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Wharton

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[54] **CAN CRUSHER**

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[73] Assignee: **William F. McDonald,** a part interest

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[52] **U.S. Cl.** ..... **100/98 R;** 100/214; 100/288

[51] **Int. Cl.²** **B30B 9/00**

[58] **Field of Search** ..... 100/288, 250, 226, 98 R, 100/97, 96, 95, 94, 39, DIG. 2; 83/54, 425; 72/324

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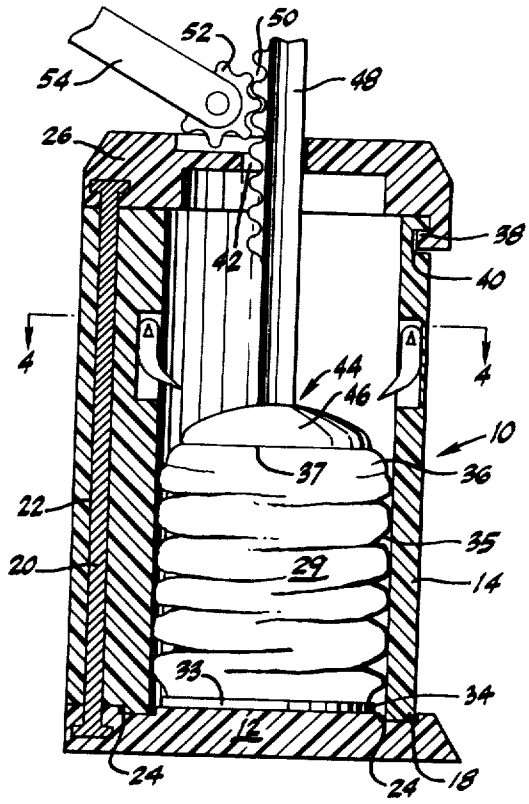
Primary Examiner—Harvey C. Hornsby

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[57] **ABSTRACT**

A method of crushing a can having a top, a bottom, and a sidewall, and apparatus therefor. The method comprises the steps of making at least one slit in the sidewall of the can from the top to the bottom and restraining the sidewall of the can from outward expansion. The can is axially compressed so as to crush the can while the sidewall is restrained from outward expansion so that the can sidewall is forced to collapse inwardly. As a result, there are a minimum of exposed sharp edges on the crushed can.

7 Claims, 6 Drawing Figures



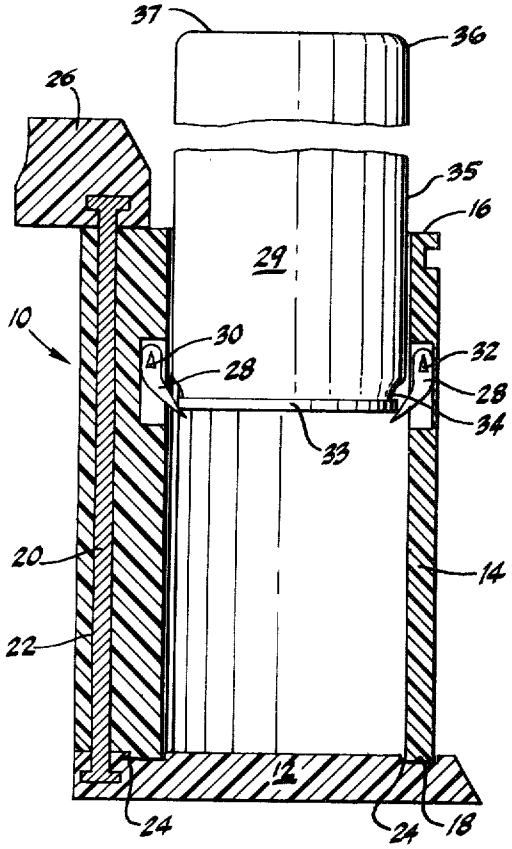


Fig. 1

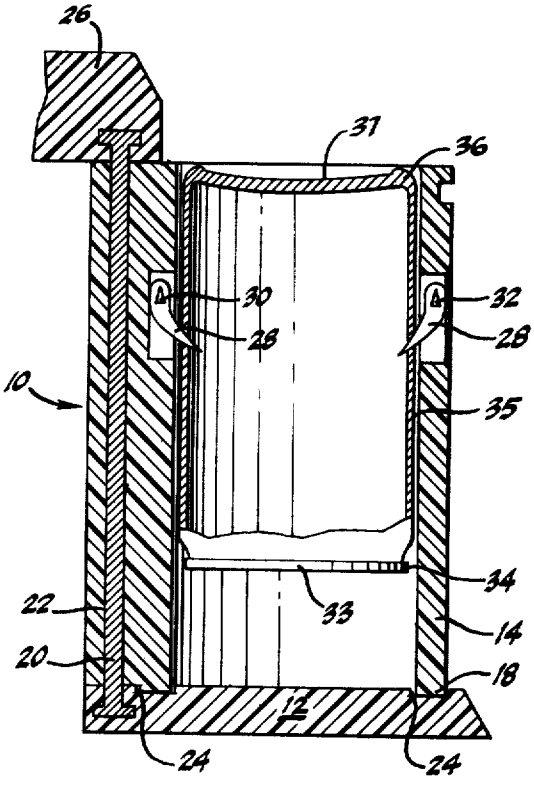


Fig. 2

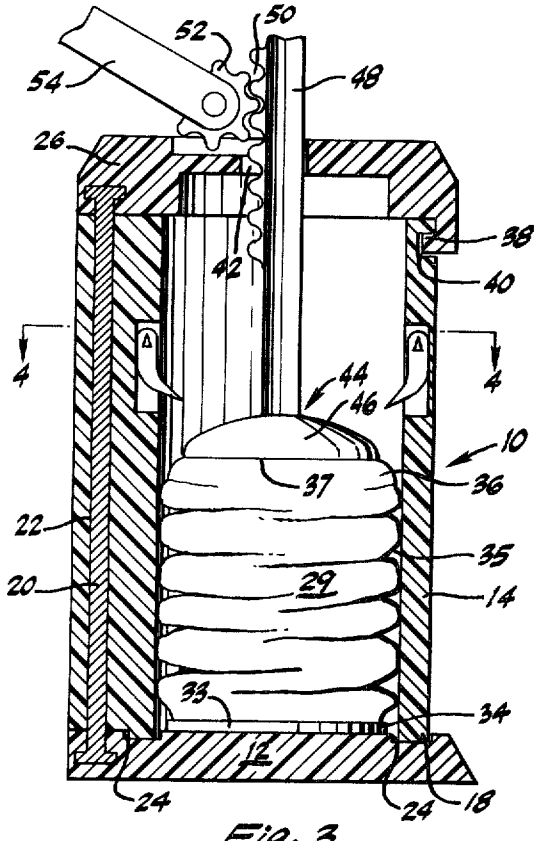


Fig. 3

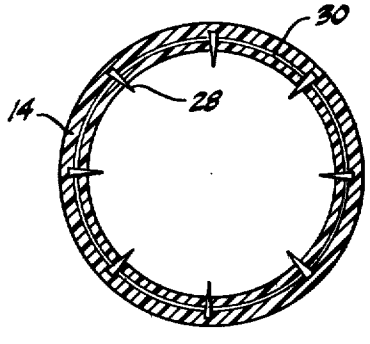


Fig. 4

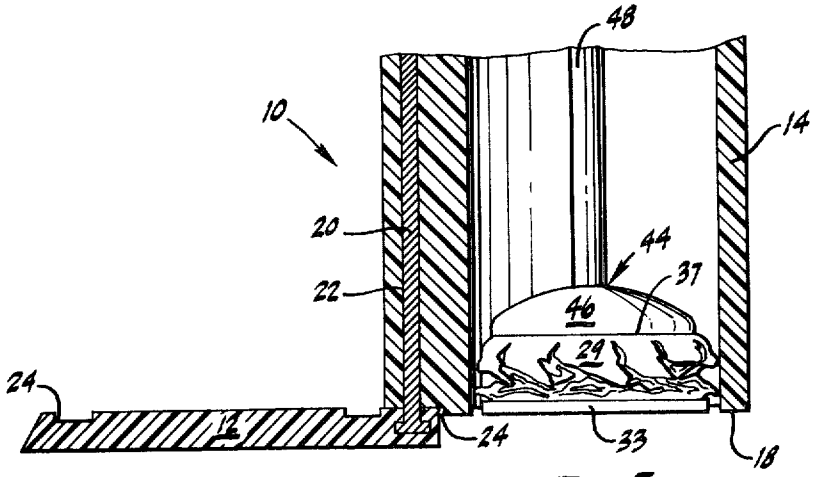

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Fig. 5

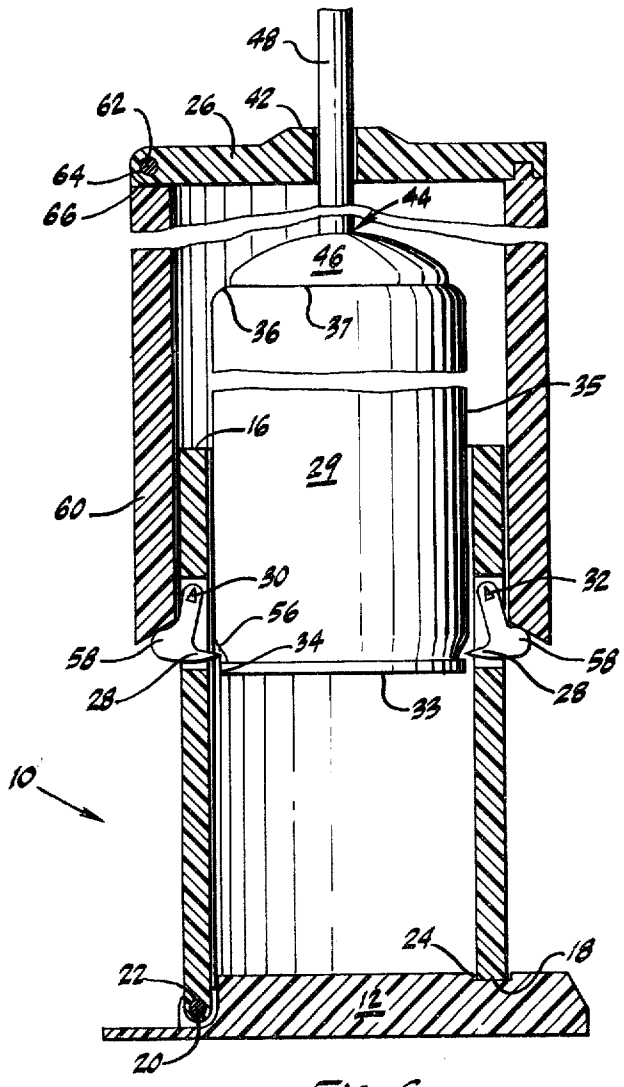

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Fig. 6

CAN CRUSHER

BACKGROUND OF THE INVENTION

The present invention relates to the crushing and compacting of containers. It is particularly applicable to crushing and compacting cans.

Over the years, there has been a continuing interest in reducing the amount of space occupied by an empty can so that it could be disposed of more efficiently or perhaps salvaged and the metal contained therein recycled. During World War II with the conventional so-called tin can, people would frequently cut the top and the bottom off the can and then flatten the sidewall. The flattened cans were salvaged and some of the metals contained therein reclaimed and recycled. With the termination of World War II, interest in flattening tin cans abated somewhat in this country.

Recently the use of aluminum in cans has become quite popular. Many of these aluminum cans are of the seamless, so-called drawn and ironed construction. In this construction the bottom and the sidewall of the can are of one piece with the bottom normally substantially thicker and stronger than the sidewall. The top of the can is normally stronger than the sidewall. The junctures of the top and the sidewall and the bottom and the sidewall are also normally stronger than the side wall itself. The construction of this type of can is such that it is extremely difficult to separate the bottom from the sidewall so that the sidewall, the top having been previously separated, could then be flattened. The construction of the can is such that the sidewall, although thin, tends to have somewhat of an eggshell effect and is quite difficult to axially compact.

With the increase in concern about the contamination of the environment and exhaustion of natural resources and the resulting increasing emphasis on recycling, particularly of materials which do not oxidize and revert to a natural state very readily such as aluminum, there has been a growing demand for an improvement in crushing and compacting aluminum cans for reclamation and recycling purposes. Since much of the collection of aluminum cans done today is by groups such as Boy Scout or Girl Scout troops and the like which conduct neighborhood collection campaigns, and lightly skilled supermarket employees, the method of crushing and compacting the can must be as safe as possible. One way to increase the safety of the system is to minimize the number of exposed edges which could cut the hands of a youngster handling the crushed and compacted can.

SUMMARY OF THE INVENTION

It is an advantage of the instant invention that it provides a method and apparatus for crushing a can which is usable on all types of cans including the seamless drawn and ironed aluminum can. It is a particular advantage of the present invention that there are a minimum of exposed sharp edges on the crushed can. Thus, the invention can be practiced by young children who are collecting cans for recycling as well as relatively unskilled supermarket employees who might also wish to crush the cans to reduce the storage problems until the cans be picked up for transfer to a central point for recycling.

The present invention provides a method for crushing a can having a top, a bottom, and a sidewall. the method involves making at least one slit in the sidewall

of the can from the top to the bottom and restraining the sidewall of the can from outward expansion. The can is axially compressed so as to crush the can while the sidewall is restrained from outward expansion. The can sidewall is accordingly forced to collapse inwardly. As a result, there are a minimum of exposed sharp edges on the crushed can.

The apparatus of the instant invention is useful for crushing cans wherein the junctures of the top and the sidewall and the bottom and the sidewall are stronger than the sidewall. The device comprises a base and a hollow cylinder open at both its upper and lower ends mounted at its lower end on the base. The cylinder has a length greater than the can and an inside diameter slightly greater than the outside diameter of the can and is adapted to contain and restrain the can while it is being crushed. At least one blade is resiliently mounted in the side of the cylinder and extending inwardly thereof a short distance. The blade is adapted to yield to the strong junctures of the top and sidewall and the bottom and sidewall of the can, and longitudinally slit the sidewall of the can as it is inserted into the cylinder starting at the upper end thereof. A piston having a diameter such that it can pass through the cylinder without touching the blade is provided which is adapted to press down on the can within the cylinder. Means are provided for moving the piston longitudinally within the cylinder from a position near the upper end to a position near the lower end so as to crush the can. The inside surface of the cylinder restrains expansion of the can as it is crushed so that the can sidewall is forced to collapse inwardly. As a result, there will be a minimum of exposed sharp edges on the crushed can.

Other objects and advantages of the present invention will be apparent from the following detailed description in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings are illustrative of advantageous embodiments of this invention.

In the drawings:

FIG. **1** is a front elevational view, partly in section, and with parts removed for purposes of clarity, of an embodiment of the present invention;

FIG. **2** is similar to FIG. **1** showing a can as it passes through the embodiment of the invention;

FIG. **3** is another view of the same embodiment showing the can as it is being crushed according to the instant invention;

FIG. **4** is a top sectional view, with parts removed for purposes of clarity, taken on line **4—4** of FIG. **3**;

FIG. **5** is another view of the embodiment of FIG. **1** showing the crushed can in position to be removed from the device;

FIG. **6** is a side elevational view with parts removed for purposes of clarity of another embodiment of the present invention.

DETAILED DESCRIPTION

Throughout the drawings corresponding reference numerals have been used for corresponding parts.

Referring now particularly to FIGS. **1** through **5**, a device for crushing cans in accordance with the present invention is indicated generally at **10**. Can crusher **10** includes a base **12** of suitable material. The type of material which can be used for base **12** is virtually unlim-

ited so long as the material can withstand the crushing pressure exerted on the can by the device. A hollow cylinder **14** open at both its upper end **16** and its lower end **18** is mounted on the base. As shown, this may be by means of a pivot pin **20** attached to base **12** and passing through a hingepassage **22** on cylinder **14.** To insure proper alignment of cylinder **14** and base **12,** mating keys **24** may be provided on lower end **18** of cylinder **14** and base **12.** A cap **26** is pivotally connected to cylinder **12,** for example, by means of the same pivot pin **20.**

The construction of cylinder **14** is such that it will be strong enough to restrain a can **29** which is being crushed therein. As shown, cylinder **14** desirably has a length greater than can **29** and an inside diameter slightly greater than the outside diameter of the can **29.** Cylinder **14** is adapted to contain and restrain can **29** while it is being crushed. At least one blade **28** is resiliently mounted in the side of cylinder **14.** In the embodiment shown eight blades **28** are provided uniformly circumferentially distributed in the side of cylinder **14** and are closer to upper end **16** than lower end **18.** The longitudinal position of blades **28** is not critical so long as they will be above the sidewall **35** of can **28** in its crushed position. Blades **28** having cutting edges thereon which extend inwardly a short distance from the side of cylinder **14,** the plane of the cutting edge of each blade **28** comprising a radius of the cylinder **14.** Blades **28** are resiliently mounted in the side of cylinder **14** by means of a torsional ring **30** positioned within the wall of cylinder **14.** The torsional ring desirably is triangular in cross section as shown and blades **28** have corresponding triangular shaped openings **32** therein through which the torsional ring passes. In this manner, blades **28** are tightly attached to torsional ring **30** and responsive to the spring pressure exerted thereby. The tension exerted on blades **28** by torsional ring **30** is such that the blades are adpated to yield to the strong juncture **34** of the top **33** and sidewall **35** and the strong juncture **36** of the bottom **37** and sidewall **35** of can **29.** The can shown is a seamless aluminum can of the drawn and ironed type but it will be appreciated practice of the instant invention is not limited thereto. The invention can be utilized on a can of virtually any construction.

Although blades **28** yield to the strong junctures **34** and **36,** they will longitudinally slit sidewall **35** of can **29** as it is inserted into cylinder **14,** for example, by being pushed in with a hand applied to bottom **37** of can **29.** As shown, can **29** is inserted into cylinder **14** starting with top **33** and starting at the upper end **16** of cylinder **14.**

Referring now particularly to FIG. **3,** cap **26** has been pivoted around into position in axial alignment with cylinder **14.** A tongue **38** may be provided in cap **26** to rest and stop in groove **40** in cylinder **14** to provide the proper alignment. A central channel **42** is provided in cap **26.** A piston **44** having a head **46** and a rod **48** is axially aligned with cylinder **14.** As shown, rod **48** of piston passes through central channel **42** of cap **26.** Head **46** of piston **44** has a diameter such that it can pass through cylinder **44** without touching blades **28** and is adapted to press down on bottom **37** of can **29** within cylinder **14.** Suitable means are provided for moving the piston assembly **44** longitudinally within cylinder **14** from a position near upper end **16** to a position near lower end **18** of cylinder **14** so as to crush can **29.** Although various means may be utilized, an arrangement comprising a rack **50** provided on piston rod **48** which coacts with a pinion gear **52** under the influence of an operating handle **54** to move the piston assembly **44** is shown for purposes of illustration.

As the can **29** is crushed by the downward movement of piston assembly **44,** the inside surface of cylinder **14** restrains the expansion of can **29** so that the sidewall **35** of can **29** is forced to collapse inwardly. The result is shown in FIG. **5** and it is readily apparent there will be a minimum of exposed sharp edges on crushed can **29.** In FIG. **5** cylinder **14** has been pivoted away from base **12** and crushed can **29** may readily be removed from the lower end **18** of cylinder **14.**

FIG. **6** illustrates another embodiment of the instant invention. In this embodiment an alternative connection between base **12** and cylinder **14** is also illustrated. Pivot pin **20** is horizontally positioned and passes through hinge passage **22** which is formed in an extension of lower end **18** of cylinder **14** instead of extending along the side thereof.

In this embodiment, can **29,** for example, at shoulder **56,** will rest on blades **28** when it is inserted into cylinder **14.** Blades **28** are provided with protruding heels **58** which extend radially through the side of cylinder **14** to the exterior thereof through appropriate apertures. A sleeve **60** having an inside diameter slightly greater than the outside diameter of cylinder **14** is adapted to slide down over cylinder **14** and in this manner engage heels **58** and force them inwardly causing blades **28** to cut into the side wall **35** of can **29** positioned in cylinder **14.** In this embodiment, cap **26** is pivotally connected as by a separate pivot pin **62** and hinge passage **64** arrangement to the top **66** of sleeve **60.** Any suitable means, not shown, including the pressure of the human hand may be used to slide sleeve **60** downwardly over cylinder **14.** In fact, the weight alone of sleeve **60** might be sufficient to accomplish this purpose. Can **29** is pushed downwardly past blades **28,** the relative movement of the two causing the slitting of side wall **35** by blade **28,** through the action of piston assembly **44** which, as it continues its downward movement, will thereafter crush the slit can **29.**

It will be appreciated that the foregoing are only descriptions of exemplary embodiments of the method of this invention and exemplary apparatus embodying the principles of the present invention. These are for illustrative purposes only and the present invention is not to be limited thereby but only by the claims wherein,

What is claimed is:

1. A device for crushing cans wherein the junctures of the top and the sidewall and the bottom and the sidewall are stronger than the sidewall which comprises:

a. a base,

b. a hollow cylinder open at both its upper and lower ends mounted at its lower end on the base and having a length greater than the can and an inside diameter slightly greater than the outside diameter of the can and having a strength sufficient to contain and restrain the can while it is being crushed:

c. at least one blade resiliently mounted in the side of the cylinder and having a cutting edge thereon extending inwardly thereof a short distance, the plane of the cutting edge of the blade comprising a radius of the cylinder, so as to longitudinally slit the sidewall of the can as it is inserted into the cylinder

starting at the upper end thereof and moves past the blade;

d. A piston having a diameter such that it can pass through the cylinder without touching the blade and adapted to press down on the can within the cylinder;

e. means for moving the piston longitudinally within the cylinder from a position near the upper end to a position near the lower end so as to crush the can, the inside surface of cylinder restraining expansion of the can as it is crushed so that the can sidewall is forced to collapse inwardly, whereby there will be a minimum of exposed sharp edges on the crushed can.

2. The device of claim **1** including means pivotally connecting the cylinder and the base so that the cylinder and the base may be pivoted away from one another for removal of the crushed can from the cylinder.

3. The device of claim **1** including a cap pivotally connected to the upper end of the cylinder and having a central channel through which the piston passes.

4. The device of claim **1** wherein the resilient mount for the blade is a torsional ring positioned within the wall of the cylinder, the blade being attached to the torsional ring.

5. The device of claim **1** wherein the blade has a protruding heel thereon which extends radially through the side of the cylinder to the exterior thereof and including a sleeve having an inside diameter slightly greater than the outside diameter of the cylinder and adapted to slide down over the cylinder and engage the heel of the blade forcing it inwardly causing the blade to cut into the sidewall of a can positioned in the cylinder.

6. The device of claim **1** wherein the number of blades is **8** and the blades are uniformly circumferentially distributed in the side of the can.

7. The device of claim **4** wherein the torsional ring is triangular in cross section and the blade has a corresponding triangular shaped opening therein through which the torsional ring passes.

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