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W. D. KIMBALL ET AL.

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GRATE DUMPING APPARATUS

Filed June 16, 1931

4 Sheets-Sheet 1

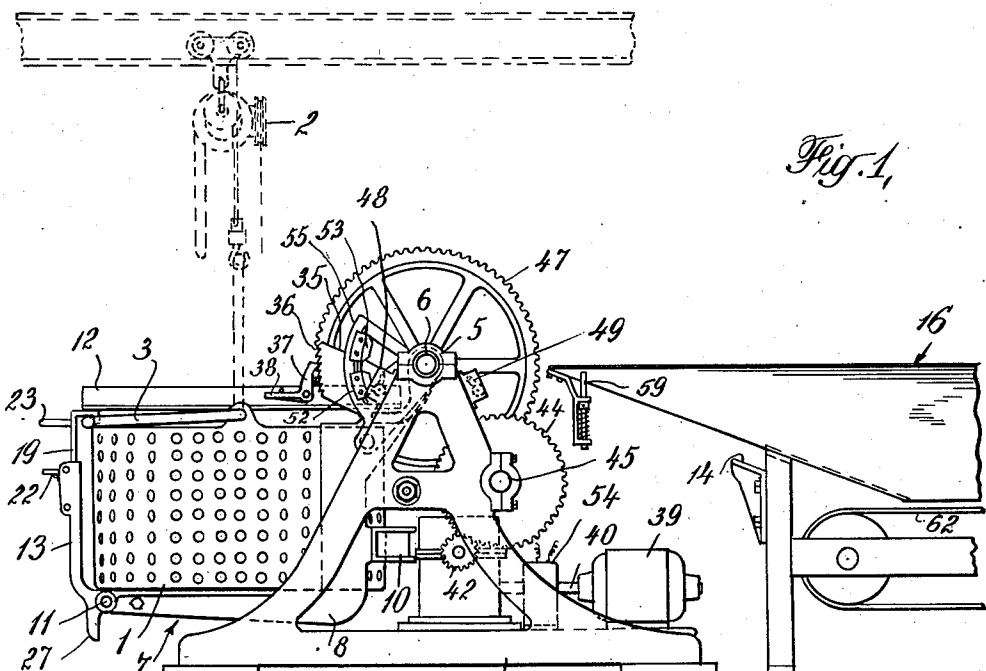


Fig. 1,

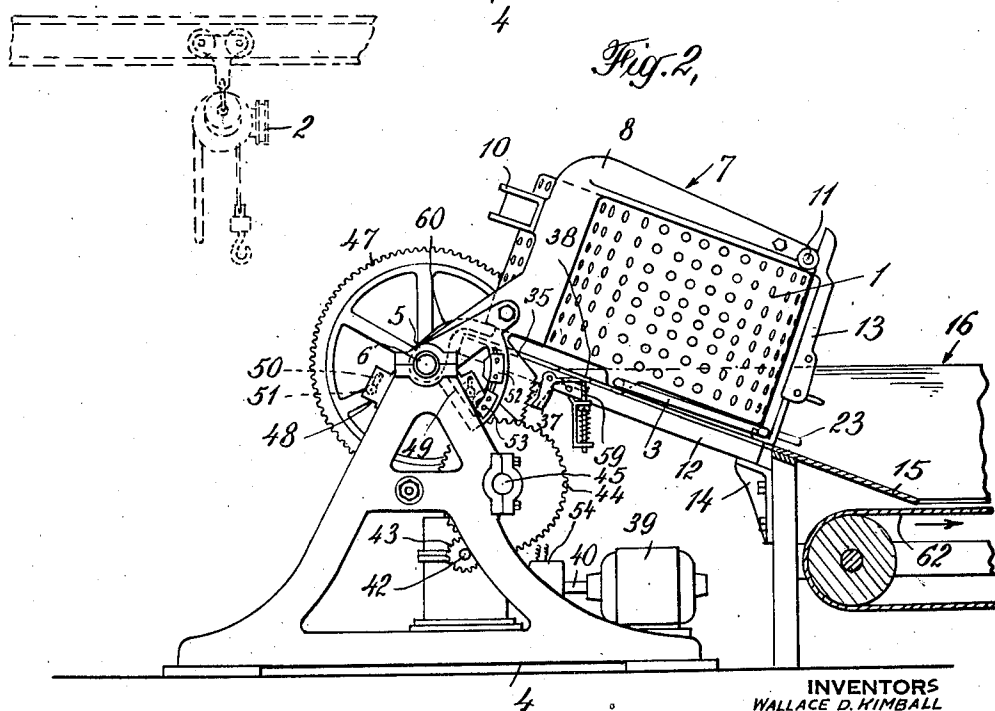


Fig. 2,

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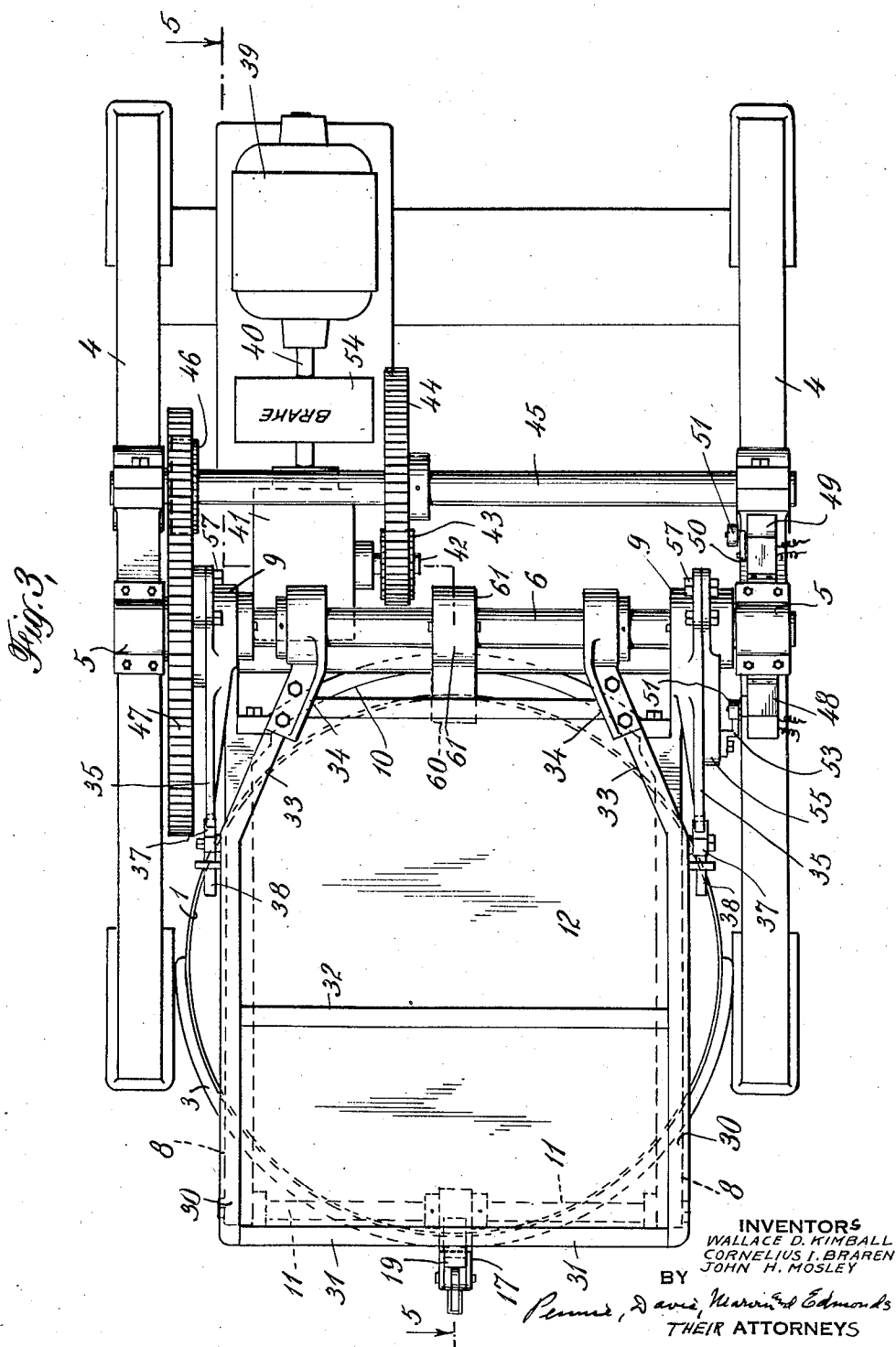
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CRATE DUMPING APPARATUS

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4 Sheets-Sheet 2



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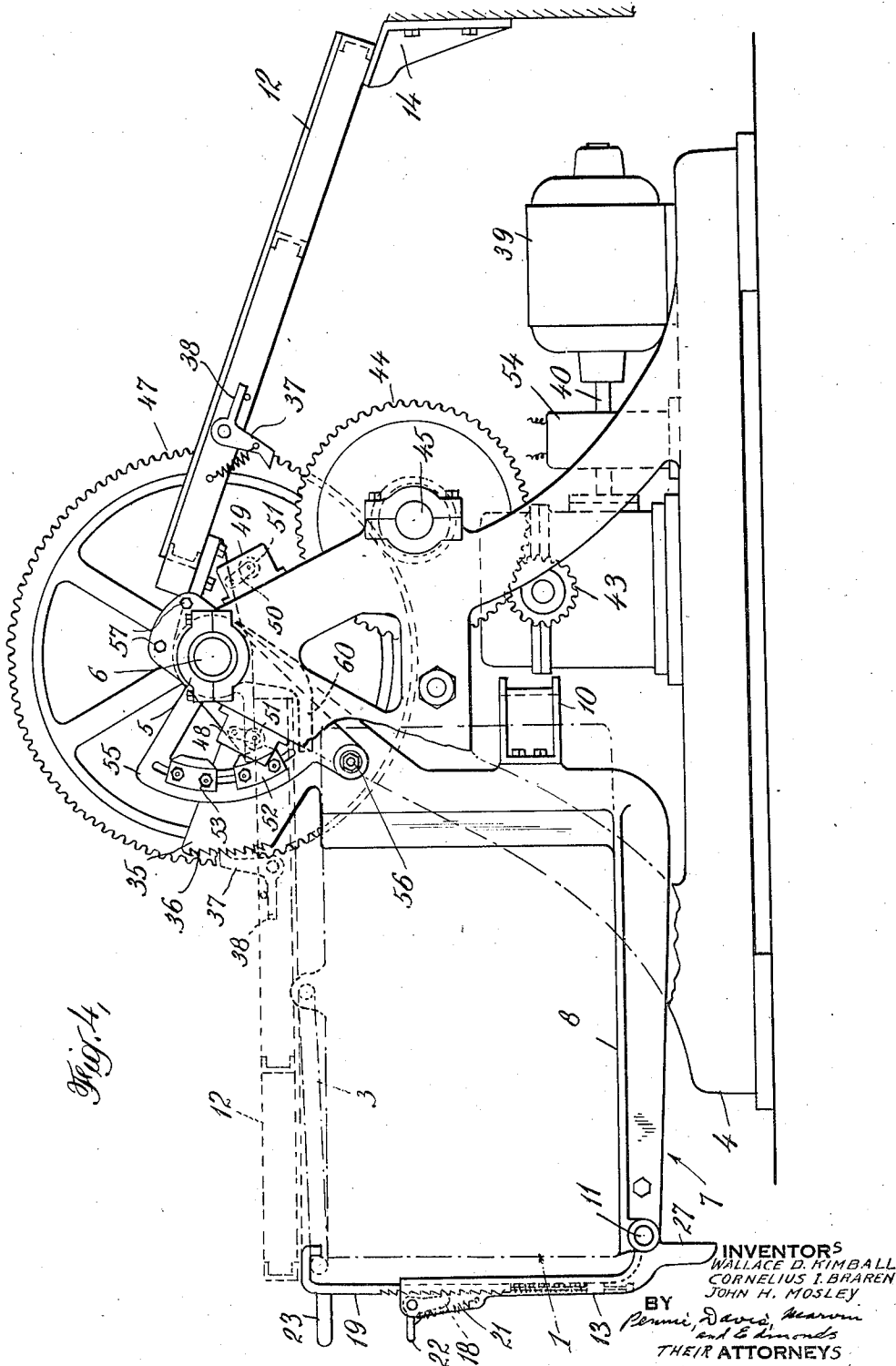
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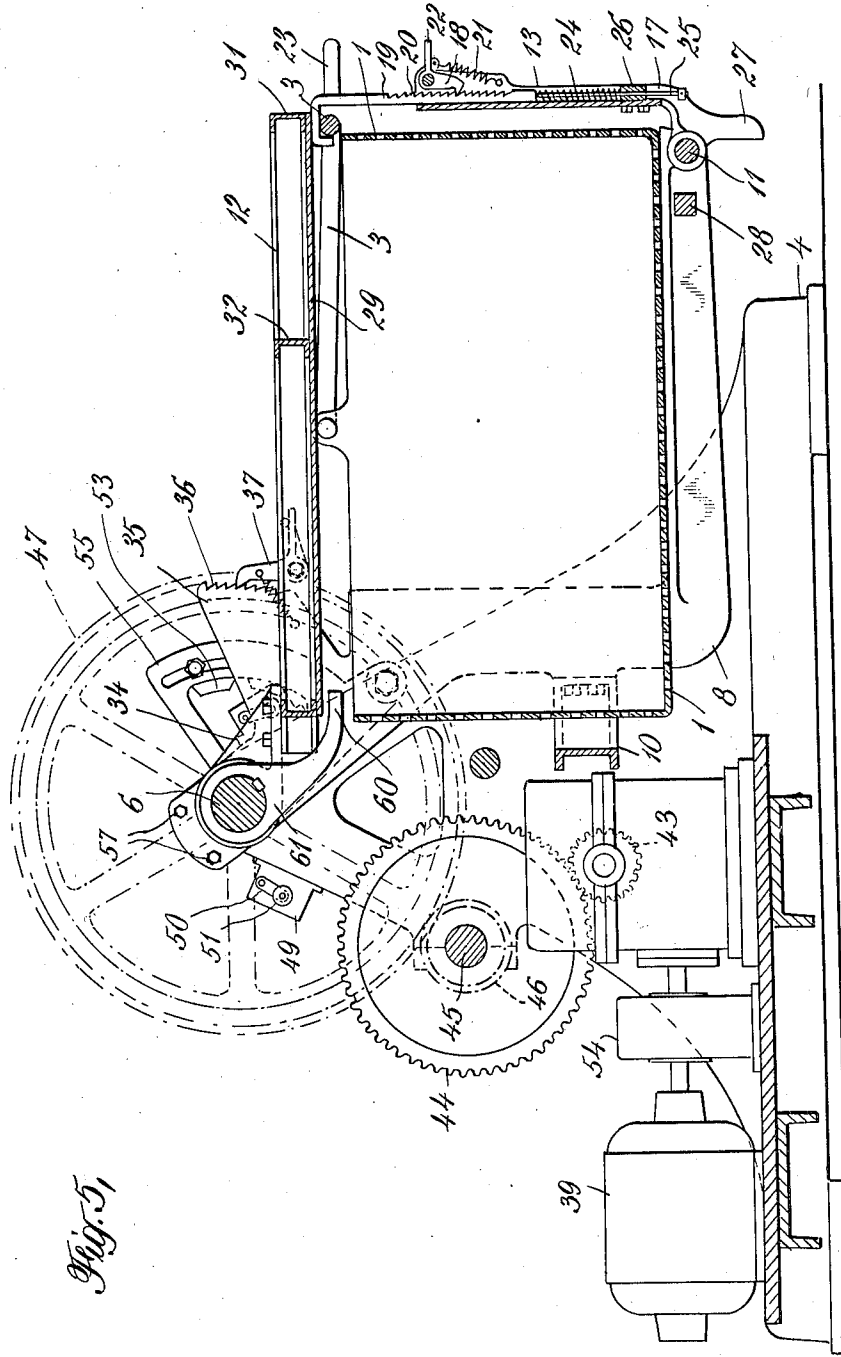


Fig. 5,

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CRATE DUMPING APPARATUS

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14 Claims. (Cl. 214—1.1)

This invention relates to crate dumping apparatus and more particularly to apparatus for receiving an open top filled container, such as a basket or crate, and turning it up side down so as to allow its contents to be discharged by gravity, and then returning the container to its upright position.

In putting up vegetables and other food stuffs in cans, it is the common practice to handle such cans during the cooking operations in large metal baskets holding one hundred or more cans. After the desired period of cooking, the metal basket containing the hot cans is transported by an overhead conveyor to the labeling or packing department where the cans are discharged on to a suitable table or hopper in a pile. From this pile the cans are, in some cases, taken by hand and delivered in proper position and spaced relation to the conveyors which carry them to the labeling machine or other destination. In other cases, the cans are dumped in a pile into the hopper of a suitably constructed automatic machine which unscrambles the cans, that is, sorts them out without hand labor, and delivers them to the labelling machine in the desired position and order.

The primary object of our present invention is to provide a machine which will receive a basket filled with such cans and dump the same in a pile in such a manner as to prevent damage to the cans through their striking one another, and then return the basket to the upright position.

A further object of the invention is to provide such a dumping machine which can be satisfactorily operated by one operator.

A further object of the invention is to provide a machine of this sort which is of rugged construction and will withstand for unlimited periods of operation, the shocks necessarily accompanying the handling of baskets or crates filled with heavy cans.

In the accompanying drawings, we have illustrated the preferred embodiment of our invention as now employed in commercial practice. In these drawings,

Figure 1 is a side elevation of our improved dumping machine showing also a portion of the overhanging conveyor and a portion of the hopper of an unscrambling machine.

Fig. 2 is a view similar to Fig. 1 showing the machine after the inverting of the basket but before the discharge of the contents thereof.

Fig. 3 is an enlarged plan view of the dumping machine as shown in Fig. 1.

Fig. 4 is an enlarged side elevation of the dumping machine as shown in Fig. 1, with part of the frame broken away and illustrating the manner of swinging the cover into position; and

Fig. 5 is a longitudinal vertical section taken on broken line 5—5 of Fig. 3 looking in the direction of the arrows.

Referring now to the accompanying drawings, the metal basket 1 of hot cans is transported from the cooking operation by means of the travelling electric hoist 2 to the dumping machine. For this purpose the basket is provided with a bail 3 by which means it is lifted by the hook of the hoist. The basket itself is an open top receptacle, as may be seen more clearly from Fig. 5, and the walls and the bottom are perforated so as to allow the hot water to readily surround the cans during the cooking operation and also to allow this water to quickly drain away from the cans after they are removed from the cooking vat.

The dumping machine comprises a pair of A-shaped side frames 4, these frames being made of heavy castings so as to properly support the various parts of the machine. At the tops of these frames there are a pair of journals 5 in which a heavy main shaft 6 is carried. The basket 1 is received from the hoist upon a cradle 7 which consists of a pair of parallel spaced side arms 8 having horizontal portions extending beneath the bottom of the basket and vertical portions extending upwardly to the top of the basket at the rear, and terminating in bosses or hubs 9 which are keyed to the main shaft 6, near each of the side frames 4. In order to provide suitable strength for the cradle 7, the side arms 8 are joined together by a rugged webbed casting 10 at the rear, and by means of a brace rod 11 at the front.

It will be understood that as the shaft 6 is rotated, i. e. oscillated in a manner to be later described, the cradle 7 carrying the baskets 1 will be rotated from the position shown in Fig. 1 to the inverted position shown in Fig. 2. Before inverting the basket a cover 12 is firmly secured in position on top of the basket, and a basket retainer 13 is arranged to engage the bail 3. The details of both of these will be described below. Then when the basket is inverted to the position shown in Fig. 2, the cover 12 is brought into engagement with a bracket or support 14 which holds the inner surface of the inverted cover in alignment with the inclined floor 15 of the hopper of the unscrambling machine indicated generally at 16. By means of

appropriate mechanism to be described, cover 12 is allowed to remain in its inclined position supported by bracket 14 while the movement of cradle 7 is reversed so as to lift the inverted basket 1 slowly, thus allowing the cans in it to gradually slide out from beneath the edge of the basket into the hopper.

The basket retainer 13 serves to keep the basket within the cradle and lift it against the friction of the descending cans. The details of this basket retainer are shown clearly in Figs. 5 and 3. It comprises a casting 17 U-shaped in cross section, and pivoted at its lower end to the central part of brace rod 11. At the upper end of the casting 17 is pivoted a dog 18 beneath which slides a bar 19 having a hook at its upper end for engaging bail 3. Bar 19 has a series of teeth 20 which are engaged by the pointed end of dog 18 which is urged against these teeth by means of a spiral spring 21 and is manually releasable from the teeth by means of a handle 22.

Bar 19 is first raised by means of handle 23 so as to hook it over the bail 3, and then forced downwardly and frictionally held in position through the engagement of dog 18 with teeth 20. The friction thus produced is sufficient to hold the basket in position during the discharge of the cans. In order to facilitate the release of the basket retainer 13 from the empty basket after it is returned to its original position at the left hand side of the machine, bar 19 is biased upwardly by means of a spiral spring 24 which surrounds rod 25 that projects downwardly from the lower end of bar 19 and slides in a guide 26. The upward movement of bar 19 is limited by the head on the lower end of rod 25. In order to limit the angular movement of basket retainer 13 when it is disengaged from the bail, a projection 27 at the lower end extends below the pivot and engages a stop 28 when the retainer is swung outwardly to about the horizontal position.

The cover 12 comprises a smooth metal sheet 29 which is reinforced by means of a pair of side arms 30 and cross member 31 and 32 of structural steel. Side arms 30 are bent inwardly at 33 and bolted to a pair of castings 34 which are bored to be received loosely upon main shaft 6.

Since the entire weight of the cans within the basket 1 is supported upon the cover 12 during the latter half of the inverting operation, it is important to firmly secure the cover in position before the swinging of the cradle commences. To accomplish this a sector-like extension 35 having a series of ratchet teeth 36 in its outer periphery is formed integrally with the hubs 9 of each of the side arms 8, and coacting with the teeth 36 is a pair of dogs 37 pivoted to the cover 12 at either side. These dogs are spring-biased into engagement with the teeth 36 and provided with handles 38 for manually releasing them.

The machine is operated to dump the basket by means of a reversible electric motor 39 which causes the turning of main shaft 6 through the train of gearing illustrated and which may be described briefly as follows: The shaft 40 of motor 39 enters a reducing gear housing 41 and on the end of this shaft in the housing there is a worm. This worm meshes with a worm gear also within the housing and mounted on shaft 42. On the end of shaft 42, outside the housing, is a pinion 43 which through a gear 44 drives

a shaft 45 which is journaled in the side frames 4. On shaft 45 near one of the frames 4 there is a pinion 46 which meshes with a large gear 47 on main shaft 6. Due to this large gear reduction the motor 39 operates at high rotational speed, and it may also be of relatively small power.

The control of the movement of the cradle 7 is accomplished by means of a manually operated push button switch (not shown) having three buttons, one for causing the cradle to be moved into dumping position, another for causing a reverse movement to the initial position, and another for stopping at any position in case of emergency. The circuit of motor 39 through this manually operated switch is also controlled by two limit switches 48 and 49 so as to automatically stop the machine when the cradle reaches either of its two extreme positions.

Each of these switches 48 and 49 has an operating lever 50 fixed to the projecting end of the switch operating shaft, and on the outer end of this lever is a roller 51. Switches 48 and 49 are mounted on one of the side frames 4 of the machine, and in order to actuate these switches there are two cam blocks 52 and 53 carried by the cradle. Switches 48 and 49 are spring biased to the closed position, and when cam block 52 engages roller 51 of switch 48 it moves the lever 50 of switch 48 to open the switch. Similarly at the opposite end of the cradle movement cam block 53 engages roller 51 of switch 49 and moves its lever to open the switch.

In order to stop the moving parts quickly at these two positions of the cradle, and to prevent the cradle from striking the floor at the initial position or the bracket 4 at the dumping position, an electro-magnetic brake 54 is preferably provided on motor shaft 40. This brake is energized by contacts on the switches 48 and 49 which contacts are closed simultaneously with the opening of the motor circuit by these switches.

The cam blocks 52 and 53 are adjustably mounted upon a slotted sector 55 which is bolted at 56 and 57 to the outside of one of the cradle arms 8. By loosening the clamping nuts for these cam segments, they may be adjusted in their position in the slot of sector 55 so as to open switches 48 and 49 at the proper times.

In operating the dumping apparatus the basket 1 filled with cans from the cooking operation, is lowered by means of hoist 2 onto cradle 7 which is assumed to be at the initial position shown in Fig. 1. The bail 3 is disengaged from the hoist hook and swung toward the outside of the cradle and basket retainer 13 is swung upwardly and the upper end of bar 19 is hooked over the bail. Bar 19 is forced down as far as possible, the friction dog 18 sliding over teeth 20. The cover 12 is then rotated by hand from the position shown in Fig. 4, in which it was left at the end of the previous dumping operation, until it rests on top of the basket 1 as shown in Figs. 1, 3 and 5, and also in the dotted position of Fig. 4. As the cover is lowered the dogs 37 ride over the teeth 36 on extensions 35, and by engagement therewith hold the cover securely in position.

The forward button on the starting switch is now pushed which energizes motor 39 and the rotation of cradle 7 with the basket 1 now commences. The hoist 2 is moved out of the path of the cradle, and the cradle swings about the axis of shaft 6 slowly toward the position shown

in Fig. 2. Just before it reaches this position, the limit switch 49 is opened by the engagement of cam block 53 with the operating lever thereof, and simultaneously therewith the tails 38 of dogs 37 on the cover 12 engage stops 59, preferably spring mounted, and cause the release of dogs 37 from the teeth 36 thereby disconnecting the cover 12 from rotative engagement with the shaft 6 and allowing it to fall against bracket 14. The motion of cradle 7 is stopped promptly upon the opening of switch 49 by the electro-magnetic brake 54, and the position of cam block 53 is preferably adjusted so that the motion of the cradle stops just before the cover 12 strikes the supporting bracket 14. Then as soon as dogs 37 are released from teeth 36, the cover drops against this bracket.

The operator of the machine then presses the reverse control button, and motor 39 operating in the reverse direction causes the cradle 7 to commence rotation back toward its initial position. As explained above, the outer rim of the basket 1 is held in position by the basket retainer 13. The inner side of basket 13 is prevented from dropping out from the cradle by means of a finger 60 against which the rim of the basket drops at the time the cover holding dogs 37 are released from teeth 36. This finger 60 projects from a casting 61 mounted on shaft 6 and keyed thereto so as to rotate with the shaft.

As the outer rim of the basket 1 rises slowly, the cans commence to slide down the smooth surface of the cover 12 on to the inclined floor 15 of the hopper from which they pass on to the flexible conveyor 62 of the unscrambling machine. Due to the slow rising of the cradle, the cans are not all discharged at once, but gradually, and hence the cans on the upper part of the stack within the basket 1 descend gradually and are prevented from falling rapidly from such a distance as would damage either themselves or any other can which they might strike.

The motion of the cradle 7 continues after all of the cans have been discharged until it reaches its initial position, as shown in Fig. 1, when it is stopped by the opening of the motor circuit through switch 48 by the engagement of cam segment 52 with the lever of that switch. The cover 12 remains resting on the bracket 14, from which position it is moved by hand after the empty basket has been removed and a new filled basket has been lowered into its place, as described previously.

Although the angular speed of cradle 7 is the same throughout both the forward and reverse movements, it will be understood that the movement in either direction may be made faster than in the opposite direction if desired. Also, the speed during part of the movement may be made greater than during another part of the movement. It is important, however, that during the discharge of the cans from beneath the inverted basket, the cradle 7 move slowly so as to prevent the cans from being discharged so rapidly as to injure one another.

It will also be understood that the above is merely an exemplifying disclosure, and that changes may be made in the construction of the apparatus without departing from the spirit of the invention which extends to such constructions as come within the scope of the appended claims.

We claim:

1. In a machine of the class described, a support for an open top filled receptacle, a cover for

said receptacle attached to said support, means for turning said support and said receptacle thereon to an inverted position in which the cover is in a sloping position, and means for lifting said inverted receptacle away from said cover to allow the contents thereof to be discharged by gravity over said sloping cover.

2. In a machine of the class described, a support for an open top filled receptacle, a cover for said receptacle hinged to said support, means for turning said support and said receptacle thereon to an inverted position in which the cover is in a sloping position, and means for turning said support backwards towards its initial position thereby raising said receptacle and allowing the contents to slide out on said cover.

3. In a machine of the class described, a support for an open top filled receptacle, a cover for the receptacle hinged to said support, means for turning said support and said receptacle thereon to an inverted position in which the cover is in a sloping position, means for holding said cover upon the receptacle during said turning movement thereby securing the receptacle to said support, means for releasing said holding means at the end of said turning movement, means for reversing the turning movement of said support to raise said receptacle and allow the contents thereof to be discharged over said sloping cover, and means for holding the inverted receptacle upon the inverted support during said reverse movement.

4. In a machine of the class described, a support for an open top filled receptacle, a cover for said receptacle hinged to said support, means for rotating the support and receptacle thereon to invert the same, a latch for holding the cover against the top of the receptacle during the inverting movement, said cover serving to hold the receptacle on said support and to take the weight of the contents thereof during part of the inverting movement, a trip for releasing said latch when the final inverted position is reached, and means to hold the inverted receptacle within the inverted support when said latch is tripped, so as to cause the contents of the receptacle to be discharged therefrom.

5. In a machine of the class described, a support for an open top filled receptacle, a cover for said receptacle hinged to said support, means for rotating the support and receptacle thereon to invert the same, a latch for holding the cover against the top of the receptacle during the inverting movement, said cover serving to hold the receptacle on said support and to take the weight of the contents thereof during part of the inverting movement, a trip for releasing said latch when the final inverted position is reached, and means to hold the inverted receptacle within the inverted support when said latch is tripped, said means comprising a member pivoted to the front of the support and having a hook for releasably engaging the receptacle and a second member fixed to said support for engaging the rim of the receptacle at the rear.

6. In a machine of the class described, a support for an open top filled receptacle, a pivot therefor at one side of the receptacle, means for raising said support with a filled receptacle thereon about and over said pivot to invert the receptacle, a cover for said receptacle mounted to swing with the support to inverted position to cause the contents of said receptacle to rest on said cover, releasable means for holding said cover against the top of the receptacle in order

to support the contents of the receptacle after the same is inverted, means for releasing said cover, and means for holding the inverted receptacle within the inverted support after the release of said cover.

7. In a machine of the class described, a support for an open top filled receptacle, a cover for said receptacle, a common pivot for said support and said cover, means for rotating said support about its pivot to invert the receptacle, a latch for holding the cover against the top of the receptacle during the inverting movement, said cover serving to hold the receptacle upon said support and to take the weight of the contents of the receptacle during part of the inverting movement, a trip for releasing said latch when the final inverted position is reached, and means to hold said inverted receptacle within said inverted support after said latch is tripped.

8. In a machine of the class described, a pair of side frames, a horizontal shaft journaled therein at a distance from the floor greater than the height of the receptacle to be inverted, a cradle comprising a pair of arms fixed to said shaft and extending therefrom beneath the receptacle to be inverted, a motor operatively connected to said shaft to turn the same, a cover hinged to said shaft and adapted to be swung over the top of the receptacle, a latch for holding the cover against the top of the receptacle during the turning movement, means for releasing said latch at the end of the turning movement, means for retaining the receptacle on the support after the release of said cover, a switch for controlling the motor to stop the forward turning movement of the cradle at the end thereof, and a switch for controlling the motor to stop the movement of the cradle when it returns to its initial position.

9. In a receptacle dumping apparatus the combination of a frame, a horizontal shaft journaled therein, power operated means operatively connected to said shaft for rotating the same through approximately one half a revolution, a support fixed to said shaft to receive the receptacle to be dumped, a cover member for said receptacle carried by said shaft, a sector having ratchet teeth thereon mounted on said shaft, and a pawl on said cover member coacting with said teeth to connect said cover member to said shaft so as to cause it to hold said receptacle on said support while said shaft is rotating to invert said receptacle.

10. In a receptacle dumping apparatus the combination of a frame, a horizontal shaft journaled therein, a support fixed to said shaft for receiving the receptacle to be dumped, power operated means connected to said shaft to turn the same to cause said receptacle to be inverted, a cover member for said receptacle carried by said shaft, releasable means for holding said

cover member against the top of said receptacle to retain said receptacle on said support during the turning movement, means for actuating said releasable means at the end of the turning movement, and means for retaining the receptacle on said support after the releasing of said cover.

11. In a machine of the class described, a frame, a horizontal shaft journaled therein, a support fixed to said shaft and extending therefrom beneath the receptacle to be inverted, power operated means operatively connected to said shaft to turn the same, a cover hinged to said shaft and adapted to coact with the top of the receptacle, a latch for holding the cover against the top of the receptacle during the turning movement, means for releasing said latch at the end of the turning movement, means for retaining the receptacle on said support after the release of said cover, and automatic means for stopping the turning movement of said support when the receptacle thereon has been turned to inverted position.

12. In a receptacle dumping apparatus the combination of a frame, a rotatable horizontal shaft journaled therein, a support solidly fixed to said shaft for receiving the receptacle to be dumped, a cover member for said receptacle carried by said shaft, means for releasably fixing said cover member to said shaft to hold said cover member against the top of said receptacle and retain said receptacle on said support during the turning movement, and power-operated means connected to said shaft to turn the same to cause said receptacle to be inverted.

13. In a receptacle dumping apparatus the combination of a frame, a rotatable horizontal shaft journaled therein, a support fixed to said shaft for receiving the receptacle to be dumped, a cover member for said receptacle carried by said shaft, a tripable latch for releasably locking said cover member to said shaft and thereby holding said cover member against the top of said receptacle to retain said receptacle on said support during the turning movement, power-operated means connected to said shaft to turn the same to cause said receptacle to be inverted, and a trip for releasing said latch at the end of said turning movement.

14. In a machine of the class described, a support for an open top filled receptacle, a cover for said receptacle attached to said support, means for turning said support and said receptacle thereon to an inverted position in which the cover is in a sloping position, and means for separating said cover and said receptacle while said cover is in a sloping position to allow the contents of the receptacle to be discharged by gravity over said sloping cover.

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