

The invention relates to a container for liquids and bulk materials in the form of a substantially parallelipipedic folding box of cardboard, more particularly a cardboard/plastics multi-layer composite material, having a head portion which tapers in cross-section through the formation of folding pockets and which has the shape of a funnel having a central opening equipped with an annular shaped member.

In a container of the kind specified the annular shaped portion engages around the top edge of the central opening on both sides and acts as a reinforcement of the edge and as an adapter for a cover closure which can be placed on. In the tapering head portion two triangular folding pockets are associated with each folding line, extending into the head portion of the container, of four parallel container edges. These folding pockets lie on the outside of the head portion, so that a substantially stepless rounding of the central opening is produced inside. Due to its bowl-shaped cover, such a container is not designed or intended to be reclosed after a small quantity of the contents has been removed (US-^APatent Specification 2 321 313).

Liquids used in only small quantities in homes and industry are nowadays almost exclusively kept in plastics containers having closable spouts. Since the disposal of plastics products causes problems, for many years containers in the form of folding boxes of a heat-sealable cardboard/plastics multi-layer composite material have been substituted for other products, such as beverages, which are consumed not in small quantities, but all at once. To the extent that such proposals have also been made for the aforementioned other products, they have hitherto acquired no practical importance, due to the difficulty of equipping the containers spouts which are efficient in practice.

In a known container of the kind specified the head portion is designed in the form of a gable roof, the spout being sealed by a flange to a side of the gable roof either from inside or outside (European Patent 0224539 A1, German Patent Specification 3 039 299 A1, German Patent Specification 3 832 412 A1). A disadvantage of such containers is that they cannot be completely emptied, since the spout is placed on one side of a gable roof and therefore not at the lowest point of the inverted container.

In contrast, another container made from a cardboard/plastics multi-layer composite material can be completely emptied. In that container the head portion is funnel-shaped and comprises a spout inserted in the funnel-shaped portion. The funnel-shaped head portion is formed by a number of cut-out triangular areas of the cardboard blank, whose adjacent edges are interconnected via sealing seams (European Patent 0223094 A2). A disadvantage of that container is that due to the cut-out triangular areas, the

funnel-shaped head portion cannot be produced without causing waste.

It is an object of the invention to provide a container for liquids and bulk materials in the form of a folding box of the kind specified to be equipped with a spout which can not only be readily produced, but also secures the spout adequately against rotation.

This problem is solved according to the invention by the features that the folding lines, extending into the head portion of the container, of the four parallel container edges form the folds, lying inside the container, of the triangular folding pockets each bearing against only one side of said folds, the folding lines for the external folds of the triangular folding pockets lying in pairs in an area of the head portion and the two areas with said folding lines lying opposite one another in the head portion of the container, and the shaped member is a spout having a shaped-on flange or an adapter having a shaped-on flange, which is disposed from inside on the funnel-shaped head portion, the shape of the spout or adapter being adapted to the inside of the head portion with the folding pockets.

The head portion has high rigidity, not only due to the funnel-shaped construction of the head portion, but more particularly due to the spout or adapter, which is disposed with a shaped-on flange from inside on the funnel-shaped head portion. The adaptation of the shape of the flange to the inside folding pockets produces a positive connection, which gives the adapter

or spout satisfactory security against rotation, combined with the other attaching means. The four inside folding pockets, used for this purpose, on opposite areas of the head portion permit folding on flat surfaces, something which is simpler to achieve in manufacturing technique than shaping on a conical mandrel. The lateral seam produced by making the tubular body from the rectangular blank can be covered in known manner by a covering strip or protected by the knocked-in inner edge of the blank.

According to another feature of the invention, the rigidity of the head portion and the attachment of the spout or adapter thereto can be further enhanced by the feature that the spout is disposed with a shaped-on flange from inside on the funnel-shaped head portion, the shape of the spout being adapted to the inside of the head portion with the folding pockets. In addition to retention by the other attaching means, a positive closure is obtained due to the adaptation of the shape, more particularly to the folding pockets.

Preferably the spout or adapter is sealed to the material of the cardboard. Also advantageously the flange has a circularly extending sealing lip which can be made of a heat-sealable material, something which encourages the hermetic connection of the spout to the cardboard. To improve appearance, the top edge of the opening in the head portion can be covered by a masking ring disposed on the spout or adapter.

To facilitate the shaping of the head portion, according to a further feature of the invention extending from each of the same

points or origin is a further folding line, which lies parallel alongside the central folding line when the folding pocket is closed.

In the case of a container of parallelepipedic cross-section, a substantially symmetrical head portion with a small opening is obtained if the angles enclosed by the radiating folding lines are of the same size, the adjacent folded lines radiating from adjacent folding lines for the lateral edges of the body impinging on one another adjacent the edge of the opening.

To minimise the danger that during the folding of the funnel-shaped head portion the lateral seam produced during the making of the container from the rectangular blank will split, according to another feature of the invention the lateral seam lies at the edge of the opening and outside the folding lines, which during the folding of the head portion are folded by more than 90°; more particularly the lateral seam should lie outside the folding pockets.

The invention also relates to a method of producing a container according to the invention which is characterized by the following method steps:

- 1) in a tubular cardboard body of rectangular cross-section, the end zones of each pair of opposite areas are folded together gable-roof-shaped, with the formation of two triangular folding pockets at each gable.

- 2) The folding pockets are folded on to the two areas forming the gable roof sides and stapled thereto.
- 3) A spout or an adapter for a spout is introduced from the inside of the tubular body into the head portion formed by the areas of the gable roof sides and the areas of the gables and into the funnel-shaped head portion formed as a result, partially inserted through its opening, and sealed to its inside.
- 4) At its end remote from the spout, the tubular body is closed by a sealed-over or sealed-in cover or by a web seam sealing with subsequent folding of the resulting lugs on to the bottom.

The invention also relates to an apparatus for the performance of the method. It is characterized by a lower tool comprising for the spout, a shaping mandrel, two gable-shaping plates which can move in relation to the shaping mandrel and are disposed at opposite outer sides thereof, and a punch disposed for axial movement in the shaping mandrel; and a number of upper tools in the form of folding tools for the gable roof folding and the folding pockets, and in the form of activating and sealing elements for the sealing of the folding pockets and the spout.

The invention will now be described with reference to the drawings, wherein:

Fig. 1 is a perspective view of a container,

Fig. 2 is a plan view of the container shown in Fig. 1,

Fig. 3 is a perspective view of the bottom of the container shown in Fig. 1,

Fig. 4 shows a blank for the container illustrated in Fig. 1 with a square cross-section,

Fig. 5 shows, viewed from the bottom, a body made from the blank shown in Fig. 4, with a lateral seam extending on one lateral edge of the body, prior to the insertion of a spout and the closure of the bottom,

Fig. 6 shows to a scale enlarged in comparison with Fig. 5 the body shown in Fig. 5 with the spout inserted, in cross-section through the spout,

Fig. 7 shows a construction of a blank for a container of square cross-section in a variant of Fig. 1,

Fig. 8 shows, viewed from the bottom, a body made from the blank shown in Fig. 7, with a lateral seam extending in the middle of a lateral wall area of the body, prior to the insertion of the spout and the closure of the bottom,

Fig. 9 is a perspective view of the sealed-in bottom of the container resulting from the blank shown in Fig. 6,

Fig. 10 shows a blank for a container of rectangular cross-section,

Fig. 11 shows, viewed from the bottom, a body made from the blank shown in Fig. 10, with a lateral seam extending between the lateral edges, prior to the insertion of a spout and the closure of the bottom,

Fig. 12 is an axial section through the head portion of the container shown in Fig. 1 with a spout,

Fig. 13 is an axial section through a screwed closure for the spout shown in Fig. 12,

Fig. 14 is an axial section through the head portion of the container shown in Fig. 1 with spout and applied screwed closure as shown in Figs. 12 and 13,

Fig. 15 is an axial section through the head portion of a container as shown in Fig. 1, with a spout constructed as a sprayer and closed by a cap,

Figs. 16 to 19a show the head portion of the container illustrated in Fig. 1, at different phases of production, in each case in plan view and axially sectioned along the line A-A in Fig. 16,

Fig. 20 is a side elevation of a shaping tool for producing a container as shown in Fig. 1,

Fig. 21 is a plan view of the shaping tool shown in Fig. 20,

Fig. 22 shows the shaping tool illustrated in Fig. 20, axially sectioned along the line B-B in Fig. 21, and

Fig. 23 shows the individual phases of the production of the body and the insertion of the spout, using the shaping tool shown in Figs. 20-22 and also folding and activating elements.

Referring to Figs. 1 to 3, a container comprises a body 1 and a spout 2 closed by a cap which can be screwed or placed on. The body 1 takes the form of a folding box and is made from a rectangular, waste-free blank (Fig. 4). The material used for the blank is preferably a heat-sealable cardboard/plastics multi-layer composite material with or without aluminium insert. The bottom 3 of the container is closed in known manner by a web seam 4. Resulting lugs 5, 6 are folded inwards on to the bottom and sealed on, as shown in Fig. 3. A strap 8 having handle flaps 8a, 8b is sealed on one lateral edge of the body 1. For transport purposes the handle flaps 8a, 8b bear flat against the lateral walls of the body 1, as shown in Fig. 1, while they can be folded up for use, as shown in Fig. 2.

The head portion 9 of the body 1 is funnel-shaped through the formation of folding pockets 9a, 9b, 9c, 9d and has a central opening 10, into which a mouthpiece 11, 12 of the spout 2 is inserted from below, as shown in detail in Figs. 12 to 15. The mouthpiece 11, 12 has a conical flange 13, 14 sealed on the

inside of the funnel-shaped head portion 9. To facilitate the sealing-on and hermetic closure, the flange 13, 14 can be equipped with hermeticizing and sealing lips 15, 16. More particularly, as shown in Fig. 6, the shape of the flange 13 is so adapted to the shape of the inside of the funnel-shaped head portion 9, having the folds and folding pockets 9a, 9b, 9c, 9d, that a positive connection is formed, in addition to the sealing connection between the flange 13 and the head portion 9.

The mouthpiece 11 shown in Fig. 12 is closed by a glued-on strap closure 17. If the mouthpiece 11 is equipped with an externally screwthreaded sleeve-formed attachment 18 (Figs. 12 and 14), when the strap closure 17 has been removed, or if there is no strap closure 17, it can be closed by a screwed-on cap 19. The cap 19 can take the form of a metering cap (Figs. 13 and 14).

The mouthpiece shown in Fig. 15 is constructed as a sprayer having a perforate plate 20 at the end. The mouthpiece 12 can be closed by placing on a cap 21. In contrast with the embodiments shown in Figs. 12 to 14, in that illustrated in Fig. 15 the free edge 22 of the head portion 9 is covered by a masking ring 23 disposed on the mouthpiece 12.

To make the body 1 shown in Fig. 1, a start is made from a rectangular blank as shown in Fig. 4. Extending over the whole height of the blank are four folding lines 31 to 34 which form the lateral edges in the central portion of the body 1. Hatched zones 35, 36 form at the two side walls of the blank a seam, namely a corner seam 37 of the body 1, which is first formed into

a tube. A folding line 38 extends over the whole width of the blank for the folding bottom 3 of the body 1. The folding line 38 forms a circularly extending supporting edge at the bottom 3. The web seam 4 is bounded by a further folding line 39 extending over the whole width of the blank. For the formation of the lugs 5, 6 of the bottom 3, which are to be folded inwards, folding lines 40, 41 are disposed in two opposite bottom areas of the body 1 and subdivide said bottom areas into triangular areas.

The head portion 9 is bounded by a folding line 43 extending over the whole width. A number of folding lines 31' to 34', 52 to 67 radiate from each of the points of intersection 48 to 51 of the folding lines 31 to 34 and the folding line 43 and extend through rectangular areas 44 to 47. The adjacent folding lines 52, 55, 56, 59, 60, 63, 64, 67 starting from the adjacent points of intersection 48 to 51 impinge upon one another adjacent the outer cutting edge of the blank, which forms the edge 22 of the opening 10 of the body 1. However, they can also meet together at the cutting edge or be at a distance from one another at that place. This depends on the geometry of the body and the mouthpiece. The angles enclosed by the folding lines 31' to 34', 52 to 67 are substantially equal to one another.

In the pleat-like folding of the head portion 9, the closed - i.e., not necessarily fully sealed folding pockets 9a, 9b, 9c, 9d (Fig. 6) are formed from the substantially triangular areas lying between the folding lines 31, 54, 55; 32, 56, 57; 33, 62, 63; 34, 64, 65, the length and portions of the folding lines 31-34 lying in the inside of the head portion 9. The result is the formation

of a funnel-shaped head portion 9 having a central octagonal opening 10 into which the spout 11, adapted in shape by its flange 13, can be inserted from below. At least at the edge 22 of the opening 10 the areas 35, 36 for the lateral seam 37 do not lie in the zone of a folding line, so that the loading of the lateral seam 37 is non-critical at this critical place.

The embodiment illustrated in Figs. 7 and 9 differs from that shown in Figs. 4 to 6 solely by the feature that the blank is constructed not for a folding bottom, but for a bottom 7 which can be sealed in (Fig. 9), the areas 135, 136 for the seam 137 lying not on a lateral edge of the body 101, but is the centre between two lateral edges. As in the previous embodiment, conditions in this case are also such that the seam 137 at the cutting edge does not lie in the zone of a folding line which must be folded strongly.

The embodiment illustrated in Figs. 10 and 11 differs from that shown in Figs. 4, 5 and 6 solely by the feature that the blank is designed not for a container square in plan, but for a container rectangular in plan and having sides of different widths, the seam 237 formed by areas 235, 236 being disposed at a distance from the lateral edges of the body 201. Another difference is that there are no folding lines corresponding to the folding lines 52, 59, 60, 67 of the blank shown in Figs. 4 and 7. Since in contrast with the folding lines 31' to 34', 54 to 57, 62 to 65, these folding lines are not required for the folding pockets, but are merely intended to facilitate the folding and/or shaping of the funnel-shaped head portion, their absence has no

particularly disadvantageous effects. In contrast, the folding lines 53, 58, 61, 66 are more important, since they contribute towards relieving the outer folding pockets in the shaping-up of the head portion. Finally, the blank is designed not for a folding bottom as shown in Fig. 3, but for a sealed-on bottom, as shown in Fig. 4.

The tool shown in Figs. 20 and 21 is used for the folding and sealing of the head portion 9 and the insertion and attachment of the spout 2. The tool comprises a shaping mandrel 71 of rectangular cross-section which is disposed fixed on a plate 72 and is formed on opposite sides with recesses 73, 74 in which gable-shaped shaping plates 75, 76 are longitudinally displaceably mounted. The shaping mandrel 71 is formed with a central recess 77 in which a punch 78 can move longitudinally. The punch 78 has a shaping head 79 on which the spout 2 can be placed in a given position of rotation. Clamping jaws 80, 81 are associated with the free sides of the shaping mandrel 71.

To produce the head portion 9 with such a tool, as shown in Fig. 23, with the clamping jaws 80, 81 opened, the tubular body 1 made from the blank shown in Fig. 4 is placed on the shaping mandrel 71 with the gable-shaped shaping plates 75, 76 in the top position and clamped by the clamping jaws 80, 81 (Fig. 23, operating steps 1 and 2).

Before this or afterwards, with the punch 78 raised, the mouthpiece 11 closed with the cap 19 is placed on the shaping head 79 in the position corresponding to the folding pockets and

the lateral seam, and the punch 78 again moved inwards (Fig. 23, operating steps 2 and 3).

Then, by means of an element 82 to be moved into the tubular body 1, the heat-sealable zones of the pockets 9a, 9b, 9c, 9d to be formed are activated on the inside, for example, with hot air (Fig. 23, operating step 4).

Using folding tools 83, the areas 44, 46 lying between the two gable-shaped shaping plates 75, 76 (Fig. 4) are folded together roof-shape, simple folding pockets 84, 85 being formed at the gables from the areas lying between the folding lines 31, 55; 32, 56; 33, 63; 34, 64 and closed by sealing (Figs. 17 and 17a and Fig. 23, operating step 5).

By means of activating elements 86 the outsides of the folding pockets 84, 85 of the areas lying between the folding lines 31', 54; 32', 57; 33', 62; 34', 65 and of the adjacent areas 44, 46 folded together roof-shape between the folding lines 31', 53; 32', 58; 33', 61; 34', 65 are activated for hot sealing (Fig. 23, operating step 6).

Then, using folding tools 87, the folding pockets 84, 85 are folded over the gable shaping plates 75, 76 and stapled to the areas 44, 46 folded in roof shape, with the formation of further folding pockets (Figs. 18 and 18a and Fig. 3, operating step 7).

After the gable-forming plates 75, 76 had been lowered, the punch 78 with the spout 2 is introduced into the head portion 9 formed

into a funnel shape with a circular opening 10. As already mentioned, the mouthpiece of the spout 2 is adapted to the shape and surface structure of the head portion 9 by its stages formed by the folding pockets and the seam and so positioned on the head 79 that the mouthpiece is introduced into the opening 10 with a positive connection (Fig. 23, operating step 8).

By means of a sealing tool 88, the edge 22 of the head portion 9 is sealed on to the flange 13, more particularly having hermeticizing and sealing lips 15, 16, of the spout 11 (Fig. 23, operating step 9).

After the release of the clamping jaws 80, 81 the body 1 equipped with the spout 2 is drawn off the shaping mandrel 71 (Fig. 23, operating step 10).

If the spout 2 has not already been provided with a closure 17, 20, as shown in Figs. 12 and 15, it is provided with a closure, and the container is filled from the open bottom. After being filled it is also closed at the bottom with a web seam closure. Alternatively, first the bottom can be closed and, after being filled, the container can be closed over the open spout with the cap.



PATENT CLAIMS

1. A container for liquids and bulk materials in the form of a substantially parallelepipedic folding box of cardboard, more particularly a cardboard/plastics multi-layer composite material, having a head portion (9) which tapers in cross-section through the formation of folding pockets (9a, 9b, 9c, 9d) and which has the shape of a funnel having a central opening (10) equipped with an annular shaped member, characterized in that the folding lines (31-34), extending into the head portion (9) of the container, of the four parallel container edges form the folds, lying inside the container, of the triangular folding pockets (9a, 9b, 9c, 9d) each bearing against only one side of said folds, the folding lines (54, 57, 62, 65) for the external folds of the triangular folding pockets (9a, 9b, 9c, 9d) lying in pairs in an area (45, 47) of the head portion (9) and the two areas (45, 47) with said folding lines (54, 57, 62, 65) lying opposite one another in the head portion (9) of the container, and the shaped member is a spout (2) having a shaped-on flange (13, 14) or an adapter having a shaped-on flange, which is disposed from inside on the funnel-shaped head portion (9), the shape of the spout or adapter being adapted to the inside of the head portion (9) with the folding pockets (9a, 9b, 9c, 9d).

2. A container according to claim 1, characterized in that the spout (2) or adapter is disposed with a shaped-on flange (13, 14) from inside on the funnel-shaped head portion (9), the shape of the spout or adapter being adapted to the inside of the head portion (9) with the folding pockets (9a, 9b, 9c, 9d).



3. A container according to claims 1 or 2, characterized in that the spout (2) or adapter is sealed to the material of the cardboard.

4. A container according to claim 2, characterized in that the flange (13, 14) has a circularly extending hermeticizing and/or sealing lip (15, 16).

5. A container according to claim 2, characterized in that the edge (22) of the opening (10) lying on the outside of the flange (14) or adapter is covered by a masking ring (23).

6. A container according to one of claims 1 to 5, characterized in that the folding box consists of a rectangular blank from each of whose folding lines (31-34), forming the lateral edges of the body (1), three folding lines (31'-34', 54, 55, 56, 57, 62, 63, 64, 65) with the same point of origin (48, 49, 50, 51) radiate for the folding pockets (9a, 9b, 9c, 9d).

7. A container according to claim 6, characterized in that the central of the three folding lines (31'-34', 54, 55, 56, 57, 62, 63, 64, 65) lies alongside the prolongation of the folding line (31-34) for the lateral edge of the body (1).

8. A container according to claim 7, characterized in that extending from each of the same points of origin (48, 49, 50, 51) is a further folding line (53, 59, 61, 66), which lies parallel alongside the central folding line (54, 57) when the folding pocket (9a, 9b, 9c, 9d) is closed.



9. A container according to claim 6, characterized in that the angles enclosed by the radiating folding lines (31'-34', 52-67) are of the same size, the adjacent folded lines (52, 55, 56, 59, 60, 63, 64, 67) radiating from adjacent folding lines (31-34) for the lateral edges of the body (1) impinging on one another adjacent the edge (22) of the opening (10).

10. A container according to one of claims 6 to 9, characterized in that the lateral seam (37, 137, 237) produced during the making of the body (1) from the rectangular blank lies at the edge (22) of the opening (10) outside the folding lines (31'-34', 54, 55, 56, 57, 62, 63, 64, 65).

11. A container according to claim 10, characterized in that the lateral seam (37) lies inside or outside the folding pockets (9a, 9b, 9c, 9d).

12. A method of producing a container according to claim 1, characterized by the following method steps:

- 1) in a tubular cardboard body of rectangular cross-section, the end zones of each pair of opposite areas are folded together gable-roof-shaped, with the formation of two triangular folding pockets at each gable.
- 2) The folding pockets are folded on to the two areas forming the gable roof sides and stapled thereto.



- 3) A spout or an adapter for a spout is introduced from the inside of the tubular body into the head portion formed by the areas of the gable roof sides and the areas of the gables and into the funnel-shaped head portion formed as a result, partially inserted through its opening, and sealed to its inside.
 - 4) The tubular body is closed at its end remote from the spout by a sealed-over or sealed-in bottom or by a web seam.
13. An apparatus for the performance of the method according to claim 12, characterized by: a lower tool comprising for the spout (11), a shaping mandrel (71), two gable-shaping plates (75, 76) which can move in relation to the shaping mandrel (71) and are disposed at opposite outer sides thereof, and a punch (78) disposed for axial movement in the shaping mandrel (71); and a number of upper tools (82, 83, 85, 86, 87) in the form of folding tools (83, 86) for the gable roof folding and the folding pockets (9a, 9b, 9c, 9d), and in the form of activating and sealing elements (82, 83, 85, 87) for the sealing of the folding pockets (9a, 9b, 9c, 9d) and the spout (11).