Jan. 28, 1964 J. ZYTKA ETAL 3,119,212

TOW PACKAGING

Filed Nov. 14, 1961 8 Sheets-Sheet 1

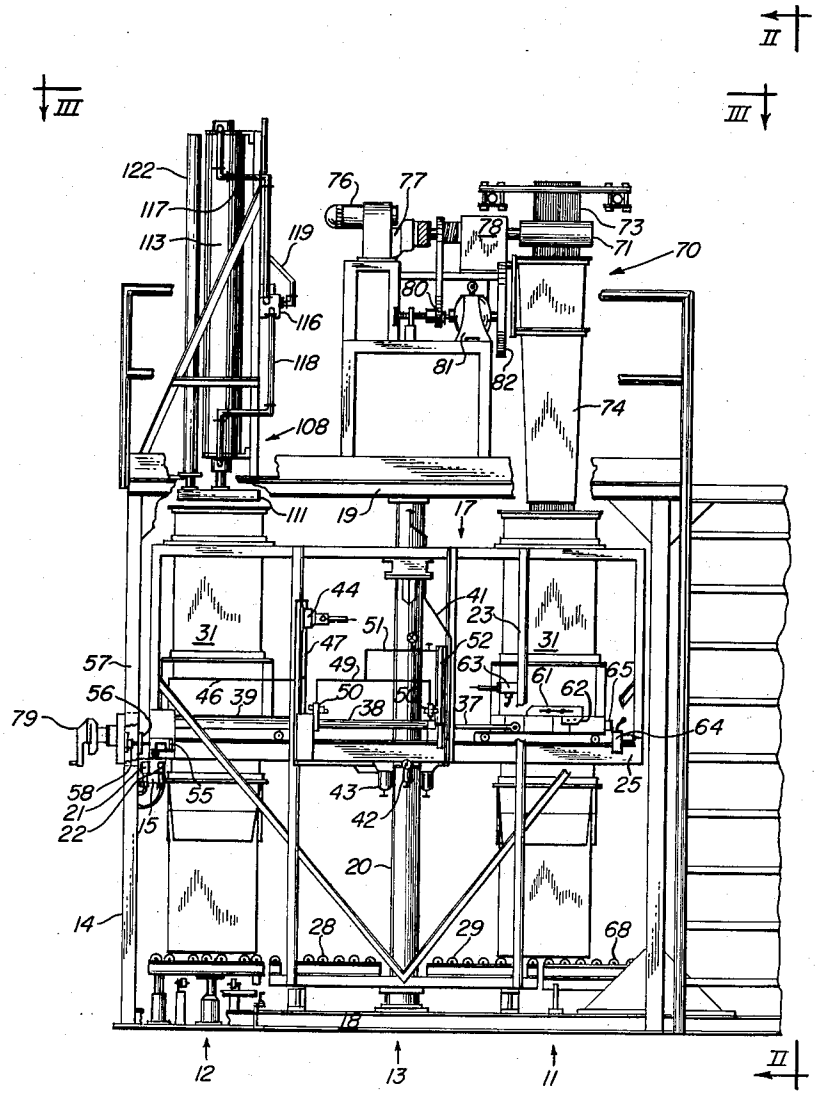


FIG. 1

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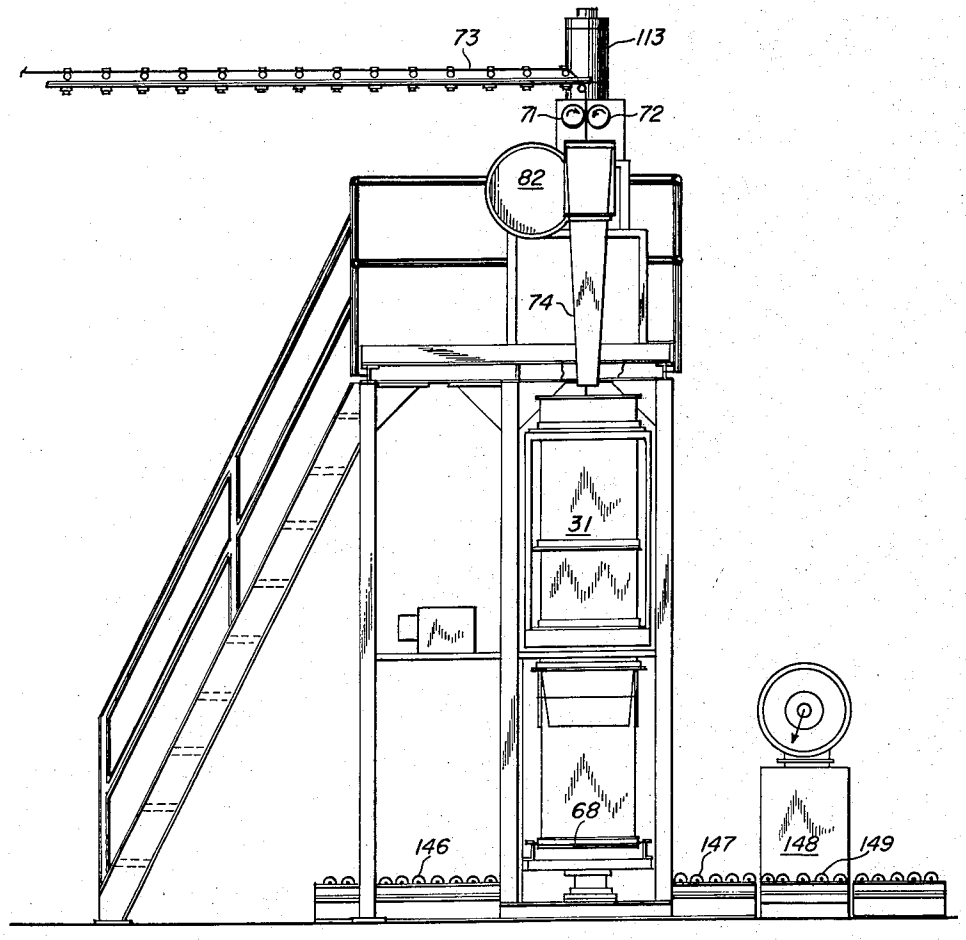


Fig. 2

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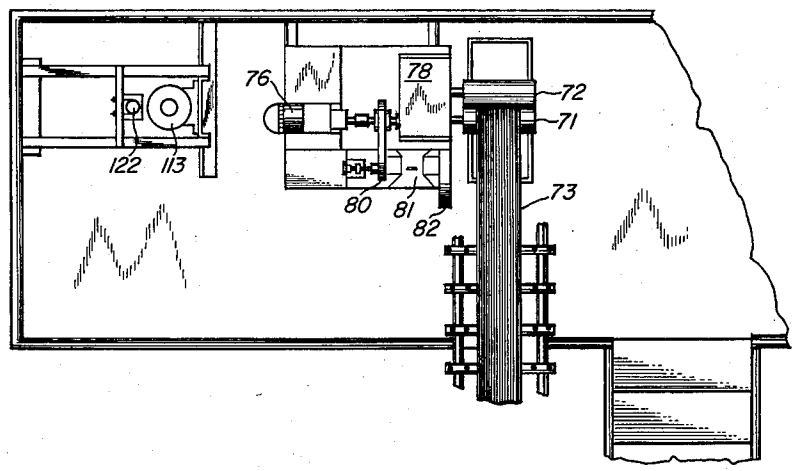


FIG. 3

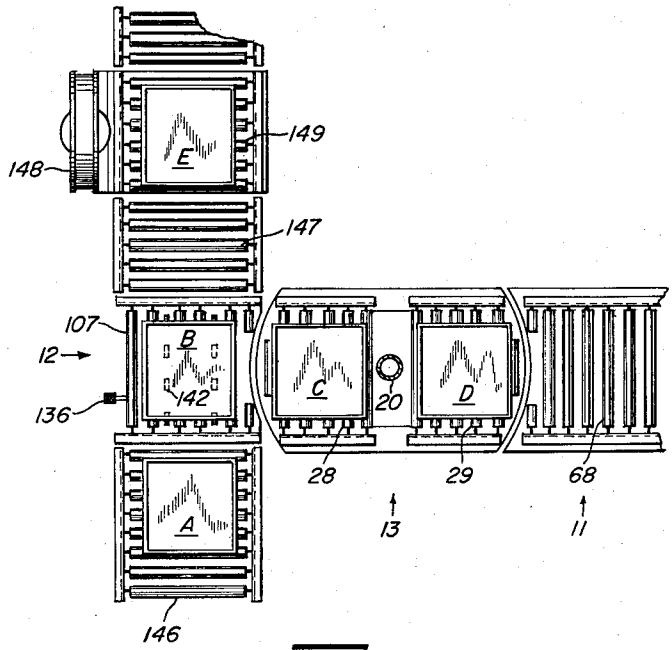


FIG. 4

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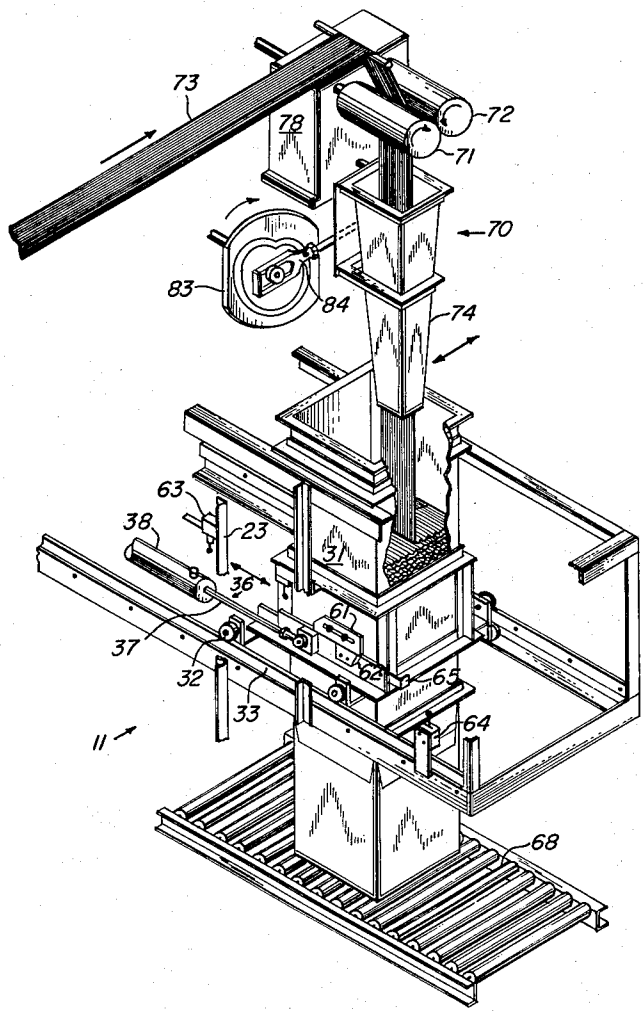


FIG. 5

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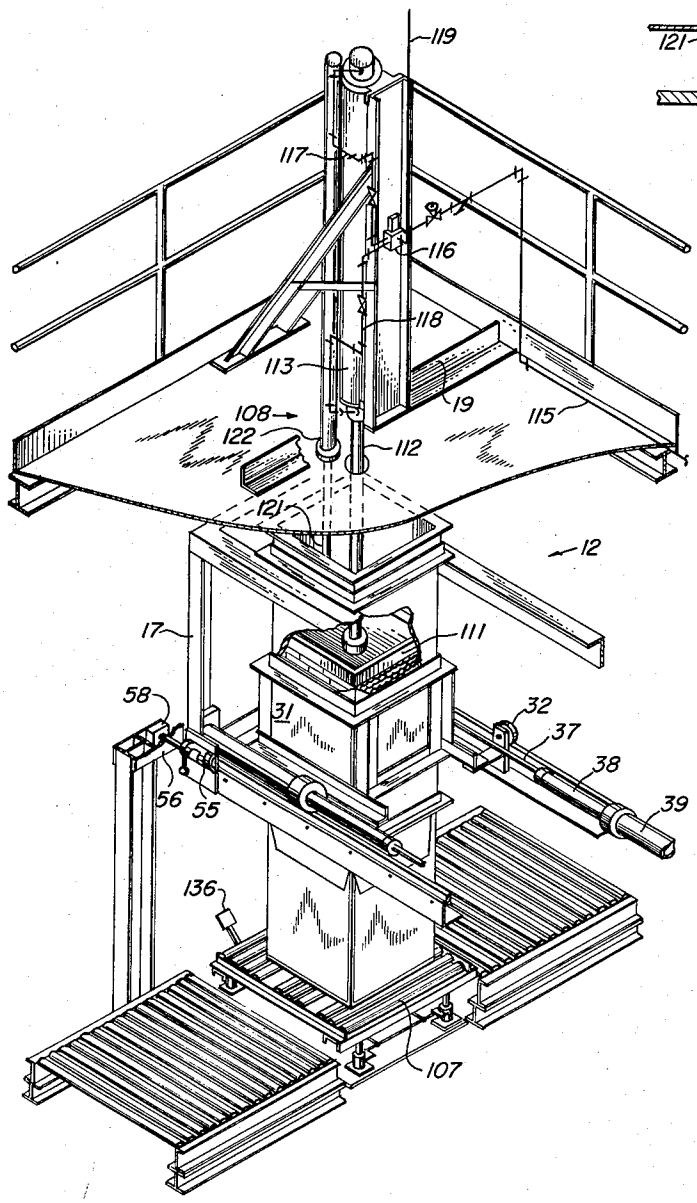


FIG. 6

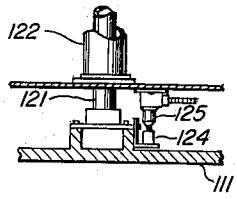


FIG. 7

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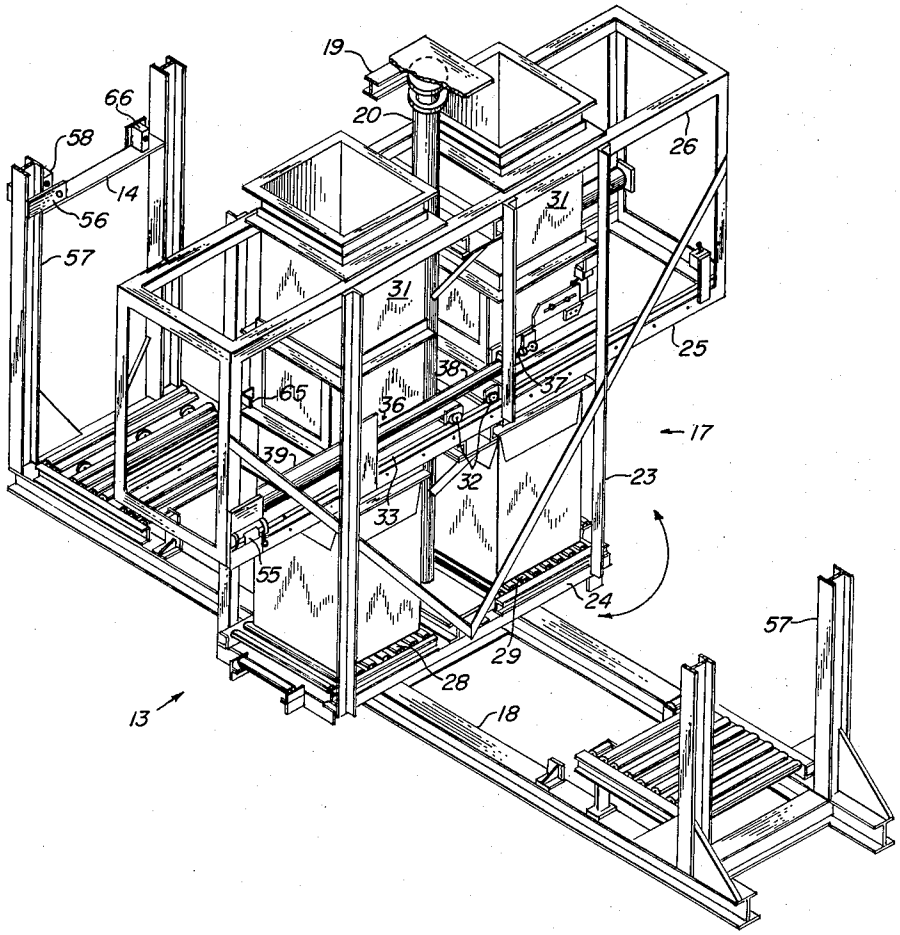


FIG. 8

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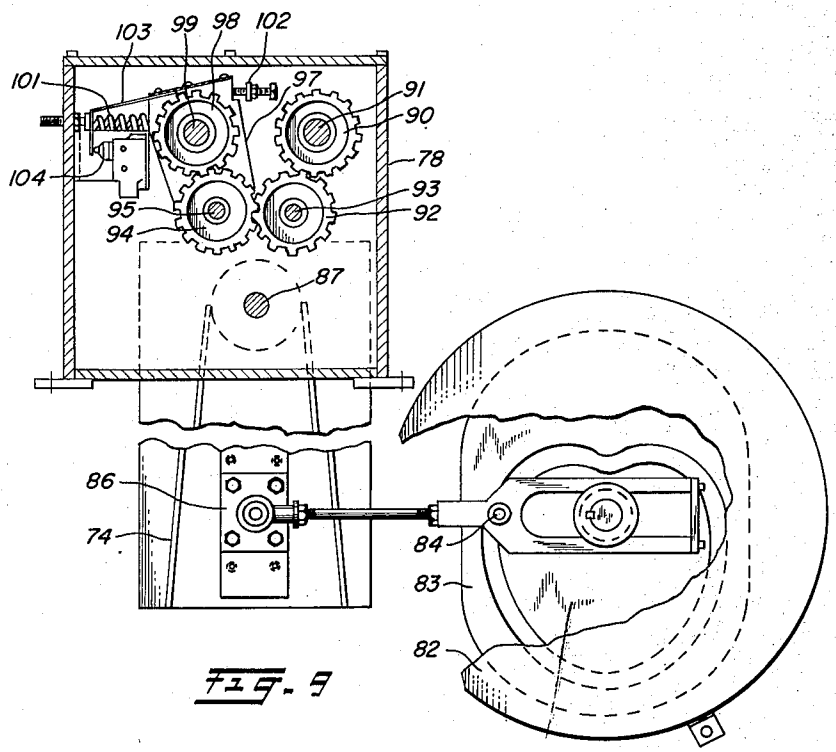


Fig. 9

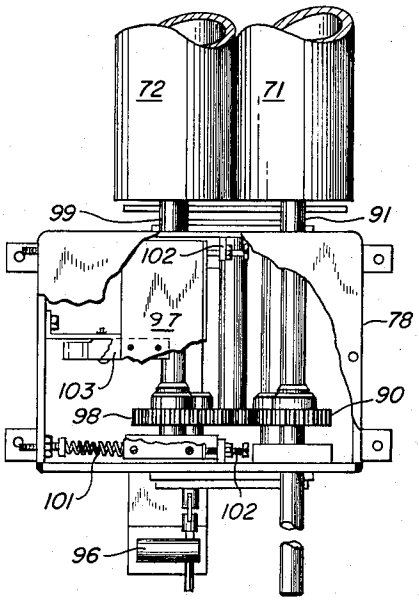


Fig. 10

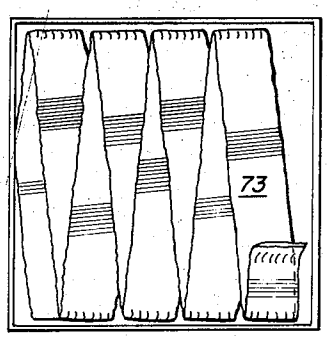


Fig. 15

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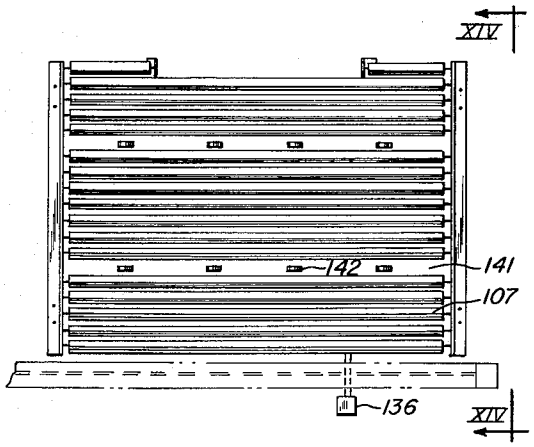


Fig-11

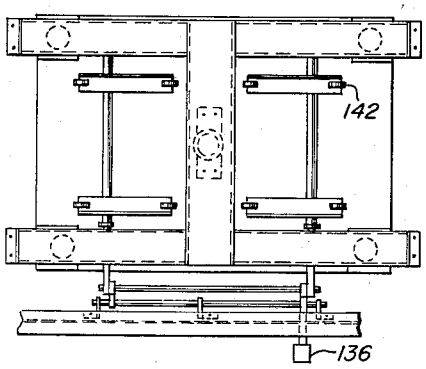


Fig-12

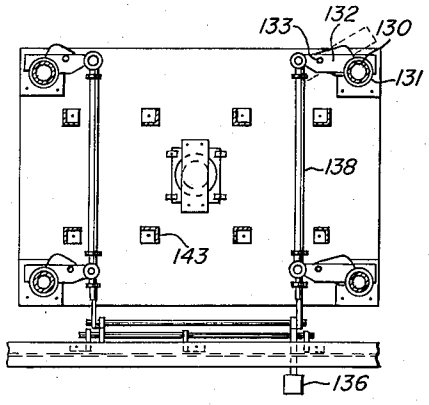


Fig-13

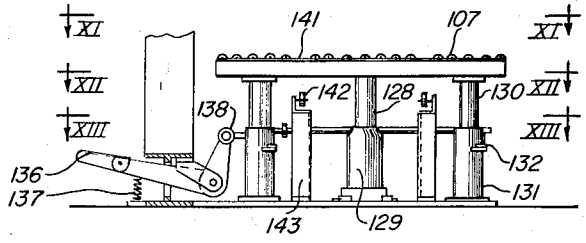


Fig-14

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3,119,212

TOW PACKAGING

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Filed Nov. 14, 1961, Ser. No. 152,303
8 Claims. (Cl. 53—24)

This invention relates to tow packaging apparatus and more particularly to apparatus for laying tow in a preselected pattern in a carton of rectangular cross section, transferring the carton to a tow compression station, and compressing the tow to a desired density to produce a relatively compact package.

Synthetic fibers are sometimes produced in the form of a tow containing a relatively large number of individual continuous filaments. It frequently is desirable to package this tow in cartons for storage or shipment.

It is an object of this invention to provide apparatus for laying a preselected amount of such tow in cartons of rectangular cross section in such a fashion as to minimize the possibility of tangling and twisting of the tow or disturbance of the fiber arrangement within the tow during subsequent handling or when such tow is later withdrawn from the carton.

It is another object of this invention to provide apparatus for compressing tow laid in the carton in such a preselected pattern to increase the capacity of the carton by increasing the density of the tow therein.

It is still another object of this invention to provide method and apparatus for laying tow in a carton, transferring said carton to a tow compressing station, and compressing said tow, which method and apparatus is simple to operate, relatively inexpensive, and highly reliable.

These objects, and other objects and advantages which will become apparent as this specification proceeds, are achieved through the utilization of the teachings of this invention, a specific embodiment of which is illustrated and described in conjunction with the accompanying drawings wherein:

FIGURE 1 is a front elevational view of a tow packaging apparatus with parts broken away for clarity of illustration;

FIGURE 2 is a side elevational view of the tow packaging apparatus viewed from line II—II of FIGURE 1;

FIGURE 3 is a top plan view of the tow packaging apparatus viewed from line III—III of FIGURE 1 with portions omitted for clarity of illustration;

FIGURE 4 is a top plan view of the roller conveyor system;

FIGURE 5 is a perspective view of the carton filling station;

FIGURE 6 is a perspective view of the tow compressing station;

FIGURE 7 is an enlarged sectional view of a portion of the apparatus illustrated in FIGURE 6;

FIGURE 8 is a perspective view of the carton transfer mechanism in the process of interchanging the positions of a filled carton and an empty carton;

FIGURE 9 is an enlarged partial elevational view of the tow feeding and traverse mechanisms;

FIGURE 10 is an enlarged partial plan view of the tow feeding mechanism;

FIGURE 11 is an enlarged plan view of the portion of the roller conveyor system underlying the tow compressing station viewed from line XI—XI of FIGURE 14;

FIGURE 12 is an enlarged plan view of a portion of the roller conveyor system viewed from line XII—XII of FIGURE 14;

FIGURE 13 is an enlarged plan view of the supporting means for the roller conveyor system of FIGURES 11 and 12 viewed from the line XIII—XIII of FIGURE 14;

FIGURE 14 is an enlarged elevational view of the roller conveyor system underlying the tow compressing station viewed from line XIV—XIV of FIGURE 11; and

FIGURE 15 is a plan view of a carton showing the pattern of the tow laid therein.

Referring next to the drawings, and more particularly to FIGURE 1, there is shown one embodiment of the tow packaging apparatus of this invention having a carton filling station indicated generally by the numeral 11 (illustrated in greater detail in FIGURE 5), a tow compressing station indicated generally by the numeral 12 (illustrated in greater detail in FIGURE 6), and a carton transfer mechanism indicated generally by the numeral 13 (illustrated in greater detail in FIGURE 8) for transferring cartons between carton filling station 11 and tow compressing station 12, all mounted on a common supporting framework 14.

Carton Transfer Mechanism

Carton transfer mechanism 13 (see FIGURE 8) includes a rotatable framework 17 supported between lower beams 18 and upper beams 19 of the main supporting framework 14 by means of center post 20 for rotational movement therearound. Carton transfer mechanism 13 has two identical halves disposed about center post 20 so that upon rotation of rotatable framework 17 through an angle of 180°, the carton transfer mechanism is again in a position identical to its previous position. Extending from supporting framework 14 is a bracket 15 on which are mounted two microswitches 21 and 22. When carton transfer mechanism 13 is in one of its extreme positions, microswitch 21 is contacted; and when carton transfer mechanism 13 is in the other of its two extreme positions (after rotation of the rotatable framework 17 through an angle of 180°), the other microswitch 22 is contacted.

Rotatable framework 17 is an open gridlike structure having four vertical angle irons 23 and three pairs of horizontal angle irons 24, 25, and 26. The lowermost pair of horizontal angle irons 24 serves as a support for two roller conveyor sections 28 and 29 extending between center post 20 and vertical angle irons 23. Central horizontal angle irons 25 and uppermost horizontal angle irons 26 are somewhat longer than lowermost angle irons 24 and therefore provide for an upper section of rotatable framework 17 which extends past vertical angle irons 23 to overhang beyond the lower section of rotatable framework 17.

In view of the aforementioned symmetry of carton transfer mechanism 13, the remainder of the description of this structure will describe one of the identical halves only. While carton transfer mechanism 13 is symmetrical, as will be described hereinafter the equipment on each side of rotatable framework 17 performs different functions at the same time. By selective contacting of either of microswitches 21 and 22 by different portions of the two ends of rotatable framework 17, different circuits may be actuated or deactivated, depending on which position rotatable framework 17 is in, so as to assure equipment supported on rotatable framework 17 in each of the two positions possible performs the functions appropriate to the position in which it is located.

Supported within the upper section of rotatable framework 17 is sleeve 31 which is supported by wheels 32 on rails 33 mounted on central horizontal angle irons 25 for movement along rails 33 between a position above roller conveyor section 28 or 29 and a position remote from center post 20 in the overhanging portion of the upper section of rotatable framework 17 for purposes to be described hereinafter. Reciprocation of sleeve 31 is produced by the use of an hydraulically-snubbed pneu-

matically-actuated piston indicated generally by numeral 36.

As is better illustrated in FIGURE 1, hydraulically-snubbed pneumatically-actuated piston 36 includes a piston rod 37 which extends through hydraulic cylinder 38 and into pneumatic cylinder 39 and is provided with pistons in each of the cylinders 38 and 39. Compressed air introduced through inlet 41 passes through reducing valve 42 and oiler 43 to solenoid valve 44 which directs the compressed air to either of two conduits 46 or 47 to cause piston rod 37 and the sleeve 31 to which it is attached to move to the right or left as seen in FIGURE 1.

Hydraulic cylinder 38 is provided with a bypass conduit 49 extending between outlets on the two ends of hydraulic cylinder 38. Bypass conduit 49 is provide with needle valves 50 and a supply line 51 leading to an hydraulic fluid reservoir 52. Movement of piston 37 under the influence of compressed air in pneumatic cylinder 39 causes a piston in hydraulic cylinder 38 to move pumping hydraulic fluid from one end of hydraulic cylinder 38 through needle valve 50, bypass conduit 49, and needle valve 50 into the other end of hydraulic cylinder 38. The resistance to flow of this hydraulic fluid produced by the needle valves 50 serves to control the rate of movement of piston 37 and sleeve 31 under the influence of pneumatic cylinder 39.

Mounted on the side of sleeve 31 is a pair of adjustable cams 61, 62 which contact microswitches 63, 64 respectively when sleeve 31 is reciprocated. Microswitches 63 and 64 are operatively connected to solenoid valve 44 to alternately admit compressed air into conduits 46 and 47 to cause sleeve 31 to reciprocate between two positions which are fixed by adjusting the positions of cams 61 and 62 for purposes to be described hereinafter.

In FIGURE 8, rotatable framework 17 of carton transfer mechanism 13 is shown in the middle of a rotational transfer movement whereby the positions of the two sides of rotatable framework 17 and the two cartons on roller conveyor sections 28 and 29 are reversed.

In FIGURE 1, rotatable framework 17 of carton transfer mechanism 13 is shown in the position it assumes when one carton is being filled with tow in the carton filling station 11 and another carton is in the tow compressing station 12. Rotatable framework 17 is maintained in the position shown in FIGURE 1 at all times except during the rotation thereof to reverse the positions of the two cartons and is accurately locked in this position by means of latch 55 (see FIGURES 1 and 6) mounted on the end of rotatable framework 17 which engages latch plate 56 mounted on a vertical post 57 of supporting framework 14. Behind latch plate 56 is microswitch 58 which is contacted when rotatable framework 17 is latched in position.

Mounted on a portion of the supporting framework 14 is a microswitch 66 (see FIGURE 8) which can be contacted by an actuator 65 (see FIGURES 1, 5 and 8) when rotatable framework 17 is latched in position and sleeve 31 is in its extreme position remote from center post 20 in the tow compressing station 12.

Carton Filling Station

Carton filling station 11 (see FIGURE 5) includes a roller conveyor section 68 on which a carton being filled with tow can be reciprocated by the motion of sleeve 31 under the influence of hydraulically-snubbed pneumatically-actuated piston 36 (previously described).

Mounted on upper beams 19 of supporting framework 14 is a tow feeding and directing device 70 which includes a pair of feed rolls 71 and 72 for feeding tow 73 to an oscillating tow directing tube 74.

As is best seen in FIGURE 1, tow feeding and directing device 70 is operated by motor 76 operating through variable speed reducer 77 and gears in housing 78 to rotate feed rolls 71 and 72 to deliver tow 73 to tow directing tube 74, which tube is oscillated by motor 76 operating through variable speed reducer 77, variable speed drive 80, gear reducer 81 and heart-shaped cam in housing 82. It is thus seen that the speed of rotation of feed rolls 71 and 72 and the rate of oscillation of tow directing tube 74 will be coordinated as both are driven from motor 76 operating through variable speed reducer 77. The rate of feeding of tow 73 is determined from the setting of variable speed reducer 77, which may be altered as desired by adjusting speed control 79 connected thereto by a flexible shaft.

Heart-shaped cam 83 (see FIGURE 9) located within housing 82 acts through cam follower 84 secured to the side of tow directing tube 74 to oscillate it. The length of the oscillating stroke may be varied by varying the location of the attachment of the end 86 of cam follower 84 toward or away from the pivot 87 about which tow directing tube 74 oscillates.

As illustrated in FIGURES 9 and 10, feed rolls 71 and 72 are driven together through the use of a plurality of intermeshing gears contained within housing 78. A first gear 90 is mounted on shaft 91 on which feed roll 71 is mounted and to which power from motor 76 is supplied. Intermeshing with gear 90 and rotated thereby is a second gear 92 mounted for free rotation on shaft 93. Intermeshing with gear 92 and rotated thereby is a third gear 94 mounted for free rotation on shaft 95, which shaft also serves as a pivotable support for a shaft mounting 97. Affixed to shaft 95 is a rotation counting device 96 which is designed to emit a signal after shaft 95 has rotated through a preselected number of revolutions thereby serving to meter the tow fed between feed rolls 71 and 72. Intermeshing with gear 94 and rotated thereby is a fourth gear 98 mounted on shaft 99 supported in pivotable shaft mounting 97 and to which feed roll 72 is affixed.

Movable shaft mounting 97 is resiliently urged by spring 101 against adjustable stop 102 mounted on a wall of housing 78. Adjustable stop 102 is set so that when shaft mounting 97 is pressed thereagainst by spring 101, feed roll 72 is then located the proper distance from feed roll 71 for proper feeding of tow 73 by the rotation of feed rolls 71 and 72. If during the feeding of tow 73 between feed rolls 71 and 72, a tangle or knot of tow should enter the nip and force feed rolls 71 and 72 apart, shaft mounting 97 would pivot about shaft 95 against the resistance of spring 101 causing a finger 103 mounted on shaft mounting 97 to lose contact with microswitch 104. Release of the pressure of finger 103 on microswitch 104 operates through suitable mechanisms (not shown) to stop motor 76 thereby stopping the operation of feed rolls 71 and 72 and the oscillation of tow directing tube 74. Likewise, should a portion of the tow wrap around either of the feed rolls 71 or 72 causing them to separate, this would likewise cause the carton filling station 11 to cease operation.

Rotation counting device 96 is connected through suitable mechanisms (not shown) to stop motor 76, to actuate an alarm system, and to cause sleeve 31 to be withdrawn from carton filling station 11 toward the center of rotatable framework 17 when rotation counting device 96 indicates that a preselected amount of tow has been fed into the carton and the sleeve 31 being filled. The amount of tow for which rotation counting device 96 is set is that amount which upon subsequent compression will just fill the carton with compressed tow at the proper density.

Tow Compressing Station

Tow compressing station 12 (see FIGURE 6) includes a vertically movable roller conveyor section 107 on which a carton may be supported directly beneath pneumatic press 108.

Pneumatic press 108 includes a press head 111 supported on piston rod 112 mounted in pneumatic cylinder 113 for vertical movement. To lower press head 111,

air from compressed air line 115 is directed through control valve 116 through conduit 117 to the upper end of pneumatic cylinder 113. Meanwhile air already in pneumatic cylinder 113 below the piston on piston rod 112 is permitted to leave the bottom of pneumatic cylinder 113 through conduit 118 to vent 119 under the control of valve 116. To raise press head 111, valve 116 is repositioned so as to admit compressed air from line 115 through conduit 118 to the bottom of pneumatic cylinder 113 and to exhaust air from the upper portion of pneumatic cylinder 113 through conduit 117 to vent 119. The action of control valve 116 is influenced by microswitch 66 (see FIGURE 8) in such fashion as to permit lowering of press head 111 only when actuator 65 contacts microswitch 66 thereby insuring that press head 111 can be lowered only when rotatable framework 17 and sleeve 31 mounted thereon are in proper position under press 108. In order to insure maintenance of the proper orientation of press head 111, press head 111 has affixed thereto a guide rod 121 which slides in sleeve 122 to prevent rotation of press head 111 about piston rod 112 as an axis.

In order to prevent movement of sleeve 31 while press head 111 is downwardly extended into sleeve 31, press head 111 is provided with a contact surface 124 (see FIGURE 7) which contacts microswitch 125 mounted on a portion of the supporting framework to permit energizing the pneumatic system for reciprocating sleeve 31 only when press head 111 is in its uppermost position.

Roller conveyor 107 (see FIGURES 11, 12, 13 and 14) is supported on piston 128 in hydraulic cylinder 129 for vertical movement thereon. Roller conveyor 107 is also provided with a plurality of legs 130 each slideable in a sleeve 131. Each sleeve 131 is provided with a detent 132 which may be inserted through a slot in the wall of sleeve 131 to extend under the lowermost end of leg 130 when conveyor 107 is in its raised position so as to provide strong support for roller conveyor 107 against the pressure produced by press head 111 in compressing the tow into the carton supported thereon.

Movement of detent 132 is controlled through the action of foot pedal 136 which operates against the force of spring 137 and through linkages 138. When roller conveyor 107 is in a lowered position, spring 137 resiliently urging foot pedal 136 upwardly acts through linkages 138 to resiliently urge detents 132 against the legs 130 through slots in sleeves 131. When roller conveyor 107 is raised a sufficient distance by piston 128 in hydraulic cylinder 129, detent 132 snaps in below the lower end of legs 130 thus locking roller conveyor 107 in its uppermost position. Depressing foot pedal 136 acts through linkages 138 to pivot detents 132 about axes 133 to withdraw detents 132 from below legs 130 permitting roller conveyor 107 to drop to its lowermost position when hydraulic pressure in cylinder 129 is relieved.

Roller conveyor 107 is provided with openings 141 through which wheels 142 mounted on supports 143 can protrude when roller conveyor 107 is in its lowermost position. When roller conveyor 107 is in its raised position, wheels 142 remain below the level of roller conveyor 107. Thus when roller conveyor 107 is in its uppermost position, a carton may be rolled thereon in a vertical direction as seen in FIGURE 11, whereas when roller conveyor 107 is dropped into its lowermost position, roller conveyor 107 is inoperative and a carton resting thereon may be moved laterally as seen in FIGURE 11 on wheels 142.

Conveyor System

A plan view of the roller conveyor system (see FIGURE 4) shows that carton transfer mechanism 13 is provided with two sections of roller conveyor 28, 29; carton filling station 11 is provided with a section of roller conveyor 68; and tow compressing station 12 is provided with a section of roller conveyor 107. When

carton transfer mechanism 13 is in its latched position, these sections of roller conveyor (68, 29, 28 and 107) are disposed in a linear configuration. These sections of the roller conveyor and their functions have been previously described.

Forming another roller conveyor pathway are a plurality of sections of roller conveyor arranged perpendicularly to the aforementioned roller conveyor section. This roller conveyor system includes roller conveyor section 146, wheels 142 (previously described), roller conveyor section 147, and scale 148 with roller conveyor 149 on its platform. Thus when roller conveyor section 107 is lowered as described in connection with FIGURES 11 through 14, cartons may be moved across this section of the roller conveyor from the tow compressing station 12 across roller conveyor section 147 to scale 148, and another carton may be moved from roller conveyor 146 into the tow compressing station.

Mode of Operation

The tow packaging device of this invention operates on two cartons concurrently. While one carton is being filled with tow being laid therein in a proper preselected pattern, a second carton has the tow therein compressed, is removed to a scale for weighing, and is replaced with an empty carton.

Taking, as a starting point for describing the cycle of operation, that moment in time when a full carton of compressed tow has just been removed from the weighing scale, the sequence of operations for the next carton to be filled will be described briefly.

An empty carton A previously placed on roller conveyor 146, is slid into position B on wheels 142 below one sleeve 31 in tow compressing station 12. Roller conveyor section 107 is raised by piston 128 in hydraulic cylinder 129 until detents 132 move into position to lock roller conveyor 107 in its upper position, thereby slipping the upper portion of the empty carton around the lower portion of sleeve 31. Actuation of pneumatic cylinder 39 retracts piston 37 pulling sleeve 31 toward center post 20 of the rotary carton transfer means 13 thereby positioning the empty carton and sleeve 31 in position C on one of the roller conveyors 28.

When the other carton has been filled with tow, latch 55 is released and rotatable framework 17 is rotated about center post 20 as illustrated in FIGURE 8 to interchange the empty carton and the filled carton. When the carton transfer means 13 has been rotated 180°, latch 55 is inserted into latch plate 56 to contact microswitch 58 to permit resumption of operation of the various mechanisms of the tow packaging apparatus. When transfer means 13 is latched into position, a portion of the rotatable framework 17 contacts either microswitch 21 or microswitch 22 to sense the orientation of rotatable framework, i.e., whether the side including roller conveyor section 28 is facing toward the tow compressing station or toward the carton filling station.

Activation of pneumatic cylinder 39 to push piston 37 serves to move sleeve 31 and the carton from a position D adjacent center post 20 to a position in carton filling station 11 beneath tow directing tube 74. Tow 73 fed by rolls 71, 72 through oscillating tow directing tube 74 is fed through sleeve 31 into the carton which is reciprocated by alternate reversals of piston 37 to lay the tow 73 in the carton in the pattern illustrated in FIGURE 15. As previously pointed out the alternate reversals of piston 37 are induced by cams 61 and 62 contacting microswitches 63 and 64 which operate solenoid valve 44. Only those microswitches 63 and 64 on the side of rotatable framework 17 positioned in the carton filling station are activated by microswitch 21 or 22 (whichever is contacted), the corresponding microswitches 63 and 64 located in the tow compressing station 12 being inactivated.

When sufficient tow has been fed between rolls 71, 72 to provide a filled carton after compression, which amount

of tow will fill a substantial proportion of sleeve **31** prior to compression, rotation counting device **96** operates suitable devices (*a*) to stop motor **76**, thereby stopping the rotation of feed rolls **71**, **72** and the oscillation of tow directing tube **74**, (*b*) to actuate pneumatic cylinder **39** to retract piston **37** to pull sleeve **31** and its associated carton onto roller conveyor **29** into position D adjacent center post **20**, and (*c*) to actuate an alarm system to notify the operator that sufficient tow has been laid in the carton and sleeve **31**.

The operator resets the alarm system, and rotation counting device **96**, severs the end of the tow **73** hanging from the top of sleeve **31**, releases latch **55**, and rotates carton transfer means **13** through 180° to move the now filled carton to position C adjacent the tow compressing station **12**.

After resetting latch **55**, pneumatic cylinder **39** is actuated to push piston **37** and sleeve **31** away from center post **20** until actuator **65** contacts microswitch **66** thereby assuring accurate location of the filled carton in position B on roller conveyor **107** directly beneath press head **111** of pneumatic press **108**. Of course, concurrently herewith, a new empty carton on the other side of carton transfer means **13** is located in carton filling station **11** by actuation of the other pneumatic cylinder **39** as previously explained.

Actuation of pneumatic cylinder **113** (which is permitted only when microswitch **66** is contacted) forces press head **111** down into sleeve **31** compressing tow **73** down into the carton to the desired density. Reversal of valve **116** retracts press head **111** after which roller conveyor **107** is lowered by depressing foot pedal **136** to lower the filled carton and to free it from sleeve **31**.

The filled carton is then moved over roller conveyor **147** to position E on roller conveyor platform **149** of scale **148** to determine the weight of tow contained therein. Positioning of another empty carton A on roller conveyor **146** starts a new cycle.

It is thus seen that the above-described apparatus, following the teachings of this invention, provides one embodiment of a tow packaging apparatus suitable for achieving the objects desired. However, it is to be understood, that the above description of specific apparatus details is meant to be illustrative of a specific form of this invention, and that the scope of this invention is not to be limited to such details, but is to include all equivalents thereof within the scope of the subjoined claims.

We claim:

1. Apparatus for packaging tow in cartons, comprising, a main support; a rotatable framework supported by said main support, said rotatable framework having a relatively short lower section and a relatively longer upper section overhanging beyond said lower section at each end thereof, said rotatable framework being substantially symmetrical about its axis of rotation; a pair of sleeves each supported in the upper section of said rotatable framework for movement along a path extending between a position adjacent the axis of rotation of said rotatable framework where said sleeve is above a portion of the lower section of said rotatable framework and a position remote from said axis of rotation where said sleeve is beyond the limits of said lower section, each sleeve being adapted to cooperate with a carton placed therebelow to effectively form a temporary vertical extension thereof; means for moving each of said sleeves along its said path; tow feeding and directing means for feeding and directing tow into a sleeve and a carton placed therebelow; and press means for compressing tow from a sleeve into the carton placed therebelow, said tow feeding and directing means and said press means being disposed on opposite sides of the axis of rotation of said rotatable framework so each of said means may simultaneously have one sleeve of said pair of sleeves operatively associated therewith.

2. Apparatus as defined in claim 1 wherein said means for moving each sleeve comprises; a first cylinder provided with means for introducing gas under pressure to either end thereof while exhausting gas from the opposite end thereof; a second cylinder with each end thereof connected to a bypass conduit for the passage of liquid through said conduit from one end of said second cylinder to the other end of said cylinder; a piston rod secured to said sleeve and secured to a first piston in said first cylinder and to a second piston in said second cylinder whereby gas introduced into one end of said first cylinder moves said first piston moving said piston rod causing said sleeve to move and causing said second piston to force liquid from one end of said second cylinder to the other through said bypass conduit; and means for controlling the resistance to flow of liquid through said bypass conduit thereby controlling the rate of movement of said piston rod and said sleeve.

3. Apparatus for packaging tow in cartons, comprising, a main support; a rotatable framework supported by said main support, said rotatable framework having a relatively short lower section and a relatively longer upper section overhanging beyond said lower section at each end thereof, said rotatable framework being substantially symmetrical about its axis of rotation; a pair of sleeves each supported in the upper section of said rotatable framework for movement along a path extending between a position adjacent the axis of rotation of said rotatable framework where said sleeve is above a portion of the lower section of said rotatable framework and a position remote from said axis of rotation where said sleeve is beyond the limits of said lower section, each sleeve being adapted to cooperate with a carton placed therebelow to effectively form a temporary vertical extension thereof; means for moving each of said sleeves along its said path; tow feeding and directing means for feeding and directing tow into a sleeve and a carton placed therebelow; press means for compressing tow from a sleeve into the carton placed therebelow, said tow feeding and directing means and said press means being disposed on opposite sides of the axis of rotation of said rotatable framework so each of said means may simultaneously have one sleeve of said pair of sleeves operatively associated therewith, and after rotation of said rotatable framework have the other of said pair of sleeves operatively associated therewith; and carton supporting means below said press means having an upper surface thereof vertically movable between a lowermost position to permit an empty carton to be placed below one of the sleeves and to permit removal of a full carton from below the sleeve and an uppermost position wherein the carton may be held in position to cooperate with a sleeve.

4. Apparatus as defined in claim 3 wherein said carton supporting means comprises; a vertically moveable, substantially horizontal roller conveyor section having at least one opening therethrough; a plurality of wheels mounted with their axes perpendicular to the axes of the rollers of said roller conveyor section; and means for raising and lowering said roller conveyor section to an upper position wherein the carton is supported on said roller conveyor section and to a lower postion wherein the carton is supported on said wheels extending through said opening in said roller conveyor section.

5. Apparatus for packaging tow in cartons, comprising, a main support; a rotatable framework supported by said main support, said rotatable framework having a relatively short lower section and a relatively longer upper section overhanging beyond said lower section at each end thereof, said rotatable framework being substantially symmetrical about its axis of rotation; a pair of sleeves each supported in the upper section of said rotatable framework for movement along a path extending between a position adjacent the axis of rotation of said rotatable framework where said sleeve is above a portion of the lower section of said rotatable framework and a position

remote from said axis of rotation where said sleeve is beyond the limits of said lower section, each sleeve being adapted to cooperate with a carton placed therebelow to effectively form a temporary vertical extension thereof; means for moving each of said sleeves along its said path; reversing means operable when filling a carton with tow for causing said sleeve moving means to oscillate said sleeve and its associated carton along its path; tow feeding and directing means for feeding tow and for directing said tow into said sleeve and carton in a path oscillating substantially perpendicular to the path along which said sleeve and carton are oscillating therebelow; and press means for compressing tow from a sleeve into the carton placed therebelow, said tow feeding and directing means and said press means being disposed on opposite sides of the axis of rotation of said rotatable framework so each of said means may simultaneosuly have one sleeve of said pair of sleeves operatively associated therewith.

6. A process for packaging tow in cartons, comprising, laying tow in a preselected pattern in one carton at a first station while concurrently at a second station compressing the tow previously laid in a preceding carton, removing said preceding carton, and replacing it with an empty carton in said second station; and interchanging the positions of the empty carton in said second station and the thus filled carton in said first station, whereby a single second station serves to compress the tow in all cartons filled at a single first station.

7. A process for packaging tow in cartons, comprising, at a first station linearly oscillating a carton and a sleeve operatively associated therewith in a first direction while feeding tow into said carton and sleeve in a path oscillating linearly in a second direction substantially perpendicular to said first direction, said two oscillations being so coordinated to lay said tow in said carton and sleeve in a preselected pattern; while concurrently at a second station compressing tow previously laid in another carton and sleeve operatively associated therewith into the carton, lowering the carton to release it from the sleeve, removing the carton full of compressed tow, replacing the carton with an empty carton, and raising the empty carton to operatively associate it with the sleeve; and interchanging the positions of the empty carton and sleeve in the second station and the thus filled carton and sleeve in the first station, whereby a single second station serves to compress the tow in all cartons filled at a single first station.

8. A tow packaging apparatus comprising, a main support; first means on said support for directing tow into a carton in a predetermined pattern including directing means for directing tow into said carton, means for reciprocating said carton in a first direction, means to impart reciprocating motion in a second direction to the tow entering said carton, and means to coordinate said carton reciprocating means and said tow reciprocating means to lay said tow in said carton in a preselected pattern; second means on said support for compressing tow in a carton, said support having an equal number of first means and second means; and rotatable means for interchanging the positions of a pair of cartons between said first means and said second means.

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