

1254 099

PATENT SPECIFICATION

(11) 1254 099

20873 A

Singapore

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NO DRAWINGS

- (21) Application No. 2113/71 (22) Filed 3 Feb. 1969
 (62) Divided out of No. 1 251 672
 (45) Complete Specification published 17 Nov. 1971
 (51) International Classification B 65 d 75/42 // B 65 b 31/06
 (52) Index at acceptance

B5D 2B1 4F

B8C 10B2D2 10B2E 10B2F1 10D2 10H4A 10H5 10P1C
 10P1D 10P2B 10S2B 10V 10Y 15B 15C 1A1 1C1
 21A1 21A2 25A 25B 25D 29C

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(54) PLASTICS CONTAINERS

(71) We, IMPERIAL CHEMICAL INDUSTRIES LIMITED, of Imperial Chemical House, Millbank, London, S.W.1., a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of forming containers suitable for use in producing, by the method claimed in Application 9849/68, (Serial No. 1,251,672), packages comprising sealed flexible plastics containers with contents including a gas at superatmospheric pressure, especially a carbonated beverage.

Application No. 9849/68 (Serial No. 1,241,947) describes and claims in Claim 1, a method of producing a package comprising a sealed flexible plastics container, with contents including a gas at super-atmospheric pressure, that comprises: locating an aperture in the wall of the closed container (as defined) over an orifice (as defined) in a substantially smooth surface, said orifice being connected to a source of a gas at superatmospheric pressure; inflating the container by the introduction of said gas while the container wall surrounding said aperture is held substantially in gas-tight contact with said surface; and, while said container is still fully inflated (as defined) and in gas-tight contact with said surface, sliding it along relative to said surface to bring that portion of the wall of the container which surrounds said aperture into contact with a supported flexible sealing strip held in substantially continuous relationship to said surface; and sealing the sealing strip to the wall of the container around said aperture, by applying heat if necessary.

In the term "over an orifice" is included any case where the container is located so that the aperture covers the orifice, irrespective of whether the surface containing the orifice is generally located above, beneath or beside the

container. By the expression "closed container" is meant that the container is gas-tight, in respect of the pressure of gas to be reached within the container, except at the aperture provided for pressurising the container and at any further aperture in the wall of the container that may be held in gas-tight contact with a surface and sealed in similar manner to the aperture described. By the term "fully inflated" is meant that the pressure inside the container is at least sufficient to allow the container to be held in substantially gas-tight contact with the surface.

In accordance with the present invention, a method of forming flexible plastics containers suitable for use in a packaging method as claimed in Claim 1 of Application 9849/68 (Serial No. 1,251,672) includes the steps of: intermittently advancing a length of tubular plastics film; forming apertures through the wall of the tubular film at intervals spaced so as to provide a filling opening for each desired container, the filling openings being formed without attachments projecting from the wall of the tubular film; and forming transverse heat-seals between the walls of the tubular film, between the spaced apertures, to close the ends of the containers, each heat-seal providing a seal for the opposite ends of adjacent container units, and the heat seals being located so that each filling opening is formed in that portion of the container which assumes a cylindrical form when the container is inflated.

The transverse heat-seals may be wide seals, which may each be subsequently divided by a transverse cut across the tubular film to sever a single unit from the strip, thus providing a seal for the opposite ends of adjacent units; or they may be double linear seals, so that the tubular film may be cut transversely between the two sealed areas of each double seal to separate the individual containers, sealed at both ends, from the strip. The transverse heat-seals are preferably located so that each filling

[Price 25p]

opening is close to one end of the portion of the container that assumes a cylindrical form when the container is inflated.

5 The apertures providing the filling openings may be formed by punching the tubular film against an internal mandrel. They may be formed at any stage in the production of the tubular film in which an internal mandrel is normally used, provided that the tubular film 10 may be intermittently advanced upon the mandrel, and that a loss of internal pressure through the apertures is not detrimental to the process. In a preferred method, however, an isolated mandrel is enclosed in the tubular film 15 for the particular purpose of providing the support for the tubular film, which is intermittently advanced around it, while the apertures are being formed during a stationary phase. The mandrel can be held in the tubular film 20 by a pair of nip rolls, or be held in position magnetically, preferably as the tubular film advances to the heat sealing station. The apertures may be formed by punching the tubular film against the mandrel, preferably by means of a tool heated to a temperature 25 above the melting temperature of the plastics material. In another suitable method, they are formed by localised heating of the film by a radiant heating probe, an aperture of suitable shape being provided in the mandrel opposite the probe and the probe being brought sufficiently close to the film to melt it back to the edges of the aperture in the mandrel, beyond which it is 30 chilled by the mandrel and further melting is prevented. Similarly, the apertures in the film may be formed by a jet of hot gas or a flame.

35 Instead of the containers being made from plastics film extruded in tubular form, which is much preferred, they may be made from a strip of flat film, longitudinally folded and having its edges sealed together by a lapped seal. The apertures providing the filling openings may be formed at a convenient stage during this operation, and the transverse seals 40 formed after the longitudinal seal has been formed.

45 The method and apparatus as described in Application 9849/68 (Serial No. 1,251,672) may be adapted to continuous operation, the containers being presented successively to the surface against which they are pressurised. The apertured container units may be fed to this apparatus as a continuous strip, from 50 which individual units may be separated.

55 One preferred form of container suitable for use in the method of Application No. 9849/68 (Serial No. 1,251,672) is formed from a length of tubular plastics film, the opposed inner surfaces at both ends thereof being joined by a seal and each end being gathered together to form a bunched neck and tightly held by a ligature or similar closure, at least the inner end of which is located inwardly of 60 the seal, and a filling aperture being provided

in that part of the wall of the container which assumes a cylindrical form when the container is inflated. One such form of container is described in Application No. 35333/67 (Serial No. 1,241,947). These containers are closed at each end by a bunched neck, with a ligature or other encircling closure applied to the bunched neck immediately inwards of a thickened region thereof that is of greater cross-sectional area than the region encompassed by the encircling closure, and with all passages leading through the bunched neck from inside the container to the atmosphere sealed against egress of gas from the container. 70

75 The method of the present invention may readily be adapted to provide a continuous strip of tubular containers with bunched necks of the type described in Application No. 35333/67 (Serial No. 1,241,947). The regions of greater cross-sectional area of the necks of the containers may be provided, for example, by forming tucks in the film before heat-sealing, so that more than two layers of film are included in the heat-seal, or by feeding strips of plastics material into the heat-sealing region, so that they become included in the seal, or by forming crimped seals that are less compressible than the adjacent areas of the neck region of the containers. A strip of these containers, joined together and each provided with a filling aperture, may be supplied continuously to an apparatus as described in Application No. 9849/68, (Serial No. 1,251,672), either with the ligatures already applied, or as a strip of flat containers sealed at both ends, a ligaturing device then being provided for use in conjunction with the said apparatus, to apply ligatures at both ends of the containers in advance of their reaching the pressurising station. It is generally preferred to adopt the latter method, since the strips of flat containers can be more easily reeled and stored than can strips of containers already ligatured. 80 85 90 95 100 105

WHAT WE CLAIM IS:—

1. A method of forming flexible plastics containers suitable for use in a packaging method as claimed in Claim 1 of Application 9849/68, that includes the steps of: intermittently advancing a length of tubular plastics film; forming apertures through the wall of the tubular film at intervals spaced so as to provide a filling opening for each desired container, the filling openings being formed without attachments projecting from the wall of the tubular film; and forming transverse heat-seals between the walls of the tubular film, between the spaced apertures, to close the ends of the containers, each heat-seal providing a seal for the opposite ends of adjacent containers, and the heat-seals being located so that each filling opening is formed in that portion of the container which assumes a cylindrical form when the container is inflated. 110 115 120 125

2. A method as claimed in Claim 1 in which

opening is close to one end of the portion of the container that assumes a cylindrical form when the container is inflated.

5 The apertures providing the filling openings may be formed by punching the tubular film against an internal mandrel. They may be formed at any stage in the production of the tubular film in which an internal mandrel is normally used, provided that the tubular film
10 may be intermittently advanced upon the mandrel, and that a loss of internal pressure through the apertures is not detrimental to the process. In a preferred method, however, an isolated mandrel is enclosed in the tubular film
15 for the particular purpose of providing the support for the tubular film, which is intermittently advanced around it, while the apertures are being formed during a stationary phase. The mandrel can be held in the tubular film
20 by a pair of nip rolls, or be held in position magnetically, preferably as the tubular film advances to the heat sealing station. The apertures may be formed by punching the tubular film against the mandrel, preferably by
25 means of a tool heated to a temperature above the melting temperature of the plastics material. In another suitable method, they are formed by localised heating of the film by a radiant heating probe, an aperture of suitable shape being provided in the mandrel opposite the probe and the probe being brought sufficiently close to the film to melt it back to the edges of the aperture in the mandrel, beyond which it is
30 chilled by the mandrel and further melting is prevented. Similarly, the apertures in the film may be formed by a jet of hot gas or a flame.

Instead of the containers being made from plastics film extruded in tubular form, which is much preferred, they may be made from
40 a strip of flat film, longitudinally folded and having its edges sealed together by a lapped seal. The apertures providing the filling openings may be formed at a convenient stage during this operation, and the transverse seals formed after the longitudinal seal has been formed.

The method and apparatus as described in Application 9849/68 (Serial No. 1,251,672)
50 may be adapted to continuous operation, the containers being presented successively to the surface against which they are pressurised. The apertured container units may be fed to this apparatus as a continuous strip, from
55 which individual units may be separated.

One preferred form of container suitable for use in the method of Application No. 9849/68 (Serial No. 1,251,672) is formed from a length of tubular plastics film, the opposed inner surfaces at both ends thereof being
60 joined by a seal and each end being gathered together to form a bunched neck and tightly held by a ligature or similar closure, at least the inner end of which is located inwardly of the seal, and a filling aperture being provided

in that part of the wall of the container which assumes a cylindrical form when the container is inflated. One such form of container is described in Application No. 35333/67 (Serial No. 1,241,947). These containers are closed at each end by a bunched neck, with a ligature or other encircling closure applied to the bunched neck immediately inwards of a thickened region thereof that is of greater cross-sectional area than the region encompassed by the encircling closure, and with all passages leading through the bunched neck from inside the container to the atmosphere sealed against egress of gas from the container.

The method of the present invention may readily be adapted to provide a continuous strip of tubular containers with bunched necks of the type described in Application No. 35333/67 (Serial No. 1,241,947). The regions of greater cross-sectional area of the necks of the containers may be provided, for example, by forming tucks in the film before heat-sealing, so that more than two layers of film are included in the heat-seal, or by feeding strips of plastics material into the heat-sealing region, so that they become included in the seal, or by forming crimped seals that are less compressible than the adjacent areas of the neck region of the containers. A strip of these containers, joined together and each provided with a filling aperture, may be supplied continuously to an apparatus as described in Application No. 9849/68, (Serial No. 1,251,672), either with the ligatures already applied, or as a strip of flat containers sealed at both ends, a ligaturing device then being provided for use in conjunction with the said apparatus, to apply ligatures at both ends of the containers in advance of their reaching the pressurising station. It is generally preferred to adopt the latter method, since the strips of flat containers can be more easily reeled and stored than can strips of containers already ligatured.

WHAT WE CLAIM IS:—

1. A method of forming flexible plastics containers suitable for use in a packaging method as claimed in Claim 1 of Application 9849/68, that includes the steps of: intermittently advancing a length of tubular plastics film; forming apertures through the wall of the tubular film at intervals spaced so as to provide a filling opening for each desired container, the filling openings being formed without attachments projecting from the wall of the tubular film; and forming transverse heat-seals between the walls of the tubular film, between the spaced apertures, to close the ends of the containers, each heat-seal providing a seal for the opposite ends of adjacent containers, and the heat-seals being located so that each filling opening is formed in that portion of the container which assumes a cylindrical form when the container is inflated.

2. A method as claimed in Claim 1 in which



the tubular plastics film has been made by extrusion in seamless tubular form.

3. A method as claimed in Claim 1 or Claim 2 in which the transverse heat-seals are wide seals which may be divided by transverse cuts across the tubular film to separate the containers.

4. A method as claimed in Claim 1 or Claim 2 in which the transverse heat-seals are double linear seals such that the tubular film may be cut transversely between the two sealed areas of the double seal to separate the containers.

5. A method as claimed in any one of the preceding claims in which the tubular film is advanced past an internal mandrel against which said apertures are formed in the wall of the tubular film.

6. A method as claimed in any one of the preceding claims in which the tubular film is gathered together to form a bunched neck at

the transversely sealed regions and tightly held by ligatures or similar closures applied to each side of each heat-seal, upon or beside the seal so that at least the inner end of each ligature or similar closure is located inwardly of the seal.

7. A method as claimed in Claim 6 in which each ligature or similar closure is applied to a bunched neck immediately inwards of a thickened region thereof that is of greater cross-sectional area than the region encompassed by the ligature or similar closure.

8. A closed, flexible, plastics container whenever made by a method as claimed in any one of the preceding claims.

9. A strip of end-to-end closed, flexible plastics containers whenever made by a method as claimed in any one of Claims 1 to 7.

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Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1971.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

