CLOSURE FEEDING METHOD

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ABSTRACT

Closure feeding method for automatically feeding and positioning closure flanges and tag ring elements within the die of a metal working press for securement about a container wall opening. A horizontally reciprocating holder simultaneously picks up a closure flange and a tag ring element in retracted position and conveys the closure parts into the die opening placing the tag ring element in the upper die and the flange in the lower die. The holder then automatically retracts to repeat the cycle.

4 Claims, 6 Drawing Figures
CLOSURE FEEDING METHOD


BACKGROUND OF THE INVENTION

In the industrial container field, particularly in the fabrication of steel drums, it has long been the practice to mechanically secure a closure flange, for reception of a threaded plug, within an opening formed in a container wall. One method of inserting flanges in container walls has been carried out by a metal working die which forms an opening in the container wall and mechanically inserts the flange in a single operation. In many instances, however, it is desirable to also include an annular tag ring in the insertion which surrounds the upstanding container wall opening neck and is permanently held in place by the outwardly curled bead at the uppermost end of the flange neck. One function of such tag ring is to provide an effective means for securing a tag for identifying the container contents. In many instances tag rings also serve as means for affixing a wire and lead seal which is threaded through the closure plug for tamperproofing purposes. In addition, with the increasing trend toward the use of lighter gauge metal in the fabrication of industrial shipping containers, it is advantageous to employ such tag rings for reinforcing the container wall opening neck to meet necessary strength requirements.

Heretofore, it was thought only possible to include such tag ring by hand feeding in flange insertions carried out in a two-step operation wherein the container wall is perforated and the surrounding container wall opening neck drawn upwardly therearound in a first punch press operation. In the second operation, the flange neck is inserted within the container wall opening from beneath whereby the tag ring could be placed over the container wall opening exteriorly surrounding the opening neck. The upper end of the flange neck is then curled outwardly so as to permanently secure the flange and the tag ring to the underlying container wall opening neck. The above described two operation flange insertion arrangement, however, is relatively costly and unsuited for high speed container fabricating processes.

The invention is particularly adaptable to the application of tag ring elements in a single operation flange insertion arrangement. This is accomplished by feeding flanges and tag ring elements into a die for insertion within a container wall in a single stroke of the press. More specifically, a flange is fed into the lower half of the die together with the feeding of a tag ring element into the upper half of the die. A container wall is then positioned in the die between the flange and tag ring element. The press is cycled, causing a perforating punch in the upper die to move downwardly through the tag ring element and perforate the container wall. Continued downward movement of the upper die causes a neck to be drawn upwardly about the container wall opening with the tag ring element positioned in overlying concentric relationship about the opening neck. Final closing of the die terms the container wall down over the flange and curls the upper end of the flange neck outwardly about the container wall opening neck and tag ring element, permanently securing the flange and the tag ring element to the container wall.

It is accordingly a primary object of the invention to provide a new method for securing closure flanges and tag ring elements to container walls in a single operation.

A further object is to provide a new method and apparatus for feeding closure flanges and tag ring elements in a die for securing said flanges and tag ring elements to a container wall.

Other and more detailed objects of the invention will in part be obvious and be in part pointed out as the description of the invention taken in conjunction with the accompanying drawing proceeds.

In that drawing:

FIG. 1 is an exploded perspective view of a closure flange and a tag ring element flat blank in accordance with one form of the invention as they would appear aligned ready for application about a container opening;

FIG. 2 is an elevational view of the feed mechanism for feeding the tag ring element and closure flange of FIG. 1 into operative position in an insertion die as illustrated;

FIG. 3 is a view taken on line 3--3 of FIG. 2 and looking in the direction of the arrows;

FIG. 4 is an enlarged vertical sectional view of the feed mechanism and die of FIG. 2 with such feed mechanism in advanced position within the die and carrying a closure flange and tag ring element;

FIG. 5 is a horizontal section taken on line 5--5 of FIG. 4 and looking in the direction of the arrows;

FIG. 6 is a view similar to FIG. 4 but with the feed mechanism in full feeding ejecting position.

Considering first the closure flange and invention tag ring element, such being the articles which the method of the invention are concerned. FIG. 1 shows a conventional closure flange 1 comprising a cylindrical neck 2 having an upper unthreaded portion 3 and an internally threaded lower portion 4 surrounded by an octagonal base 5. An annular gasket 6 surrounds the cylindrical neck at the juncture of the threaded lower portion 4 and the flange base 5. The tag ring element 7 of one form of the invention is formed as a flat blank having a circular inner free edge 8 bordering a central opening and terminating in outermost octagonal free edge 9. A series of eyelets 10 are formed in the tag ring element 7 adjacent the free edge 9 at the corners of the octagon.

In FIGS. 2 through 6 the feed mechanism, generally indicated at 11, is shown for feeding a closure flange and tag ring element together into an insertion die. A horizontally disposed pneumatic drive cylinder 12 is secured to a metal working punch press (not shown) within which the insertion die is mounted. The cylinder piston rod 13 is directed toward the insertion die and has a nut 14 threadedly engaging its distal end. An L-shaped frame 15 has an upstanding wall 16 provided with an opening 17 through which the piston rod 13 slidingly extends. A collar 18 is fixed to the piston rod 13 for engagement by a coil compression spring 19 which surrounds the piston rod 13 and normally urges the upstanding wall 16 against the nut 14. A pair of rods 20 are connected to the cylinder 12 extending parallel to the piston rod 13 and provided with stop nuts 21 at their outer ends. The upstanding wall 16 of the
frame 15 is provided with a pair of apertures 22 through which the rods 20 extend. The L-shaped frame 15 has a horizontal leg 23 terminating in a cylindrical collar 24 adapted internally for the reception of a closure flange 1. Such receiving opening 24a has a lowest annular double stepped formation 25 within which the flange base 5 and gasket 6 are nested. A radially inwardly directed spring ball 26 is mounted within the wall of the collar 25 to extend within the opening 24a for frictional engagement with the flange neck 2. A lower plunger 27, formed as an incomplete annulus is slidably positioned within the opening 24a and is provided with a diametrically extending internal pin 28. An elongated lower pivot arm 29 pivotally connected at 30 to a leg 23 extends inwardly through cutout portions in collar 24 and plunger 27, terminating in a forked inner end 31 which slidingly receives the pin 28. An upwardly opening slot 32 is formed in the inner end of the lower pivot arm 29 directly above the pivot connection 30. A vertically extending bracket 33 is connected to the nut 14 at the end of piston rod 13, and carries lower and upper transversely extending pivot pins 34 and 35 respectively. The lower of these pins 34 is slidable and pivotally received within the slot 32 in the arm 29.

An upwards extending cylindrical sleeve 36 is secured to the upper portion of the collar 24 and is formed with a radially outwardly extending projection 37. An upper elongated pivot arm 39 overlies the arm 29 and has its inner end pivotally connected at 38 to the collar projection 37. The upper pivot arm 39 has generally the same configuration as the lower pivot arm 29 and is provided at its inner end with a slot 40 positioned below the pivot connection 38 for slidable and pivotal engagement with the pivot pin 35 carried by the bracket 33. The pivot arm 29 extends through an opening in the sleeve 36 and terminates in a forked inner end 41. An upper tubular plunger 42 slidably received within the sleeve 36 is also formed with an opening through which the arm 39 extends. A diametrically extending internal pin 43 secured within the upper plunger 42 is seated for slidable and pivotal movement within the forked end 41 of the arm 39. A vertical keyway 48 is formed in the exterior surface of the plunger 42 and a pin 44 seated in the outer sleeve 36 projects into the groove 48 to prevent relative rotational movement between the sleeve 36 and plunger 42. The upper portion of the upper plunger 42 is surrounded by a spring biased vertically slidable compression ring 45 supported in raised position by a plurality of coil springs 46 acting against a ledge 49. The upper surface of the compression ring 45 is recessed at 47 so that when the ring 45 is in its uppermost position a flat continuous surface is presented by the surface of the recess 47 and the upper end of the plunger 42. The recess 47 has an octagonal border so that a flat tag ring element 7 can be securely nested therein to extend across the top of the plunger 42. In this position the element 7 is ready to be transferred to the receiving portion of the insertion die to be described.

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The insertion die into which the closure flange and tag ring element are fed comprises lower and upper die sub-assemblies. The lower die sub-assembly 50, as clearly illustrated in FIG. 4, has a lower die shoe 51 for mounting on a punch press bolster plate (not shown) and is provided with a central aperture 52. A tubular flanging punch 53 is centrally supported on the die shoe 51 with its lower end extending into the aperture 52. A series of coil compression springs 54 interacting between the die shoe 51 and a circumferentially enlarged lower portion 55 of the flanging punch 53 resiliently urge the flanging punch upwardly. An annular support 56 surrounds the flanging punch 53 and has a radially inwardly projecting ledge 57 which limits the upward movement of the flanging punch 53. An annular lower anvil 58 surrounds an intermediate portion of the flanging punch 53 above the enlarged lower portion 55 thereof and is secured to the supporting ring ledge 57. An annular compression ring 59 having an octagonal interior surface 64 surrounds the anvil 58 extending vertically thereabove thus forming a circumferential recess 60 about the flanging punch 53 spaced below its upper end. A series of vertical pins 61 seated on coil compression springs 62 resiliently urge the compression ring 59 upwardly with respect to the die shoe 51. An inwardly projecting lip 63 at the upper end of the support 56 limits upward movement of the compression ring 59.

The upper die sub-assembly 70 has an upper die shoe 71 mounted on the ram of a punch press (not shown). A perforating punch 72 is centrally mounted on the upper die shoe 71 in vertical concentric alignment with the flanging punch 53. An annular curling anvil 73 surrounding the perforating punch 72 is provided with an annular concave curling anvil surface 72 vertically spaced above the lower end of the perforating punch 72. An embossing ring 75 surrounds the curling anvil 73 and is resiliently urged downwardly by a series of coil compression springs 76 surrounding mounting bolts 76a and acting between the embossing ring 75 and the die shoe 71. The embossing ring 73 terminates in a lowermost downwardly facing embossing surface 77 normally disposed in a horizontal plane intermediate the curling anvil surface 74 and the lower end of the perforating punch 72. The surface 77 terminates radially inwardly in a short vertical wall 78 having an octagonal configuration. From the wall 78 the embossing surface extends by way of a radiused juncture portion 80 into an upper embossing surface 79 extending radially inwardly.

The operation of the feed mechanism and insertion die described above in the inserting of the flange and applying the tag ring element of the invention as follows: Through the use of article handling mechanisms (not shown) as closure flange 1 is inserted within the collar 24 in properly oriented nested position and a tag ring element 7 is similarly placed in properly oriented nested position within the compression ring 45. The pneumatic cylinder 12 is then activated causing the piston rod 13 to move the frame 15 inwardly along the rods 20. As seen in FIG. 4, the stop nuts 21 are set to terminate forward movement of the frame 15 when the flange and tag ring are properly aligned in the insertion die between the flanging punch 53 and the perforating punch 72. Continued advancement of the piston rod 13 compresses the spring 19 and moves the bracket 33 forward relative to the wall 16. As seen in FIG. 6, the above described limited movement pivots the forked ends of the arms 29 and 39 away from each other. As the plunger 27 is moved downwardly by the action of the arm end 31 on the pin 28, it pushes the flange 1 free from the grip of the ball spring 26 and ejects it from the collar 24. The flange is thus seated about the flanging punch 53 within the octagonal wall 64 onto the lower
anvil 58. At the same time the upper plunger 42 is moved upwardly by the action of the arm end 41 on the pin 43 causing the compression ring 45 to contact the working surface 77 on the embossing ring 71. The plunger 42 continues to move upwardly a slight amount against the compression of springs 46 so that the upper end of the plunger 42 releases the tag ring from the compression ring cutout 47 and seats the tag ring element 7 up within the embossing ring surface 79 in oriented nested relationship within the octagonal wall 78. Various friction fit and spring pin arrangements may be employed for holding the tag ring element within the embossing ring.

Once the closure flange and tag ring element are positioned in the die, the travel of the piston rod 13 is reversed causing retraction of the feed mechanism to its original position away from between the die subassemblies. To complete the operation the head of a 55 gallon steel drum is then positioned in the die by suitable guides (not shown) readying the press for cycling to effect the insertion stroke.

We claim:

1. The method of simultaneously feeding a closure flange and a tag ring element into an insertion die for securing the same to a container wall, comprising the steps of supporting a closure flange and a tag ring element in vertically spaced juxtaposition, advancing said closure flange and said tag ring element horizontally into said insertion die, displacing said closure flange and tag ring element vertically away from each other, releasing said closure flange and said tag ring element in said insertion die and supporting said closure flange and said tag ring element in said insertion die for permanent securing about a container wall opening.

2. The method as in claim 1 and effecting said displacing by moving said tag ring element upwardly and moving said closure flange downwardly.

3. The method as in claim 1 and ejecting said closure flange and said tag ring element into said insertion die after said releasing.

4. The method of feeding a pair of annular container elements to be secured together into a work station for effecting the securing of said elements comprising the steps of mounting said elements in spaced vertically aligned oppositely faced locations horizontally moving said elements so mounted into said work station, separating said elements vertically and ejecting said elements from said mounting into opposite locations of said work station for securement thereof.

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