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(54) CONTAINER TRIMMING APPARATUS

(71) We, REDICON CORPORATION, a corporation organized under the laws of the State of Delaware, United States of America, of 4150 Belden Village Street, Canton, Ohio 44718, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus for trimming a flange from the top edge of a container.

In the art of container making where the container is formed from a sheet of metal, the metal is stamped and drawn from its flat condition into a cup or can shaped configuration. This operation leaves an irregularly shaped flange at the top of the formed container and, in order to apply the lid, it is necessary to trim this flange to uniform dimensions.

There are a number of prior art apparatus for shearing or trimming these flanges for this purpose.

An example of such a machine can be seen in U.S. Patent No. 3,878,743, wherein the container is placed on a horizontally disposed spindle which is then rotated between stationary and annular cutter elements to effectuate the trimming.

There are also prior art devices in this field wherein the container itself is forced downward by a trimming punch to effectuate shearing of the unwanted flange material.

The principal difficulties encountered with regard to the prior art relate to the fact that due to the motion utilized to effectuate the trimming of the flange, particularly with heavier material such as steel, there is a good likelihood that a burr or jagged edge will develop. With the prior art devices, these burrs usually project upwardly away from the bottom of the can.

This presents a problem which is significant, because these flanges are subsequently

rolled over and then receive a lid which carries an annular sealing member secured to the rolled flange to close off the top of the container. With the burrs or jagged edges projecting upwardly, destruction of or damage to the sealing member occurs quite commonly, and an unsatisfactory seal is obtained. Therefore, while the prior art devices will in fact trim the flanges, they do not necessarily effectuate the trimming so that the end product is provided in its most desirable configuration.

According to the present invention we provide an apparatus for trimming a flange which extends outwardly from the top edge of a container including a press having a base and a relatively movable member and an annular trim punch, a trim die and an annular trim punch stripper; said trim punch being secured to said base for receipt of said container within it with the flange resting on the upper face of said punch and said stripper, said trim punch stripper being telescoped about said trim punch; a pressure pad being carried by said movable member of said press for movement therewith into and out of holddown contact with said flange of said container; and said trim die is carried by said movable member of said press for movement therewith to cooperate with said punch to trim said flange.

We describe below a trimming apparatus in which the movable upper die holder is equipped with a trim die movable therewith and a pressure pad which is independently movable in a downward direction and movable with the trim die and the movable die holder in an upward direction.

It has been discovered that an apparatus construed in this fashion is capable of permitting the pressure pad to descend to engage a portion of the flange and hold it against the trim punch, following which the trim die will descend shearing the flange in a direction toward the bottom of the container. In this fashion, any irregularities

which might occur in the remainder of the flange will project downwardly, thereby presenting no particular problem when the flange is ultimately rolled and engages the top closure member.

In the embodiment described below means are provided reciprocally within the trim punch and matrix to eject the container following retraction of the trim die and pressure pad, and a trim punch stripper can be provided to eject the trim ring after the trim die has been retracted.

In the drawings:

FIGURE 1 is an elevational view in section, showing a trimming apparatus in the closed position.

FIGURES 2, 3 and 4 are partially schematic elevational views, showing the various positions of the apparatus during the trimming operation.

FIGURE 5 is a partial sectional view of a typical container following trimming.

Referring first then to FIGURE 1, it will be noted that the overall apparatus, generally indicated by the numeral 10, includes a press having an upper movable die holder 11 and a bottom fixed base member 12. These members have been shown schematically only, since they are believed to be well known in the art of drawing containers.

The actual trimming apparatus includes, in general terms, a matrix block 20, ejection means 30, a trim punch 40, a trim punch stripper 42, a trim die 50, and pressure pad 60.

Referring then still to FIGURE 1, the base 12 is not shown in any detail since, as noted above, a base member for a drawing operation for forming containers is well known. The base member 12 does, however, have a through bore 12a therein with annular bushings 12b, 12b secured to its inner surface. Ejection means 30 are received in bore 12a and consist of a piston rod 31 and a piston head 32 having a wear ring 33 thereon, as is shown in FIGURE 1. The use and operation of this portion of the apparatus will be described in greater detail below.

Still referring then to FIGURE 1, it will be noted that a matrix block 20 is secured to the top of the base 12 by means of a plurality of screws 21, 21. A pressure cap 22 is also provided within an annular groove 21a in the bottom of the matrix member, as is an annular trim punch stripper piston 45.

Secured to the top of matrix 20 is a hollow trim punch 40. This punch is secured to the top of the matrix by the screws 41, 41, and a trim punch stripper 42 is provided around the trim punch 40.

Also associated with the trim punch stripper 42 are a plurality of pressure pins 44, each of which seats on the top of the trim punch stripper piston 45 and supports trim punch stripper 42 having bushings 44a,

44a associated therewith. In the drawings, only one pressure pin 44 is illustrated, but it is understood that a plurality would be employed. Similarly, only one screw 41 is shown securing the punch 40 to the matrix 20, but it should also be noted that a plurality of these screws also will be employed normally.

Air pressure is provided against the bottom of piston 45 through pressure cup 22 to normally force the piston 45, and thus the trim die stripper 42, away from the base 12. This stripper is held in place by the cylindrical retainer 43 which is bolted to the matrix 20 by screws 43a.

Attached to the upper die holder 11 is a trim die riser 52, and this riser 52 has the actual trim die 50 secured to its bottom edge by screws 51, 51. In this fashion, the riser 52 and the trim die 50 will move up and down in response to movement of the upper die holder 11.

Telescopically received within the riser 52 and the trim die 50 is a pressure pad 60 which has wear plugs 61, 61 on its periphery and an annular seal 62 adjacent its upper end. This pressure pad 60 actually operates independently of the upper die holder and the trim die when the machine is moving in a downward direction, but moves upwardly with the movement of the upper die holder when it is being retracted. The relative movement of these components will be described more fully below.

Referring then to FIGURES 1 through 4, for a description of the operation of the device, it will be noted that FIGURE 2 represents the initial action and the initial position wherein the container C is in place in the trim punch 40 with the flange or lip F resting on the top surface of the trim punch 40 and trim punch stripper 42. At this time, the upper die holder 11 and the trim die 50 and trim die riser 52 are in the open or retracted position. Also, the stripper 42 has been moved up to the die line, or slightly above it, by air pressure acting on the bottom of the trim punch stripper piston 45 which, in turn, forces pressure pins 44, and thus trim punch stripper 42, up.

Actuation of the press (not shown) will cause the upper die holder 11 to move in a downward direction. Simultaneously, pneumatic pressure which is introduced through the conduit 11a in the upper die holder 11 in the direction of the arrow 70 will begin to actuate pressure pad 60. This will force the pressure pad 60 down so that it comes into contact with the top surface of the flange or lip F trapping it against the top of trim punch 40, as clearly shown in FIGURE 3 of the drawings. Continued downward movement of the upper die holder 11 will bring the trim die 50 into contact with the flange F of the container C, as shown

(15)

in FIGURE 1, trapping it against the top of trim punch stripper 42. Further action of the trim die 50 against the trim punch 40 will then shear off the excess flange material S.

At this time, the stripper 42 will also be forced downward overcoming the air pressure on the trim punch stripper piston 45 to permit the excess flange material S to be severed from the flange F, as shown in FIGURE 1 of the drawings.

Following this, the upper die holder 11 is withdrawn, and as it moves upward carrying the trim die 50 and die riser 52 with it, the lip 53 formed by the top surface of the trim die 50 will engage the under surface of the lip 63 of the pressure pad, thereby pulling the pressure pad 60 upward along with the rest of the upper apparatus and returning the parts to the position of FIGURE 2.

At this time, or simultaneously with the upward movement of the upper die holder 11, the knockout piston 30 is actuated and moves in the direction of the arrow 80 to eject the container from the matrix 20 and punch 40, as shown in FIGURE 4 of the drawings. Also, as soon as the trim die is moved out of engagement with the severed trim ring, the air pressure on piston 45 will force it, and thereby the trim punch stripper 42, up to dislodge the trim ring.

Conventional gripping fingers (not shown) will then remove the container C from this station.

FIGURE 5 is an enlarged partial sectional view of the container C after the trimming operation, wherein it will be seen that the flange F has a burr B, but this burr is projecting in a downward direction toward the bottom of the container.

As noted earlier, as a practical matter, the flange F is normally rolled under, following which the top closure with its sealing member is applied. The fact that the burr or irregularity on the flange is on the downward side thereof means that once the flange is rolled, it is of no consequence and does not in any way interfere with the sealing properties of the closure member, as is the case with the prior art.

WHAT WE CLAIM IS:—

1. Apparatus for trimming a flange which extends outwardly from the top edge of a container including a press having a base and a relatively movable member and an annular trim punch, a trim die and an annular trim punch stripper, said trim punch being secured to said base for receipt of said container within it with the flange rest-

ing on the upper face of said punch and, said stripper, said trim punch stripper being telescoped about said trim punch; a pressure pad being carried by said movable member of said press for movement therewith into and out of holddown contact with said flange of said container; and said trim die is carried by said movable member of said press for movement therewith to cooperate with said punch trim said flange.

2. The apparatus of Claim 1 wherein pressure means are carried by said base for normally urging said trim punch stripper away from said base; said trim die overcoming said pressure means and forcing said trim punch stripper toward said base upon movement of said movable member toward said base.

3. The apparatus of Claim 2 wherein said pressure means includes a trim punch stripper piston disposed beneath said trim punch stripper and a plurality of pressure pins each having one end resting on said piston and the opposed end engaging said trim punch stripper.

4. The apparatus of any one of Claims 1 to 3, wherein said pressure pad is telescopically received within said trim die and means are provided for moving said pressure pad toward said base.

5. The apparatus of Claim 4 wherein said pressure pad is elongate and has an outwardly directed flange on one end; said trim die is elongate and has a top end engageable with said flange of said pressure pad.

6. The apparatus of any one of Claims 1 to 5, wherein said trim punch has its outer surface tapered inwardly adjacent its top edge; and said trim punch stripper has its inner surface tapered inwardly adjacent its top edge.

7. The apparatus of any one of Claims 1 to 6, wherein a retainer is carried by said base in encircling relationship with said trim punch and said trim punch stripper and in partial overlying relationship with said trim punch stripper.

8. Apparatus for trimming flanges substantially as herein described with reference to the accompanying drawings.

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in FIGURE 1, trapping it against the top of trim punch stripper 42. Further action of the trim die 50 against the trim punch 40 will then shear off the excess flange material S.

At this time, the stripper 42 will also be forced downward overcoming the air pressure on the trim punch stripper piston 45 to permit the excess flange material S to be severed from the flange F, as shown in FIGURE 1 of the drawings.

Following this, the upper die holder 11 is withdrawn, and as it moves upward carrying the trim die 50 and die riser 52 with it, the lip 53 formed by the top surface of the trim die 50 will engage the under surface of the lip 63 of the pressure pad, thereby pulling the pressure pad 60 upward along with the rest of the upper apparatus and returning the parts to the position of FIGURE 2.

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As noted earlier, as a practical matter, the flange F is normally rolled under, following which the top closure with its sealing member is applied. The fact that the burr or irregularity on the flange is on the downward side thereof means that once the flange is rolled, it is of no consequence and does not in any way interfere with the sealing properties of the closure member, as is the case with the prior art.

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1. Apparatus for trimming a flange which extends outwardly from the top edge of a container including a press having a base and a relatively movable member and an annular trim punch, a trim die and an annular trim punch stripper, said trim punch being secured to said base for receipt of said container within it with the flange rest-

ing on the upper face of said punch and, said stripper, said trim punch stripper being telescoped about said trim punch; a pressure pad being carried by said movable member of said press for movement therewith into and out of holddown contact with said flange of said container; and said trim die is carried by said movable member of said press for movement therewith to cooperate with said punch trim said flange.

2. The apparatus of Claim 1 wherein pressure means are carried by said base for normally urging said trim punch stripper away from said base; said trim die overcoming said pressure means and forcing said trim punch stripper toward said base upon movement of said movable member toward said base.

3. The apparatus of Claim 2 wherein said pressure means includes a trim punch stripper piston disposed beneath said trim punch stripper and a plurality of pressure pins each having one end resting on said piston and the opposed end engaging said trim punch stripper.

4. The apparatus of any one of Claims 1 to 3, wherein said pressure pad is telescopically received within said trim die and means are provided for moving said pressure pad toward said base.

5. The apparatus of Claim 4 wherein said pressure pad is elongate and has an outwardly directed flange on one end; said trim die is elongate and has a top end engageable with said flange of said pressure pad.

6. The apparatus of any one of Claims 1 to 5, wherein said trim punch has its outer surface tapered inwardly adjacent its top edge; and said trim punch stripper has its inner surface tapered inwardly adjacent its top edge.

7. The apparatus of any one of Claims 1 to 6, wherein a retainer is carried by said base in encircling relationship with said trim punch and said trim punch stripper and in partial overlying relationship with said trim punch stripper.

8. Apparatus for trimming flanges substantially as herein described with reference to the accompanying drawings.

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