Nov. 26, 1968 J. W. KILLOUGH ET AL 3,412,675

METAL CAN CRUSHING DEVICE

Filed Aug. 3, 1966 2 Sheets-Sheet 1

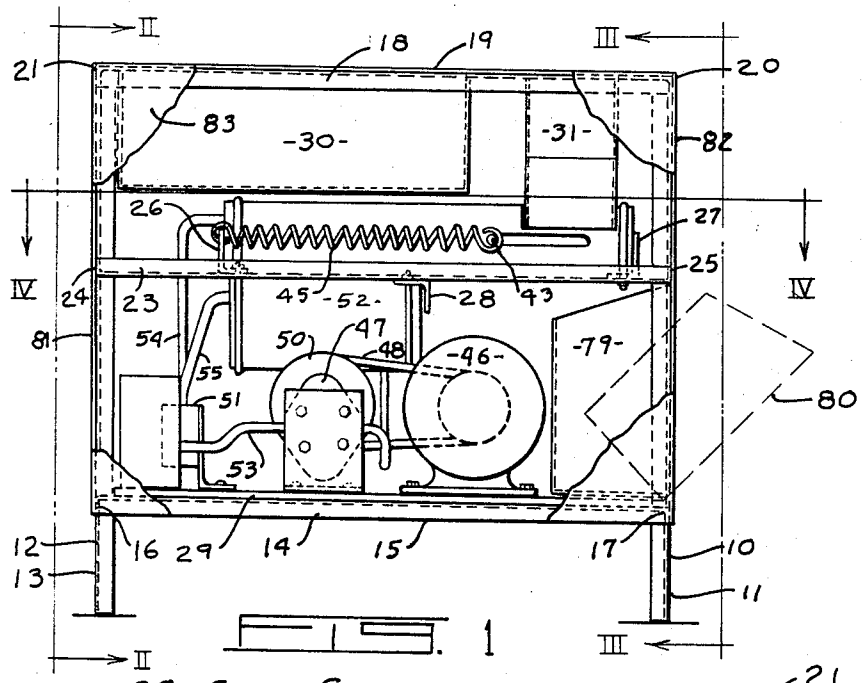


FIG. 1

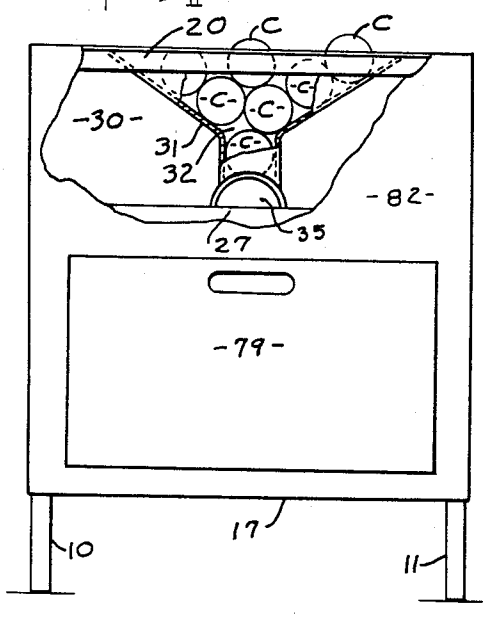


FIG. 3

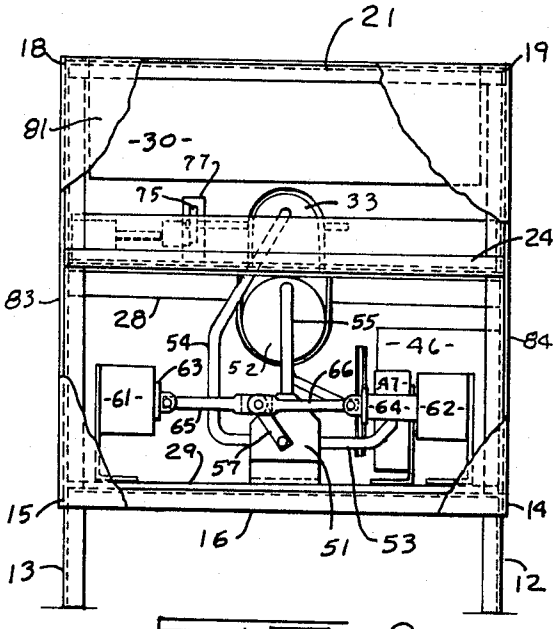


FIG. 2

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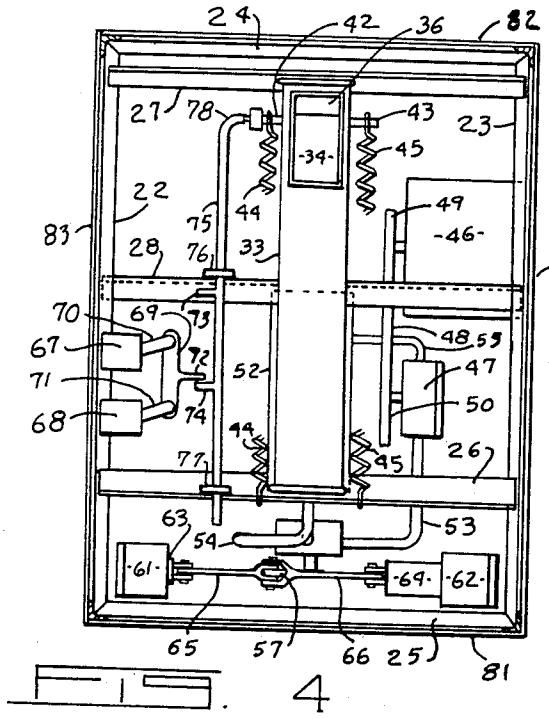


FIG. 4

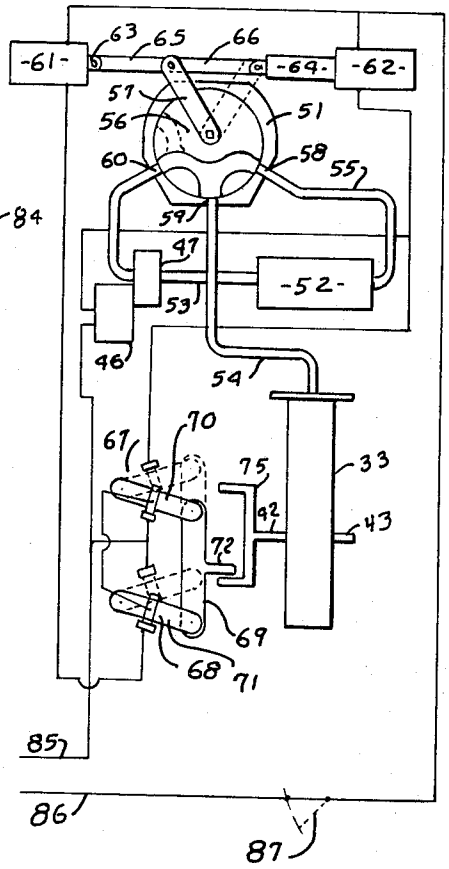


FIG. 6

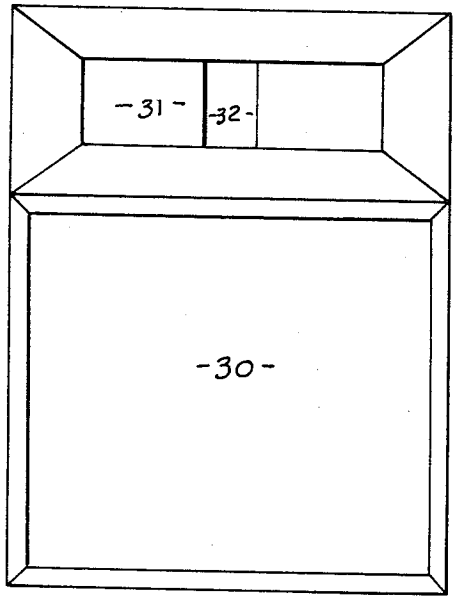


FIG. 5

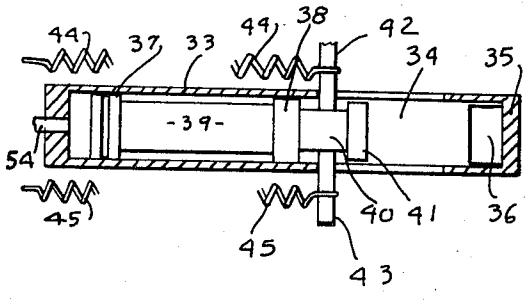


FIG. 7

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METAL CAN CRUSHING DEVICE

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2 Claims. (Cl. 100—215)

ABSTRACT OF THE DISCLOSURE

This metal can crushing device includes a tray for receiving empty cans with a cradle and a cylinder beneath the tray and a passage through the bottom of the tray into the cradle through which empty cans can be fed into the cradle preparatory to entering a power driven ram that is operable in the cradle for can crushing purposes and means for discharging the crushed cans from the cylinder into a receiving element for carry out and emptying purposes.

This invention relates to an improvement in metal can crushing devices. In such places as taverns, drink dispensaries, restaurants and the like where canned beverages are sold there is usually a sizable accumulation of empty metal or even cardboard or plastic containers that are bulky and occupy considerable space that is often needed for other purposes. In view of this fact we have provided our improved metal can crushing device wherein these empty containers can be placed and crushed or mashed into a thin piece of material so as to occupy the least possible space until they can be disposed of as trash and the like.

In view of the fact that this crushing operation requires considerable power our crushing device is hydraulically powered and the device is very sturdy in construction and will withstand considerable strain and pressure for the purpose it is intended to be used. A further object of the invention is to provide a device of the kind mentioned that is repetitious in its crushing movements so that containers can be speedily crushed or mashed in a minimum amount of time. The device is comparatively simple in construction as well as being sturdy and will therefore be highly efficient in its work and will be very durable and long lived.

These and other objects of the invention will be more fully explained as this description progresses. Now referring to the accompanying drawings in which similar numerals of reference designate the same parts throughout the several figures of the drawings:

FIG. 1 is a side view of the machine in which portions of the side wall are broken away for the convenience of showing internal working parts of the machine.

FIG. 2 is an end view of the machine in which part of the end wall is broken away for the convenience of showing internal parts of the machine, the view being as seen from the line II—II in FIG. 1 and looking in the direction of the arrows.

FIG. 3 is an opposite end view from that shown in FIG. 2 and having a part of the end wall broken away in order to show internal parts of the machine, the view being as seen from the line III—III in FIG. 1 and looking in the direction of the arrows.

FIG. 4 is a detail sectional view through the machine, the view being as seen from the line IV—IV in FIG. 1 and looking in the direction of the arrows.

FIG. 5 is a top plan view of the machine.

FIG. 6 is a schematic diagram showing the electrical system, the mechanical and hydraulic system of the machine and their co-operable association each with the other.

FIG. 7 is a detail sectional view through the hydraulic cylinder cradle and anvil.

In the drawings the machine is shown as having a substantially rectangular frame structure made preferably of angle iron metal and in which the frame includes four angle iron combination corner and support legs **10**, **11**, **12** and **13** to which is rigidly fixed a horizontally disposed lower frame having the two side and spaced apart members **14** and **15** and the two spaced apart end members **16** and **17** that are all equally spaced well above the lower ends of the supporting legs **10**, **11**, **12** and **13**.

The machine is further provided with an upper horizontally disposed rectangular frame having the two spaced apart side members **18** and **19** and the two spaced apart end members **20** and **21** which are all carried on the upper ends of the legs or corner elements **10**, **11**, **12** and **13**.

The machine is still further provided with an intermediate horizontally disposed rectangular frame having the two spaced apart side frame members **22** and **23** and the two spaced apart end frame members **24** and **25**, all of which are rigidly attached to and are supported by the four leg or corner members **22** and **23**, **24** and **25**, **10**, **11**, **12** and **13** at a point intermediate the afore defined upper and lower rectangular horizontal frames, and intermediate the end members **24** and **25** and parallel therewith is a cross frame member **26** that is rigidly carried by the two side frame members **22** and **23**.

The intermediate frame **22**, **23**, and **24** and **25** is further provided with two more cross members **27** and **28** located one on opposite sides of the cross member **26**, the end frame members **24** and **25**.

The lower rectangular frame members **14**, **15**, **16** and **17** have a floor member **29** which covers the entire frame and is supported thereby.

All of this frame structure is for the support and carriage of all the working parts of the machine and for the enclosure thereof as will be later described.

The machine is further provided with a combination tray **30** and a rectangular portion or funnel **31** that fits snugly between the side frame members **18** and **19** and end members **20** and **21** of the upper rectangular frame, and extends downwardly therethrough and the upper outside edge portion of the tray **30** and funnel **31** are turned outwardly so as to rest on the upper rectangular frame members **18**, **19**, **20** and **21** so as to rigidly support the tray **30** and funnel **31**.

The funnel **31** has a rectangular opening **32** therein that is of such size that a cylindrical shaped can C of a predetermined design may be laid on its side and passed through the opening **32**.

Beneath the tray **30** and funnel **31** is positioned the can crushing or collapsing mechanism which comprises a unit consisting of a hydraulic cylinder **33**, and a combination cradle and crushing trough **34** which is positioned directly beneath the funnel opening **32** and in can receiving relationship thereto.

The rear end of the cradle **34** is provided with an anvil element **35** in the cradle element and immediately next to the anvil element is a discharge opening **36**.

In the cylinder **33** is a piston **37** and a ram guide **38**, the two of which are connected by a push rod **39** and extending forwardly from the ram guide **38** and rigidly connected thereto is a ram rod **40** having ram head **41** that is rigidly attached thereto and the ram head **41** substantially fits and lies within the cradle **34** and rigidly attached to the ram rod **40** is a pair of aligned and oppositely projecting spring pins **42** and **43**.

The machine is further provided with a pair of helical tension retracting springs **44** and **45** that are positioned one on opposite sides of the cylinder **33** and are parallelly

disposed therewith. And one end of each spring 44 and 45 is connected with its respective cross pins 42 and 43 and the other end of each spring is connected to the cross frame member 26 so as to retract the piston and the ram rod portions rearwardly into the cylinder 33.

The device is further provided with a power unit (preferably an electric motor) and a hydraulic pump 47, both of which are carried on the floor member 29 in such a manner that the power unit 46 may drive the pump unit 47 by means of a flexible element 48 (preferably a V-belt), passing around the pulleys 49 and 50 on the power unit and the pump 47.

The machine is also provided with a hydraulic reservoir unit 52.

The device is further provided with a hydraulic control valve 51 that is also carried on the floor 29. The control valve 51 is preferably of the cylinder type valve having connections with both the hydraulic cylinder and the reservoir 52 as shown in FIG. 6. There is a feed pipe 53 connecting between the reservoir 52 and the pump 47.

Another combination pressure feed and exhaust line 54 connects between the cylinder 33 and the valve 31 and the device is still further provided with a third line 55, which is an exhaust from the valve 51 to the reservoir. The cylinder of the valve is provided with an operating lever 57 which will serve to rotate the valve cylinder portion 56 to its several positions as will later be described. The wall of the valve 51 has ports 58, 59 and 60 therein and therethrough, that are so positioned as to come into registry with valve passages as shown in FIG. 6 and are so set that the fluid will flow in the return direction and into the reservoir 52 and as the valve 56 is rotated, the ports will come into registry at such a time that a pressure line will be created from the pump and into the cylinder 33 whereupon the piston 37 and ram 39 will be forced forward with great force to crush a can that would be lying in the cradle 34, between the ram 41 and anvil 35, at which time, through a mechanism (later to be described) the valve cylinder 56 will be rotated to complete an exhaust passage through a pipe 54 and the valve 51 and return line 55 into the reservoir 52.

This action would be accomplished by reason of the retracting tension of the two springs 44 and 45, whereupon the valve is ready for a repeat of the action above described.

The device is further provided with a valve operating device which is comprised of a pair of spaced apart and opposed electric solenoid coils 61 and 62. The coil 61 has a movable core 63 and the coil 62 has a movable core 64. The mechanism is provided with a pair of links 65 and 66. One end of each link is pivotally connected to the outer end portion of the valve lever 57 and the other ends of the links 65 and 66 are connected one to each of the movable cores 63 and 64, so that the coils 61 and 62, when energized alternately will rock the valve operating lever 57 back and forth to alternately position the valve cylinder 56 for the reversing flows of hydraulic liquids so as to create the reciprocal movements of the piston 37 and ram 39.

The device is provided with two electric switches 67 and 68 one for the coil 61 and one for the coil 62 and the switches are operated by a link 69, the ends of which are connected to the switch handles 70 and 71 so that as the link will be moved backward and forward, both switches 67 and 68 will be simultaneously operated, one to make and the other to break its respective electric circuit in which the two coils 61 and 62 are a part. On the link 69 is an outwardly projecting arm 72 which is engageable by similar inwardly projecting spaced apart arms 73 and 74 that are rigidly carried on a control rod 75 that is longitudinally and slidably carried in bearings 76 and 77 that are carried on the cross frame members 26 and 28. The upper end of the control rod 75 is bent at right-angles and the end 78 of the control rod 75 as seated in a bore in the spring pin 42 so that, as the ram rod 39 moves, the control rod 75 will move therewith to operate the two switches 67 and 68, whereby the reciprocal operations of the machine will continue one after the other, and as these motions take place, of course a can from the funnel 31 will drop into the cradle 34 and then as the ram moves forward the can will be collapsed or crushed between the ram head 41 and the anvil 35, at which point the switches 67 and 68 have been changed and the ram is withdrawn to its rearward position, whereupon, simultaneously a new can C falls into the cradle and the crushed can drops from its position against the anvil through the discharge opening 36, where as shown in the drawings it will fall into a hopper 79 which, when filled with crushed cans may be slipped or rocked from the frame of the machine as indicated by the dotted lines 80 for emptying purposes.

The foregoing description is that of the working parts of the machine and to complete the machine it has four enclosure walls 81, 82, 83 and 84, one on each side, and end of the machine and carried by the aforedescribed framework of the machine.

In FIG. 6 is shown a pair of feed wires 85 and 86 leading to the two control switches 67 and 68 and in the wire 86 is a master switch 87 whereby the machine may be turned on or off to control its operation.

While the machine as shown and described may be the preferred form of the machine, it is to be understood that such modifications of the machine may be employed as lie within the scope of the appended claims without departing from the spirit and intention of the invention.

Now having fully shown and described our invention what we claim is:

1. A container crushing device; said device having in combination a frame structure, said frame structure comprising an upper rectangular and horizontally positioned frame element, an intermediate rectangular and horizontally positioned frame element; and a lower rectangular shaped and horizontally positioned frame element, all of said frame elements being of the same shape and size and being spaced apart one above the other; supporting leg elements, one for and positioned at each corner of said horizontally positioned frame element and being rigidly attached to each horizontally positioned rectangular frame element for the support of the entire structure; a container receiving tray, said tray being supported on the first said rectangular frame element, said tray being rectangular in shape and having a bottom therein, a portion of which slopes downwardly from each side and end of the tray, said sloping portion of the tray having an opening in the bottom thereof and at the point of meeting of the sloping portion of the bottom; a container crushing mechanism, said container crushing mechanism being carried by the said intermediate rectangular frame element and below the said tray on the first said rectangular frame element; said container crushing mechanism comprising a horizontally positioned cylinder, and a horizontally positioned crushing cradle attached to one end of the cylinder and having an opening in the bottom and at one end portion thereof that is positioned below the first said opening in the said tray and in receiving relationship therefrom; a crushing ram, said ram being longitudinally operable in said cradle for crushing containers deposited in said cradle, said ram being hydraulically powered to crush containers positioned in the said cradle; a hydraulic system; said system including a reservoir, a pump, and the hydraulic cylinder and a valve for controlling the movements of the ram in said cradle, said valve being operable by the movements of said ram for the reciprocal operations of the ram; a power unit; said power unit being connected with said pump for the power operation thereof; said pump being connected with the said reservoir for the supply of hydraulic liquid thereto; a hydraulic pressure system connected with said pump and said control

valve for delivering hydraulic liquid to both the said reservoir and hydraulic cylinder; and also having means therein for the timed discharge from the pump and cylinder to the reservoir, and spring means for retracting the piston and discharging the contents of the cylinder into the reservoir during the time the hydraulic liquid is being discharged from the pump into the reservoir.

2. A container crushing device; the combination of the structure, parts and arrangements thereof as defined in claim 1; said combinaion further including a crushed container receiving drawer; said drawer being slidably carried by the aforedefined framework and being positioned below said cradle, an anvil at one end of the crushing cradle, said drawer being in position to receive crushed material from the said cradle opening at one end of the crushing cradle; said drawer being entirely removable from the said framework for purposes of

emptying the drawer; said framework having closure panels around the sides thereof for enclosing the working parts of the said device, one of said panels having an opening therein through which the said drawer may be removed and then replaced from and then into the said framework for the purpose of emptying and then replacing the said drawer from and into the said framework.

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