This invention relates to boxing machines of the type used in filling boxes or cartons with cans and more particularly to that class of boxing machine which is typified in the structure shown in the patent to Cornell, No. 560,088, May 12th, 1896.

The boxing machine, which formed the subject matter of the Cornell patent referred to, comprised a runway along which cans were rolled to a position opposite a discharging outlet in cooperation with which an open box or carton was held by an operator. A plunger device was then actuated either through a hand lever or a foot pedal to push laterally from the runway and through the outlet an accumulated group of cans sufficient in number to fill the box or carton. The apparatus included also means for providing a double tier of cans so that a single operation of the plunger pushed into the box the double tier required to fill the same.

A general object of the present invention is to provide a boxing machine which will constitute an improvement in the construction shown in the Cornell patent and which will function to operate rapidly and accurately, without injury to the labels on the cans, and with a relatively higher degree of efficiency than was possible with the older apparatus.

The invention comprises a machine which includes, as in the older device, a runway having a plurality of vertically separated tracks along which cans roll to a position opposite a feeding chute or passage through which an accumulated group of cans can be pushed to fill a box or carton held in enclosing relation to the framework of the chute.

The invention includes a plunger which is adapted to be moved to and fro across the path of travel of the cans along the runway to push the cans into the chute, and the provision of means for cushioning the return stroke of the plunger.

A feature of the invention resides in a special adaptation of an electric motor or other source of mechanical power for actuating the feeding plunger, and the provision of means for preventing the transmission of shocks to the motor.

Another feature of the invention resides in the provision of an improved positively acting clutch device for transmitting the power of the motor to the feeding plunger.

Another feature of the invention resides in the provision of an improved separating or holding device for holding back the further supply of cans while the group of cans constituting the charge are fed into the box or carton.

Another feature of the invention resides in the provision of means for producing a separating movement of the accumulated charge of cans from the cans in the supply line which are temporarily restrained from movement by the separating or holding device referred to. This device functions to engage and impel the group of cans, which are awaiting the movement of the plunger, to cause the cans to move away from the cans in the supply line and thereby obviate the possibility of injury to the labels of the cans at the line of separation of the two groups.

Still another feature of the invention resides in the provision of a set of rollers so disposed and mounted at the delivery end of the feeding chute as to facilitate a tilting movement of the filled box or carton as it is withdrawn from the chute to thereby swing the box into an upright position.

Other features of the invention will be hereinafter referred to.

In the drawings, in which a number of embodiments have been selected for illustration:

Figure 1 is a plan view of a can boxing machine embodying the invention;

Figure 2 is a view in vertical section on the line 2—2 of Figure 1;
Figure 3 is a view in vertical section on the line 3—3 of Figure 1;

Figure 4 is a view in end elevation and on an enlarged scale of a portion of the device shown in Figure 1;

Figure 5 is a view in vertical section on the line 5—5 of Figure 4;

Figure 6 is a view on an enlarged scale showing driving mechanism forming part of the invention;

Figure 7 is a view in vertical section and on an enlarged scale showing details of the operating mechanism;

Figure 8 is a view in vertical section taken on the line 8—8 of Figure 7;

Figure 9 is a view in vertical section and on an enlarged scale of a clutch device forming part of the invention;

Figure 10 is a view in vertical section on the line 10—10 of Figure 9;

Figure 11 is a plan view of a modified form of the invention showing the runway adapted to handle a double tier of cans.

Referring to the drawings for a more detailed description of the invention, a pair of elongated rectangular frame members 10 and 11 are arranged in a T-shaped relation to each other and supported on three standards 12 which are arranged in a substantially triangular relation to each other. The base portions of the standards 13 are preferably connected by brace rods 13.

The rectangular frame member 10 forms a runway and is provided with three vertically separated tracks 14 along which cans roll from the receiving end 15 to a collecting station 16 formed at the junction at the other end of the runway frame member 10 with an intermediate portion of the frame member 11.

The framework 11 supports or includes a slide way for a frame member 17 which supports a plunger device 18 having a plurality of plunger members 19 which are adapted to engage the vertically separated rows of cans in the collecting space 16 to force the cans thereon into a chute 20 formed of a series of prongs or fingers 21.

The plunger device 18 is operated through a motor drive means connected to a motor 22.

The power driven connection includes a clutch device 23, a reducing worm gear device 24, a crank 25, and a connecting rod 26 between the crank and a rod 27 mounted in the plunger device 18. The clutch device 23 is connected through a flexible cable 27a with a foot pedal 28 so that when the pedal 28 is depressed by a foot of the operator, the clutch is actuated to bring about an operation of the plunger device and to thereby push a charge of cans accumulated in the collecting space 16 into the chute 20 and thereby into a box or carton which is held in enclosing relation to the chute fingers 21 by the operator.

A feature of the invention resides in the provision of a separating or restraining device for holding back the main supply of cans while a charge of cans in the collecting space 16 is being pushed laterally into the receiving chute 20. This device includes a series of rock arms 29 pivoted on vertical standards 30 in flanking relation to the trackways 14 of the runway frame member 10.

The rock arms are pivoted on bolts or pinle members 31 which may be adjusted in slots 32 in the standards 30, as may be found desirable. The rock arms 29 are arranged in pairs on the oppositely disposed supporting standards 30 and carry at their forward extremities holding rods 33 which are arranged in the operative position of the rock arms to engage the forward cans 34 on the trackways 14 to hold the cans from further movement during the operation of the box filling plunger 18.

In addition to restraining the movement of cans in the trackways 14, the two lower holding rods 33 operate to engage the rearward edges of the adjacent cans within the collecting space 16 to thereby provide a forwarding impulse to the cans in the lower rows within the collecting chamber. This forwarding movement of the cans within the collecting station serves to separate the cans in the collecting space from the cans remaining on the runway tracks 14 and thereby obviates the possibility of injury to the labels on the foremost cans on the runway track and the rearmost cans in the collecting space during the operation of the feeding plunger 18.

In addition to the forwarding impulse, which is provided by the rods 33, the trackways 35 within the collecting space 16 are provided with a downward inclination so that the cans within the collecting space tend to roll away from the cans remaining on the runway tracks 14. This downward inclination of the tracks 35 is more pronounced with respect to the uppermost track so that the cans in the upper row are given the necessary separating movement from the forward can on the uppermost trackway 14 without the necessity for bringing the uppermost rod 33 into engagement with the adjacent can in the collecting space.

There is included in the construction shown a set of temporary restraining members 36 which form no essential part of the present invention but are shown in the prior Patent No. 1,286,212, December 3rd, 1918. The restraining members referred to consist of horizontally extending rods normally positioned for engagement by the middle portion of the forward can as it reaches its position in the collecting space. Simultaneously with the operation of the separating devices rods 33 at the entrance end to the collecting space, the restraining or stop members 36 are moved to...
a lower position to thereby provide for a further slight forward movement of the cans in the collecting space to enhance the general separating movement already referred to of the cans in the collecting space from the cans still on the runway trackways 14.

The stop rods 36 are carried by vertically movable slide members 37 mounted at the rear face of the stop plate 38, the slides 37 being operated by a link connection 39 with a crank 40 operated by a reciprocating rod 41 mounted beneath the framework of the collecting space 16. The upper end of the link 39 is connected to a cross rod 42 attached at its ends to the slide members 37 so that the link 39 imparts vertical reciprocating movement to the slide members 37 and thereby moves the stop rods 36 into and out of operating position.

The stop rod 41 is attached at its other end to the upper end of an arm 42 carried by a shaft 43, the connection of the rod 41 to the arm 42 being by means of a pin and slot connection 44 for a purpose to be hereinafter described. The shaft 43 also carries an arm 45 which is connected through a link 46 with a cross bar 47 connecting the lower extremities of a pair of vertically disposed actuating members 48 which are connected to extremities of the rack arms 39 in order to swing the rods 33 into and out of holding relation of the cans in the trackways 14.

The operating shaft 43 also carries a crank arm 49 which is provided with a cross pin 50 having engagement with a recess 51 in an operating rod 52 provided with a roller 53 having operative engagement with a cam groove 54 in a cam member 55 carried by the plunger device or carriage 18. It will be seen that the reciprocation of the operating rod 52 which is produced by the movement of the carriage 18 rocks the shaft 43 through the connection therewith of the arm 49 and thereby brings about the operation of the connected parts.

The operation of the rack arm actuating members 48 takes place previously to the operation of the stop rods 36 by reason of the provision of the slot and pin connection 44 between the arm 42 and the arm 41. The result of this is that the pin has movement in the slot during the upward movement of the shafts 48 so that the separating rods 33 are lowered to operating position before the stop rods 36 are brought to their lower or full line position.

Referring now to the motor drive devices, the motor 22 operates a shaft 56 in which is placed a flexible coupling 57 housed in a casing 58. The other end of the shaft 56 is provided with a worm 59 which has intermeshing engagement with a worm gear 60 in the reducing gear structure 24. The reducing gear is keyed to a shaft 61 in which the clutch device 23 is placed. The clutch device includes a shaft terminating in the crank arm 25 which operates the connecting rod 26 connected to the plunger cross rod 27.

The structure of the clutch device 23 will now be described. The shaft 61 leading from the worm gear 60 is provided with a clutch member 62 keyed to the shaft 61 for constant rotation therewith. The clutch member 63 has keyed relation to the stub shaft 64 terminating in the crank arm 25 already referred to. The clutch member 63 is provided with a locking member 65 slidably fitted in a recess 66, one end of which contains a spring member 67 bearing against the locking pin 65 tending to force the locking pin into one of a series of recesses 68 formed in the face of the revolving clutch member 62.

The clutch member 63 is provided with an annular groove 69 with which engages an actuating or control member 70 having a partially circular or crescent shape. The control member 70 normally engages a notch 71 formed for the purpose in the locking pin 65 and restrains the locking pin from movement under the pressure of the spring 72 into one of the recesses 68 in the clutch member 62. In order to actuate the control member 70, the flexible cable 73 already referred to is attached to the lower extremity of a rod 74 attached at its upper end to a cross pin 75 passing through the lower extremity of the control member 70. The rod 72 passes through an elongated opening 74 formed in a standard 75 mounted on the frame member 76. A spring 76 engages the lower end of the control member 70 and tends to move the control member upwardly into locking engagement with the locking pin 65. With this construction in order to bring about an engagement of the clutch parts, the pedal 28 is depressed whereupon the control member 70 is pulled downwardly through the connection of the rod 72 therewith whereupon the control member is disengaged from the notch 71 in the locking pin 65. The locking pin is thereupon, through the pressure of the spring 72, pushed into one of the recesses 68 in the adjacent face of the clutch member 62. The parts are thereupon engaged so that the clutch member 63 rotates with the rotating clutch part 62. This, of course, results in the operation of the crank arm 25 and the reciprocating plunger device 18 so that the charge of cans in the space 16 is pushed into the feeding chute 20 and into the box held in a position in association therewith.

When the crank 25 has made one complete revolution, the structure of the clutch is such that the clutch parts are then disengaged so that, as the plunger returns to its normal operative position, it comes to rest and remains stationary until the pedal 28 is again actuated to bring about another feeding revolution.
operation. Means for bringing the parts to rest at the completion of a single revolution of the clutch parts includes a cam shaped extremity 77 on the control member 70 and terminating in a pointed wedge member 78 which is adapted to enter into a space 79 left for the purpose between the face of the locking pin 65 and the confronting face of a side wall of the groove 69 when the locking pin is in locking position. The space 79 is provided by reason of the fact that the depth of the recesses 68 is less than the width of the notch 71 in the locking pin 65, as will be clear.

In order to control operation of the crank arm 25 and connected parts and prevent lashing or loose play thereof, a brake member 81 is provided which is mounted in a groove 82 formed for the purpose in the clutch member 66 and locked against rotation by a pin 83 which passes through the brake structure and into the standard 84 in which the shaft section 64 is journaled. The pin 83 also forms a pintle or connection for the clutch parts which are held together at their other ends by a bolt 85.

In order to cushion the return stroke of the carriage or plunger 18, a spring 86 is provided for engaging the parts as the carriage reaches its normal inoperative position.

In order to facilitate the removal of the filled box from its enclosing relation to the prongs or fingers 21 of the chute 20, a set of rollers 87 is provided which are so mounted as to facilitate a rocking of the box from a position on its side in which the cans were received to an upright position as it is removed by the operator for placement on an adjacent platform or traveling conveyor.

While in the device shown and described provision is made for feeding into the runway a single tier of cans, we contemplate also the use of a double tier runway such as is shown in Figure 11 of the drawings. By using the double tier runway from its point of beginning, the assembly of the double tier for a filling of a box in a single charging operation is facilitated.

The terms and expressions which we have employed are used as terms of description and not of limitation, and we have no intention, in the use of such terms and expressions, of excluding any mechanical equivalents of the features shown and described, or portions thereof, but recognize that various structural modifications are possible within the scope of the invention claimed.

What we claim is:

1. In a machine of the class described an inclined can feeding runway having a collecting space at the end thereof, means adjacent said collecting space for shifting cans longitudinally from said space into a receptacle, a displaceable abutment adapted to temporarily arrest the cans in said collecting space, an unyielding member extending the entire length of a can and adapted to be interposed between the cans on said runway and those in said collecting space, and means for simultaneously displacing said abutment and interposing said arm between said cans in timed relation to arrest the cans on the runway and positively advance the cans in said space a predetermined distance.

2. In a machine of the class described an inclined can feeding runway having a collecting space at the end thereof, means adjacent said collecting space for shifting cans longitudinally from said space into a receptacle, a displaceable abutment adapted to temporarily arrest the cans in said collecting space, an unyielding member extending the entire length of a can and adapted to be interposed between the cans on said runway and those in said collecting space, means for displacing said abutment and means for synchronizing the movements of said abutment and said arm to first arrest the cans on said runway and then withdraw said abutment and positively advance the cans within said collecting space a predetermined amount by simultaneous operation of said abutment and arm.

3. In a machine of the class described an inclined can feeding runway having a collecting space at the end thereof, means adjacent said collecting space for shifting cans longitudinally from said space into a receptacle, a displaceable abutment adapted to temporarily arrest the cans in said collecting space, a rigid bar extending longitudinally of said cans and normally out of the path of movement thereof, means for rocking said bar into the path of the cans on the runway, and means operable simultaneously and in synchronism therewith for displacing said abutment and permitting said bar to positively advance the cans within said collecting space.

4. In a machine of the class described an inclined can feeding runway having a collecting space at the end thereof, abutment means for temporarily arresting the cans in said collecting space, means for interrupting the feed of cans into said space, and means for shifting said abutment means transversely to the path of movement of said cans in timed relation to said interrupting means, said interrupting means serving to positively shift said cans within the collecting space in a longitudinal direction into a receptacle.

5. In a machine of the class described an inclined can feeding runway having a collecting space at the end thereof, a rockably mounted bar extending parallel to and throughout the length of a can on the runway adjacent said collecting space, said bar being normally out of the path of the cans, means for rocking said bar to separate the cans on said runway from those in said colle-
lecting space, an abutment member adapted to temporarily arrest the cans fed into said collection space, means for withdrawing said abutment member, common operating means for said bar rocking means and said abutment withdrawing means, said operating means having a delayed action with respect to said abutment withdrawing means, and means for forcing the cans longitudinally from said collecting space into a receptacle.

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