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Wright

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[54] **APPARATUS FOR STRIPPING CONTAINER BODIES FROM METAL WORKING PUNCHES**

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[52] **U.S. Cl.** **72/345**

[51] **Int. Cl.** **B21d 45/00**

[58] **Field of Search** ..... 72/344, 345, 346, 72/348, 349, 361, 427; 113/120 H, 7 R

[56] **References Cited**

UNITED STATES PATENTS

3,270,544	9/1966	Maeder et al.	72/348
3,402,591	9/1968	Maeder	72/345
3,406,554	10/1968	Frankenberg	113/7 R
3,423,985	1/1969	Stolle et al.	113/120 H
3,524,338	8/1970	Bozek	72/345

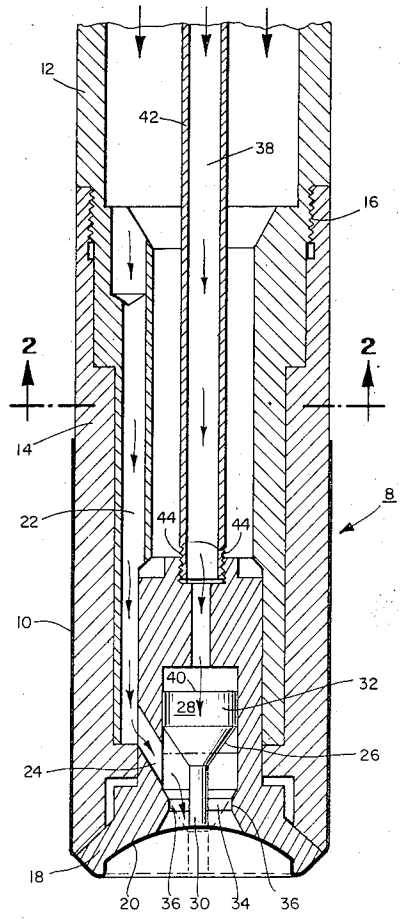
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[57] **ABSTRACT**

Fluid under pressure is utilized to strip a can body from a metal working punch at the conclusion of a metal working stroke. The punch includes a valve member which is maintained in a closed position covering a stripping fluid outlet in a valve chamber before the end of the metal working stroke. The valve member is maintained in the closed position by a pneumatic bias applied to the end of the valve member opposite the end of the punch. At the conclusion of the metal working stroke, the can body is domed upwardly toward the valve member so as to engage a projection extending from the valve member thereby forcing the valve member away from the end of the punch and opening the outlet in the valve chamber. This permits the stripping fluid to pass through the valve chamber outlet into contact with the interior of the container body thereby stripping the body from the punch.

11 Claims, 3 Drawing Figures



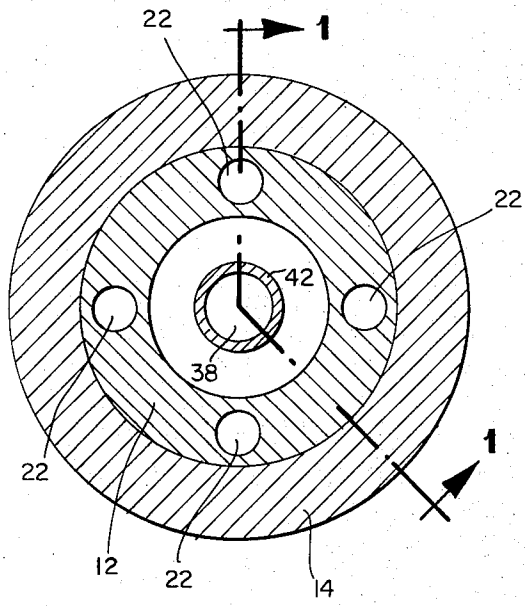

22
1
22
42
38
1
22
12
22
14

Fig. 2

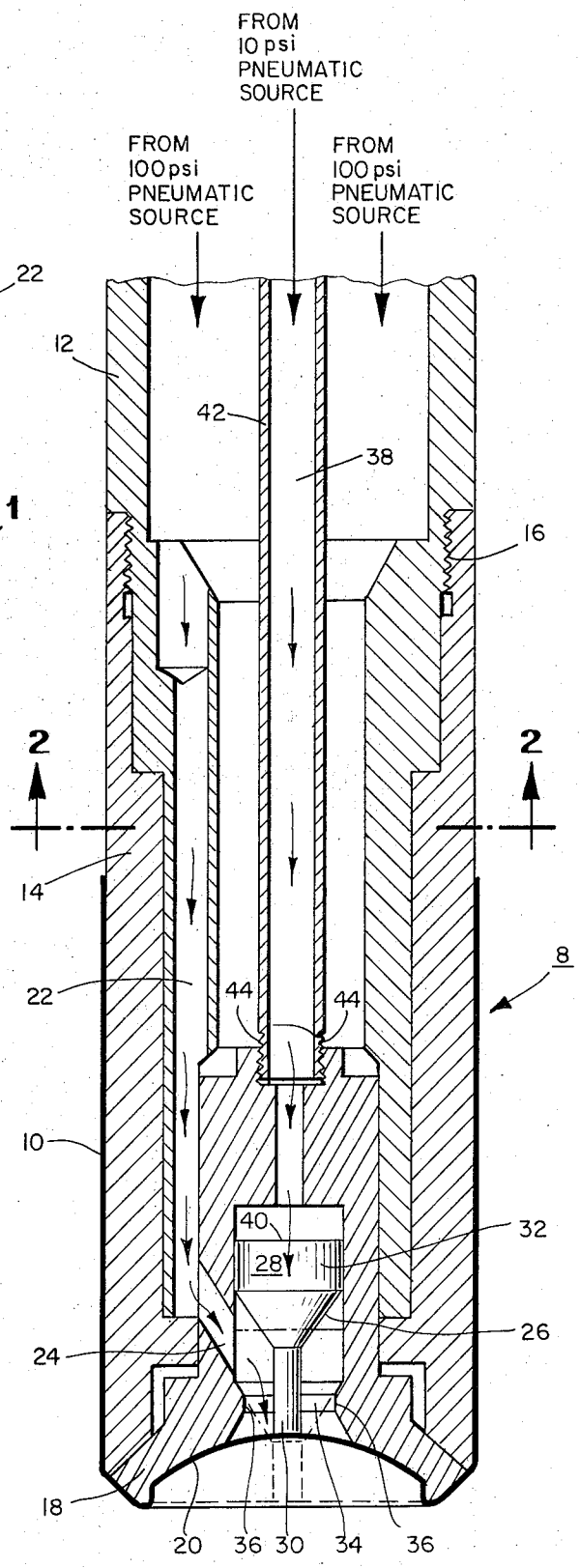
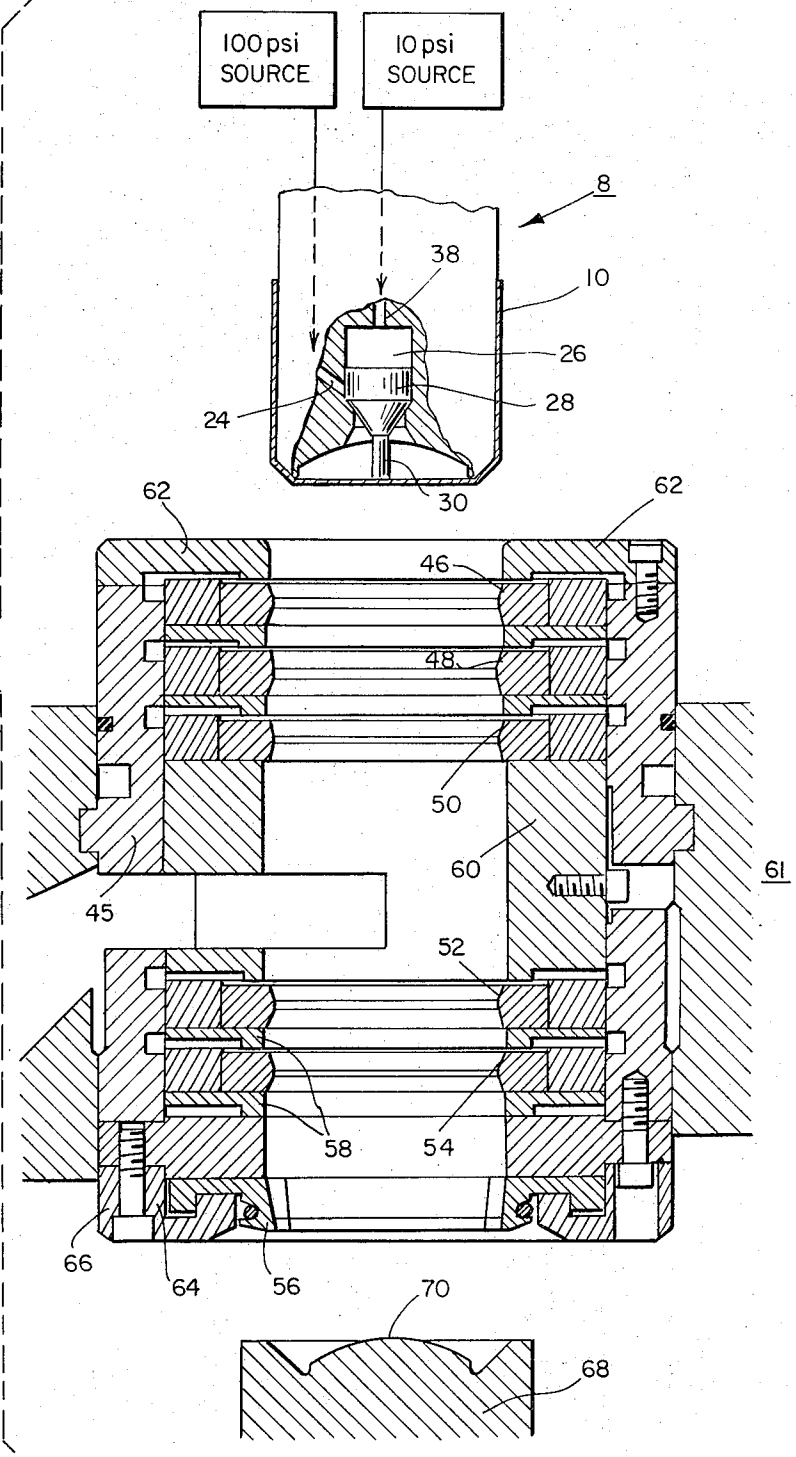

FROM
10 psi
PNEUMATIC
SOURCE
FROM
100 psi
PNEUMATIC
SOURCE
FROM
100 psi
PNEUMATIC
SOURCE
12
42
38
16
2
2
14
8
22
44
44
10
40
32
28
26
24
18
20
36
30
34
36

Fig. 1

Fig. 3


100 psi SOURCE
10 psi SOURCE
8
38
10
26
28
24
30
62
62
46
48
50
60
61
45
52
58
54
66
64
56
70
68

APPARATUS FOR STRIPPING CONTAINER BODIES FROM METAL WORKING PUNCHES

BACKGROUND OF THE INVENTION

This invention relates to apparatus for drawing, sizing and/or wall ironing container bodies having integral bottom and side wall portions.

In the drawing, sizing and/or wall ironing of such containers, a male punch carrying a blank or cup cooperates with a female die during a metal working stroke of the punch. By utilizing a plurality of drawing and wall ironing operations, a container body of a type which may utilized for beer or soft drinks or other products may be formed. Once the metal working stroke is completed, the container body must be removed from the punch or the punch from the body.

Various systems have been proposed and utilized in the prior art to remove container bodies from the punch after the metal working stroke is complete. These systems have falled into two general catagories: punch-carried strippers and die-carried strippers. This invention is concerned with the punch-carried strippers.

Punch-carried stripper systems relay upon the application of pressure on the interior of the container body bottom. Heretofore, most punch-carried strippers have been mechanical or hybrid mechanical-fluid strippers. For example, U.S. Pat. Nos. 3,270,544 — Maeder et al. and 3,402,591 — Maeder a mechanical stripping member which is extended from the end of the punch while air is simultaneously applied through that member so as to strip the container from the end of the punch. A somewhat similar system is disclosed in U.S. Pat. No. 3,423,985 — Stolle et al.

A somewhat different hybrid stripper system is shown in U.S. Pat. No. 3,524,338 — Bozek wherein the end of the metal working punch extends beyond the sides of the punch before the metal working stroke begins. Once the metal working stroke begins, the end of the punch is forced back into the interior of the punch compressing air within. Once the metal working operation is completed and the die(s) no longer provide resistance along the sides of the container body, the compressed air within the punch forces the end of the punch outwardly with respect to the sides of the punch so as to strip the container body from the punch.

SUMMARY OF THE INVENTION

In accordance with one important aspect of the invention, a fluid container body stripping mechanism is provided for removing container bodies from a metal working punch after the walls of a blank have been drawn, sized and/or wall-ironed by suitable dies and the bottom of the container body has been domed by a doming die. This system comprises a source of stripping fluid under pressure, a fluid passageway coupled to the source and extending through the punch with the passageway having an outlet communicating with the end of the punch, and a valve means for closing the outlet. Bias means maintain the valve in the closed position during the metal working stroke with the valve means including on actuating means extending into a position adjacent the container body bottom so as to be engaged and actuated by the container body bottom during doming thereby opening the outlet and allowing stripping fluid to push the bottom of the container body away from the end of the punch.

In a preferred embodiment of the invention, the outlet is located in a cylindrical chamber of the punch and the valve means comprises a cylindrical body member adapted to reciprocate through the chamber to close and open the outlet. The actuating means of the valve comprises a projection extending from the cylindrical body member toward the end of the punch so as to be engaged by the domed container body bottom.

The preferred embodiment of the invention also comprises a biasing means for the valve means including a source of biasing fluid under pressure and a passageway leading to the end of the cylindrical body member of the valve opposite the end of the punch. The fluid thus forces the cylindrical body member toward the end of the punch so as to close the valve before doming of the container body bottom. Since the force required to bias the valves in the closed portion is substantially less than the force required to strip a container body from the punch, the pressure of the biasing fluid may be substantially less than that of the stripping fluid.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of a punch emboding the stripper system of this invention taken along section line 1—1 of FIG. 2;

FIG. 2 is a cross-sectional view of the punch taken along section line 2—2 of FIG. 1; and

FIG. 3 is a sectional view of the punch in combination with a die system utilized in forming a container body.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

As shown in FIGS. 1 and 2, a metal working punch 8 for use in forming a container body 10 comprises a punch holder 12 which is secured to a side wall portion 14 at threads 16. An end portion 18 of the punch which conforms with the bottom of the container body 20 extends into the hollow axial chamber of the holder 12 and the side wall portion 14. A source of stripping fluid under pressure, e.g., a 100 p.s.i. pneumatic source, is connected to a stripping passageway 22 which extends through the punch 8. At the end of the passageway 22, an outlet 26 is provided which permits the fluid to oommunicate with the end of the container body 20 through a chamber 26.

In accordance with this invention, a valve 28 is provided which is adapted to reciprocate within the chamber 26 so as to open and close the outlet 24 thereby blocking the flow of stripping fluid to the interior of the container body bottom. In the position shown in full, the valve 28 is open due to the fact that the domed bottom 20 of the container bottom has made contact with an actuating means in the form of an extension 30 on a cylindrical valve portion 32. However, prior to the time that the bottom 20 is domed, the extension 30 assumes a forward position shown in dotted lines with the cylindrical valve body 32 also moving forward to a position shown in dotted lines so as to close the outlet 24. Since the cylindrical chamber 26 within the hollow end portion 18 of the punch has a restricted opening 34 formed by surfaces 36 of the end portion 18, the cylindrical portion 32 is unable to leave the chamber 26 even though it is under considerable biasing pressure at the surface 40 remote from the end of the punch

The biasing means for the valve **28** comprises a biasing fluid source, e.g., a 10 p.s.i. pneumatic source, which is coupled to a central or axial passageway **38** which communicates with the surface **40** of the cylindrical member **32.** The passageway **38** is separated from the passageway **22** by a tubular member **42** which is secured to the end portion **18** at the thread **44.**

Although a single fluid passageway **22** has been shown in FIG. **1,** it will be appreciated by reference to FIG. **2** that a plurality of such passageways may be provided with each having an outlet **24** entering into the valve chamber **26.** It will also be appreciated that additional passageways for cooling fluid may be provided in the side wall portion **14** of the punch as shown in copending application Ser. No. 240,121 filed Mar. 31, 1972.

The punch described with reference to FIGS. **1** and **2** will now be discussed in conjunction with a die combination including a plurality of annular dies adapted to receive the punch **8** and a doming die adapted to cooperate with the end of the punch **8** so as to dome the bottom of the container body **20.** As shown in FIG. **3,** the partially sectioned punch **8** is about to enter a series of female dies carried by a cartridge **45.** The series includes a presizing die **46,** a first ironing die ring **48,** a first sizing or stabilizing die ring **50,** a second ironing die ring **52,** and a second sizing or stabilizing die ring **54.** While a rather close spacing between the dies is required, spacers **58** are utilized which are substantially thinner than the dies which are separated. In addition to providing separation between the presizing ring **46,** the ironing die ring **48** and the sizing or stabilizing dies **50,** the spacers **58** also provide separation between the second ironing die ring **52,** the second sizing or stabilizing die ring **54** and a pause stripper **56** for assisting the fluid stripping system in removing the wall ironed container **10** from the punch **8.** In order to provide substantially greater separation between the first sizing or stabilizing die ring **50** and the second ironing die ring **52,** a spacer **60** of very substantial axial length is utilized. A housing **61** and upper and lower retainer elements **62** and **64** complete the cartridge **45.** The lower retainer element comprises a mounting ring **66** which is bolted to the housing **61.**

Separate and apart from the ironing and sizing dies, a doming die **68** having a central doming surface **70** is provided. This doming surface **70** deforms the container body bottom **20** upwardly into the recessed surface of the punch end portion **18.**

As shown in FIG. **3,** the punch **8** is about to begin passing through the sizing and ironing dies to the doming die **68.** In the position shown, the extension **30** is in contact with the flat bottom **20** and the cylindrical valve body **32** covers the stripping fluid outlet **24.** This valve position is maintained as the punch **8** and the container body **10** pass downwardly through the sizing dies and the ironing dies. Then, when the bottom of the container body **20** begins to contact the doming surface **70** of the doming die **68,** the extension **30** and hence the cylindrical valve portion **32** are forced upwardly in the valve chamber **26** so as to overcome the bias provided by the 10 p.s.i. pneumatic source. Once the **24** outlet is exposed, the stripping fluid rushes through the outlet **24** into contact with the bottom **20** stripping the container body **10** from the punch **8.** Once the bottom **20** of the container body **10** has been forced away from the end of the end portion **18** of the punch **8** a distance substantially equal to the length of the projection **30,** the valve **28** will move to a closed position over the outlet **26** so as to shut off the flow of stripping fluid. After the container body **10** has been removed from the punch **8** to this degree, the stripping pawl **56** is effective to completely remove the container body **10** from the punch without any substantial deformation at the upper edge **72** of the container body. Further details regarding the die assembly are set forth in copending application Ser. No. 240,121 filed Mar. 31, 1972.

In the foregoing, the stripping fluid source has been described as a 100 p.s.i. pneumatic source and the biasing fluid source has been described as a 10 p.s.i. pneumatic source. It will of course be appreciated that the p.s.i. level for the sources are merely illustrative. For example, the pressure for the stripping fluid source might vary in the range of 80 to 120 p.s.i. The important thing is to provide sufficient pressure to strip the container body **8** from the punch **10.** Generally, any pressure in this range will provide sufficient force for such stripping.

The biasing fluid source may also vary. The important thing with respect to this source is that pressure is sufficiently low so as not to deform the domed bottom **20** of the container body **10.** In general, pressure below 20 p.s.i. should satisfy this requirement.

It will also be understood that the pneumatic sources may be replaced by hydraulic sources. Actually, a hydraulic source is a particularly convenient way of providing pressure for biasing and stripping since hydraulic fluid is usually circulated through a metal working punch of the type shown for cooling purposes. Although the cooling passageways and ports in punch **8** have not been shown, it will be understood that such ports may be provided as, for example, in the side wall portion **18.** In addition, the lubricating fluid for the punch may be utilized for the stripping and/or the biasing fluid. Of course, the proper pressure levels with respect to these fluids must be maintained.

Although the invention has been described in conjunction with a sizing and ironing operation performed by the die assembly shown in FIG. **3,** it will be understood that the invention is equally applicable to a drawing operation wherein deformation of the bottom of the object drawn is performed at the conclusion of the drawing operation. However, it has been found to be particularly advantageous with respect to the drawing and wall ironing operations performed on an integral container body such as that disclosed in copending application Ser. No. 57,124 filed July 22, 1970 which is incorporated herein by reference.

Although a specific embodiment of the invention has been shown and described in detail, the appended claims are intended to cover this embodiment as well as any other embodiments as fall within the true spirit and scope of the invention.

What is claimed:

1. In an apparatus for forming an integral can body having at least one drawing, sizing and/or wall ironing die, a can body doming die, a punch for carrying a blank or cup into metal working engagement with said ironing die and said doming die during a metal working stroke, the improvement residing in a system for stripping the can body from said punch at the end of said metal working stroke comprising:

a source of stripping fluid under pressure;

a stripping passageway coupled to said source and extending through said punch, said passageway having an outlet communicating with the end of said punch;

valve means for closing said outlet; and

bias means for maintaining said vlave in the closed position during said metal working stroke;

said valve means including actuating means extending into a position adjacent said can bottom so as to be actuated by the can bottom during doming thereby opening said outlet and releasing said fluid for stripping the can body from said punch.

2. The apparatus of claim **1** wherein said bias means comprises:

a biasing pneumatic source; and

a pneumatic passageway extending through said punch from said source and into communication with said valve means for biasing said valve means to the closed position

3. The apparatus of claim **2** wherein said pneumatic passageway extends along the axis of said punch.

4. The apparatus of claim **3** including a plurality of said stripping fluid passageways located radially outwardly from said pneumatic passageway.

5. The apparatus of claim **1** wherein said punch comprises a chamber communicating with an outlet from said stripping fluid passageway, said valve means adapted to reciprocate in said chamber from a position closing said outlet to a position opening said outlet.

6. The apparatus of claim **5** wherein said actuating means of said valve means comprises a projection extending toward the end of said punch, the end of said projection being engaged by the central portion of a domed can body bottom so as to open said valve.

7. The apparatus of claim **6** wherein said punch includes a substantially cylindrical chamber, said valve means including a substantially cylindrical portion mating with said chamber, the axis of said cylindrical chamber and said cylindrical portion being substantially coaxial with said punch.

8. The apparatus of claim **7** wherein said chamber is formed in part by a restriction adjacent the end said punch, said projection extending through the opening formed by the restriction, said restriction preventing said valve means from leaving said chamber in the absence of a can body on said punch.

9. The apparatus of claim **2** wherein said stripping fluid source comprises a pneumatic source.

10. The apparatus of claim **2** wherein the pressure generated by said stripping fluid source substantially exceeds the pressure generated by said biasing pneumatic source.

11. The apparatus of claim **9** wherein the pressure of said stripping fluid source lies in the range of 80–120 p.s.i. and the pressure of said biasing means pneumatic source lies in the range of 5 to 20 p.s.i.

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