

Feb. 25, 1969

H. W. GOODNER

3,429,009

TOW CAN APPARATUS

Filed Oct. 26, 1966

Sheet 1 of 3

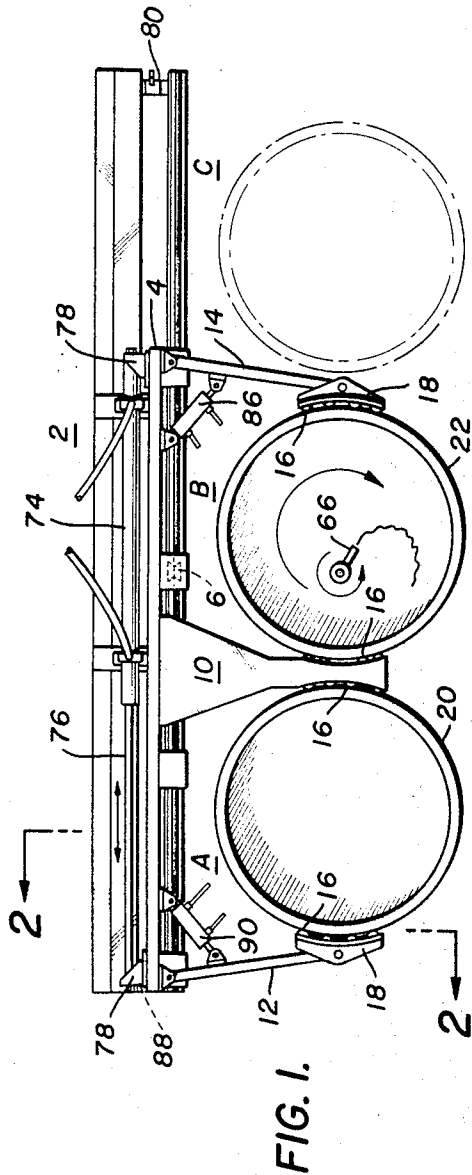


FIG. 1.

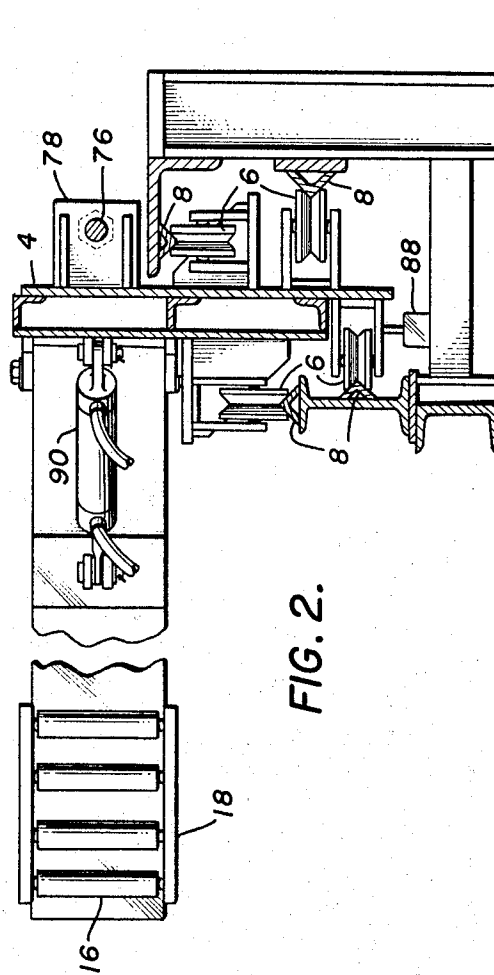


FIG. 2.

INVENTOR.
HOMER W. GOODNER

BY

Alexander Kozel
AGENT

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Sheet 2 of 3

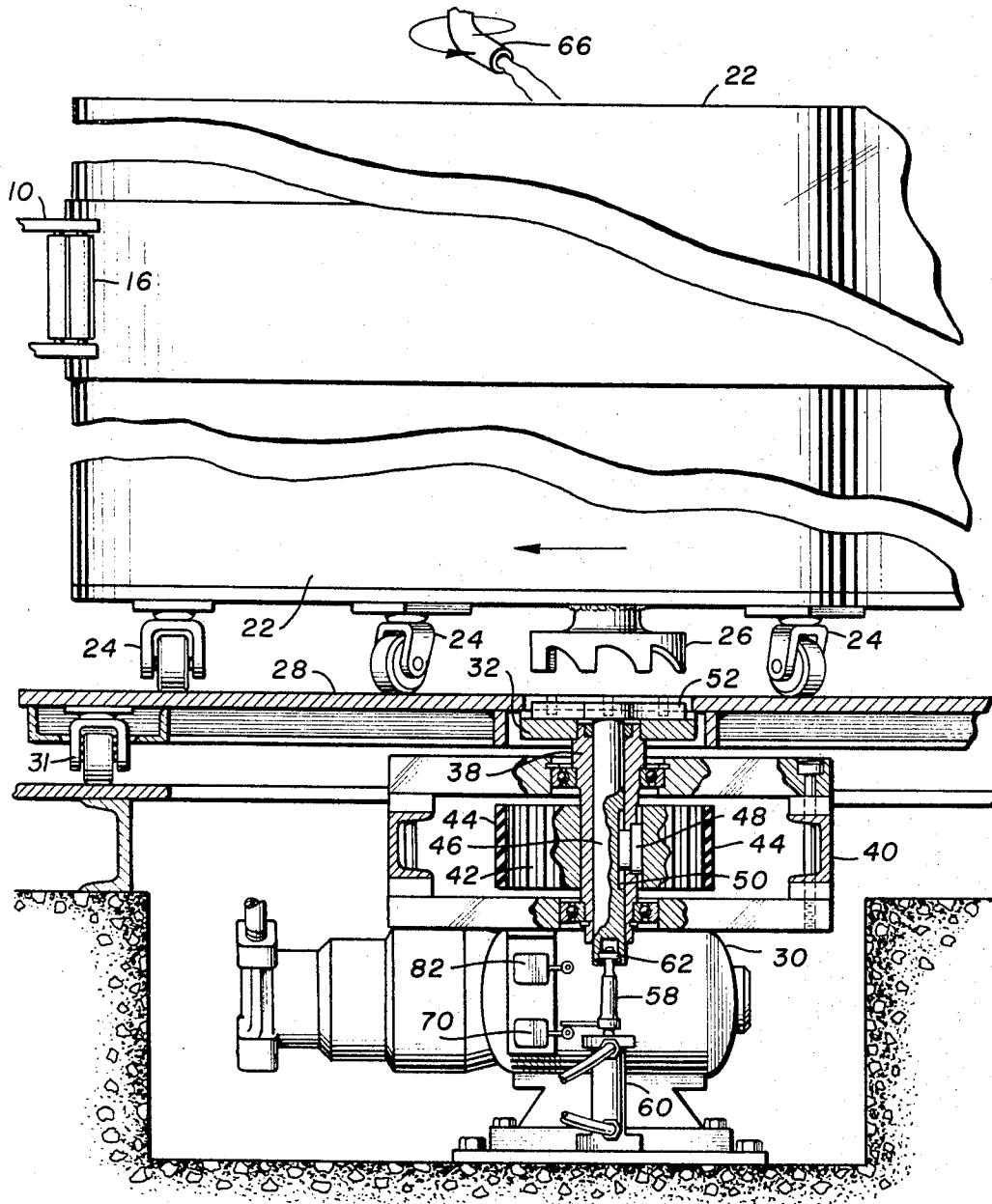


FIG. 3.

INVENTOR.
HOMER W. GOODNER

BY
Alexander Kozel
AGENT

Feb. 25, 1969

H. W. GOODNER

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Sheet 3 of 3

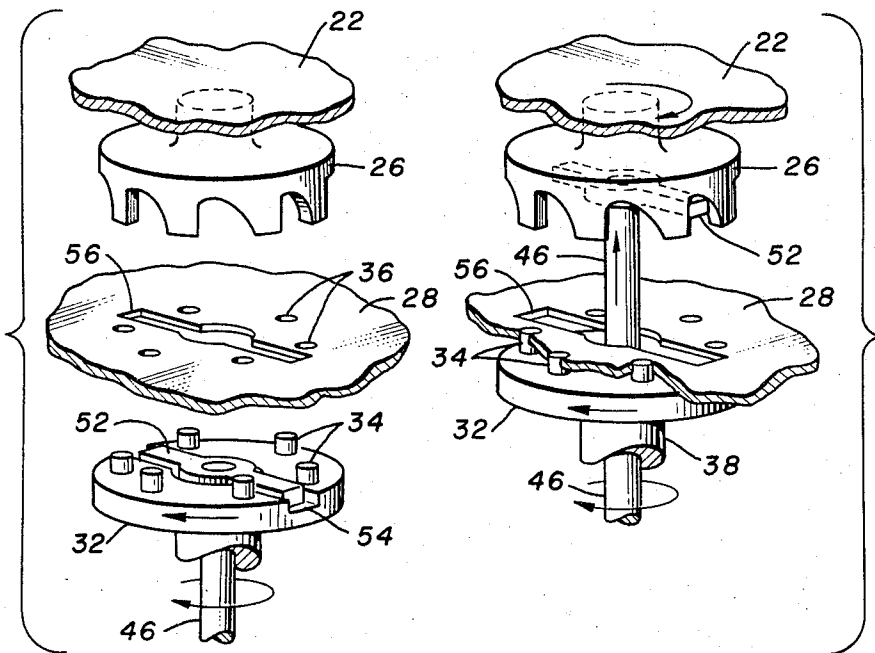


FIG. 4.

FIG. 5.

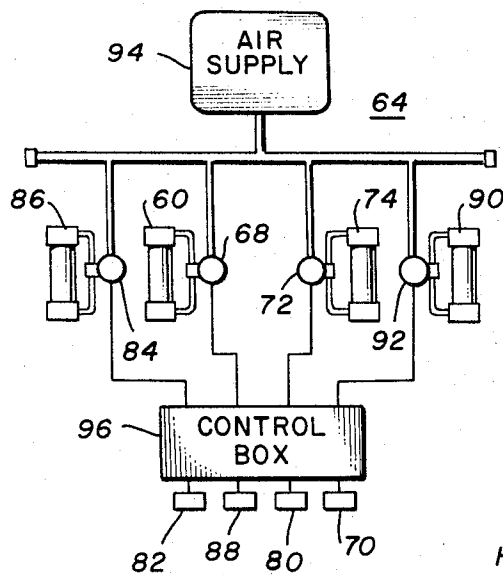


FIG. 6.

INVENTOR.
HOMER W. GOODNER

BY

Alexander Kozal
AGENT

1

3,429,009

TOW CAN APPARATUS

Homer W. Goodner, Decatur, Ala., assignor to Monsanto Company, St. Louis, Mo., a corporation of Delaware
Filed Oct. 26, 1966, Ser. No. 589,579

U.S. Cl. 19—159 4 Claims
Int. Cl. D04h 9/02, 9/18

ABSTRACT OF THE DISCLOSURE

A can handling apparatus having a traversable carriage controlled to clamp and reversibly shift cans onto and off a driven turntable in timed relation.

This invention relates to a novel tow can apparatus adapted to automatically shift large containers called tow cans into and out of a filling position beneath a piddler device that jets heavy denier continuous tow into the cans in large quantities.

Different designs of tow can doffing and donning apparatus are used in tow processing. Some are complicated in structure while other are not designed for heavy duty operation. The tow can apparatus described herein evolved from an attempt to provide a relatively simple and reliable apparatus for automatically rolling or displacing an oversized container filled with thousands of pounds of tow away from and shifting an empty tow can into a tow filling position, simultaneously.

It is an object of this invention to provide an automatic tow can apparatus.

Another object of the invention is to provide a reciprocable tow can apparatus adapted to shift a plurality of rollaway cans, alternately, in opposite traversing direction to remove a packaged tow can from and to replace an empty tow can onto a constantly rotating turntable.

The novel tow can apparatus, in brief, comprises a turntable means adapted to be constantly rotated at a predetermined speed. A rollaway tow can is positioned on the turntable and another similar rollaway can is positioned alongside the other. The tow can on the turntable is clutched and centered by a clutch means while a reciprocable carriage means with beam members clamps both tow cans within the carriage in journaled relation. Eccentrically positioned over the can being filled is a piddler device for delivering tow thereto.

A control means operates on programmed sequence to unlock the clutch means from the tow can on the turntable when the latter has been filled with a predetermined amount of tow such as polyester or the like; to shift the carriage means in one direction for rolling the packaged tow can off of the turntable and concurrently to roll a standby tow can into a tow packaging position onto the turntable; to actuate the clutch means to clutch and center the standby can in the packaging position on the turntable; to release the packaged tow can from a clamped position within the carriage to allow the packaged can to be rolled away and an empty can placed within the carriage; and to clamp the replaced tow can within the carriage. The control system times the packaging of the tow cans and operates to traverse the carriage, alternately, in opposite directions.

A better understanding of the invention will be obtained by referring to the accompanying drawings and to the more detailed description that follows.

2

In the drawings:

FIGURE 1 is a plan view of the novel automatic tow can apparatus.

FIGURE 2 is a cross-section taken through 2—2 of FIG. 1.

FIGURE 3 is a partial section of the turntable arrangement,

FIGURE 4 is a perspective view of the tow can clutching means showing the clutch disengaged,

FIGURE 5 is a perspective view of the tow can clutching means showing the clutch engaged, and

FIGURE 6 is a schematic view of the control system for the apparatus of the invention.

In the different figures, like components are designated by the same reference numerals.

Referring to the drawings, the novel tow can apparatus comprises a reciprocable carriage 2 that has a main longitudinal beam 4 rollingly supported to move left and right through rollers 6 mounted at spaced intervals along the longitudinal beam 4. Rollers 6 ride on fixed rails or tracks 8. Three spaced can clamping beams, a central beam 10 extending perpendicularly from one side of the main beam 4 and two oppositely disposed pivotal end beams or arms 12 and 14 act to clamp a plurality of tow cans within carriage 2.

Central beam 10, at opposite sides of the free end thereof, has concave portions each with a radius complementary to circumferential tow containers or cans and each concave portion rollably supports a plurality of bearings 16. Beams 12 and 14 are pivotally connected to beam 4 and have adjustable end pieces or blocks 18 opposite the pivoted ends thereof that are formed with a radius to match the curvature of two cans and which rollably support a plurality of bearings 16.

Pivotal beams 13 and 14 are spaced from the central beam 4 so that two tow can stations A and B are provided. A third station C is an empty space which is used when carriage 2 is traversed, as will be explained in operation.

A pair of tow cans 20 and 22 are positioned within carriage 2 at stations A and B, respectively, and are rotatably claimed between beams 10, 12, and 14. Tow cans 20 and 22 are approximately five feet in diameter and five feet in height and are open at the upper ends thereof. The tow cans are rollably supported on casters 24 and each tow can has a cam clutch member 26 fixed axially to the bottom of the can.

Tow can 22 rests on a rotary turntable or platform 28 driven through a motor 30. Turntable 28 rolls on casters 31. The arrangement for driving turntable 28 consists in a plate 32 having a plurality of pins 34 at the upper side thereof. Pins 34 fit into corresponding holes 36 formed in the center of turntable 28. A rotatable sleeve 38 is coaxially fixed at one end thereof to the bottom side of plate 32 and is journaled by conventional bearing means to rotate within a framework 40.

To rotatably drive sleeve 38 and turntable 28, sleeve 38 has a pulley 42 mounted thereon which is connected by a belt 44 to motor 30.

In order to center and to impart a rotating force to a tow can on the turntable 28, a reciprocable shaft 46 is slidably operable within sleeve 38. A key 48 connects pulley 42, sleeve 38 and shaft 46 for common rotation and an elongated keyway 50 formed on shaft 46 permits the latter to be slidably reciprocated up and down within sleeve 38. Shaft 46 has a crossbar 52 fixed thereto at its

3

upper end forming a T bar. Bar 52 fits into a groove 54 in plate 32 when shaft 46 is in its lowermost position shown in FIG. 4, and extends upwardly through a slot 56 in turntable 28 into engagement with cam clutch member 26 when in an uppermost position (FIG. 5). Shaft 46 is actuated by means of an actuating rod 58 operable by and extending from an air cylinder 60. The lower end of rod 58 is connected to a piston within air cylinder 60 and the upper end extends axially through the center of a bearing 62 retained in the lower end of shaft 46 and is connected to the bearing 62 by a shoulder that abuts against the lower side of bearing 62 and a retainer ring on rod 58 at the upper side of bearing 62.

A control system 64 (FIG. 6) is provided to operate the tow can apparatus in predetermined sequence. Prior to operation, empty tow cans 20 and 22 are rollingly clamped between beams 10, 12, and 14 with tow can 20 at station A and tow can 22 at station B. Can 22 is on turntable 28 and is clutched by the crossbar 52 which is in engagement with cam clutch 26 as shown in FIG. 5. Motor 30 is driving sleeve 38 which in turn is rotating turntable 28 in a clockwise direction (FIG. 1). A piddler 66 is eccentrically positioned over can 22 and is rotating in a counterclock direction while delivering tow to can 22 so that a spiral package is formed in the can.

The control system 64 times the filling of a can to package the cans uniformly with the same amount of tow. When tow can 22 is filled to a predetermined amount, control system 64 sends a signal to a solenoid valve 68, as a four-way valve, to control the delivery of air to air cylinder 60 for actuating rod 58 downwardly. Rod 58 carries shaft 46 and crossbar 52 downwardly out of engagement from cam clutch 26 and into slot 54. When shaft 46 reaches a lowermost position, it trips a microswitch 70 that signals the control system 64 to send a signal to a solenoid valve 72 to deliver air to an air cylinder 74 fixed to a frame. Air cylinder 74 has an elongated actuating rod 76 that extends therethrough and substantially the length of beam 4 and is connected at opposite ends thereof to a respective bracket 78 attached to beam 4. Air cylinder 74 is controlled to shift rod 76, alternately, rightwardly and leftwardly. As shown in FIG. 1, air admitted to air cylinder 74 in the assumed cycle of operation causes actuating rod 76 to move to the right carrying carriage 2 rightwardly. Carriage 2 in turn having tow cans 20 and 22 clamped between beams 10, 12 and 14 rolls the tow cans rightwardly thereby rolling tow can 22 off of the turntable 28 and rolling tow can 20 onto turntable 28. When carriage 2 reaches its rightward limit position it contacts a microswitch 80 sending a signal to the control system 64 which in turn controls valve 68 to deliver air to air cylinder 60 for moving actuating rod 58, shaft 46, and crossbar 52 upwardly into camming engagement with cam clutch member 26 on tow can 20. When shaft 46 reaches its upper limit position, a microswitch 82 is contacted sending a signal to the control system indicating that can 20 is clutched. Tow can 20 will then be clamped within the carriage and will be rotating in a clockwise direction while tow can 22 will be resting in the space provided by station C. At this time, an operator cuts the towline and guides the cut end so that it falls into tow can 20 to begin the packaging operation of the can. The control system 64 receiving the signal from microswitch 82, signals a solenoid valve 84 to deliver air to an air cylinder 86 which is connected to pivotal beam 14 to cause the beam to pivot in a counterclockwise direction (FIG. 1) away from tow can 22 thus releasing it from a clamped position. An operator then removes the packaged tow can 22 by manually rolling it away from station C and replaces it with an empty tow can. The control system after a pre-set delay, permitting the operator to replace the filled can, signals solenoid valve 84 to deliver air to air cylinder 86 for pivoting beam 14 in a clockwise direction (FIG. 1) to clamp the replacement tow can within the carriage 2.

4

After tow can 20 is packaged with tow, the control system 64 operates to traverse carriage 2 leftwardly and the sequence of operation is similar to that explained above. When the carriage 2 is shifted leftwardly, a microswitch 88 at the left side of carriage 2 (FIG. 1) is used to indicate the leftward limit position of the carriage, and an air cylinder 90 and solenoid valve 92 function through the control system 64 to operate beam 12 in the manner of beam 14 as explained above.

In FIG. 6 the source of air under pressure is illustrated by the reference numeral 94 and the electrical relay and timing circuit by the reference numeral 96.

The tow can apparatus is illustrated in the form of a two-can construction, however, the apparatus may be modified to operate with more than two cans. For example, beam 4 of carriage 2 may have another set of beams 10, 12, and 14 and another turntable may be arranged opposite the one shown to provide a four-can apparatus. Any phase of the automatic control sequence may be modified to provide manual or separate operation. It may be desirable, for example, to pivot beams 12 and 14 by a separate system wherein an operator may open and close the beams at will. Safety switches may be provided to prevent the carriage 2 from being shifted before the T bar is removed from the clutch member 26 and indicators can be incorporated to show an operator that a tow can is sufficiently supplied with tow.

It will be understood that modifications and variations of the illustrated embodiment are expected to be covered by the invention and that the invention be limited only by the scope of the following claims.

I claim:

1. A tow can apparatus comprising in combination:

a plurality of tow cans each having a clutch member, a driven rotary turntable, means for driving said turntable, a reciprocable carriage means including clamp means for clamping said plurality of tow cans in journaled relation therein,

clutch means for engaging with and disengaging from said clutch member on said tow cans, control means for controlling said reciprocable carriage means, said clamp means, and said clutch means to act responsively thereto to rollingly clamp said plurality of tow cans normally positioned within said reciprocable carriage means, to reciprocate said reciprocable carriage means in one direction to position one of said tow cans on said turntable while holding another tow can in a standby position adjacent said turntable, to actuate said clutch means to engage with said clutch member on said tow can positioned on said turntable, to time the stay period of said tow can on said turntable, to disengage said clutch means from said clutch member on said tow can, to reciprocate said carriage means in the opposite direction for removing said tow can from said turntable and positioning said standby tow can thereon simultaneously, to unclamp said tow can removed from said turntable to permit removal therefrom and replacement therein of an empty tow can, to clamp said empty tow can within said carriage means, and to repeat said sequence of operation with said carriage means being traversed, alternately, in opposite directions continuously.

2. A tow can apparatus as in claim 1, wherein said tow cans, said reciprocable carriage means and said turntable are supported on rolling means.

3. A tow can apparatus as in claim 1, wherein said means for driving said turntable and said clutch means are of integral construction said clutch means having common rotation with said driving means and being reciprocable therein.

4. A tow can apparatus comprising in combination:

a driven turntable means,

a reciprocable carriage means for clamping a plurality

5

of tow cans in journaled relation and for shifting
packaged tow cans off of and empty tow cans onto
said turntable means,
clutch means for clutching and unclutching said tow
cans on said turntable means,
control means for controlling said reciprocable carriage 5
means to clamp and unclamp said tow cans and to
reciprocate the latter onto and off of said driven
turntable means in predetermined timed relation, and
for controlling said clutch means to clutch and un-
clutch said tow cans on said turntable means. 10

6

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DORSEY NEWTON, *Primary Examiner.*