Sept. 25, 1962 W. L. KOMPH, SR 3,055,289

CAN CRUSHER

Filed July 31, 1959 2 Sheets-Sheet 1

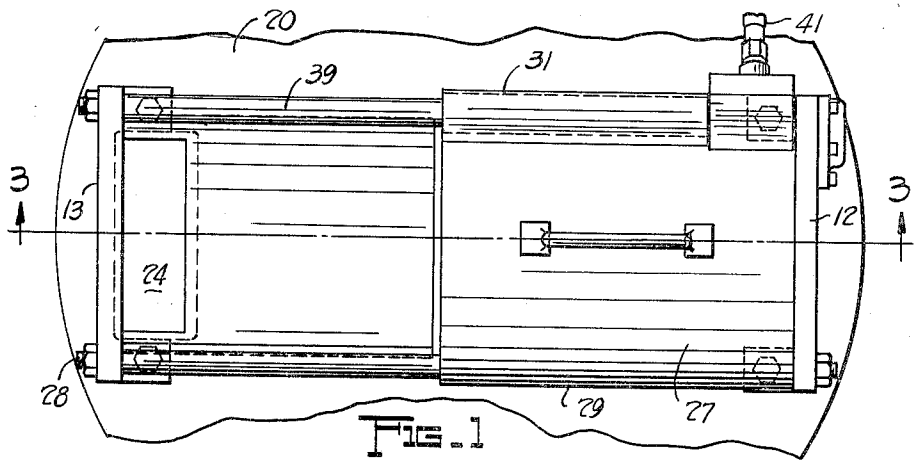


Fig. 1

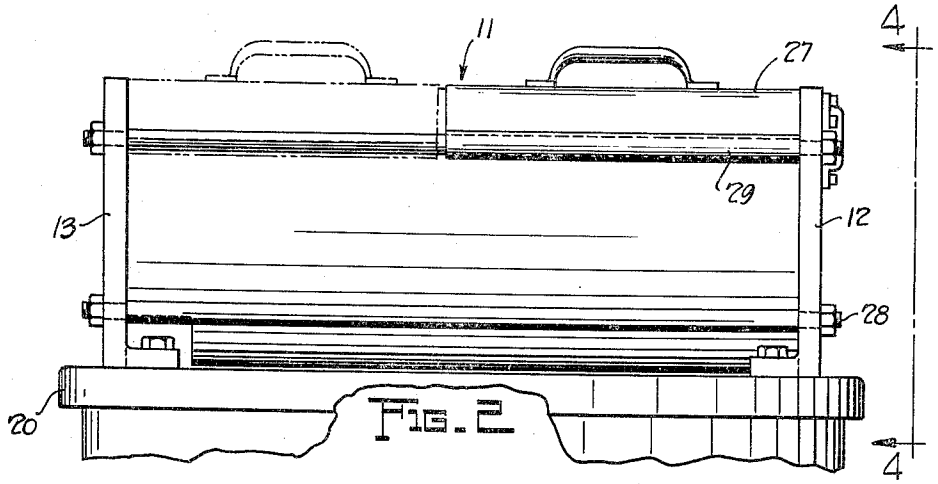


Fig. 2

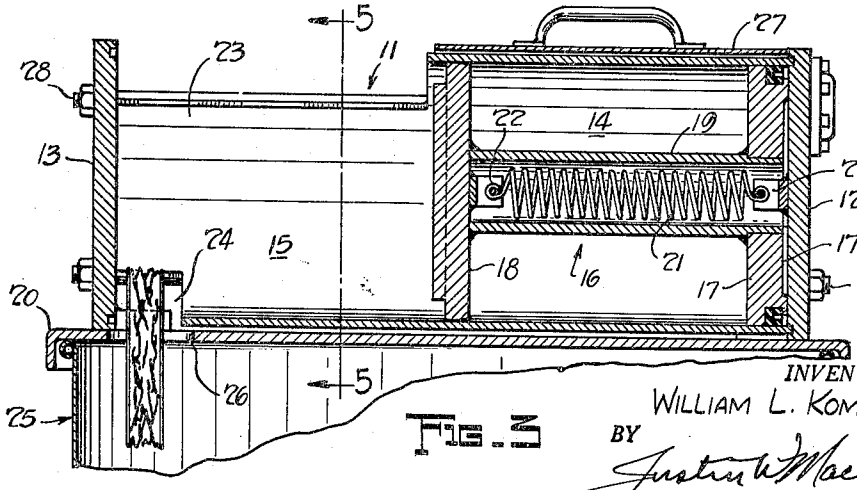


Fig. 3

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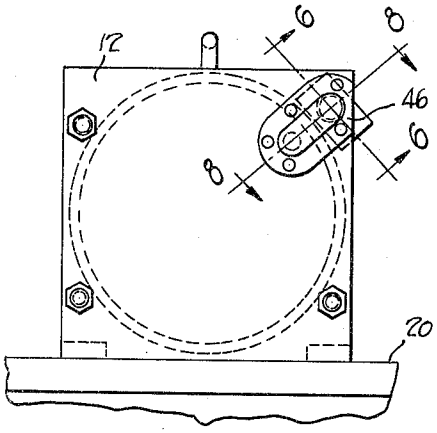


Fig. 4

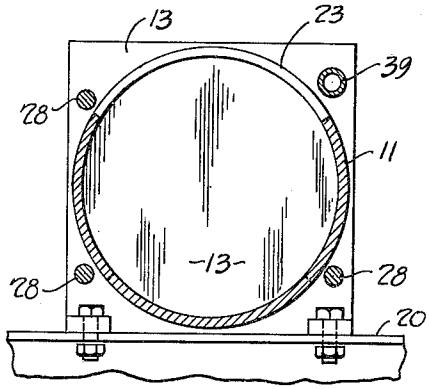


Fig. 5

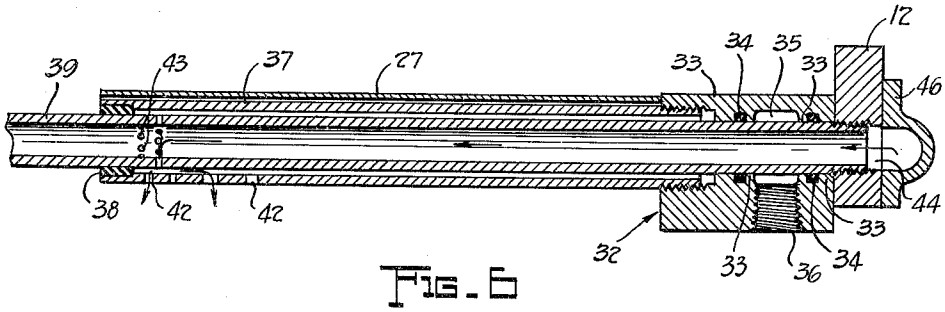


Fig. 6

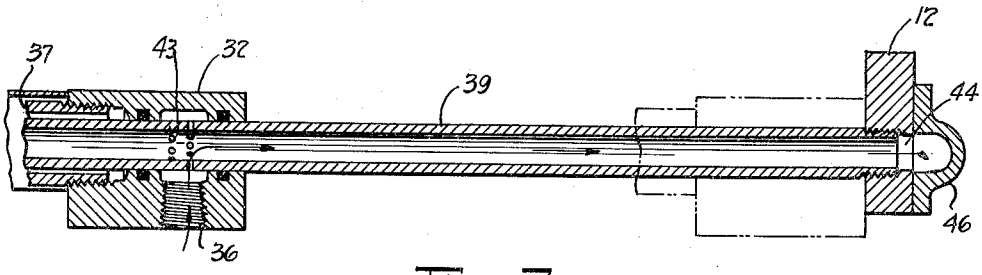


Fig. 7

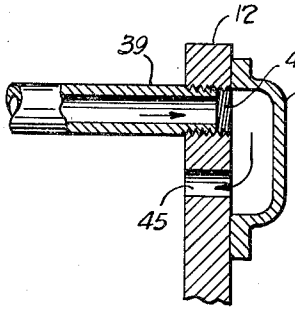


Fig. 8

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3,055,289

CAN CRUSHER

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7 Claims. (Cl. 100—53)

This invention relates to an improvement in can crushers of the type which are used in service stations and similar establishments to dispose of cans ranging in size from approximately one to five quarts.

A wide variety of can crushers have been developed in the past for compact storage and convenient disposal of empty cans. With the advent of aluminum cans, such devices have become of increased importance since means must be provided for the storage of aluminum cans because of their reclamation value. Of necessity, can crushers of the type described must be economical, relatively simple in construction and, at the same time, efficient and completely safe in their operation.

Most of the presently used can crushers fail to meet the required standards since they are comparatively complex in design and are constructed from a plurality of parts, thus contributing to a high manufacturing cost Many of the prior art devices also are functionally objectionable since the crushing head is unsupported except for a pneumatic or mechanical linkage which permits the head to crush the can unevenly and, in many instances, to jam thereby necessitating need for frequent repair.

Although conventional can crushers are frequently provided with safety features, such as an enclosed crushing chamber designed to prevent the operator from injuring his hands, they have not been found "foolproof" in operation. Often the safety features can be "overrun," that is, the crusher operated without the protection of the safety means.

The present invention obviates these and other disadvantages by providing a uniquely designed can crusher which is relatively inexpensive to manufacture and which is efficient in operation and not subject to jamming. The present invention includes a foolproof safety device in a can crusher which can be quickly and easily operated and yet cannot be overrun.

Other objects and attendant advantages of the present invention will become apparent as the same becomes better understood when considered in connection with the following detailed description and in conjunction with the accompanying drawings wherein:

FIGURE 1 is a plan view of the can crusher embodying my invention.

FIGURE 2 shows a side elevation of the same.

FIGURE 3 is a longitudinal, sectional view taken along a vertical plane indicated by the line 3—3 of FIG. 1, looking in the direction of the arrows.

FIGURE 4 is an end view taken as indicated by the line 4—4 of FIG. 2.

FIGURE 5 is a transverse section taken on a plane indicated by the line 5—5 in FIG. 3, looking in the direction of the arrows.

FIGURE 6 shows a sectional view along the axis of the telescoping air tubes forming a part of my invention, with the cover in its open position, the plane being along the line 6—6 of FIG. 4.

FIGURE 7 is a sectional view similar to FIG. 6, but with the cover of the device closed.

FIGURE 8 is a fragmentary sectional view taken on a plane at the line 8—8 of FIG. 4.

Referring now to the drawings by reference numerals, it will be seen that the can crusher is comprised generally of a tubular casing 11 having its ends sealed by end plates 12 and 13 mounted on a base 20, and a composite crushing ram and piston unit 16 arranged to reciprocate within the casing.

As shown in FIG. 3, casing 11 defines both a cylinder 14 and a crushing chamber 15. The dual function of the casing, combined with the fact that it may be conveniently formed from any material of suitable strength, such as aluminum or the like, contributes to a unit of low manufacturing cost.

The crushing ram 16 includes a piston 17 and a crushing head 18 connected together by a suitable means which, as shown in FIG. 3, may take the form of a hollow rod 19. The ram, piston, and connecting means may be separately constructed and then welded together to form the crushing unit 16, or alternatively, the unit 16 may be formed in a single piece by well known techniques, such as impact extrusion and casting. In operation, the ram is arranged so that the crushing head is moved into the crushing chamber by fluid acting on face 17*a* of the piston 17 while a spring 21 is provided to return the ram to the position indicated in FIG. 3. The spring 21 has its ends fastened to inwardly extending ears 22 on the end plate 12 and head 18, and, in the embodiment illustrated, is conveniently disposed within the rod 19.

It will be apparent that the crushing head 18 will be guided in the crushing stroke by the contiguous inner wall of the casing which forms the crushing chamber area. The positively guided movement prevents the head from cocking and possibly jamming when it applies pressure, as is often the case in conventional apparatus. Thus the can is uniformly crushed and the danger of possible damage to the apparatus eliminated.

Access to the compression chamber 15 is provided by an opening 23 which has a size sufficient to receive up to a five quart can. Preferably the sides of the opening are above the center line of the crushing chamber in order to maintain maximum sliding contact between the crushing head and the casing. A smaller opening 24 is provided at the bottom end of the crushing chamber adjacent end wall 13, and is designed to permit the crushed can to fall by gravity from the chamber and through an aligned opening 26 in base 20. Base 20 is formed so that the can crusher can be positioned over an empty drum 25 which will receive and store the crushed cans as they fall from the crushing chamber.

The opening 23 must be closed by the arcuate, slidable cover 27 before fluid can be injected into the cylinder to initiate the crushing cycle. In the embodiment shown, one of the tie rods 28 securing the end walls to the casing serves as a guide for one side 29 of the cover. The other side 31 of the cover is guided for reciprocal motion by a tubular rod 39 which has its ends connected to the end plates.

Referring to FIGS. 6 and 7, it will be observed that side 31 consists of an integral control valve 32 slidably engaged with rod 39 by means of internal lands 33. Lands 33 define a fluid chamber 35 surrounding member 39 and

are provided with suitable sealing means such as O-rings 34. Access to the fluid chamber is provided by a threaded aperture 36 adapted to be connected to a flexible pipe or conduit 41 leading from a pressure source. A combined muffler and exhaust tube 37, concentrically mounted around tube 39 and spaced therefrom, has one end threaded into the control valve and its opposite end provided with a sealing ring 38 which engages the surface of member 39. The muffler is effective to render the operation of the can crusher substantially noiseless. Apertures 42 venting to the atmosphere are located in the end of the exhaust tube or muffler 37 opposite the control valve while a double row of staggered apertures 43 are provided in the wall of tube 39 communicating with the interior of the tube.

The threaded aperture 36 and fluid chamber 35 in the control valve, apertures 43 and the interior of tube 39, together with apertures 44 and 45 in the end wall 12 and a housing 46 secured to the end wall, co-operate to form a fluid passageway connecting conduit 41 to the interior of the cylinder.

At the start of the crushing cycle, the fluid pressure source is connected to conduit 41 while the cover is in open position as shown in FIGS. 1–4 and 6, and a can is horizontally inserted in the compression chamber. It will be observed that, even though the fluid pressure source is turned on at this time, movement of the ram cannot be occasioned with the cover in its open position since there is no way for the fluid to enter tube 39 and thence to the cylinder. When the cover is closed (FIG. 7), fluid is free to flow in the direction of the arrows through apertures 43 into tube 39 and then into the cylinder via apertures 44 and 45 and housing 46. Fluid acting on the face 17*a* of piston 17 will then force the crushing head into the crushing chamber against the end of the can.

When the crushing stroke of the ram has been completed, the cover may be opened thereby again interrupting the fluid passageway leading to the cylinder. With the cover opened as shown in FIG. 6, the head will be withdrawn from the compression chamber under the tension of spring 21 while fluid is vented from the cylinder to the atmosphere via tube 39 and apertures 42 and 43 thereby completing the crushing cycle.

It will be apparent from the detailed description above that the safety feature comprised of the sliding control valve is foolproof in its operation and cannot be overrun by inadvertence or design of the operator. At the same time, the operation of the invention is extremely simple, the operator being required only to close the cover to instigate the crushing cycle of the ram.

Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood, that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A can crusher comprising a tubular casing, end walls at either end of said casing, said casing and end walls defining an axially aligned cylinder and crushing chamber, a ram reciprocal along the longitudinal axis of said casing, said casing being provided with an opening communicating with the interior of said crushing chamber, an arcuate cover, means slidably mounting said cover adjacent the outer surface of said casing, said cover being movable between a first position where said opening is uncovered and a second position where said opening is closed, a substantially rigid tube mounted adjacent the outer surface of said casing and extending in a direction parallel to the path of movement of said cover, said tube communicating with said cylinder, said rigid tube having apertures therein, and a control valve having a pressure conduit slidably mounted on said tube, said control valve being secured to said cover and movable between said first position where said control valve is spaced from said apertures and said second position where said control valve is aligned with said apertures and fluid is free to enter said cylinder.

2. A can crusher as claimed in claim 1 wherein said ram comprises a piston, crushing head, and connecting means therebetween, said fluid being operative against said piston to drive said ram into said crushing chamber when the cover is in said second position.

3. A can crusher as claimed in claim 2 including a spring connected to said ram and one of said end walls, said spring being operative to withdraw the crushing head from said crushing chamber when the cover and control valve are moved from said second position.

4. A can crusher as claimed in claim 3 including an exhaust tube secured to said control valve and concentrically positioned around said first mentioned tube, said exhaust tube having an aperture therein.

5. A can crusher comprising a hollow tubular casing, end walls at either end of said casing, said casing and end walls defining an axially aligned crushing chamber area and cylinder area, said casing having a can receiving opening in said crushing chamber area, a cover substantially the size of said opening, means mounting said cover adjacent the outer surface of said casing for reciprocal movement between a first position where said opening is uncovered and a second position where said opening is covered, ram means reciprocally mounted within said casing, means defining a fluid passageway communicating with said cylinder area, said fluid passageway means being mounted adjacent to the outer surface of said casing and extending in a direction substantially parallel to the path of movement of said cover, and a control valve secured to said cover and slidably mounted on said fluid passageway means, said control valve being movable with said cover between said first position where fluid is prevented from entering said passageway means and said second position where fluid is free to enter said cylinder area through said passageway means to act on said ram means.

6. A safety device for air operated apparatus having a cylinder and piston comprising a substantially rigid conduit connected to said cylinder, said rigid conduit having an aperture in the wall of said conduit, a control valve slidably mounted on said conduit, a pressure conduit connected to said control valve for movement therewith, said control valve being movable between a first position where said control valve is spaced from said aperture and a second position where air pressure from said pressure conduit is free to pass through said aperture and said rigid conduit into said cylinder to actuate said piston, and a muffler secured to said control valve and concentrically positioned around said rigid conduit, said muffler having apertures therein and being effective to render the operation of said air operated device substantially noiseless.

7. A can crusher comprising a substantially enclosed crushing chamber including a side wall and an end wall, said side wall being provided with an opening so that a can may be placed within said chamber, a crushing head disposed in sliding contact with said side wall within said chamber, said crushing head being movable toward said end wall to crush a can therebetween, a cover for closing said opening, means mounting said cover adjacent said side wall for movement between a first position in which said opening is uncovered and a second position in which said opening is closed, a cylinder connected to said crushing chamber, a fluid-actuatable piston reciprocally disposed within said cylinder, means connecting said piston to said crushing head so that movement of said piston in one direction will slide said crushing head toward said end wall, a tube connected to said cylinder, said tube having apertures therein, a control valve having a pressure conduit slidably mounted on said tube, pressure fluid supply means connected to said conduit, and means interconnecting said control valve and cover so that movement of said cover to said second position acts to align said control valve with said apertures to admit pressure

fluid to the cylinder and movement of said cover to said first position acts to space said control valve from said apertures to shut off flow of pressure fluid to the cylinder.

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