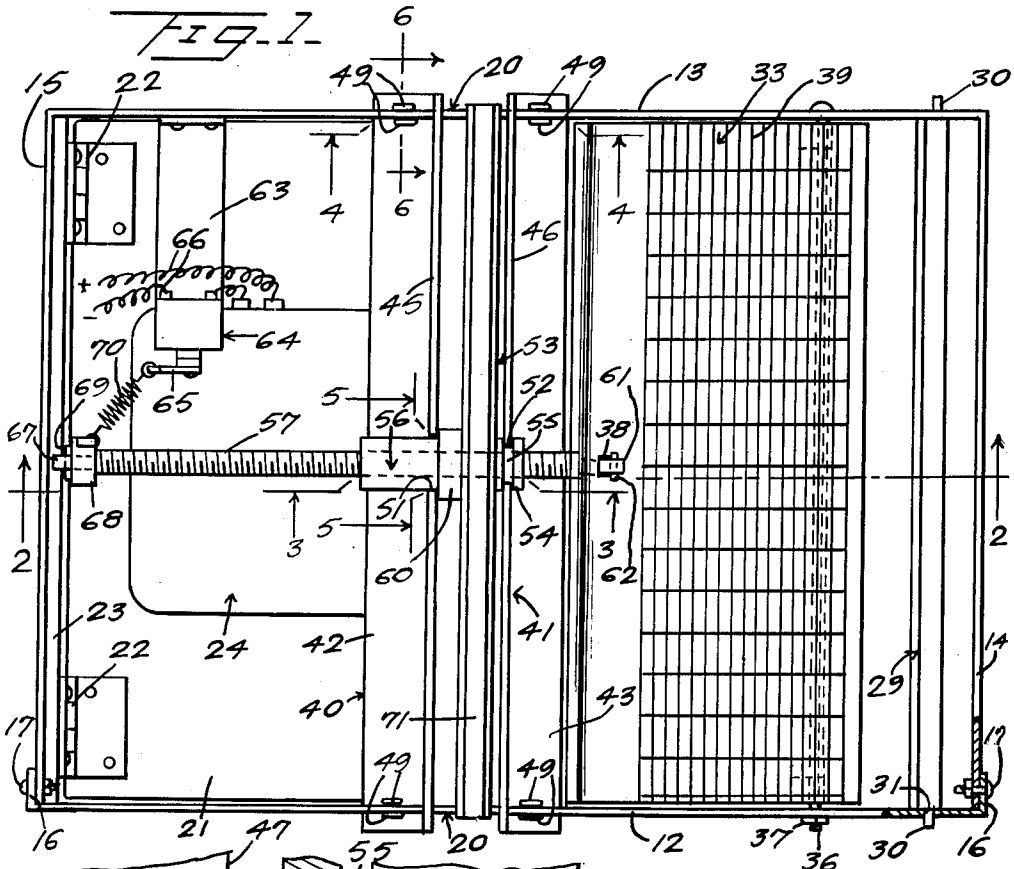
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CRUSHING MACHINE WITH FLEXIBLE DRIVE

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FIG. 1



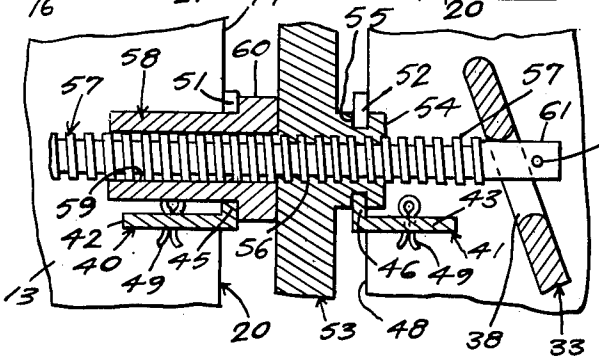


FIG. 3

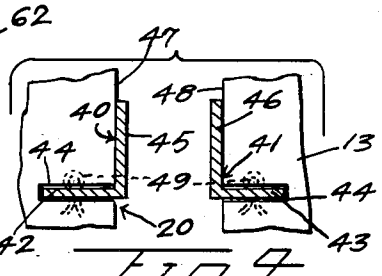


FIG. 4

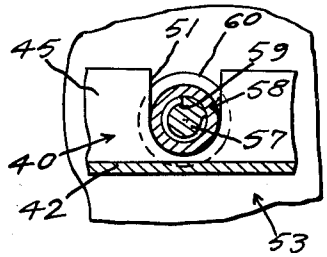


FIG. 5

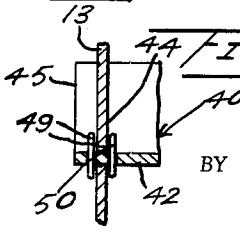


FIG. 6

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FIG. 2.

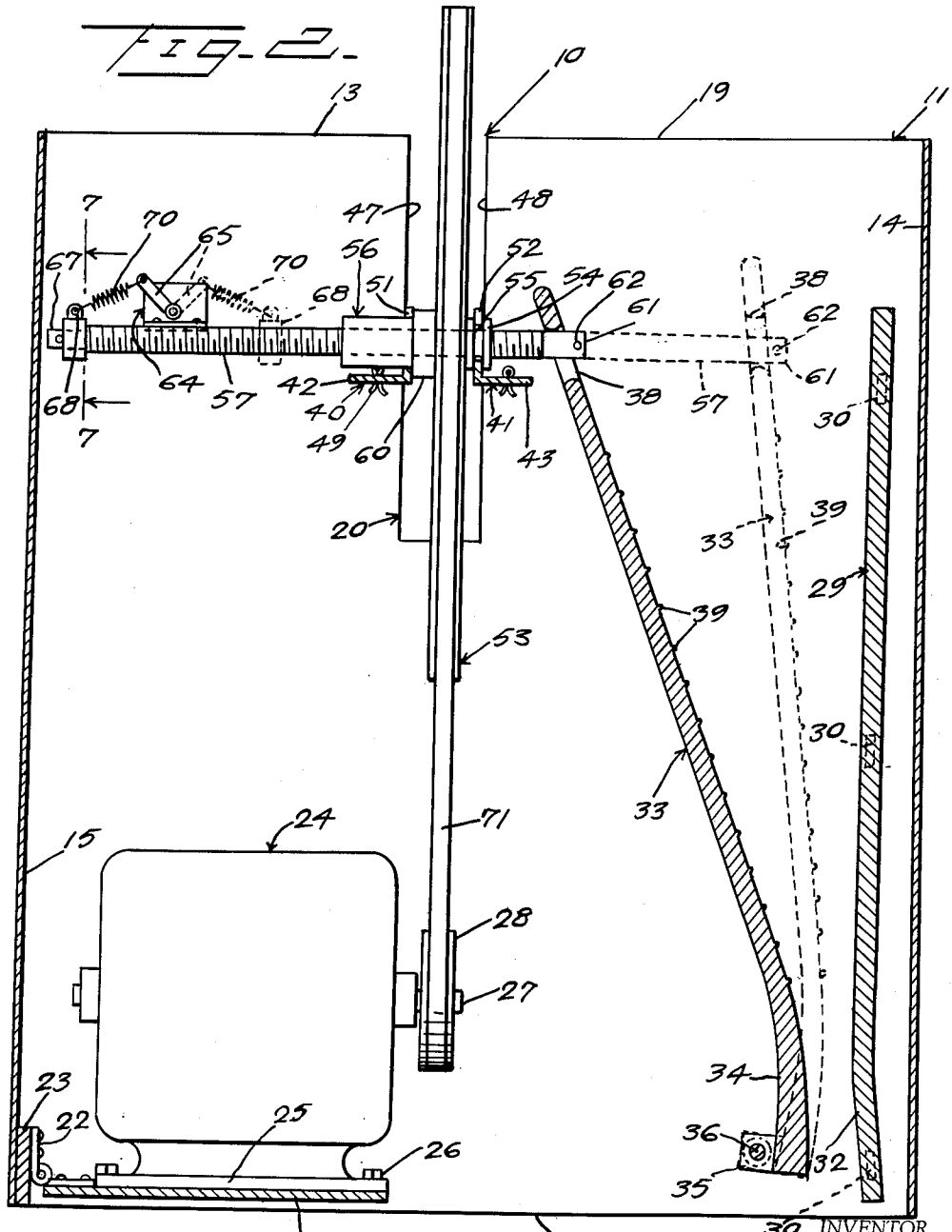
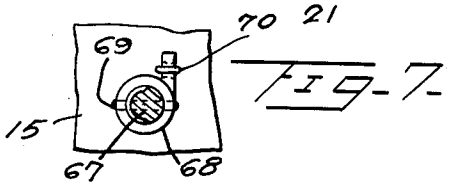


FIG. 7.



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CRUSHING MACHINE WITH FLEXIBLE DRIVE

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Filed May 8, 1961, Ser. No. 108,412
3 Claims. (Cl. 100—233)

This invention relates to a machine of extremely simple construction which is capable of effectively functioning for crushing disposable containers including cans.

More particularly, it is an object of the present invention to provide an extremely compact machine composed of a minimum number of parts and having novel means of extremely simple construction for converting a rotary motion into a reciprocating motion.

Still another object of the invention is to provide a crushing machine including a self-contained power source for supplying the rotary motion to the reciprocably actuated part which, in turn, actuates a movable crushing element.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a presently preferred embodiment thereof, and wherein:

FIGURE 1 is a top plan view of the crushing machine;

FIGURE 2 is a longitudinal sectional view thereof, taken substantially along the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged fragmentary vertical sectional view, taken substantially along the line 3—3 of FIGURE 1;

FIGURE 4 is an enlarged fragmentary longitudinal sectional view, taken substantially along the line 4—4 of FIGURE 1;

FIGURE 5 is an enlarged transverse fragmentary vertical sectional view, taken substantially along the line 5—5 of FIGURE 1;

FIGURE 6 is an enlarged fragmentary transverse vertical sectional view, taken substantially along a plane as indicated by the line 6—6 of FIGURE 1, and

FIGURE 7 is an enlarged fragmentary transverse vertical sectional view, taken substantially along a plane as indicated by the line 7—7 of FIGURE 2.

Referring more specifically to the drawings, the crushing machine in its entirety is designated generally 10 and includes an elongated rigid rectangular frame 11 composed of spaced apart substantially parallel side walls 12 and 13, and spaced substantially parallel end walls 14 and 15. The end walls 14 and 15 may be formed integral with the side wall 13, as illustrated, and the side wall 12 may be provided with inturned end flanges 16 which overlap and are detachably secured by nut and bolt fastenings 17 to the other ends of the walls 14 and 15, as seen in FIGURE 1. The frame 11 has an open bottom 18, formed by coplanar bottom edges of the walls 12–15, and an open top 19. The side walls 12 and 13 are each provided with a relatively wide and deep upwardly opening recess 20, which recesses are disposed in alignment with one another and spaced from the end walls 14 and 15.

A platform 21 is mounted for vertical swinging movement in one end of the bottom portion of the frame 11, as by means of hinges 22 which are secured to said platform and to a bracing strip 23 which is secured to and disposed along the inner side of the lower portion of the end wall 15. The platform 21 is disposed somewhat above the level of the plane of the open bottom 18, when the platform is disposed substantially parallel thereto. A conventional reversible electric motor 24 has a base 25 which rests on and is secured by fastenings 26 to the platform 21. The motor 24 is positioned so that its armature or drive shaft 27 is disposed longitudinally of the frame 11 and a small V-belt pulley 28 is fixed to the end

of the shaft 27 which is located remote from the end wall 15 and between and spaced from the walls 14 and 15.

A stationary crushing plate 29 is disposed within the frame 11 between the side walls 12 and 13 and adjacent the end wall 14. The plate 29 has lugs 30 which project from its side edges through slots 31 in the walls 12 and 13 for supporting said plate immovably in the frame 11. The plate 29 is substantially flat and is disposed in substantially an upright position except the lower portion 32 thereof which is curved slightly and inclined toward the end wall 14.

A movable crushing plate or jaw 33, of a width slightly less than the spacing between the side walls 12 and 13, is disposed within the frame 11 between the stationary plate 29 and the power source 24 and is likewise substantially flat except the lower portion 34 thereof which is curved to slope away from the lower portion 32. The lower end of the plate 33, on the side thereof remote from the plate 29, is provided with aligned apertured lugs 35 through which a bolt 36 extends. The headed bolt 36 extends through the side walls 12 and 13 and is secured thereto by a nut 37, and the lugs 35 turnably engage said bolt for mounting the jaw 33 for rocking movement about the bolt toward and away from the plate 29, as illustrated in full and dotted lines in FIGURE 2. The bolt 36 is located adjacent to but spaced from the frame bottom 18 and the lower plate portions 32 and 34 terminate slightly above the bottom 18 and are spaced from one another, as seen in FIGURE 2. The jaw or plate 33 has a vertically elongated opening 38 near its upper end and approximately midway between its side edges. The inner side or face of the jaw 33 may be roughened or serrated, as indicated at 39.

A pair of rigid bars 40 and 41 of angular cross section extend across the frame 11. The bars 40 and 41 are longer than the spacing between the walls 12 and 13 and have coplanar bottom horizontal flanges or sides 42 and 43, respectively, which engage in horizontal slots 44 of the walls 12 and 13, as seen in FIGURE 6, which slots open into intermediate portions of the recesses 20. The bars 40 and 41 have upstanding inner vertical flanges 45 and 46, respectively, which extend through the recesses 20 and which abut against the opposite edges 47 and 48, respectively, thereof. Cotter pins or the like 49 extend through openings 50 of the horizontal flanges 42 and 43 and embrace the walls 12 and 13, as seen in FIGURE 1, to prevent sliding movement of the bars 40 and 41 crosswise of the frame 11.

The vertical flanges 45 and 46 are provided, intermediate of their ends, with aligned upwardly opening notches 51 and 52, respectively, the bottom portions of which are substantially semicircular, as seen in FIGURE 5.

A large V-belt pulley 53 is disposed between the bars 40 and 41 and has a hub 54 which projects from one side of the pulley. The projecting portion of the tub 54 is provided with an annular groove 55 which fits turnably in the notch 52. The hub 54 has a threaded bore 56 extending therethrough, so that said hub froms a nut in which a threaded rod 57 is received. A bushing 58 engages in the notch 51 and has a smooth bore 59 extending therethrough, in which the threaded rod 57 has a slidable engagement. The bushing 58 has an enlarged or flanged end forming a head 60 which is disposed between the flange 45 and the other end of the pulley hub 54 to combine with the hub groove 55 for confining the pulley 53 between and spaced from the bars 40 and 41. It will thus be seen that the bushing 58, rod 57 and the hub groove 55 combine to support the pulley 53 rotatably on and between the bars 40 and 41 and, in combination with the cotter pins 49, retain said pulley against translational movement relative to the frame 11.

The rod **57** has a stem **61** at one end thereof of rectangular cross section, as seen in FIGURE 3, which extends through the opening **38** and fits slidably but nonrotatably therein, so that the rod is held against rotation by the jaw **33**. A pin **62** extends through the stem **61** and across the opening **38** for slidably confining the stem therein. The threaded portion of the rod **57** is larger in diameter than the width of the opening **38**.

A bracket **63** extends inwardly from and is supported by the wall **13** to support a conventional tumbler or toggle switch **64** which is disposed above the motor **24**, between the end wall **15** and bar **40** and between the side wall **13** and rod **57**. The toggle switch **64** has an arm or lever **65** which is swingably movable about an axis disposed crosswise of the rod **57** and by a snap action for reversing the electric motor; switch **64** being interposed in the electric circuit **66** of the motor **24**, as seen in FIGURE 1.

The threaded rod **57** has a stem **67** of reduced size at its opposite end, which is located between the end wall **15** and the bushing **58**. A collar **68** is secured on the stem **67** by a pin **69** which extends through said stem. One end of a contractile spring **70** is connected to the collar **68** and the other end of said spring is connected to the arm **65**.

An endless V-belt **71** is trained around the pulleys **53** and **28** for driving the pulley **53** from the motor shaft **27**. The pulley **53** is of a much larger diameter than the pulley **28** so that said pulley will be driven much slower than the pulley **28**. The weight of the motor **24** on the hinged platform **21** urges said platform to swing downwardly for maintaining tension on the belt **71**.

Assuming that the parts are disposed in the positions as seen in FIGURES 1 and 2, in which position the arm **65** has just been moved by snap action from its dotted line to its full line position of FIGURE 2 for reversing the motor **24**, in this position of the parts the movable jaw **33** is in a fully open position so that a can or other disposable container, not shown, can be dropped through the open top **19** of the frame into the space between the crushing plates **29** and **33**. With the switch arm **65** in the position as seen in FIGURES 1 and 2, the pulley **53** will be driven in a direction for feeding the rod **57** from left to right through the hub **54** for moving said rod and the jaw **33** from the full line to the dotted line positions of said parts, as seen in FIGURE 2. During this movement the can or other receptacle, disposed between the plates **29** and **33**, will be crushed or partially crushed. The thrust receiving head **60** of the bushing **58** will receive the thrust exerted by the rod **57** on the pulley hub **54** to prevent the pulley from moving toward the bar **40**. When the rod **57** reaches its dotted line position of FIGURE 2, the collar **68** will be in its dotted line position of this view and at which time the arm **65** will have been pulled by the spring **70** from its full line to its dotted line position for reversing the motor **24**, so that the pulley **53** will thereafter be driven in the opposite direction for moving the rod **57** in the other direction, to return said rod and the jaw **33** to their full line positions of FIGURE 2. The aforedescribed operation effecting swinging movement of the jaw **33** toward and away from the plate **29** will be repeated automatically for crushing any container or containers disposed between said plates until the container can pass between the lower plate portions **32** and **34** and be discharged by gravity from the machine **10**. It will be obvious that more than one container can be crushed simultaneously and that containers to be crushed can be fed intermittently into the machine while other containers are being crushed. The slight thrust which is imparted in the opposite direction to the hub **54**, while the rod **57** is moving toward the end wall **15**, for swinging the jaw **33** away from the plate **29**, is borne by the grooved hub portion engaging in the notch **52**.

The machine **10** can be secured to any suitable support, not shown, or can be disposed with its bottom **18** resting on a horizontal supporting surface, but so that the part thereof disposed beneath the plate portions **32** and **34** will be exposed to allow the crushed containers to be discharged by gravity from the machine.

It will be readily apparent that other forms of flexible drives may be provided between the shaft **27** and hub **54**, such as a sprocket wheel and chain drive, since the belt and pulleys as shown only constitute one form of flexible drive which may be employed.

Various other modifications and changes are contemplated and may be resorted to, without departing from the function or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A crushing machine comprising a rigid frame having side walls, a reversible power source disposed in and supported by said frame, a stationary crushing plate secured in substantially an upright position in the frame and crosswise thereof, a movable crushing plate, means swingably mounting said movable crushing plate in the frame in opposed relation to the stationary crushing plate for swinging movement toward and away from the stationary crushing plate about a substantially horizontal axis disposed adjacent a bottom edge of the movable crushing plate, a pair of rigid braces spanning the frame and connected to said side walls in spaced apart relation to one another, said movable crushing plate being disposed adjacent to the stationary crushing plate and between the stationary crushing plate and said braces, a threaded rod extending across said braces, a nut threadedly engaging on said rod, means reciprocably supporting said rod on the braces for supporting and journaling said nut between the braces, means nonrotatably connecting one end of said rod to the movable crushing plate remote from the pivot thereof for sliding movement of the rod relative to said movable crushing plate toward and away from the axis of said pivot, said power source having a rotatably driven part, a large belt pulley disposed around and fixed to the nut, a small belt pulley fixed to the rotatably driven part, and an endless belt trained over the belt pulleys and forming a flexible driving connection between the power source and nut for rotating the nut in opposite directions to feed the threaded rod back and forth therethrough for oscillating the movable crushing plate toward and away from said stationary crushing plate.

2. A crushing machine as in claim 1, and a platform pivotally mounted in the frame for vertical swinging movement, said platform being disposed below the large belt pulley and having the power source mounted thereon whereby the weight of the power source is supported by said belt for maintaining the belt tensioned about the pulleys.

3. A crushing machine as in claim 1, an electric circuit supplying electric current to the power source, and a reversing switch interposed in the electric circuit and connected to said threaded rod for reversing the power source as the threaded rod reaches the extremities of its reciprocating movement.

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