnating the web material in the calendared end portion of the core and additionally entering the cylindrical channel 158 which will form the handle attachment socket in the finished moulding. The physical characteristics of the moulding process, e.g. temperature, rate of injection, retention time, cooling temperature and cooling time may all be selected according to known criteria in the well known field of injection moulding and so will not be described in detail here.

Once the moulding step is complete, the finished mop head, comprising core 5 with integrally bonded

plastics moulded body 12 with attachment socket 20, can be removed from the moulding head 140 by opening of the moulding members 150, following which any desired or necessary finishing operations may be carried out, e.g. subsequent cooling and hardening, finishing to remove surplus moulding composition, burrs, and the like, all of which post-moulding techniques are well known in the art. Following removal of the finished mop head, the moulding process beginning from Figure 4(a) again may now be repeated with a new coiled core 5. The finished mop head is shown in Figure 1(c).

It may be desired in certain embodiments of the present invention to provide the moulded head not with an integral plug-in socket for the mop handle as shown in Figures 1 to 4 in the context of the most preferred embodiment, but to mould the head so that it is attachable to a handle-mountable intermediate mechanical fixing which may be of any suitable mechanical construction, possibly as already known in the art of mop head attachment techniques. For this purpose, one or more additional steps may be employed in the overall mop head manufacturing process, including for example the step of forming one or more holes in the substrate for the insertion of pins, lugs, spigots or other mechanical attachment means, either before or after rolling up of the web material to form the core. Corresponding or further attachment means may also be formed during the moulding steps, for example as integral mechanical fixing lugs, detents, screw threads or any other similarly operative mechanical interference attachment means.

Figure 5 shows one such alternative form of moulded body as part of a finished mop head of this invention, this being shown in exploded view in Figure 5 and in cross-section in Figure 6.

The moulding apparatus used to form the moulded body of plastics material 212 in this embodiment differs from that shown in Figure 4 used for the preferred embodiment simply in that there is no cylindrical channel 158 provided in the moulding bed 156. The resulting moulding chamber formed upon closure of the moulding members 150a and 150b is therefore simply cylindrical.

In this embodiment the means of attachment of the head to a mop handle is provided by an intermediate mounting means comprising a cylindrical housing 219 having extending from its upper surface a handle-accommodating socket 220 and including locking means for securably and releasably retaining the moulded plastics body 212 of the head within the housing 219. Most conveniently, the housing 219 may be provided permanently fixed to the mop handle via socket 220.

The locking means comprises a resiliently flexible locking collar 218 locatable within a channel 235 provided on the exterior of the housing 219. Provided in the bed of the channel 235 is at least one window 232 through which protrudes, when brought into register with it, at least one corresponding spigot or other similar

protrusion 240 provided on the radially interior surface of the locking collar 218. The sides of the or each spigot or protrusion and/or window 232 may be suitably shaped, e.g. inclined or smoothly contoured, to ease the location of these two interengaging surface formations with each other and out of each other as the collar 218 is rotated within the exterior housing channel 235.

Location of the one or more (preferably two diametrically opposite) protrusions 240 in its or their respective window apertures 232 enables the moulded plastics body 212 of the head to be locked within the housing once it has been inserted therein, as shown in Figure 6.

For inserting the head into the housing 219, the locking collar 218 is rotated in its channel 235 to bring the protrusion(s) 240 out of register with the corresponding window aperture(s) 232, in which open condition the plastics body 212 of the head can be simply inserted into the housing 219. To lock the head in place within the housing, the locking collar 218 is then further rotated within its channel 235 until the protrusion(s) 240 come into register with and protrude through the corresponding respective window aperture(s) 232, in which condition the opening into the housing 219 is restricted as shown in Figure 6. In this manner removal of the head from the housing is prevented. Rotation of the locking collar 218 and the popping in and out of the protrusion(s) 240 into and from the window aperture(s) 232 is assisted by the resilient flexibility of the collar material, which may be made of any such suitable material, e.g. plastics, as may the main housing and socket 219, 220 of the attachment means. In this simple manner, a reliable clip release mechanism is formed, allowing ready attachment and removal of the mop head from the means of attachment of the head to the mop handle.

Embodiments of the present invention have been described above by way of example only and many modifications and variations are possible within the scope of the present invention as claimed, as will be apparent to persons skilled in the art.

Claims

1. A method of producing a mop head, comprising forming a core of elongate absorbent strip elements and around an end portion thereof moulding a body of plastics material to form a means by which the core can be mounted on a mop handle, characterised in that prior to formation of the core, an end zone of the material of the strip elements, around which the plastics material is moulded, is subjected to a calendering process.
2. A method according to claim 1, wherein the core of elongate absorbent strip elements comprises a single, coiled web of the absorbent strip material having slits therein defining individual strips, the said slits terminating short of an upper edge of the web at which the calendered end zone is situated.

3. A method according to claim 2, wherein the calendaring process includes the step of pulling or driving the uncoiled web of absorbent strip element material between a pair of contra-rotating rollers, the surfaces of the rollers being spaced apart by a distance less than the normal, uncalendered thickness of the strip element material, and the rolling surfaces of at least one of the rollers being heated compared with ambient temperature.
4. A method according to claim 3, wherein the surface of at least one of the rollers has formed therein a textured or keying pattern which imparts a corresponding uneven calendaring pattern to the strip element material pulled or driven between the rollers during the calendaring process.
5. A method according to any one of claims 1 to 4, wherein during the step of moulding the plastics material around the end zone of the core of strip elements, fluid plastics moulding material seeps along and between the strips of absorbent material in the end zone of the core.
6. A method according to claim 5, wherein fluid plastics material additionally impregnates the absorbent material in the end zone thereof.
7. A method according to any preceding claim, wherein the calendered end zone of the core extends beyond the limit of the body of plastics material which is moulded around it.
8. A method according to any preceding claim, wherein the depth of calendaring in the calendered zone of the strips changes smoothly over at least part of the section of the strips in the calendered zone in the longitudinal direction of the core.
9. A method according to claim 8, wherein the said part of the calendered zone in which the depth of calendaring changes smoothly constitutes a transition zone between the calendered and uncalendered zone of each strip, at least one surface of each strip in the transition zone thereby being formed as a ramp surface situated between the calendered and uncalendered zones.
10. A method according to any preceding claim, wherein the upper surface of the coiled core of absorbent strip elements is serrated or pinked such as to present an irregular surface for the moulding of plastics material thereon and therearound.
11. A method according to claim 2, wherein, prior to the moulding step, the coil of absorbent web material is wound up on itself under tension.

12. A method according to claim 11, comprising the step of applying to the web material means for preventing its unwinding once it is coiled up.
13. A method according to any preceding claim, further including integrally moulding simultaneously with the head connection means for mounting the completed head on a mop handle.
14. A mop head comprising a core of elongate absorbent strip elements having moulded around an end portion thereof a body of plastics material which forms a means of attaching the core to a mop handle, characterised in that the absorbent material of the strip elements has been subjected to a calendaring process in an end zone thereof around which the plastics material is moulded.
15. A mop head formed by a method according to any one of claims 1 to 13.

Patentansprüche

1. Verfahren zur Herstellung eines Moppkopfteils, umfassend Bilden eines Kerns aus langgestreckten absorbierenden Streifenelementen und Formen eines Körpers aus Kunststoffmaterial um einen Endteil desselben herum, um eine Einrichtung zu bilden, mittels welcher der Kern an einem Moppgriff angebracht werden kann, dadurch gekennzeichnet, dass vor der Bildung des Kerns eine Endzone des Materials der Streifenelemente, um die herum das Kunststoffmaterial geformt wird, einem Kalandrierverfahren unterzogen wird.
2. Verfahren nach Anspruch 1, bei welchem der Kern aus langgestreckten absorbierenden Streifenelementen ein einzelnes aufgewickeltes Gewebe des absorbierenden Streifenmaterials umfasst, das Schlitze darin aufweist, die einzelne Streifen begrenzen, wobei die besagten Schlitze kurz vor einem oberen Rand des Gewebes enden, an dem sich die kalandrierte Endzone befindet.
3. Verfahren nach Anspruch 2, bei welchem das Kalandrierverfahren den Schritt eines Hindurchziehens oder Hindurchtreibens des unaufgewickelten Gewebes aus absorbierendem Streifenelementmaterial zwischen einem Paar gegenläufigen Rollen einschließt, wobei die Oberflächen der Rollen durch einen Abstand getrennt sind, der kleiner ist als die normale unkalandrierte Dicke des Streifenelementmaterials, und die Abrollflächen von mindestens einer der Rollen verglichen mit Umgebungstemperatur erwärmt werden.
4. Verfahren nach Anspruch 3, bei welchem die Oberfläche von mindestens einer der Rollen ein textu-

riertes oder Formschluss-Muster darin ausgebildet aufweist, das dem während des Kalandrierverfahrens zwischen den Rollen hindurchgezogenen oder hindurchgetriebenen Streifenelementmaterial ein entsprechendes ungleichmäßiges Kalandriermuster verleiht.

5. Verfahren nach einem beliebigen der Ansprüche 1 bis 4, bei welchem während des Schritts eines Formens des Kunststoffmaterials um die Endzone des Kerns aus Streifenelementen herum flüssiges Kunststoff-Formmaterial entlang der Streifen und zwischen den Streifen aus absorbierbarem Material in die Endzone des Kerns sickert.

6. Verfahren nach Anspruch 5, bei welchem flüssiges Kunststoffmaterial zusätzlich das absorbierende Material in seiner Endzone tränkt.

7. Verfahren nach einem beliebigen vorangehenden Anspruch, bei welchem sich die kalandrierte Endzone des Kerns über die Begrenzung des Körpers aus Kunststoffmaterial, welcher um ihn herum geformt wird, hinaus erstreckt.

8. Verfahren nach einem beliebigen vorangehenden Anspruch, bei welchem sich die Kalandriertiefe in der kalandrierten Zone der Streifen in Längsrichtung des Kerns über mindestens einen Teil des Abschnitts der Streifen in der kalandrierten Zone sanft verändert.

9. Verfahren nach Anspruch 8, bei welchem der besagte Teil der kalandrierten Zone, in dem sich die Kalandriertiefe sanft verändert, eine Übergangszone zwischen der kalandrierten und der unkalandrierten Zone jedes Streifens bildet, wobei dadurch mindestens eine Oberfläche jedes Streifens in der Übergangszone als eine zwischen der kalandrierten und der unkalandrierten Zone befindliche Schrägfläche ausgebildet wird.

10. Verfahren nach einem beliebigen vorangehenden Anspruch, bei welchem die Oberseite des aufgewickelten Kerns aus absorbierenden Streifenelementen gezahnt oder zickzackförmig ist, so dass sie zum Formen von Kunststoffmaterial darauf und darum herum eine unregelmäßige Oberfläche darbietet.

11. Verfahren nach Anspruch 2, bei welchem vor dem Formschritt der Wickel aus absorbierendem Gewebematerial unter Zugspannung auf sich selbst aufgewickelt wird.

12. Verfahren nach Anspruch 11, umfassend den Schritt eines Zuführens von Mitteln zum Gewebematerial, um sein Abwickeln zu verhindern, sobald

es aufgewickelt ist.

13. Verfahren nach einem beliebigen vorangehenden Anspruch, weiter einschließend ein gleichzeitiges einstückiges Formen zusammen mit dem Kopfteil von Verbindungseinrichtungen zum Anbringen des fertigen Kopfteils auf einem Moppgriff.

14. Moppkopfteil, umfassend einen Kern aus langgestreckten absorbierenden Streifenelementen mit einem um einen Endteil desselben herum geformten Körper aus Kunststoffmaterial, der eine Einrichtung zum Anbringen des Kerns an einem Moppgriff bildet, dadurch gekennzeichnet, dass das absorbierende Material der Streifenelemente in einer Endzone derselben, um die herum das Kunststoffmaterial geformt wird, einem Kalandrierverfahren unterzogen worden ist.

15. Durch ein Verfahren nach einem beliebigen der Ansprüche 1 bis 13 gebildeter Moppkopfteil.

Revendications

1. Procédé de fabrication d'une tête de balai à franges, consistant à former un coeur d'éléments absorbants allongés en forme de bandes et à mouler un corps en matière plastique autour d'une extrémité du coeur pour former un moyen grâce auquel le coeur peut être monté sur un manche du balai à franges, caractérisé en ce que, avant de former le coeur, une zone d'extrémité de la matière des éléments en forme de bandes, autour de laquelle la matière plastique est moulée, a subi un processus de calandrage.

2. Procédé selon la revendication 1, dans lequel le coeur d'éléments absorbants allongés en forme de bandes comprend une seule pièce enroulée de matière absorbante en forme de bandes ayant des fentes définissant des bandes individuelles, lesdites fentes se terminant peu avant un bord supérieur de la pièce, au niveau duquel la zone d'extrémité calandree est située.

3. Procédé selon la revendication 2, dans lequel le processus de calandrage comprend la phase consistant à tirer ou à entraîner la pièce déroulée de matière absorbante d'éléments en forme de bandes entre une paire de cylindres à rotation inverse, les surfaces des cylindres étant espacées suivant une distance inférieure à l'épaisseur normale non calandree de la matière des éléments en forme de bandes, les surfaces de laminage d'au moins un des cylindres étant chauffées par rapport à la température ambiante.

4. Procédé selon la revendication 3, dans lequel la

surface d'au moins un des cylindres a formé à l'intérieur de la surface un dessin structuré ou de clavage qui donne un dessin de calandrage correspondant non régulier, à la matière des éléments en forme de bandes, tirée ou entraînée entre les cylindres pendant le processus de calandrage.

5. Procédé selon l'une quelconque des revendications 1 à 4, dans lequel, pendant la phase de moulage de la matière plastique autour de la zone d'extrémité du coeur des éléments en forme de bandes, une matière plastique fluide de moulage s'infiltre le long et entre les bandes de matière absorbante dans la zone d'extrémité du coeur. 5
6. Procédé selon la revendication 5, dans lequel la matière plastique fluide imprègne en outre la matière absorbante dans sa zone d'extrémité. 10
7. Procédé selon l'une quelconque des revendications précédentes, dans lequel la zone d'extrémité calandree du coeur s'étend au-delà de la limite du corps en matière plastique qui est moulé autour du coeur. 15
8. Procédé selon l'une quelconque des revendications précédentes, dans lequel la profondeur de calandrage dans la zone calandree des bandes varie progressivement sur au moins une partie de la section des bandes dans la zone calandree, dans la direction longitudinale du coeur. 20
9. Procédé selon la revendication 8, dans lequel ladite partie de la zone calandree, dans laquelle la profondeur de calandrage se modifie progressivement, constitue une zone de transition entre la zone calandree et la zone non calandree de chaque bande, au moins une surface de chaque bande dans la zone de transition étant ainsi formée comme une surface en forme de rampe située entre les zones calandree et non calandree. 25
10. Procédé selon l'une quelconque des revendications précédentes, dans lequel la surface supérieure du coeur enroulé des éléments absorbants en forme de bandes est striée ou dentelée, de façon à présenter une surface irrégulière pour le moulage de la matière plastique sur la surface du coeur et autour de celle-ci. 30
11. Procédé selon la revendication 2, dans lequel, avant la phase de moulage, la bobine de matière absorbante de la pièce est enroulée sur elle-même, sous tension. 35
12. Procédé selon la revendication 11, comprenant la phase d'application, sur la matière de la pièce, de moyens pour empêcher son déroulement une fois que la matière a été enroulée. 40

13. Procédé selon l'une quelconque des revendications précédentes, comprenant en outre le moulage intégral, effectué simultanément avec le moulage de la tête, de moyens d'accouplement pour monter la tête complète sur un manche de balai à franges.

14. Tête de balai à franges comprenant un coeur d'éléments absorbants allongés en forme de bandes, ayant un corps en matière plastique moulé autour d'une extrémité du coeur, ledit corps formant un moyen de fixation du coeur sur un manche du balai à franges, caractérisée en ce que la matière absorbante des éléments en forme de bandes a subi un processus de calandrage dans sa zone d'extrémité autour de laquelle la matière plastique est moulée.

15. Tête de balai à franges formée par un procédé selon l'une quelconque des revendications 1 à 13.

Fig.1(a).

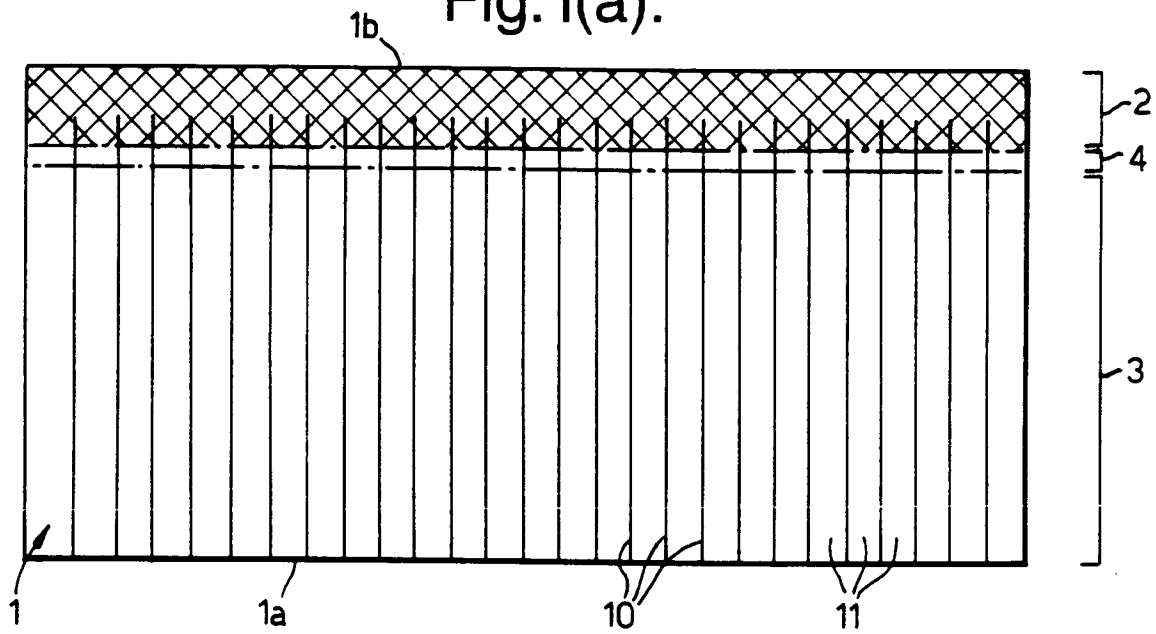


Fig.1(b).

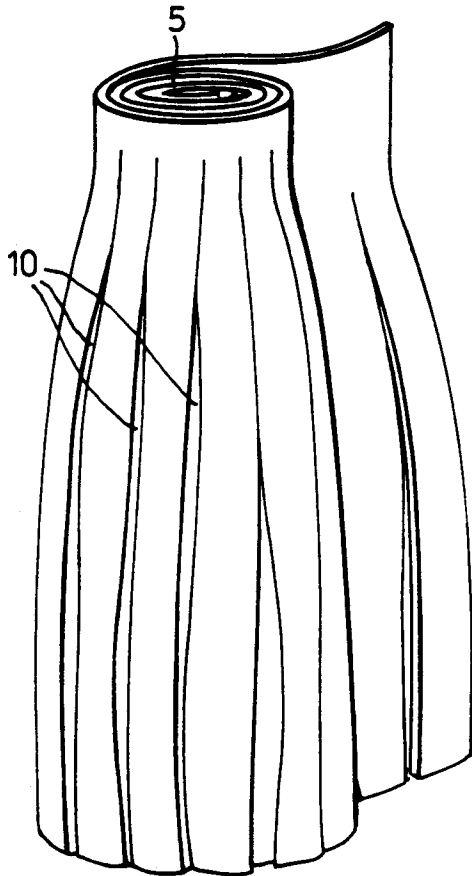


Fig.1(c).



Fig.2.

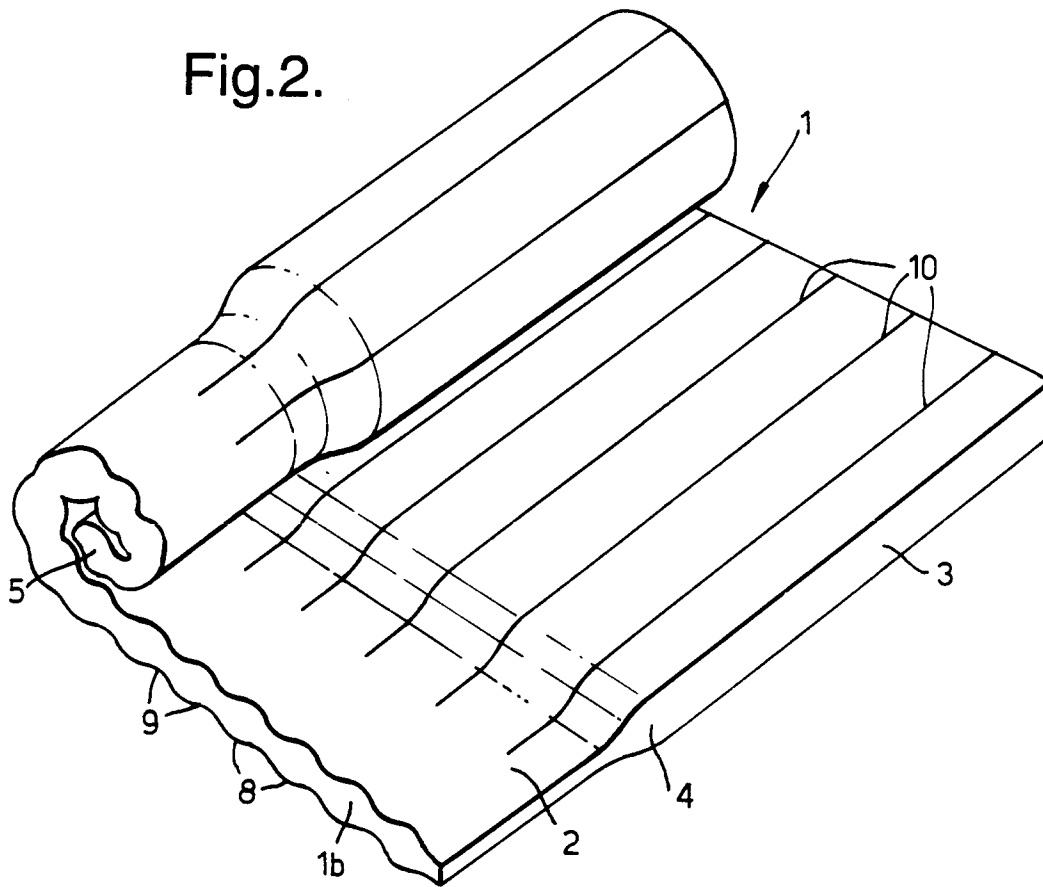


Fig.3(a).

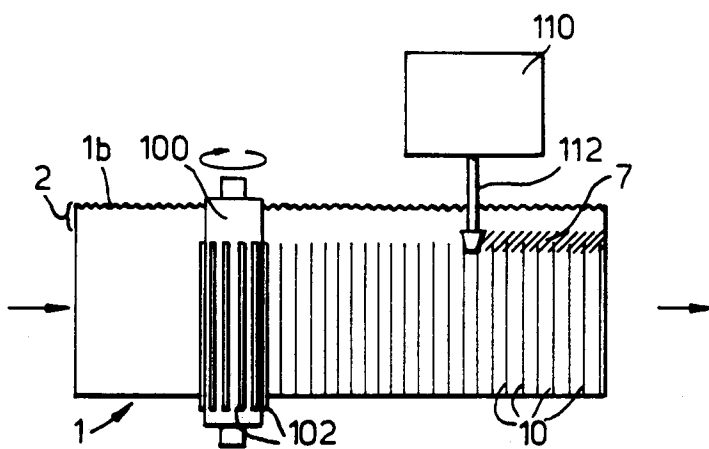


Fig.3(b).

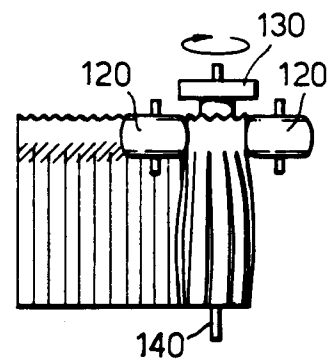


Fig.4(a).

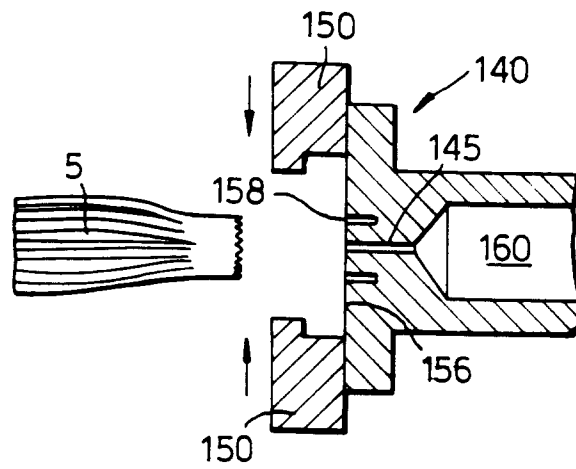


Fig.4(b).

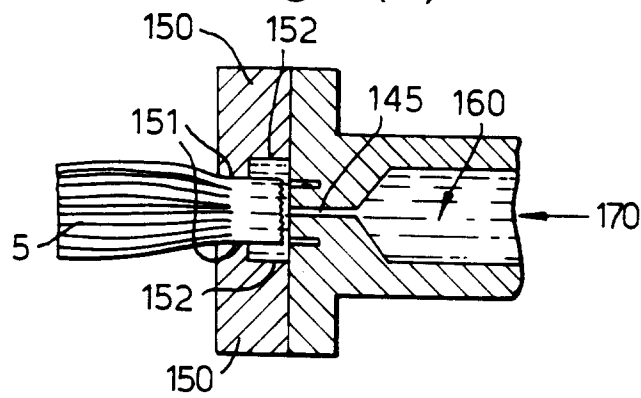


Fig.4(c).

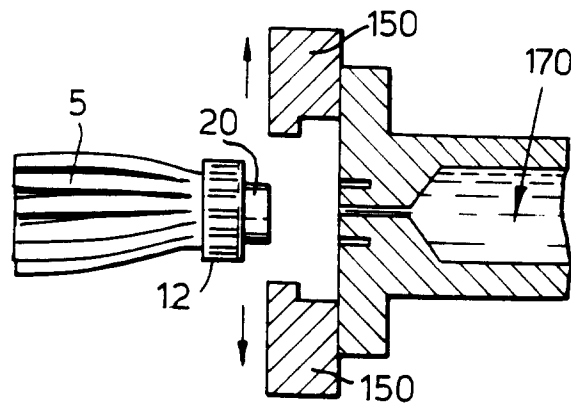


Fig.5.

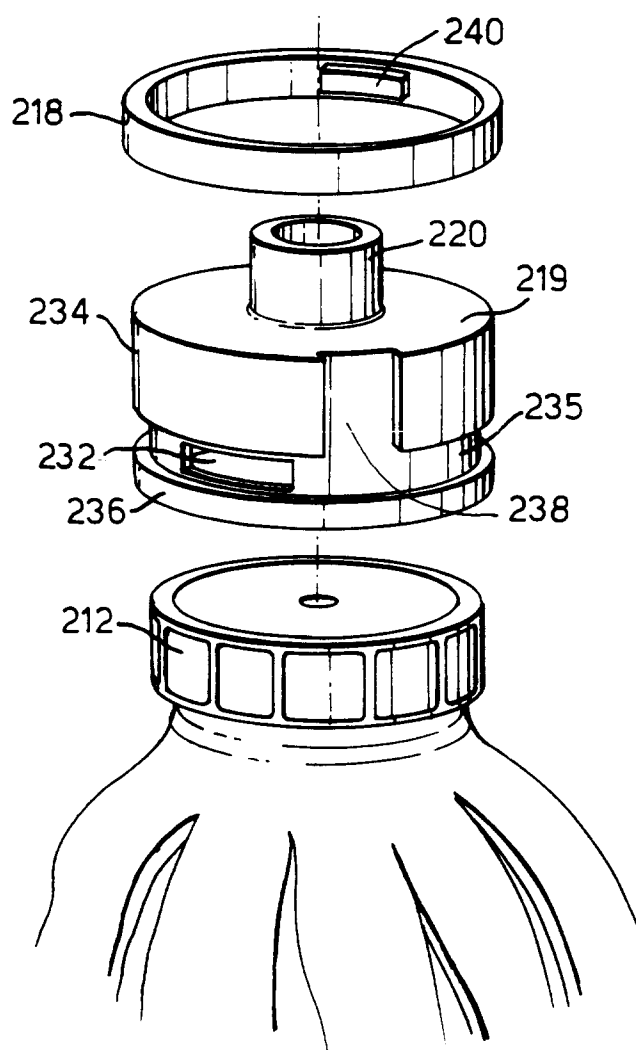


Fig.6.

