June 23, 1964 W. H. MOORHEAD 3,138,090

CAN SMASHER

Filed Jan. 17, 1961 2 Sheets-Sheet 1

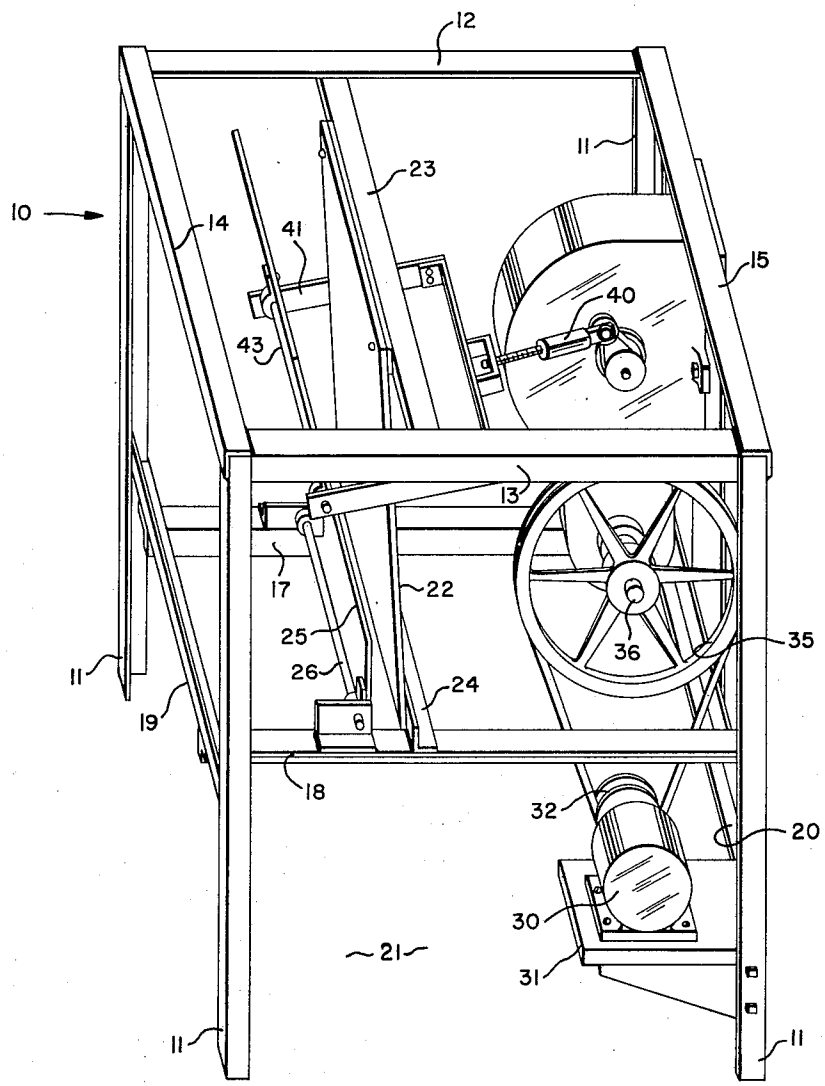


FIG.-1

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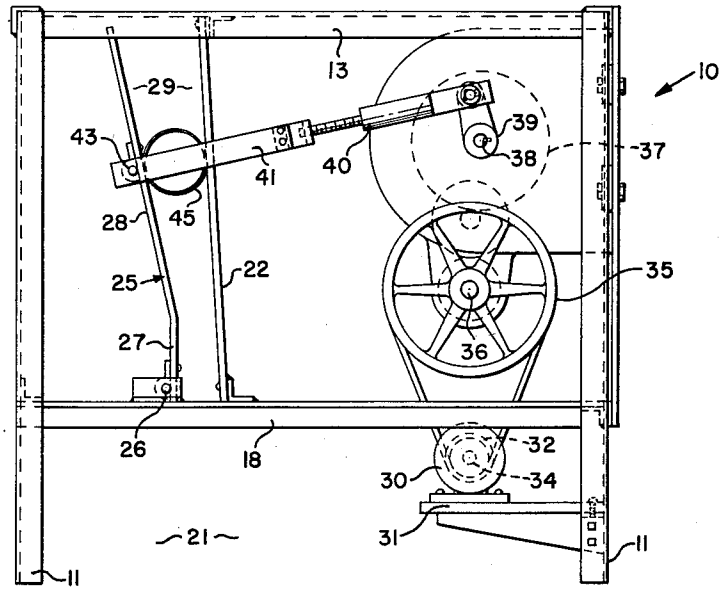


FIG.-2

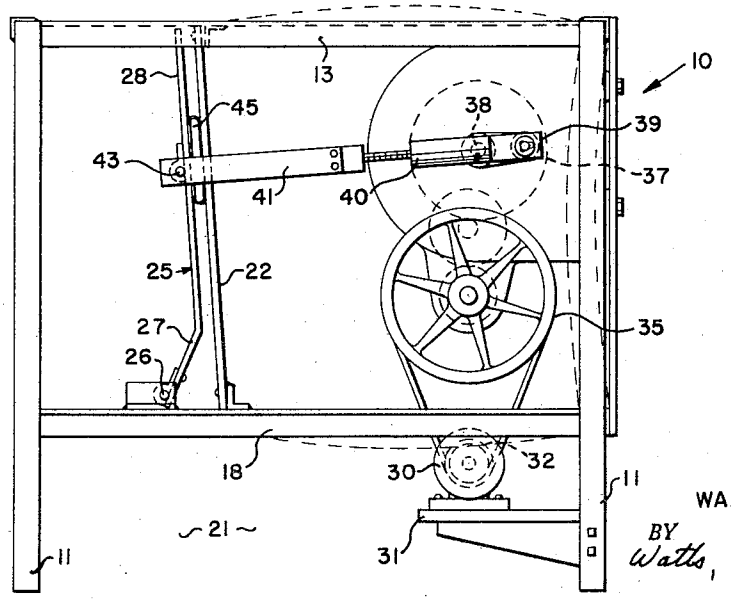


FIG.-3

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CAN SMASHER

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12 Claims. (Cl. 100—233)

This invention pertains to mechanisms for flattening emptied fluid vessels.

In many modern businesses, the disposal of emptied glass and metal containers presents a rather irritating problem. In gasoline service stations, for example, large volumes of emptied oil cans are collected. In bars and restaurants similar problems are presented by empty food and beverage cans, bottles and the like. In any one of these examples, the emptied vessels must, of course, be disposed of periodically.

In a busy gasoline station, for example, the services of a refuse collection agency may be required about three times a week for the purpose of disposing of emptied oil and anti-freeze cans. These emptied cans are relatively light-weight but rather volume consuming and can absorb a great deal of storage space.

The mechanism of the present invention is directed to alleviating this waste disposal problem by flattening emptied metal containers and pulverizing emptied bottles to minimize the storage space required for emptied vessels. In the cited example of a gasoline station which requires disposition of its emptied cans three times a week, this disposition can be reduced to once a week or less without requiring any additional storage space for emptied containers.

The flattening of such vessels or the pulverizing of glass vessels, would, at first blush, appear to be a relatively simple problem. The provision, however, of a simple light-weight and dependable structure which is both compact and inexpensive has been a very difficult objective to obtain. The principal problem which had to be overcome was the provision in a relatively limited space, of the very high forces required at the outset and at the conclusion of a can flattening operation.

With the mechanism of this invention two platens are provided. One of these platens is flat and fixed to a frame. The other platen is pivoted at its base and movable toward and away from the fixed platen. Preferably the movable platen includes a lower portion which is parallel to the fixed platen when the platens are in their open position. This lower portion and the fixed platen are spaced to provide an outlet from a flattening region between the platens. The remaining and upper portion of the platen is at an angle with the lower portion. This upper portion assumes a position paralleling and close to the fixed platen when the two are in the closed position.

A power means is secured to the frame to move the movable platen toward and away from the fixed. This power means supplies maximum closing force with minimum speed at the beginning and again at the end of the closing portion of a cycle. This provides the maximum flattening pressures at the two times when maximum pressure is required. Intermediate these two times of maximum pressure, the platen moves at a greater rate of speed and with lower force to provide a fast flattening operation and take advantage of the lessened force requirements at that time. This variable force application is provided through the use of an eccentric which is driven by an electric motor and a crank secured to the eccentric and to the movable platen.

A unique and simple arrangement has been provided to reduce the closing power required and obtain very efficient can flattening and bottle smashing with a relatively small motor. This unique solution is the provision of a

simple light-weight fabricated frame which is yieldable. The frame is characterized by the absence of cross bracing in any plane paralleling the plane of force application to the movable platen. Thus, the frame has rectangular sides which yield as force is applied to a can to be flattened. With this construction, the entire frame in effect becomes a large spring which distorts until the smashing operation begins. As soon as the can begins to yield it will flatten relatively easily until the conclusion of the flattening cycle is reached. At this time, the frame again yields.

Accordingly, one of the principal objects of this invention is to provide a novel and improved mechanism for flattening cans, smashing bottles, and the like.

Another object of the invention is the provision of a can smashing mechanism in which a frame is yieldable to provide a spring means for the storage of energy which cooperates with energy supplied by a flattening power means.

Another object of the invention is to provide a vessel flattening device which has two platens movable toward and away from one another in which the platens are spaced, when in an open position, to provide an outlet through which flattened vessels are automatically dropped.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a perspective view of the novel and improved vessel flattening device;

FIGURE 2 is a side elevational view of the device in an open position and on a reduced scale with respect to FIGURE 1; and,

FIGURE 3 is a side elevational view corresponding to FIGURE 2 and showing the device in a closed position.

Referring now to the drawings, a frame is shown generally at **10**. The frame **10** includes four upright corner members **11** which are the legs for the entire mechanism. The legs **11** are connected together at the top by a pair of upper side frame members **12, 13** and a pair of upper end members **14, 15**. Corresponding lower bracing members **17, 18** are positioned below and paralleling the upper side members **12, 13**. Corresponding lower end members **19, 20** are positioned below and preferably identical to the upper members **14, 15**. The lower side and end members **17–20** are positioned in spaced relationship with the lower ends of the legs **11**. This provides a space designated generally by the numeral **21** where a suitable container for receiving flattened vessels may be positioned.

With the described frame pieces, the upper side and end members **12** through **15** together define a top rectangle which is open and has no cross bracing. Similarly, the upper and lower side members **12, 17** and two of the legs **11** define one side rectangular frame which is also open and free of cross bracing. Similar open rectangular sides of the frame are defined respectively by the upper and lower side members **13, 18** and legs **11**; the upper and lower end members **14, 19**, and the legs **11**; and the upper and lower end members **15, 20** and the legs **11**.

A fixed flat platen **22** is connected to the upper side members **12, 13** by an upper support bar **23** and to the lower side members **17, 18** by a lower support bar **24**. A movable platen **25** is pivotally connected to the frame by a pivot bar **26**. This pivot bar **26** is pivotally connected to the two lower side members **17, 18**.

The movable platen **25** includes a lower portion **27** and a larger upper portion **28**. As is best seen in FIGURE 2, the lower portion **27** is spaced from and parallel to the fixed platen when the movable platen **25** is in the open position shown in FIGURE 2. The upper portion **28** is at an angle with the lower portion **27**. The upper portion **28** parallels the fixed platen **22** in closely spaced

relationship when the movable platen is in the closed position shown in FIGURE 3.

The portions **27**, **28** of the movable platen are at a flat obtuse angle. The upper portion **28** flares outwardly gradually with respect to the fixed platen when the mechanism is in the open position of FIGURE 2. This provides a tapered flattening region **29** of diminishing transverse dimension from top to bottom. A can or other object **45** will drop until it engages both platens and assumes a flattening position. Usually the spacing will be such that the most commonly encountered can sizes will rest at about the midpoint, vertically speaking, of the region **29** where flattening pressure is applied. At the same time the relative taper of the upper portion **28** and the fixed platen **22** is relatively gradual so that the object **45** will stay in the region **29** and not tend to roll up out of it when flattening pressure is applied.

An electric motor **30** is mounted on a support plate **31**. The support plate **31** is connected, in the embodiment shown, to two of the legs **11** and positioned below the side member **20**. The motor **30** has a pulley **32** connected to its drive shaft **34**. The pulley **32** is relatively small and belt connected to a large speed reducing pulley **35**. The pulley **35** is carried by and drives a power transmission shaft **36**. The power transmission shaft drives a gear train **37**. The gear train **37** has an output shaft **38** which drives an eccentric **39**. An adjustable crank **40** is connected to the eccentric **39** and to a yoke **41**. This yoke **41** is connected to both ends of a pivot bar **43** which is secured to the movable platen **25**.

In the preferred arrangement it will be seen that the eccentric and the platen are all positioned within the confines of a rectangular side and ends defined by the members designated by the numbers **11–20**. It should be again emphasized that these members define a frame with rectangular ends and sides in which there is no diagonal cross bracing to give the frame rigidity. It is particularly important that the frame be free of diagonal cross bracing in the planes paralleling the planes of crank movement or, expressed another way, force application. A frame constructed in this manner of relatively light weight members yields as pressure is applied to a can or other object **45**, positioned between the platens.

In operation, as the eccentric and crank pass over the over-center position, the position of maximum opening, shown in FIGURE 2, the cranks and eccentric will begin to supply closing force at maximum pressure with minimum closing speed. During this portion of the cycle, the can may not begin to flatten. When this occurs, the motor, will nonetheless continue to rotate and the eccentric will continue to move. This continued movement without the can yielding is possible because the frame yields. The phantom lines in FIGURE 3, while not necessarily accurately depicting the actual flexure of the frame, are intended to demonstrate that the frame members do yield and bend to serve as a spring. The entire frame serves as a large spring which stores force which cooperates with the force supplied by the eccentric until the can first yields. Then the can is rapidly flattened as the eccentric moves through the portion of its cycle in which there is maximum speed of closing movement with minimum force. As the closing portion of the cycle is approached, the can provides increasing resistance to that closing movement. Again, the frame will yield and serve as a spring to store force.

Expressed another way, and perhaps more accurately, the provision of a yieldable frame which has no cross bracing permits the motor to continue to move under conditions in which it would otherwise stall. It permits, for example, the provision of a very satisfactory can smasher with a ¼ horsepower motor which smasher can complete a cycle in four or five seconds. With a five-second cycle, obviously the mechanism can flatten cans at the rate of twelve per minute if the cans are fed into the flattening region between the platens one at a time. If the frame is cross braced on the other hand, it is necessary to provide a motor of ¾ horsepower to one horsepower to flatten cans of the same size and the same facility as can be flattened with the described mechanism using a ¼ horsepower motor.

While the invention has been described with a great deal of detail it is believed it essentially comprises a pair of relatively movable platens carried by a yieldable frame and a power means to move the platens toward and away from one another in repetitive cycles.

Although the invention has been described with a great deal of particularity in its preferred form, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. A mechanism for flattening cans or the like comprising, a yieldable frame means, first and second platens carried by the frame means with one platen movable toward and away from the other, power means connected to the frame means and the one of the platens to move the one platen toward and away from the other from open to closed positions, and return, in repetitive cycles, said power means imparting maximum force moving the one platen toward the other at the beginning and the end of the portion of a cycle when the one platen is moving toward the other, said frame means including yieldable spring structure constructed to provide a spring force cooperating with said power means force during such impartings of maximum force, said power means moving said one platen toward the other at maximum closing speed during a part of the closing portion of the cycle intermediate such impartings of maximum force.

2. The device of claim 1 wherein the frame means is fabricated from metal members secured together and wherein the members in a plane paralleling the plane of force application define the edges of rectangles free of cross bracing.

3. A mechanism for flattening cans or the like comprising a yieldable frame means, a first platen fixed to the frame means, a second platen pivotally connected to the frame means near the lower end of the second platen, said second platen being pivotal about said connection toward and away from the first platen from an open to a closed position and return in repetitive cycles, power means connected to the frame means and to the second platen to open and close the second platen with the closing portion of the cycle varying from a period of substantially maximum force and minimum speed at the outset of such closing portion to a period of substantially minimum force and maximum speed and thence to another period of substantially maximum force and minimum speed at the conclusion of such closing portion of the cycle, and said frame means including yieldable spring structure constructed to provide yielding to a visibly distorted condition during such periods of maximum force to impart a force co-operating with said power means.

4. A mechanism for flattening cans or the like comprising, a yieldable frame means, a first platen fixed to the frame, a second platen pivotally connected to the frame means near the lower end of the second platen, said second platen being pivotal about said connection toward and away from the first platen from an open to a closed position and return in repetitive cycles, power means connected to the frame means and to the second platen to open and close the second platen with the closing portion of the cycle varying from a period of substantially maximum force and minimum speed at the outset of such closing portion to a period of substantially minimum force and maximum speed and thence to another

period of substantially maximum force and minimum speed at the conclusion of such closing portion of the cycle, said frame means including yieldable spring structure constructed to provide yielding to substantially the elastic limit of said structure and imparting spring force co-operating with said power means during such period of maximum force.

5. A mechanism for flattening cans or the like comprising,

(a) members secured together to define a frame, said members being positioned to define the edges of a space and the edges of a rectangle in all planes of cross section;

(b) a first platen fixed to the frame;

(c) a fixed pivot secured to the frame near the base of the first platen, the axis of the pivot being generally parallel to the first platen;

(d) a second platen pivotally mounted on the pivot, said second platen being movable toward and away from the first platen when rotated about the pivot;

(e) power means connected to the second platen to move the second platen in a path toward and away from the first platen from open to closed positions and return in repetitive cycles;

(f) said power means imparting maximum force moving the first platen toward the second platen at the beginning and the end of the portion of a cycle when the first platen is moving toward the second;

(g) said power means moving said first platen toward the second at a maximum closing speed during a part of the closing portion of the cycle intermediate such impartings of maximum force;

(h) said platens and said prime mover being within the frame; and

(i) said frame being free of cross bracing in planes paralleling the path of platen movement, whereby said frame may flex during each of said cycles.

6. The device of claim 5 wherein the second platen includes a lower portion paralleling and spaced from the first platen and an upper portion at an angle with the lower portion and slanting away from the first platen when the platens are in the open position, and wherein the upper portion parallels the first platen in closely spaced relationship when the platens are in the closed position.

7. A crushing device for flattening cans and the like comprising,

(a) first and second groups of resilient metal members with the members of each group secured together to define first and second frame sides;

(b) at least four members of each group defining a frame side opening free of cross bracing;

(c) other members securing the frame sides together to form a frame structure with the first group of members defining one opening lying in a first plane and with the second group of members defining another opening lying in a second plane generally paralleling the first plane;

(d) a prime mover mounted on the frame structure and disposed between the planes;

(e) a pair of relatively moveable pistons mounted on the frame structure and disposed between the planes, the relative movement of said platens being in a path generally paralleling the planes; and,

(f) means connecting the prime mover to one of the platens to cause such relative movement.

8. A crushing device for flattening cans and the like comprising,

(a) first and second groups of resilient metal members with the members of each group secured together to define first and second frame sides;

(b) four members of each group defining a side opening free of cross bracing;

(c) other members securing the frame sides together to form a frame structure with the four members of the first group lying in a first plane and the four members of the second group lying in a second plane generally paralleling the first;

(d) at least four of said other members being arranged in first and second vertically spaced pairs;

(e) a prime mover mounted on the members of the first pair and disposed between the planes;

(f) a first platen secured to the members of the second pair and disposed between the planes;

(g) a moveable platen mounted on the frame structure near the fixed platen for movement relative to the fixed platen toward and away from the fixed platen in a path paralleling the planes;

(h) said platens being disposed between the planes; and,

(i) means connecting the prime mover to the moveable platen to cause such relative movement.

9. A flattener for cans or the like comprising,

(a) first, second, third and fourth leg members each having a lower supporting end and an upper end;

(b) first upper end first lower side members secured to the first and second leg members;

(c) second upper and second lower side members secured to the third and fourth leg members;

(d) first upper and first lower cross members secured to the first and third leg members;

(e) second upper and second lower cross members secured to the second and fourth leg members;

(f) said upper members being secured to the leg members near the upper ends thereof;

(g) said lower members being secured to the leg members between the ends thereof;

(h) a prime mover mounted on and vertically between the first cross members;

(i) other cross members fixed to the side members, a fixed platen secured to said other cross members;

(j) said members each being resilient and providing a yieldable frame;

(k) a moveable platen moveably mounted on the frame near the fixed platen and moveable toward and away from the fixed platen in a path generally paralleling the side members; and,

(l) means connecting the prime mover to the moveable platen.

10. The device of claim 9 wherein the first side members and connected legs define one opening and the second side members and connected legs define a second opening and wherein the openings are free of cross bracing.

11. A can crusher comprising,

(a) a frame structure;

(b) a fixed, flat, platen vertically mounted on the frame and having a base;

(c) a pivot on the frame paralleling and spaced from the base of the fixed platen;

(d) a movable platen having a base and a lower throat defining portion extending upwardly from the base;

(e) said movable platen being pivotally mounted at its base on said pivot;

(f) said platen having an upper flattening portion at an obtuse angle with the lower portion;

(g) said movable platen being pivoted from an open position to a flattening position;

(h) the lower portion being parallel to the fixed platen and the upper portion flaring outwardly to cooperate with the fixed platen in defining a tapered can receiving space when the movable platen is in the open position;

(i) said upper portion being generally parallel to the fixed platen when in the closed position; and,

(j) power means mounted on the frame connected to the movable platen to move the platen cyclically from one position to the other and return.

12. A mechanism for flattening cans or the like com-

prising, a frame structure, a flat platen secured to the frame structure, a movable platen having upper and lower portions, a fixed pivot on the frame structure generally paralleling the flat platen, the lower portion of the movable platen being pivotally mounted on the pivot, said movable platen being pivotal from an open position toward the flat platen to a closed position and returning in repetitive cycles, the lower portion of the movable platen when in the open position being parallel and spaced from the flat platen to provide an outlet therebetween, said upper portion being at an angle with the lower portion and flaring away from the flat platen when the movable platen is in its open position, said upper portion being parallel to and closely spaced from the flat platen when the movable platen is in its closed position,

and power means connected to the frame structure and to the movable platen to move it from its open to its closed position and return.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,138,090 June 23, 1964

Walter H. Moorhead

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 5, line 62, for "pistons" read -- platens --.

Signed and sealed this 3rd day of November 1964.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents