

Description

The present invention relates to an easily breakable plastic capsule, and more particularly, to an easily breakable plastic capsule adapted to use in the fields of foodstuff, medical supplies, industrial chemicals, etc. The invention also relates to a filter for a cigarette using the capsule of this type.

In the food industry, for example, miniature containers or so-called capsules are used conveniently for packing liquid or powdery materials which are consumed in very small quantities. These materials include cream for coffee, sugar, liquid sweeteners, seasonings, table salt, spices, etc. The capsules are not opened until the filler materials therein are going to be used actually. Thus, a fixed amount of material can be taken out of each capsule by opening the same. Since these capsules are small-sized, however, they sometimes cannot be unsealed easily, or the filler materials may be unexpectedly spilled out of the capsules at the time of unsealing.

Such an awkward situation may be experienced not only with the aforementioned capsules for foodstuff, but also with capsules used in various other fields, including medical supplies, industrial chemicals, household goods, etc.

Besides these fields, the tobacco industry has recently come to require development of filters which can be attached to cigarettes. Basically, these filters comprise a filter housing open at both ends, a filter member contained therein, and water with which the filter member is impregnated. More specifically, one end of the filter housing serves as a socket for a cigarette, while the other end is formed as a filter tip. In these filters, however, a seal cap must be attached to each end of the filter housing, in order to prevent the water in the filter member from being evaporated before use. At the start of using one such filter, therefore, the removal of the seal caps require time. On account of the aforesaid structural problem, moreover, the conventional filters cannot be used as filters for filter cigarettes. Thus there is a demand for the development of such kind of filters which can be applied to cigarettes by utilizing the aforementioned capsules.

In the DE-B- 2 009 403 an easily breakable sealed plastic capsule packet with a material is disclosed, wherein said capsule is comprising a cylindrical body having an end wall. The said body is elastically deformable when subjected to external pressure, and the said end wall is including a thin-walled region being thinner than any other regions of the body and extending radially from the central axis of said cylindrical body.

Further, the said end wall is cone-shaped. Thus, if the said end wall is squeezed lightly in the radial direction, it is merely bent and deformed,

since only a small amount of stress is generated inside the capsule. Therefore, the capsule of DE-B- 2 009 403 must be squeezed with considerable force to ensure that sufficient stress is generated to split the cone-shaped end wall. If the capsule structured in the manner described were housed in a cigarette filter, the smoker would have to squeeze the filter strongly in the radial direction in order to split the end wall of the capsule. Hence, squeezing thus would cause deformation of the filter portion, obstruct smoking and thus it would not be realistic to put such a filter into practical use.

The end wall of the prior known capsule is - as already mentioned above - a cone-shaped hat, and made of paper. When the opening of a cone-shaped hat is squeezed in the radial direction, its rim is easily deformed into an oval shape. However, the other portions of the hat are merely curved, with no substantial deformation, such as of splitting the paper occurring.

The US-A- 3 502 084 discloses the structure of a capsule containing water inside a filter portion of a cigarette, wherein the said capsule is ball-shaped. There are no means facilitating and ensuring the breaking of the said capsule when squeezed.

A first object of the present invention is to provide means facilitating and ensuring the breaking of a capsule according to the preamble of claim 1 when squeezed in the radial direction with only a small amount of force.

A second object of the present invention is to provide a filter for a cigarette using such a capsule.

The first object of the invention is achieved by the characterizing feature of claim 1, wherein the second object of the invention is achieved by the characterizing features of claim 8.

According to the present invention, the grooves of the end wall of the capsule are designed to break easily and without fail, when the end portion is squeezed in the radial direction, using only a small amount of force. When the body of the capsule according to the present invention is squeezed in the radial direction by a user's finger, shear deformation occurs in the radial direction of the portion which is perpendicular to the central axis, causing high shear stress inside the capsule. In contrast to the prior art structure of for example DE-B-2 009 403, the end wall of the capsule body according to the present invention can be compared with a circular piece of paper pasted tightly over a circular frame which can be deformed. When the circular frame is deformed by being squeezed in the radial direction, the paper pasted on the frame is not deformed but split. This is because a great shear distortion in radial plane direction is applied to the paper on the frame. Due to the difference in shape, considerable distortion

of the thin-walled region of the capsule occurs when the end portion of its body is deformed only a little, with the result that the grooves of the thin-walled region split easily.

The said effect is supported by the further feature upon which the thin-walled region is to be thinner than any other region of the body.

Due to the above described effects of the capsule according to the present invention the said capsule is well suited as part of a filter for a cigarette.

With respect to preferred structural details of the claimed for capsule and filter it is referred to the subsidiary claims 2 to 7 and 9 to 17, respectively.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a sectional view of an easily breakable plastic capsule according to a first embodiment of the present invention, as taken along line I-I of Fig. 2;

Fig. 2 is a sectional view taken along line II-II of Fig. 1;

Fig. 3 is a sectional view taken along line III-III of Fig. 2;

Figs. 4, 5 and 6 are sectional views of easily breakable plastic capsules according to second, third, and fourth embodiments, respectively, of the invention;

Fig. 7 is a side view of an easily breakable plastic capsule according to a fifth embodiment of the invention;

Fig. 8 is a sectional view taken along line VIII-VIII of Fig. 7;

Fig. 9 is a sectional view similar to Fig. 8, showing a configuration of a groove;

Fig. 10 is a sectional view showing an embodiment of a water filter of the present invention applied to a cigarette;

Figs. 11 to 14 are sectional views individually showing modifications of the water filter;

Fig. 15 is a sectional view taken along line XV-XV of Fig. 14;

Fig. 16 is a cross-sectional view of another water filter;

Fig. 17 is a sectional view of still another filter; and

Fig. 18 is a sectional view taken along line XVIII-XVIII of Fig. 17.

Referring now to Fig. 1, there is shown an easily breakable plastic capsule according to the present invention, which comprises a hollow cylindrical body 2 open at one end. Body 2 is liable to elastic deformation. Available materials for body 2 include thermoplastic resins, such as polyethylene, polypropylene, polystyrene, polyvinyl chloride,

polyvinylidene chloride, polyester, polycarbonate, polyamide, etc., and mixtures of these resins. In this embodiment, the actual material of body 2 is low-density polyethylene obtained by mixing SHOLEX -9300 (trademark) with NOVATEC M-450 (trademark) at a ratio of 3 : 7 by weight, in consideration of the compressive strength, breaking strength, and water-vapor permeability.

The open end of body 2 is closed in a liquid-tight manner by means of seal film 4. Thus, packed chamber 6 is defined inside body 2. The capacity of chamber 6, which may be suitably set depending on the application of the capsule, generally ranges from 0.15 cc to several cubic centimeters. A filler material to be packed in chamber 6, which is selected also according to the application, is a fluid material, such as a liquid or powder.

In this embodiment, seal film 4 is a laminate or coated film composed of an aluminum foil and a thermoplastic resin. The film is fused to the open end of body 2 by heating. Film 4 is not limited to these materials, and may alternatively be a simple film of a thermoplastic resin. It is necessary only that the film material be strong enough not to be broken when body 2 is deformed elastically.

As seen from Figs. 1 and 2, a plurality of grooves 10, e.g., six in number, are formed on inner surface 8a of end wall 8 of body 2. Extending radially, these grooves are arranged uniformly so that central portion 12 of wall 8 is left uncut. Annular groove 12a is formed around portion 12, whereby the respective inner ends of grooves 10 are connected to one another. In this embodiment, the angle formed between two opposite inner wall surfaces of each groove 10 is set within a range of 35° to 120°, and preferably, is set to 90°.

The configuration of grooves 10 will be described further in detail. Each groove 10 has a bottom wall with predetermined width W. As shown in Fig. 3, thickness T of the bottom wall preferably ranges, for example, from 1/20 to 3/5 of thickness S of the wall of body 2 or end wall 8. This thickness is a thickness such that the bottom wall can be broken when body 2 is deformed elastically by external force.

Grooves 10 can be formed simultaneously with body 2, as a general structure, only if a die used for injection molding of the whole body is provided with ridges for the formation of grooves 10.

As seen from Fig. 1, central portion 12 of end wall 8 projects slightly from inner surface 8a of wall 8. The diameter of portion 12 may be determined as required.

Six ribs 14 are formed on the inner peripheral surface of body 2. As shown in Fig. 2, these ribs are arranged circumferentially, at regular intervals, between grooves 10. Each rib 14 extends from end wall 8 to a point near the open end of body 2.

According to the easily breakable plastic capsule described above, end wall 8 is deformed elastically if the peripheral wall of body 2 is squeezed by fingers. By the elastic deformation of wall 8, stress is concentrated on the bottom walls of grooves 10, so that the bottom walls can be broken easily. Thus, the capsule is unsealed, and the filler material therein is allowed to flow out.

In the capsule of the present invention, the bottom walls of grooves 10 cannot be broken unless body 2 is subjected to elastic deformation. Thus, the capsule can be handled with ease before and during transportation.

The capsule of the invention is not limited to the arrangement of the embodiment described above. Several modifications of the capsule will now be described. In the description to follow, like reference numerals are used to designate like members with the same functions.

In an easily breakable plastic capsule shown in Fig. 4, taper portion 16 is formed on the outer peripheral surface of body 2. Portion 16, which starts at end wall 8, covers about 1/3 of the overall length of body 2. At this taper portion, the thickness of the peripheral wall of body 2 is reduced gradually with distance from the middle portion of the body. Also, ring-shaped rib 18 is formed on the inner surface of the peripheral wall of body 2. Rib 18, which is situated on the open end side of body 2, interrupts grooves between ribs 14. Ring-shaped projection 20 is formed on the outer surface of end wall 8.

According to the aforementioned capsule shown in Fig. 4, taper portion 16 serves to facilitate the elastic deformation of body 2 and therefore, unsealing of the capsule.

According to an easily breakable plastic capsule shown in Fig. 5, grooves 22, e.g., six in number, are formed on the peripheral wall of body 2, in place of taper portion 16 shown in Fig. 4. These grooves are arranged circumferentially at regular intervals on the outer surface of the peripheral wall of body 2. In the case of the embodiment of Fig. 5, ribs 14 are not provided on the inner wall surface of body 2.

If body 2 had grooves 22 as aforesaid, the peripheral wall of body 2 can be thinned, as in the case of the arrangement including taper portion 16, so that body 2 can be elastically deformed with ease.

In an easily breakable plastic capsule shown in Fig. 6, seal film 24 composed only of an aluminum foil is used in place of seal film 4. Film 24 is bonded to the open end of body 2 by means of a thermoplastic bonding agent. Available materials for the thermoplastic bonding agent include adhesive polyolefin resin, low-density polyethylene, etc.

Unlike seal film 4 of the foregoing embodiments, seal film 24 of the embodiment of Fig. 6 is subjected to a tensile force when it is deformed elastically. Thus, film 24 is broken simultaneously with grooves 10 of end wall 8. Thus, the thickness of film 24 is set within a range of 10 μ to 30 μ , and preferably, is set to 15 μ .

In a capsule shown in Fig. 7, four grooves 10 are formed on end wall 8 of body 2. In this case, wall 8 is not provided with central portion 12. In the embodiment of Fig. 7, moreover, grooves 10 are formed on outer surface 8b of end wall 8, as shown in Fig. 8, instead of being formed on inner surface 8a. Alternatively, grooves 10 may be provided on both inner and outer surfaces 8a and 8b of end wall 8, as shown in Fig. 9.

The easily breakable plastic capsule according to the present invention is not limited to the embodiments described above, and the following various modifications (not shown) may be effected in the invention.

In any of the aforementioned embodiments, body 2 is in the form of a hollow cylinder. However, body 2 must only be a hollow structure, and its shape is not limited to any specific configuration. In other words, body 2 may have the shape of a sphere, ellipsoid, triangular prism, quadrangular prism, or the like. In the foregoing embodiments, moreover, body 2 is provided with an opening portion through which the material is filled therinto. After body 2 is thus filled with the material, the opening portion is closed by means of seal film 4 or 24. Alternatively, however, a body may be used which is not provided with the opening portion. In this case, the material is injected into the body by using a needle or the like, and a resulting pinhole in the body is sealed by suitable means. Further, the location of the thin-walled region of body 2, in which grooves 10 are formed, is not limited to end wall 8, and may be determined as required, depending on the shape of the body.

A filter for a cigarette using the aforementioned easily breakable plastic capsule will now be described.

Referring now to Fig. 10, there is shown cigarette 26, which is fitted with filter 28 according to the present invention.

Filter 28 comprises flexible casing 30 in the form of a hollow cylindrical member made of paper. More specifically, the cylindrical member includes inner cylinder 30a and outer cylinder 30b pasted on the outer peripheral surface of cylinder 30a. As seen from Fig. 10, one end portion of outer cylinder 30b of casing 30 constitutes boss 32, which projects axially over a predetermined length from inner cylinder 30a. An open end of boss 32 serves as a socket for cigarette 26. Thus, one end portion of cigarette 26 is fitted in boss 32. As in the

case of a conventional filter cigarette, the one end portion of cigarette 26 and boss 32 of casing 30 are coupled to each other by pasting.

A pair of filter members 34 and 36 are arranged spaced in casing 30. These members are situated individually at two opposite ends of inner cylinder 30a. Filter members 34 and 36 may be formed of the same filter materials as are used in conventional filter cigarettes, i.e., acetate fibers, pulp fibers, etc. Preferably, however, at least one of the filter members, member 34 in this embodiment, should be formed by hydrophobic, fusible complex fibers. The other end of casing 30, or filter member 36 constitutes a mouthpiece.

Water capsule 38, similar to the easily breakable plastic capsule of Fig. 1, is interposed between filter members 34 and 36 in casing 30. About 0.15 cc to 0.4 cc of liquid is sealed in capsule 38. In this case, the liquid is composed essentially of water. Alternatively, however, the liquid may be a water solution of sugar, tobacco essence, spices, brandy, etc.

As shown in Fig. 10, end wall 8 of body 2 of water capsule 38 is located in close vicinity to filter member 34.

The outside diameter of capsule 38 or body 2, as seen from Fig. 10, is smaller enough than the inside diameter of casing 30 to secure smoke passage 40, through which a flow of smoke from cigarette 26, passing through filter member 34, is guided to the mouthpiece via filter member 36.

In water capsule 38 used in filter 28 for a cigarette, the length of body 2 ranges from 10 mm to 20 mm, and preferably, is 14 mm. The outside diameter of body 2 ranges from 5 mm to 12 mm, and preferably, is 7 mm. Thickness T (see Fig. 3) of the bottom wall of each groove 10 of end wall 8 is set within a range of 0.06 mm to 0.15 mm, and preferably, is set to 0.13 mm. Width W (see Fig. 3) of the bottom wall is set to 0.2 mm, for example. Moreover, thickness S (see Fig. 1) of those portions of end wall 8 other than grooves 10 is set within a range of 0.3 mm to 0.6 mm, and preferably, is set to 0.5 mm. Central portion 12 projects about 0.4 mm from the inner surface of end wall 8, and its diameter is 1 mm or thereabout. The thickness and width of each rib 14 are 0.2 mm and about 0.8 mm, respectively.

According to the water-filtered cigarette shown in Fig. 10, filter 28 can be squeezed in the directions of the arrows by a smoker's fingers. When filter 28 is crushed in this manner, casing 30 is deformed, so that body 2 of water capsule 38 is reduced in diameter by elastic deformation. Thereupon, the bottom walls of grooves 10 of end wall 8 of body 2 are broken as aforesaid, and at the same time, the liquid in capsule 38 is ejected toward filter member 34. Thus, member 34 is impregnated with

the liquid. Grooves 10 of end wall 8 extend radially, and ribs 14 are formed on the inner peripheral surface of body 2 so as to be situated between grooves 10. When body 2 is crushed, therefore, stress is concentrated on those regions of the bottom walls of grooves 10 near central portion 12, so that such regions are broken first. Accordingly, the liquid in capsule 38 is ejected intensively from the center of end wall 8.

When a user lights cigarette 26 for smoking, thereafter, water-soluble substances, such as nicotine and tar, contained in the flow of smoke from the cigarette are dissolved in the liquid with which filter member 34 is impregnated. Thus, these substances can be reduced before they reach the smoker's mouth, so that the smoker can enjoy soft smoking. Despite the presence of water capsule 38, moreover, smoke passage 40 is secured in filter 28 during the smoking. Therefore, the smoke flow can be guided satisfactorily from cigarette 26 to the mouthpiece.

As described above, filter 28 of the present invention is constructed so that filter member 34 is impregnated with the liquid in water capsule 38 by breaking the capsule immediately before the start of smoking. During the production of a cigarette with filter 28 of this construction, the liquid can be sealed and held securely in capsule 38. Also in a manufacturing apparatus for ordinary filter cigarettes, therefore, water capsule 38 can be handled in the same manner as filter members 34 and 36. Thus, filter 28 of the invention can be easily used in place of a conventional cigarette filter. Moreover, the outer diameter of capsule 38 is smaller than those of members 34 and 36. In connecting cigarette 26 with casing 30 of filter 28 or inner cylinder 30a by means of outer cylinder 30b, therefore, water capsule 38 cannot be subjected to any excessive force. Thus, the capsule is prevented from being opened unexpectedly.

Since filter 28 is provided with smoke passage 40, furthermore, it can be checked by means of a conventional defective tester of an air-circulation type.

In the embodiment of Fig. 10, moreover, end wall 8 of water capsule 38 faces filter member 34 which is situated remoter from the filter tip. At the start of use or when capsule 38 is unsealed, only member 34 is impregnated with the liquid. During smoking, therefore, the liquid in capsule 38 is prevented from flowing out to the filter tip. Thus, the taste of smoking cannot be spoiled by the liquid.

Filter 28 of the present invention is not limited to the embodiment shown in Fig. 10. Referring now to Figs. 11 to 18, various modifications of the filter will be described.

In filter 28 shown in Fig. 11, filter members 34 and 36 are situated reversely to those of the filter

of Fig. 10. In this arrangement, water capsule 38 is oriented reversely with respect to its axial direction.

In filter 28 shown in Fig. 12, filter member 36 is replaced with a filter member similar to filter member 34 of the filter of Fig. 10.

In filter 28 shown in Fig. 13, filter member 36 of the filter of Fig. 11 is omitted.

In filter 28 shown in Figs. 14 and 15, ribs 42, e.g., four in number, are formed on the outer peripheral surface of water capsule 38. They are arranged circumferentially at regular intervals. A plurality of smoke passages 40 are secured between ribs 42.

Filter 28 shown in Fig. 16 has corrugated sheet 44, which is wound around the outer peripheral surface of water capsule 38 so as to be situated between casing 30 and capsule 38. Also with use of such a sheet, a plurality of smoke passages 40 can be secured between casing 30 and capsule 38.

Filter 28 shown in Figs. 17 and 18, unlike the embodiments described above, is formed as a so-called water pipe which is independent of cigarette 26. As seen from Fig. 17, water capsule 38 of pipe 28 includes body 2a of a double-pipe structure. Thus, end wall 8 and an open end of body 2, and therefore, seal film 4, are all ring-shaped. According to water capsule 38 constructed in this manner, axially extending smoke passage 40 can be secured in the central portion of the capsule. In water pipe 28, moreover, the greater part of casing 30 is formed of plastic material. Meanwhile, region 46 of casing 30 in which water capsule 38 is contained is formed of a flexible material, such as rubber. Thus, body 2a of capsule 38 can be easily crushed by externally applying force to casing 30.

In the embodiments described above, the filter uses the easily breakable plastic capsule shown in Fig. 1. It is to be understood, however, that the easily breakable plastic capsules shown in Figs. 4 to 7 can be used in place of the one shown in Fig. 1.

When using the easily breakable plastic capsule or water capsule shown in Fig. 6, for example, it is preferably substituted for the water capsule used in the embodiment of Fig. 12. In this arrangement, water capsule 38 of Fig. 6 is broken at both ends when it is unsealed. Accordingly, a space formed in capsule 38 after the discharge of the liquid can be utilized as smoke passage 40. In this case, smoke passage 40 between casing 30 and capsule 38 can be omitted, so that the outer peripheral surface of the capsule can be made to be in intimate contact with the inner peripheral surface of casing 30.

Claims

1. An easily breakable sealed plastic capsule packed with a material, said capsule comprising a cylindrical body having an end wall (8), said body (2) being elastically deformable when subjected to external pressure, said end wall (8) including at least one thin-walled region being thinner than any other regions of the body (2) and extending radially from the central axis of said cylindrical body (2), characterized in that said end wall (8) has a planar surface, said at least one thin-walled region extending perpendicular to the central axis of said body (2) and in that said at least one thin-walled region includes a plurality of radially extending grooves (10).
2. The capsule according to claim 1, characterized in that said radially extending grooves (10) extend radially so that a central portion (12) of the end wall is left ungrooved.
3. The capsule according to claim 2, characterized in that said central portion (12) has an annular groove (12a) connected to the respective inner ends of the radially extending grooves (10).
4. The capsule according to any of the claims 1-3, characterized in that said body (2) is composed of a hollow cylindrical member having one end closed by an end wall (8) and the other end open, said capsule further comprising a seal film (4, 24) for sealing the other end of the body.
5. The capsule according to claim 1, characterized in that the respective inner ends of said individual radially extending grooves (10) are connected to one another.
6. The capsule according to claim 1, characterized in that the peripheral wall of said body (2) includes a taper portion (16) reduced in wall thickness toward the end wall (8).
7. The capsule according to claim 1, characterized in that said body (2) is formed, on the outer peripheral surface thereof, with a plurality of grooves (22) extending within a predetermined range from the end wall (8) and arranged at regular intervals in the circumferential direction of the body (2).
8. A filter for a cigarette comprising, a flexible casing (30), at least one filter member (34, 36)

of Fig. 10. In this arrangement, water capsule 38 is oriented reversely with respect to its axial direction.

In filter 28 shown in Fig. 12, filter member 36 is replaced with a filter member similar to filter member 34 of the filter of Fig. 10.

In filter 28 shown in Fig. 13, filter member 36 of the filter of Fig. 11 is omitted.

In filter 28 shown in Figs. 14 and 15, ribs 42, e.g., four in number, are formed on the outer peripheral surface of water capsule 38. They are arranged circumferentially at regular intervals. A plurality of smoke passages 40 are secured between ribs 42.

Filter 28 shown in Fig. 16 has corrugated sheet 44, which is wound around the outer peripheral surface of water capsule 38 so as to be situated between casing 30 and capsule 38. Also with use of such a sheet, a plurality of smoke passages 40 can be secured between casing 30 and capsule 38.

Filter 28 shown in Figs. 17 and 18, unlike the embodiments described above, is formed as a so-called water pipe which is independent of cigarette 26. As seen from Fig. 17, water capsule 38 of pipe 28 includes body 2a of a double-pipe structure. Thus, end wall 8 and an open end of body 2, and therefore, seal film 4, are all ring-shaped. According to water capsule 38 constructed in this manner, axially extending smoke passage 40 can be secured in the central portion of the capsule. In water pipe 28, moreover, the greater part of casing 30 is formed of plastic material. Meanwhile, region 46 of casing 30 in which water capsule 38 is contained is formed of a flexible material, such as rubber. Thus, body 2a of capsule 38 can be easily crushed by externally applying force to casing 30.

In the embodiments described above, the filter uses the easily breakable plastic capsule shown in Fig. 1. It is to be understood, however, that the easily breakable plastic capsules shown in Figs. 4 to 7 can be used in place of the one shown in Fig. 1.

When using the easily breakable plastic capsule or water capsule shown in Fig. 6, for example, it is preferably substituted for the water capsule used in the embodiment of Fig. 12. In this arrangement, water capsule 38 of Fig. 6 is broken at both ends when it is unsealed. Accordingly, a space formed in capsule 38 after the discharge of the liquid can be utilized as smoke passage 40. In this case, smoke passage 40 between casing 30 and capsule 38 can be omitted, so that the outer peripheral surface of the capsule can be made to be in intimate contact with the inner peripheral surface of casing 30.

Claims

1. An easily breakable sealed plastic capsule packed with a material, said capsule comprising a cylindrical body having an end wall (8), said body (2) being elastically deformable when subjected to external pressure, said end wall (8) including at least one thin-walled region being thinner than any other regions of the body (2) and extending radially from the central axis of said cylindrical body (2), characterized in that said end wall (8) has a planar surface, said at least one thin-walled region extending perpendicular to the central axis of said body (2) and in that said at least one thin-walled region includes a plurality of radially extending grooves (10).
2. The capsule according to claim 1, characterized in that said radially extending grooves (10) extend radially so that a central portion (12) of the end wall is left ungrooved.
3. The capsule according to claim 2, characterized in that said central portion (12) has an annular groove (12a) connected to the respective inner ends of the radially extending grooves (10).
4. The capsule according to any of the claims 1-3, characterized in that said body (2) is composed of a hollow cylindrical member having one end closed by an end wall (8) and the other end open, said capsule further comprising a seal film (4, 24) for sealing the other end of the body.
5. The capsule according to claim 1, characterized in that the respective inner ends of said individual radially extending grooves (10) are connected to one another.
6. The capsule according to claim 1, characterized in that the peripheral wall of said body (2) includes a taper portion (16) reduced in wall thickness toward the end wall (8).
7. The capsule according to claim 1, characterized in that said body (2) is formed, on the outer peripheral surface thereof, with a plurality of grooves (22) extending within a predetermined range from the end wall (8) and arranged at regular intervals in the circumferential direction of the body (2).
8. A filter for a cigarette comprising, a flexible casing (30), at least one filter member (34, 36)



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contained in the casing (30) and an easily breakable sealed plastic capsule (38) which contains a liquid disposed inside the casing (30) in close vicinity to the at least one filter member (34, 36),

characterized in that said easily breakable sealed plastic capsule comprises a cylindrical body having an end wall (8) in the vicinity of the at least one filter member (34, 36),

said body (2) being elastically deformable when subjected to external pressure,

said end wall (8) including at least one thin-walled region being thinner than any other regions of the body (2) and extending radially from the central axis of said cylindrical body (2),

said end wall (8) has a planar surface, said at least one thin-walled region extending perpendicular to the central axis of said body (2) and in that said at least one thin-walled region includes a plurality of radially extending grooves (10).

9. The filter according to claim 8, characterized in that said body (2) is composed of a hollow cylindrical member having one end closed by an end wall (8) and the other end open, and said capsule (38) further includes a seal film (4, 24) for sealing the other end of the body (2).

10. The filter according to claim 8, characterized in that said thin-walled region includes a plurality of radially extending grooves (10) formed on the end wall (8), said grooves (10) extending radially so that a central portion (12) of the end wall (8) is left ungrooved.

11. The filter according to claim 10, characterized in that said central portion (12) has an annular groove (12a) connected to the respective inner ends of the radially extending grooves (10).

12. The filter according to claim 8, characterized in that said body (2) is formed, on the outer peripheral surface thereof, with a plurality of grooves (22) extending within a predetermined range from the end wall (8) and arranged at regular intervals in the circumferential direction of the body (2).

13. The filter according to claim 8, characterized in that said capsule (38) is held between a pair of filter members (34, 36) in the casing.

14. The filter according to claim 13, characterized in that said seal film (24) is broken together with the end wall (8) when the body (2) is

deformed elastically.

15. The filter according to claim 8, characterized in that said casing (30) is made of paper, and said casing (30) and said cigarette (26) are coupled to each other by pasting.

16. The filter according to claim 8, characterized in that it comprises guide means for guiding a flow of smoke from the cigarette (26) into the casing (30) extending from the cigarette (26) to a mouthpiece, and in that said guide means includes a passage (40) defined between the casing (30) and the capsule (38).

17. The filter according to claim 13, characterized in that said guide means includes a space inside the capsule (38) provided after the liquid is discharged from the capsule (38).

Patentansprüche

1. Leicht aufbrechbare, dicht verschlossene Kunststoffkapsel, die mit einem Material dicht gefüllt ist, wobei die Kapsel einen zylindrischen Körper mit einer Endwand (8) aufweist, wobei der Körper (2) elastisch verformbar ist, wenn er einem äußeren Druck unterworfen wird,

die Endwand (8) wenigstens einen dünnwandigen Bereich aufweist, der dünner als alle anderen Bereiche des Körpers (2) ist und sich in Radialrichtung von der Mittelachse des zylindrischen Körpers (2) erstreckt,

dadurch gekennzeichnet, daß die Endwand (8) eine ebene Fläche hat, wobei der wenigstens eine dünnwandige Bereich senkrecht zu der Mittelachse des Körpers (2) verläuft, und daß der wenigstens eine dünnwandige Bereich eine Vielzahl von in Radialrichtung verlaufenden Nuten (10) aufweist.

2. Kapsel nach Anspruch 1, dadurch gekennzeichnet, daß die in Radialrichtung verlaufenden Nuten (10) derart radial verlaufen, daß ein zentraler Bereich (12) der Endwand nutenfrei bleibt.

3. Kapsel nach Anspruch 2, dadurch gekennzeichnet, daß der zentrale Bereich (12) eine Ringnut (12a) hat, die mit den jeweiligen inneren Enden der in Radialrichtung verlaufenden Nuten (10) verbunden ist.

4. Kapsel nach einem der Ansprüche 1-3, dadurch gekennzeichnet, daß der Körper (2) aus einem hohlzylindrischen Element besteht, dessen eines Ende von einer Endwand (8) ver-

geschlossen und dessen anderes Ende offen ist, wobei die Kapsel ferner eine Abdichtfolie (4, 24) aufweist, um das andere Ende des Körpers dicht zu verschließen.

5. Kapsel nach Anspruch 1, dadurch gekennzeichnet, daß die jeweiligen inneren Enden der einzelnen in Radialrichtung verlaufenden Nuten (10) miteinander verbunden sind.

6. Kapsel nach Anspruch 1, dadurch gekennzeichnet, daß die Umfangswand des Körpers (2) einen verjüngten Bereich (16) aufweist, dessen Wandstärke in Richtung zur Endwand (8) abnimmt.

7. Kapsel nach Anspruch 1, dadurch gekennzeichnet, daß der Körper (2) an seiner Außenumfangsfläche mit einer Vielzahl von Nuten (22) ausgebildet ist, die sich innerhalb eines vorbestimmten Bereichs von der Endwand (8) erstrecken und in regelmäßigen Abständen in der Umfangsrichtung des Körpers (2) angeordnet sind.

8. Filter für eine Zigarette, der aufweist: ein flexibles Gehäuse (30), wenigstens ein Filterelement (34, 36), das in dem Gehäuse (30) enthalten ist, und eine leicht aufbrechbare, dicht verschlossene Kunststoffkapsel (38), die eine Flüssigkeit enthält, die in dem Gehäuse (30) in unmittelbarer Nähe des wenigstens einen Filterelements (34, 36) angeordnet ist,

dadurch gekennzeichnet, daß die leicht aufbrechbare, dicht verschlossene Kunststoffkapsel einen zylindrischen Körper mit einer Endwand (8) in der Nähe des wenigstens einen Filterelements (34, 36) aufweist,

der Körper (2) elastisch verformbar ist, wenn er einem äußeren Druck unterworfen wird,

die Endwand (8) wenigstens einen dünnwandigen Bereich aufweist, der dünner als alle anderen Bereiche des Körpers (2) ist und sich in Radialrichtung von der Mittelachse des zylindrischen Körpers (2) erstreckt,

die Endwand (8) eine ebene Fläche hat, wobei der wenigstens eine dünnwandige Bereich senkrecht zu der Mittelachse des Körpers (2) verläuft, und daß der wenigstens eine dünnwandige Bereich eine Vielzahl von in Radialrichtung verlaufenden Nuten (10) aufweist.

9. Filter nach Anspruch 8, dadurch gekennzeichnet, daß der Körper (2) aus einem hohlzylindrischen Element besteht, dessen eines Ende von einer Endwand (8) verschlossen und dessen anderes Ende offen ist, und die Kapsel

(38) ferner eine Abdichtfolie (4, 24) aufweist, um das andere Ende des Körpers (2) dicht zu verschließen.

10. Filter nach Anspruch 8, dadurch gekennzeichnet, daß der dünnwandige Bereich eine Vielzahl von in Radialrichtung verlaufenden Nuten (10) aufweist, die an der Endwand (8) gebildet sind, wobei die Nuten (10) derart radial verlaufen, daß ein zentraler Bereich (12) der Endwand nutenfrei bleibt.

11. Filter nach Anspruch 10, dadurch gekennzeichnet, daß der zentrale Bereich (12) eine Ringnut (12a) aufweist, die mit den jeweiligen inneren Enden der in Radialrichtung verlaufenden Nuten (10) verbunden ist.

12. Filter nach Anspruch 8, dadurch gekennzeichnet, daß der Körper (2) an seiner Außenumfangsfläche mit einer Vielzahl von Nuten (22) ausgebildet ist, die sich innerhalb eines vorbestimmten Bereichs von der Endwand (8) erstrecken und in regelmäßigen Abständen in der Umfangsrichtung des Körpers (2) angeordnet sind.

13. Filter nach Anspruch 8, dadurch gekennzeichnet, daß die Kapsel (38) zwischen einem Paar von Filterelementen (34, 36) in dem Gehäuse gehalten ist.

14. Filter nach Anspruch 13, dadurch gekennzeichnet, daß die Abdichtfolie (24) gemeinsam mit der Endwand (8) aufgebrochen wird, wenn der Körper (2) elastisch verformt wird.

15. Filter nach Anspruch 8, dadurch gekennzeichnet, daß das Gehäuse (30) aus Papier besteht und das Gehäuse (30) und die Zigarette (26) durch Verkleben miteinander verbunden sind.

16. Filter nach Anspruch 8, dadurch gekennzeichnet, daß er eine Führungseinrichtung aufweist, um einen Rauchstrom von der Zigarette (26) in das Gehäuse (30) zu leiten, die sich von der Zigarette (26) zu einem Mundstück erstreckt, und daß die Führungseinrichtung einen Durchlaß (40) aufweist, der zwischen dem Gehäuse (30) und der Kapsel (38) definiert ist.

17. Filter nach Anspruch 13, dadurch gekennzeichnet, daß die Führungseinrichtung einen Raum innerhalb der Kapsel (38) aufweist, der gebildet wird, nachdem die Flüssigkeit aus der Kapsel (38) abgegeben ist.



Revendications

1. Capsule étanche en matière plastique facile à briser remplie d'un matériau tassé, cette capsule comprenant un corps cylindrique ayant une paroi terminale (8), ce corps (2) étant élastiquement déformable lorsqu'il est soumis à une pression extérieure, cette paroi terminale (8) contenant au moins une région à paroi mince plus mince que toute autre région du corps (2) et s'étendant radialement à partir de l'axe central du corps cylindrique (2), caractérisée en ce que cette paroi terminale (8) a une surface plane, la(les) région(s) à paroi mince s'étendant perpendiculairement à l'axe central du corps (2) et en ce que cette(ces) région(s) à paroi mince présente(nt) une multiplicité de rainures radiales (10).
2. Capsule selon la revendication 1, caractérisée en ce que les rainures radiales (10) s'étendent radialement de manière à laisser non rainurée une portion centrale (12) de la paroi terminale.
3. Capsule selon la revendication 2, caractérisée en ce que cette portion centrale (12) comporte une rainure annulaire (12a) se raccordant aux extrémités intérieures respectives des rainures radiales (10).
4. Capsule selon l'une des revendications 1 à 3, caractérisée en ce que le corps (2) est constitué par un élément cylindrique creux ayant une extrémité fermée par une paroi terminale (8) et sa deuxième extrémité ouverte, cette capsule comprenant en outre un film de scellement (4,24) pour fermer hermétiquement la deuxième extrémité du corps.
5. Capsule selon la revendication 1, caractérisée en ce que les extrémités intérieures respectives des rainures radiales individuelles (10) sont raccordées les unes aux autres.
6. Capsule selon la revendication 1, caractérisée en ce que la paroi périphérique du corps (2) comporte une portion conique (16) dont l'épaisseur de paroi diminue en direction de la paroi terminale (8).
7. Capsule selon la revendication 1, caractérisée en ce que la surface périphérique extérieure du corps (2) présente une multiplicité de rainures (22) s'étendant depuis la paroi terminale (8) sur une longueur prédéterminée et disposées à intervalles réguliers dans la direction circonférentielle du corps (2).

8. Filtre pour une cigarette, comprenant une manchette souple (30), au moins un élément filtrant (34,36) contenu dans la manchette (30), et une capsule étanche en matière plastique facile à briser (38), contenant un liquide et disposée à l'intérieur de la manchette (30) à proximité immédiate du(des) élément(s) filtrant(s) (34,36), caractérisé en ce que la capsule étanche en matière plastique facile à briser comprend un corps cylindrique ayant une paroi terminale (8) à proximité du(des) élément(s) filtrant(s) (34,36), ce corps (2) étant élastiquement déformable lorsqu'il est soumis à une pression extérieure, cette paroi terminale (8) contenant au moins une région à paroi mince plus mince que toute autre région du corps (2) et s'étendant radialement à partir de l'axe central du corps cylindrique (2), cette paroi terminale (8) ayant une surface plane, la(les) région(s) à paroi mince s'étendant perpendiculairement à l'axe central du corps (2) et en ce que cette(ces) région(s) à paroi mince présente(nt) une multiplicité de rainures radiales (10).
9. Filtre selon la revendication 8, caractérisé en ce que le corps (2) est constitué par un élément cylindrique creux ayant une extrémité fermée par une paroi terminale (8) et sa deuxième extrémité ouverte, cette capsule (38) comprenant en outre un film de scellement (4,24) pour fermer hermétiquement la deuxième extrémité du corps.
10. Filtre selon la revendication 8, caractérisé en ce que la région à paroi mince présente une multiplicité de rainures radiales (10) formées sur la paroi terminale (8), ces rainures (10) s'étendant radialement de manière à laisser non rainurée une portion centrale (12) de la paroi terminale (8).
11. Filtre selon la revendication 10, caractérisé en ce que cette portion centrale (12) comporte une rainure annulaire (12a) se raccordant aux extrémités intérieures respectives des rainures radiales (10).
12. Filtre selon la revendication 8, caractérisé en ce que la surface périphérique extérieure du corps (2) présente une multiplicité de rainures (22) s'étendant depuis la paroi terminale (8) sur une longueur prédéterminée et disposées à intervalles réguliers dans la direction circonférentielle du corps (2).



13. Filtre selon la revendication 8, caractérisé en ce que la capsule (38) est tenue entre deux éléments filtrants (34,36) dans la manchette.

14. Filtre selon la revendication 13, caractérisé en ce que le film de scellement (24) est brisé en même temps que la paroi terminale (8) lorsque le corps (2) est déformé élastiquement.

15. Filtre selon la revendication 8, caractérisé en ce que la manchette (30) est en papier et que cette manchette (30) et la cigarette (26) sont couplées l'une à l'autre par collage.

16. Filtre selon la revendication 8, caractérisé en ce qu'il comporte des moyens de guidage pour guider un courant de fumée depuis la cigarette (26) dans la manchette (30) allant de la cigarette (26) à un embout, et en ce que les moyens de guidage comportent un passage (40) définie entre la manchette (30) et la capsule (38).

17. Filtre selon la revendication 13, caractérisé en ce que les moyens de guidage comprennent un espace procuré à l'intérieur de la capsule (38) après décharge du liquide de la capsule (38).

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