

[54] **ROLL-UP COMPRESSIVE PACKAGING APPARATUS**

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[22] Filed: **Nov. 2, 1973**

[21] Appl. No.: **412,236**

[52] U.S. Cl. **53/21 FW; 53/24; 53/118; 53/124 C; 53/137; 100/5; 100/87**

[51] Int. Cl. **B65b 63/04; B65b 63/02**

[58] Field of Search. **53/24, 124 D, 124 C, 214, 53/215, 118, 137, 199, 21 FW; 242/DIG. 3; 100/87, 5**

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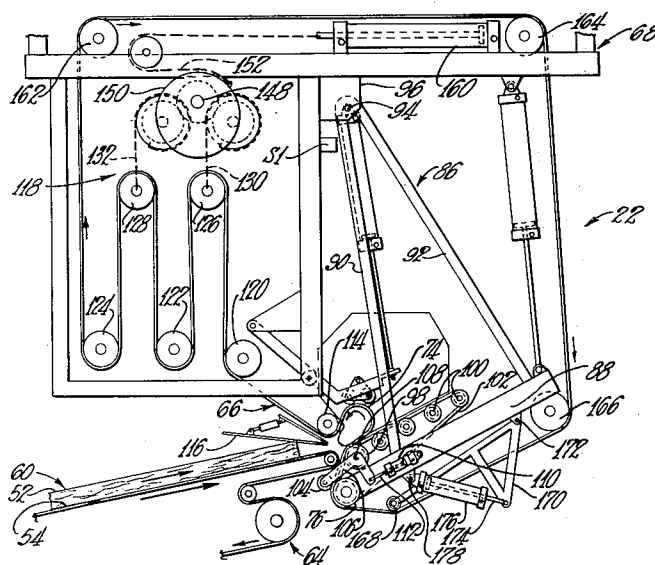
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[57] **ABSTRACT**

Apparatus is provided for packaging compressible material in strip form, such as building insulation. The compressible strip is wound into a roll and held under compression during rolling to provide a compact package. The compressed package is then held by tape, which is automatically fed onto an end portion of the compressible strip as it is being rolled up, with the package then being automatically ejected. The apparatus includes an endless belt carried on a frame and positioned and driven in a manner to form a loop in itself which is in the path of the compressible strip being lineally moved toward the belt. The belt is driven to roll the strip as it is moved into the loop and means are provided for maintaining the belt under tension to place the strip in compression. The tension means for the belt also provides increased pressure on the strip during rolling, and as the loop and roll enlarge. The tape is fed from underneath to a trailing end portion of the strip and is wrapped around the roll after entering the loop. When the roll is completed, part of the frame for the belt is moved away from a stationary part to open the loop and automatically eject the compressed, packaged roll.

33 Claims, 9 Drawing Figures



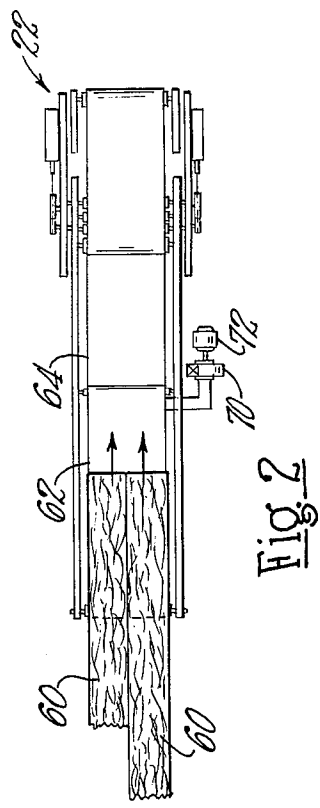


Fig. 2

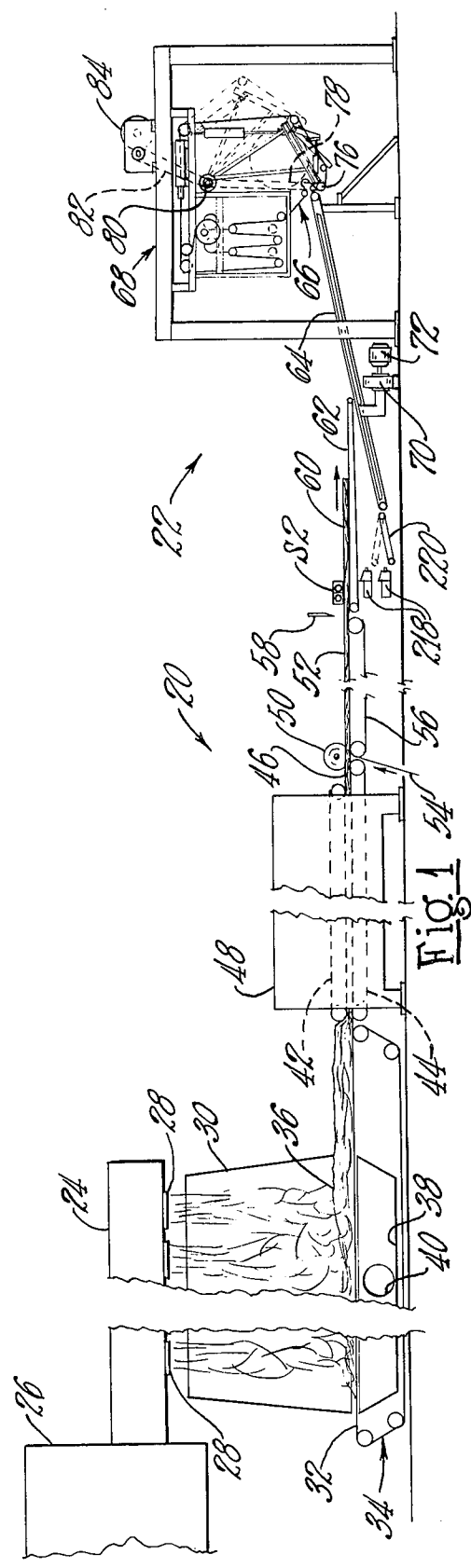
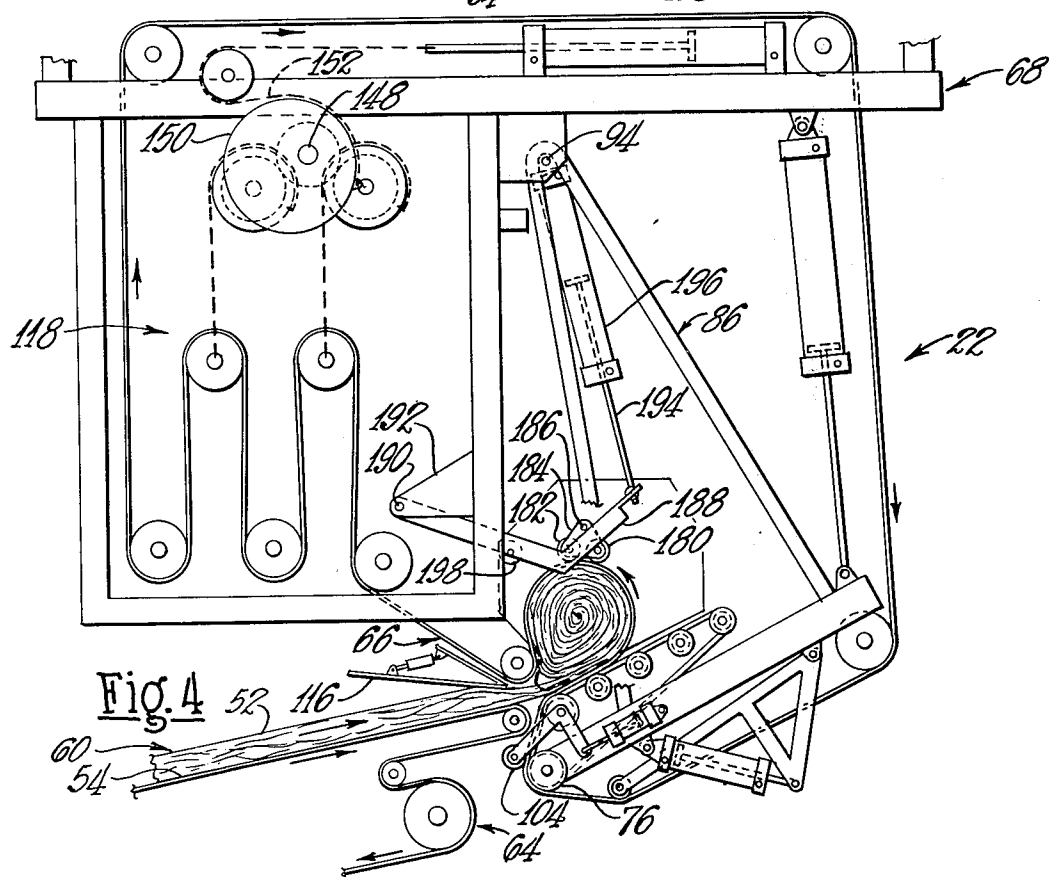
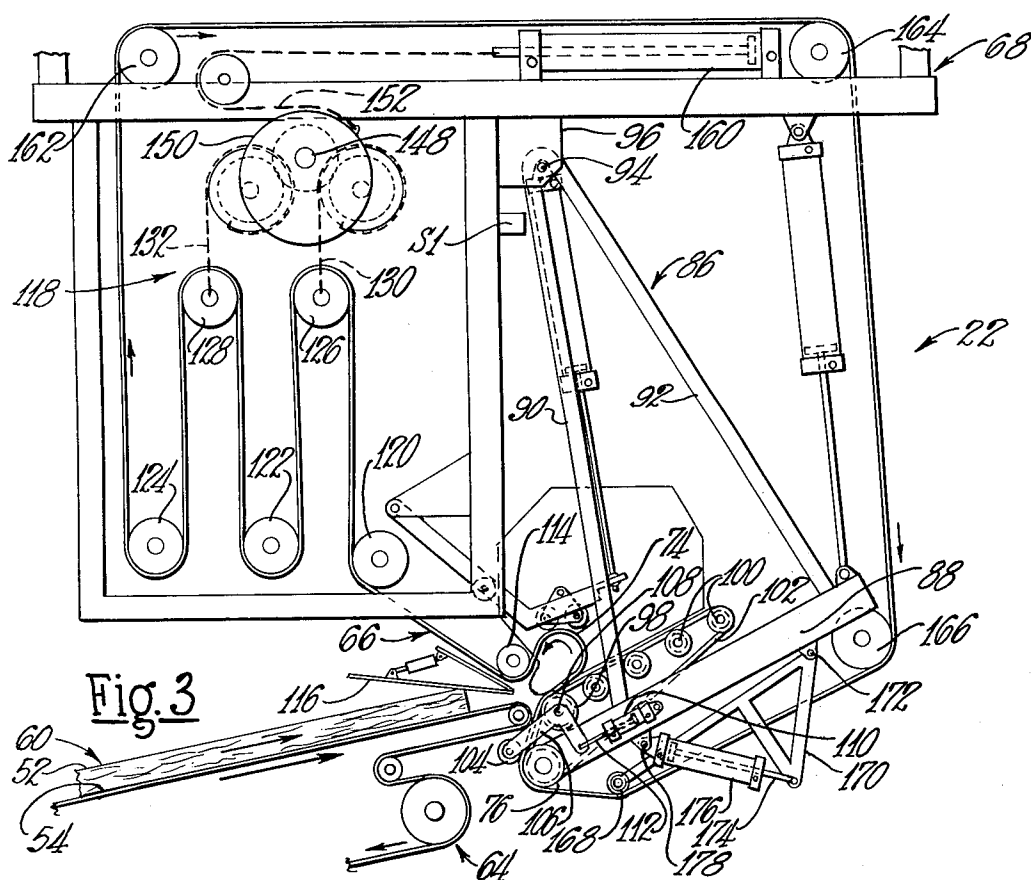
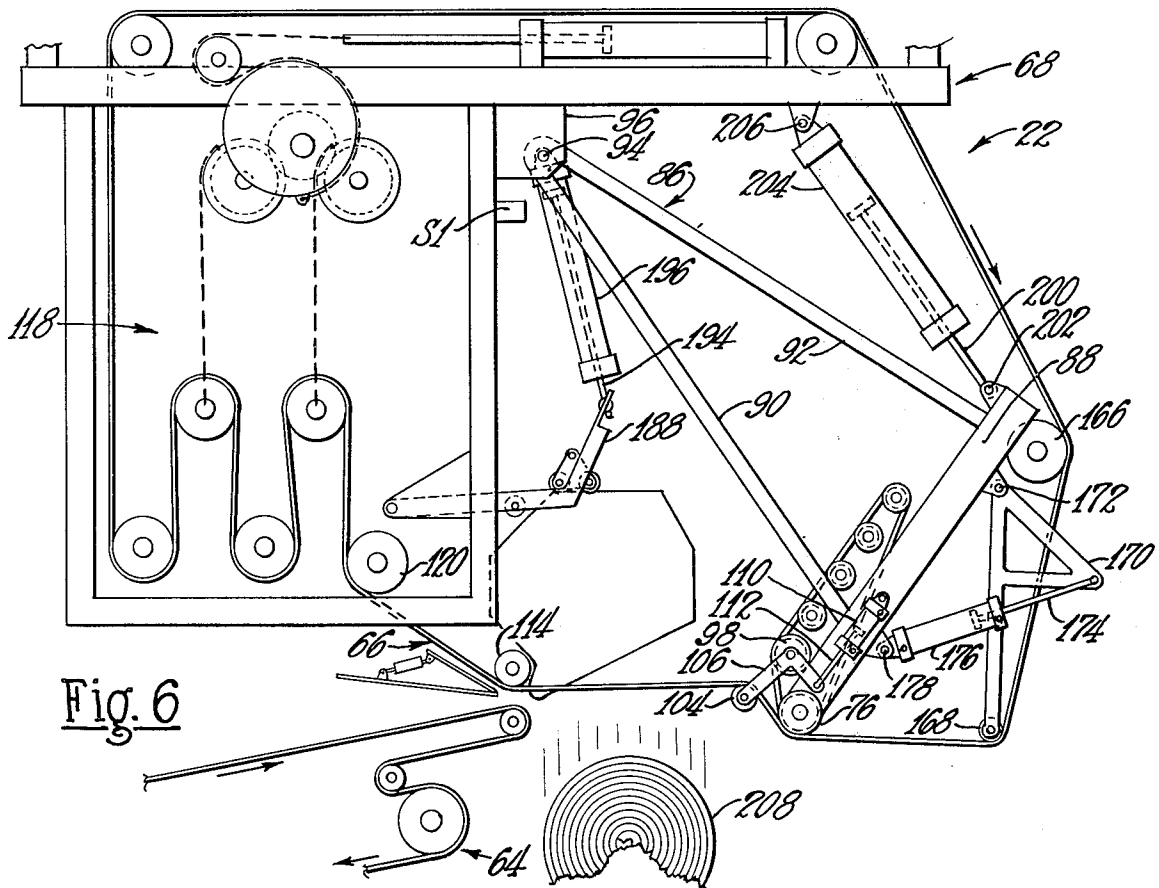
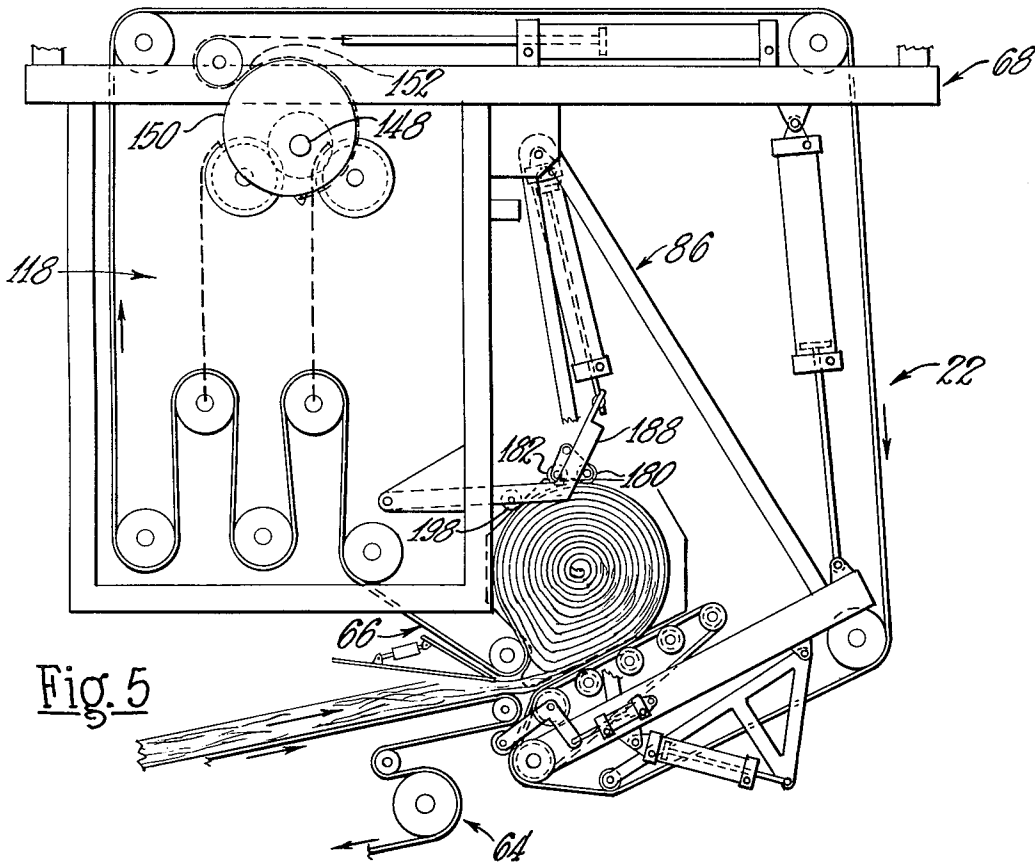
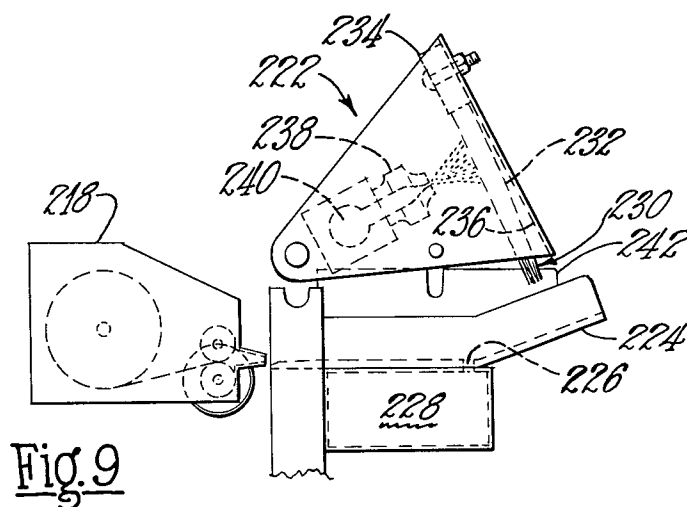
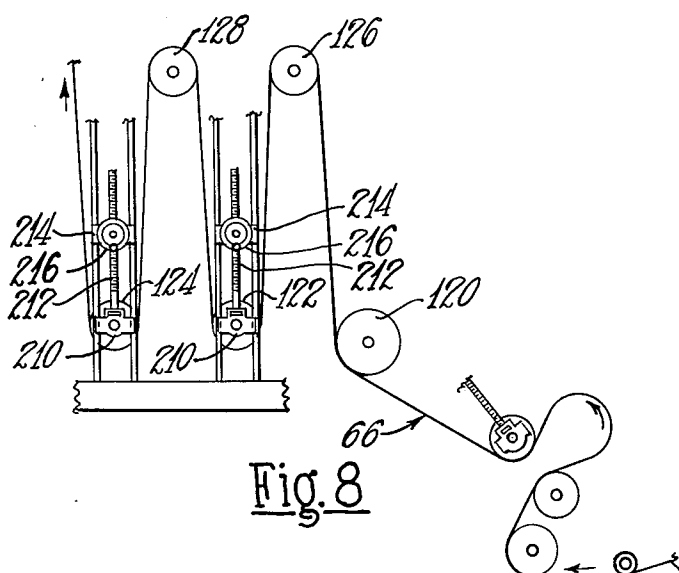
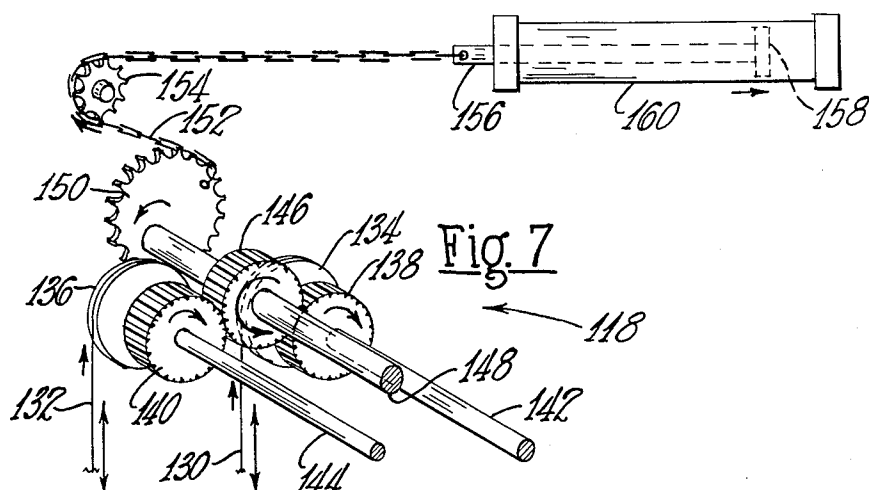


Fig. 1







ROLL-UP COMPRESSIVE PACKAGING APPARATUS

This invention relates to apparatus for packaging a strip of compressible material into a compressed roll held by a tape or the like extending therearound.

Heretofore, strips of compressible material, and specifically building insulation, have been removed from the ends of the line on which they are formed and packaged by workmen who individually handle the rolls. The packaging heretofore has been slow and laborious with the rolls requiring considerable handling. Further, the packaged strips have not always been as neat or compressed to the extent desired. Limited attempts to partially automate the packaging of the insulation have not been successful.

The present invention provides apparatus for packaging building insulation and the like in which a compressible strip of insulation is received directly into the apparatus from the end of a production line on which it is made. The strip is rolled on itself under compression and taped automatically to provide a finished, packaged roll which is then automatically ejected from the apparatus. The insulation is not handled at all until it is in the complete, packaged form. The insulation is compressed in the package to an extent exceeding that heretofore achieved, and the insulation is also rolled more uniformly into the roll, with lesser tendency to project or telescope to one side. Further, the labor or effort required by the workmen is less than heretofore needed in packaging such material.

More specifically, the apparatus according to the invention includes an inclined conveyor aligned with the discharge end of a conveyor of the production line on which the strips of building insulation are made. Typically, two or three strips of the building insulation are formed in side-by-side relationship and are discharged longitudinally off the end of the conveyor, these also being simultaneously rolled up and packaged. Each of the strips comprises a layer of compressible fibers held together by a binder and adhered to a backing sheet on which they are deposited on the production conveyor line. The overall insulating strips are commonly 15 inches or 23 inches wide with the thickness of the compressible insulating layers varying from 2 inches to 6 inches. It will be readily understood that a lengthy roll of such a strip, capable of covering 50 to 75 square feet, by way of example, can be quite bulky if not compressed substantially when packaged. In fact, the packaging should only be limited by the degree to which the fibers can return substantially to the previous thickness after the packaged roll is opened. Heretofore, such strips have usually not been compressed to the maximum extent possible, short of causing permanent deformation of the fibrous layer.

A frame is located beyond the upper end of the inclined conveyor on which is carried an endless movable belt. The belt is positioned and driven so that a loop or pocket is formed therein in alignment with the upper end of the inclined conveyor. The compressible strip is moved onto and up the inclined conveyor with the end received into the loop, with the belt being moved in a manner such that the strip is rolled on itself with the backing sheet facing outwardly. The belt is maintained under tension as the roll is wound so that increasing pressure is maintained on the roll as the loop enlarges to accommodate the ever-increasing diameter of the roll being packaged. The compressible strip is cut to a

predetermined length on the production line and as the trailing end of the strip moves up the inclined conveyor, tape is applied thereto, with a portion of the tape adhered to the trailing end of the strip and a portion of the tape extending rearwardly thereof. The latter portion of the tape is adhered to the previous wrap of the strip as it is carried with the strip into the loop of the belt. Consequently, the roll is completely packaged by the time the strip moves into the loop and turns approximately one more revolution to cause the tape to adhere to the previous wrap. At this time, a portion of the frame is swung away to straighten the portion of the belt forming the loop and to cause the roll to be ejected downwardly. Up to this point, the insulation is not touched at all by human hands.

It is, therefore, a principal object of the invention to provide improved apparatus for packaging compressible material in strip form.

Another object of the invention is to provide apparatus for packaging a compressible strip in roll form under greater compression than heretofore.

A further object of the invention is to provide apparatus for packaging a compressible strip faster and with less labor.

Yet another object of the invention is to provide apparatus for automatically packaging a compressible strip and automatically ejecting the packaged strip therefrom.

Still another object of the invention is to provide apparatus for rolling up a compressible strip and for automatically applying tape to the strip.

Still a further object of the invention is to provide apparatus for automatically packaging simultaneously two or more compressible strips received directly from an end of a production line.

Many other objects and advantages of the invention will be apparent from the following detailed description of a preferred embodiment thereof, reference being made to the accompanying drawings, in which:

FIG. 1 is a schematic, fragmentary side view in elevation of a production line and packaging apparatus embodying the invention;

FIG. 2 is a somewhat schematic top view of the packaging apparatus of FIG. 1;

FIGS. 3-6 are enlarged, somewhat schematic side views in elevation of a portion of the packaging apparatus and showing various components thereof in different positions during the packaging and discharge of a strip of compressible material received from the production line;

FIG. 7 is a somewhat schematic view in perspective of apparatus for maintaining tension on an endless belt of the packaging apparatus;

FIG. 8 is a detailed, schematic view in elevation of an adjustable take-up which is part of the tension apparatus of FIG. 7; and

FIG. 9 is a fragmentary, side view in elevation of a portion of tape dispensing apparatus for applying tape to the trailing edge of the compressible strip.

Referring to FIG. 1, a production line on which a compressible strip, specifically building insulation, can be produced is indicated at 20 and packaging apparatus for packaging the compressible strip is indicated at 22. The production line 20 is of a substantially conventional design and construction and will be discussed only generally. A forehearth 24 receives heat-softened glass or other flowable, fiber-forming material from a

melting furnace 26 of a suitable, known design in which raw material is reduced to a flowable or molten state. The molten glass is fed to fiber-forming units 28 located beneath the forehearth 24. The units 28, by way of example, can be hollow, rotatable members or spinners having orifices in the peripheries through which glass is attenuated into primary fibers. The primary fibers are then further attenuated and directed downwardly by hot gaseous blasts from blowers or burners (not shown) located adjacent the units 28. The fibers move downwardly through a forming hood 30 and are sprayed with binder by suitable spray devices (not shown) which direct the binder into the forming hood transversely of the fiber path. The fibers are then received on an upper flight 32 of a foraminous, endless belt conveyor 34, the fibers being collected as a mass or layer 36 of an approximate predetermined thickness, and are carried along the conveyor 34 toward the right, as viewed in FIG. 1. A suction chamber 38 is located below the upper flight 32 of the conveyor, with an exhaust conduit 40 connected to a suction blower (not shown) for establishing a reduced pressure in the chamber 38. The reduced pressure or suction assists in the collection of the fibers on the flight 32 and also carries away the spent gases of the attenuating blasts and organic particles from the binder.

The layer 36 of the fibers is advanced to a region between upper and lower foraminous belts 42 and 44 which are positioned to compress the fibers somewhat into a fibrous layer or body 46 of predetermined thickness. The foraminous belts 42 and 44 convey the fibrous layer through an oven or heating chamber 48 in which the binder is set or partially cured on the fibers at a temperature in the order of 450°-500°F. When the layer 46 emerges from the oven 48, the edges are trimmed by suitable rotatable knives 50 which remove uneven edge strips from the layer 46. In this instance, a center one of the rotatable knives 50 can also be provided to sever the formed layer 46 into two narrower fibrous layers 52. A plow (not shown) can be used to spread apart the two layers 52 somewhat to leave a gap therebetween. At this time, a coated kraft paper or similar backing sheet 54 can be applied to each of the layers 52, these sheets being fed upwardly and underneath the layers 52. The sheets can have an adhesive suitably applied to the upper sides thereof prior to being fed into contact with the layers 52 to provide adhesion therebetween. The adhesive can also help serve as a vapor barrier for the resulting insulation and can also contain a suitable fire retardant. The combined layers 52 and backing sheets 54 are then carried along a discharge conveyor 56 and under a cut off knife 58 which cuts the layers 52 and the sheets 56 into building insulation strips 60 of predetermined length. The insulation 60, which constitutes compressible strips in this instance, is carried from the discharge conveyor 56 onto a supply conveyor 62 of the packaging apparatus 22. The insulation 60 is then moved up an inclined conveyor 64 toward an endless belt 66 carried by a frame 68. Both of the belts 62 and 64 can be driven by a suitable gear reducer mechanism 70 and a drive motor 72. The conveyors 62 and 64 move at a speed in excess of the conveyors of the line 20 since each compressible strip of insulation must be discharged after being packaged, thus resulting in a delay which must be compensated for by the faster packaging speed for the insulation.

The belt 66 has a loop or pocket 74 formed therein which is in alignment with the slanted conveyor 64 to receive the forward ends of the compressible strips or insulation 60. The belt 66 is driven by a drive roll 76 which, in turn, is driven by suitable means such as a chain 78 (FIG. 1), idler sprockets 80, a drive chain 82, and a drive unit 84 located on an upper portion of the frame 68. The drive roll 76 is carried by a pivotable sub-frame 86 (FIGS. 3-6) comprising a lower supporting frame bar 88 and two struts 90 and 92 pivotally mounted by a pivot pin 94 which is held by an ear portion 96 of the frame 68. Actually, there is one of the bars 88 and one of each of the struts 90 and 92 on each side of the packaging apparatus 22, beyond the ends of the drive roll 76. The drive roll 76 also drives a bend roll 98 and four supporting rolls 100 through a plurality of V-belts 102, seven of such belts being used in the particular instance. These belts and rolls support the lower portion of the belt loop 74 as it expands, and helps continue expansion of the loop in the direction shown. The rolls 98 and 100 are also supported by the supporting frame bar 88 through suitable side plates (not shown) extending upwardly from the bar 88.

The belt 66 is held against the periphery of the drive roll 76 by a pinch roll 104 which is rotatably carried by a lever 106 pivotally mounted on an axle 108 which also rotatably carries the bend roll 98. The lever 108 is operated through a pneumatic cylinder 110, being connected to a piston rod 112 thereof. The pinch roll 104 forces the belt 66 into driving contact with the drive roll 76 when the piston rod 112 is retracted into the cylinder 110. The timing of the operation of the pinch roll 104 is important in forming the loop 74, as will be discussed more fully subsequently.

Beyond the loop 74, in the direction of movement of the belt 66, the belt bends around a throat roll 114 located above an adjustable plate 116 which helps to direct the forward edge of the insulation 60 between the rolls 98 and 114. The plate also prevents the insulation from contacting the belt 66 above the throat roll 114 which would tend to kick the insulation up and away from the loop 74. Side plates 117 can also be employed at the sides of the belts 102 to prevent telescoping of the insulation 60, particularly when two or three narrower strips are packaged instead of a single wide one. The plates are adjustable to control the spacing therebetween.

It is important that the belt 66 be allowed to expand at the loop 74 as the insulation rolls up therein and yet tension must be maintained on the belt 66 in order to maintain compressive force or pressure on the insulation 60 as each wrap is rolled. For this purpose, a take-up or tension mechanism indicated at 118 is carried by the frame 68. Referring to FIGS. 3 and 7, the take-up mechanism 118 includes three stationary idler rolls 120, 122, and 124 and two upper, vertically-movable take-up rolls 126 and 128. The rolls 126 and 128 are urged upwardly to place the belt 66 under tension but move downwardly as the size of the loop 74 increases to enable the loop to properly accommodate the ever-increasing size of the package being formed.

The take-up rolls 126 and 128 are supported by chains 130 and 132 which are wound on sprockets 134 and 136. The chains do not extend completely around the sprockets but only sufficiently far to enable the take-up rolls 126 and 128 to move between their extreme upper positions, as shown in FIG. 3, and their ex-

treme lower positions, as shown in FIGS. 5 and 6. The sprockets 134 and 136 are affixed to spur gears 138 and 140, respectively, with the sprockets and gears rotatably mounted on axles 142 and 144. The gears 138 and 140, in turn, are engaged by a common drive gear 146 keyed to a shaft 148. A drive sprocket 150 is also affixed to the shaft 148 with a chain 152 affixed to the drive sprocket 150 and extending around an idler sprocket 154 to a piston rod 156 of a piston 158 in a cylinder 160.

The drive sprocket 150 is eccentrically mounted on the shaft 148 to provide a variation in torque, by variation in the length of the torque arm, as measured between the shaft 148 and the point of tangency of the chain 152 on the periphery of the sprocket 150. Comparing FIGS. 3, 4, and 5, the torque arm is shorter when the take-up rolls 126 and 128 are in their upper positions and the torque arm is longer when the take-up rolls are in their lower positions. With a constant fluid supply to the cylinder 160, there will be increased tension on the belt 66 as the take-up rolls 126 and 128 move lower and the chain 152 acts on a longer torque arm, to urge the drive spur gear 146 in a counterclockwise direction, and the spur gears 138 and 140 in clockwise directions which urge the chains 130 and 132 upwardly. The take-up rolls 126 and 128 continue to move downwardly, however, as the loop 74 increases, but at the same time the tension on the belt 66 continues to increase, with additional pressure placed on the insulation as the size of the roll increases. There are a set of the gears 146, 138, and 140, the sprockets 134 and 136, and the chains 130 and 132 at each end of the take-up rolls.

Beyond the take-up mechanism 118, the belt continues upwardly around an idler roll 162 (FIG. 3), moving back across the top of the frame 68, and around an idler roll 164. The belt continues downwardly around a lower idler roll 166 carried by the pivotal frame 86. Finally, the belt extends around a slack control roll 168 (FIGS. 3 and 6) back to the drive roll 76. Each end of the slack control roll 168 is rotatably carried by a lever 170 which is pivotally mounted by a pin 172 to the supporting bar 88. The lever 170 is pivotally moved by a piston rod 174 extending from a cylinder 176 which is also pivoted by a pin 178 to the bar 88. The roll 168 helps to maintain tension on the belt 66 immediately adjacent the drive roll 76 and also controls the slack in the belt when the frame 86 is opened, as will be discussed subsequently.

To help form a controlled, round package, a pair of float rolls 180 and 182 (see FIG. 4) can be located above the loop 74 to place a predetermined amount of pressure thereagainst as the loop enlarges. The ends of the float rolls 180 and 182 are each carried by a triangular plate 184 which is pivotally mounted by a pin 186 on a lever arm 188. The lever arm 188 is pivotally mounted by a pin 190 to an ear 192 affixed to the frame 68. The opposite ends of both of the lever arms 188 are connected by a cross bar which is pivotally connected to a piston rod 194 which extends into a centrally-located cylinder 196, the upper end of which is pivotally supported through the pin 94 by the frame 68. Fluid pressure is supplied to the rod end of the cylinder 196 to urge the piston rod 194 upwardly and reduce the pressure of the float rolls 180 and 182 on the loop 74. Without the cylinder 196, the weight of the rolls on the related components would be excessive.

As the loop builds up, the carrier plates 184 pivot with respect to the levers 188 to maintain both of the rolls against the loop, as shown in FIG. 5, for example. As the roll size increases, an additional float roll 198 also engages the outer surface of the loop 74 for additional control of the package. With the roll discharged, the piston rod 194 would revert to the lower position, nothing supporting the float rolls 180, 182, and 198. Because this is too slow, however, fluid pressure is temporarily supplied to the blind end of the cylinder 196 to more quickly return it and the rolls to the lower position, ready for the next compressive strip. The float rolls are not used in all instances, being more advantageous for a single wide strip of insulation. When the side plates 117 are used as is usually the case, the float rolls are not used.

When the roll is complete and an elongate, flexible material in the form of tape or an overwrap, to be discussed subsequently, has been wrapped thereon, the roll is automatically discharged. For this purpose, a piston rod 200 (FIG. 6) is pivotally connected by a pin 202 to each of the rear corners of the pivotable frame 86. The piston rod 200 extends into a cylinder 204 which is pivotally connected by a pin 206 to an upper rear corner of the frame 68, the pivot pin 206 being spaced substantially to the rear of the pivot pin 94 for the frame 86. Consequently, when fluid is supplied to the rod end of the cylinder 204 and the piston rod 200 is retracted, the frame 86 pivots in a counterclockwise direction to the position of FIG. 6. At this time, the fluid-operated cylinder 110 is operated through sensing means, such as a proximity switch S1, to extend the piston rod 112 and move the pinch roll 104 outwardly. This immediately reduces the engagement of the drive roll 76 with the belt 66, substantially stopping it. At the same time, the switch S1 causes fluid to be supplied to the blind end of the cylinder 176 to extend the piston rod 174 and move the slack control roll 168 in a counterclockwise direction. This takes up substantially all slack in the belt 66 and eliminates the loop 74 for the time being, causing a package 208 to be discharged downwardly from the apparatus 22. In some instances, a protective overwrap can be substituted for the tape and wound around the roll while in the apparatus. For this purpose, the overwrap has suitable adhesive near one end. The overwrap also can be applied later, if desired.

After discharge, the piston rod 200 is extended once again and the piston rod 174 retracted. As the frame 86 approaches its original position of FIG. 3, the proximity switch S1 causes the piston rod 112 to retract to place slack in the belt 66 upstream of the loop 74, and causes the piston rod 112 to retract to enable the pinch roll 104 to again squeeze the belt 66 between it and the drive roll 76. This causes the belt to immediately begin to move and causes a portion to project between the throat rolls 98 and 114, thereby forming the loop 74 again. The operation of the pinch roll 104 thereby is important in enabling the loop 74 to be formed. The apparatus 22 is then in its receiving position and ready to form a package from the next compressive strip or strips cut off by the knife 58.

The initial size of the loop 74 can be adjusted by controlling the positions of the stationary rolls 122 and 124. As shown in FIG. 8, this can be accomplished through bearing blocks 210 for the rolls which are connected through screws 212 to threaded, fixed support

ing members 214 having adjustable hand wheels 216 to move the screws 212 up and down relative to the fixed members 214.

To maintain the roll of the compressible strip in compression, at least one length of tape is preferably applied to the backing sheets of each roll. The length of tape preferably should be applied so that about one-half the length is adhered to the trailing end portion of the insulation 60 while the other half can be applied to the backing sheet of the previous wrap of insulation as the roll is rotated in the loop or pocket 74. However, many variations in the application of the tape are possible. The tape can even be wrapped completely around the package to overlap the joint thereof twice.

Referring to FIG. 1, two banks of tape dispensers 218 are located below the conveyor 62. A tape transfer conveyor 220 is located in front of the dispensers 218 and is positioned to receive tape from the bank which is in operation. The two banks enable one bank to be refilled, serviced, etc. while the other is in use. Tape from the dispenser 218 is fed lineally along the transfer conveyor 220 to a lower end of the inclined conveyor 64.

The dispensers 218 are commercially available, differing in that the tape is dispensed with the glue or adhesive side facing upwardly. To properly activate the glue on the upper surface of the tape, a special applicator indicated at 222 in FIG. 9 is employed. A tape trough 224 is mounted in front of the dispensing opening of the dispenser 218 with a suitable drain opening 226 therein for returning water to a tank or receptacle 228. A relatively stiff brush 230 has bristles 232 and a head 234 which is affixed to a housing 236. Water is sprayed from a spray head 238 having a supply line 240 extended to a suitable source (not shown) with the water directed onto the bristles 232 from which the water flows uniformly downwardly and onto the tape in the trough 224. Baffles 242 are located at the sides of the trough 224. Water intercepted by the baffles flows to the side and through the drain opening 226. With this arrangement, the water is uniformly and rapidly applied to the upper, glue side of the tape.

With the special applicator 222 and the commercially-available dispensers 218, the tape can be dispensed ready for applying at speeds in excess of 40 inches per second. The tapes are fed out along the conveyor 220 and the inclined conveyor 64 until their upper ends are near the conveyor 62. At this point, the tapes would tend to be dragged along the conveyor 64 but the opposite ends of the tapes are still held within the dispensers 218 so that the tapes remain until the other ends are cut. At that time, the tapes are carried up the conveyor 64 into contact with the backing sheets 54 of the insulation 60, and are carried therealong into the loop 74. The timing of the tapes and lengths thereof are such that one-half of each of the tapes is affixed to the trailing end of the insulation and the other half is wound around and affixed to the backing sheet of the adjacent wrap of the insulation. This provides a secure package with a minimum amount of tape and yet a package which maintains the high compressive forces on the insulation after the package is complete.

The overall operation of the packaging apparatus 22 will now be discussed. When the leading edge of the insulation 60 passes a pair of electric eyes or other sensing device S2 located beyond the cut off knife 58, a first, tape delay timer is started which provides a short

delay and then starts a second, tape length timer. At this time, the tape dispensers 218 feed out tape and continue to do so until the tape length timer times out. The forward ends of the tape at this time are on the inclined conveyor 64. When the trailing edge of the insulation 60 passes the electric eye sensing device S2, a tape cut-off delay timer starts. When this timer times out, the tape is cut and at the same time a fourth, delay eject timer starts. When the tape is cut, it is carried into the loop 74 with the trailing edge of the insulation. After the delay eject timer times out, it actuates the cylinders 204 for the pivotable frame 86 and causes it to swing out and discharge the packaged roll. By this time, the tape will have been wound onto the adjacent wrap of the backing sheet of the insulation. The cylinders 110, 160, 176, and 196 also will operate through their cycles. The cylinders are actuated temporarily so that the frame 86 and the various components return to the position of FIG. 3 ready to receive another of the compressive strips in a minimum of time.

Various modifications of the above-described embodiment of the invention will be apparent to those skilled in the art, and it is to be understood that such modifications can be made without departing from the scope of the invention, if they are within the spirit and the tenor of the accompanying claims.

We claim:

1. Apparatus for rolling and compressing a flexible, compressible strip, said apparatus comprising an endless belt, a portion of said belt defining a loop, means for feeding an end of the strip into the loop, means for moving said belt, means for placing said belt under tension to place the strip in compression as it is rolled in the loop, means for discharging the rolled strip from said loop by straightening said loop after the strip is rolled up, and means associated with said moving means for substantially disengaging said moving means from said belt when the rolled strip is being discharged.

2. Apparatus according to claim 1 characterized by said belt moving means comprises a drive roll engageable with said belt adjacent the opening of said loop and on the upstream side of said loop.

3. Apparatus according to claim 2 characterized by said disengaging means comprises a pinch roll, and means for moving said pinch roll toward and away from said drive roll with said belt being disposed therebetween.

4. Apparatus according to claim 1 characterized further by a plurality of supporting rolls disposed generally under said loop to support the loop and the strip therein as the loop expands.

5. Apparatus according to claim 4 characterized by belt means carried by said supporting rolls and movable in the same direction as the lower portion of said loop.

6. Apparatus according to claim 1 characterized by said discharging means comprises a pivotable frame carrying a portion of said belt and said belt moving means.

7. Apparatus according to claim 6 characterized by a slack control roll carried by said pivotable frame, and means for moving said slack control roll outwardly from said pivotable frame to reduce the slack in the loop of the belt as the pivotable frame is opened.

8. Apparatus according to claim 1 characterized by a float roll positioned above the loop and engageable therewith as the loop increases in size, and means for

controlling the amount of pressure applied to the loop by said float roll.

9. Apparatus according to claim 8 characterized by at least one additional float roll positioned adjacent and in parallel relationship with the first float control roll.

10. Apparatus according to claim 1 characterized by means for applying a length of tape to a trailing end of the strip with the tape extending substantially beyond the trailing end, as the trailing end approaches the loop.

11. Apparatus for rolling and compressing a flexible, compressible strip into a roll, said apparatus comprising an endless belt, means for supporting and driving said belt in a manner to define a loop therein, means for feeding an end of the strip into the loop, means for discharging the rolled strip from said loop after the strip is rolled up, means for placing said belt under increasing tension to supply greater pressure to the strip being rolled as the loop increases in size, said tension means comprises at least two stationary rolls, an intermediate, take-up roll positioned therebetween and movable toward and away from said stationary rolls, said belt extending around one of said stationary rolls, around said take-up roll, and around the other of said stationary rolls, means for urging said take-up roll in a direction away from said stationary rolls, said urging means comprising a first elongate, flexible member connected with said take-up roll, circular means spaced from said take-up roll around which a portion of said flexible member is wrapped, means for urging said circular means in a direction to wrap the flexible member thereon, said last-named means comprising a shaft, means connected with said shaft for engaging said circular means, tensioning means mounted on said shaft in an eccentric manner, a second flexible member wrapped on said tensioning means, and means for placing said second flexible member under tension resulting in a force on said first elongate flexible member which is insufficient to prevent movement of said take-up roll toward said stationary rolls as the loop increases in size, the eccentric mounting of said tensioning member causing the distance from the tangential point of departure of said second flexible member to said shaft to increase as said take-up roll moves toward said stationary rolls.

12. Apparatus according to claim 11 characterized by said means for placing said second flexible member under tension comprising a fluid-operated cylinder having a piston rod connected to said second flexible member.

13. Apparatus according to claim 11 characterized by a gear mounted on said shaft and rotatable therewith and a second gear connected and rotatable with said circular means and meshing with said first gear.

14. Apparatus according to claim 11 characterized by said means for supporting and guiding said belt comprises a drive roll engageable with the belt adjacent the opening of the loop.

15. Apparatus according to claim 14 characterized by a pinch roll, and means for moving said pinch roll toward and away from said drive roll with said belt being positioned between them.

16. Apparatus according to claim 11 characterized by said discharging means comprises a pivotable frame carrying a portion of said belt, and means for pivoting said pivotable frame when the strip is rolled up.

17. Apparatus according to claim 11 characterized by a float roll positioned above the loop and engageable therewith as the loop increases in size, and means

for controlling the amount of pressure applied to the loop by said float roll.

18. Apparatus according to claim 11 characterized by means for applying a length of tape to a trailing end of the strip with the tape extending substantially beyond the trailing end, as the trailing end approaches the loop.

19. Apparatus for rolling and compressing a flexible, compressible strip, said apparatus comprising a belt, a portion of said belt defining a loop, means for feeding an end of the strip into the loop, means for placing said belt under tension, means for moving said belt, means for discharging the rolled strip from said loop after the strip is rolled up, means for applying a length of elongate, flexible material to the other end of the strip prior to the other end entering said belt loop, with the elongate flexible material extending substantially beyond the other end, said means for feeding an end of the strip into the loop comprises a conveyor, and said applying means comprises means for placing a portion of the elongate, flexible material on said conveyor prior to the other end of the strip passing beyond said conveyor.

20. Apparatus according to claim 19 characterized by said elongate, flexible material being a tape fed with an adhesive side facing upwardly, and means for activating the adhesive prior to feeding the tape onto said conveyor.

21. Apparatus according to claim 20 characterized by said means for activating the adhesive comprises bristles having lower ends in contact with the adhesive side of the tape, and means for applying water to said bristles.

22. Apparatus according to claim 21 characterized by said water applying means comprises a spray head.

23. Apparatus according to claim 19 characterized by means for increasing the tension on said belt as the size of the loop increases.

24. Apparatus for rolling and compressing a flexible, compressible strip, said apparatus comprising an endless belt, a portion of which defines an open loop, means for feeding an end of the strip into the loop, means for moving said belt, said moving means being positioned adjacent the opening of the loop and on the upstream side thereof, means for placing said belt under tension to place the strip in compression as it is rolled in the loop, means for discharging the rolled strip from said loop by straightening said loop after the strip is rolled up, and means associated with said moving means for reducing the rate of movement of said belt by said moving means when the rolled strip is being discharged.

25. Apparatus according to claim 24 characterized by said belt moving means comprises a drive roll engageable with said belt.

26. Apparatus for rolling and compressing a flexible, compressible strip, said apparatus comprising an endless belt, a portion of which defines a loop, means for feeding an end of the strip into the loop, means for moving said belt, means for placing said belt under tension to place the strip in compression as it is rolled in the loop, means for discharging the rolled strip from said loop by straightening said loop after the strip is rolled up, and a plurality of supporting rolls disposed generally under said loop to support the loop and the strip therein as the loop expands.

27. Apparatus according to claim 26 characterized by belt means carried by said supporting rolls and mov-

able in the same direction as the lower portion of said loop.

28. A method for rolling, compressing, and packaging a flexible, compressible, elongate body, said method comprising moving said elongate body in a path parallel to its longitudinal extent, directing a forward end of said elongate body into a confined zone of generally circular transverse cross section, wrapping the forward end of said elongate body into a spiral while placing pressure on the entire portion of the outer surface of said elongate body which is in said zone except for that portion of the zone where the elongate body enters, and continuing to wrap the body into the spiral configuration while placing pressure sequentially on the portions of the outer surface of said body within said zone at least until the other end of said elongate body enters said zone.

29. A method according to claim 28 characterized further by applying a packaging material around the final portion of the outer surface of said body within said zone prior to releasing the wrapped body from said zone.

30. Apparatus for rolling and compressing a flexible, compressible strip, said apparatus comprising an endless belt, a portion of which defines an open loop, means for feeding an end of the strip into the loop, means for moving said belt, means for placing said belt under tension to place the strip in compression as it is rolled in the loop, means for discharging the rolled strip from said loop by straightening said loop after the strip is rolled up, and said means for feeding an end of a strip into a loop comprises a conveyor located below the strip and a guide plate located above said conveyor for aiding in directing the forward end of the strip into the loop, the edge of said plate away from said loop being adjustable in a direction toward and away from said conveyor.

31. Apparatus for rolling and compressing a flexible, compressible strip, said apparatus comprising a belt, a portion of said belt defining a loop, means for feeding an end of the strip into the loop, means for placing said belt under tension, means for moving said belt, means

for discharging the rolled strip from said loop after the strip is rolled up, means for applying a length of elongate, flexible material to the other end of the strip prior to the other end entering said belt loop, with the elongate, flexible material extending substantially beyond the other end, said means for moving said belt comprises a drive roll engagable with said belt adjacent the opening of said loop and on the upstream side thereof, a pinch roll adjacent said drive roll, and means for moving said pinch roll toward and away from said drive roll with the belt disposed therebetween.

32. Apparatus for packaging a flexible, elongate strip of insulating material, said apparatus comprising an endless belt, a portion of which defines a loop, a conveyor for carrying the elongate strip in a longitudinal direction into said loop, means for feeding a length of tape having an adhesive side facing upwardly along with said conveyor and into contact with the lower surface of said elongate strip toward the trailing end thereof, means for activating the adhesive prior to feeding the tape into contact with the trailing end of the elongate strip, and means for releasing said tape when a portion thereof extends substantially beyond the trailing end of said elongate strip.

33. Apparatus for rolling and compressing flexible, elongate strips in side-by-side relationship, said apparatus comprising an endless belt, a portion of which defines an open loop, means for substantially simultaneously feeding ends of adjacent strips in side-by-side relationship into said loop, means for moving said belt, means for placing said belt under tension to place the strips in compression as they are rolled into the loop, means for substantially simultaneously discharging the rolled strips from said loop by straightening said loop after the strips are rolled up, a restriction plate located adjacent each opposite edge portion of said belt which defines the loop to restrict transverse movement of the outer ones of said strips as they are being rolled, said plate being of a size at least substantially equal to said loop at the time the rolled strips are completed.

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