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APPARATUS FOR CLOSING AND SEALING CONTAINERS

Filed May 22, 1953

2 Sheets-Sheet 1

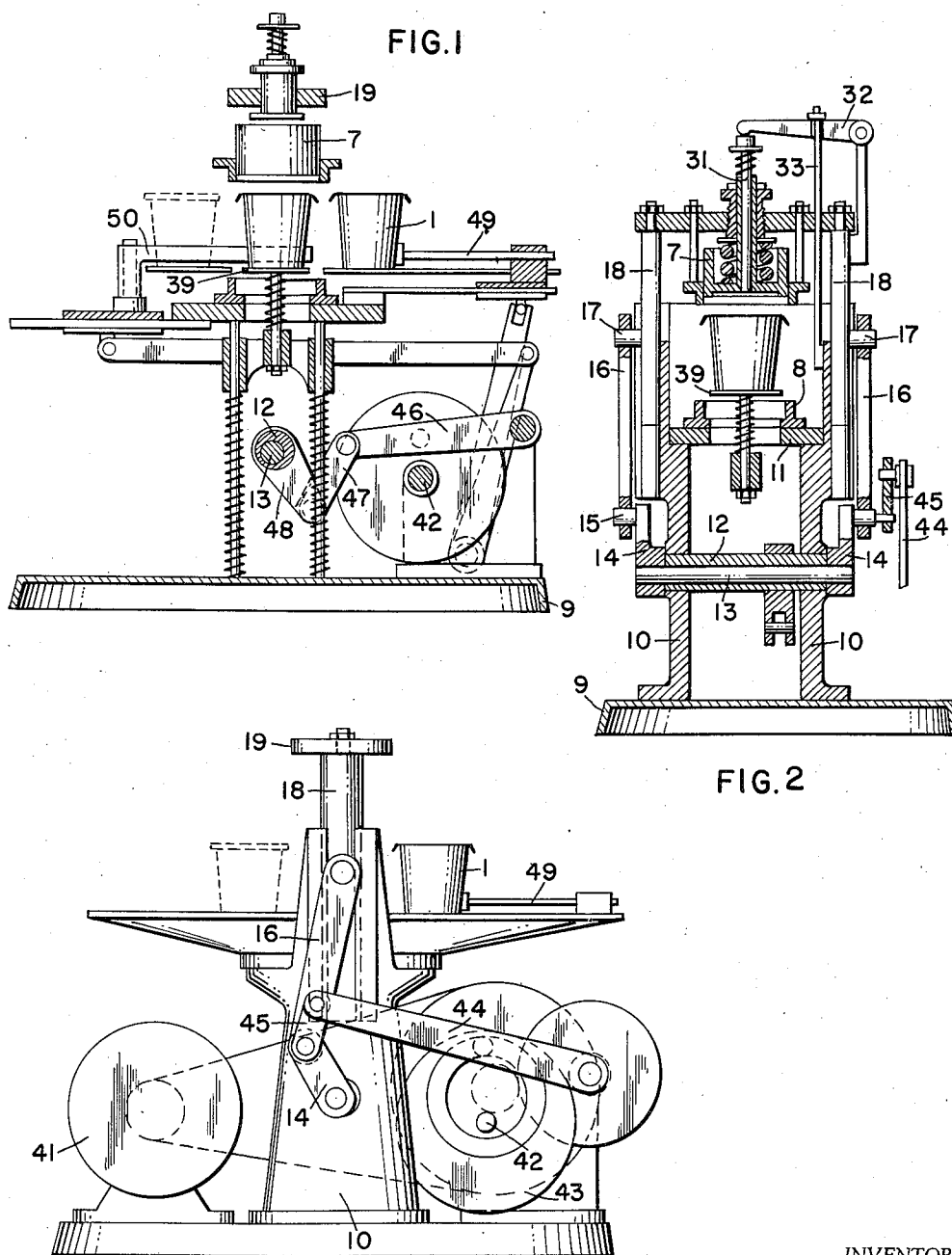


FIG. 3

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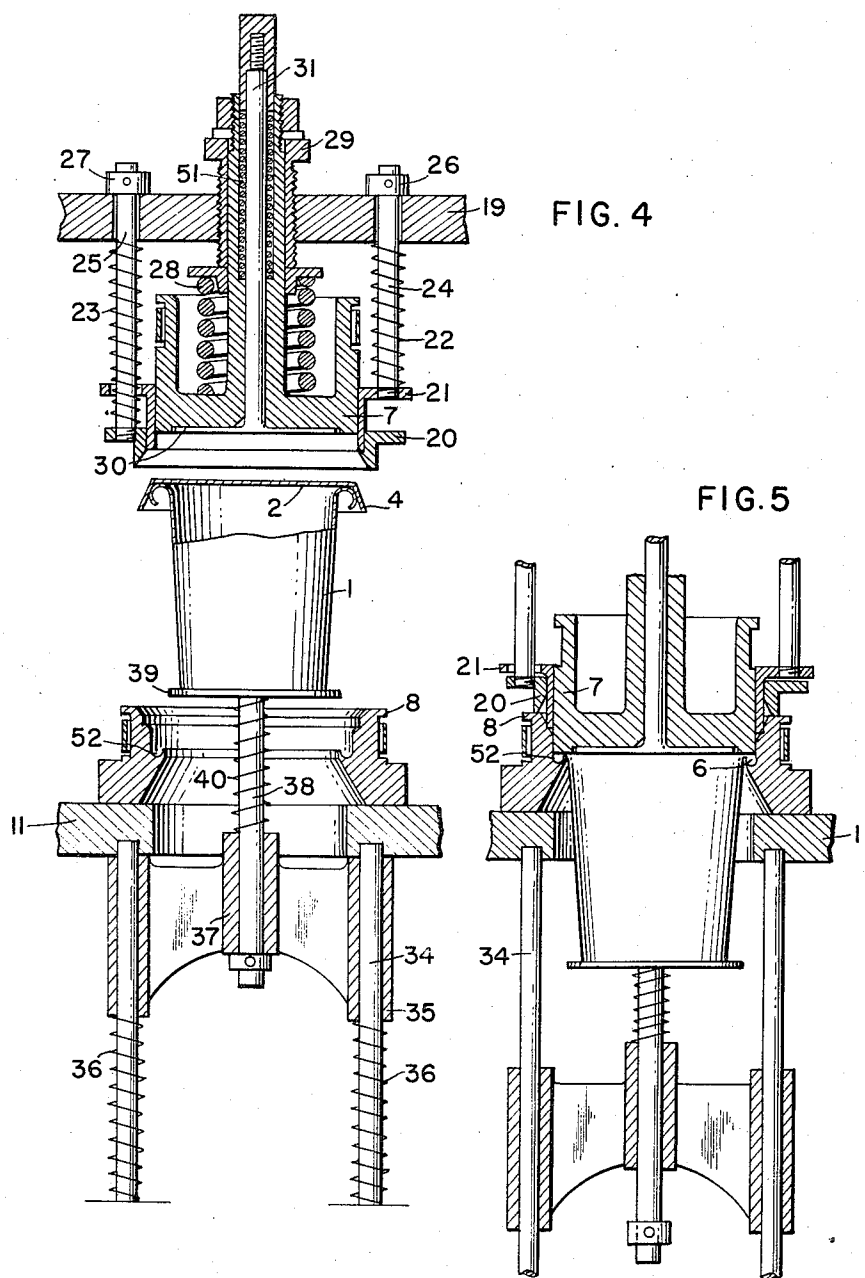
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APPARATUS FOR CLOSING AND SEALING CONTAINERS

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Application May 22, 1953, Serial No. 356,624

5 Claims. (Cl. 53—341)

This invention relates to an apparatus for sealing containers, and more particularly to an apparatus for providing packing containers made of paper, cardboard, or the like sheet fibrous material, with a liquid-tight seal.

This application is a continuation-in-part of my patent application, Serial No. 278,571, filed March 26, 1952.

It is one object of this invention to provide an apparatus for sealing packing containers having separate covers fitting openings of said containers so as to render them liquid-tight and to permit enclosing therein liquid material of any type, such as fruit juices, milk, beer, lubricants, lacquers, and other liquid material.

Other objects of this invention and advantageous features thereof will appear as the description proceeds.

According to this invention a drawn cover is slipped over the flanged and preferably beaded border of the container casing, the edge of said cover extending somewhat over the flanged and beaded border of said casing, and said cover edge is then rolled by means of a beading tool about the flanged and beaded border of said casing to provide a clinching interlocking convolute bead. The following description sets forth in detail an apparatus suitable for producing such clinching interlocking convolute bead of the flanged and beaded border of the container casing and the flanged edge of the cover.

In the production of such beaded firmly compressed closure, measures must be employed that will ensure the most reliable performance of operation of such an apparatus on large scale production. The container casings provided with a flanged beaded border and the drawn covers provided with a rim-formed border as required for closing and sealing container casings, usually, are made in special plants and supplied to the particular users where the containers are filled, closed, and sealed. It has been found that through storage, transportation, filling manipulation or the like both the container casings and the covers are often slightly deformed so that the upper border of the container will not always be perfectly round and likewise the rim-formed border of the covers will no longer be at a right angle to the cover surface. On account thereof, certain difficulties are encountered on introducing the rim-formed cover borders into the sealing and closing device. Said rim-formed edges of the cover borders tend to rest upon the border of the beading tool instead of being introduced thereinto; as a result thereof the cover becomes unfit for use and has to be replaced by a new one provided this could still be done. Often, however, not only the damaged cover had to be replaced but also the container casing itself due to damage to the upper flanged and beaded border of the container casing.

To avoid these drawbacks it is necessary to straighten out and adjust the upper border of the container with respect to the cover placed thereon in such a manner that container and cover are exactly in centric position with respect to the beading tool and the counter-die and

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that the rim-formed cover border forms a right angle to the cover surface.

To meet these requirements, the counter-die provided for the beaded border of the container casing, according to the present invention, is surrounded with two guide rings which are arranged in such a manner that they can be moved in axial direction thereto and which are provided at their inner lower border with a conical inlet opening. These guide rings are spring-supported around the counter-die and, thereby, are always forced into their lower position. The conical inlet opening of the outer guide ring is of such a diameter that said guide ring is capable of properly aligning, with respect to the counter-die, containers which might be inaccurately placed, for closing and sealing, upon the pickup plate by the feeding device, and of introducing said aligned containers into the inner guide ring. The inner guide ring has only a slightly enlarged inlet opening and fits with its outer diameter into a recess of the beading tool which has a conical inlet opening on its upper border, so that said inner guide ring and the beading tool are accurately centered with respect to each other. A pickup table for the container casing and the cover placed thereon, said pickup table being movable towards the counter-die and cushioned by a double spring action, is retained in its normal position by the beading tool carrier. On downward movement of the counter-die the container resting upon the pickup plate is automatically guided through the outer guide ring, even when standing somewhat eccentrically to the counter-die, into the inner guide ring until the cover border of the container abuts the counter-die. Thereby not round deformations of container and cover are eliminated and the rim-formed borders of the cover are brought into vertical position which is required to produce good and flawless beads. Due to the double spring action of the pickup plate this operation of adjusting and aligning the container is accomplished with great ease so that any damage to container and its cover is avoided. On further movement of the counter-die towards the beading tool the outer guide ring is caused to rest upon the top edge of the beading tool and moves upward and the inner guide ring is introduced into the corresponding recess of the beading tool. As soon as said inner guide ring impinges the bottom edge of said recess, it is also forced upward over the counter-die thereby sliding upward on the rim-formed cover flange and introducing said flange exactly into the recess leading to the beading groove.

Should, after sealing, some containers be jammed in the sealing device, they are ejected by an ejector.

The sealing device is driven by means of an eccentric or crank gear driving mechanism, and more advantageously, because of simpler construction, by a lever gear driving mechanism. A lever gear driving mechanism produces more appropriate curves of movement.

In order to enable rational operation, the packing containers are inserted into the sealing device and the sealed containers are removed therefrom by means of pushing, gripping or the like devices, which are mechanically controlled and are also driven by the driving mechanism.

The same applies to the operation of placing the covers on the filled containers.

A preferred sealing apparatus according to this invention is illustrated in the accompanying drawings.

Fig. 1 is a vertical sectional view through the sealing apparatus in front view.

Fig. 2 is a vertical sectional view through the sealing apparatus in side view.

Fig. 3 is a front elevation of the sealing apparatus.

Fig. 4 is a vertical sectional view through those parts

of said sealing apparatus which cause actual closure and sealing, said parts being shown more specifically in the position of introducing the container to be sealed into said parts, while

Fig. 5 is a vertical sectional view through the same parts shown in the beading and sealing position.

In Figs. 1 to 3, two lateral supports are arranged on base 9. Said supports 10 carry beading tool carrier 11 and arranged thereon beading tool 8. In said lateral supports 10 a bushing 12 is arranged which carries, in its eccentric bore, crankshaft 13 with cranks 14. Crank pins 15 are connected by draw rods 16 and pivots 17 with guide rods 18 slidably mounted in lateral supports 10, said guide rods 18 carrying crosshead 19. Counter-die 7 with guiding means-is attached to said crosshead 19. Said guiding means consist of outer guide ring 20 and inner guide ring 21. They are forced downward by springs 22 and 23, respectively, whereby adjusting rings 26 and 27, respectively, which are fastened to guide rods 24 and 25, determine their normal position. Counter-die 7 is cushioned by very strong spring 28. Its higher or lower position can be adjusted by threaded bushing 29. Counter-die 7, at its inner face, is provided with ejector disk 30 which is held in place by spiral spring 51 provided in said counter-die 7, disk 30 being actuated by rod 33 by means of lever 32 and spindle 31. Guide rods 34 are provided on beading tool carrier 11. Guide piece 35 is slidably arranged on said guide rods 34 and is held in upper position by springs 36. Guide piece 35 carries in its guide 37 piston 38 with pickup plate 39, said piston 38 being held in normal position by spring 40. Main shaft 42 is driven by motor 41 by means of driving parts not shown in detail in the drawings. Eccentrics are provided at said main shaft 42, said eccentrics governing each individual movement of the sealing apparatus. Eccentric 43 actuates lever 44, which by means of draw clip 45 engages one of cranks 15. Another eccentric actuates lever 46 which, by means of draw clip 47 and lever 48 actuates eccentric bushing 12. Other eccentrics actuate by means of levers, draw rods, and guides device 49 for feeding the filled container into the sealing device, and device 50 for removing the filled and sealed container therefrom.

The sealing apparatus according to the present invention operates as follows:

Crankshaft 42 driven by motor 41 actuates feeding device 49 and supplies container 1 with cover 2 applied thereto to pickup plate 39. One of crank pins 15 is actuated by eccentric 43 by means of lever 44 and draw clip 45. Shaft 13 causes crank 14 to be actuated. As a result of such actuation, draw rods 16 with pivots 17 and guide rods 18 with crosshead 19 and counter-die 7 with its equipment, attached to crosshead 19 are moved in downward direction towards the beading tool. At the beginning of such movement only guide ring 20 slips with its conically enlarged inlet opening over container 1 provided with cover 2. Thereby container 1 and cover 2 are straightened out and accurately centered with respect to inner guide ring 21 and counter-die 7 and are introduced into said inner guide ring 21 with its slightly conically enlarged inlet opening, until container 1 with cover 2 are forced against counter-die 7 by the pressure of springs 40 and 36 carrying pickup plate 39. The inner wall of inner guide ring 21 causes adjustment and elimination of deformations of container 1 and cover 2 and the outwardly sloping rim-formed edge 4 of cover 2 is again brought into vertical position. Upon further movement of counter-die 7, container 1 is forced downward against the gradually increasing force of springs 40 and 36 of pickup plate 39 until counter-die 7 with its outer guide ring 20 contacts beading tool 8, whereupon said guide ring 20 abuts the border of beading tool 8 and is forced upward until inner guide ring 21 enters a corresponding, conically enlarged recess of beading tool 8 and thereby accurately centers container 1 and cover 2 with respect to

beading tool 8. As soon as the inner guide ring 21 has reached the lower edge of the corresponding recess of beading tool 8, it is moved upward over counter-die 7. Said counter-die 7 by its further movement in a downward direction causes the flange of container 1 positioned with cover 2 within inner guide ring 21 to be forced into the recess of heated beading tool 8 and, guided by said recess, beading groove 52. On further movement of counter-die 7 rim-formed edge 4 of cover 2 is beaded and, jointly with the bead of packing container 1 is subjected to a preliminary compression of the interlocking convolute bead formed thereby. At this moment cranks 14 have attained their lowest position. Thereafter eccentric bushing 12 is actuated by means of lever 46, draw clip 47, and lever 48, as a result whereof shaft 13 is, to a slight extent, moved in downward direction. Said movement is transmitted to beading tool 8 and counter-die 7 by driving parts and exerts a very strong pressure upon bead 6. After cover 2 is sealed to container 1 by said final compression under the influence of pressure and heat, and after, in the course of further movement of the transmitting elements, counter-die 7 has again attained its uppermost position, ejector disk 30 is actuated by draw rod 33 by means of lever 32 and spindle 31 thereby forcing a container which might have been jammed in guide ring 21, out of said guide ring 21 upon pickup plate 39 which also moves upward. While removing device 50 removes the sealed container from pickup plate 39, feeding device 49 supplies a new container ready for sealing, to pickup plate 39, whereup a new cycle of operations begins.

It is, of course, also possible to direct in upward direction the main movement of the sealing apparatus, according to this invention, in contrast to the above described downward movement thereof. Thereby counter-die 7 is stationary and beading tool 8 is moved upward against said counter-die 7.

By means of the sealing apparatus according to this invention it is possible to produce perfectly sealed, absolutely liquid-tight containers that may contain goods highly sensitive with respect to odor and taste. The waste usually encountered on sealing such containers is thereby reduced to a small proportion. This is due to the fact that the new sealing apparatus according to the present invention permits exact centering of container 1 and cover 2 with respect to counter-die 7, as a result whereof, at the same time, rim-formed flange 4 of cover 2 and container 1 itself are adjusted true to their correct diameter and placed into correct position as prerequisite for the production of proper beads. The rim-formed flange 4 of cover 2 is thereby forced exactly into the recess of beading tool 8 leading to beading groove 52. Of particular advantage is thereby the remarkable efficiency of the apparatus achieved by the above described improvements in the construction of the sealing device and in its simple design thereby enabling economical, safe, and reliable operation.

It is, of course, understood that this invention is not limited to closing a filled container and sealing the cover thereto, but may be used likewise for providing a liquid-tight bottom to a container casing prior to filling and sealing the container.

Counter-die 7 and beading tool 8 used in this sealing apparatus according to the present invention may be designed as disclosed in my co-pending application Serial No. 278,571 for a "Device and Method for Closing and Sealing Containers," filed March 26, 1952, of which the present application is a continuation-in-part application. Said device for closing and sealing containers made from fibrous sheet material and being provided with beaded edges, comprises a counter-die serving as prop on beading the flange of a cover placed over said container, and as support on pressing together the bead of said cover with the bead of said container, and a beading tool movable in upward direction towards said counter-die, said

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beading tool having a conically shaped upper opening part for receiving and guiding the cover flange, a cylindrical guiding part for guiding said cover flange, and a rounded beading recess for forming a bead of said cover flange over and into the beaded edge of said container and for firmly compressing the beads of said cover and container, the lower inner opening of said beading tool having a larger diameter than the outside diameter of the container casing at the place of beading and compressing the beads, the cylindrical guiding part of said beading tool having a height corresponding at least to the height of the cover flange, and the diameter of said beading recess being such that its inner edge does not contact the container wall at the starting place of the beaded edge of said container. The beading tool therein is preferably provided with heating means.

Other designs of said counter-die and beading tools may, of course, also be used.

I claim:

1. An apparatus for forming an interlocking, convolute sealing bead between a container casing end flange and a flange of a cover placed over the container casing end, the cover flange surrounding the container casing flange, said apparatus, comprising, in combination: an annular beading tool having an inwardly tapered receiving portion for guiding the cover flange, a shoulder forming an annular recess in said tapered portion, a substantially cylindrical portion adjacent said tapered portion, and an annular rim portion defining an arcuate beading recess between the rim and the cylindrical portion, the diameter of the rim portion being in excess of the largest container casing diameter to leave a clearance between the beading tool rim and the container casing; a counter-die having a substantially flat annular surface coaxial with the beading recess and arranged to engage the beading tool with its surface facing the beading recess so as to form said sealing bead in the recess; guide and centering means for guiding the cover flange into the receiving portion of the beading tool and centering the cover flange and the container casing flange together in relation to the beading recess, said means consisting of an inner and an outer guide ring mounted coaxially with and surrounding the annular surface of the counter-die for longitudinally slidable movement in relation to each other, the edges of the guide rings being inwardly beveled and the beveled edge of the inner guide ring fitting into the annular recess of the tapered portion of the beading tool upon engagement of the counter-die with the beading tool, independent biasing means for the counter-die, the inner guide ring and the outer guide ring to provide relative

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sliding movement therebetween; and means for moving the beading tool and the counter-die toward each other for engagement of the counter-die flat surface and the beading recess, said moving means being so correlated that the beveled edge of the outer guide ring first contacts the cover flange thereby centering the container casing and cover assembly in relation to the inner guide ring and counter-die, the inner guide ring then engages the cover flange and the counter-die engages the cover, the outer ring subsequently abuts the beading tool and the inner ring slides into the annular recess of the tapered portion of the beading tool thereby centering the assembly in relation to the beading recess, and the flat surface of the counter-die is finally pressed against the beading recess to form the interlocking, convolute sealing bead.

2. The apparatus of claim 1, wherein said beading tool is stationary and said moving means actuate the counter-die with its guide rings, also comprising a support member for the container-cover assembly and means for moving the support member simultaneously with and in the same direction as the counter-die through said beading tool.

3. The apparatus of claim 1, wherein said moving means comprises a single crank drive mechanism including an eccentric bushing and a crank shaft eccentrically arranged therein for effecting the final compression between the counter-die and the beading tool.

4. The apparatus of claim 3, wherein said crank drive mechanism includes cam means for effecting the said sequential movements.

5. The apparatus of claim 3, comprising means for supplying container-cover assemblies to the apparatus in a sealing position between the beading tool and the counter-die, the supply means also being actuated by the crank drive mechanism.

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