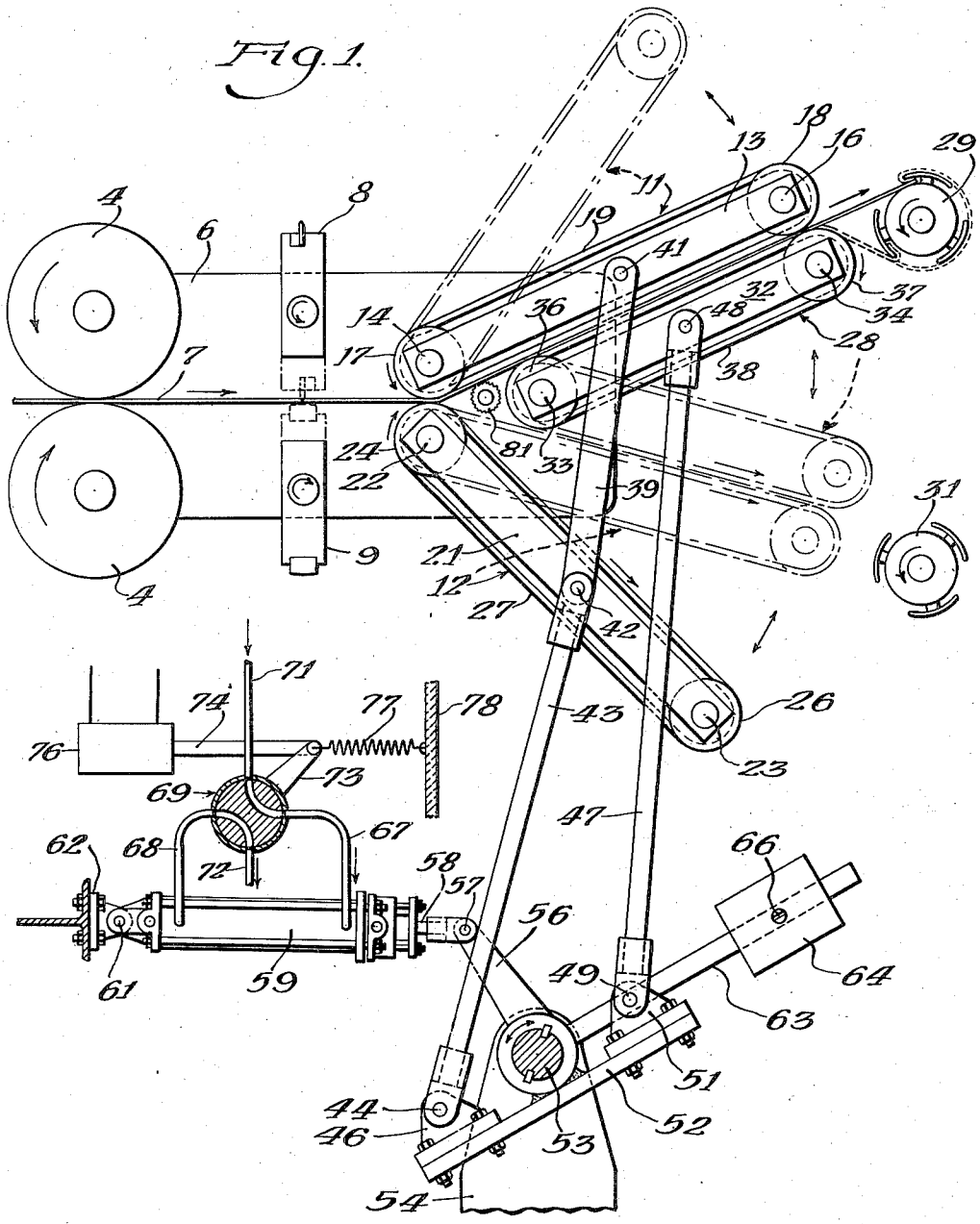
Sept. 14, 1948. J. R. KNOBLE 2,449,234

WINDER APPARATUS

Filed May 20, 1947 2 Sheets-Sheet 1

Fig. 1.



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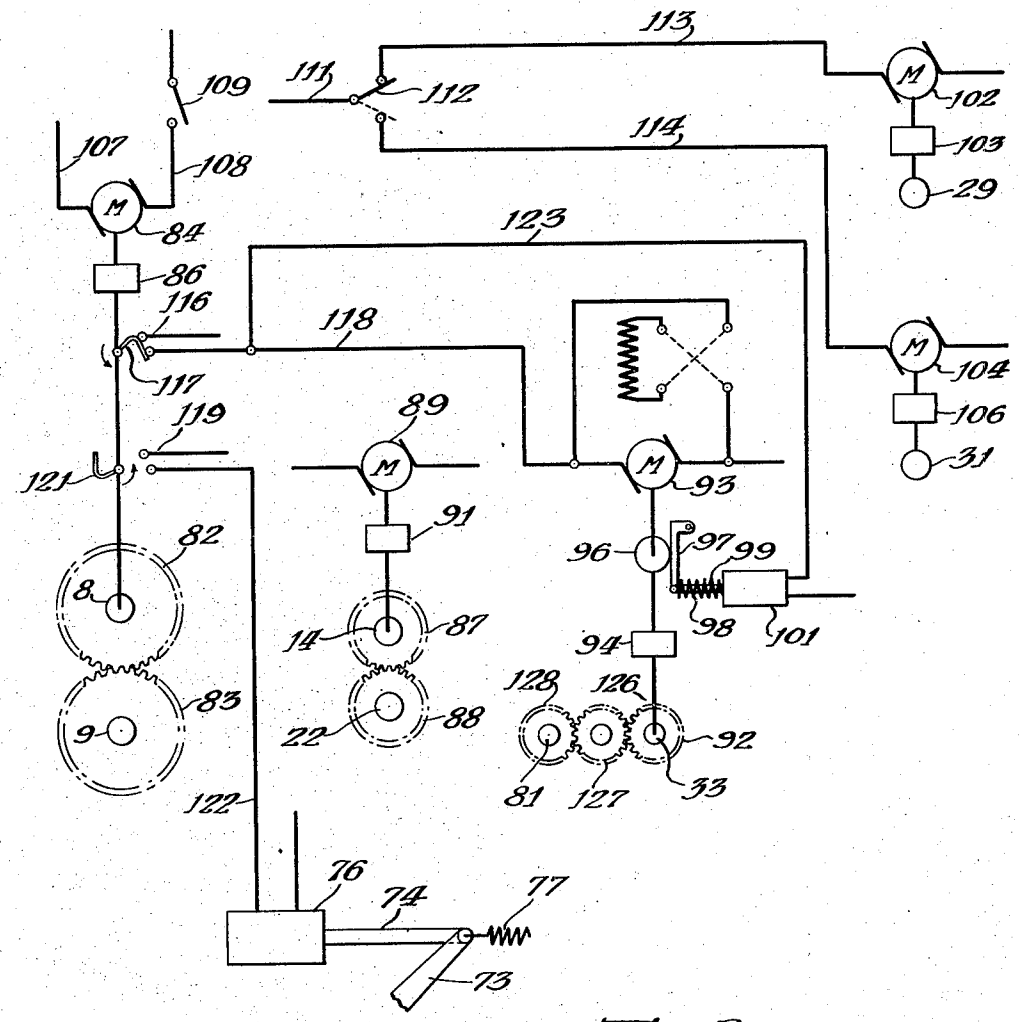


Fig. 2.

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UNITED STATES PATENT OFFICE

2,449,234

WINDER APPARATUS

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12 Claims. (Cl. 242—56)

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This invention relates to winder apparatus, and is more particularly concerned with the provision of an apparatus adapted for use in winding sheet material into rolls. The present invention is contemplated for use in forming rolls of roofing material, in which asphalt-coated or impregnated sheet material is continuously processed within the usual coating and drying apparatus and then wound onto a mandrel to form a roll of predetermined length. It has heretofore been necessary, in the manufacture of roll roofing material, to stop the advance of the coated sheet material after a roll of predetermined size had been formed on the mandrel. The present invention contemplates the provision of means for alternately directing the sheet material toward a pair of mandrels to permit the sheet material to be advanced continuously through the coating and cooling stages of the manufacturing operation. After a roll has been formed upon one of the mandrels, the sheet material is cut transversely and the forward edge of the advancement sheet is directed into engagement with the other mandrel to be formed into a roll. It will thus be seen that a roll of roofing material may be removed from one mandrel during the rolling operation of its companion mandrel.

This invention further contemplates the provision of a winder apparatus embodying three sets of endless belts which coact to alternately guide and direct sheet material into engagement with said mandrels.

This invention further contemplates the provision of a deflector roll disposed for engagement with the front edge of an advancing sheet to direct the sheet into position for engagement between a pair of endless belts.

This invention further contemplates the provision of a winder apparatus in which an intermediate endless belt is interposed between two outer endless belts and is alternately movable into engagement with said outer endless belts.

This invention further contemplates the provision of three sets of endless belts which are movable relative to each other responsive to a single actuating means for directing sheet material to a pair of roll mandrels.

This invention embodies other novel features, details of construction and arrangement of parts which are hereinafter set forth in the specification and claims and illustrated in the accompanying drawings wherein:

Fig. 1 is a side elevational view showing schematically the construction and arrangement of parts of the improved winder apparatus.

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Fig. 2 is a wire diagram illustrating the electrical means employed for controlling the operation of the winder apparatus.

Referring now to the drawings for a better understanding of this invention, the winder apparatus is shown as comprising a pair of feed rolls 4—4 journaled for rotational movement on the frame 6 and adapted to be driven by an electric motor (not shown) to advance sheet material 7 from a sheet treating apparatus to the winder apparatus. The winder apparatus is particularly adapted for use in continuously coiling roofing material as the latter is being treated with waterproofing material, etc.

A flying shear comprising a knife carrier 8 and an anvil 9 is provided on the frame 6, the members 8 and 9 being journaled for rotational movement, in the direction indicated by the arrows, to transversely cut the sheet material 7. An upper endless belt conveyor 11 and a lower endless belt conveyor 12 have their forward ends pivotally mounted on the frame 6 to receive the sheet material 7. The upper endless belt conveyor 11 comprises a frame 13, a driving shaft 14, a shaft 16, a driving pulley 17 secured to the driving shaft 14, a driven pulley 18, journaled on the shaft 16, and a plurality of endless belts 19 extending around the pulleys 17 and 18. The driving shaft 14 is journaled in suitable bearings provided in the frame 6.

The lower endless belt conveyor 12 comprises a frame 21, a driving shaft 22, a shaft 23, a driving pulley 24 keyed to the driving shaft 22, a driven pulley 26 journaled on the shaft 23, and a plurality of endless belts 27 extending around the driving pulley 24 and driven pulley 26. The driving shaft 22 is journaled at its ends in suitable bearings provided in the frame 6. An intermediate endless belt conveyor 28 is interposed between the upper and lower conveyors to coact therewith in directing sheet material 7 toward mandrels 29 or 31. The intermediate conveyor comprises a frame 32, a driving shaft 33, a shaft 34, a driving pulley 36, a driven pulley 37, and a plurality of endless belts 38 extending around the driving pulley 36 and driven pulley 37. The driving shaft 33 is journaled in suitable bearings provided on the frame 6.

The upper and lower conveyor frames 13 and 21 are connected together intermediate their ends by means of a connecting link 39 and bearing pins 41 and 42. A connecting rod 43 is pivotally connected at its one end to bearing pin 42 and at its other end to a pin 44 provided on a bearing bracket 46. A connecting rod 47 is pivotally connected at its one end to a bearing pin 48 provided

on the intermediate conveyor frame 32 and at its other end on a pin 49 provided on a bearing bracket 51. Bearing brackets 46 and 51 are bolted to opposite ends of a rocker arm 52 which is keyed on a shaft 53 journaled on a bearing frame 54. A lever 56 is keyed at its inner end to the shaft 53 and is pivotally connected at its outer end at 57 to a piston 58. The inner end of the piston 58 is mounted for reciprocable movement within a cylinder 59 which is pivotally mounted at 61 to a bracket 62. A counterweight arm 63 is keyed at its inner end to the shaft 53 and extends outwardly in substantially parallel alignment to the rocker arm 52 to receive a counterweight 64, the counterweight being adjustably secured to the free end of the arm 63 by means of a set screw 66.

Conduits 67 and 68 lead from the front and rear ends, respectively, of the cylinder 59 to a four-way valve 69 which is connected to a source of fluid under pressure by means of a conduit 71. A return conduit 72 leads from the valve 69 back to a reservoir, not shown. The valve 69 is provided with an operating handle 73 having its free end engaged by a plunger 74 of a solenoid 76. The free end of the handle 73 is also engaged by one end of a tension spring 77 which has its other end secured to a frame 78. The valve 69 is normally held in the position illustrated in Fig. 1 to direct fluid under pressure through the conduit 67 and into the forward end of the cylinder 59. When the solenoid 76 is energized, the valve 69 is actuated to direct fluid under pressure through the conduit 68 into the rear end of the cylinder 59 to move the piston 58 toward the front end of the cylinder.

A deflector roll 81 is journaled at its ends in the frame 6 and is provided with a corrugated surface for engagement with the front edge of the advancing sheet 7. As illustrated in Fig. 1, the deflector roll is rotated in a clockwise direction to direct the sheet material upwardly between the upper conveyor 11 and intermediate conveyor 28. The deflector roll 81 is rotated in a counterclockwise direction to direct the sheet material between the intermediate conveyor 28 and the lower conveyor 12.

The means employed for driving and controlling the operation of the winding apparatus is diagrammatically illustrated in Fig. 2 in the drawings. The flying shear members 8 and 9 are driven in timed relation by means of a pair of meshing gears 82 and 83, the shear member 8 being driven by means of a suitable electric motor 84 acting through a suitable transmission 86. A pair of gears 87 and 88 are secured to the conveyor driving shafts 14 and 22, respectively, and are driven by means of an electric motor 89 acting through suitable gear transmission 91. A gear 92 is secured to the intermediate conveyor driving shaft 33 and is driven by a reversible electric motor 93 acting through suitable transmission 94. A brake drum 96 is interposed in the power transmission shaft between the motor 93 and the driving shaft 33 to be engaged by a friction lever 97 which is moved into frictional engagement with the brake drum 96 by means of a compression spring 98. The brake arm 97 is drawn out of frictional engagement with the brake drum 96 by means of a plunger 99 actuated by a solenoid 101. The mandrel 29 is driven by a motor 102 acting through a suitable transmission 103; and the mandrel 31 is driven by a motor 104 through a suitable transmission 106. The motor 84 is connected to a source of current by means of leads 107 and 108, and a switch 109 is interposed in lead 108 to control the operation of the motor. The motor 102 is connected to a source of current through lead 111, switch 112 and lead 113; while the motor 104 is connected to a source of current through lead 111, switch 112 and conduit 114. The reversing motor 93 is connected to a source of current through the lead 116, rotary switch 117 and lead 118. The solenoid 76 is connected to a source of current through lead 119, rotary switch 121, and lead 122. The solenoid 101 is connected to a source of current through lead 116, rotary switch 117 and lead 123.

In the operation of the winder apparatus, the sheet material 7 is adapted to be moved continuously through the feed rolls 4—4 and then between the forward ends of the upper and lower conveyors 11 and 12. When all the conveyors are in the positions illustrated in full lines in Fig. 1, the forward edge of the advancing sheet 7 is engaged by the deflector roll 81 which is turning in a clockwise direction to direct the sheet material upwardly between the upper conveyor 11 and intermediate conveyor 28. The forward edge of the advancing sheet is engaged in one of the recesses provided in the collapsible mandrel 29 which is rotated in a counterclockwise direction by the motor 102 until a roll of sufficient diameter is formed thereon.

When the roll of sheet material on the mandrel 29 reaches a predetermined diameter, the switch 109 is closed to cause the flying shear to rotate one complete revolution to cut the sheet 7 transversely. During rotation of the flying shear, the rotary switch 117 acts to break and then complete the circuit to reverse the direction of rotation of the motor 93 and thus acts to reverse the direction of rotation of the driving pulley 36 of the intermediate conveyor 28. The deflector roll 81 is then caused to rotate in a counterclockwise direction by means of a train of gears comprising a driving gear 126, an intermediate gear 127 and a driven gear 128. During alternate revolutions of the flying shear, the solenoid 76 is energized to actuate the four-way valve 69 and cause the piston 58 to move outwardly to pivot the rocker arm 52 which, in turn, acts through connecting rods 43 and 47 to raise the conveyors 11 and 12 and lower the conveyor 28 to the position indicated in dotted outline. The switch 112 is moved to its dotted position to complete the circuit to the motor 104 to rotate the mandrel 31.

It will thus be seen that the forward edge of the advancing sheet 7 will first be engaged and directed by the deflector roll 81 into position between a pair of endless conveyors which in turn act to direct the advancing sheet toward a mandrel for winding. The mandrels 29 and 31 are preferably of the collapsible type to facilitate removal of a roll of sheet material from one mandrel while the sheet material is being wound on the other mandrel. During operation of the flying shear, it will be noted that the rotary switch 117 breaks the circuit to the solenoid 76 and permits the friction arm 97 to be moved into frictional engagement with the brake drum 96 by means of the compression spring 98 to stop rotation of the motor 93 and the parts driven thereby prior to reversal of rotation of the motor. During the operation of the apparatus, the upper and lower conveyors 11 and 12 are driven continuously in the directions indicated by the arrows by means of the motor 89. It is contemplated

that the switches 109 and 112 may be operated manually or automatically.

While this invention has been shown in but one form, it is obvious to those skilled in the art that it is not so limited but is susceptible of various changes and modifications without departing from the spirit and scope of the claimed invention.

I claim as my invention:

1. In an apparatus embodying a pair of power driven mandrels disposed to wind sheet material into rolls, a frame, upper, lower and intermediate endless belt conveyors having their forward sheet receiving ends pivotally mounted on said frame, means to raise and lower the free ends of said upper and lower conveyors, means to raise and lower the free end of said intermediate conveyor to cause the latter to alternately coact with said upper and lower conveyors to direct sheet material toward one and then the other of said mandrels, and means to drive said conveyors.

2. In an apparatus embodying a pair of power driven mandrels disposed to wind sheet material into rolls, a frame, upper, lower and intermediate endless belt conveyors having their forward sheet receiving ends pivotally mounted on said frame, means to simultaneously raise and lower the free ends of said upper and lower conveyors, means to raise and lower the free end of said intermediate conveyor to cause the latter to alternately coact with said upper and lower conveyors to direct sheet material toward one and then the other of said mandrels, and means to drive said conveyors.

3. In an apparatus embodying a pair of power driven mandrels disposed to wind sheet material into rolls, a frame, upper, lower and intermediate endless belt conveyors having their forward sheet receiving ends pivotally mounted on said frame, means to raise and lower the free ends of said upper and lower conveyors, means to raise and lower the free end of said intermediate conveyor to cause the latter to alternately coact with said upper and lower conveyors to direct sheet material toward one and then the other of said mandrels, means to drive said conveyors, and means to reverse the direction of rotation of said intermediate conveyor during pivotal movement of the latter.

4. In an apparatus embodying a pair of power driven mandrels disposed to wind sheet material into rolls, a frame, upper, lower and intermediate endless belt conveyors having their forward sheet receiving ends pivotally mounted on said frame, means to raise and lower the free ends of said upper and lower conveyors, means to raise and lower the free end of said intermediate conveyor to cause the latter to alternately coact with said upper and lower conveyors to direct sheet material toward one and then the other of said mandrels, means to drive said conveyors, and a deflector to direct the forward edge of an advancing sheet between a pair of said conveyors disposed in coacting relation.

5. In an apparatus embodying a pair of power driven mandrels disposed to wind sheet material into rolls, a frame, upper, lower and intermediate endless belt conveyors having their forward sheet receiving ends pivotally mounted on said frame, means to raise and lower the free ends of said upper and lower conveyors, means to raise and lower the free end of said intermediate conveyor to cause the latter to alternately coact with said upper and lower conveyors to direct sheet material toward one and then the other of said mandrels, means to drive said conveyors, and a deflector roll to direct the forward edge of an advancing sheet between a pair of said conveyors disposed in coacting relation.

6. In an apparatus embodying a pair of power driven mandrels disposed to wind sheet material into rolls, a frame, upper, lower and intermediate endless belt conveyors having their forward sheet receiving ends pivotally mounted on said frame, means to raise and lower the free ends of said upper and lower conveyors, means to raise and lower the free end of said intermediate conveyor to cause the latter to alternately coact with said upper and lower conveyors to direct sheet material toward one and then the other of said mandrels, means to drive said conveyors, a deflector roll to direct the forward edge of an advancing sheet between a pair of said conveyors disposed in coacting relation, and means to rotate said deflector roll in a clockwise and then a counterclockwise direction.

7. In an apparatus embodying a pair of power driven mandrels disposed to wind sheet material into rolls, a frame, upper, lower and intermediate endless belt conveyors having their forward sheet receiving ends pivotally mounted on said frame, means to raise and lower the free ends of said upper and lower conveyors, means to raise and lower the free end of said intermediate conveyor to cause the latter to alternately coact with said upper and lower conveyors to direct sheet material toward one and then the other of said mandrels, means to drive said conveyors, a deflector roll to direct the forward edge of an advancing sheet between a pair of said conveyors disposed in coacting relation, and means to change the direction of rotation of said deflector roll responsive to a change in direction of rotation of said intermediate conveyor.

8. In an apparatus embodying a pair of power driven mandrels disposed to wind sheet material into rolls, a frame, upper, lower and intermediate endless belt conveyors having their forward sheet receiving ends pivotally mounted on said frame, means to connect said upper and lower conveyors together for joint pivotal movement, common means to pivot said intermediate conveyor in one direction and the upper and lower conveyors in an opposite direction to cause the intermediate conveyor to alternately coact with said upper and lower conveyors to direct sheet material toward one and then the other of said mandrels, and means to drive said conveyors.

9. In an apparatus embodying a pair of power driven mandrels disposed to wind sheet material into rolls, a frame, upper, lower and intermediate endless belt conveyors having their forward sheet receiving ends pivotally mounted on said frame, means to connect said upper and lower conveyors together for joint pivotal movement, common means to pivot said intermediate conveyor in one direction and the upper and lower conveyors in an opposite direction to cause the intermediate conveyor to alternately coact with said upper and lower conveyors to direct sheet material toward one and then the other of said mandrels, means to drive said conveyors, and means to reverse the direction of rotation of said intermediate conveyor during pivotal movement of the latter.

10. In an apparatus embodying a pair of power driven mandrels disposed to wind sheet material into rolls, a frame, upper, lower and intermediate endless belt conveyors having their forward sheet receiving ends pivotally mounted on said frame, means to connect said upper and lower conveyors

together for joint pivotal movement, common means to pivot said intermediate conveyor in one direction and the upper and lower conveyors in an opposite direction to cause the intermediate conveyor to alternately coact with said upper and lower conveyors to direct sheet material toward one and then the other of said mandrels, means to drive said conveyors, means to reverse the direction of rotation of said intermediate conveyor during pivotal movement of the latter, and means to direct the forward edge of an advancing sheet between said intermediate conveyor and its coacting conveyor.

11. In an apparatus embodying a pair of power driven mandrels disposed to wind sheet material into rolls, a frame, upper, lower and intermediate endless belt conveyors having their forward sheet receiving ends pivotally mounted on said frame, means to connect said upper and lower conveyors together for joint pivotal movement, common means to pivot said intermediate conveyor in one direction and the upper and lower conveyors in an opposite direction to cause the intermediate conveyor to alternately coact with said upper and lower conveyors to direct sheet material toward one and then the other of said mandrels, means to drive said conveyors, a power driven flying shear, and means to operate said flying shear and to pivot said conveyors.

12. In an apparatus embodying a pair of power driven mandrels disposed to wind sheet material into rolls, a frame, upper, lower and intermediate endless belt conveyors having their forward sheet receiving ends pivotally mounted on said frame, means to connect said upper and lower conveyors together for joint pivotal movement, common means to pivot said intermediate conveyor in one direction and the upper and lower conveyors in an opposite direction to cause the intermediate conveyor to alternately coact with said upper and lower conveyors to direct sheet material toward one and then the other of said mandrels, means to drive said conveyors, means to reverse the direction of rotation of said intermediate conveyor during pivotal movement of the latter, a power driven flying shear, and means to operate said flying shear and to pivot said conveyors and to reverse the direction of rotation of said intermediate conveyor.

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