

3,374,730

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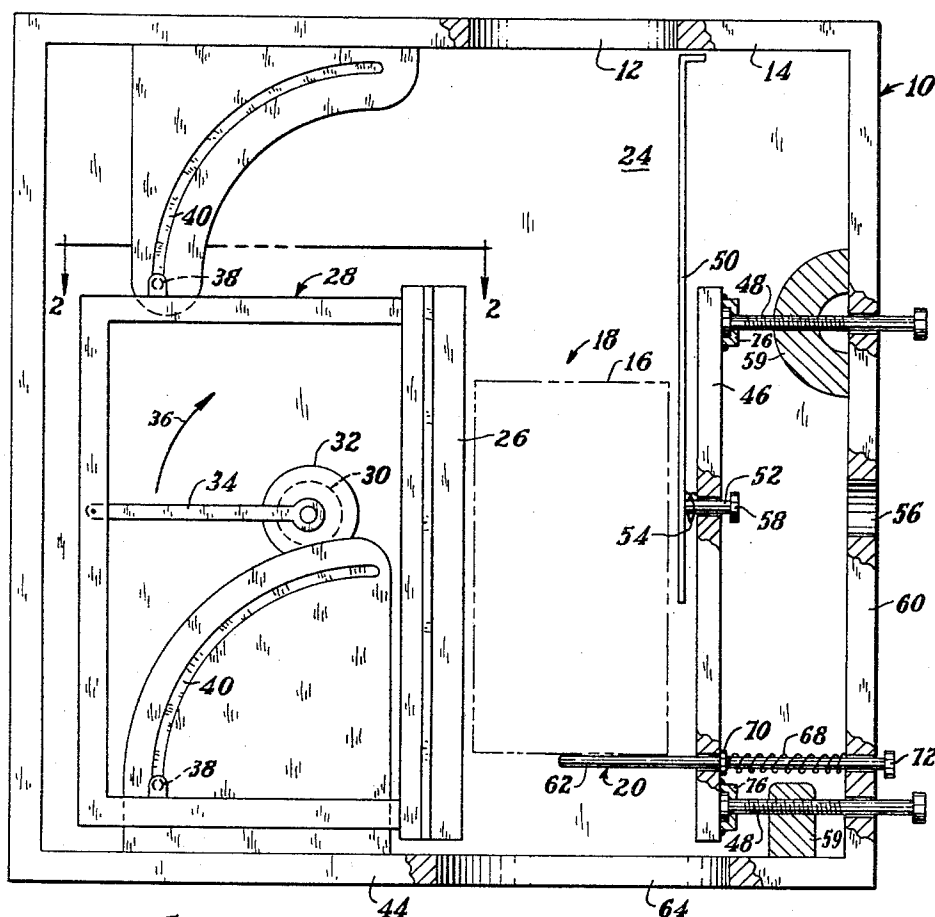


Fig. 1

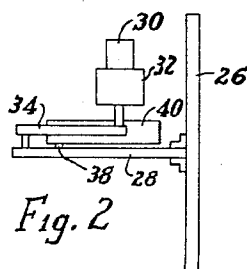


Fig. 2

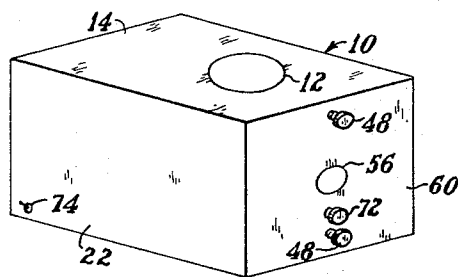


Fig. 3

HALL H. CAIN,
INVENTOR.

BY *Robert A. Spray*
ATTORNEY

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CRUSHING DEVICE

Hall H. Cain, R.R. 4, Spencer, Ind. 47460

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ABSTRACT OF THE DISCLOSURE

A can-crushing device, power-operated, in which the crushing is achieved by a compound relative movement of crushing walls, the movement first being primarily longitudinally of the can axis, thereby achieving a can-weakening effect with relatively little power, and subsequently the movement being primarily transversely of the can axis achieving the can-crushing with relatively little power after the can has been weakened.

This invention relates to a crushing device. More particularly, concepts of the invention provide a can-crushing device with advantageous features of action.

Various products are marketed or sold in metal cans or other disposable or throw-away containers which provide an effective service of product-packaging. However, the volume or bulk of these containers, which is a desirable characteristic for holding the desired amount of the product, is a disadvantage when the product-contents have been used; for the container-size then renders the discarding of these containers bothersome. Several of the empty containers, in their original size and shape, when accumulated by the user, often present a nuisance, bother, or inconvenience to the user, to store or dispose of in a trash receptacle or other disposing means.

Crushing of such empty containers often requires either extra container-cutting operations, to weaken the container for ease of crushing, or requires considerable power or force; for, to be serviceable in its product-packaging operation, the container has considerable rigidity built into its design and construction.

Accordingly, concepts of this invention provide a crushing device which has advantageous features of actuation and action, which will effectively achieve a desired crushing effect without extra container-cutting being necessary, and without the power requirements of crushers not utilizing the concepts herein set forth.

In carrying out the invention in the illustrated embodiment, there is provided a device having a crushing chamber, at least one wall or member thereof being powered and guided so that it will move both axially and inwardly against the container being crushed. Further, at the beginning of the stroke, the movement is relatively more axially than inwardly, and at the end-portion of the stroke, the movement is more inwardly than axially.

This achieves, with relatively little power, a weakening of the container-rigidity at the early portion of the stroke; and at the end portion of the stroke, relatively little power is required to effect a more direct collapsing crushing of the container.

The above description is introductory and generalized for brevity; a more detailed description of the concepts and features of the invention now follows, of an embodiment illustrative of the inventive concepts, reference being had to the accompanying somewhat schematic and diagrammatic drawings, in which:

FIG. 1 is an elevational view of a crushing device according to an embodiment of the invention, a front cover plate removed to show interior details;

FIG. 2 is a detail view, in substantially smaller scale, looking downwardly, taken generally as indicated by view-line 2—2 of FIG. 1; and

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FIG. 3 is a pictorial exterior view of the overall device.

As shown in the drawings, in the illustrative embodiment of the invention, there is provided a crushing device 10 having an opening 12 in its top wall 14 to accommodate the reception of a container 16 to be crushed. The container 16 drops into a crushing chamber 18, and rests upon a movable support 20 to be described below.

The front and rear walls 22 and 24, respectively, of the crushing chamber, are shown provided by the front and rear walls of the overall device. Those walls 22 and 24 usually are not engaged by the container 16 during crushing, except occasionally they would support the container 16 against tipping.

Crushing is shown as actuated by powered relative movement of the left and right wall or abutment members now to be described.

An important concept of the invention is that at least one of the opposed crushing walls moves both axially of the container as well as inwardly thereof, thus achieving a container-weakening collapse of the container as well as a flattening thereof.

Accordingly, the left crushing-chamber wall 26 is shown as provided on a powered bracket 28, the bracket 28 being illustratively shown as powered by an electric motor 30 through suitable reduction gearing 32, and a power arm 34 keyed to the reduction gearing 32 so that the arm 34 sweeps or revolves under power. Total travel, or arc movement of the arm 34, is only ninety degrees. The outer end of the arm 34 is freely joined to the bracket 28. Direction of movement is indicated by movement-indicating arrow 36.

The bracket 28 is guided, as by guide lugs 38 engaging tracks 40 carried by the top frame wall 14 and bottom frame wall 44 respectively, so that the bracket 28 translates in an orbital movement which is circular in this illustrated embodiment, carrying with the bracket 28 the can-crushing wall or abutment 26 which thus also has a movement which is axially and inwardly of the crushing chamber 18.

Opposing the right crushing-chamber wall 26, the right chamber-wall 46 is shown as non-powered, and stationary except as hereinafter set forth, the right wall 46 providing the reaction support for the container 16.

The relative movement of left wall 26 and right wall 46 is thus both toward one another (in a direction inwardly of the container 16) and longitudinally of one another (in a direction axially of the container 16).

More specifically, at the beginning of the power stroke of wall 26, its movement is mostly axially of the container 16, thus beginning an axially-forced deformation or collapse of the container walls, with relatively little movement in a direction inwardly of the container. In a subsequent stage of the travel of arm 26, the movement of arm 26 is substantially wholly in a direction inwardly of the container 16. This actuation achieves desired can-crushing effects with relatively little power requirement.

The right wall 46 is shown as supported on adjustment screws 48, whose adjustability permits the user to vary the size of chamber 18. An ejector bar 50 is shown as carried by wall 46, a rod 52 being connected to bar 50 and extending through wall 46. A compression spring 54, carried on rod 52 between bar 50 and wall 46, urges the ejector bar 50 leftwardly to loosen any can which would somehow cling to the wall 46; and an access opening 56 accommodates access to the head 58 of rod 52, the opening 56 being provided in the right outer wall 60 of the device 10 permitting the user to strike the head 58 of rod 52 if the spring 54 does not dislodge the container 16.

Each adjustment screw 48 is shown threadedly engaging a frame-carried boss 59.

The container rest or support 20 is shown as a rod 62 also extending through wall 46, and also through the right outer wall 60; and after the can-crushing operation, the user pulls the rod 62 rightwardly, permitting the crushed container 16 to fall through an outlet opening 64 in the bottom wall 44 of the device 10. A compression spring 68 is disposed on the rod 62, and between outer wall 60 and an enlargement 70 on rod 62, to bias the rod 62 to can-supporting (leftward) position; and a convenience knob 72 is provided on the outer (right) end of the rod 62 for grasping by the user to manipulate the rod 62 to effect a release of the crushed container 16.

It will be understood that means for stopping the movement of the arm 34 and bracket 28 will be provided, as by conventional means for breaking the electric circuit rendering circuit-closure by main actuator switch 74 ineffective to continue travel of wall 26, and return means will permit return of the arm 24 and bracket 28 to the position shown, ready for the next crushing operation, after the crushing operation hereinabove described.

Of course, any crushing of the container, in any direction, may and usually does have the effect of both a weakening and a compressing crushing the container; but for simplicity and emphasis of statement, these aspects are described as though they are independent effects of the different components of direction, and thus the scope is not to be considered as limited to the obtaining of these effects independently.

Co-operating with the adjustability of size shown as by adjustment screws 48 (the bottoms of which carry enlargements which turn in small brackets 76 mounted on wall 46), there may be provided suitable load-limit clutch or slip means (not shown) in the power train, as of an over-riding type which slips as soon as a certain amount of resistance is encountered.

It is thus seen that a crushing device according to concepts of the present invention provides novel and advantageous concepts and features providing for crushing of articles such as empty containers by force directed in two directions, that is, axially and inwardly of the container, achieving the weakening and flattening effects described, minimizing power requirements and achieving a crushing device of relatively small and convenient size.

Accordingly, it will be seen from the foregoing description of the invention, according to the embodiment to illustrate the inventive concepts, considered with the accompanying drawings, that the present invention provides a new and useful crushing device having desired advantages and characteristics, and accomplishing the intended objects, including those hereinbefore pointed out and others which are inherent in the invention.

Modifications and variations may be effected without departing from the scope of the novel concepts of the invention; accordingly, the invention is not limited to the

specific form or arrangement of components or features herein described or shown as illustrative of the inventive concepts, in the particular embodiment disclosed.

What is claimed is:

1. A crushing device having opposed wall members between which an article to be crushed is adapted to be disposed, and means relatively moving said wall members initially in a direction primarily relatively longitudinally of one another and subsequently in a direction primarily relatively toward one another, thereby obtaining crushing actuation by a combination of powered engagement of the said article initially in a direction which weakens the article by relative movement of its portions in a direction longitudinally of the wall-members, and subsequently in a different direction which compresses the weakened article.

2. The invention as set forth in claim 1 in a combination in which one of said wall members is carried in an arcuate path, the curvature of which is such as to guide the said one wall member to an initial primary longitudinal relative movement and to a subsequent primary inward relative movement.

3. The invention as set forth in claim 2 in a combination in which the moving one of said walls is carried on a bracket member, and in which the moving means includes a power arm which revolves in a circular path and is connected to said bracket member.

4. The invention as set forth in claim 1 in a combination in which means are provided to support said article in a position in which its axis is at least generally parallel to the said wall members, and the initially relative longitudinal movement of the wall members applies a force to said article to tend to force portions of said article relatively axially thereof, and the subsequent relative movement of said wall members toward one another applies a force to said article to force portions of said article relatively perpendicularly to the axis thereof.

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BILLY J. WILHITE, *Primary Examiner.*