Oct. 21, 1969 J. L. BISHOP 3,473,499

CAN OPENERS

Filed April 26, 1967 3 Sheets-Sheet 1

Fig. 1.

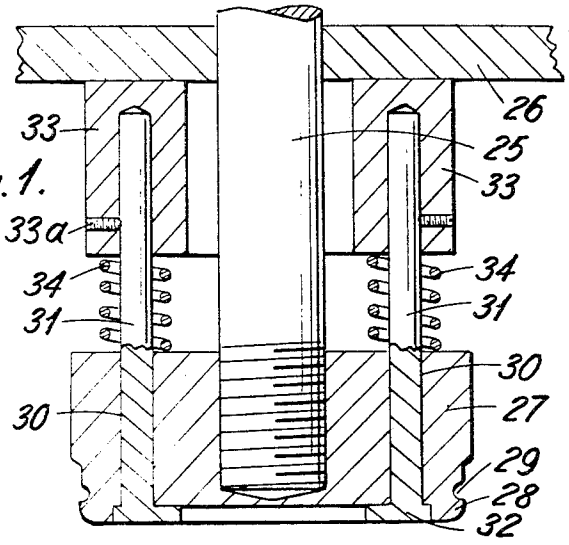


Fig. 2.

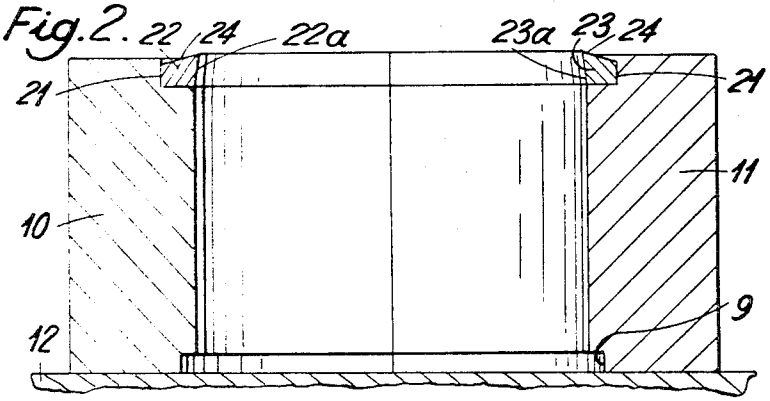


Fig. 3.

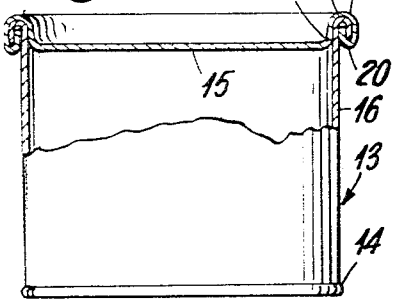
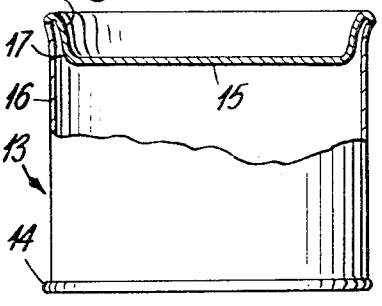


Fig. 4.



Inventor:
James Lawrence Bishop

By Watson, Cole, Grindle & Watson
attorneys

Oct. 21, 1969 J. L. BISHOP 3,473,499

CAN OPENERS

Filed April 26, 1967 3 Sheets-Sheet 2

Fig. 5.

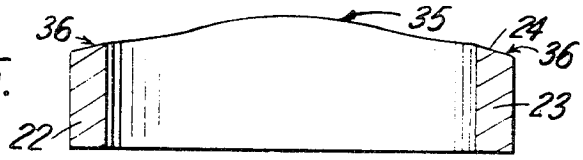


Fig. 6.

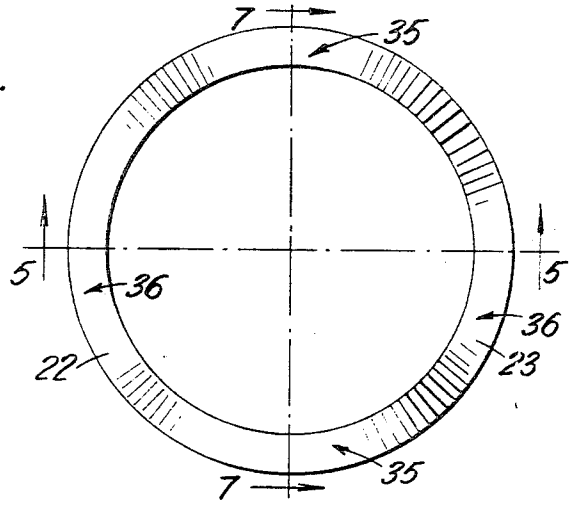


Fig. 7.

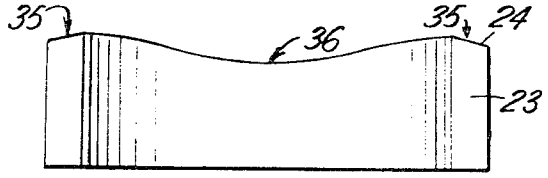
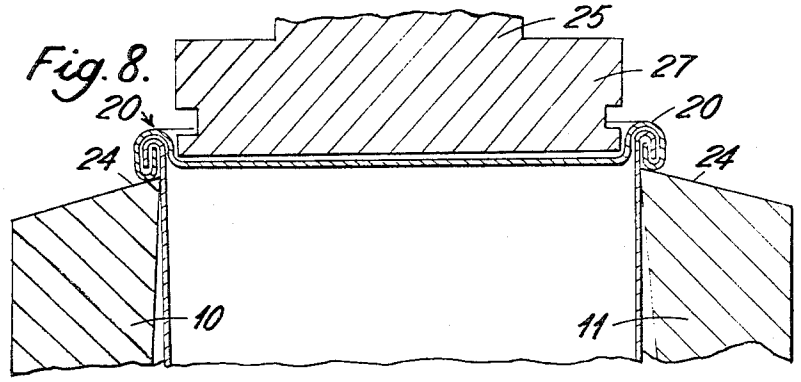


Fig. 8.



Inventor
James Lawrence Bishop
By
Watson, Cole, Grindle & Watson
Attorneys

Oct. 21, 1969 J. L. BISHOP 3,473,499

CAN OPENERS

Filed April 26, 1967 3 Sheets-Sheet 3

Fig. 9.

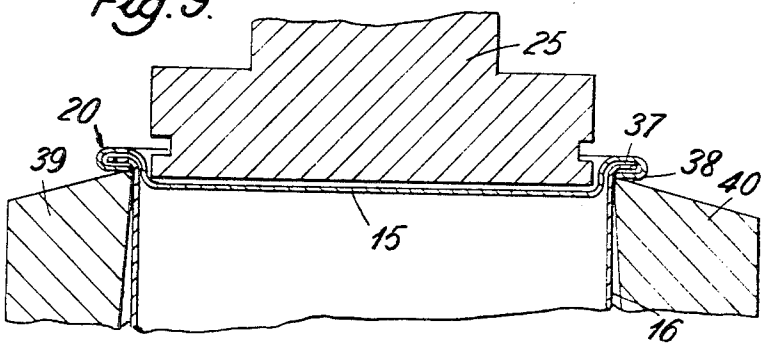


Fig. 10.

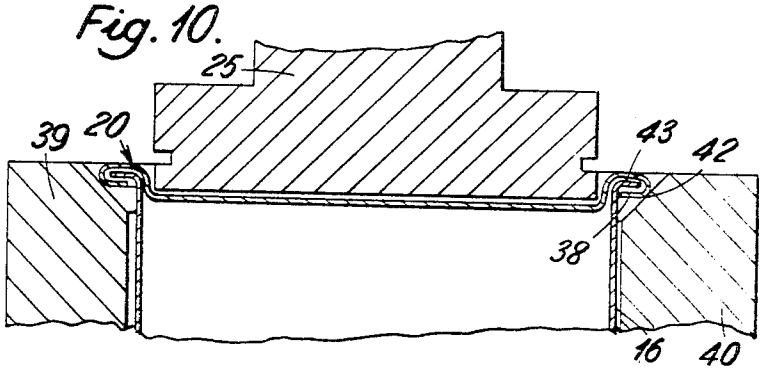
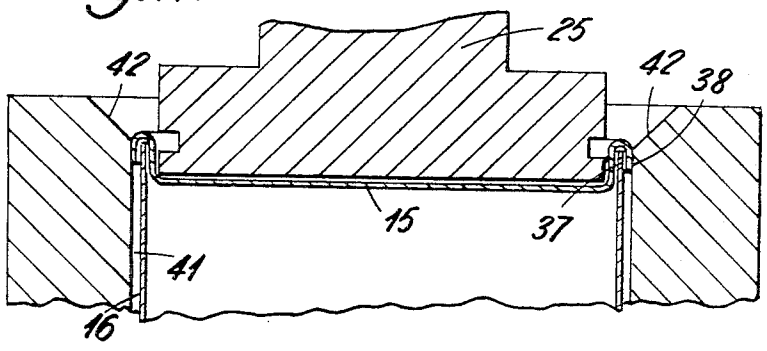


Fig. 11.



Inventor
James Lawrence Bishop

by Watson, Cole, Grindle & Watson
Attorneys

United States Patent Office 3,473,499 Patented Oct. 21, 1969

3,473,499

CAN OPENERS

James Lawrence Bishop, Ickenham, England, assignor to H. J. Heinz Company Limited, Hayes, Middlesex, England, a British company

Filed Apr. 26, 1967, Ser. No. 633,812
Claims priority, application Great Britain, Apr. 27, 1966, 18,489/66
Int. Cl. B67b 7/16; B23p 19/04
U.S. Cl. 113—1 18 Claims

ABSTRACT OF THE DISCLOSURE

A can opener comprising two half-cylindrical body parts which may be brought together around a can so that the outwardly directed flange or seam of the can overlies the end faces of the body parts, and which end faces are frusto-conical, and there is also provided a plunger movable towards and away from an end wall of the can so that when moved in the former direction the plunger causes the flange or seam to be forced against the frusto-conical faces causing the flange or seam to be unrolled or bent outwardly thereby releasing the end wall of the can.

This invention relates to can openers for use with cans of the kind in which an end wall has a flange which encircles the peripheral wall of the can thus forming an external encircling shoulder, and particularly of the kind in which the peripheral wall of the can is outwardly flanged and this flange and the first said flange are rolled around one another to form a seam which constitutes the aforesaid shoulder.

According to this invention a can opener for a can of a kind in which an end wall of the can is formed with a flange which encircles a peripheral wall of the can, comprises a first part engageable with the outer surface of said end wall and at least one other part for disposal outside the peripheral wall so as to underlie the flange, means for imparting relative movement between said two parts in the direction of the axis of the can and which second part is so shaped that in engaging the flange it bends it outwardly from the peripheral wall during said relative movement.

A face of said other part or of each said other parts which engages the flange may be a frusto-conical surface, the inner periphery of which is arranged close to the peripheral wall of the can so as to engage the flange.

The other part or each said other part may be in the form of a ring which encircles the can.

In the case where a single other part in the form of a ring is provided the relative movement between said part is arranged to be of such an extent that the flange is brought substantially clear of the edge of the mouth of the can.

In the case where two rings are provided, they are arranged successively to engage the shoulder and to effect the disengagement of the end wall from the other part of the can in two stages.

The ring first to engage the shoulder is so shaped that whenever its inner peripheral wall meets the conical surface the resulting edge is a close or interference fit around the periphery of the can, and which edge is slidable into engagement with the shoulder and the face of the ring which engages the shoulder is frusto-conical in shape.

In the case where two rings are provided which are brought successively into operation, whereas the first ring has a projecting frusto-conical face, the second ring has a recessed frusto-conical face. The effect of this on a rolled seam is that the first ring partly unrolls the seam so that the flange on the peripheral wall of the can is left directed outwardly with a part of the flange on the

end wall underlying it and the second ring brings the first said flange into line with the peripheral wall of the can and the flange on the end wall loosely encircling it enabling the end wall to be withdrawn. This reduces the possibility of the production of swarf during the unrolling of the seam which might otherwise enter the can.

The frusto-conical surface may be modified by the provision of undulations extending around it whereby portions of the edge initially engage the shoulder at a number of locations spaced around it and progressively unroll the flange from those locations.

Preferably in such an arrangement the inner peripheral wall of said ring is cylindrical.

In any of the arrangements incorporating a single ring the relative movement between the first said part and the ring may be sufficient to bring the flange which encircles the outer side of the peripheral wall of the can clear of the end of that peripheral wall around the whole of its circumference.

The aforesaid ring or each said ring may be inserted in a body part and may be formed from a hardened steel e.g. "Stellite" or "F.M.B." stainless steel whereas the body part is formed from a softer metal e.g. mild steel.

The inner circumferential face of the ring may be slightly tapered so that the smaller diameter portion meets the smaller diameter portion of the frusto-conical face which is engageable with said shoulder on the can.

In the case where the opener is for use with a can of the kind in which flanges on the end wall and on the peripheral wall are rolled around one another to form a seam constituting said shoulder and the end wall is inset from the end of the peripheral wall, the first said part of the opener which engages the outer face of said end wall is a comparatively loose fit within the encircling seam so that the effect of relative movement between said two parts is to unroll the seam.

The aforesaid first part may be provided with an ejector or knock out mechanism for separating from it the detached end wall of the can should the flange thereon become contracted around said first part.

It is quite usual for a can to have both end walls secured in the above manner and in order to assist in the assembly of the ring or each said ring may be diametrically split so that the two parts may be brought together on opposite sides of the can. The split parts may be hinged together. One of the parts may be attached to a fixed support. Clamping means may be associated with the split parts so that they firmly grip the can.

In any of the arrangements referred to above the aforesaid other part or parts may be arranged to be stationary and means are provided for moving the first part towards and away from the other part.

The following is a more detailed description of two forms of can opener according to the invention reference being made to the accompanying drawings in which:

FIGURE 1 is a vertical section through the upper part of one form of opener;

FIGURE 2 is a vertical section through the lower part of the opener;

FIGURE 3 is a section through a can on a smaller scale showing a seam securing an end wall of the can to the peripheral wall;

FIGURE 4 is a similar view to FIGURE 3 showing how the flange on the end wall is unrolled as a result of the operation upon it by the opener;

FIGURE 5 is a vertical section through an alternative form of lower part of the opener on the line 5—5 of FIGURE 7;

FIGURE 6 is a section through said lower part on the line 6—6 of FIGURE 7;

FIGURE 7 is a plan view of the ring shown in FIGURE 5;

FIGURE 8 is a diagrammatic section through the upper part of a can and through one ring of a two ring opener showing it in engagement with the seam at the commencement of an unrolling operation;

FIGURE 9 shows the parts of the seam at the end of the operation of the first ring;

FIGURE 10 shows the second ring in position at the commencement of its operation; and

FIGURE 11 shows the state of the seam at the end of the operation of the second ring.

Referring to FIGURES 1 to 4 the lower part of the opener comprises a cylindrical body or bolster formed from mild steel and split into two parts **10** and **11** which on one side are secured together by a hinge (not shown) and one of the parts is rigidly fixed to a support **12**. The parts **10** and **11** are swung apart to receive a can **13**. The two parts **10** and **11** are each provided at its lower end with a recess **9** for accommodating a seam **14** at the bottom of the can.

As will be seen from the upper part of FIGURE 3 the end wall **15** of the can is inset within the peripheral wall **16** and is formed with a flange bent back upon itself so that a part **17** of the flange is within the peripheral wall and an outer part **18** of the flange is wrapped over and then under a bent over portion **19** of the peripheral wall **16** to form a seam having a downwardly directed shoulder **20**. The upper end of each part of the cylindrical body **10, 11** is provided with a recess **21** and fixed within the recess are two parts **22, 23** or a split ring which may be secured in position by welding or brazing or by clamping which latter parts are formed from hardened steel such as "Stellite" or "F.M.B." stainless steel. The upper surface of each of the parts **22, 23** is frusto-conical in shape as indicated at **24**. The internal faces **22***a*, **23***a* are tapered so that the smaller diameter portions may be closely adjacent to the peripheral wall of the can. When the can is placed in position with the shoulder **20** resting on the frusto-conical face **24** of one of the parts of the split ring the lower seam will be located in the upper part of the recess **9** at a distance away from the support **12**. The other split ring is then swung into a position to grip the can. The support **12** comprises one part of a hydraulic or pneumatic press, the other part of which is provided with a spindle **25** which may be moved in an up and down direction relatively to a fixed part **26** of the press by a hydraulic or pneumatic ram. The lower end of the spindle **25** is screw threaded to engage a threaded hole in a plunger **27** formed from hardened steel, "Stellite" or "F.M.B." stainless steel and which constitutes the aforesaid first part of the opener. The lower end **28** of the plunger is of such a size as to fit loosely within the inner portion **17** of the flange of the upper end wall of the can and is provided with a circumferential groove **29**. The plunger **27** is provided with a number of holes **30** through which slide pins **31**, the lower extremities of which are formed integrally with an annular plate **32**, may abut against the end wall of the can. The upper ends of the pins are secured by grub screws **33***a* to a head **33** which may abut against the underside of the fixed part **26**.

Light helical compression springs **34** encircle the pins between the heads **33** and plunger **27**. In operation, after a can has been gripped between the split rings **22, 23**, the spindle **25** is forced downwardly by the press, the annular plate **32** coming into engagement with the end wall **15** and the lower part **28** of the plunger and groove **29** lying within the inner portion **17** of the flange on the end wall **15**. The shoulder **20** formed by the seam is forced into engagement with the frusto-conical face **24** and the reaction force provided by the split rings **22, 23** cause the outer flange part **18** to be unrolled as best seen in FIGURE 4. The depth of the recess **9** is such as to permit the can to move bodily downwards during the unrolling of the flange. The distortion of the flange may cause it to be contracted around the part **28** of the plunger and the groove **29** increases the grip between the unwrapped flange and the plunger **28**.

The upward movement of the spindle **25** will withdraw the end wall away from the can and when the heads **33** comes into contact with the underside of the part **26** further movement of the spindle upwards causes the pins **31** and annular plate **32** to be forced downwardly relatively to the plunger **27** forcing away the flanged end wall therefrom which can then be removed.

As indicated earlier, the lower part of the opener in the form of a split ring **22, 23** may have its frusto-conical surfaces **24** modified by undulations extending around it as shown in FIGURES 5 to 7, the summits of the undulations being indicated at **35** in FIGURE 5 and the bottoms of the undulations at **36** in FIGURE 6. This modified surface **24** may be generated by a line so disposed in a plane as to be inclined to an axis about which the plane rotates, and which line reciprocates with a simple harmonic motion in a direction parallel to the axis during said rotation.

Referring now to FIGURES 8 to 11, which show the operation of a two ring arrangement, the ring shown in FIGURES 8 and 9 and the plunger **27** are identical in construction to that shown in FIGURES 1 and 2 but are only shown diagrammatically.

As will be seen from FIGURE 8, at the commencement of the operation, the ridge formed between the frusto-conical faces **24** of the split ring **10** and **11** and the smaller diameter portions of the internal bore of the split ring underlie the seam **20**. The stroke of the plunger **25** is limited so that, at the end of the operation of the two part rings **10** and **11**, the seam is partly unrolled leaving an outwardly directed flange **27** on the peripheral wall **16** of the can and a part **38** of the flange on the end wall **15** underlying the flange **27**. The split ring **10** and **11** is then removed and another split ring **39** and **40** is arranged to encircle the peripheral wall **16** of the can and it will be seen that the inner circumferential wall of the split ring **39, 40** is so dimensioned as to leave a gap **41** between that circumferential wall and the can. Also instead of the two part ring being provided with a projecting frusto-conical face it is provided with a recessed frusto-conical face **42** and at the commencement of operation the partly unwrapped seam **43** rests on this face. Towards the end of the operation of the second split ring, as shown in FIGURE 11, the outwardly directed flange **37** is brought into line with the peripheral wall **16** of the can and the part **38** of the flange on the end wall **15** now loosely encircles the peripheral wall **16**. This enables the end wall **15** to be lifted away from the can by the upward movement of the plunger **25**. As previously indicated, with this arrangement, production of swarf during the unrolling of the seam is either eliminated or very much reduced with little risk of any swarf entering the can.

I claim:

1. A can opener for a can of a kind in which an end wall of the can is formed with a flange which encircles a peripheral wall of the can, comprising a first part engageable with the outer surface of said end wall, a second part adapted to surround the peripheral wall of the can so as to underlie and engage the flange along substantially the whole of its length, and means for imparting relative movement between said two parts along the axis of said parts, said second part having means for engaging the flange and bending the flange outwardly from the peripheral wall during said relative movement.

2. A can opener according to claim **1** wherein said second part has a circular aperture for encircling cans of circular cross section.

3. A can opener according to claim **2** wherein said means is defined by a surface of said second part, said surface being frusto-conical in shape and the inner periphery of which is arranged close to the peripheral wall of the can so as to engage the flange.

4. A can opener according to claim 2 wherein the relative movement between said parts is arranged to be of such an extent that the flange on the end wall of the can is brought substantially clear of the mouth of the can.

5. A can opener according to claim 3 wherein there is provided a further part having a circular aperture adapted to encircle the can and wherein said second part and said further part are adapted to engage the flange successively and to effect the disengagement of the end wall from the remaining part of the can in two stages.

6. A can opener according to claim 5 wherein the aperture in said second part has an inner peripheral wall which meets said surface underlying the flange and form an edge closely fitting around the periphery of the can, said edge being slidable into engagement with the shoulder of the flange after being bent outwardly from the peripheral wall.

7. A can opener according to claim 5 wherein said further part has a recessed frusto-conical face encircling the aperture therein.

8. A can opener according to claim 3 wherein said frusto-conical surface of said second part is in the form of vertical undulations extending around it whereby portions of the inner periphery initially engage the shoulder at a number of locations spaced around it and progressively unroll the flange from these locations.

9. A can opener according to claim 2 wherein said second part comprises a body part having a ring inserted therein, said ring being formed of a hardened steel, and said body part being formed of a softer metal.

10. A can opener according to claim 2 wherein the inner peripheral wall of the aperture in said second part is cylindrical.

11. A can opener according to claim 3 wherein the inner peripheral wall of the aperture in said second part is slightly tapered thereby forming a small diameter portion which meets the surface which is engageable with the flange on the can.

12. A can opener according to claim 1 adapted for

use with a can of the kind in which said endwall flange is rolled around a flange on the peripheral wall to form a seam constituting a shoulder and the end wall being inset from the end of the peripheral wall, wherein said first part of the opener which engages the outer face of said end wall is a comparatively loose fit within the encircling seam so that the effect of the relative movement between said two parts is to unroll the seam.

13. A can opener according to claim 1 wherein said first part is provided with an ejector mechanism for separating from it the detached end wall of the can should the flange thereon become contracted around said first part.

14. A can opener according to claim 1 wherein said second part is formed in two portions so arranged that they may be brought together on opposite sides of the can.

15. A can opener according to claim 14 wherein said two portions are hinged together.

16. A can opener according to claim 14 wherein one of said portions is attached to a fixed support.

17. A can opener according to claim 14 wherein there are provided clamping means adapted to secure said two portions together around the can.

18. A can opener according to claim 1 wherein said second part is arranged to be stationary and means are provided for moving said first part towards and away from said second part.

References Cited

UNITED STATES PATENTS

880,085	2/1908	Lindsey	83—690 X
3,045,617	7/1962	Dieter et al.	81—3.3 X

ROBERT C. RIORDON, Primary Examiner

R. V. PARKER, JR., Assistant Examiner

U.S. Cl. X.R.

29—427; 81—3.2