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3,079,856

CAN CRUSHER

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2 Sheets-Sheet 1

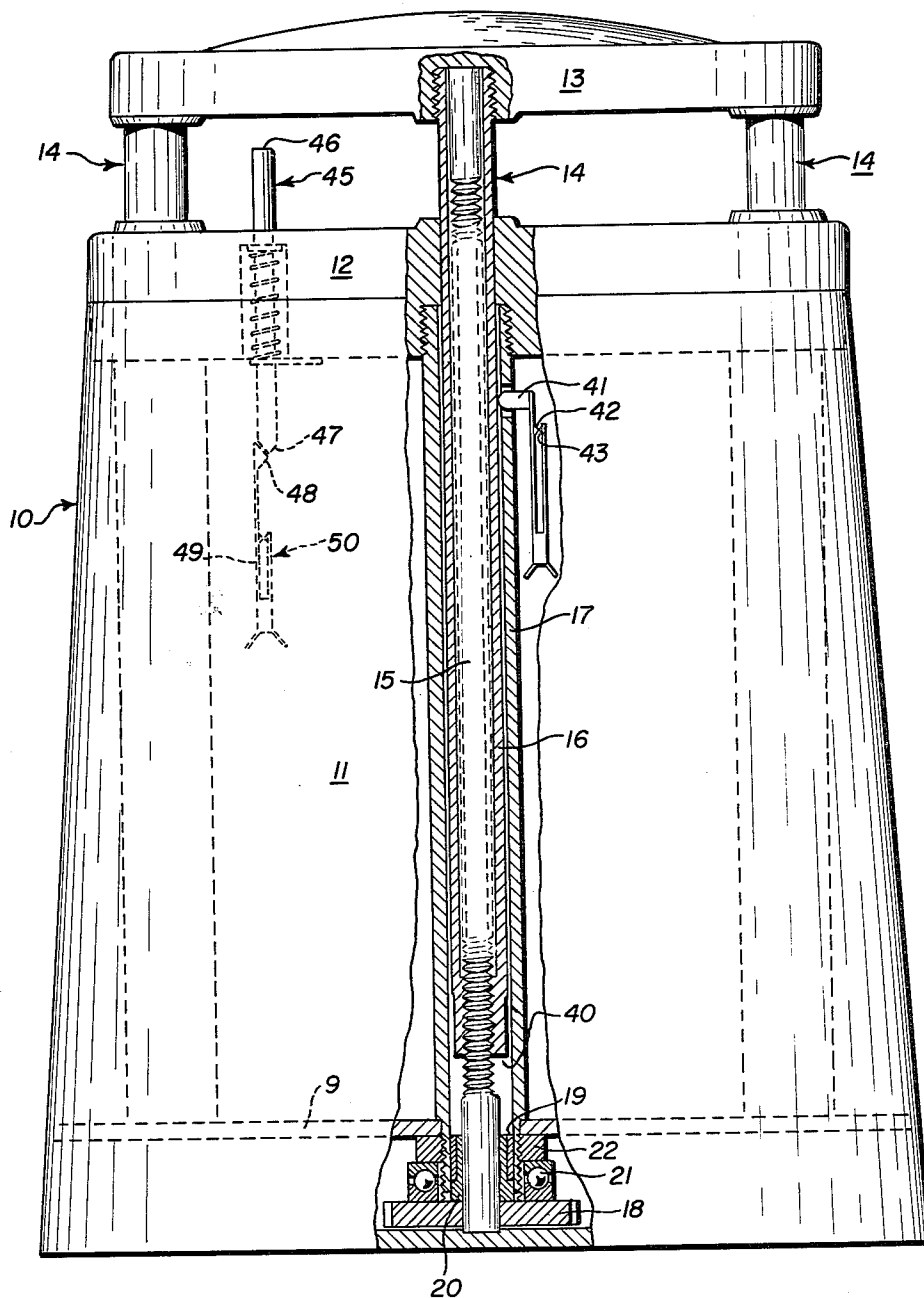


Fig. -1

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2 Sheets-Sheet 2

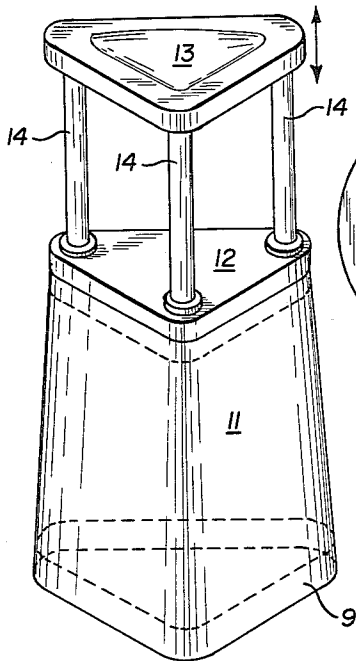


Fig. - 2

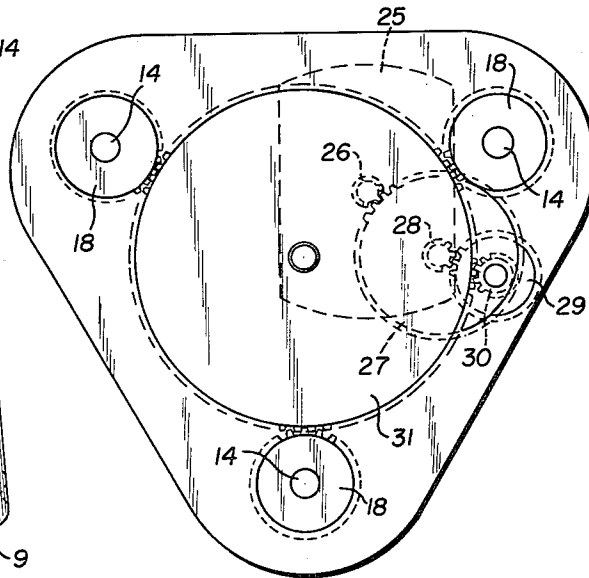


Fig. - 3

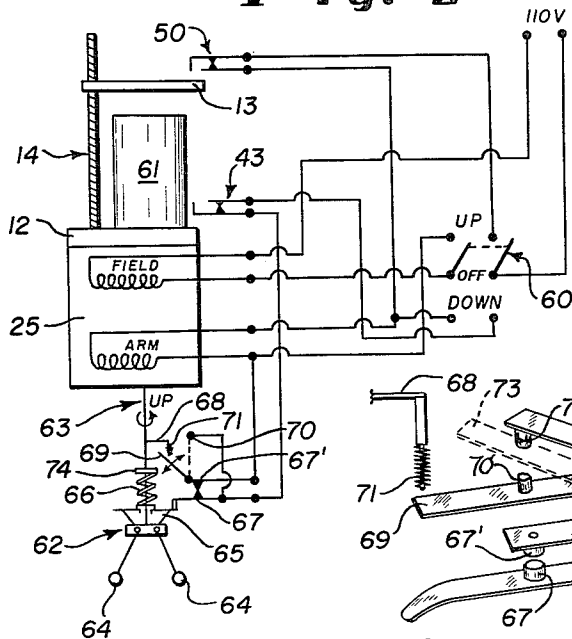


Fig. - 4

Fig. - 6

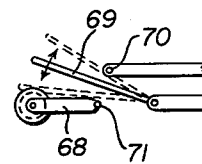
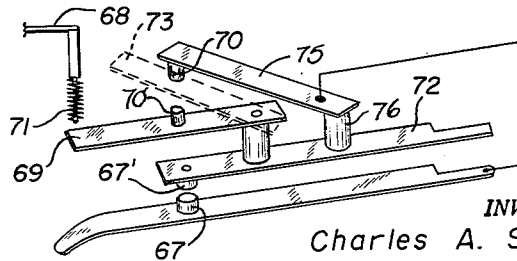


Fig. - 5



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6 Claims. (Cl. 100—50)

This invention is directed to a device for collapsing tin cans and the like and more particularly to a portable, preferably electrically powered, can crusher for use in the family kitchen.

Due to the large population increases, the problem of removal and disposal of trash from residential areas is becoming an increasingly difficult task with which to cope. Also, with increasing usage of the "tin can" for foods, beverages of all types, and various other household commodities, larger containers of various sorts have become necessary around the home to contain trash before removal. The increased usage of tin cans as mentioned above has enlarged the problems of trash removal and disposition because of the unnecessarily large volume or bulk storage space necessary to store, transport and dispose of empty tin cans.

Realizing how much easier the task of trash removal would be if the volume of the interior of empty tin cans were usable, I have invented my portable, power operated, can crusher to provide a simple can crushing operation for home or similar uses. Although I intend my invention primarily for home uses, others such as gasoline service stations and the like, will find use of my device advantageous in lessening their related problems of trash storage, removal and disposal. In the case of the service station, crushing of the large numbers of empty oil cans normally incident to such businesses requires much time.

Briefly, my invention is a simple, relatively inexpensive, easily manufactured and operated device for crushing empty tin cans and the like. It is comprised, essentially, of a supporting base member having a generally flat stationary upper member. Mounted in and extending from the base are extensible and retractable supports for a second member having a substantially flat surface substantially parallel to the stationary upper member of the base member. A power transmission system, preferably powered by a reversible electric motor, induces a closing and separating motion between the above-mentioned opposed flat members whereby tin cans inserted between them are crushed or collapsed to a relatively flat, thin configuration, and then removed for disposal. Additionally, I provide a novel governor arrangement which prevents motor overload and resultant damage. A more detailed description of my invention is set forth hereafter.

Having briefly described my invention, it is among its objects and advantages to provide a simple, economical, easily operated crusher for tin cans and the like.

It is also an object of my invention to provide a simple, efficient and economical device capable of rapidly crushing empty tin cans and the like for ease of disposal.

It is a further object of my invention to provide a portable electrically powered can crusher for use in a family kitchen or similar locations which is inclusive of means for preventing damage to the structure and operating parts of the device by overloading and running the device beyond its structural limits.

It is believed that other objects and advantages of my invention will become readily apparent from the following description with reference to the appended exemplary drawings, in which:

FIG. 1 is a side elevation, partially broken, of a can crusher according to my invention as it would be in substantially its closed position;

FIG. 2 is the device of FIG. 1 in reduced scale showing the device in its open position;

2

FIG. 3 is a top schematic view of the power transmission system used in the device of FIG. 1;

FIG. 4 is a schematic diagram of the wiring system of the apparatus of FIG. 1;

FIG. 5 is an enlarged detail of the governor of the circuit of FIG. 4; and

FIG. 6 is an enlarged isometric detail of the apparatus of FIGS. 4 and 5.

Before describing the invention in detail, I wish it understood that the accompanying drawings are merely exemplary of one manner of practicing my invention and I do not intend to be limited thereby but rather to the scope of the thereafter appended claims.

In FIG. 1 there is shown an exemplary model of a portable power-operated can crusher according to my invention which is inclusive of a base member generally indicated by reference character 10 and which consists of a bottom member 9 and a top member 12. The members 9 and 12 are preferably formed in the generally triangular shape shown in FIGS. 2 and 3. The members 9 and 12 are supported within a sheet metal frame or cover 11. Of course, other types of covering materials may be used for forming the hollow enclosure of the base structure. The broken section in FIG. 1 shows the detail of one of the three extensible and retractable members which raise and lower the upper portion 13 toward and away from the upper surface of the casting 12. The three extensible and retractable members (the relationship of which is better shown in FIG. 2) are designated by reference character 14 in the drawings and all are similar in construction and detail. Essentially, the extensible and retractable members each consist of a threaded rod 15 located centrally of the extensible and retractable members. In threaded relationship with the threaded rod 15 is a hollow tubular member 16 which is internally threaded along at least a portion of its lower end. Exteriorly of the tubular member 16 is a second tubular member 17. The base of the rod 15 is in fixed relationship with a gear 18. Bearing bushing 19 is firmly affixed internally to tubular member 17 and serves as a bearing surface for the lateral positioning of the rotating sleeve 20 which is attached to rod 15. Thrust bearing 21 permits free rotation of the screw 15 under the lengthwise compressional forces developed by the screw.

Referring for the moment to FIG. 3, the three extensible and retractable members 14 each have a similar gear 18 associated therewith and are simultaneously driven by the gear train which will be described hereafter. The gear train is driven by a power source 25, preferably a reversible electric motor. The power takeoff 26 of the electric motor drives a first gear 27 which has centrally located a second gear member 28. The central gear 28 drives a third gear 29 which in turn, through its central gear member 30, drives the large gear 31. The large gear 31 simultaneously engages and drives the three gears 18 of the extensible and retractable members 14.

In operation, then, as the power source, which is preferably a reversible electric motor, supplies power to the power transmission system either in a clockwise or counterclockwise direction, resultant movement of the three gears 18 causes the extensible and retractable members 14 to raise or lower depending on the direction in which the gears 18 turn. The manner in which the extensible and retractable members are caused to raise and lower is substantially as follows: As the gear 18 turns, the rod 15 turns within the internally threaded tubular member 16, causing that member to raise or lower within the outer tubular member 17 thus causing uniform upward or downward movement of the upper casting or plate member 13.

The lower edge of the internally threaded tubular member 16 has a sharp drop as generally indicated at 40. The purpose of this drop is to prevent overextension of the

extensible and retractable members. The manner in which this operation is accomplished is that as the threaded rod 15 turns, the internally threaded tubular member 16 advances upwardly until the cam 41 falls off the end 40 of the tubular member 16. The cam 41 carries a portion 42 of the switch 43. When the end 40 reaches the cam 41, it will open the switch, causing a break in the motor circuit and thus a cessation of motion in the extensible and retractable members. Also shown in FIG. 1 is a lower motion limiting device generally indicated by reference character 45. The limit controls of this device are shown in FIG. 1. In operation, the under surface of the upper member 13 depresses a spring-loaded plunger 46, causing its lower cam surface 47 to act upon the cam member 48. When the cam member 48 is moved (generally to the left as shown in the drawings) the contact 49 of the switch 50 is moved, thus causing a break in the circuit, thereby preventing further downward or closing motion of the device.

Referring for the moment to FIG. 4 wherein there is a wiring diagram of the device of FIG. 1 and in which like reference numerals refer to like parts of the assembly shown in FIG. 1, it will be observed that when the toggle switch 60 is placed upon the "up" terminal, the circuit will be closed, causing the motor 25 to operate and cause an upward movement of the extensible and retractable members 14. When the toggle switch 60 is thrown on the down position, a reversing or downward movement will be induced in the extensible and retractable members 14. In FIG. 4, 61 is meant to be generally indicative of a can placed between the upper casting 13 and the lower casting 12. Reference character 62 is generally indicative of a novel governor control switch included in devices according to my invention.

When the electric motor 25, preferably having an operating characteristic of 15,000 r.p.m., is in operation, its motion induces a motion in the element 63 causing a circumferential motion to be induced in the balls 64 of the governor control switch. As rotation is induced in the balls 64 by the action of centrifugal force, they tend to swing in a circle of ever increasing circumference until the maximum allowable is reached. As these balls 64 swing outwardly to their maximum circumference, the plate member 65 moves upwardly against the calibrated pressure spring 66 thereby closing the switch composed of contacts 67 and 67'. Simultaneously with the upward movement of the element 65 against the pressure spring 66, the element 68 (also shown in FIG. 5) will hit the pivotal member 69 causing it to bear against the terminal 70. If the toggle switch is now moved toward the down position, there is a closed circuit through the governor control system and the extensible and retractable members 14 will cause a lowering of the upper cast member 13.

If there is an overload in the motor due to a tin can, such as 61, which is too strong or which resists the crushing movement, there will be a slowing of the motor and thereby a slower circumferential force is induced by the swinging balls 64. When this occurs, the plate 65 is lowered and the switch composed of contacts 67 and 67' is opened, thereby turning the machine off. Also, simultaneously with the downward motion, the member 68 will have ridden against the pivotal member 69 thereby opening the secondary circuit. Preferably, the member 68 has a tightly coiled spring 71 disposed on the end thereof and it is this spring which comes in contact with the element 69. The use of such a device as the tightly coiled spring 71 is a safety factor to avoid excessive wear from the swinging movement of the element 68 against the pivotal member 69.

Referring further to the governor switch, when there is an overload in the motor and the contacts 67 and 67' have been opened, no further downward motion is possible and any further motion must be of an upwardly directed character. Therefore, by reversing the toggle switch to the up position, the extensible and retractable

members 14 cause the upper cast member 13 to move away from the tin can 61. As this upward motion is induced, the member 68 will again swing the pivotal member 69 into contact with the contact 70, thereby closing the circuit for subsequent downward movement. Thus, if it is desired, the toggle switch may be again thrown to the down position and a second attempt made to crush the tin can. The foregoing described movement of the element 65 to close contacts 67 and 67' will cause downward movement of element 13 and also cause the secondary circuit through contact 70 to be opened.

In detail, the operation of the governor switch is as follows: During the opening motion of the crusher the movement is limited by the upper limit switch 50, the governor is not needed, and its associated switches are not in the circuit.

After the completion of an upward movement, the subsequent downward movement is initiated by switching the toggle switch 60 to the Down position. This throws the governor switch es into the circuit. However, contacts 67 and 67' are normally open when the motor is stopped and the motor will not start unless these contacts are shorted by contacts 70 and 70'. This shorting action is accomplished by the closing of contacts 70 and 70' by arm 68 and spring 71 moving member 69 during the previous upward movement. As soon as the motor starts in the reverse or downward direction, however, the contacts 70 and 70' are opened again by the action of arm 68 and spring 71 and the motor will immediately stop unless it has gained enough speed for the weights 64 to move outward and close contacts 67 and 67'. The arrangement shown in FIGS. 5 and 6 insures that the contacts 67 and 67' are closed before contacts 70 and 70' are opened because contacts 67 must close with contact 67' and mechanically move members 72 and 69 upward until member 69 comes into the path of spring 71 which moves member 69 to the position shown in dashed lines in FIGS. 5 and 6 and indicated by reference character 73. Contact 70 and arm 75 are attached to member 72 by means of electrical insulator 76. The entire motor current now flows through contacts 67 and 67' and the motor current will be switched off completely if the motor slows down enough for the centrifugal force to allow the weights 64 to drop. The speed at which this stopping action occurs can be varied by adjusting the tension in spring 66 by moving the thumb screw 74.

After the downward motion is completed, either by the action of the governor or by throwing the toggle switch to the Off position, the circuitry is in order to start the next upward movement when the toggle switch is thrown to the Up position.

Thus, there are three safety features in the circuit of a can crusher according to my invention which will prevent overextension of the limits of the machine, i.e., the lower limit switch 50, the upper limit switch 43 and the governor control switch 62.

Although in the foregoing description I have only referred to a gear driving power transmission system and a reversible electric motor as a power source, it is to be understood that an electric motor and a hydraulic power system for causing motion in the extensible and retractable members is within the scope of my invention. Furthermore, it is likewise anticipated that a system of pulleys and cables could be used to cause the opposed movement of the castings 12 and 13. Furthermore, the governor switch could be of a pressure or torque type, or a tripping relay operated in conjunction with the electric current in the motor, although these are not considered as fool proof as the ones shown in the drawings, which represent a preferred embodiment.

Having thus described one manner of practicing my invention, what I desire to be protected by Letters Patent is set forth in the following appended claims.

I claim:

1. A portable can crusher comprising a hollow base member adapted to be seated on a supporting surface and having a flat top surface on which cans are seated during crushing, said top surface having three spaced openings adjacent its periphery, elongated guide members secured within the base member adjacent its bottom and extending vertically to the respective openings in concentric relation thereto, an upper member shaped similarly to said flat top surface and having a flat bottom surface, hollow columns secured on said upper member and depending through said openings and associated guide members, each said column being internally threaded adjacent its bottom, a vertical screw supported at the bottom of the base member and extending upwardly through each hollow column in engagement with its internal thread, and means including a train of gears for imparting a synchronous drive to said screws so as to maintain uniform spacing between the flat surfaces in can crushing and removal operations.

2. A portable can crusher comprising a hollow base member adapted to be seated on a supporting surface and having a flat top surface on which cans are seated during crushing, said top surface having three spaced openings adjacent its periphery, elongated guide members secured within the base member adjacent its bottom and extending vertically to the respective openings in concentric relation thereto, an upper member shaped similarly to said flat top surface and having a flat bottom surface, hollow columns secured on said upper member and depending through said openings and associated guide members, each said column being internally threaded adjacent its bottom, a vertical screw supported at the bottom of the base member and extending upwardly through each hollow column in engagement with its internal thread, and means including a train of gears for imparting a synchronous drive to said screws in forward and reverse directions so as to vary the spacing between the flat surfaces in can crushing and removal operations.

3. A portable can crusher comprising a hollow base member adapted to be seated on a supporting surface and having a flat top surface on which cans are seated during crushing, said top surface having three spaced openings adjacent its periphery, elongated guide members secured within the base member adjacent its bottom and extending vertically to the respective openings in concentric relation thereto, an upper member shaped similarly to said flat top surface and having a flat bottom surface, hollow columns secured on said upper member and depending through said openings and associated guide members, each said column being internally threaded adjacent its bottom, a vertical screw supported at the bottom of the base member and extending upwardly through each hollow column in engagement with its internal thread, and means including a reversible electric motor and a train of gears for imparting a synchronous drive to said screws in forward and reverse directions so as to vary the spacing between the flat surfaces in can crushing and removal operations.

4. A portable can crusher comprising a hollow base member adapted to be seated on a supporting surface and having a flat top surface on which cans are seated during crushing, said top surface having three spaced openings adjacent its periphery, elongated guide members secured within the base member adjacent its bottom and extending vertically to the respective openings in concentric relation thereto, an upper member shaped similarly to said

flat top surface and having a flat bottom surface, hollow columns secured on said upper member and depending through said openings and associated guide members, each said column being internally threaded adjacent its bottom, a vertical screw supported at the bottom of the base member and extending upwardly through each hollow column in engagement with its internal thread, means including a reversible electric motor and a train of gears for imparting a synchronous drive to said screws in forward and reverse directions so as to vary the spacing between the flat surfaces in can crushing and removal operations.

5. A portable can crusher comprising a hollow base member adapted to be seated on a supporting surface and having a flat top surface on which cans are seated during crushing, said top surface having three equidistantly spaced openings adjacent its periphery, elongated guide members secured within the base member adjacent its bottom and extending vertically to the respective openings in concentric relation thereto, an upper member shaped similarly to said flat top surface and having a flat bottom surface, hollow columns secured on said upper member and depending through said openings and associated guide members, each said column being internally threaded adjacent its bottom, a vertical screw supported at the bottom of the base member and extending upwardly through each hollow column in engagement with its internal thread, and means including a train of gears for imparting a synchronous drive to said screws in forward and reverse directions so as to vary the spacing between the flat surfaces in can crushing and removal operations.

6. A portable can crusher comprising a hollow base member adapted to be seated on a supporting surface and having a flat top surface on which cans are seated during crushing, said top surface having three spaced openings adjacent its periphery, elongated guide members secured within the base member adjacent its bottom and extending vertically to the respective openings in concentric relation thereto, an upper member shaped similarly to said flat top surface and having a flat bottom surface, hollow columns secured on said upper member and depending through said openings and associated guide members, each said column being internally threaded adjacent its bottom, a vertical screw supported at the bottom of the base member and extending upwardly through each hollow column in engagement with its internal thread, means including a reversible electric motor and a train of gears for imparting a synchronous drive to said screws in forward and reverse directions so as to vary the spacing between the flat surfaces in can crushing and removal operations, and means including a switch actuated by movement of said upper member for stopping the electric motor responsive to measured conditions of overload on said upper member.

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