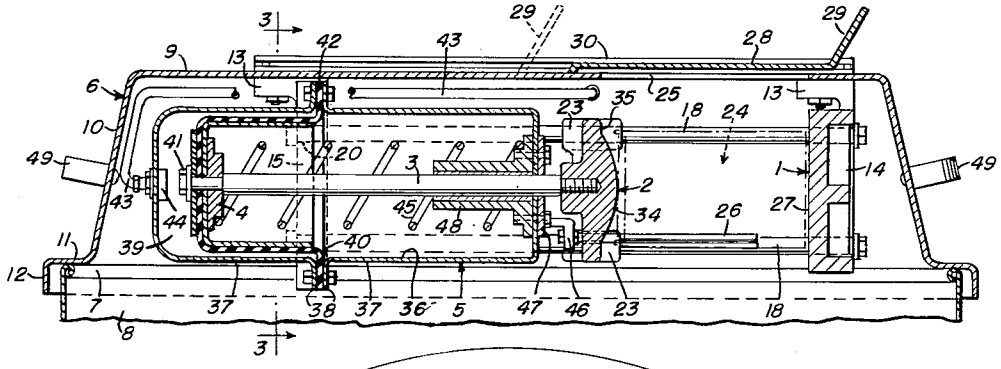
May 15, 1962 J. McC. HOWELL 3,034,422

CAN CRUSHER

Filed Feb. 4, 1958 2 Sheets-Sheet 1

FIG. 2



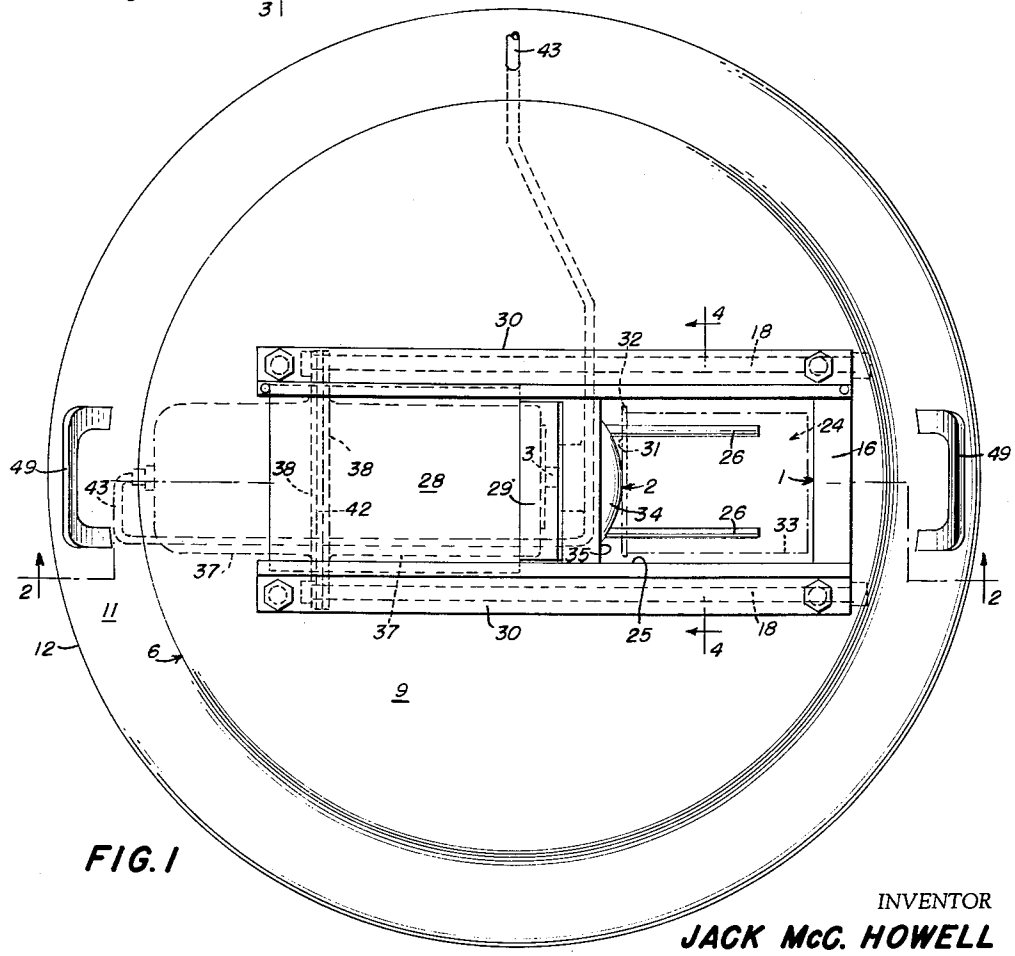


FIG. 1

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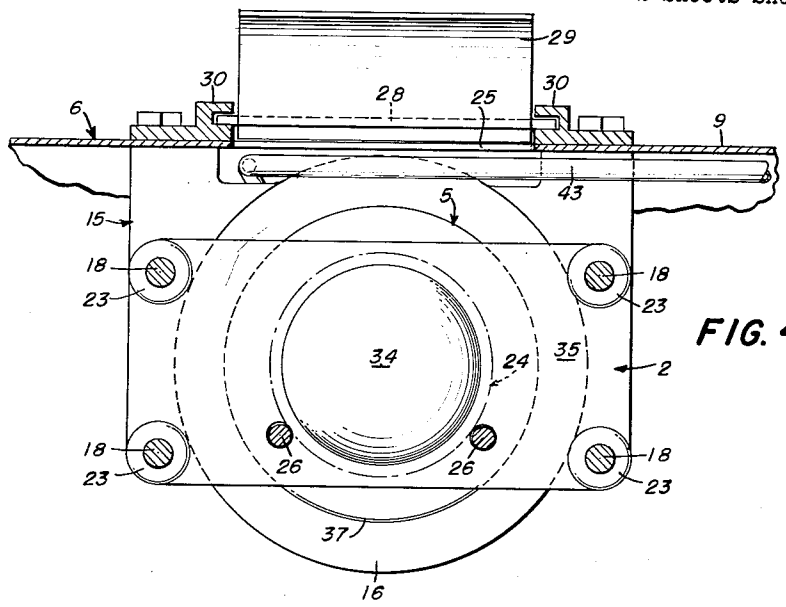

FIG. 4

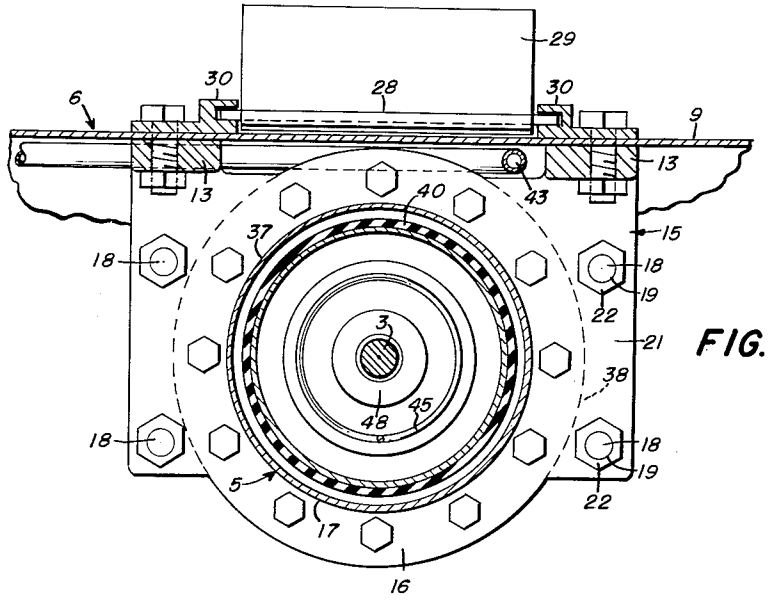

FIG. 3

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CAN CRUSHER

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2 Claims. (Cl. 100—70)

This invention relates to a can crusher for crushing empty oil and like cans.

A number of can crushers have been devised for crushing cans after they have been emptied of their contents to reduce the bulkiness of the cans and thus facilitate storage and subsequent handling. Such crushers are of two general types, one of which first pierces or cuts the ends of a can and then crushes the can radially. The other type crushes a can axially between a pair of relatively movable flat heads and is preferable over the first type in its ability to crush a can in a single step. However, the present axial crushers have the disadvantage of requiring a relatively high force. I have now discovered that if, at the outset of the crushing operatoin, at least one end of the can is bulged inwardly, the can can be crushed by about one-third the force required by a flat-headed crusher.

It therefore is the primary object of the present invention to provide an improved can crusher wherein at least one of a pair of relatively movable heads between which a can is axially crushed carries a blunt protuberance for bulging the confronting end of the can inwardly at the outset of a crushing operation, thereby markedly reducing the force required to crush the can.

Another object of the invention is to provide an improved can crusher which is operable by fluid pressure or mechanically to shift a movable towards a fixed head and wherein one of the heads carries a blunt protuberance for bulging the confronting end of a can inwardly so that the can can be crushed by a relatively low force exerted by the movable head.

An additional object of the invention is to provide an improved can crusher which not only can crush a can by relatively low pressure but is adapted for mounting on an open-topped receptacle and after crushing a can automatically discharges it into the receptacle.

A further object of the invention is to provide an improved can crusher operable under relatively low pressure and so arranged and constructed as readily to receive a can and enclose the can during the crushing operation.

Other objects and advantages of the invention will appear hereinafter in the detailed description, be particularly pointed out in the appended claims and be illustrated in the accompanying drawings, in which:

FIGURE 1 is a plan view of a preferred embodiment of the improved can crusher of the present invention;

FIGURE 2 is a vertical sectional view taken along the lines 2—2 of FIGURE 1;

FIGURE 3 is a vertical sectional view taken along the lines 3—3 of FIGURE 2; and

FIGURE 4 is a vertical sectional view taken along the lines 4—4 of FIGURE 1.

Referring now in detail to the drawings, in which like reference characters designate like parts, the improved can crusher of the present invention is adapted for use wherever the reduction in bulk of empty cans is necessary or desirable to facilitate subsequent handling. However,

it is particularly designed for use in gasoline service stations in crushing the recently introduced aluminum oil cans, the metal in which is intended to be salvaged for reuse to render them competitive with conventional steel cans. Basically, the improved can crusher is comprised of a pair of relatively movable heads, at least one of which carries a blunt protuberance adapted to engage and bulge inwardly a confronting end of an can at the outset of the crushing operation, support means for supporting a can between the heads with a confronting end substantially centered on the protuberance, and means for moving the heads toward each other and crushing a can therebetween.

As exemplified in the illustrated embodiment, in which it has been adapted for service station use, the can crusher has a fixed head **1** and a movable head **2** normally spaced from and movable or reciprocable longitudinally or axially realtive to the fixed head. While the movable head **2** may be moved mechanically in either or both directions relative to the fixed head, it will usually be preferred, particularly for service station use in which a source of fluid pressure is readily available, to apply can crushing force to the movable head by fluid pressure. Accordingly, in the illustrated form, the movable head **2** is attached to the outer end of a piston rod **3**, the piston **4** of which reciprocates in a cylinder **5**.

Although the mounting of the operating parts of the can crusher may vary depending on the intended use, for service station use the heads **1** and **2** and fluid pressure cylinder **5** advantageously may be mounted on a housing or casing **6** which serves as both a mounting and a housing. Fittable over the upper end **7** of an open-topped oil drum or like receptacle **8**, the illustrated housing **6** is a substantially frusto-conical shell having a substantially horizontal top wall **9**, an upwardly tapering frusto-conical side wall **10** and an annular foot **11** bounding the lower extremity of and outstanding from the side wall and in turn bounded outwardly by a depending annular skirt **12**, the foot **11** resting on and being positioned or centered by the skirt **12** relative to the upper end **7** of the drum **8**. The described housing **6** readily lends itself to suspension of the operating parts of the crusher through a plurality of longitudinally or axially or, relative to the housing, radially spaced mounting blocks or hangers having at their upper ends horizontally directed legs **13** underlying and releasably attached or secured, as by bolting, to the top wall **9** of the housing. One of the illustrated mounting blocks, designated as **14**, carries or supports and may have formed integrally with it the fixed head **1**, while the other illustrated block **15** supports or carries and, as well, may have formed integrally with it a collar or ring **16** apertured as at **17** to receive the cylinder **5**.

In part to rigidify the structure, the mounting blocks **14** and **15** are both connected and spaced in substantially parallel relation by a plurality of parallelly extending rods or rails **18**, here arranged in vertically spaced pairs, the rods having radially reduced threaded ends **19** extending through holes **20** in flange portions **21** formed on each of the mounting blocks outwardly of its fixed head **1** or collar **16**, respectively, and therebeyond carrying clamping nuts **22**. Both spacing and connecting the mounting blocks **14** and **15**, the rods **18** also conveniently serve as guide rods or rails for slidably mounting the

movable, reciprocable or shiftable head 2, the latter for that purpose being provided with a plurality of preferably integral cylindrical bosses 23, each slidably receiving one of the guide rods.

The heads 1 and 2, initially or normally, are spaced longitudinally or axially from each other sufficiently to accommodate, endwise, a can, designated as 24, of one-quart or other size, for which the crusher is designed and the guide rods 18 of each pair are spaced sufficiently horizontally to permit vertical passage of such a can therebetween. Insertible between the heads 1 and 2 through an overlying opening 25 in or interrupting the top wall 9 of the housing 6, a can is supported or held in position to be crushed endwise by support or seat means, preferably in the form of a pair of support bars or rods 26 extending parallel to the direction of movement of the movable head 2 and thus to the guide rods 18. Disposed below the level and to either side of the center of the movable head 2 and at a horizontal spacing which, at their level, will substantially center a can axially on the heads, the support rods 26 conveniently may be anchored or fixed at their outer ends to the adjacent or contiguous end of the fluid pressure cylinder 5 and extend axially through and be slidably received by the movable head. At their inner ends, the support bars terminate short of the confronting flat face 27 of the fixed head 1 with the space therebetween sufficient to permit a crushed can to drop therethrough into the receptacle 8. For protection, the opening 25 above the heads 1 and 2 preferably is made closable by a door or closure member 28 attached to the housing 6, the illustrated door being graspable by a lip or knob 29 and slidable to open and closed position between guides or slides 30 fixed or secured to the upper side of the top wall 9.

With a can supported endwise between the heads 1 and 2 on the supporting rods 26, the pressure stroke of the movable head 2 first applies pressure by engagement of its blunt protuberance or bulge with the confronting end 31 of the can. As the pressure exerted between the fixed and movable heads continues to be applied, this end 31 of the can is bulged inwardly, exerting an inward radial pull or pressure on the surrounding crimped rim 32 of the can and in turn on the adjoining end portion of the can's side wall 33. Weakened by the inward pressure on its end, the side wall 33 of the can begins to crumple from that end as axial pressure is applied to it by the movable head 2 and, thereafter, during the pressure stroke, crumples progressively towards its far end until fully crushed.

The important consequence of the initial weakening of the side wall 33 adjacent the inwardly bulged end 31 is that the can can be crushed by about one-third the force required with flat-faced heads, permitting a reduction in the total pressure from about 200 pounds to about 70 pounds in the case of a one-quart aluminum oil can. Blunt-nosed to apply pressure, without cutting, to the confronting end 31 of the can 24, the bulge or protuberance 34 acts most effectively when the inward pressure is exerted substantially uniformly about the rim 32 and, accordingly, preferably is not only arcuately but spherically convex. Also, while the width or diameter of the bulge 34 may be greater than the outside diameter of the rim 32, the resultant outward force on the rim, when the latter is engaged by the movable head 2, to a degree could nullify the effect of the radially inward pressure attendant the inward bulging of the end 31. Consequently, it is preferred that the width or diameter of the bulge 34 be substantially or at most no greater than the inside diameter of the rim 32 of the can for which the pressure is designed and that the face 35 of the movable head 2 outwardly of or interrupted by the bulge be substantially flat and parallel to the flat face 28 of the fixed head 1.

While other forms of fluid pressure or, as previously mentioned, even a mechanical drive will suffice to drive the movable head 2 at least in its pressure or power stroke, the illustrated form of the fluid pressure cylinder 5 especially lends itself to the intended installation. Instead of housing a piston carrying a gasket wiping against its inner wall 36, the cylinder 5 is made of two parts 37 carrying confronting flanges 38 connectable as by bolting to each other and to the flange 21 carried by the mounting block 15 and contains the inwardly facing cup-shaped piston 4 opening inwardly or away from a fluid pressure chamber 39 in the outer end of the cylinder 5. Spaced inwardly radially from the inner wall 36 of the cylinder 5 the piston 4 is enabled to seal the pressure chamber 39 from the balance of the piston by a rubber or other flexible diaphragm 40 wrapping or extending about the piston in the normal position of the latter and secured centrally to the inner end 41 of the piston rod 3 and at its marginal edge 42 between the confronting flanges 39 on the two parts of the cylinder. With this construction, introduction of air or other fluid into the chamber 39 through an inlet line 43 and inlet port 44 forces the piston 4 to move toward the opposite end of the cylinder 5 with the diaphragm 40 meanwhile unrolling from the piston to follow its movement. On completion of the power or pressure stroke, here determined by the spacing between the heads 1 and 2, the fluid pressure to the chamber 39 is shut off and the fluid in the chamber is bled, enabling the piston 4 to be restored to initial or normal position by a return spring 45 encircling the piston rod 3. It has been mentioned that the support rods 26 may conveniently be anchored at their outer ends to the adjoining end of the cylinder 5. With the illustrated cylinder, this is readily accomplishable by anchoring the support rods 26 to anchors or brackets 46, in turn anchored or secured to a mounting disc 47 for the bushing 48 in which the piston rod slides.

Readily handleable by handles 49 attached to the side wall 10 of its housing 6, the illustrated can crusher may be connected to a source of fluid pressure (not shown) through a suitable fitting (not shown) on its inlet line 43 and thereafter may be operated at will to crush a can by any suitable hand or foot operated valve (not shown). It should be understood that the described and disclosed embodiment is merely exemplary of the invention and that all modifications are intended to be included which do not depart from either the spirit of the invention or the scope of the appended claims.

Having described my invention, I claim:

1. A can crusher comprising a fixed head, a head reciprocable relative to said fixed head, means for reciprocating said reciprocable head, support means for supporting a can endwise between said heads, said heads having substantially flat and parallel confronting faces for engaging confronting rims of said can and therethrough applying axial pressure to crush a side wall thereof, and means for weakening said side wall of said can prior to crushing, said weakening means including a blunt bulge interrupting the flat face of one of said heads and projecting inwardly therefrom toward said other head a distance greater than the axial projection of the confronting rim beyond an adjoining end of said can, said bulge having a width less than the inside diameter of the confronting rim of said can and being substantially centered thereon for bulging said end inwardly on movement of said heads toward each other in advance of engagement of both of said rims.

2. A can crusher comprising a fixed head, a head reciprocable relative to said fixed head, means for reciprocating said reciprocable head, support means for supporting a can endwise between said heads, said heads having substantially flat and parallel confronting faces for engaging confronting rims of said can and therethrough applying axial pressure to crush a sidewall there-

of, and means for weakening said side wall of said can prior to crushing, said weakening means including a spherically convex bulge interrupting the flat face of one of said heads and projecting inwardly therefrom toward said other head a distance greater than the axial projection of the confronting rim beyond an adjoining end of said can, said bulge having a width less than the inside diameter of the confronting rim of said can and being substantially centered thereon for bulging said end inwardly on movement of said heads toward each other in advance of application of axial pressure to said side wall.

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