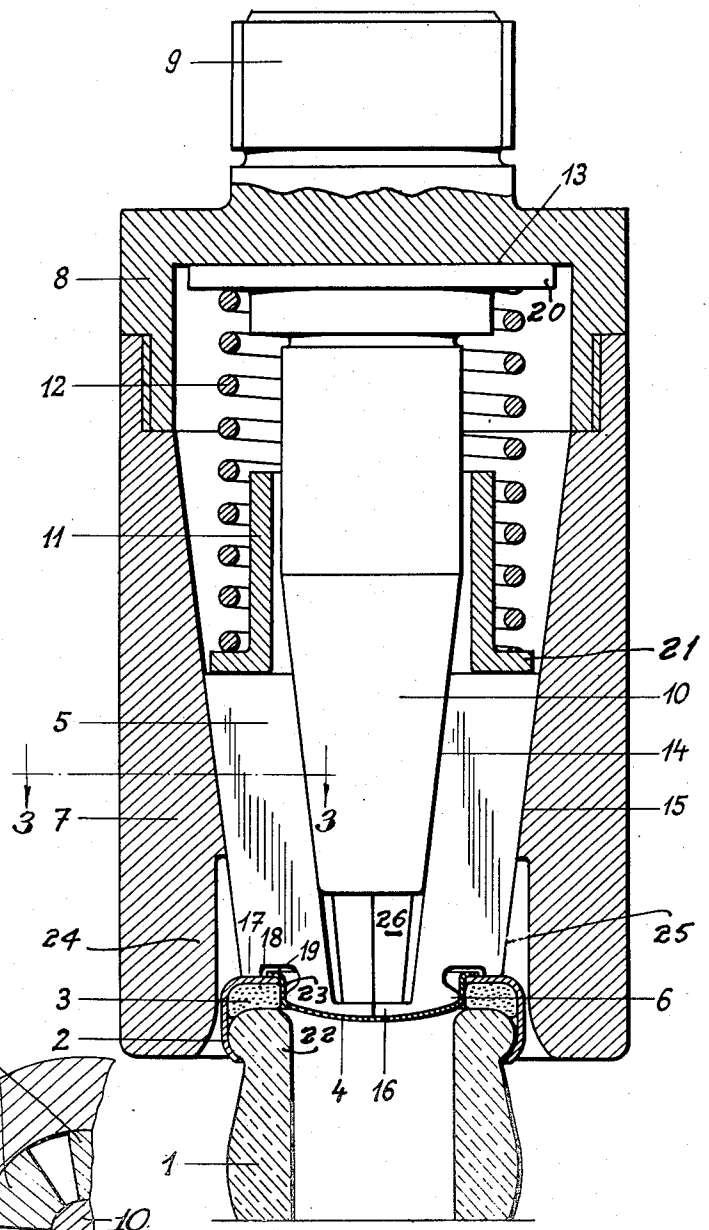
Dec. 14, 1954 J. STALLER 2,696,938

APPARATUS FOR APPLYING CLOSURE SHEETS TO CONTAINERS

Filed May 17, 1950 2 Sheets-Sheet 1

Fig. 1.



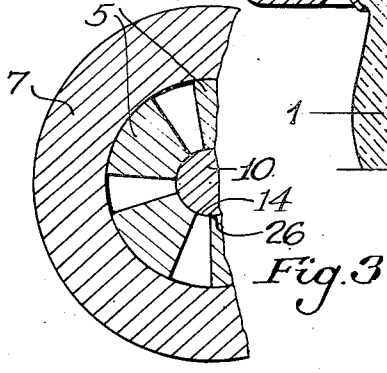


Fig. 3

INVENTOR.

Jan Staller

BY

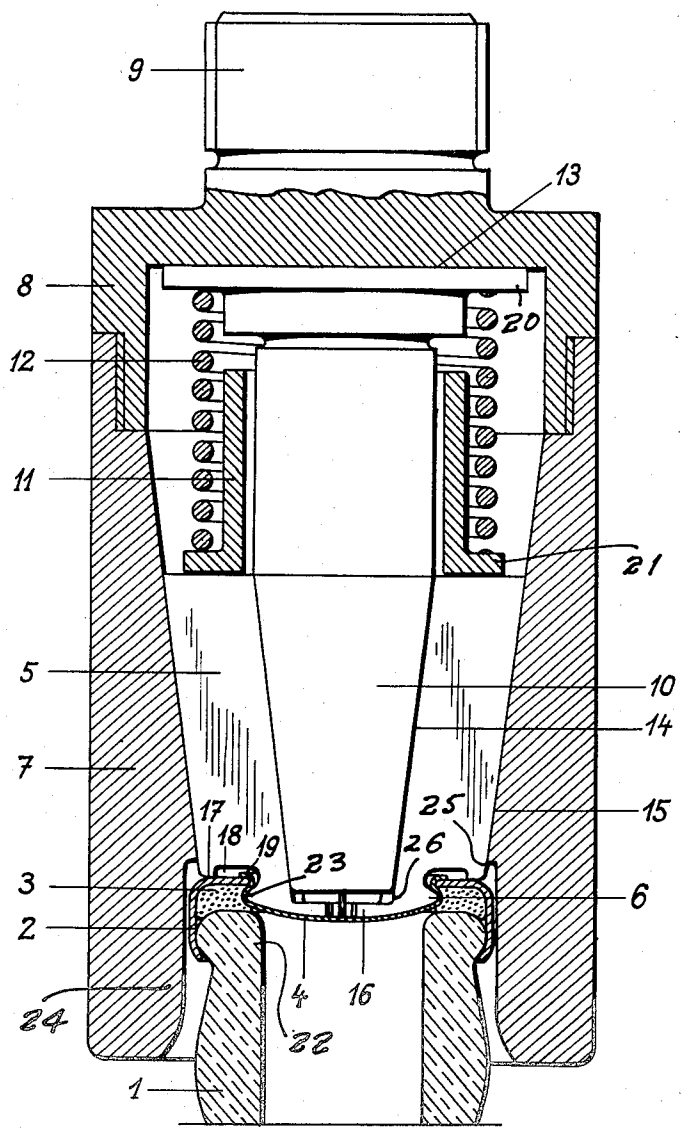
Mudael & Hoffman

Dec. 14, 1954 J. STALLER 2,696,938

APPARATUS FOR APPLYING CLOSURE SHEETS TO CONTAINERS

Filed May 17, 1950 2 Sheets-Sheet 2

Fig. 2.



INVENTOR.

BY

United States Patent Office 2,696,938 Patented Dec. 14, 1954

2,696,938

APPARATUS FOR APPLYING CLOSURE SHEETS TO CONTAINERS

Jan Staller, Zurich-Erlenbach, Switzerland

Application May 17, 1950, Serial No. 162,430

9 Claims. (Cl. 226—86)

The present invention relates to an apparatus for securing a closure sheet across the mouth of a container, for instance a bottle, the closure sheet having a concavo-convex shape having the convex side thereof directed toward the interior of the container.

The concavo-convex shape of the closure sheet is particularly suitable for beer bottles or the like in which a considerable excess pressure exists inside the bottle.

It is an object of the present invention to provide an apparatus of the kind described which is suitable for securing closure sheets having relatively large tolerances in their dimensions.

It is another object of the present invention to provide an apparatus which can apply the closure sheet to mouths of containers having differences in their shape, particularly such as are due to wear.

It is a further object of the present invention to avoid a flattening of the concavo-convex shape of the closure sheet during the securing thereof so that the latter is able to withstand a high internal pressure such as a pressure occurring in pasteurization of the bottle contents.

An apparatus according to the present invention comprises in combination a casing having an open end portion for arranging therein the mouth of the container and a conical surface arranged on the inside of the casing adjoining the end portion, a plurality of members having conically shaped outer and inner surfaces, the outer surfaces of the members slidably engaging the conical surface of the casing, the members being adapted for bending the closure sheet into container-closing position, a driving element having a conical surface engaging the inner surfaces of the members so as to shift the same laterally toward the outside with respect to the container, resilient means arranged in the upper portion of the casing between the driving element and the members, means for arranging the element for a limited radial displacement in the casing so as to allow a non-uniform arrangement of the members in accordance with irregularities of the mouth of the container, and abutments connected, respectively, to the members and adapted to contact the concave side of the closure sheet opposite to the convex side thereof.

In a preferred embodiment of the present invention extensions are arranged, respectively, on the members in continuation to the conically shaped outer surfaces thereof so as to abut against a closure member arranged on the mouth of the container and so as to substantially enclose the rim portion of the closure sheet, the extensions being spaced apart from the rim portion of the closure sheet; and recesses are arranged in said members, respectively, adjoining the inner sides of the extensions, respectively, and adapted to receive the rim portion of the closure sheet.

In a preferred embodiment of the present invention the abutments are integral, respectively, with the conically shaped members.

According to a preferred embodiment of the present invention abutment means are provided between the driving element and the casing permitting the element to carry out a limited radial displacement in the casing so as to allow a non-uniform arrangement of the members in accordance with irregularities of the mouth of the container.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together

with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a longitudinal cross-section through an apparatus according to the present invention and the mouth of a bottle, the parts being shown before the securing of the closure sheet; and

Fig. 2 is a similar cross-section of the apparatus shown in Fig. 1, the parts having the position after the securing of the closure sheet.

Fig. 3 is a fragmentary sectional view taken along the line 3—3 of Fig. 1 in the direction of the arrows.

Referring now to the drawings, and first to Fig. 1 the mouth **22** of the neck **1** of a bottle or container is arranged at the lower end of the casing **7**, **8**. The mouth **22** carries an elastically resilient sealing annulus **3** and an annular cap **2** preferably consisting of sheet metal and permanently securing the annulus **3** to the mouth **22** of the neck **1** of the bottle. A concavo-convex closure sheet **4** is arranged across the mouth **22** of the neck **1** of the bottle and has the convex side thereof directed toward the interior of the bottle. The closure sheet **4** may consist of metal and has a marginal portion **23** and a rim portion **19**. The marginal portion **23** establishes the connection between the concavo convex portion of the closure sheet **4** and the rim portion **19** and is before the securing of the closure sheet arranged in a substantially vertical position and in contact with the resilient annulus **3** whereas the rim portion **19** is arranged in a substantially horizontal position and in contact with the cap **2**, as clearly shown in Fig. 1.

In order to secure the closure sheet to the bottle an apparatus is used which comprises a casing having a longitudinal axis, a lower part **7** and an upper part **8**. The lower part **7** has a lower open end portion **24** of a substantially cylindrical shape for arranging therein the mouth **22** of the neck **1** of the bottle. Furthermore a conical surface **15** is arranged on the inside of the lower part **7** of the casing adjoining the end portion **24** and located about the axis of the casing. Members **5** have part conically shaped outer and inner surfaces **25** and **26**, respectively, forming parts of two cones located about the casing axis the outer surfaces **25** of the members **5** slidably engaging the conical surface **15** of the casing **7**, **8** and members **5** being distributed about the casing axis. The members are provided at their lower end with lateral protuberances **6** engaging the marginal portion **23** of the closure sheet **4**. The part conically shaped inner surfaces **26** are in engagement with the conical surface **14** of a driving element **10** (Fig. 3). The part conical surfaces **25** and **26** are preferably substantially parallel to each other.

The driving element **10** has a part at its upper end **20** enlarged to form a flange-like disk which is in contact with the surface **13** of the upper part **8** of the casing which is arranged at right angles to the axis of the apparatus. The flange-like disc **20** can carry out limited radial displacements within the upper part **8** of the casing. A sleeve **11** having a lateral flange **21** and enclosing the middle portion of the element **10** rests on the upper end of the members **5** and resilient means including the sleeve **11** and a spring **12**, is arranged between the member **5** and the flange-like disc **20** of the driving element **10**, the spring **12** engaging flange **21** of sleeve **11**.

The upper portion **8** of the casing carries a threaded portion **9** by which the apparatus may be connected to a part of a machine (not shown) which moves in vertical direction so that the casing **7**, **8** can be lowered or raised with respect to the bottle. Abutments **16** are provided at the lower end of the members **5** and preferably made integral with them. The abutments have a shape substantially corresponding to the concave side of the closure sheet **4** so that they contact same.

Preferably extensions **17** are arranged, respectively, on the members **5** in continuation to the part outer surfaces **25** thereof so as to substantially enclose the rim portion **19** of the closure sheet **4**, the extensions **17** being spaced apart from the rim portion **19** of the closure sheet **4**. Recesses **18** are provided in the members **5**, respectively, adjoining the inner sides of the extensions **17** between the

latter and the casing axis and having dimensions sufficient for accommodating loosely the rim portion 19 of the closure sheet 4.

The operation of this device is as follows:

In the position of the parts shown in Fig. 1 the casing 7, 8 is moved downward so far that the closure sheet 4 is in contact with the annular cap 2 by means of the rim portion 19 and in contact with the sealing annulus 3 by means of the marginal portion 23, the latter being in a substantially vertical position. If the casing 7, 8 is moved further downward into the position shown in Fig. 2, the driving element 10 penetrates deeper into the space between the members 5 and drives the same radially outward with respect to the casing 7, 8 and the mouth 22 of the neck 1 of the bottle. During this movement the part conically shaped outer and inner surfaces 25 and 26 slide, respectively, on the conical surface 15 of the casing 7, 8 and the conical surface 14 of the driving member 10. In consequence thereof, the protuberances 6 of the members 5 exert a bending stress on the marginal portion 23 of the closure sheet 4 so that it assumes the shape shown in Fig. 2 in which the marginal portion 23 locks the closure sheet 4 against any ejecting action of the pressure prevailing in the interior of the bottle. Since the main portion of the closure sheet 4 abuts against the abutments 16 it will not be flattened during this operation. In consequence thereof the closure sheet 4 is capable of withstanding internal pressures in the bottle even after it has been secured to the mouth 22 of the neck 1 of the bottle.

The marginal portion 23 is lengthened in width during the operation just described and the material for lengthening the width of the marginal portion 23 cannot be provided by the concavo-convex main portion of the closure sheet 4 since this portion abuts against the abutments 16. It is, however, provided by the rim portion 19 of the closure sheet 4 which is loosely accommodated within the recesses 18 of the members 5. The loose accommodation of the rim portion involves the advantage that the material of the closure sheet is not unduly stressed during the securing operation so that the closure sheet 4 will not show any cracks in the rim portion 19 or the marginal portion 23.

The members 5 are arranged so as to be resiliently supported in the axial direction of the apparatus which fact has a particular importance in case of an irregularity of the mouth 22 or the annular cap 2 of the bottle. If, for instance, the end face of the annular cap 2 being in contact with the extensions 17 is uneven, such unevenness being due to a wrong mounting of the cap on the bottle or to wear or damage during transportation or use, the extensions 17 adjust themselves to different levels and adjust the members 5 at different levels along the conical guiding surfaces 14 and 15 so that automatically each protuberance 6 is imparted the correct level with respect to the adjoining portion of the marginal portion 23 of the closure sheet 4, which will adapt itself to the uneven shape of the end face of the cap 2. The accuracy of this adaptation increases with the number of members 5 provided in the casing 7, 8. If the axial independent resiliency of the members 5 were not provided, the members would adjust themselves all at the same level corresponding to the highest point of the uneven face of the cap 2 and the protuberances 6 would not be able to secure a complete sealing of the closure sheet 4.

Also if the aperture of the annular cap 2 is eccentrically arranged with respect to the perimeter of the annular cap 2 the device according to the present invention achieves a perfect sealing of the bottle since the driving element 10 can adapt itself to any irregularities by means of the flange-like disc 20 thereof which abuts freely against the surface 13 of the upper part 8 of the casing. The flange-like disc 20 can carry out limited radial displacements and even assume a slightly inclined position with respect to the surface 13 so that the driving element 10 can adapt itself to all irregularities which arise in practice.

The abutments 16 need not be integral with the members 5 but could be made as separate pieces which are radially slidable with respect to the members 5.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of apparatuses for securing a closure sheet across the mouth of a container differing from the types described above.

While I have illustrated and described the invention as embodied in an apparatus for securing a closure sheet across the mouth of a bottle, I do not intend to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of my invention.

Without further analysis, the foregoing will so fully reveal the gist of my invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What I claim as new and desire to secure by Letters Patent is:

1. An apparatus for securing a closure sheet across the mouth of a container, the closure sheet having a concavo-convex shape having the convex side thereof directed toward the interior of the container, comprising in combination, a casing having a longitudinal axis, an open end portion for arranging therein the mouth of the container and a conical surface arranged on the inside of said casing adjoining said end portion and located about said axis; a plurality of members distributed about said axis and each provided with an outer and inner surface respectively forming parts of two cones located about said axis, said outer surfaces of said members slidably engaging said conical surface of said casing, said members being adapted to bend the closure sheet into container-closing position; a driving element having a conical surface located substantially about said axis and engaging said inner surfaces of said members for shifting the same laterally away from said axis; resilient means arranged in the upper portion of said casing between a part of said driving element and said members; means for arranging said element for a limited radial displacement in said casing so as to allow a non-uniform arrangement of said members in accordance with irregularities of the mouth of the container; abutments connected, respectively, to said members at the lower ends thereof and adapted to contact the concave side of the closure sheet opposite to the convex side thereof; extensions arranged, respectively, on said members in continuation to said outer surfaces thereof so as to substantially enclose a rim portion of the closure sheet, said extensions being spaced apart from the rim portion of the closure sheet; and said members having recesses, respectively, each recess being arranged between said extension and said abutment on each member and adapted to accommodate loosely the rim portion of the closure sheet.

2. An apparatus for securing a closure sheet across the mouth of a container, the closure sheet having a concavo-convex shape having the convex side thereof directed toward the interior of the container, the rim portion of the closure sheet being in contact with a closure member arranged on the mouth of the container, comprising in combination, a casing having a longitudinal axis, an open end portion for arranging therein the mouth of the container and a conical surface arranged on the inside of said casing adjoining said end portion and located about said axis; a plurality of members distributed about said axis and each provided with an outer and inner surface respectively forming parts of two cones located about said axis, said outer surfaces of said members slidably engaging said conical surface of said casing and said members being adapted to bend the closure sheet into container-closing position; a driving element having a conical surface located substantially about said axis and engaging said inner surfaces of said members for shifting the same laterally away from said axis; resilient means arranged in the upper portion of said casing between a part of said driving element and said members; means for arranging said element for a limited radial displacement in said casing so as to allow a non-uniform arrangement of said members in accordance with irregularities of the mouth of the container; abutments connected, respectively, to said members at the lower ends thereof and adapted to contact the concave side of the closure sheet opposite to the convex side thereof; extensions arranged, respectively, on said members in continuation to said outer surfaces thereof so as to abut against the closure sheet arranged on the mouth of the container and so as to substantially enclose the rim por-

tion of the closure sheet, said extensions being spaced apart from the rim portion of the closure sheet; and said members having recesses respectively, each recess being arranged between said extension and said abutment on each member and adapted to accommodate loosely the rim portion of the closure sheet.

3. An apparatus for securing a closure sheet across the mouth of a container, the closure sheet having a concavo-convex shape having the convex side thereof directed toward the interior of the container, the rim portion of the closure sheet being in contact with a closure member arranged on the mouth of the container, comprising in combination, a casing having a longitudinal axis, an open end portion for arranging therein the mouth of the container and a conical surface arranged on the inside of said casing adjoining said end portion and located about said axis; a plurality of members distributed about said axis and each provided with an outer and inner surface respectively forming parts of two cones located about said axis, said outer surfaces of said members slidably engaging said conical surface of said casing and said members being adapted to bend the closure sheet into container-closing position; a driving element having a conical surface located substantially about said axis and engaging said inner surfaces of said members for shifting the same laterally away from said axis; resilient means arranged in the upper portion of said casing between a part of said driving element and said members; means for arranging said element for a limited radial displacement in said casing so as to allow a non-uniform arrangement of said members in accordance with irregularities of the mouth of the container; abutments being integral, respectively, with said members and adapted to contact the concave side of the closure sheet opposite to the convex side thereof; extensions arranged, respectively, on said members in continuation to said outer surfaces thereof so as to abut against the closure sheet arranged on the mouth of the container and so as to substantially enclose the rim portion of the closure sheet, said extensions being spaced apart from the rim portion of the closure sheet; and said members having recesses, respectively, each recess being arranged between said extension and said abutment on each member and adapted to accommodate loosely the rim portion of the closure sheet.

4. An apparatus for securing a closure sheet across the mouth of a container, the closure sheet having a concavo-convex shape having the convex side thereof directed toward the interior of the container, comprising in combination, a casing having a longitudinal axis, an open end portion for arranging therein the mouth of the container and a conical surface arranged on the inside of said casing adjoining said end portion and located about said axis; a plurality of members distributed about said axis and each provided with an outer and inner surface respectively forming parts of two cones located about said axis, said outer surfaces of said members slidably engaging said conical surface of said casing and said members being adapted to bend the closure sheet into container-closing position; a driving element having a conical surface located substantially about said axis and engaging said inner surfaces of said members for shifting the same laterally away from said axis; resilient means arranged in the upper portion of said casing between said members and a part of said driving element engaging said casing so that said element can carry out a limited radial displacement in said casing so as to allow a non-uniform arrangement of said members in accordance with irregularities of the mouth of the container; abutments connected, respectively, to said members at the lower ends thereof and adapted to contact the concave side of the closure sheet opposite to the convex side thereof; extensions arranged, respectively, on said members in continuation to said outer surfaces thereof so as to substantially enclose a rim portion of the closure sheet, said extensions being spaced apart from the rim portion of the closure sheet; and said members having recesses, respectively, each recess being arranged between said extension and said abutment on each member and adapted to accommodate loosely the rim portion of the closure sheet.

5. An apparatus for securing a closure sheet across the mouth of a container, the closure sheet having a concavo-convex shape having the convex side thereof directed toward the interior of the container, the rim portion of the closure sheet being in contact with a closure member arranged on the mouth of the container, comprising in combination, a casing having a longitudinal axis, an open end portion for arranging therein the mouth of the container and a conical surface arranged on the inside of said casing adjoining said end portion and located about said axis; a plurality of members distributed about said axis and each provided with an outer and inner surface respectively forming parts of two cones located about said axis, said outer surfaces of said members slidably engaging said conical surface of said casing and said members being adapted to bend the closure sheet into container-closing position; a driving element having a conical surface located substantially about said axis and engaging said inner surfaces of said members for shifting the same laterally away from said axis; resilient means arranged in the upper portion of said casing between said members and a part of said driving element engaging said casing so that said element can carry out a limited radial displacement in said casing so as to allow a non-uniform arrangement of said members in accordance with irregularities of the mouth of the container; abutments connected, respectively, to said members at the lower ends thereof and adapted to contact the concave side of the closure sheet opposite to the convex side thereof; extensions arranged, respectively, on said members in continuation to said part outer surfaces thereof so as to abut against the closure sheet arranged on the mouth of the container and so as to substantially enclose the rim portion of the closure sheet, said extensions being spaced apart from the rim portion of the closure sheet; and said members having recesses, respectively, each recess being arranged between said extension and said abutment on each member and adapted to accommodate loosely the rim portion of the closure sheet.

6. An apparatus for securing a closure sheet across the mouth of a container, the closure sheet having a concavo-convex shape having the convex side thereof directed toward the interior of the container, the rim portion of the closure sheet being in contact with a closure member arranged on the mouth of the container, comprising in combination, a casing having a longitudinal axis, an open end portion for arranging therein the mouth of the container and a conical surface arranged on the inside of said casing adjoining said end portion and located about said axis; a plurality of members distributed about said axis and each provided with an outer and inner surface respectively forming parts of two cones located about said axis, said outer surfaces of said members slidably engaging said conical surface of said casing and said members being adapted to bend the closure sheet into container-closing position; a driving element having a conical surface located substantially about said axis and engaging said inner surfaces of said members for shifting the same laterally away from said axis; resilient means arranged in the upper portion of said casing between said members and a top flange of said driving element engaging said casing so that said element can carry out a limited radial displacement in said casing so as to allow a non-uniform arrangement of said members in accordance with irregularities of the mouth of the container; abutments being integral, respectively, with said members and adapted to contact the concave side of the closure sheet opposite to the convex side thereof; extensions arranged, respectively, on said members in continuation to said outer surfaces thereof so as to abut against the closure sheet arranged on the mouth of the container and so as to substantially enclose the rim portion of the closure sheet, said extensions being spaced apart from the rim portion of the closure sheet; and said members having recesses, respectively, each recess being arranged between said extension and said abutment on each member and adapted to accommodate loosely the rim portion of the closure sheet.

7. An apparatus for securing a closure sheet across the mouth of a container, the closure sheet having a concavo-convex shape having the convex side thereof directed toward the interior of the container, comprising in combination, a casing having a longitudinal central axis, an open end portion for arranging therein the mouth of the container and a conical surface arranged on the inside of said casing adjoining said end portions and located about said axis; a plurality of independently movable members distributed about said axis and each provided with an outer and inner surface respectively forming parts of two cones located about said axis, said outer

surfaces of said members slidably engaging said conical surface of said casing and said members being adapted to bend the closure sheet into container-closing position; resilient means operatively connected to said members for sliding the same independently along said conical surface of said casing toward said open end portion thereof and said axis; a conical driving element engaging said inner conical surfaces of said members for shifting the same laterally away from said axis and for limiting the movement of said members toward said axis and open end portion of said casing; means for arranging said element for a limited radial displacement in said casing so as to allow a non-uniform arrangement of said members in accordance with irregularities of the mouth of the container; and means for moving said casing and element along said axis with respect to said members to move said members radially and outwardly with respect to said axis.

8. An apparatus for securing a closure sheet across the mouth of a container, the closure sheet having a concavo-convex shape having the convex side thereof directed toward the interior of the container, the rim portion of the closure sheet being in contact with a closure member arranged on the mouth of the container, comprising in combination, a casing having a longitudinal axis, an open end portion for arranging therein the mouth of the container and a conical surface arranged on the inside of said casing adjoining said end portion and located about said axis; a plurality of members distributed about said axis and each provided with an outer and inner surface respectively forming parts of two cones located about said axis, said outer surfaces of said members slidably engaging said conical surface of said casing and said members being adapted to bend the closure sheet into container-closing position; a driving element having a conical surface located substantially about said axis and engaging said inner surfaces of said members for shifting the same laterally away from said axis; resilient means arranged in the upper portion of said casing between a part of said driving element and said members; means for arranging said element for a limited radial displacement in said casing so as to allow a non-uniform arrangement of said members in accordance with irregularities of the mouth of the container; abutments connected, respectively, to said members at the lower ends thereof and adapted to contact the concave side of the closure sheet opposite to the convex side thereof; extensions arranged, respectively, on said members in continuation to said outer surfaces thereof so as to abut against the closure member arranged on the mouth of the container and so as to substantially enclose the rim portion of the closure sheet, said extensions being spaced apart from the rim portion of the closure sheet; and said members having recesses, respectively, each recess being arranged between said extension and said abutment on each member and adapted to accommodate loosely the rim portion of the closure sheet, said abutments protruding beyond said extensions and having protuberances adapted to exert a bending stress on a marginal portion of the closure sheet.

9. An apparatus for securing a closure sheet across the mouth of a container, the closure sheet having a concavo-convex shape having the convex side thereof directed toward the interior of the container, the rim portion of the closure sheet being in contact with a closure member arranged on the mouth of the container, comprising in combination, a casing having a longitudinal axis, an open end portion for arranging therein the mouth of the container and a conical surface arranged on the inside of said casing adjoining said end portion and located about said axis; a plurality of members distributed about said axis and each provided with an outer and inner surface respectively forming parts of two cones located about said axis, said outer surfaces of said members slidably engaging said conical surface of said casing and said members being adapted to bend the closure sheet into container-closing position; a driving element having a conical surface located substantially about said axis and engaging said inner surfaces of said members for shifting the same laterally away from said axis; resilient means arranged in the upper portion of said casing between a part of said driving element and said members; means for arranging said element for a limited radial displacement in said casing so as to allow a non-uniform arrangement of said members in accordance with irregularities of the mouth of the container; abutments being integral, respectively, with said members and adapted to contact the concave side of the closure sheet opposite to the convex side thereof; extensions arranged, respectively, on said members in continuation to said outer surfaces thereof so as to abut against the closure sheet arranged on the mouth of the container and so as to substantially enclose the rim portion of the closure sheet, said extensions being spaced apart from the rim portion of the closure sheet; and said members having recesses, respectively, each recess being arranged between said extension and said abutment on each member and adapted to accommodate loosely the rim portion of the closure sheet, said abutments protruding beyond said extensions and having protuberances adapted to exert a bending stress on the marginal portion of the closure sheet.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
808,556	Lindsay	Dec. 26, 1905
1,585,820	Baum	May 25, 1926
1,693,262	Taylor	Nov. 27, 1928
1,747,343	Baum	Feb. 18, 1930
1,940,667	Engelman	Dec. 26, 1933
2,085,879	Trump	July 6, 1937
2,104,671	Pierce	Jan. 4, 1938
2,401,499	Nelson et al.	June 4, 1946

FOREIGN PATENTS

Number	Country	Date
103,705	Switzerland	Feb. 19, 1923