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(54) **CYLINDER FOR AEROSOLS (ALTERNATIVES)**

(57) The invention relates to the field of packaging, in particular, to a container, and constitutes a vessel mostly made of polyethylene terephthalate (PET), which is intended for filling with aerosols.

taloid bottom, and the housing wall may have a thickness of 0.3 mm to 1.2 mm.

The technical problem solved by the invention is to increase the operational strength of aerosol cylinders through modification of the design of its structural elements: the bottom and the neck.

The stated technical problem is solved due to the fact that, in the aerosol cylinder according to embodiment 1 comprising a neck and a body with a bottom, the bottom is formed with radial grooves, and the neck edge is provided with an annular outwardly projecting rectangular collar constituting the flat end of a larger diameter, the width of the wall together with the neck collar being approximately equal to the height of the collar, and according to embodiment 2 comprising a neck and a body with a bottom, the bottom is formed with radial grooves, the neck is provided with an outwardly projecting annular collar located on the lateral surface, indented from the upper edge having a longitudinal section of a shape close to a semicircle, where the upper half of the collar is tapered inwardly towards the edge of the neck, and an annular concave groove is formed within the neck at the collar level.

In a preferred embodiment of the cylinder, the radial grooves in the bottom of may be made widened and deepened from the center to the periphery to form a pen-

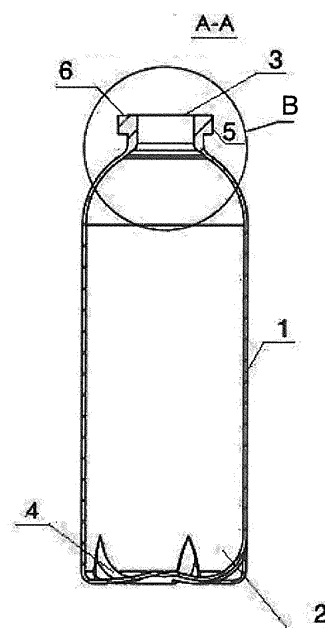


Fig. 2

Description

[0001] The invention relates to the field of packaging, in particular, to a container, and constitutes a vessel mostly made of polyethylene terephthalate (PET), which is intended for filling with aerosols.

[0002] Widely known is use of industrial containers in the form of metal cylinders for storage of aerosols (see, e.g., the "Raw Materials and Packaging" journal, No. 10 (29), 2006). Metal cylinders are strong, do not change their shape as a result of increased pressure therein and properly protect the product from adverse effects of the environment. However, operation of metal cylinders has a number of disadvantages associated with extra costs, namely:

- high cost of the cylinder material and sophisticated technology of its manufacture;
- exposure to most of aggressive environments and mechanical damage;
- considerable net weight of the cylinder, which reduces the volume of one-time delivery of the product;
- it is impossible to produce transparent cylinders;
- complex recycling.

[0003] Also known is industrial packaging container in the form of a cylinder for aerosol of such a polymer material as PET described in the utility model patent RU 22125, cl. B65D 1/00, published on Nov 20, 2001. This device is the closest analog to the proposed technical solution.

[0004] PET cylinders have numerous advantages. They are related to elimination of all of the above drawbacks, with PET of the cylinders fully recyclable at disposal.

[0005] A shortcoming of the known PET cylinder design lies in its low strength characteristics at operation. The liquid inside the cylinder is pressurized. It is therefore necessary for the cylinder structure to retain its shape, i.e., not to be deformed and not to release pressure through a lid with a valve loosely press-fit onto the neck.

[0006] The technical problem solved by the invention is to increase the operational strength of aerosol cylinders through modification of the design of its structural elements: the bottom and the neck.

[0007] The stated technical problem is solved due to the fact that, in the aerosol cylinder according to embodiment 1, comprising a neck and a body with a bottom, the bottom is formed with radial grooves, and the neck edge is provided with an annular outwardly projecting rectangular collar constituting the flat end of a larger diameter, the width of the wall together with the neck collar being approximately equal to the height of the collar.

[0008] In a preferred embodiment of the cylinder, the radial grooves in the bottom may be made widened and deepened from the center to the periphery to form a pentaloid bottom, and the housing wall may have a thickness of 0.3 mm to 1.2 mm.

[0009] The stated technical problem is also solved by the fact that in the aerosol cylinder according to embodiment 2, comprising a neck and a body with a bottom, the bottom is formed with radial grooves, the neck is provided with an outwardly projecting annular collar located on the lateral surface indented from the upper edge having a longitudinal section of a shape close to a semicircle, where the upper half of the collar is tapered inwardly towards the edge of the neck, and an annular concave groove is formed within the neck at the collar level.

[0010] In a preferred embodiment of the cylinder, the radial grooves in the bottom may be made widened and deepened from the center to the periphery to form a pentaloid bottom, and the housing wall may have a thickness of 0.3 mm to 1.2 mm.

[0011] The finished product has improved performance due to the lack of deformation in the bottom part and a reliable coupling of the neck with the lid having a valve. The cylinder (embodiment 1), apart from the bottom with grooves, has a massive neck with a collar. The cylinder (embodiment 2), apart from the bottom with grooves, has a massive neck with a collar and an annular groove within the neck.

[0012] The invention is illustrated with graphic materials, where

Fig. 1 is the front view of the cylinder (embodiment 1)

Fig. 2 is the section along A-A of Fig. 1 (longitudinal section) (option 1),

Fig. 3 is view B of Fig. 2 (neck) (embodiment 1).

Fig. 4 is the bottom view of the cylinder (embodiment 1)

Fig. 5 is the front view of the cylinder (embodiment 2)

Fig. 6 is the section along A-A of Figure 5 (longitudinal section) (embodiment 2)

Fig. 7 is view B of Fig. 6 (neck) (embodiment 2).

Fig. 8 is the bottom view of the cylinder (embodiment 2)

[0013] According to the first embodiment, the aerosol cylinder comprises body 1 of a cylindrical form, bottom 2 and neck 3. Bottom 2 is formed with radial grooves 4 forming stiffening ribs. The edge of the neck is provided with outwardly annular rectangular collar 5, forming flat end 6 of a larger diameter. The width of the wall of the neck in conjunction with the collar is approximately equal to the height of the collar. The bottom of collar 4 is parallel to the top of the collar (the end face of the neck) and is conjugated with the neck with a ledge. In one of the cylinder embodiments according to this utility model, bottom 2 can be of a pentaloid shape. The housing walls have a thickness of 0.3 mm to 1.2 mm.

[0014] According to the second embodiment, the aerosol cylinder comprises body 7 of a cylindrical shape, bottom 8 and neck 9. Bottom 8 is formed with radial grooves 10n forming stiffeners. Neck 9 is provided with an outwardly projecting annular collar 11 on the lateral surface indented from the upper edge 12 having a lon-

gitudinal section of a shape close to a semicircle. The upper half 13 of the collar is tapered inwardly towards the edge of the neck, and annular concave groove 14 is formed within the neck at the collar level. In one of the embodiments of the cylinder according to this utility model, the radial grooves in the bottom may be made widened and deepened from the center to the periphery to form pentaloid bottom 15. The housing walls have a thickness of 0.3 mm to 1.2 mm.

[0015] First, a preform with a non-expandable neck is produced, along the edge of which there is rectangular annular collar 5 (embodiment 1) or annular collar 11 outside the neck with annular groove 14 therein (embodiment 2). Then, the preform is heated to a state of elastic rubber, placed in a die mold and, while in the rubber-like state, is inflated with compressed air. At that, non-expandable neck 3 is clamped in a clamping assembly of the device, and body 1 is inflated. The shape of the housing and the bottom is set by the die mold. Further on, the finished product cools down on the cold walls of the die mold. Radial grooves 4 (embodiment 1) and 10 (embodiment 2) form stiffening ribs in the bottom, which make the bottom stiff thereby increase its operational strength. Then a valve is roll-formed onto the neck. In the first embodiment, the valve is put onto the neck from above, closing annular rectangular collar 5 and is roll-formed. In the second embodiment, the valve is inserted into the neck, and the valve enters with its annular projection into annular groove 14 inside neck 9 thereby increasing the area of cohesion between the neck and the valve. As a result, this increases the operational strength of the entire product as a whole. The diameter of the neck is generally 20 to 25 mm.

Claims

1. A cylinder for aerosols comprising a neck and a housing with a bottom **characterized in that** the bottom is formed with radial grooves, and the neck edge is provided with an annular outwardly projecting rectangular collar constituting the flat end of a larger diameter, the width of the wall together with the neck collar being approximately equal to the height of the collar.
2. The cylinder according to claim 1 **characterized in that** the radial grooves in the bottom are made widened and deepened from the center to the periphery and form a pentaloid bottom.
3. The cylinder according to claim 1 or claim 2 **characterized in that** the housing wall has a thickness of 0.3 mm to 1.2 mm.
4. A cylinder for aerosols comprising a neck and a housing with a bottom **characterized in that** the bottom is formed with radial grooves, the neck is provided

with an outwardly projecting annular collar located on the lateral surface, indented from the upper edge having a longitudinal section of a shape close to a semicircle, where the upper half of the collar is tapered inwardly towards the edge of the neck, and an annular concave groove is formed within the neck at the collar level.

5. The cylinder according to claim 4 **characterized in that** the radial grooves in the bottom are made widened and deepened from the center to the periphery and form a pentaloid bottom.
6. The cylinder according to claim 4 or 5 **characterized in that** the housing wall has a thickness of 0.3 mm to 1.2 mm.

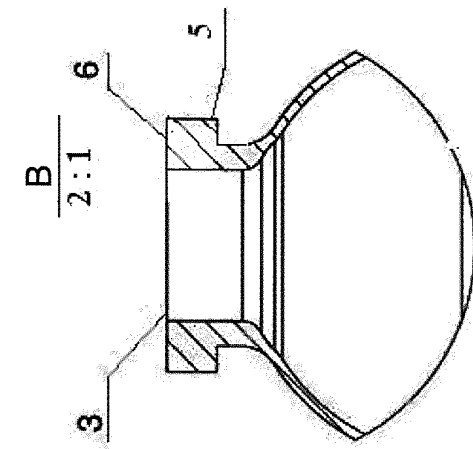


Fig.3

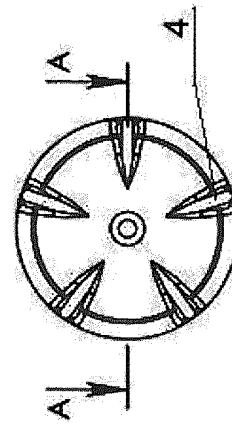


Fig.4

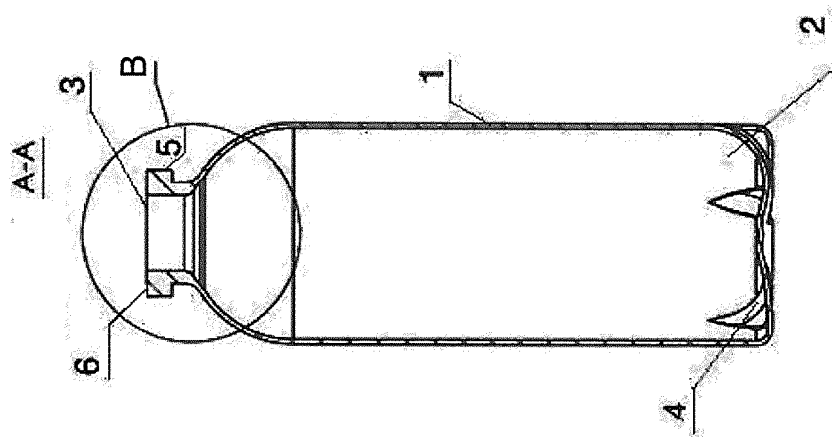


Fig. 2

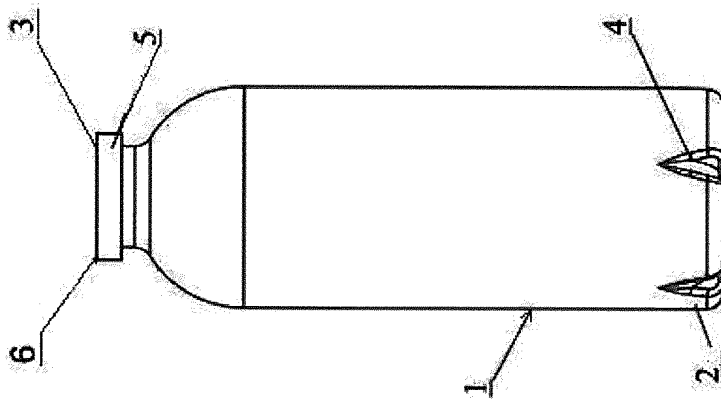
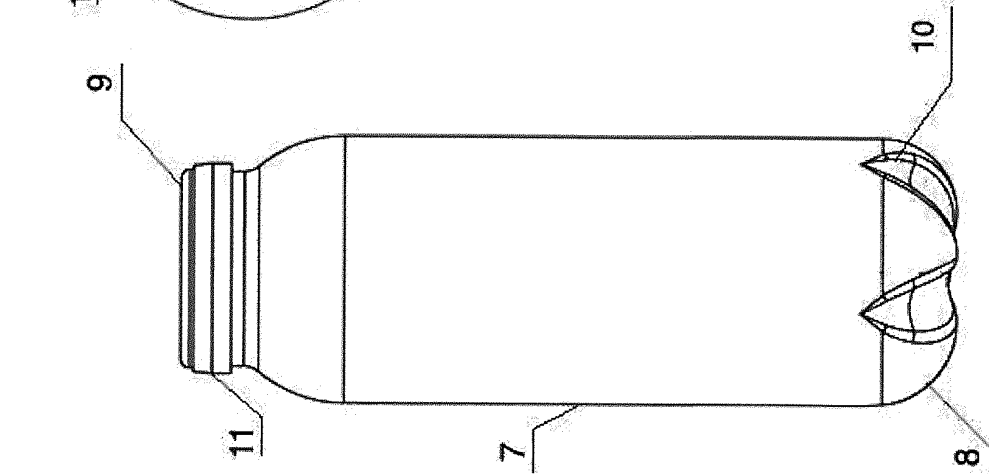
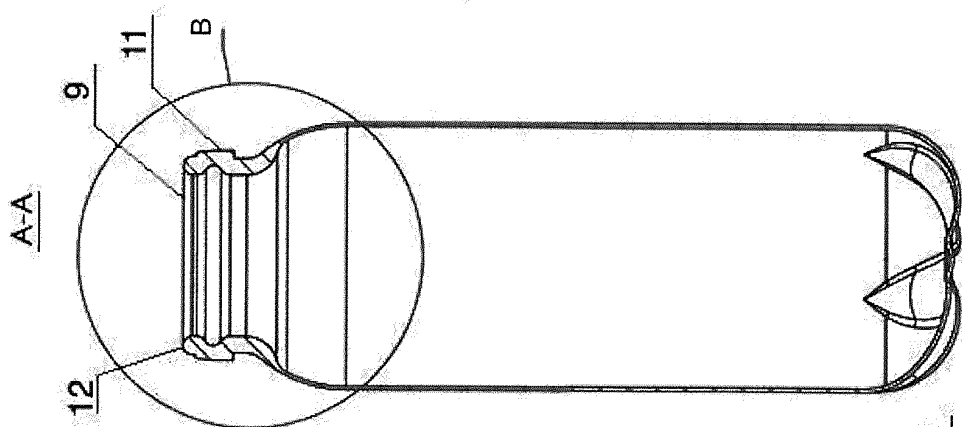
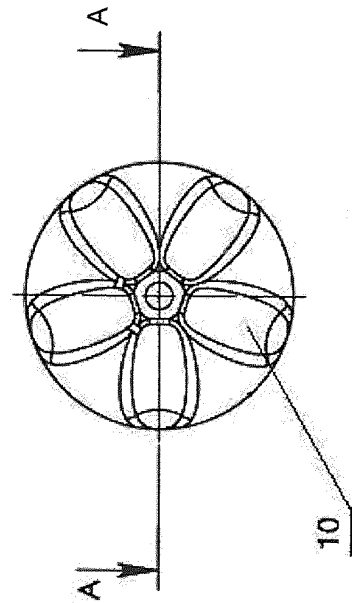
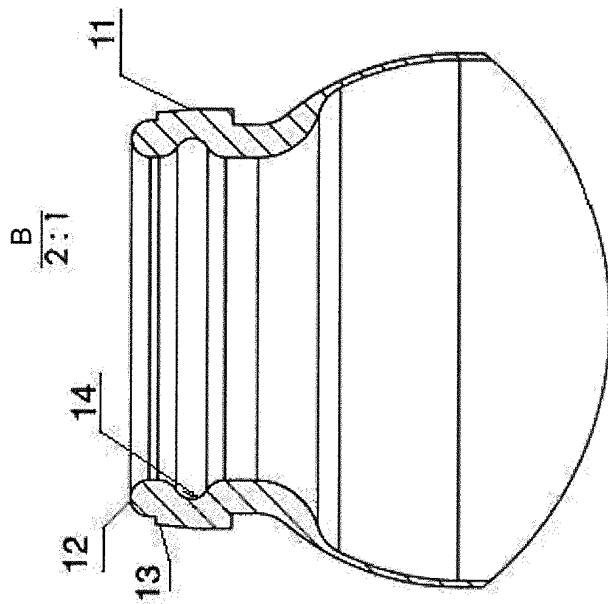


Fig.1



INTERNATIONAL SEARCH REPORT

International application No.

PCT/RU 2013/000238

A. CLASSIFICATION OF SUBJECT MATTER

B65D 83/14 (2006.01) B65D 83/38 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65D 83/14, 83/38, 1/02, B05B 9/04, 11/00, B67D 1/04, 1/12

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Esp@cenet, USPTO DB, DEPATISNET, PatSearch

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011/0017701 A1 (ATEF GABR SOLIMAN) 27.01.2011, paragraph [0011] - [0040], fig. 1, 3-5, 8, 9	1-3
A		4-6
A	US 2005/0127022 A1 (STANLEY J. FLASHINSKI et al.) 16.06.2005	1-6
A	US 3598270 A (CONTINENTAL CAN COMPANY, INC.) 10.08.1971	1-6
A	WO 2004/063087 A I (ECOKEG PTY LTD) 29.07.2004	1-6

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

08 July 2013 (08.07.2013)

Date of mailing of the international search report

18 July 2013 (18.07.2013)

Name and mailing address of the ISA/

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/RU 2013/000238

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

On the basis of the results of the search, it has been established (a posteriori) that the application does not meet the requirement of unity of invention (PCT Rule 13). Since it is known from the prior art (US 2011/0017701) to provide the base of an aerosol container with radial grooves, the subjects of claims 1 and 4 are not related by a single inventive concept, said claims lacking the same or corresponding special technical features (which define a contribution over the prior art). The special technical feature of the subject matter of claim 4 is that an outwardly projecting annular collar is situated on the lateral surface of the neck at an offset from the upper edge, which edge has an approximately semi-circular cross-section, the upper half of the collar narrowing towards the edge of the neck, and, inside the neck, an annular groove having a concave surface is provided at the level of the collar. The subject matter of claim 1 does not have corresponding features. Consequently, the application contains two groups of inventions, corresponding to claims 1-3 and claim 4 respectively, among which there is no technical relationship.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- RU 22125 [0003]

Non-patent literature cited in the description

- *Raw Materials and Packaging*, 2006, vol. 10 (29 [0002])