Jan. 24, 1967 J. A. GEIGER ETAL 3,299,845

APPARATUS FOR SEAMING METALLIC CONTAINERS

Filed Nov. 29, 1963 3 Sheets-Sheet 1

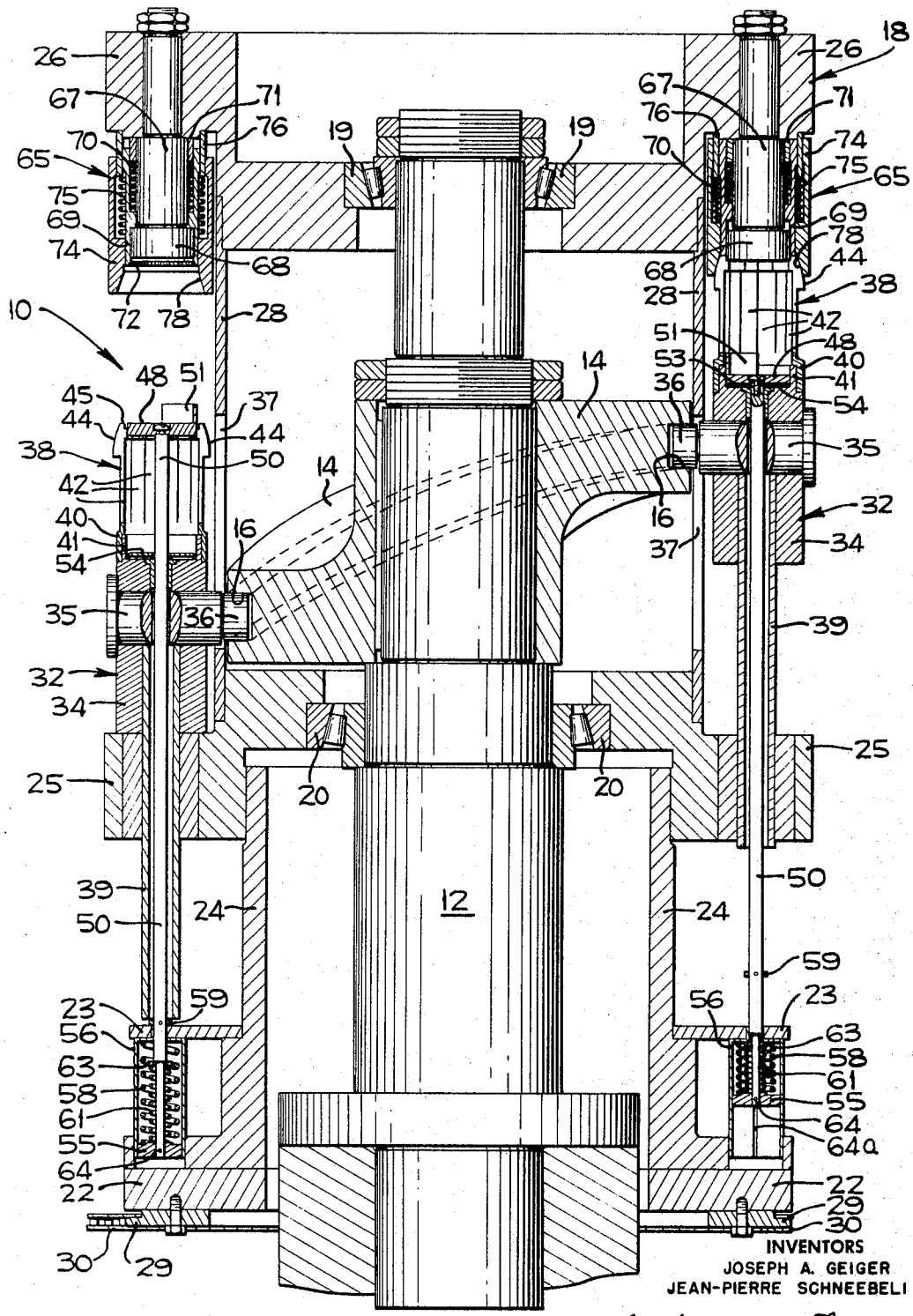

FIG_1

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FIG_4

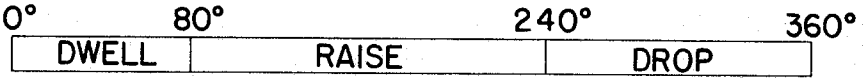

FIG_2

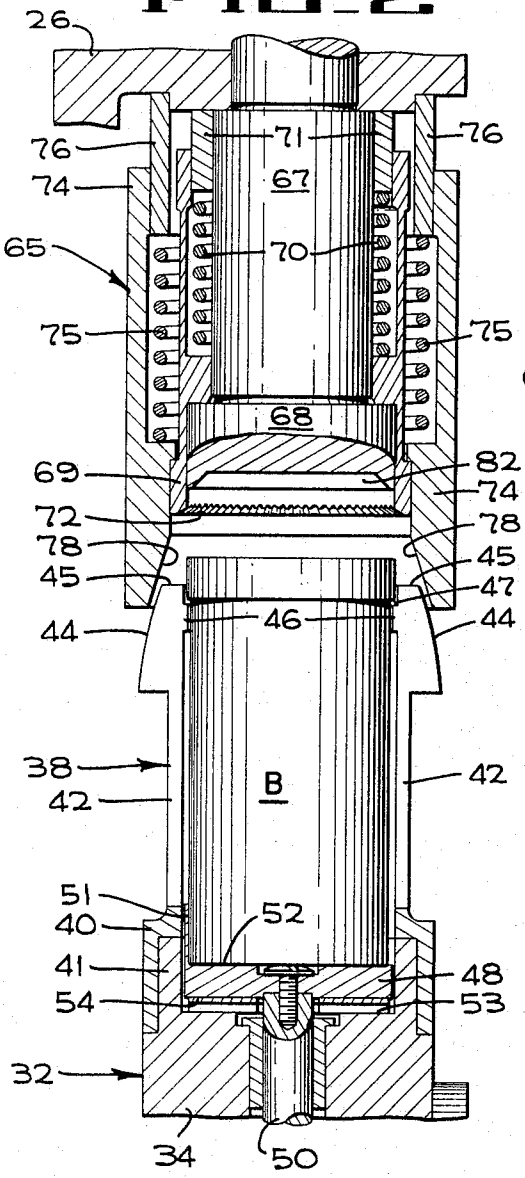

FIG_3

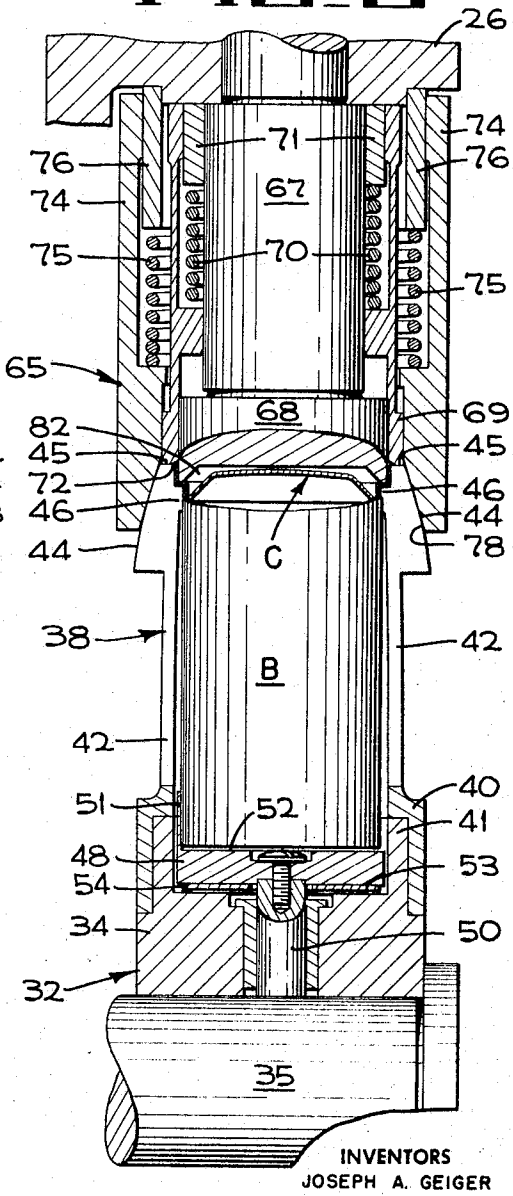

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FIG_5

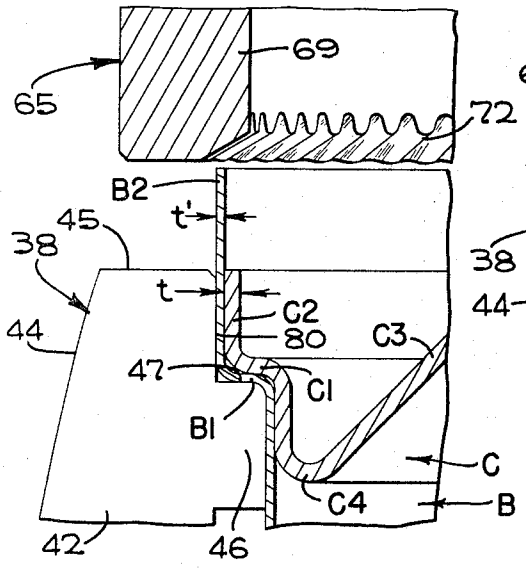


FIG_6

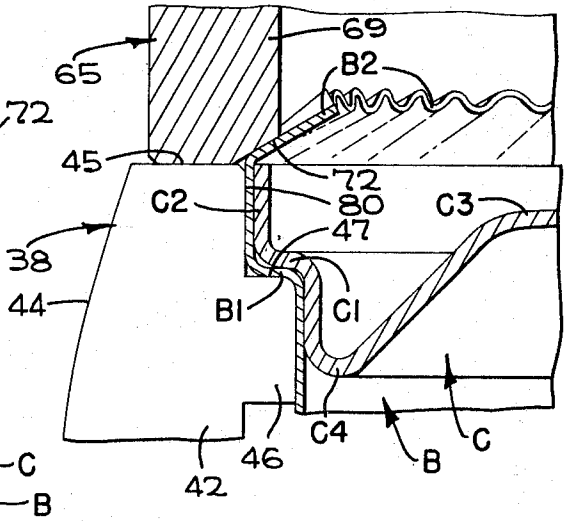


FIG_7

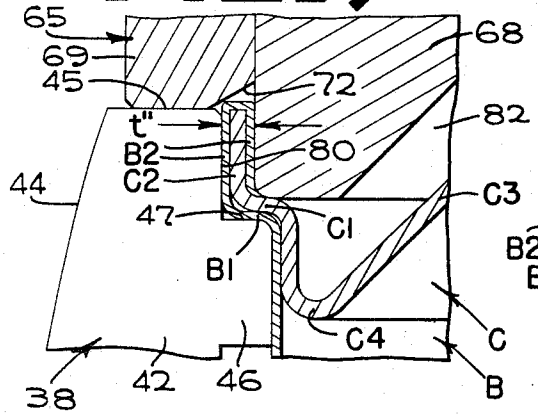
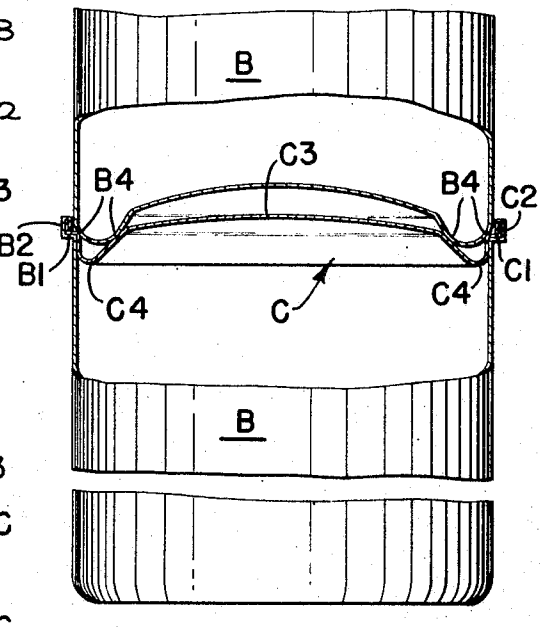


FIG_8



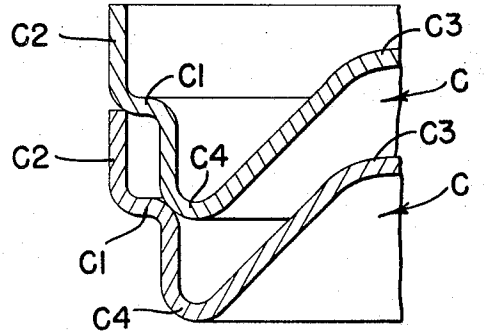


FIG_9

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United States Patent Office 3,299,845 Patented Jan. 24, 1967

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APPARATUS FOR SEAMING METALLIC CONTAINERS

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Filed Nov. 29, 1963, Ser. No. 326,816
11 Claims. (Cl. 113—30)

The present invention relates to apparatus for seaming metallic containers and more particularly to apparatus for sealing covers or lids to the open ends of cans such as those used, for example, in the canned food and beverage industry.

The prior art development in the container seaming or capping art, wherein a lid or cover is applied to the open end of a tubular container, has generally progressed along two paths. One of the most well known and conventional techniques for seaming closing covers to tubular can bodies involves the use of rollers which progressively roll interlocked peripheral edges of the cover and can together as either the can or the rollers are rotated about the axis of the can. Another well known method involves the simultaneous crimping of an end closure about the entire periphery of the open end of the container body, as for example, in bottle capping.

Both of these well known prior art methods of closing a filled container present problems to the present development of high-speed systems for the filling, closing, and other processing of containers. The rolled seam necessitates costly and complex mechanisms, and furthermore, such mechanisms are generally unsuitable for use in aseptic filling processes. The crimped, overlying cap or cover is generally unsuitable for metal-to-metal seams, and, furthermore, such a closing method usually requires a special sealing element in addition to the container body and end cover.

Another object of the present invention is to provide apparatus for forming a metal-to-metal seam between a container body and an end cover simultaneously about the entire periphery of the container and with one straight-line motion of the seaming apparatus.

Another object of this invention is to provide an apparatus for seaming a closing cover or lid to the open end of a tubular container which apparatus is relatively simple in structure and operation and is economical to manufacture.

Another object is to provide a machine for seaming closed a continuous series of filled metallic containers which machine may be operated at processing speeds in excess of those presently used in the industry to thereby handle a maximum number of containers during a given period of time.

Another object of the present invention is to provide apparatus for forming a permanent metal-to-metal seam between the mating peripheral edges of a container body and a cover whereby one of said edges is drawn or deformed and the other edge is elastically stressed.

Other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings in which:

FIGURE 1 is a fragmentary vertical section showing the seaming machine of the present invention.

FIGURE 2 is an enlarged vertical section of one of the ram and die assemblies of the machine of FIGURE 1 during one stage in its cycle of operation, with a container being shown in position upon the ram assembly for seaming.

FIGURE 3 is a vertical section similar to FIGURE 2 but showing the ram and die assemblies in a position they assume at a time slightly subsequent in the cycle of operation to the position depicted in FIGURE 2.

FIGURE 4 is a chart which schematically illustrates the operating cycle of the machine of FIGURE 1.

FIGURES 5, 6 and 7 are enlarged fragmentary operational views illustrating the method of seaming used in the present invention.

FIGURE 8 is a fragmentary elevation, partly broken away to show a pair of metallic containers each of which is provided with a seam according to the present invention.

FIGURE 9 is a fragmentary section through a peripheral portion of a stacked pair of covers of the type used in the method of the present invention as illustrated in FIGURES 5, 6 and 7.

Referring first to FIGURE 1, a machine **10** is shown for seaming an end closure or cover C (FIG. 8) onto the upper open-end of a metallic container body B in accordance with the method of the present invention. The apparatus shown in FIGURE 1 is particularly adapted to seam metallic containers of cylindrical shape; however, the scope of the present invention is not believed to be limited to such a particular peripheral shape but encompasses other metallic container shapes as well, as will hereinafter be made apparent. The differences between the machine **10** and apparatus which might be used for seaming substantially different container shapes will readily be recognized as being only matters of design lying well within the skills of persons knowledgeable in the seaming art.

Machine **10** comprises a fixed supporting column **12** which may be anchored to the floor or other ground supporting structure. A barrel cam **14** is keyed to the shaft **12** and is thus rigidly attached thereto, the outermost cylindrical surface of the barrel cam containing a recessed track **16**. A segmented drum assembly **18**, containing the operative elements of the seaming machine, is mounted for rotation about the supporting column **12** by means of roller bearings **19** and **20**.

The drum assembly **18** essentially comprises a plurality of annular flanges that support the seam-effecting elements of the machine which are continuously rotated about the supporting column **12**. As seen in FIGURE 1, the drum assembly includes a thickened lower annular flange **22**, an annular guide flange **23** directly above the lower flange, a lower shell **24**, a large annular supporting flange **25**, and an upper annular flange **26** which is joined to the flange **25** by a thin upper cylindrical shell **28**, all parts of the drum assembly being rigidly secured together as by welding or bolting. The drum assembly, including each of its projecting annular flanges, is continuously rotated during operation of the machine by means of a large sprocket wheel **29** fixed to the lower annular flange **22** and rotated by a chain **30** which is trained about the sprocket wheel and is driven by a suitable power source (not shown) such as an electric motor.

A plurality of ram assemblies **32** which carry the individual containers to be seamed are equally spaced about the circumference of the machine **10**. While FIGURE 1 shows but two ram assemblies positioned 180° part on the drum assembly **18**, it will be obvious that a greater number of such assemblies could be provided around the periphery of the machine. Each ram assembly includes a body member **34** fixedly mounting a transversely projecting cam follower **35** with a rotatable roller head **36** of the cam follower projecting through a slot **37** in the drum shell **28** and riding in the cam track **16**. Fixed to the body member **34** is an upwardly extending collet **38** and a downwardly extending tubular guide shaft **39** that extends completely through the body member. Each ram assembly is slidably mounted in the vertically-fixed an-

nular flange 25 by the guide shaft 39 which projects through the flange wherein it is guided by a suitable anti-friction, anti-rotation bushing.

The collet 38 is adapted to hold the container body B during the seaming operation and is comprised of a rigid tubular base 40 fixed upon an annulus 41 at the upper end of the body member 34 of the ram assembly. The collet includes a series of circumferentially arranged jaw segments 42 which extend upwardly from base 40, with each segment being normally slightly spaced from the adjacent segments. Each segment 42 (FIG. 1) includes an upper enlarged portion having an outwardly facing arcuate surface 44 (FIG. 2), a flat upper surface 45, and an inwardly extending flange or jaw 46 spaced just slightly below the upper surface 45 and defining a shoulder 47. The jaws 46 of the segments 42 are arranged so as to form a segmented annulus. Mounted for relative movement within the collet is a container supporting platform 48 which is supported by a rod 50 that projects vertically through the guide shaft 39 of the ram assembly. The uppermost surface 52 of the platform carries a semi-cylindrical guide rim 51 for positioning the container to be seamed upon the platform. A compressible spring washer 54 having an annular corrugated body with spaced ends, is received about the rod 50 within the annulus 41 at the upper end of the body member 34 so that it will be compressed against the bottom surface 53 of the platform when the ram assembly is in its uppermost position as illustrated by the assembly at the right-hand side of FIGURE 1.

While the major portion of the ram assembly 32 is vertically movable through the interaction of the cam follower 35 and the barrel cam 14, the rod 50 and the platform 48 carried thereby are more or less retained in position with respect to the rest of the ram assembly by having an independent, resilient mounting upon the annular flange 23. The lower end of rod 50 therefore carries a stop member 55 that is slidable within a tubular housing 56 attached to the flange 23 and is biased away from the flange by a compression spring 58. An annular stop 59 pinned on the rod 50 limits the downward vertical movement of the rod by abutment against the upper surface of the flange 23 as shown in the assembly at the left-hand side of FIGURE 1. A second compression spring 61, which has a spring constant much higher than that of the spring 58, is received within the confines of spring 58 between the stop member 55 and an annular collar 63 that is slidable on the rod 50. The specific purposes of the springs 58 and 61 and the spring washer 54, which together control the relative movement bewteen the rod 50 and the remainder of the ram assembly, will be explained hereinafter in the description of the operation of the machine. The rod 50 is restrained from rotation within the housing 56 by means of a pin 64 which extends through the stop member 55 and is slidably received within a slot 64*a* in the housing 56.

Associated with each ram assembly 32 is a corresponding die assembly 65 which is mounted directly above the ram assembly upon the upper annular flange 26 of the drum assembly 18. The die assemblies therefore rotate with their corresponding ram assemblies and the containers carried thereupon. Each die assembly includes a closing punch 67 (FIG. 2) which is firmly bolted to the flange 26 in axial alignment with the corresponding ram assembly 32. The punch has an expanded cylindrical head portion 68 for engaging and seaming the metallic container and cover in a manner to be explained hereinafter. Mounted for sliding movement along the outer surface of the closing punch is a curling sleeve 69 that is axially movable with respect to the punch against the urging of a compression spring 70 which, in the normal condition of the die assembly (FIG. 2), urges the curling ring downwardly against the head portion 68 of the punch, the spring 70 being disposed between sleeve 69 and a sleeve 71 that it fixed to flange 26. The lowermost end wall of the curling ring includes an inwardly beveled annular surface 72 which is uniformly serrated. Mounted upon the exterior surface of the curling ring 69 for relative axial movement is a cylindrical guide cone 74 which is biased downwardly by a spring 75 received against an annulus 76 that is fixed to the drum flange 26. The lowermost end wall of the guide cone includes an inwardly extending generally frusto-conical surface 78 which is adapted to engage the arcuate surfaces 44 of the jaw segments 42 during the seaming operation.

The seaming operation of the present invention will first be described with respect to FIGURES 5, 6 and 7 which illustrate the technique used to seal the cover C onto the open end of the cylindrical container body B. These views show only a peripheral cross section of the collet 38, the curling ring 69, and the head portion 68 of the closing punch 67, which are the particular elements of the seaming machine 10 which directly co-act with the container body B and the cover C to effect the seam.

The container body B and cover C are specified as being of a metallic material, with no specific metal being named. While the seaming method of the present invention is adaptable for use with many metallic materials (particularly the soft metals), this method has been found to be particularly effective and advantageous when performed upon aluminum containers such as those used in packaging beer or like products. In any case, the following description should provide sufficient information so that one skilled in the art will readily recognize other fields wherein the invention may be put to practical use and other specific metallic materials which may be seamed in accordance with the disclosed method.

As seen in FIGURE 5, the container body B is received within the collet 38 upon the shoulders 47 of the jaw segments 42 with the open end of said body facing upwardly. The container is retained upon the shoulder of the collet by means of an outwardly extending segment B1 of the container near the upper end of the container body, which segment terminates in an upwardly extending peripheral segment B2 extending substantially parallel to the major portion of the sides of the container body and abutting an inner face 80 of the collet jaw segments 42 (FIGS. 5–7) which joins the top surface 45 to the shoulder 47. The cover C is pushed manually or by automatic lid feeding mechanism into the upper end of the container body and includes an outwardly extending shoulder C1 for positioning the cover upon the container body segment B1 that is resting on the collet shoulder 47. The outer peripheral segment C2 of the cover extends upwardly and is disposed in abutment with the outer peripheral segment B2 of the container body. It can be seen, however, that the segment B2 of the container is approximately twice the height of the adjacent cover segment C2 and that uppermost edge of the segment C2 is approximately even wth the top face 45 of the collet in this initial position of the cover and container body.

Preferably, the cover C should be dimensioned so that it will have a sung fit within the end of the container body without causing any undue binding or distortion upon insertion. This will provide a temporary seal during handling of the container after it has been filled and prior to seaming to prevent spillage. Furthermore, it should be noted that the metal of the cover is noticeably thicker than the material of the container body. This has been found to provide additional resistance to compression for the cover in order to better achieve the proper conditions for seaming. Furthermore, the metal of the cover may, if desired, be alloyed with harder metals to give it increased strength and resistance to compression.

As seen in FIGURE 6, the first step in the seaming operation, after the positioning of the container body and cover, is the relative movement of the curling ring 69 to a position in abutment with top surface 45 of the collet 38. This movement causes the serrated surface 72 of the curling ring to engage the upwardly projecting segment

B2 of the container body and fold it inwardly over the cover segment C2. The serrations in the edge 72 provide a controlled curling of the segment B2 to create a uniform and evenly stressed deformation in the segment B2 in order to reduce the force necessary for this portion of the operation.

FIGURE 7 depicts the third and last step of the seaming operation. Once the curling ring 69 has been received upon the upper face 45 of the collet, the closing punch 67 is caused to move relatively to the curling ring and collet to engage the bent-over portion of the container body segment B2 and flatten or iron it out against the inner surface of the cover segment C2. The most important factor in this step is that the thickness t'', which is the thickness between the outer surface of the head 68 of the closing punch and the surface 80 of the collet, is less than the combined thicknesses of the cover (t) and twice the container body thickness ($2t'$). This latter combined thickness represents the uncompressed seam thickness while the former thickness represents the compressed or final seam thickness. It is obvious, therefore, that the compressive action of the closing punch must result in the drawing and radial deformation of the metal in the seam, and this is, in fact, what occurs during the final step of the operation. The metal in the inwardly folded portion of the container body segment B2 is stressed beyond its elastic limit and caused to flow and radially outwardly deform. The radial pressure puts the cover segment C2 under compression also but, since this segment is not directly adjacent the closing punch and since it is better able to resist compressive stress, it is not stressed past the elastic limit and is, therefore, not deformed. When the head 68 of the closing punch is removed from the seam, the deformed portion of the container body segment B2 remains in its new set position and permanently retains the cover segment C2 under compression. This residual compression in the seam results in a very good air-tight seal due to the intimate metal-to-metal contact between the peripheral edges of the container body and the cover. It will thus be recognized that a self-locking and self-sealing action is accomplished by the deformation of the outer peripheral edge of the container body with a single straight-line motion of the die elements, and that the seaming operation is simultaneously performed upon the entire circumference of the container. Furthermore, the deformation or drawing of the body segment B2 places the outer peripheral edge of the cover segment C2 in compression to achieve a metal-to-metal seal at this edge which is also retained due to the deformation of the body segment.

The cover C is formed with a central portion C3 which is turned downwards for a short distance from the annular shoulder segment C1 to follow the interior surface of the container body to a lowermost annular edge C4 from which it projects upwardly towards the end of the container. This cover configuration prevents internal pressures within the container from affecting the seam in a manner which might cause its deterioration and, accordingly, this construction results in a stronger seam.

Having disclosed the principles behind the seaming operation, the method of the present invention will now be described in relation to the aforesaid machine 10. As viewed in FIG. 1, the ram assembly 32 at the left-hand side of the machine is in the loading position. A container body B having a cover C pushed into its open upper end (in the manner of FIGURE 5) is placed upon the platform 48 by automatic transfer means (not shown) or by hand. The semi-cylindrical rim 51 serves to guide the container body into the proper position with respect to the ram assembly during this initial feeding operation. As the drum assembly 18 is rotated by sprocket and chain drive means 29 and 30, the cam follower head 36 rotates along the cam track 16 and thus progressively raises the entire ram assembly toward the associated die assembly 65. Since the guide tube 39 is movable relative to the vertically depending rod 50, carrying the container supporting platform 48 the platform does not move vertically during the initial upward movement of the rest of the ram assembly. Thus, the collet 38 is raised upwardly around the container. During this initial movement, the individual jaw segments 42 are in their slightly spaced, unrestrained position.

As the ram assembly 32 is rotated about the supporting column 12 towards the right-hand side (FIG. 1) thereof, the collet 38 continues to rise with respect to the rod 50 and platform 48 supporting the container until the bottom surface 53 of the platform abuts the spring washer 54 within the annulus 41 at the upper end of the body member 34. Further upward movement of the ram assembly now will urge the platform 48 upwardly also. Since the spring 58 restraining the lower end of rod 50 from upward movement has a substantially lower spring constant than the spring washer 54, the spring 58 is the first to be compressed as the rod is moved upwardly. FIGURE 2 depicts the relative positions of the container B, the upper end of the ram assembly, and the die assembly 65 during that stage of the operating cycle when the spring 58 has been compressed to the extent necessary to bring the collar 63 into contact with the top wall of the housing 56 adjacent the flange 23, and before the spring washer 54 has been compressed. It can be seen from this view that the jaw segments 42 of the collet have not yet engaged the die assembly, although the upper ends thereof are received within the frusto-conical wall surface 78 of the guide cone 74. In this position, before compression of the spring washer 54, the outwardly extended segment B1 of the container body is spaced just slightly above the shoulders 47 of the collet segments 42. It should further be noted that the initial unstressed position of the segments 42 was such that they cleared the platform 48 and the outer diameter of the container B2 to allow them to be positioned within the collet.

From the position of FIGURE 2, further upward movement of the ram assembly results in the compression of the spring washer 54 and of the compression spring 61. These springs are chosen so that the force required to collapse the spring washer 54 is substantially lower than the force required to initially compress the spring 61. Therefore, the spring washer 54 is first compressed to lower the container body B within the collet and bring the annular segment B1 of the can into engagement with the top edges 47 of the segments 42 of the collet. At about the same time, the outer arcuate faces 44 of the segments 42 engage the frusto-conical surface 78 of the guide cone 74, and the segments 42 are thereby urged inwardly into a tight ring closing the spaces between them. The inwardly extending face of the collet jaw 46 now engages the outer diameter of the container body B just below the outwardly extending segment B1 which as mentioned above is received upon the collet shoulder 47. Furthermore, once the container body has been received upon the shoulder 47, the relative movement between the platform 48 and the collet continues through compression of spring washer 54 until the bottom of the container is slightly spaced from the platform as shown in FIG. 3. The jaws 46 in their tightened position firmly engage the exterior surface of the container B but do not compress it. The ram and dye assemblies are now in the relative position with respect to the container body as is illustrated in FIGURE 5.

Further upward movement of the ram assembly causes compression of the spring 61 which is compressed between the slider 63 and the outer stop member 55 as the collet 38 is tightly engaged within the guide cone 74. This further upward movement of the ram assembly moves the guide cone 74 upwardly also against the urging of spring 75 and brings the uppermost segment B2 of the container body into engagement with the serrated surface 72 of the curling ring 69 (see FIGS. 5 and 6).

As the uppermost portion of the container body segment B2 is bent over or curled into the position shown

in FIGURE 6, the upper face **45** of the collet engages the annular leading edge of the curling ring **69** and further upward motion of the ram assembly carries with it the curling ring against the resistance of spring **70**. This last phase of the relative movement between the ram and die assemblies occurs as the compression spring **70** in the die assembly and the compression spring **61** in the ram assembly are compressed together as the ram assembly is moved into its uppermost position as seen at the right-hand side of FIGURE 1 or in FIGURE 3. In this position the curling ring **69** has been moved upward past the closing punch **67** so that the larger head **68** of the punch engages the curled leading edge of container body segment **B2**, folds it over against the segment **C2** of the cover, irons it out into a smooth cylindrical shape, and deforms it radially, all as set forth hereinbefore in the description of the seaming method. As seen in FIGURES 2 and 3, the central portion **82** of the head **68** of the closing punch is recessed so that the central, raised position C3 of the cover C will fit within the closing punch as it is lowered into the deforming position of FIG. 7.

As mentioned hereinbefore, one of the important features of the invention is that the width t'' (FIG. 7), which defines the clearance between the outer surface of the closing punch **68** and the inner surface **80** of the collet **38** adjacent the peripheral segment B2 of the container body, is slightly less than the combined thicknesses of the cover t and twice the container thickness t'. In practice, it has been found that t'' should be made at least 0.001 to 0.002 inch less than the sum of twice the thinnest gauge of container body metal plus the thinnest gauge of cover metal where the body metal and cover metal thicknesses are about 0.010 and 0.015 inch, respectively. If either one or both of the cover or container body gauges are substantially thicker than these thinnest values, the pressure exerted by the closing punch will be enough to cause the collet jaw segments **42** to expand radially outwardly and thereby push the guide cone **74** slightly upward against its biasing spring **75**. This action assures predetermined regular radial compression of the seam, which compression is, therefore, partially determined by the angle of the frusto-conical surface **78** which engages the arcuate surface **44** of the jaw segments, and partially by the compressive force exerted by the spring **75** in its uppermost position. It can be seen, therefore, that the surface **78** should be of a large enough angle to prevent any locking action from occurring. Furthermore, the arcuate surface **44** has a shape to facilitate entry of the collet into the guide cone and also to prevent binding when the jaw segments are expanded.

From its uppermost position shown in FIGURE 3, the ram assembly **32** is gradually lowered back down to its initial vertical position as the cam roller head **36** rotates around the cam track **16**, such downward path being shown in broken lines in FIGURE 1. As the ram assembly is lowered, the pressure upon the curling ring **69** is released so that the curling ring moves downwardly relative to the closing punch **67** and aids in stripping the seamed end of the container from the closing punch. The springs **75** and **70** in the die assembly make the guide cone **74** and the curling ring **69**, respectively, follow the movement of the collet **38** until all parts of the die assembly are returned to their original positions. This downward movement also permits the collet **38** to open to spread the individual jaw segments **42** at the same time releasing the spring washer **54**. Release of the spring washer slightly retards the downward motion of the container by again causing the container body to be supported upon the platform **48**. The platform and the container will reach the end of their vertical movement as soon as the platform has reached its initial position whereby the spring **58** is back into its fully extended position. However, the ram assembly **32** will continue moving downward until it reaches its lowermost position to expose the seamed container. At this time, the seamed container may be removed from the platform **48** by a suitable transferring device (not shown) and another unseamed container body and cover may be positioned thereon. Thus, a new cycle of operation is ready to begin.

FIGURE 4 shows diagrammatically the operating cycle for the seaming machine. From 0° to 80°, the ram assembly **32** is in a dwell or level position with respect to the vertical as depicted by the ram assembly at the left-hand side of FIGURE 1. At or near the 0° position, the seamed container is removed, and, before the assembly has rotated to the 80° position, a new unseamed container body and cover are placed upon the platform. The ram assembly is then gradually elevated between the 80° and 240° positions to perform the seaming operation, the 240° position or the position of maximum elevation being shown in FIGURE 3. From the 240° position back to the 360° or 0° position, the ram assembly is lowered to release the container from the die and to elevate it with respect to the collet so that it can be readily removed. While no removal or container positioning mechanisms have been illustrated or described, such mechanisms are well known in the art and there are many suitable devices of this type which may be utilized with the machine of the present invention.

FIGURE 8 shows one of the additional advantages inherent in the seaming method of the present invention. Since the upper seamed edge of the container is outwardly offset from the normal container diameter, the containers may be easily stacked top to bottom. As shown in FIGURE 8, the container bottom may be provided with an outer rounded ridge **B4** which rests against the inner edge of the annular shoulder segment C1 of the cover and against the raised portion C3 towards the center of the cover.

FIGURE 9 shows that the individual covers may be easily stacked or nested together. This is of particular importance since the seaming apparatus with its straight-line motion is particularly adapted for sealing under aseptic conditions wherein the covers must first be sterilized and then maintained in a position wherein they may easily be transferred. As noted in FIGURE 9, the lowermost edge C4 of a first cover is received upon the inner annular edge of the shoulder C1 of a second cover located directly below said first cover in a nested arrangement. The upwardly projecting peripheral segments C2 of the covers are directly aligned to support each other so that each cover is supported upon a lower cover along two annular edges with the remainder of the surface area of the adjacent covers being spaced apart. This arrangement provides good stability, and yet it permits the easy removal of the top cover. The engaging annular edges of shoulder C1 and C4 of adjacent covers automatically centers the nested stack.

It can be seen, therefore, that the present invention provides a method for effecting a metal-to-metal seam between a container and its end cover without the necessity of including any additional sealing elements or gaskets. The action in forming the seam is simple and direct with the seam being formed simultaneously upon the entire periphery of the container. The container resulting from this seaming operation includes a deformed container peripheral end edge which is tightly pressed into intimate contact with the peripheral edge of the cover to place the cover edge under compression and form an air-tight seal therewith.

While one embodiment of the present invention has been shown and described, it will be understood that various changes and modifications may be made therein without departing from the spirit of the invention or the scope of the appended claims. For example, the shape of the container, the die assembly, and the ram assembly may be modified for differently shaped containers.

The invention having thus been described, what is believed to be new and desired to be protected by Letters Patent is:

1. Apparatus for seaming a metallic closing cover to the open end of a metallic container body which body includes a radially outwardly extending narrow peripheral portion terminating in a second narrow peripheral portion extending in the direction of the axis of said container body to the peripheral edge of the container body at said open end thereof and which closing cover is placed within said container body upon said outwardly extending peripheral portion and includes a narrow peripheral edge portion contiguous with said second peripheral portion of said body, said apparatus comprising a generally tubular-shaped container supporting member, said supporting member having an inwardly extending shoulder adapted to receive said outwardly extending portion of the container body and an upwardly extending pressure resisting face adapted to engage the outer face of said second peripheral portion of the container body, a first die member relatively movable with respect to said supporting member to engage said peripheral edge of said container body at its open end to bend said second peripheral portion inwardly over said peripheral edge portion of the cover, and a second die member relatively movable with respect to said supporting member and said first die member, said second die member including an outer peripheral face for engaging the bent-over portion of said second peripheral portion of the container body to deform it into sealing engagement with the inner face of said peripheral edge portion of the cover, the radial distance between the outer peripheral face of said second die member and said pressure resisting face of the supporting member being less than the combined thicknesses of the cover and twice the container body thickness.

2. Apparatus for seaming a metallic closing cover to the open end of a metallic container body which body includes a radially outwardly extending narrow peripheral portion terminating in a second narrow peripheral portion extending in the direction of the axis of said container body to the peripheral edge of the container body at said open end thereof and which closing cover is placed within said container body upon said outwardly extending peripheral portion and includes a narrow peripheral edge portion contiguous with said second peripheral portion of said body, said apparatus comprising a generally tubular-shaped container supporting member, said supporting member being formed by a plurality of flexible, normally slightly spaced segments with each of said segments being circumferentially aligned to form a ring, each of said segments including an inwardly extending shoulder adapted to receive said outwardly extending portion of the container body and an upwardly extending pressure resisting face adapted to engage the outer face of said second peripheral portion of the container body, a camming member relatively movable with respect to said supporting member to engage said segments and force them into tight interengagement for receiving the outwardly extending peripheral portion of the container body upon said shoulders, a first die member relatively movable with respect to said supporting member and said camming member to engage said peripheral edge of the container body at its open end to bend said second peripheral portion thereof inwardly over said peripheral edge portion of the cover, and a second die member relatively movable with respect to said supporting member and said first die member, said second die member including an outer peripheral face for engaging the bent over portion of said second peripheral portion of the container body to deform it into sealing engagement with the inner face of said peripheral edge portion of the cover.

3. The apparatus of claim 2 wherein said camming member includes a biasing spring member allowing it to move relatively to said supporting member to permit the segments of said supporting member to separate slightly under a predetermined pressure from said second die member through said second peripheral portion of the container body and said peripheral edge portion of said cover.

4. The apparatus of claim 2 wherein each of the supporting member segments includes an outer longitudinally arcuate face and said camming member includes a radially inwardly extending frusto-conical face engageable with the arcuate faces of said segments for moving the segments into their interengaging position, said camming member further including a spring member biasing it into engagement with said segments which spring member is adapted to yield when said segments are placed under a predetermined pressure from said second die member acting through said second peripheral portion of the container body and said peripheral edge portion of said cover to permit the arcuate faces of the segments to slide upon the frusto-conical face of the camming member and thus slightly space said segments.

5. Apparatus for seaming a metallic closing cover to the open end of a metallic container body which body includes a radially outwardly extending narrow peripheral portion terminating in a second narrow peripheral portion extending in the direction of the axis of said container body to the peripheral edge of the container body at said open end thereof and which closing cover is placed within said container body upon said outwardly extending peripheral portion and includes a narrow peripheral edge portion contiguous with said second peripheral portion of said body, said apparatus comprising a generally tubular-shaped container supporting member adapted to receive said container body therein, said supporting member having an inwardly extending shoulder adapted to receive said outwardly extending portion of the container body and an upwardly extending pressure resisting face adapted to engage the outer face of said second peripheral portion of the container body, a platform relatively movable within said container supporting member for bringing an unseamed container body into engagement with the shoulder of the supporting member and for removing the seamed container from the supporting member, a first die member relatively axially movable with respect to said supporting member to engage the peripheral edge of said container body at its open end to bend said second peripheral portion inwardly over said peripheral edge portion of the cover, and a second die member relatively movable with respect to said supporting member and said first die member, said second die member including an outer peripheral face for engaging the bent over portion of said second peripheral portion of the container body to deform it into sealing engagement with the inner face of said peripheral edge portion of the cover.

6. Apparatus for the seaming of metallic containers comprising a container supporting collet, said collet being formed by a plurality of flexible, normally slightly spaced segments with each of the segments being aligned to define a central space, each of said segments including an inwardly extending shoulder for supporting a metallic container body within said space and a pressure resisting face extending upwardly from said shoulder, a camming member for camming said shoulders into tight interengagement as said container body is positioned upon them, and a die member relatively movable within the upper peripheral portion of the collet and exerting radial outward seaming pressure to seam a closing cover to the container body supported by said collet, said pressure resisting faces of the segments and said die member applying compressive stress to the seam formed by the cover and the container body up to a predetermined amount.

7. Apparatus for the seaming of metallic containers comprising a container supporting collet, said collet being formed by a plurality of flexible, normally slightly spaced segments with each of the segments being aligned to enclose a space within said segments, each of said seg-

ments including an inwardly extending shoulder for supporting a metallic container body within said space and a pressure resisting face extending upwardly from said shoulder, a camming member for camming said segments into tight interengagement when a container body is to be supported upon said shoulders of the segments, and a die member relatively movable within the upper edge peripheral portion of the collet and exerting radial outward seaming pressure to seam a closing cover to the container body supported by said collet, said camming member being spring biased into engagement with said collet whereby it is adapted to yield vertically to permit said segments of the collet to become slightly spaced under a predetermined amount of said radial outward seaming pressure upon their said pressure resisting faces.

8. Apparatus for the seaming of metallic containers comprising a container supporting collet, said collet being formed at its upper end by a plurality of flexible, normally slightly spaced segments with each of the segments being arranged in a pattern to enclose a space within said segments, each of said segments including an inwardly extending shoulder for supporting a metallic container body within said space and a pressure resisting face extending upwardly from said shoulder, a platform relatively movable with respect to said collet within said space for bringing a container body into seaming position upon said shoulders, a camming member for camming said shoulders into tight interengagement as said container body is positioned upon them, and a die member relatively movable within the upper edge peripheral portion of the collet and exerting radial outward seaming pressure to seam a closing cover to the container body supported by said collet, said pressure resisting faces of the segments and said die member applying compressive stress to the seam formed by the cover and the container body up to a predetermined amount, said platform being relatively movable with respect to said collet upon the conclusion of the seaming operation to remove the seamed container from the space within the collet.

9. Apparatus for the seaming of metallic containers comprising a container supporting collet mounted for vertical movement and having a space therein for receiving a container body and an inwardly extending shoulder at its upper end for supporting said container body, a rod having a platform at its upper end and extending along the axis of said collet, said rod being fixed in position with respect to said collet so that said platform is relatively movable within said space to lower said container body into engagement with said shoulder a first die member fixed with respect to said collet for engaging the upper peripheral edge of said container body and bending it inwardly over the outer peripheral edge of a cover received within said container body, and a second die member for seaming said peripheral edges of the cover and container body, said first die member being relatively movable with respect to said second die member upon the completion of its inward bending operation to allow the second die member to move within the peripheral edge of the container body to effect the seaming operation, said rod and platform being operable upon the conclusion of the seaming operation to remove the seamed container from within the collet.

10. The apparatus of claim 9 wherein said rod is provided with a biasing spring fixing said rod with respect to said second die member so that said collet is upwardly movable during the seaming operation under the restraint of said biasing spring acting through said platform which is then engaged with said collet.

11. An apparatus for securing a cover on the upper open end of a container having an annular ledge at its upper end portion to receive the peripheral edge of the cover and a peripheral wall extending upwardly to a point higher than the uppermost surface of the cover, said apparatus comprising support means engageable with the underside of said ledge to support the container in free hanging position, and die means mounted above said support means, means mounting said support means and said die means for relative vertical movement to bring said die means into engagement with the peripheral wall of the container, continued relative movement being effective to clamp said wall of the freely supported container over the peripheral edge of the cover.

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