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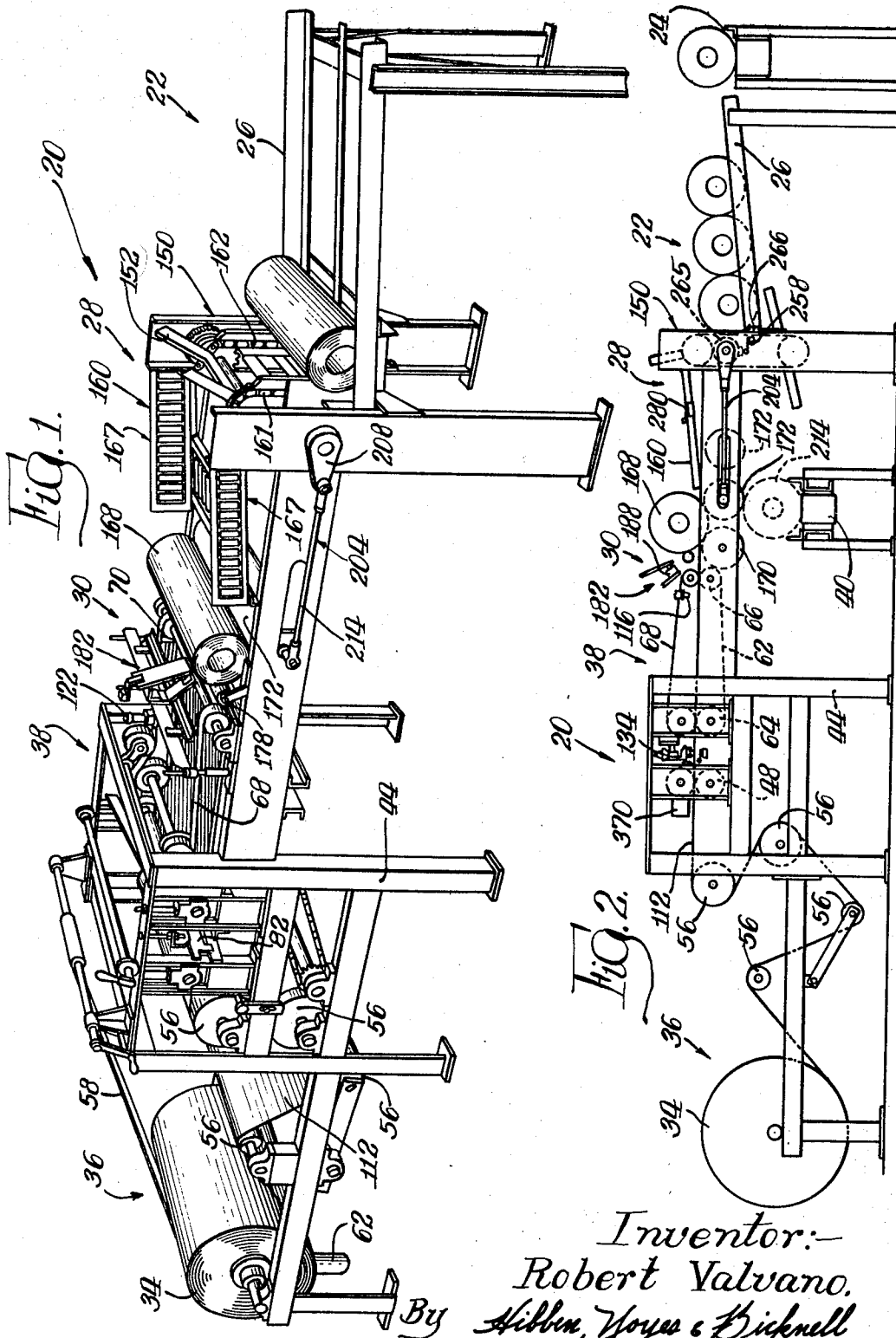
R. VALVANO

3,494,095

ROLL WRAPPING MACHINE AND METHOD

Filed Aug. 15, 1967

8 Sheets--Sheet 1



Inventor:-
Robert Valvano.
Hibben, Voyce & Bicknell
Attys.

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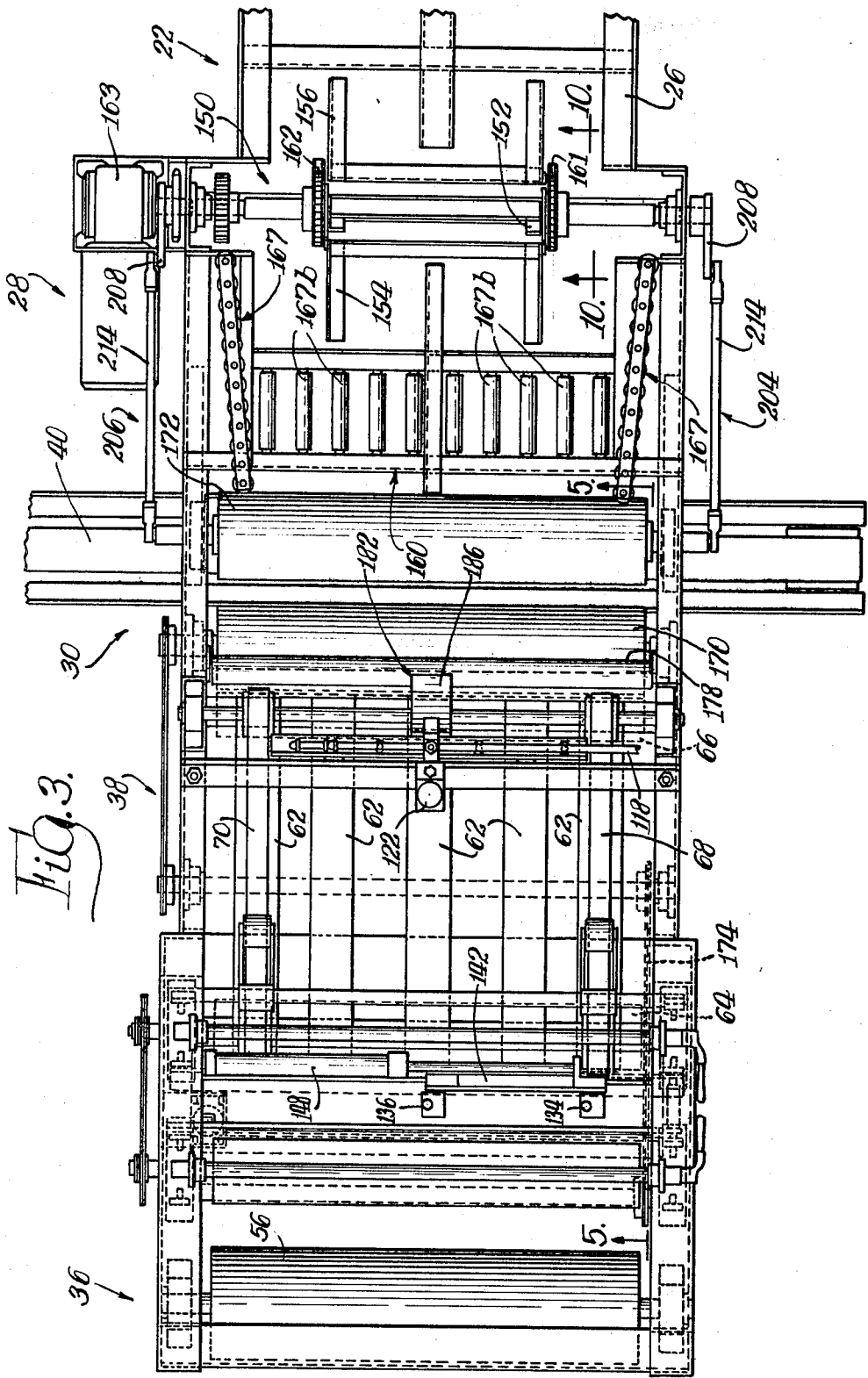
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ROLL WRAPPING MACHINE AND METHOD

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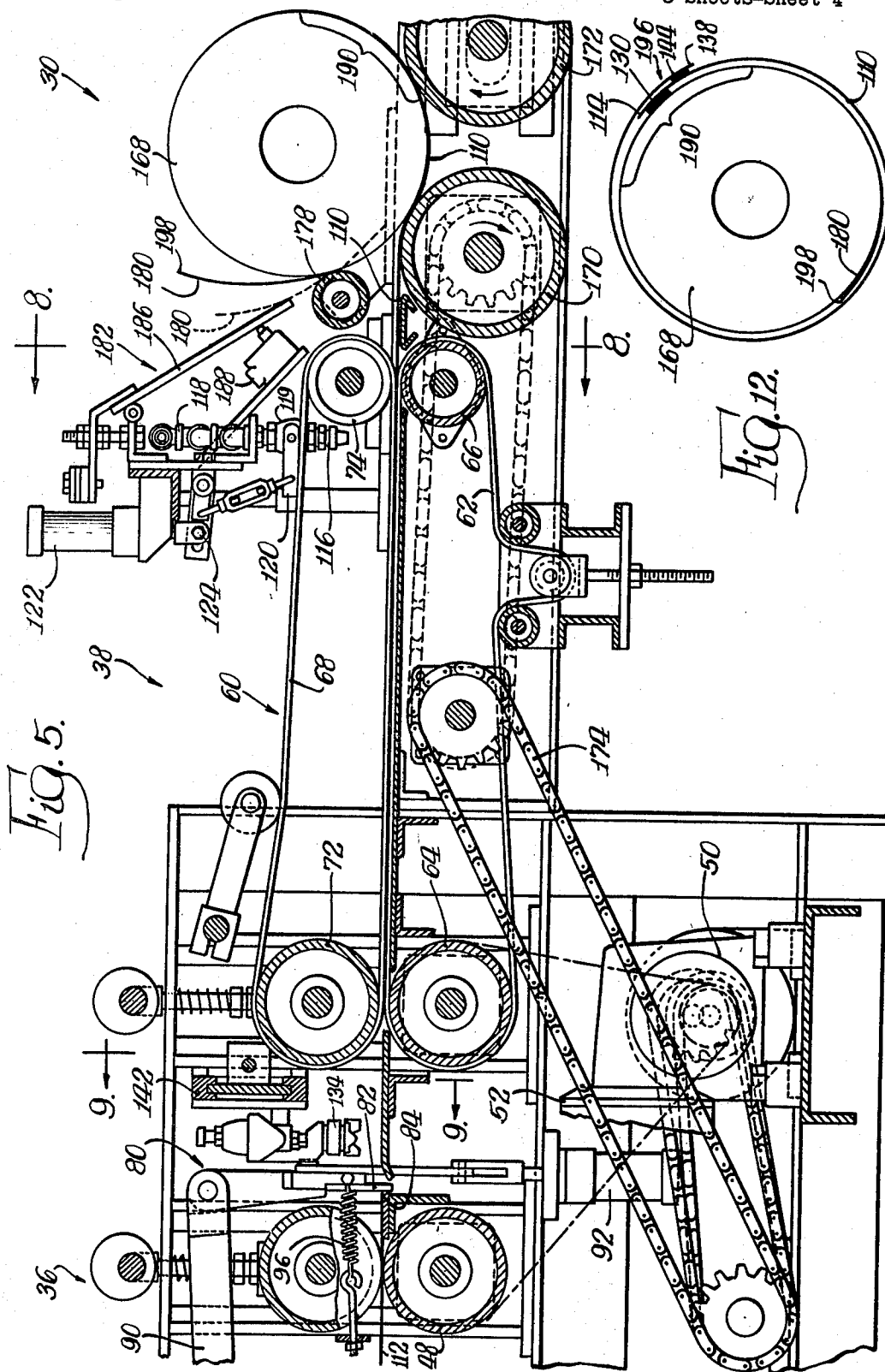
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ROLL WRAPPING MACHINE AND METHOD

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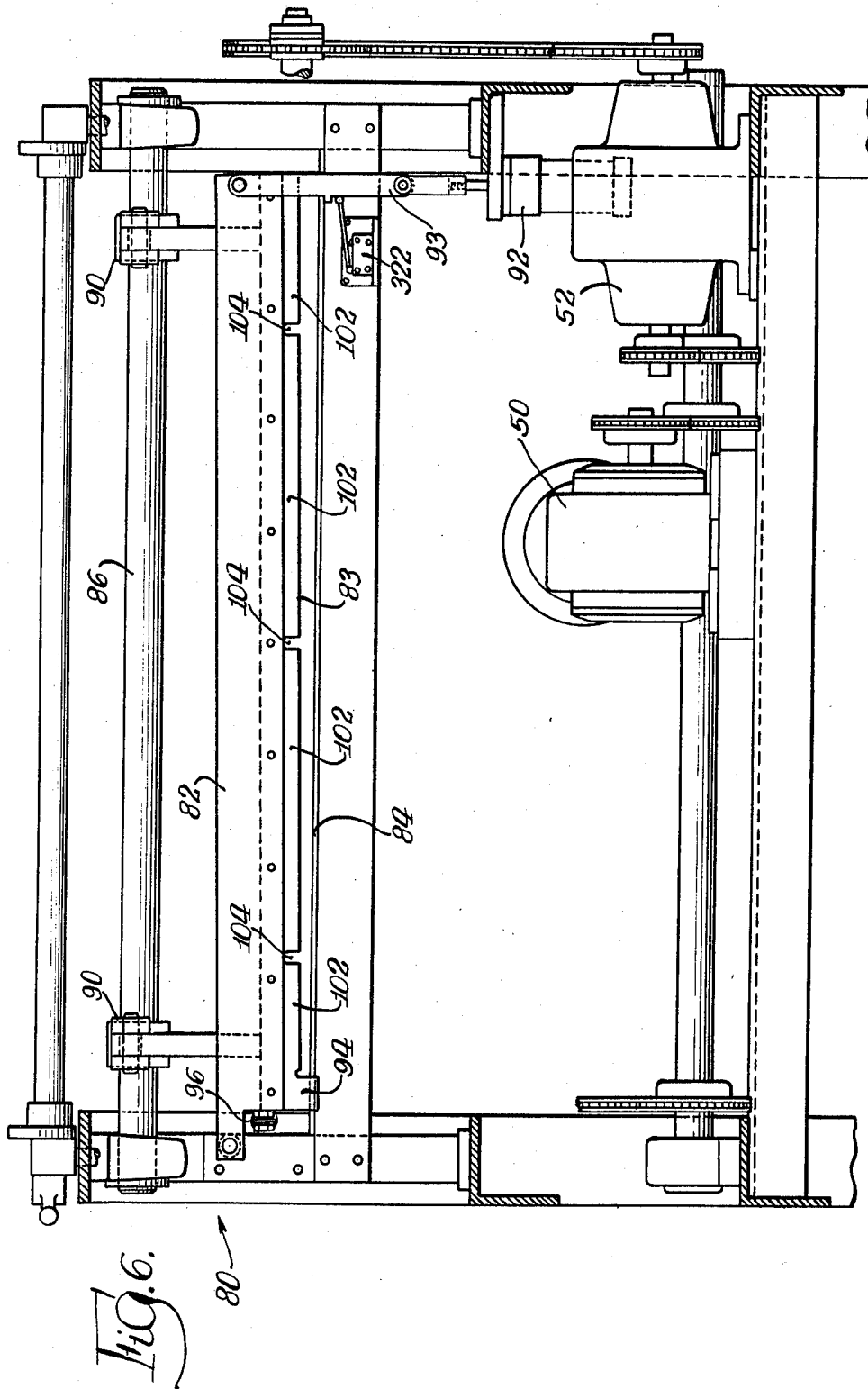
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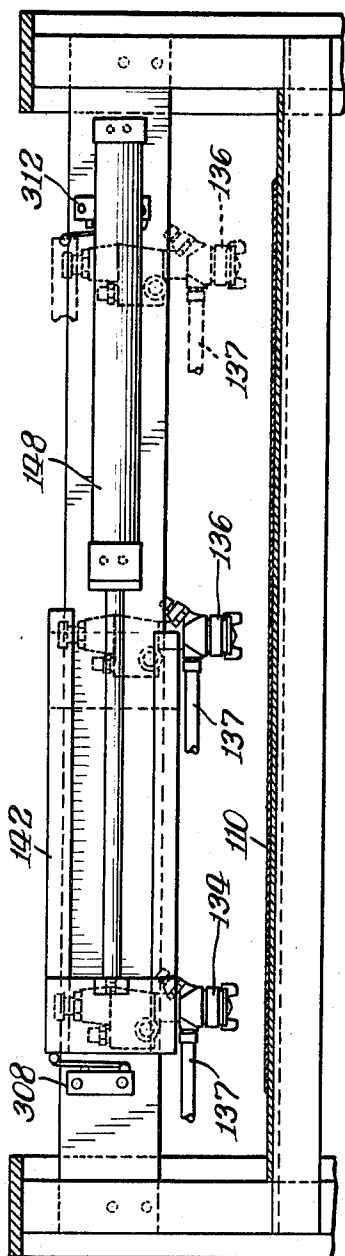


Fig. 9.

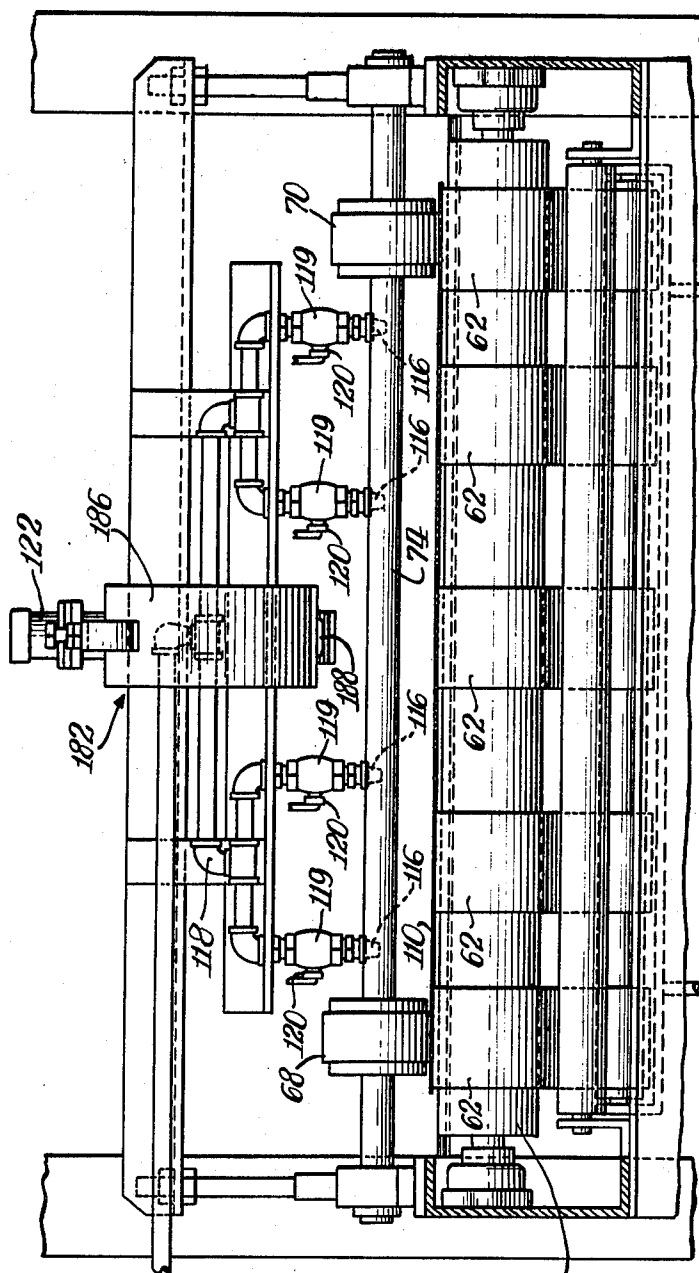


Fig. 8.

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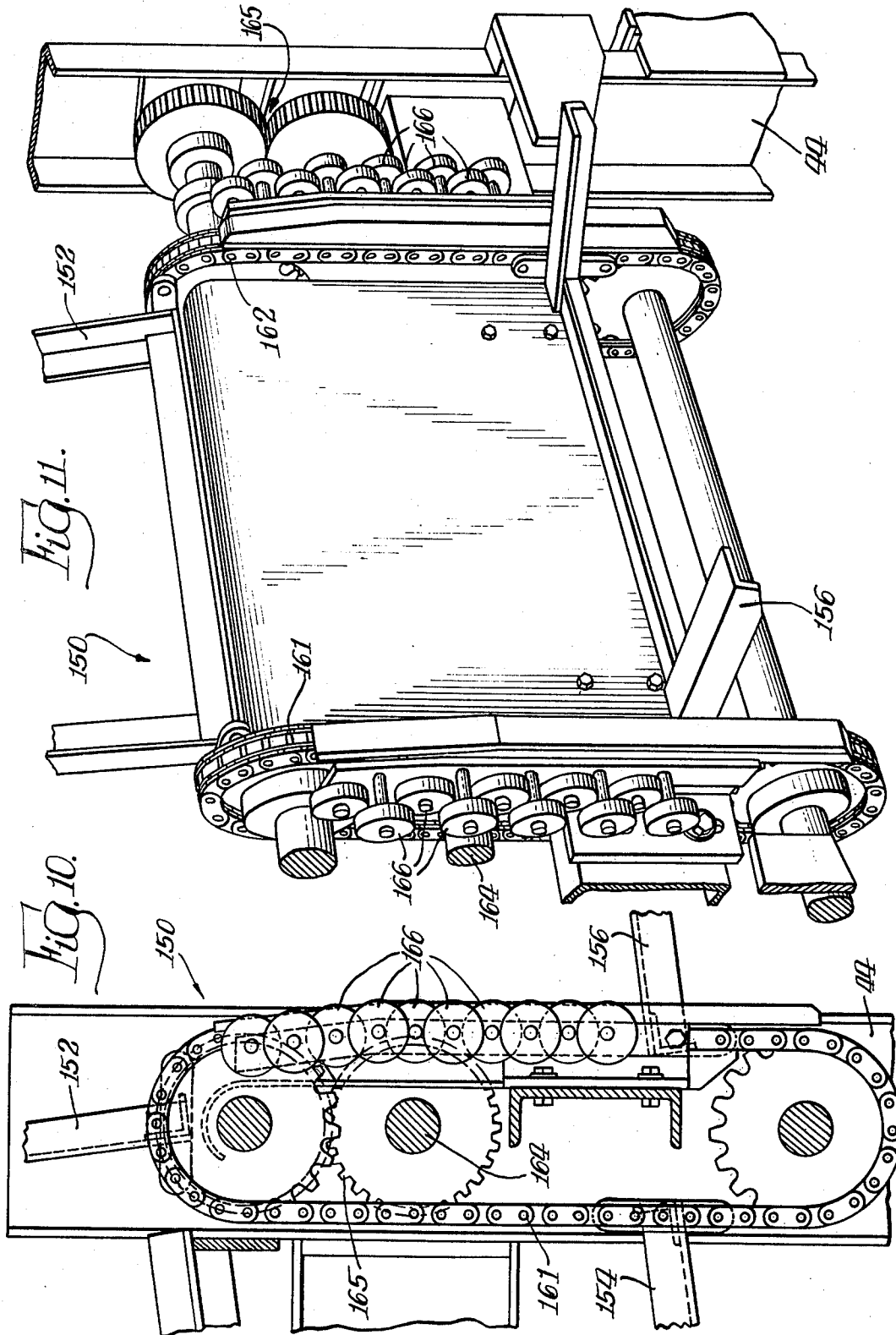
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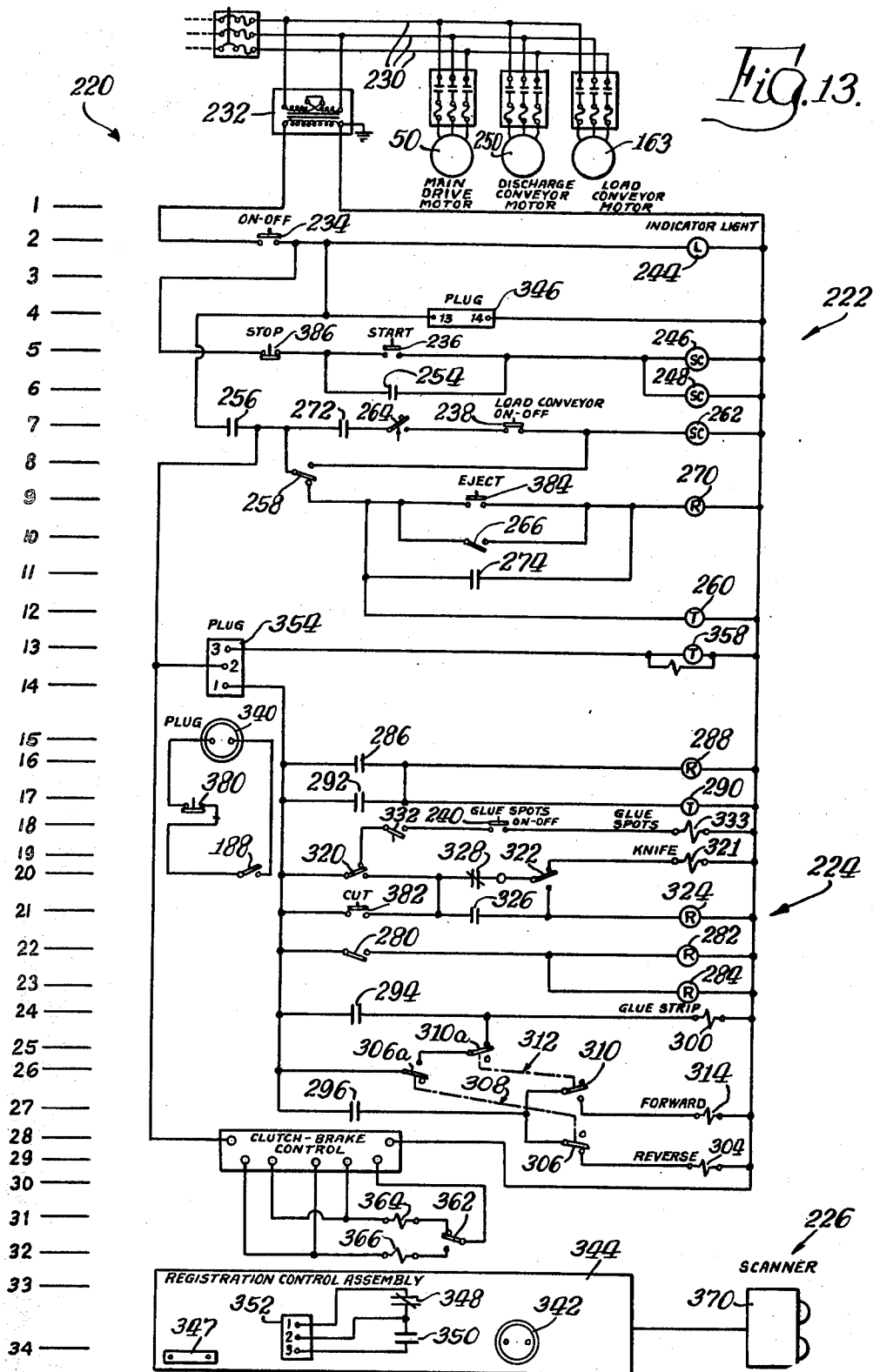
R. VALVANO

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ROLL WRAPPING MACHINE AND METHOD

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3,494,095

ROLL WRAPPING MACHINE AND METHOD
Robert Valvano, Cincinnati, Ohio, assignor to Reichel & Drews, Inc., Chicago, Ill., a corporation of Illinois
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Int. Cl. B65b 11/10, 51/02, 61/28
U.S. Cl. 53—32 34 Claims

ABSTRACT OF THE DISCLOSURE

Disclosed herein is a machine for wrapping rolls of roofing and other stiff materials having outwardly projecting end flaps. The machine includes a conveyor for transporting the rolls of material in succession to a wrapping station. Each roll of material is rotated at the wrapping station to actuate a sensor switch with the outwardly projecting end flap. A section of wrapping paper is then attached to the roll of material at an area substantially opposite from the outwardly projecting flap and wrapped around the roll of material.

Rolls of roofing paper and other relatively stiff materials are difficult to wrap due to the outer end of flap of the roll. The outer end of flap of a roll of stiff material tends to separate or unwind from the main body of the roll. When the roll is being wrapped, this outwardly projecting flap must be pressed against the main body of the roll to form a compact package. If one end of a place of wrapping paper is attached to the flap the paper is usually pulled loose from the flap or torn by the force required to pull or bend the flap into engagement with the main body of the roll. Of course, once the end of the wrapping paper has pulled loose from the roll, the wrapping paper cannot be pulled taut around the roll.

The previously described difficulty in wrapping rolls of stiff material slows the production of the wrapped rolls of material and increases the cost of the material. Therefore, it is an object of this invention to provide a machine and method for quickly and economically wrapping rolls of stiff material.

Another object of this invention is to provide a machine for attaching an end of a sheet of wrapping material to a roll of material at an area opposite to the outer end or flap of the roll of material.

Another object of this invention is to provide a machine for cutting wrapping paper into sections of a predetermined length, applying adhesive to opposite ends of these sections of wrapping paper, attaching one end of a section of wrapping paper to a roll of stiff material, wrapping the section of wrapping paper around the roll of stiff material and securing a second end of the section of wrapping paper against movement relative to the roll of material.

These and other objects and features of the invention will become more apparent upon a consideration of the following detailed description taken in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of a machine for wrapping rolls of material;

FIG. 2 is a schematic elevational illustration of the roll wrapping machine of FIG. 1;

FIG. 3 is an enlarged plan view of a portion of the roll wrapping machine of FIG. 1;

FIG. 4 is an elevational view of the portion of the roll wrapping machine shown in FIG. 3;

FIG. 5 is an enlarged sectional view, taken along the line 5—5 of FIG. 3, illustrating the wrapping of a roll of material with the roll wrapping machine of FIG. 1;

FIG. 6 is an enlarged sectional view, taken along the

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line 6—6 of FIG. 4, illustrating a knife assembly for cutting wrapping material into sections;

FIG. 7, on sheet 3 of the drawings, is a schematic illustration of the application of adhesive to a section of the wrapping material;

FIG. 8 is an enlarged sectional view, taken along the line 8—8 of FIG. 5, illustrating the structure of applicators or nozzles for applying adhesive to a leading end portion of a section of wrapping material;

FIG. 9 is an elevational view, taken along the line 9—9 of FIG. 5, illustrating applicators or guns for applying adhesive to a trailing edge portion of a section of wrapping material;

FIG. 10 is an enlarged sectional view, taken along the line 10—10 of FIG. 3, illustrating the structure of an elevator for loading rolls of material;

FIG. 11 is a perspective view of the elevator of FIG. 10;

FIG. 12, on sheet 4 of the drawings, is a schematic illustration on an exaggerated scale of a wrapped roll of material; and

FIG. 13 is a schematic illustration of a control circuit for the roll wrapping machine of FIG. 1.

GENERAL DESCRIPTION

Briefly described, this invention relates to a machine and method for wrapping rolls of relatively stiff material having resiliently outwardly projecting end flaps, such as rolls of roofing material. The rolls of material are transported one at a time to a wrapping station where the rolls are rotated on a pair of rollers. As each roll of material is being rotated, the outwardly projecting relatively stiff end flap actuates a sensor assembly. A section of wrapping paper, or other material, having adhesive on a leading end portion is then moved into engagement with the rotating roll of material at an area which is substantially opposite from an outer edge of the end flap. As the roll of material continues to rotate, the end flap is pressed inwardly and the wrapping paper is wound tautly around the roll of material to hold the end flap in engagement with the main body of the roll of material. A trailing end portion of the section of the wrapping paper is coated with an adhesive which secures the wrapping paper in place on the roll of material. After the roll of material has been wrapped, the rollers at the wrapping station are separated and the wrapped roll of material descends between the rollers to a conveyor.

A roll wrapping machine 20 embodying my invention is illustrated in FIG. 1 and is shown schematically in FIG. 2. Rolls of roofing paper or similar relatively stiff material are transported to a loading station 22 of the machine 20 by a supply conveyor, indicated schematically at 24 in FIG. 2. The rolls of material are moved from the supply conveyor 24 to a downwardly sloping supply or storage ramp 26 at the loading station 22. The rolls of material are then moved one at a time from the loading station 22 to a wrapping station 30 by a roll conveyor 28. At the wrapping station 30, the rolls of material are wrapped in sheets or sections of wrapping paper or other suitable material. The sheets of wrapping paper or other material are supplied from a roll 34 which is mounted at a wrapping paper supply station 36. The wrapping paper is conveyed from the wrapping paper supply station 36 to a wrapping paper preparation station 38 where the paper is cut into sections and adhesive is applied to opposite end portions of the sections. The prepared sections of wrapping paper are then moved to the wrapping station 30 where the leading end portions of the sections of paper are attached to predetermined surface areas of the rolls of material. After the rolls of material have been wrapped, they are discharged or ejected from the ma-

chine downwardly onto a wrapped roll or discharge conveyor 40 which is shown schematically in FIG. 2.

WRAPPING PAPER PREPARATION

The roll of wrapping paper 34 is rotatably mounted on the base frame 44 for the machine 20 to provide a supply of paper for wrapping the rolls of material. The wrapping paper is pulled from the roll 34 by a drive roller 48 (see FIGS. 2, 4 and 5) which is driven by a motor 50 through a commercially available brake and clutch assembly 52. A plurality of idler rollers, indicated generally at 56 in FIGS. 1 and 2, are provided for taking up slack in the web of wrapping paper extending from the roll 34 to the paper preparation station 38. A friction brake, consisting of a flexible band 58 and counterweight 62 (see FIG. 1), is provided for retarding rotation of the roll 34 of wrapping paper.

The wrapping paper is conveyed from the wrapping paper preparation station 38 to the wrapping station 30 by a wrapping paper conveyor assembly 60 (FIGS. 4 and 5). The wrapping paper conveyor assembly 60 includes a plurality of base or bottom drive belts 62 mounted on rollers 64 and 66 and a pair of upper or top belts 68 and 70 which are mounted on rollers 72 and 74 (see FIGS. 3, 4, 5 and 8). The base belts 62 and rollers 64 and 66 support the wrapping paper at the wrapping paper preparation station 38 and are driven by the motor 50 through the brake and clutch assembly 52 (see FIGS. 4 and 5). The base belts 62 move the wrapping paper forwardly from the wrapping paper supply station 36 to the wrapping paper preparation station 38 and then into engagement with a roll of material at the wrapping station 30.

The long continuous web of wrapping paper from the roll 34 is cut into sections of a predetermined length by a knife assembly 80 at the wrapping paper preparation station 38 (see FIGS. 5 and 6). The knife assembly 80 cuts the wrapping paper into sections which are long enough to circumscribe a roll of material with an overlapping of opposite end portions of the sections of wrapping paper. The knife assembly 80 (see FIG. 6) includes a vertically movable blade 82 having a segmented, sloping cutting edge 83 which cooperates with a fixed horizontally disposed blade 84. The movable blade 82 is mounted on a rocker shaft 86 by arms 90. An air cylinder 92 is connected to the movable blade 82 by a linkage 93 and pulls the movable blade 82 downwardly from the raised or normal position shown in FIG. 6 across the fixed blade 84 in a scissor action to cut the wrapping paper. The movable blade 82 is initially guided in this downward movement by a depending guide flange or leg 94 (FIG. 6) which engages the fixed blade 84. A spring 96 (see FIG. 5) is attached to one end of the movable blade 82 and pulls the movable blade toward the fixed blade 84 to maintain continuous engagement between the blades during the downward cutting stroke of the movable blade 82.

The movable knife blade 82 includes a plurality of cutting sections 102 which are separated by generally V-shaped recess 104 so that the wrapping paper is only partially cut by a plurality of perforations or slots 108 (see FIG. 7) at the trailing end of a section 110 of the wrapping paper. Since the wrapping paper is merely perforated at 108, rather than being completely severed, the section 110 remains connected to the main web 112 of wrapping paper. Therefore, the section 110 guides the main web 112 of wrapping paper into engagement with the drive belts 62, 68 and 70 of the wrapping paper conveyor assembly 60 as the section 110 is moved to the wrapping station 30 by the wrapping paper conveyor

assembly. Adhesive is applied to a forward end portion 114 of the section 110 of wrapping paper by a plurality of applicator nozzles 116 (see FIGS. 5, 7 and 8) to enable the forward end portion of the section of wrapping paper to ad-

here to the outer surface of a roll of material. The applicator nozzles 116 are connected to a source of adhesive under pressure by pipes or conduits 118. The flow of adhesive through applicator nozzles 116 is controlled by valves 119 which are mounted immediately upstream from the nozzles. Lever arms 120 are connected to these valves to enable them to be actuated by the operation of an air cylinder 122 which is connected to the lever arms 120 by a linkage 124 (see FIG. 5). The applicator nozzles 116 deposit adhesive in discrete bodies or dots 130 on the leading end portion 114 of the section 110 of wrapping paper (see FIG. 7). These discrete bodies or dots 130 of adhesive are raised above the surface of the section 110 of wrapping paper to facilitate engaging a roll of material at the wrapping station 30.

A pair of applicator guns or nozzles 134 and 136 are provided for applying adhesive to an opposite or trailing end portion 138 of the section 110 of wrapping paper (see FIGS. 5, 7 and 9). The applicator guns 134 and 136 are connected to a source of adhesive under pressure by flexible hoses 137 and are mounted on a carriage 142 for movement from the position shown in solid line in FIG. 7 to the position shown in dashed lines in FIG. 7 and back again. During this movement the guns 134 and 136 apply a band or strip 144 of adhesive to the trailing end portion 138 of the section 110 of wrapping paper. A pneumatic cylinder assembly 148 reciprocates the carriage 142 to move the guns from right to left to apply adhesive to one section 110 of wrapping paper and then from left to right to apply adhesive to a next succeeding section of wrapping paper. The two guns 134 and 136 each apply adhesive to one-half of the trailing end portion 138, that is the gun 134 applies adhesive to the left half of the section 110, as seen in FIG. 7, while the gun 136 applies adhesive to the right half of the section of wrapping paper. Thus, at the wrapping paper preparation station 38 sections 110 of wrapping paper are partially cut from the main web 112 of wrapping paper by the perforations 108 and adhesive is applied to the leading and trailing end portions 114 and 138 of the sections 110 by applicator guns or nozzles 116, 134 and 136. These prepared sections of wrapping paper will be wound or wrapped around rolls of material at the wrapping station 30.

The rolls of material are initially received at the loading station 22 on the supply ramp 26. The rolls are lifted upwardly, one at a time, from the supply ramp 26 by an elevator 150. The elevator 150 (see FIGS. 3, 4, 10 and 11) includes a plurality of sets of outwardly projecting arms 152, 154 and 156 which engage rolls of material on the ramp 26 to lift the rolls upwardly onto a loading ramp 160 (see FIGS. 1 and 2). The arms 152 through 156 are mounted on endless chains 161 and 162 which are driven by a motor 163 (FIG. 3) having a shaft 164 (FIG. 11) connected to a gear drive train 165. When a roll of material is positioned on the loading ramp 160 by one of the sets of arms 152 through 156, a next succeeding roll on the supply ramp 26 is engaged by the next succeeding set of arms. Thus, when the set of arms 152 is at the top of its travel and is positioned to locate a roll of material on the loading ramp 160, the set of arms 156 will be positioned to engage a next succeeding roll of material on the supply ramp 26. During this upward movement the rolls of material are also engaged at their ends by a plurality of guide wheels or rollers 166 (FIG. 11) which are mounted on opposite sides of the elevator 150. The guide rollers 166 prevent the end flaps of the rolls of material from catching and being torn as the rolls are lifted upwardly.

Each roll of material must be centered at the wrapping station 30 in order to position the section 110 of wrapping paper relative to opposite ends of the roll of material. A pair of inwardly converging side assemblies 167 having vertically extending rollers 167a are provided for centering the roll of material as it descends down the loading ramp 160. A plurality of rollers 167b extend

longitudinally of the loading ramp 160 to facilitate transverse movement of the roll of material under the influence of the side assemblies 167.

WRAPPING OF ROLLS OF MATERIAL

A roll of material, indicated at 168, is both supported and rotated at the wrapping station 30 on a pair of cylindrical rollers or drums, that is a drive roller 170 and an idler roller 172 (see FIGS. 4 and 5). The drive roller 170 is driven by the motor 50 through a chain drive 174 to rotate the roll of material 168. The roll of material 168 is rotated in a counterclockwise direction by clockwise rotation of the drive roller 170; as viewed in FIGS. 4 and 5. The idler roller 172 is rotated in a clockwise direction by the counterclockwise rotation of the roll of material 168. A stop roller 178 is also mounted at the wrapping station 30 to hold the roll of material 168 against forward movement as it is rotated in a counterclockwise direction by the drive roller 170.

As the roll of material 168 is rotated, an outwardly projecting end flap or tail section of the roll of material, indicated at 180 in FIG. 5, engages a position sensor assembly 182. The sensor assembly 182 is actuated by the outwardly projecting end flap 180 of the roll of material 168 when the roll of material is in a predetermined location or rotary position relative to the sensor assembly, that is when the roll is located with the end gap 180 in the position indicated in dashed lines in FIG. 5. When the roll of material 168 is in this actuating position, a lever or paddle 186 of the sensor assembly 182 is pressed downwardly against a sensor switch 188 to actuate the switch. Actuation of the sensor switch 188 energizes control circuitry, hereinafter described, which starts the wrapping paper conveyor assembly 60 after a short predetermined period of time has elapsed. This predetermined period of time is sufficient to enable the roll of material to be rotated to locate an outer surface area 190 of the roll of material 168 adjacent to the end of the wrapping material conveyor assembly 60 and the drive roller 170, as shown in FIG. 4. When the roll of material is so positioned, the leading end portion 114 of a section 110 of wrapping paper is moved into engagement with the surface area 190 of the counterclockwise rotating roll of material 168 and the outer surface of the clockwise rotating drive roller 170 to pull the section of wrapping paper toward the wrapping station 30. Further rotation of the roll of material presses the adhesive dots 130 on the leading end portion 114 of the section 110 of wrapping paper against the surface area 190 of the roll of material 168. This pressing action results from the downward weight of the roll of material on the drive roller 170 and the idler roller 172 and securely attaches the section of wrapping paper to the roll of material.

After the leading end 114 has been securely attached to the roll of material 168, the rotation of the roll of material is continued at a relatively high rate of speed by the drive roller 170 while the wrapping paper conveyor assembly 60 is operated at a relatively low rate. The roll of material 168 and drive roller 170 will both have a linear speed at their peripheries which exceed the speed at which the wrapping paper conveyor assembly 60 transports the wrapping paper. Therefore, the roll of material 168 pulls the section 110 of wrapping paper from the wrapping material conveyor assembly 60 and the main web 112 of wrapping paper. This pulling action severs or tears the section 110 of wrapping paper from the main web 112 of wrapping paper at the perforations 108 which were previously cut by the knife assembly 80 (see FIG. 7). The pulling or tearing loose of the section 110 from the main web 112 of wrapping paper pulls the main web of wrapping paper past the knife assembly 80 and into the wrapping paper conveyor assembly 60 to insure a proper feeding of the wrapping paper by the wrapping paper conveyor assembly 60. In addition, the pulling of section 110 of wrapping paper from the wrap-

ping paper conveyor assembly 60 pulls the section of wrapping paper taut as it is wound around the roll of material 168.

As the rotation of the roll of material 168 is continued, the flap 180 is again pressed radially inwardly by the roller 170 (see FIG. 5). The section 110 of wrapping paper will also be pressed radially inwardly with the flap 180 by the drive roller 170 to form a compact roll of material. Still further rotation of the roll of material overlaps the trailing end portion 138 of the section 110 of wrapping paper with the leading end portion 114 of the section wrapping paper to form a joint 196 (see FIG. 12). The roll of material 168 is now completely circumscribed by the wrapping paper, and the strip 144 of adhesive engages an outer surface of the section 110 of wrapping paper to secure the trailing end portion 138 to the leading end portion 114 of the section 110 of wrapping paper to hold the section 110 against movement relative to the roll of material 168.

The area 190 of the roll of material 168, to which the leading end portion 114 of the section 110 of wrapping paper is attached, is spaced from an outer end or edge 198 of the flap 180 for a distance which is sufficient to ensure that the joint 196 is not pulled apart by radially outward forces exerted by the resilient flaps 180 on the section 110 of wrapping paper. The area 190 is located substantially opposite from the edge 198 of the flap 180 to enable the position of the joint 196 to vary somewhat relative to the flap while still being spaced from the edge 198 of the flap. Also, by so locating the area of initial engagement of the section 110 of wrapping paper relative to the flap 180, the section of wrapping paper is securely attached to the roll of material 168 and is pulled tautly around the roll of material 168 as the roll is rotated. The weight of the roll of material 168 on the drive roller 170 and the idler roller 172 holds the section 110 of wrapping paper against movement relative to the roll of material when the wrapping paper is wrapped around the resiliently outwardly projecting end flap 180 of the roll of material 168. This holding action prevents the end flap 180 from pulling the leading end portion 114 of the section 110 of wrapping paper loose from the roll of material 168 as the end flap is wrapped. If the leading end portion 114 of the section 110 of wrapping paper was attached to the roll of material 168 at an area immediately adjacent to the outer edge 198 of the flap 180, the resilient spring force of the flap 180 would pull the adhesive 130 on the leading end portion 114 of the section of wrapping paper loose from the roll of material 168. Continued rotation of the roll of material 168 would then merely result in the wrapping paper being jammed up at the wrapping station 30 rather than being wound around the roll of material 168. Thus, by using the sensor assembly 182 to detect when the roll of material 168 is in a predetermined position at the wrapping station 30 and by attaching the leading end portion 114 of the section of wrapping paper 110 to the roll of material 168 at a predetermined area 190 substantially opposite from the outer edge 198 of the flap 180, the joint 196 is not subjected by the resilient flap 180 to radially outward forces tending to separate the joint 196. In addition, the section 110 of wrapping paper and the flap 180 are both pressed inwardly against the main body of the roll of material 168 by the drive roller 170 and idler roller 172 as the roll of material is being wrapped.

After the roll of material has been wrapped, as shown in FIG. 12, the idler roller 172 is pulled transversely away from the drive roller 170, from the position shown in solid lines in FIG. 2 to the position shown in dashed lines in FIG. 2, by a pair of crank assemblies 204 and 206 on opposite sides of the roll wrapping machine 20 (see FIGS. 1 and 3). This separation of the drive roller 170 and idler roller 172 enables the wrapped roll of material to descend between the rollers to the discharge conveyor 40. The crank assemblies 204 and 206 each include

a drive arm 208 which is driven by the motor 163 for the elevator 150. Connector links 214 are each attached at one end to the arms 208 and at an opposite end to the idler roll 172. When the elevator 150 is driven by the motor 163 to lift rolls of material upwardly onto the loading ramp 160, the crank arms 208 are rotated through one complete revolution. During the first half of a revolution, the crank arms 208 pull the idler roller 172 from the adjacent or operating position shown in solid lines in FIG. 2 to the separated or eject position shown in dashed lines in FIG. 2. During a second half of the revolution the crank arms 208 move the idler roller 172 back to the adjacent position shown in solid lines in FIG. 2. While the idler roller 172 is spaced apart from the drive roller 170, a roll of material at the wrapping station 30 will descend downwardly between the drive roller 170 and idler roller 172 onto the discharge conveyor 40, as indicated in dashed lines at 214 in FIG. 2. Since the crank assemblies 204 and 206 are driven by the elevator motor 210, the idler roller 172 is moved away from the drive roller 170 and back again each time a roll of material is lifted from the supply ramp 26 by the elevator 150 to discharge or eject a previously wrapped roll from the roll wrapping machine before a next succeeding roll of material is transported to the wrapping station 30.

Control Circuitry

A control circuit 220 for the roll wrapping machine 20 is illustrated schematically in FIG. 13. The control circuit 220 includes three interconnected subcircuits, that is a loading subcircuit 222 for controlling the conveying of rolls of material to the wrapping station 30, a paper preparation subcircuit 224 for controlling the cutting and applying of adhesive to the sections of wrapping paper at the wrapping paper preparation station 38, a wrapping paper feed subcircuit 226 for controlling both the conveying of prepared sections of wrapping paper to the wrapping station 30 and the conveying of paper to the wrapping paper preparation station 38. The three subcircuits 222 through 226 are supplied with power from lines 230 through a transformer 232. To facilitate locating the various components in the subcircuits 222 through 226, line identifying numerals are provided at the left of FIG. 13.

The operation of the roll wrapping machine 20 is started by actuation an on-off switch 234 (line 2), a start switch 236 (line 5), a load conveyor on-off switch 238 (line 7), and a glue spots on-off switch 240 (line 18). Closing the on-off switch 234 energizes an indicator light 244 (line 2) on a control panel of the machine. Closing the on-off switch 234 and the start switch 236 energizes a start coil 246 (line 5) for the main drive motor 50 (see FIGS. 4 and 6). A start coil 248 (line 6) is also energized to begin operation a motor 250 for the discharge conveyor 40. The start coils 246 and 248 are held energized over a circuit including normally open contacts 254 (line 6) which are associated with the start coil 246. Energization of the start coil 248 closes contacts 256 (line 7) to complete a circuit through a limit switch 258 (line 8) to a timer 260 (line 12). The timer 260 controls the energization of a start coil 262 (line 7) for the load conveyor motor 163 (FIG. 3) by means of contacts 264 (line 7).

The timer 260 insures, through the contacts 264, that a predetermined minimum time period elapses between the actuation of either the on-off switch 234 or the limit switch 258 and the energization of the load conveyor motor 210. This predetermined time period enables a preceding roll at the roll wrapping station 30 to be wrapped before the next roll is transported to the roll wrapping station. The limit switch 258 is mounted on the frame 44 and is actuated to reset the timer 260 each time a roll of material is lifted by the elevator 150. To this end a cam 265 is connected to the crank arms 208 of

the crank assemblies 204 and 206 (see FIGS. 1, 2 and 3) for operating the switch 258.

When the limit switch 258 is in its normal position, that is actuated by the nose of the cam 265, and a limit switch 266 (line 10 and FIG. 2) is closed by rolls of material on the supply ramp 26, a relay 270 (line 9) is energized to close contacts 272 and 274 (lines 7 and 11). Assuming that the predetermined time period has elapsed and the contacts 264 of the timer 260 are closed, closing the contacts 272 of the relay 270 energizes the start coil 262 for the motor 163. Energization of the motor 163 operates the elevator 150 to raise the next roll of wrapping material upwardly onto the loading ramp 160. As the elevator 150 begins its operation the nose of the cam 265 moves out of engagement with the limit switch 258 and the limit switch 258 is released to deenergize both the relay 270 and the timer 260 while maintaining the start coil 262 energized. The start coil 262 is energized through the limit switch 258 until the limit switch is again engaged by the nose of the cam 265. Thus, the crank assemblies 204 and 206 must make a complete cycle of operation so that the idler roller 172 is moved outwardly from the drive roller 170 to enable a preceding roll of material to descend downwardly onto the conveyor 40 before a next succeeding roll of material can be transported to the wrapping station 30. While the idler roller 172 is being moved apart from the drive roller 170, the elevator 150 is lifting the next roll of material upwardly to the loading ramp 160. When the roll of material has been lifted on the loading ramp 160, the nose of the cam 265 again actuates the limit switch 258 to complete the circuit for energizing the timer 260 and relay 270. The timer 260 then maintains the contacts 264 in an open condition for a predetermined time period so that the start coil 262 and motor 163 cannot be energized until sufficient time has elapsed to enable the roll of material which was just placed on the loading ramp 160 to be wrapped.

As the roll of material moves down the loading ramp 160 to the wrapping station 30 the roll of material actuates a limit switch 280 (line 22 and FIG. 2) to initiate energization of the paper preparation subcircuit 224 for controlling the cutting and applying of adhesive to the wrapping paper at the wrapping paper preparation station 38. Closing the limit switch 280 energizes relays 282 and 284 (lines 22 and 23) in the paper preparation subcircuit 224. Energizing the relay 282 closes normally open contacts 286 (line 16) to energize a timer relay 288 (line 16) and a timer 290 (line 17). The timer 290 is held energizing over contacts 292 (line 17) of the now energized timer relay 288. Energization of the relay 284 closes contacts 294 and 296 (lines 24 and 27) to initiate operation of the glue guns 134 and 136 (see FIG. 9).

Closing the contacts 294 energizes a solenoid 300 (line 24) for controlling the operation of an air valve to supply adhesive under pressure to the glue guns 134 and 136. Closing the contacts 296 completes a circuit through one of two limit switches to energize one of two solenoids to move the glue gun carriage 142 (FIG. 9) in either a forward or reverse direction. Assuming that the glue guns have been moved forward and that the circuit appears as shown in FIG. 13, a reverse solenoid 304 (line 29) is energized through closed contacts 306 of a limit switch 308 (line 28 and FIG. 9) to conduct air under pressure to the left end of the cylinder 148 to thereby move the carriage 142 in a reverse direction or toward the right as viewed in FIG. 9. It should be noted that the limit switch 308 will be released as soon as the carriage 142 begins its reverse movement (see FIG. 9) so that limit switch 308 is moved from the position shown in FIG. 13 and the solenoid 304 is deenergized. The switch 308 includes the sets of contacts, that is the contacts 306 (line 28) and contacts 306a (line 26). When the reverse movement of the carriage 142 is initiated, the contacts 306a are also moved from the position shown in FIG. 13 to maintain the solenoid 300 energized through the con-

tacts 306a. As the carriage 142 is moved in a reverse direction across the trailing end portion 138 of the wrapping paper section 110, the glue guns 134 and 136 apply a strip of adhesive to the wrapping paper. The glue gun 134 applies adhesive to one-half of the paper while the glue gun 136 applies adhesive to the other half.

As the forward movement of the roll of material down the supply ramp 160 continues, the limit switch 280 is released and the relays 282 and 284 are deenergized. Deenergization of the relay 284 opens the contacts 294 and 296. However, the solenoid 300 is maintained in an energized condition by the now actuated or closed contacts 306a of the limit switch 308. When the carriage 142 reaches the end of its reverse stroke, contacts 310 and 310a (lines 25 and 26) of a forward limit switch 312 (FIG. 9) are moved from the position shown in FIG. 13 by engagement of the carriage with the limit switch 312. Actuation of the contacts 310a deenergizes the solenoid 300 to stop the application of adhesive to the trailing end portion of the section 110 of wrapping paper. On the next cycle of operation, actuation of the limit switch 312 will enable a solenoid 314 (line 27) to be energized to operate an air valve to move the carriage 142 forward or toward the left as viewed in FIG. 9 to apply adhesive to the next succeeding section of wrapping paper. Thus, the limit switches 308 and 312 operate solenoids 304 and 314, and the associated air valves, to reciprocate the carriage 142 to alternate the direction in which the guns 134 and 136 move relative to successive sections of wrapping paper.

Contemporaneously with this operation of the glue guns 134 and 136, energization of the timer 290 operates timer contacts 320 (line 20) and energizes a solenoid 321 for operating an air valve for the cylinder 92 (line 19 and FIG. 6) to move the knife blade 82 downwardly to perforate the wrapping paper, as shown at 108 in FIG. 7. When the movable knife blade 82 reaches the end of its downward stroke a limit switch 322 (line 20 and FIG. 6) is operated to deenergize the solenoid 321. The actuation of the limit switch 322 energizes a relay 324 (line 21) to close contacts 326 and open contacts 328 (lines 20 and 21). Closing contacts 326 holds the relay 324 energized as long as the limit switch 320 is actuated. Opening the contacts 328 maintains the solenoid 321 in a deenergized condition so that a return spring in the air cylinder 92 can move the knife blade 82 upwardly to its normal position shown in FIG. 6.

Energization of the relay 288 (line 16) also closes contacts 332 (line 18) in a circuit for energizing a solenoid 333 for controlling the operation of the air cylinder 122 and the adhesive applicator nozzles 116 (see FIGS. 5 and 8). The solenoid 333 is energized when a predetermined time period has elapsed after the energization of the timer 290 and the contacts 320 of the timer are moved from the actuated position to the normal position shown in FIG. 13. When the contacts 320 are moved to their normal position the solenoid 333 is energized through the contacts 320, the contacts 332 (line 18) of the relay 288, and the closed manual switch 240. Energization of the solenoid 333, as previously explained, operates the cylinder 122 and valves 119 to apply dots 130 of adhesive to the forward end portion 114 of the section 110 of wrapping paper. Thus, actuation of the limit switch 280 by a roll of material moving down the loading ramp 160 initiates energization of the paper preparation subcircuit 224 to cut the wrapping paper into a section 110 by energizing the solenoid 321 to operate the knife assembly 80, and to apply adhesive to the opposite end portions of the section 110 with the applicators 116, 134 and 136 to prepare the section of wrapping paper to wrap the roll of material which previously actuated the limit switch 280.

The wrapping paper feed subcircuit 226 is energized next to operate the wrapping paper conveyor assembly 60 to thereby transport the prepared section 110 of wrapping paper forwardly into engagement with the roll of material which has just rolled down the loading ramp 160 to the

wrapping station 30. The roll of material is continuously rotated at the wrapping station 30 by the drive roller 170 so that the outwardly projecting end flap 180 on the roll actuates the sensor assembly 182 in the manner previously explained. When the sensor assembly 182 is actuated, the sensor switch 188 (line 20 and FIGS. 4 and 5) is opened. The sensor switch 188 is connected to a plug 340 (line 15) in a receptacle 342 of a registration control unit 344 (lines 33 and 34). The registration control unit 344 is well known per se, and in one embodiment of the invention an Electronic Machines Part, Inc., Registration Control model 104FC is used and is energized through a plug 346 (line 4) which is connected to a receptacle 347 (line 34). The registration control unit 344 includes a relay contacts 348 and 350 connected to a receptacle 352 (lines 33 and 34). The receptacle 352 is engaged by a plug 354 (lines 13 and 14). The relay in the registration control assembly 344 is operated, by an opening of the sensor switch 188, to open the contacts 348 between terminals 1 and 2 of the plug 354 and thereby deenergizes the relay 288 and the solenoid 333. In addition, when the relay in the registration control assembly 344 is operated the contacts 350 are closed to energize a timer 358 (line 13) which is connected to contact 3 of the plug 354. Thus, actuation of the sensor assembly 182 operates a relay in the registration control unit to deenergize the relay 288 and the solenoid 270 and to energize the timer 358.

Continued rotation of a roll of material moves the tail section 180 out of engagement with the sensor assembly 182 so that the sensor switch 188 returns to its normal or closed position. When the timer 358 reaches the end of a predetermined time period, corresponding to the time required for the surface area 190 of the roll of material 168 to move from the position shown in FIG. 5 to a position adjacent the end of the conveyor assembly 62, as shown in FIG. 4, contacts 362 (line 31) of the timer 358 are moved to an actuated position. When the timer contacts 362 are actuated, a solenoid 364 (line 30) for energizing the brake, in the brake and clutch assembly 52, is deenergized to release the wrapping paper conveyor assembly 60 and a solenoid 366 (line 32) for the clutch, in the brake and clutch assembly 52, is energized to engage the clutch. Engaging the clutch of the brake and clutch assembly 52 drives the wrapping paper conveyor assembly 60 to move the leading end portion of the section 110 of wrapping paper forwardly into engagement with the surface area 190 of the roll of material 168. (See FIGS. 4 and 5). The timer 358 can be adjusted to vary the time period between the actuation of the sensor assembly 182 and the operation of the conveyor assembly 60 with variations in the diameter of the roll of material being wrapped and the rate of rotation of the drive roller 170.

The clutch of the brake and clutch assembly 52 remains engaged until a photoelectric scanner unit 370 (lines 33 and 34 and FIGS. 2 and 7) detects the passage of an index mark 372 (see FIG. 7) on the wrapping paper. When the index mark 372 on the wrapping paper passes the scanner unit 370 the relay in the registration control unit 344 is again operated to return the relay in the registration control unit and the associated contacts 348 and 350 to their normal position, thereby deenergizing the timer 358. Deenergization of the timer 358 moves the contact 362 back to the normal position shown in FIG. 13 to energize the brake solenoid 364 and halt the movement of the wrapping paper. The index marks 372 on the wrapping paper are spaced apart a predetermined distance corresponding to the length of paper required to wrap the rolls of material. Thus, the wrapping paper conveyor assembly 60 is operated for a sufficient length of time to move the next succeeding section of wrapping paper to the wrapping paper preparation station 38 while the preceding section of wrapping paper is wound around a roll of material at the wrapping station 30. With rolls of relatively flexible material, the sensor switch 188 could be eliminated since the wrapping paper can initially engage any portion of

a roll of flexible material. It is contemplated that a timer would be used to control the operation of the wrapping material conveyor assembly 60 if the sensor switch was eliminated.

After the leading end portion 114 of the section 110 of wrapping paper has engaged the roll of material at the wrapping station 30, the rotation of the roll of material is continued to wrap the roll of material and to bring the trailing end portion 138 of the section 110 of wrapping paper into an overlapping relationship with the leading end portion 114. The strip of adhesive 144 is then pressed against the leading end portion 114 to hold the section 110 of the wrapping paper against movement relative to the roll. The rotation of the now wrapped roll of material is continued until the timer 260 times out or operates to close the contacts 264 (line 7) so that the start coil 262 and load conveyor motor 210 can be energized to operate the elevator 150 to thereby raise the next succeeding roll onto the load ramp 160. As the elevator 150 is operated, the crank assemblies 204 and 206 are also operated to move the idler roller 172 away from the drive roller 170 so that the now wrapped roll of material can descend between the drive roller 170 and idler roller 172 onto the conveyor 40.

The roll wrapping machine is initially started by actuating a manual feed switch 380 (line 17) which deenergizes the relay in the registration control unit 344 in the same manner as does the operation of the sensor switch 188. The wrapping paper is then fed forward in the roll wrapping machine 20 until an index mark 372 is sensed by the scanner unit 370. When an index mark 372 is sensed, the forward movement of the wrapping paper is stopped and a whole or part of a section of wrapping paper is located at the paper preparation station 38. The knife assembly 80 is then operated by depressing a manually operated cut switch 382 to energize the knife solenoid 321. Energization of the knife solenoid 321 operates the air cylinder 92 to cut the wrapping paper. The feed switch 380 is then actuated for a second time to operate the wrapping paper conveyor assembly 60 to move the wrapping paper until the next mark is sensed by the scanner 370. When the next mark is sensed by the scanner 370 the relay in the registration control assembly 344 will again be operated to halt the movement of the wrapping paper with a complete section located at the wrapping paper preparation station 38. The preceding part or whole section of wrapping paper can then be torn at the perforations 108 and disengaged at the main web 112. The machine is now loaded with wrapping paper and is ready to wrap the next roll of material at the wrapping station 30.

The roll wrapping machine 20 is stopped by emptying the supply ramp 26, so that the limit switch 266 remains in the position shown in FIG. 13, and operating an eject switch 384 (line 9) to energize the relay 270 and close the contacts 272. Closing the contacts 272 energizes the start coil 262 and the motor 210 to operate the elevator 150. Since the supply ramp 26 is empty, the operation of the elevator 150 does not bring an unwrapped roll of material upwardly onto the loading ramp 160. However, operation of the elevator 150 operates the crank assemblies 204 and 206 to move the idler roller 172 away from the drive roller 170 to enable a roll of material which has just been wrapped to descend between the rollers to the conveyor 40. After the wrapped roll has descended to the conveyor 40, the machine can be shut off by merely depressing a stop switch 386 (line 5).

METHOD OF OPERATION

In view of the foregoing remarks it can be seen that I have provided a roll wrapping machine 20 for wrapping rolls of stiff material having an outwardly projecting end flap. The unwrapped rolls of material will be received on a supply ramp 26 where they actuate a limit switch 266 to complete a circuit for energizing the motor 163

to operate the elevator 150. As the elevator 150 is operated, a roll of material will be raised and the crank assemblies 204 and 206 will be operated to discharge a preceding roll from the wrapping station 30. The elevator 150 will raise the unwrapped roll of material onto the loading ramp 160. As the unwrapped roll of material descends down the loading ramp 160 it will actuate the limit switch 280 to energize the wrapping paper preparation subcircuit 224. Energization of the subcircuit 224 will operate the knife assembly 80 to cut a section 110 of wrapping paper. Contemporaneously with this operation of the knife assembly 80 the spray guns 134 and 136 will begin to apply a strip of adhesive 144 to the trailing end portion 138 of this section of wrapping paper. After the operation of the knife assembly 80, the applicator nozzles 116 will apply dots 130 of adhesive to a leading end portion 114 of the section of wrapping paper. Thus, actuation of the limit switch 280 by the unwrapped roll of material results in a section of wrapping paper being prepared for wrapping the unwrapped roll of material which actuated the limit switch 280 as the roll of material rolled down the loading ramp 160.

When the unwrapped roll of material reaches the wrapping station 30, the drive roller 170 will rotate the roll of material. As the roll of material is being rotated, an outwardly projecting relatively stiff flap 180 will engage a sensor unit 182 to operate a sensor switch 188. Operation of the sensor switch 188 will energize control circuitry for the wrapping paper conveyor assembly 60 which will then move the section of wrapping paper 110 forwardly so that the adhesive on the leading end portion 114 of the section engages the rotating roll of material at an area 190 substantially opposite from the flap 180. Continued rotation of the roll of material will tear the section 110 of wrapping paper loose from the main web 112 and will wrap the section of wrapping paper around the roll of material. The adhesive strip 144 on the trailing end portion of the section of wrapping paper will then overlap and engage the leading end portion 114 of the section of wrapping paper to secure the wrapping paper against movement relative to the roll of material. By attaching the leading end portion 114 of the section of wrapping paper to the roll of material at an area 190 spaced from the flap 180, the roll of material will be rotated for half of a revolution before the flap 180 is in position to resiliently press the section of wrapping paper radially outwardly. Therefore, the flap 180 does not engage the section of wrapping paper until the wrapping paper is held against tearing loose from the roll of material by the downward weight of the roll of material on the drive roller 170 and idler roller 172. Although the joint 196 is shown almost directly opposite from the edge 198 of the flap, it will be apparent to those skilled in the art that the position of the joint 196 can be varied relative to the flap 180 as long as the joint is spaced a sufficient distance from the flap to keep the resilient spring force of the flap from separating or tearing apart the joint 198.

The wrapped roll of material will be discharged from the roll wrapping machine by the operation of the crank assemblies 204 and 206 which move the idler roller 172 apart from the drive roller 170. The crank assemblies 204 and 206 will be operated when a next succeeding roll of material is lifted onto the load ramp 160 by the elevator 150. When the crank assemblies 204 and 206 are operated, the wrapped roll of material will descend between the separated drive roller 170 and idler roller 172 onto the conveyor 40 which transports the wrapped roll to a receiving station. The operation of the crank assemblies 204 and 206 each time a roll is lifted onto the load ramp 160 insures that only one roll of material at a time is transported to the wrapping station 30.

In the illustrated embodiment of the invention the roll wrapping machine 20 is used for wrapping rolls of roofing paper. However, it is contemplated that the roll

wrapping machine will be used by those skilled in the art for wrapping many other types of relatively stiff materials having outwardly projecting end flaps. While the roll wrapping machine 20, as illustrated herein, uses relatively wide sections 110 of paper to wrap the rolls of roofing material, it is contemplated that relatively narrow bands of wrapping material could be wrapped entirely or part way around the rolls of material at a plurality of locations. It is also contemplated that material other than paper could, if desired, be used for wrapping the rolls of material. Therefore, while a specific embodiment of the invention has been illustrated, it should be understood that the invention is not to be limited thereto since many modifications may be made and it is intended to cover, by the appended claims, any such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A machine for wrapping rolls of material, said machine comprising paper conveyor means for transporting a continuous web of wrapping paper from a supply roll of wrapping paper to a wrapping station, cutter means mounted adjacent to said paper conveyor means for cutting said web of wrapping paper into sections of a predetermined length, applicator means mounted adjacent to said paper conveyor means for applying adhesive to an end portion of each of said sections of wrapping paper, roll conveyor means for moving rolls of material from a loading station to said wrapping station, drive means mounted at said wrapping station for rotating said rolls of material, and sensor means mounted adjacent to said wrapping station for sensing when a roll of material at said wrapping station is in a predetermined rotary position, said sensor means being cooperable with said paper conveyor means for effecting operation of the latter after said sensor means detects that a roll of material is in said predetermined rotary position to move said end portion of a section of wrapping paper into engagement with a predetermined portion of said roll of material to thereby attach said section of wrapping paper to said roll of material, said drive means rotating said roll of material to wind said section of wrapping paper around said roll of material to thereby wrap said roll of material.

2. A machine as set forth in claim 1, wherein said drive means includes a pair of cylinders which are rotated to rotate said roll of material at said wrapping station, said cylinders being movable transversely away from each other to enable a wrapped roll of material to descend downwardly between said cylinders after said roll of material has been wrapped.

3. A machine as set forth in claim 1, wherein said sensor means include an actuator which is engaged by an outwardly extending end portion of said roll of material when said roll of material is in said predetermined position.

4. A machine as set forth in claim 3, wherein said predetermined portion of said roll of material is substantially opposite to said end portion of said roll of material, and said end portion of said roll of material is pressed inwardly as said section of said wrapping paper is wound around said roll of material.

5. A machine as set forth in claim 1, wherein said cutter means includes spaced apart cutting sections for perforating said web of wrapping paper to form said section and said drive means includes means for rotating said roll of material at such a rate as to pull said section of wrapping paper from said paper conveyor means to thereby separate said section of wrapping paper from said web of wrapping paper.

6. A machine as set forth in claim 1, wherein said roll conveyor means includes a supply ramp, an elevator at a lower end portion of said supply ramp for raising rolls of material upwardly, and a loading ramp extending

downwardly from an upper end portion of said elevator to said wrapping station for supporting said rolls of material as they are moved downwardly to said wrapping station.

7. A machine as set forth in claim 1, further including timer means cooperable with said paper conveyor means for controlling the operation of said paper conveyor means to provide a predetermined time period between the detecting by said sensor means that said roll of material is in said predetermined position and the operation of said paper conveyor means to move said section of wrapping paper into engagement with said roll of material.

8. A machine as set forth in claim 1, wherein said roll conveyor means includes a supply ramp having inwardly converging side assemblies for positioning said rolls of material transversely relative to said supply ramp.

9. A machine as set forth in claim 8, wherein said supply ramp includes a plurality of longitudinally extending rollers for facilitating transverse movement of said rolls of material under the influence of said side assemblies.

10. A machine for wrapping rolls of material having outwardly projecting end flaps, said machine comprising a roll conveyor for transporting rolls of material to a wrapping station, a drive assembly mounted at said wrapping station for rotating a roll of material, a sensor assembly mounted at said wrapping station for detecting when said roll of material is in a predetermined position, and a wrapping material conveyor cooperable with said sensor assembly for transporting wrapping material to said wrapping station, said sensor assembly being actuated by the outwardly projecting end flap of said roll of material as said roll of material is rotated by said drive assembly to thereby regulate the operation of said wrapping material conveyor to move wrapping material into engagement with a predetermined area of said roll of material which is spaced from an outer edge of said end flap.

11. A machine as set forth in claim 10, wherein said sensor assembly includes a switch and a lever, said lever being pivoted by the outwardly projecting end flap of said rotating roll of material to actuate said switch.

12. A machine as set forth in claim 10, wherein said drive assembly includes a pair of rollers movable between first and second positions, said rollers in said first position being located adjacent to each other and rotated to both support and rotate said roll of material, said rollers in said second position being spaced apart from each other to enable said roll of material to be discharged from said machine by passing between said rollers.

13. A machine as set forth in claim 12, wherein said drive assembly is operatively connected to said roll conveyor, and said rollers are moved from said first position to said second position and back to said first position each time said roll conveyor transports a roll of material to said wrapping station whereby to discharge from said machine any roll of material which may be at said wrapping station before a next succeeding roll of material is transported to said wrapping station.

14. A machine as set forth in claim 10, further including a first adhesive applicator mounted adjacent to said wrapping material conveyor for applying adhesive to a leading end portion of said wrapping material, a second adhesive applicator mounted adjacent to said wrapping material conveyor for applying adhesive to a trailing end portion of said wrapping material, said leading end portion of said wrapping material being moved into engagement with said area of said roll of material by said wrapping material conveyor to attach said wrapping material to said roll of material, said trailing end portion of said wrapping material being pressed inwardly toward said roll of material by said drive assembly to secure said wrapping material against movement relative to said roll of material.

15. A machine as set forth in claim 14, wherein said first adhesive applicator is mounted in a fixed relation-

ship with said wrapping station to apply a plurality of small bodies of adhesive to said leading end portion of said wrapping material, and said second adhesive applicator is movable relative to said wrapping station to apply a strip of adhesive to said trailing end portion of said wrapping material.

16. A machine as set forth in claim 10, wherein said drive assembly engages said wrapping material as said roll of material is rotated to urge both said wrapping material and said end flap inwardly to form a generally cylindrical wrapped roll of material.

17. A machine as set forth in claim 10, further including control means cooperable with said wrapping material conveyor and said sensor assembly for enabling a predetermined time period to elapse between the actuation of said sensor assembly and the operation of said wrapping material conveyor, said roll of material being rotated through a predetermined angular distance by said drive assembly during said predetermined time period to position said predetermined area of said roll of material adjacent to an end portion of said wrapping material conveyor.

18. A machine as set forth in claim 10, further including timer means cooperable with said roll conveyor for providing a predetermined minimum time period between successive rolls which are transported to said wrapping station.

19. A machine for wrapping a roll of material, said machine comprising a roll conveyor for transporting a roll of material to a wrapping station, a drive assembly at said wrapping station for rotating said roll of material, a cutting assembly having a plurality of spaced apart cutting portions for partially severing a section of wrapping material from a web of wrapping material, and a wrapping material conveyor assembly extending between said cutter assembly and said wrapping station for moving said section of wrapping material into engagement with said roll of material, said wrapping material conveyor assembly including means for moving said section of wrapping material at a first rate and said drive assembly including means for rotating said roll of material to pull said section of wrapping material from said wrapping material conveyor assembly at a second rate which is faster than said first rate whereby to tear said section of wrapping material from said web of wrapping material.

20. A machine as set forth in claim 19, for wrapping a roll of material, said machine further including applicator means mounted adjacent to said wrapping material conveyor assembly for applying adhesive to the leading end portion of said section of wrapping material whereby said section of wrapping material is attached to said roll of material to enable said roll of material to pull said section of wrapping material outwardly from said wrapping material conveyor assembly.

21. A machine as set forth in claim 19, wherein said cutter assembly includes a movable knife blade having a plurality of spaced apart cutting sections for perforating said wrapping material to partially sever said section of wrapping material from said web of wrapping material.

22. A machine as set forth in claim 19, wherein said drive assembly includes a roller which is rotated to rotate said roll of material, said roller being rotated at such a rate as to have a peripheral linear speed which exceeds the speed at which said section of wrapping material is transported by said wrapping material conveyor assembly.

23. A machine for wrapping rolls of material, said machine comprising a roll conveyor means for transporting rolls of material to a wrapping station, first control means cooperable with said roll conveyor means for regulating the operation of said roll conveyor means, said first control means including a first timer for providing a minimum time period between the conveying of successive rolls of material to said wrapping station by said roll conveyor means to enable each roll of material to be wrapped before a next succeeding roll of material is transported to

said wrapping station, drive means at said wrapping station for rotating said rolls of material, wrapping material conveyor means for moving sections of wrapping material into engagement with said rolls of material at said wrapping station, and second control means cooperable with said wrapping material conveyor means for regulating the operation of said wrapping material conveyor means, said second control means including a second timer for providing a predetermined time period during which each roll of material is rotated at said wrapping station before a section of wrapping material is moved into engagement with the roll of material by said wrapping material conveyor means.

24. A machine as set forth in claim 23, wherein said second control means includes sensor means for detecting when a roll of material at said wrapping station is in a predetermined rotary position, said second timer beginning the measuring of said predetermined period of time with the detection by said sensor means that a roll of material is in said predetermined rotary position to thereby enable said wrapping material conveyor means to move a leading end portion of a section of wrapping material into engagement with a predetermined area of a roll of material at said wrapping station.

25. A machine as set forth in claim 23, further including means for supplying a web of wrapping material to said wrapping material conveyor means, cutter means mounted adjacent to said wrapping material conveyor means for cutting said sections of wrapping material from said web, and said second control means including scanning means for detecting index marks located a predetermined distance apart on said web of wrapping material and means for regulating the operation of said wrapping material conveyor means to move said web of wrapping material relative to said cutter means for said predetermined distance each time a roll of material is wrapped.

26. A machine as set forth in claim 25, wherein said cutter means includes a plurality of spaced apart cutting portions for partially severing said sections of wrapping material from said web of wrapping material, and said drive means includes means for rotating a roll of material at a rate such that the linear peripheral speed of the roll of material is greater than the speed at which said wrapping material conveyor means moves said web of wrapping material whereby a section of wrapping material is torn from said web by the rotation of a roll of material.

27. A method of wrapping a roll of stiff material having a radially outwardly projecting end flap, said method comprising the steps of rotating said roll of material, sensing when said roll of material is in a predetermined rotary position, and attaching one end portion of a section of wrapping material to a portion of said roll of material which is spaced from an outer edge of said flap while said roll is being rotated.

28. A method as set forth in claim 27, further including the method steps of moving said flap radially inwardly, and securing said section of wrapping material against movement relative to said roll to hold said flap radially inwardly.

29. A method as set forth in claim 27, wherein said sensing step is performed by sensible engagement with said flap while said roll is being rotated.

30. A machine as set forth in claim 1, further including scanning means for detecting index marks located at predetermined intervals along said web, and control means cooperable with said scanning means and said paper conveyor means for stopping operation of the latter when a predetermined length of said web has been conveyed to said wrapping station.

31. A machine for wrapping rolls of material comprising roll conveyor means for moving rolls of material from a loading station to a wrapping station, drive means at said wrapping station for rotating a roll of material, wrapping material conveyor means for moving a web of wrap-

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ping material to said wrapping station, cutter means for cutting sections of wrapping material of predetermined length from said web, adhesive applicator means for applying adhesive to the sections of wrapping material, first control means for effecting operation of said cutter means and said adhesive applicator means in response to movement of a roll of material from said loading station to said wrapping station, and second control means for effecting intermittent operation of said wrapping material conveyor means in response to rotation of a roll of material at said wrapping station.

32. A machine as set forth in claim 31, wherein said second control means includes sensor means at said wrapping station for detecting when said roll of material is in a predetermined rotary position and then initiating operation of said wrapping material conveyor means, and means responsive to movement of a predetermined length of said web by said wrapping material conveyor means for stopping operation of the latter.

33. A machine as set forth in claim 32, wherein said last-named means comprises scanning means for detecting index marks located at predetermined intervals along said web.

34. A machine for wrapping rolls of material having outwardly projecting end flaps, said machine comprising means for rotating a roll of material at a wrapping station, wrapping material conveyor means for moving wrap-

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ping material to said wrapping station to be wrapped around the roll of material during rotation of the latter, and control means for regulating the operation of said conveyor means, said control means including a sensor assembly at said wrapping station for detecting when the roll of material is in a predetermined rotary position, said sensor assembly being adapted to be actuated by the outwardly projecting end flap of the roll of material as the roll is rotated, whereby said conveyor means is operated to move wrapping material into engagement with a selected area of the roll which is circumferentially spaced from the end flap.

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TRAVIS S. McGEHEE, Primary Examiner

NEIL ABRAMS, Assistant Examiner

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