April 25, 1967 H. H. SIMSHAUSER 3,315,594

MACHINE FOR CRUSHING CANS, BOTTLES AND THE LIKE

Filed Oct. 13, 1964

2 Sheets-Sheet 1

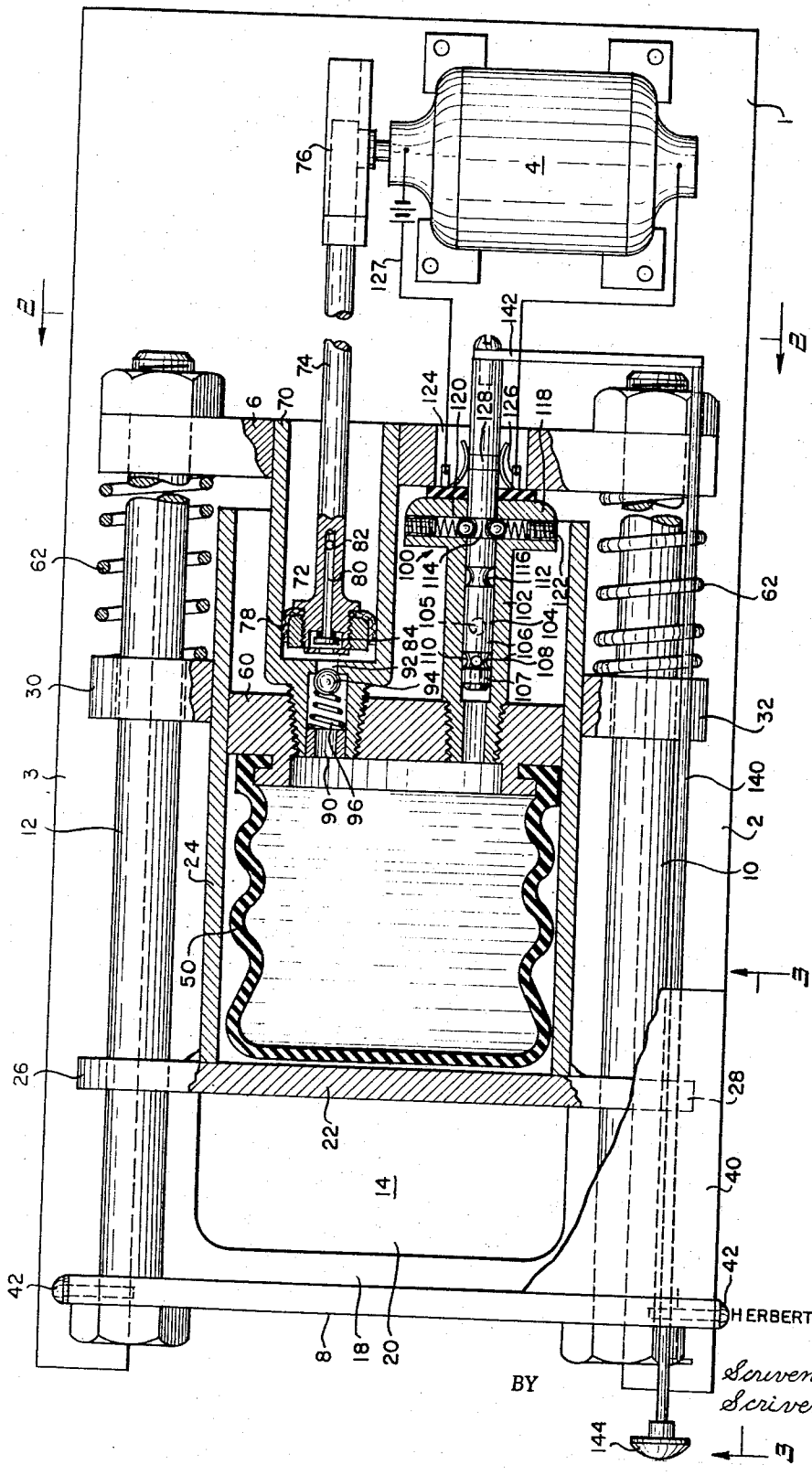


FIG. 1

INVENTOR

HERBERT H. SIMSHAUSER

BY

Scrivener Parker
Scrivener & Clarke

ATTORNEYS

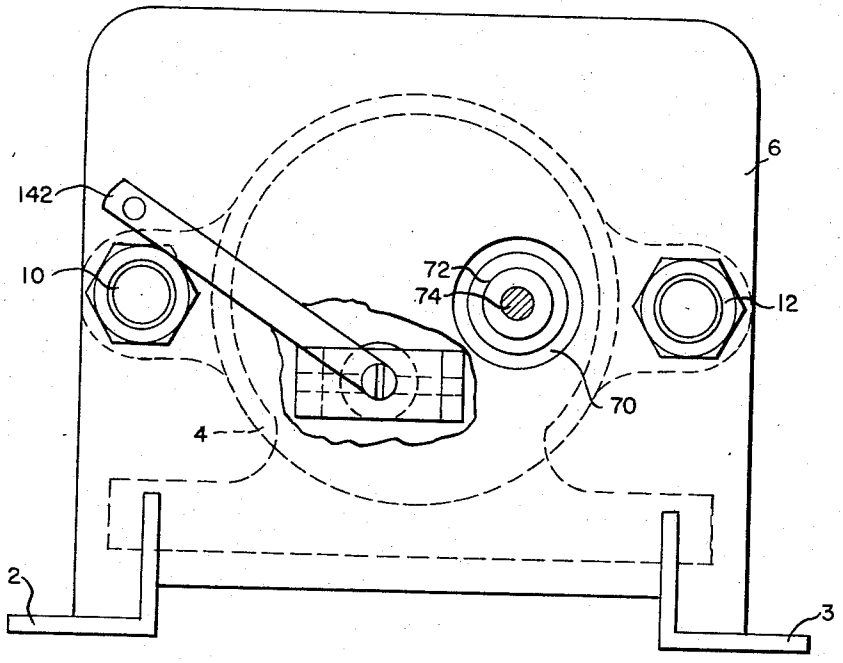
April 25, 1967 H. H. SIMSHAUSER 3,315,594

MACHINE FOR CRUSHING CANS, BOTTLES AND THE LIKE

Filed Oct. 13, 1964

2 Sheets-Sheet 2

Fig. 2



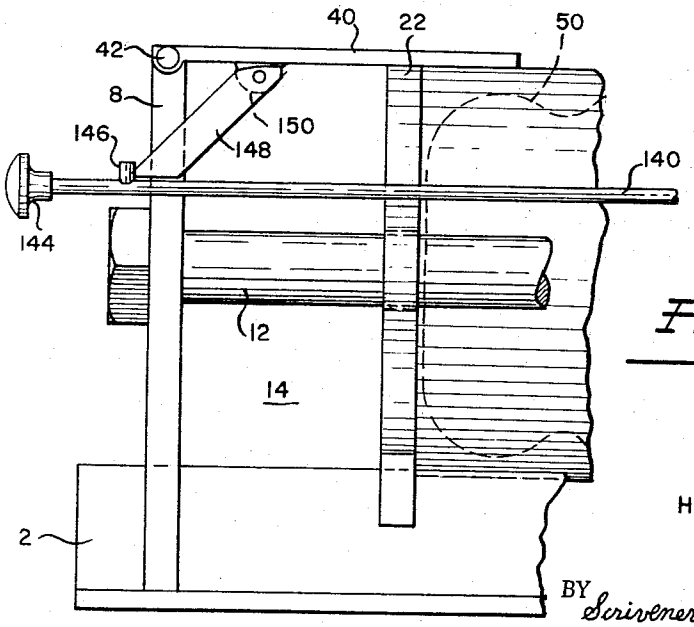


Fig. 3

INVENTOR

HERBERT H. SIMSHAUSER

BY Scrivener Parker Scrivener & Clarke

ATTORNEYS

United States Patent Office 3,315,594
Patented Apr. 25, 1967

3,315,594

MACHINE FOR CRUSHING CANS, BOTTLES AND THE LIKE

Herbert H. Simshauser, Rte. 2, Ravenna, Ohio 44266

Filed Oct. 13, 1964, Ser. No. 403,732
6 Claims. (Cl. 100—52)

This invention relates broadly to material handling machines and apparatus and, more particularly, to machines for crushing articles such as empty cans, bottles and the like.

It has been the principal object of this invention to provide such a crushing machine which is semi-automatic in operation, both with respect to the crushing cycle and the retraction cycle, whereby quicker and more efficient operation is obtained. Another object of the invention has been to provide a machine of the described type in which the articles to be crushed may be supplied to the crushing chamber by hand, and in which means are provided which insure that the crushing means cannot operate while in a condition to receive the operator's hand, thereby insuring complete safety to the operator.

Other objects and features of novelty of the invention are described in the following specification and described in the accompanying drawing in which:

FIG. 1 is a part elevational and part sectional view of the crushing machine provided by the invention, the crushing means being shown in retracted, or non-crushing, position;

FIG. 2 is a view taken on line 2—2 of FIG. 1, and FIG. 3 is a view taken on line 3—3 of FIG. 1.

The crushing machine provided by the invention is principally disclosed in FIG. 1 of the drawings and is provided with a supporting base comprising a flat plate **1** at one end of the base, from which there extend two parallel angle irons **2, 3**. On this base there are mounted, proceeding from the right hand end in FIG. 1, a motor **4** having its shaft extending at right angles to the length of the base, a fixed upstanding wall **6** extending parallel to the motor axis, and at or adjacent the left hand end of the base there is a second fixed upstanding wall **8**. Two rods **10, 12** extend between the upstanding fixed walls **6, 8** and form a support extending longitudinally of the base on which parts of the machine are mounted for sliding movement. Just inboard of the end wall **8** is the compartment **14** within which the can or bottle to be crushed is placed and this compartment is defined by the end wall **8**, a lower wall **18** having an opening **20** therein which is not sufficiently large to pass an uncrushed can or bottle but is of such size that a crushed can or bottle will fall therethrough to a container positioned below the machine. The wall **18** is therefore merely a shelf defining the opening **20**, as shown in FIG. 1. The inboard end of the crushing compartment is formed by a movable flat wall **22** which is parallel to and spaced inwardly from the end wall **8** and which is carried on the outer end of a cylinder **24** which extends lengthwise of the base and is mounted on the rods **10, 12** by two sets of ears **26, 28** and **30, 32** for sliding movement along the rods. The ears **26, 28** extend outwardly in opposite directions from the side edges of the ram **22**, as most clearly shown in FIG. 1, and the ears **30, 32** are mounted closely to the open end of the cylinder **24** and extend outwardly from the sides thereof. The wall **22** therefore forms a ram which may be moved toward and away from the fixed end wall **8** and when sufficiently moved toward that wall, crushes anything between them. The crushing compartment **20** is provided with a cover **40** which is hinged by pins **42** to the upper edge of end wall **8** and is of such length and width that when closed it covers the entire crushing compartment and extends inboard of the machine beyond the retracted position of the wall **22**, all as shown in FIG. 1.

Means are provided by the invention for moving the ram **22** and its connected cylinder **24** toward and away from the fixed end wall **8**, and such means comprise a hollow, flexible, bellows-type air bag **50** having its closed end adjacent and bearing on the inboard side of the ram **22** and having its annular open end connected to a fixed wall **60** which is positioned within the cylinder **24** and closes it. The cylinder **24** and ram **22** are normally maintained in retracted, non-crushing position by strong extension springs **62** which surround the rods **10, 12** and are connected at their ends to the fixed end wall **6** and to the ears **30, 32** which are carried by the cylinder and are slidably mounted on the rods **10, 12**. The springs normally retract the ram **22** and cylinder **24** to non-crushing position in which the bag **50** is collapsed, and these parts are moved against the force of the springs to crushing position of wall **22** by expansion of the bag **50** when fluid under pressure is forced into it.

Means are provided by the invention for forcing fluid under pressure into the bag **50**, and such means comprise, first, a cylinder **70** which has its open end connected to the outer end wall **6** and which extends therefrom longitudinally of the base within the cylinder **24** and has its other end screw threaded within an opening in fixed wall **60**. A piston **72** is mounted for reciprocatory movement within cylinder **70** and is operated through piston rod **74** by a cam **76** which is mounted on the shaft of motor **4** by well-known and conventional mechanism through which the piston rod is operated in a manner to prevent sidewise oscillation of the piston rod, thus insuring straightline movement of piston **72** in cylinder **70**. The annular space between the piston and the cylinder is filled by a conventional seal **78** which insures fluid-tight operation on the compression stroke of the piston. An axial bore **80** extends from the free end of the piston, and within the piston rod is open to atmosphere through port **82**. The outer end of the bore is covered by a spring pressed flap valve **84** which closes on the compression stroke of the piston and opens on the return stroke to permit fluid to pass from atmosphere through port **82** and bore **80** to the cylinder **70** in front of the working face of the piston. The working space in front of the piston **72** and within the cylinder **70** is communicated to the interior of the bag **50** by a passage **90** through the reduced end part of cylinder **70** which is threaded through the fixed wall **60**. The inner end **92** of this passage is controlled by a ball check valve comprising ball **94** which is constantly urged into closing engagement with passage **92** by spring **96**, whereby fluid under pressure forced by piston **72** through passage **92** will unseat the ball and pass into bag **50**, but is prevented by the ball check valve from passing from the bag.

Means are provided by the invention for controlling the operation of the crushing ram **22** by starting the pump, thereby initiating crushing movement of the ram, and at the completion of such movement releasing the fluid pressure to cause retracting movement of the ram and, at the same time, stopping operation of the motor and pump. Such means comprise, first, a combined valve and electrical switch device **100** having a cylindrical valve body **102** which is threaded at its inner end into fixed wall **60** and extends outwardly therefrom toward motor **4** and is supported by fixed end wall **6**. The valve body has an axial bore **104** extending from end to end within which a cylindrical valve member **106** is slidably mounted and the valve body is also provided midway of its length with an atmospheric port **105**. The inner end of the valve member, adjacent fixed wall **60**, has a short axial bore **107** which communicates at its inner end within the valve body with a radial port **108**, the outer end of which opens into a groove **110** in the outer wall of the valve body. Spaced from this groove in the direction of fixed wall **6** the valve stem has two external grooves **112, 114** which

cooperate with balls **116** to provide two detents for holding the valve stem in either of two predetermined positions. The balls are positioned in the inner ends of the bores in two radial arms **118** which extend radially outwardly from the valve body just inwardly of the fixed wall **6**. Springs **120** are positioned within the bores and constantly urge the balls toward the valve stem, and the springs are backed by screws **122** by which their tension may be adjusted. The outer end part of the valve stem passes through an opening **124** in end wall **6** and the peripheral wall of this opening has mounted thereon at least one copper switch contact member **126** which extend radially and axially within the opening and engage the outer wall of the valve stem, being so shaped that the valve stem can move freely with respect to them. These contacts are connected by leads **127** in series with the winding of motor **4** and with power. The valve stem is provided with an external annular electrically conductive contact ring **128** which is so positioned with respect to the contacts that it engages them when the valve stem is in its innermost position.

Means are provided by the invention for operating the combined valve and electrical switch **100** to control the operation of the machine. Such means comprise, first, an elongated rod **140** which extends longitudinally of the machine parallel to the adjacent and outside the supporting and guiding bar **12** and is connected at its one end to the outer end of valve stem **106** by member **142**. At its other end which is adjacent end wall **8**, as most clearly shown in FIG. 3, the rod is provided with a knob **144** and a lug **146**. Cooperating with this lug is a pawl **148** which is hinged at **150** to the underside of the cover **40** for the can compartment **14**. This pawl extends downwardly and toward wall **8** and it and lug **146** are so positioned with respect to each other that when the cover is closed the outer, or lower end of the pawl engages and pushes the lug, moving it and rod **140** in the direction of wall **8**. This motion is transmitted through connecting member **142** to the valve stem **106**.

Operation

If it is desired to crush an article such as a can, bottle or the like the cover **40** is raised and the can is placed in the crushing compartment **14** where it is supported by the partial wall or shelf **18**. The cover **40** is now closed causing pawl **148** to engage lug **146** and move rod **140** to the left, as viewed in the drawings, thus moving valve stem **106** to its innermost position, which is shown in FIG. 1. In this condition of the valve the port **108** and groove **110** of the valve stem are blanked, i.e., they do not communicate with exhaust port **105**, contact ring **128** is in engagement with contacts **126**, and balls **116** engage in outer groove **114** releasably holding the stem in position. In this condition of the parts the circuit of the motor **4** is completed and the motor is operated to cause reciprocation of the piston **72** in cylinder **70**. This causes air to be pumped into bag **50** which expands, moving the ram wall **22** against the force of springs **62** toward fixed end wall **8** to crush the can in the crushing compartment. The pressure of springs **120** on balls **116** has previously been so adjusted that when the wall **22** reaches a predetermined position, in which the article in compartment **14** is crushed between walls **8** and **22**, the air pressure in bag **50** reaches a predetermined p.s.i. and the reaction of pressure fluid on the end of valve stem **106** through valve port **104** is sufficient to move the valve stem to the right, as viewed in the drawings, until it reaches a position in which the balls engage in the inboard groove **112**. At this point the port **108** and groove **110** of the valve stem communicate with exhaust port **105** and the pressure within bag **50** is exhausted to atmosphere and springs **62** pull cylinder **24** and ram wall **22** to retracted poition, collapsing bag **50**. The movement of the valve stem to pressure exhaust position moves rod **140** in the same direction, causing lug **146** to move pawl **148** and cover **40** to cover open position. In this final position the parts are ready for the next crushing cycle, as described, and the crushing can falls through the bottom aperture of the crushing compartment.

It will be seen that the machine provided by the invention is fully automatic, the crushing and retracting cycles being initiated by closing of the cover for the crushing compartment and continuing without further action by the operator. Further, as the operation is started by closing of the cover it is apparent that the operator's hand cannot be injured by being within the crushing compartment during the crushing cycle.

While I have described and illustrated one embodiment of my invention it will be apparent to those skilled in the art to which it relates that other embodiments, as well as modifications of that disclosed, may be made and practised without departing in any way from the spirit or scope of the invention, for the limits of which reference must be made to the appended claims.

What is claimed is:

1. A machine for crushing an article such as a can, bottle or the like, comprising a fixed wall, a movable wall parallel to and normally spaced from the fixed wall to provide an article receiving compartment between them, means for moving the movable wall toward the fixed wall to crush an article in said compartment, a movable cover for said compartment, means operable by closure of said cover to cause movement of the movable wall toward the fixed wall, means operable at a pre-determined position of the movable wall in its movement toward the fixed wall for moving the movable wall in a direction away from the fixed wall, and means operable upon such retracting movement of the movable wall to open the cover for the article receiving compartment.

2. A machine for crushing an article such as a can, bottle or the like, comprising a fixed wall, a movable wall parallel to and normally spaced from the fixed wall to provide an article receiving compartment between them, fluid pressure operated means for moving the movable wall toward the fixed wall to crush an article in said compartment, a movable cover for said compartment, means operable by closure of said cover to cause movement of the movable wall toward the fixed wall, means operable upon a pre-determined fluid pressure in moving the movable wall toward the fixed wall to move the movable wall away from the fixed wall, and means operable upon such retracting movement of the movable wall to open the cover for the article receiving compartment.

3. A machine for crushing an article such as a can, bottle or the like, comprising a fixed wall, a movable wall parallel to and normally spaced from the fixed wall to provide an article receiving compartment between them, means for moving the movable wall toward the fixed wall to crush an article in said compartment and comprising an expansible chamber abutting the side of the movable wall away from the fixed wall, a reciprocable piston for forcing fluid under pressure into said chamber, a motor for operating the piston, a normally open electric circuit for said motor, means for closing the circuit to operate the motor to force fluid under pressure into the chamber and thereby move the movable wall toward the fixed wall, and means responsive to a predetermined pressure of fluid in the chamber to open the circuit and de-energize the motor.

4. A machine for crushing an article such as a can, bottle or the like, comprising a fixed wall, a movable wall parallel to and normally spaced from the fixed wall to provide an article receiving compartment between them, means for moving the movable wall toward the fixed wall to crush an article in said compartment and comprising an expansible chamber abutting the side of the movable wall away from the fixed wall, means for forcing fluid under pressure into said chamber, a valve having a movable part subject to the pressure of fluid in said chamber and being movable at a pre-determined pressure of such fluid to a position to release the pressure fluid in the chamber, and means for moving the movable

wall away from the fixed wall upon such release of the pressure fluid in said chamber.

5. A machine for crushing an article such as a can, bottle or the like, comprising a fixed wall, a movable wall parallel to and normally spaced from the fixed wall to provide an article receiving compartment between them, means for moving the movable wall toward the fixed wall to crush an article in said compartment and comprising an expansible chamber abutting the side of the movable wall away from the fixed wall, a reciprocable piston for forcing fluid under pressure into said chamber, a motor for operating said piston, a normally open electric circuit for said motor, a combined valve and switch device associated with said expansible chamber and said motor, said valve having a movable member subject to the pressure of fluid in said chamber and having a first blanked position and a second position to which it is moved by a pre-determined fluid pressure and in which it causes release of such pressure fluid to atmosphere, said switch device having a fixed contact and a movable contact carried by the movable valve member, means for moving the movable valve member to its first position in which the valve is blanked and the switch contacts closed thereby to operate the motor to force fluid into the chamber, the switch contacts being so positioned with respect to each other that the contact carried by the movable valve member is moved out of engagement with the fixed contact upon movement of the valve to its second position.

6. A machine for crushing an article such as a can, bottle or the like, comprising a fixed wall, a movable wall parallel to and normally spaced therefrom to provide an article receiving compartment between them, a cover for said compartment movable to open and closed positions, an expansible chamber abutting the movable wall on

the side thereof away from the fixed wall, a piston and cylinder connected to force fluid under pressure into the chamber when the piston is operated, an electric motor for operating the piston, a valve device having a fixed part having ports communicating with the chamber and with atmosphere respectively and a movable part subject to the pressure of fluid in the chamber for controlling the ports, a switch in the circuit of said motor having a fixed contact and a movable contact carried by the movable valve part, said movable valve part being movable to a first position in which the valve is blanked and the switch contacts are closed and to a second position in which the valve communicates the chamber to atmosphere and the switch contacts are open, means operable by closing of the cover to move the movable valve part to its first position, means for releasably holding the movable valve part in its first position and arranged to be overcome by a pre-determined pressure of fluid in the chamber to release the movable valve member to permit it to be moved to its second position by such fluid under pressure, and means for collapsing the chamber upon movement of the movable valve part to its second position.

References Cited by the Examiner

UNITED STATES PATENTS

877,139	1/1908	Tartarinoff	100—269
2,763,202	9/1956	Gramelspacher	100—52
2,800,159	7/1957	Walsh et al.	100—266 X
2,813,569	11/1957	Nelson	100—53
2,916,985	12/1959	Beach	100—256 X
3,024,720	3/1962	Welsh	100—53
3,025,837	3/1962	Beach.	
3,104,607	9/1963	Galas	100—53

BILLY J. WILHITE, *Primary Examiner.*