July 4, 1950 P. C. ANDRÉ 2,513,777

APPARATUS FOR SINUOUS CONTOURED MATERIAL

Filed Dec. 9, 1947 2 Sheets-Sheet 1

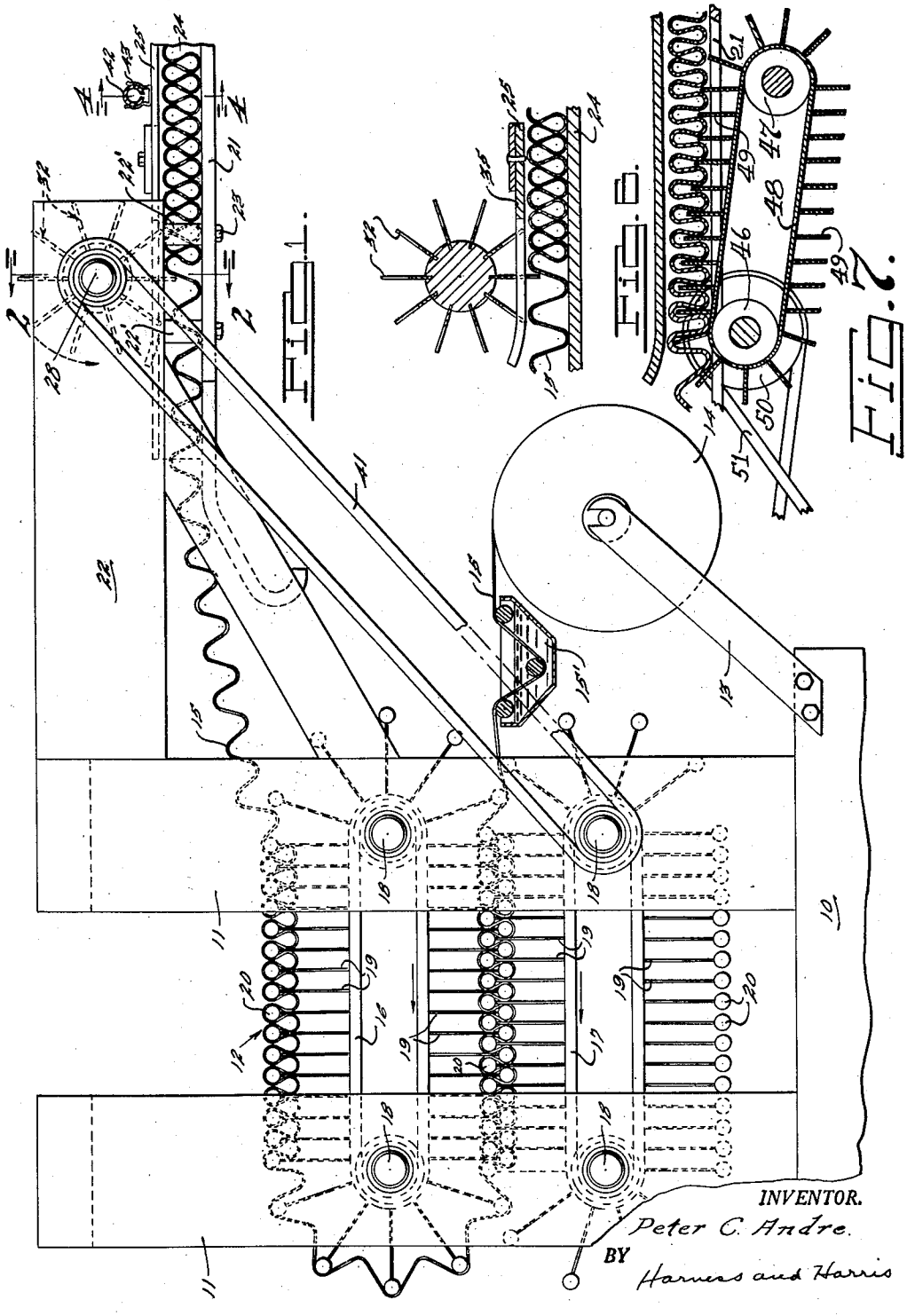


Fig. 1.

Fig. 6.

Fig. 2.

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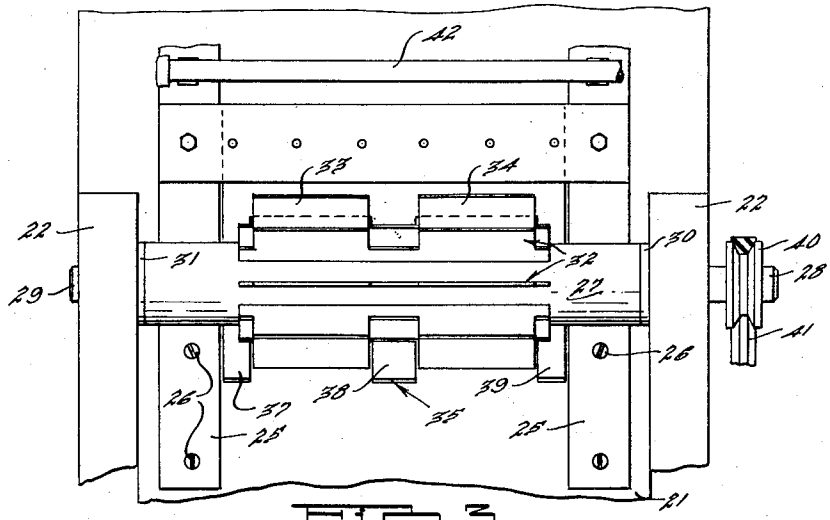


FIG. 3.

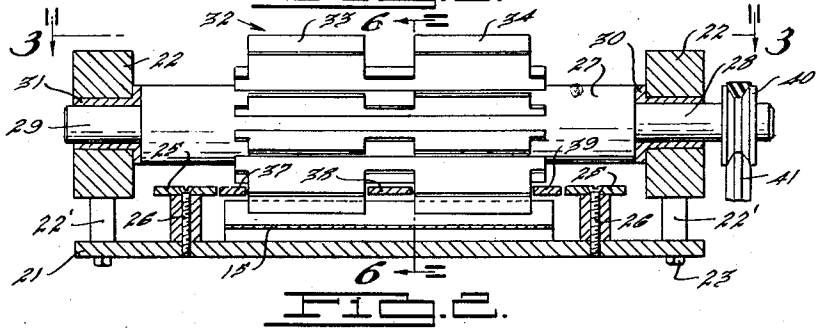


FIG. 2.

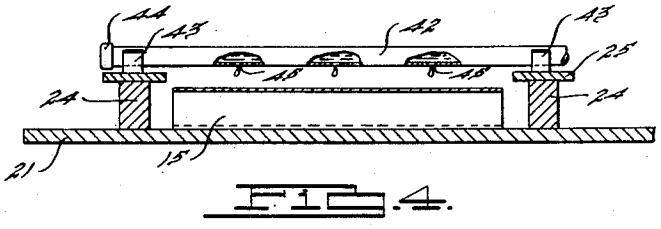


FIG. 4.

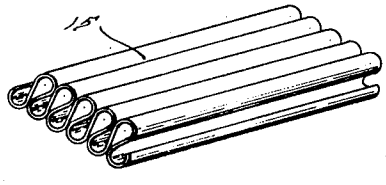


FIG. 5.

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APPARATUS FOR SINUOUS CONTOURED MATERIAL

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Application December 9, 1947, Serial No. 790,490

10 Claims. (Cl. 154—30)

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This invention relates to improvements in apparatus for the manufacture of a sinuous formed structural material and more particularly to mechanism for dislodging the material from a machine that imparts the sinuous contour to the material.

The making of sinuous formed structural material in the past has been tedious because of the difficulty of uniformly and speedily taking the material from the machine and packing it. Structural material consisting of a plurality of hollow columns can be made by an apparatus including a plurality of forming members mounted on a belt, for example, and adapted to engage successive portions of sheet stock to loop the same thereabout and form the hollow columns. Such an apparatus has the advantage of relatively high speed production, but difficulty has been experienced in releasing the looped material from the forming members due to the fact that the material is looped substantially thereabout and the further fact that the material when impregnated with a strengthening agent, for example a resin, may tend to adhere to the forming members.

The principal object of my invention is to provide apparatus for sinuously contouring material with means for detaching the material from the forming machine.

Another object of my invention is to provide means for packing the material after it has been delivered from the forming machine.

A further object of my invention is to provide the apparatus for the sinuous contouring of structural material with means for disposing liquid resin or some other type of adhesive matter on the material to facilitate keeping the material in a packed position.

A still further object of my invention is to provide means for detaching sinuously formed material from a forming machine wherein the force employed by this means is applied transversely to the forming bars of the machine.

Various objects and advantages of the invention will be more apparent from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevational view of a forming machine and paddle-wheel mechanism embodying my invention.

Fig. 2 is a front elevational view partly in section taken on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary plan view taken on the line 3—3 of Fig. 2.

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Fig. 4 is a front sectional view of an adhesive dispensing tube taken on the line 4—4 of Fig. 1.

Fig. 5 is a perspective view of the sinuously formed material.

Fig. 6 is a sectional view of the paddle-wheel mechanism taken on the line 6—6 of Fig. 2.

Fig. 7 is a fragmentary sectional view of a dislodging mechanism for sinuous formed material embodying a modification of my invention.

Referring now to Fig. 1, I have shown a device for contouring material into sinuous loops. This device comprises a base 10 having four vertical supports 11 secured thereto. These supports 11 comprise the framework of an oven in which contouring apparatus 12 is housed. A pair of brackets 13 are also secured to the base 10 and are adapted to receive a spool 14 of material 15 to be fed into the apparatus 12. Material 15 may be kraft paper and is exposed to moisture, as by passing through water bath 15' to absorb a content sufficient to permit deformation of the material without fracture of the fibers thereof.

The apparatus 12 includes a pair of endless belts 16 and 17, of rubber or other material, arranged one above the other, and each is moved by a pair of rollers 18. Each belt has secured thereto a plurality of arms 19, each of which carries a circular rod 20 having a length equal to the width of the material 15 to be operated on. The upper belt 16 rotates in a clockwise direction and the lower belt 17 in a counter-clockwise direction as indicated by the arrows and the arms and rods are so arranged that the material 15 is first engaged by a rod of the upper belt 16 and then by an arm of the lower belt 17 to thereby partially loop successive portions of the material 15 about respective alternate rods of the belts, the loop provided by a rod of one belt being between adjacent arms of the other belt, and the thickness of the arms 19 being relatively small so that the loops of each plane are in relatively close proximity.

Each loop is formed as the belts and rods begin their travel in a horizontal path from right to left as viewed in Fig. 1, continuing in a semicircular path around the left hand extremity of the upper belt and moves from left to right being retained in looped form during such travel. The moisture impregnated material 15 is engaged by rods 20 and looped thereabout and when so engaged the moisture content is dissipated by the heated atmosphere within the oven. Under these conditions the looped material has sufficient resiliency to return to its contoured form when releasably elongated.

The mechanism for dislodging the material from the upper right hand corner of the upper belt as viewed in Fig. 1, comprises an elongated base plate 21 which is mounted for operation relative to the contouring device by a pair of outwardly extending supports 22. The supports are secured at one extremity of the vertical supports 11 and at their other extremity to the base plate 21 by means of a plurality of spacing collars 22' and bolts 23 extending therethrough. The base plate 21 is provided with a pair of rectangular members 24 extending longitudinally of the plate one each along opposed sides of the plate. Each member 24 is provided with a strip 25 extending longitudinally thereon which covers and overlaps the face of the member 24 opposite the plate. A plurality of intermittently spaced bolts 26 extend through the strips 25 and members 24 and are journaled in the plate thereby securing them in the position more clearly shown in Fig. 2. The combination of the plate 21, members 24 and strips 25 define a trough for receiving the sinuously formed material 15 from the forming machine. A shaft 27 having reduced end portions 28 and 29 journaled in the extremities of the supports 22 opposite the vertical supports 11 is positioned above the base plate 21 and is adapted to rotate in the bearings 30 and 31. The shaft 27 has radially mounted thereon a plurality of substantially U-shaped paddlewheel blades 32 having two leg portions 33 and 34 defining a notch therebetween, the blades being adapted to revolve above the longitudinal axis of the shaft 27 in a paddlewheel fashion when the shaft is rotated.

The base plate 21 is flanged downwardly at its extremity nearest the machine to facilitate easier reception of the material thereon. A three-pronged fork member 35 is provided between the shaft 27 and the base plate 21 in the plane of the strips 25 and is mounted therebetween by means of a transverse plate 26 which is secured at its central portion to the closed end of the fork member 35 and at its opposed extremities to the strips 25. The open extremities of the prong are flanged upwardly to similarly facilitate reception of the material into the trough. The fork member 35 is so positioned relative to the shaft 27 that the innermost portions of the member 35 between the prongs 37 and 38, and 38 and 39 are very close to the path defined by the revolution of the outer periphery of the blades 32. Similarly the center prong 38 of the fork member 35 passes through the notches of the blades 32 in close proximity therein during revolution thereof. The reduced end portion 28 of the shaft 21 extends through the support 22 to be received in and keyed to a pulley 40. A belt 41 connects the pulley 40 and the roller 18 thereby rotating the shaft 27 in timed relation with the rotation of the roller 18.

A tube 42 positioned transversely in relation to the base plate 21 is mounted by supports 43 to the strips 25. The tube 42 has one extremity closed by plug 44 and the other extremity connected to mechanism (not shown) for delivering liquid adhesive, such as some type of resin under pressure, thereto. The tube 42 is provided with a plurality of orifices 45 positioned adjacent the base plate 21 for allowing the flow of adhesive from the tube to the upper face of the sinuous formed material 15. The size of the orifices 45 and the pressure under which the adhesive is delivered to the tube may be so regulated that the flow of resin from the orifices is of a steady even nature. The adhesive in the tube 42 flows between adjacent loops of the material 15 and adheres the same together.

In operation the material 15 leaves the spool 14, passes through the bath 15' and enters the oven to be contoured into a plurality of sinuously fromed loops. When the material leaves the device, it is guided into the trough of the mechanism by the flanged portions of the base plate 21 and the forked member 35. The formed material is pulled from the device by the paddlewheel blades 32 which engage successive loops of the material. It may be readily seen that the force of the blades 32 exerted against the successive loops of the material 15 is transverse to that force exerted against the loops by the forming bars 20. As a result each time a blade engages a loop of the material, another loop is released from a forming bar. By this method the material is packed into the trough and is held in packed position by frictional engagement with the base plate 21. As the material is pushed along the plate by the blades 32, it passes under the tube 42 which dispose adhesive thereon through the orifices 45.

The trough may be any convenient length depending on the length of the former material to be used. The material may be cut and stacked thereby allowing the adhesive on one face to contact the unglued face of another similar length of material.

In Fig. 7 I have shown a modification of my invention wherein the plate 21 is provided with a longitudinal slot for facilitating operation of a dislodging mechanism positioned below the plate 21. This mechanism comprises a pair of shafts 46 and 47, having a chain-like belt 48 connected there-between so that rotation of the shafts accomplishes relative movements of the belt 48 in a clockwise movement as viewed in Fig. 7. The belt 48 has mounted thereon a plurality of blades 49 which move with the belt and engage successive loops of the contoured material. The shaft 46 is provided with a pulley 50 journalled thereon. A belt 51 connects the pulley 50 and the roller 18 thereby moving the belt 48 in timed relation with the rotation of the roller 18. The shafts 46 and 47 are so positioned relative to the plate 21, that a plane connecting the axes of the shafts is inclined from the plane of the plate 21. By being positioned in this manner the blades 49 engage the looped material 15 as they move around the shaft 46 and thereafter slowly withdraw from between the adjacent faces of the looped material as the blades 49 approach the shaft 47 and are completely disengaged from the material as they start their rotation about the shaft 47. This construction is advantageous in that the blades 49 do not engage the loops of the looped material when they rotate about the sahft 47 and thus the loops are not displaced to a slanted position by the rotation of the blades.

Although but one embodiment of the invention is herein shown and described it will be understood that various changes in the details of construction and materials employed may be made without departing from the spirit of the invention.

I claim:

1. In an apparatus for contouring sheet material, a plurality of belt-driven forming elements adapted to respectively engage successive

portions of the material and loop the same substantially thereabout and permanently set the material when so looped, and a plurality of rotatably mounted blades adapted to respectively engage certain of said loops and to exert a force thereon in a direction tending to open other of said loops to facilitate separation of the latter from their respective loop-forming elements.

2. In an apparatus for contouring sheet material, a plurality of belt-driven forming elements adapted to respectively engage successive portions of the material and loop the same substantially thereabout and permanently set the material when so looped, a plurality of rotatably mounted blades adapted to respectively engage certain of said loops and to exert a force thereon in a direction tending to open other of said loops to facilitate separation of the latter from their respective loop-forming elements, and a guide for receiving the looped material accommodating movement of the latter under the influence of the force exerted thereon by said blades, said looped material frictionally engaging said guide during the aforesaid movement thereof to oppose the latter to a degree such that walls of adjacent loops are urged into engagement one with the other.

3. In an apparatus for contouring sheet material, a plurality of movable elements adapted to respectively engage successive portions of the material and loop the same substantially thereabout, and paddlewheel mechanism movable in timed relationship with said elements, said mechanism having radially extending blades adapted to engage certain of said loops and exert a force thereon tending to so open other of said loops as to facilitate separation of the latter from the respective loop forming elements.

4. In apparatus for contouring sheet material, the combination comprising a machine having forming means for imparting a sinuous contour to said material, and mechanism for dislodging said material from said forming means, said mechanism comprising a base, a rotatable rod spaced relative to said base, means for rotating said rod about its longitudinal axis, and a member radially mounted on said rod and adapted to engage said material thereby pulling the same from said machine as an incident to rotation thereto.

5. In apparatus for contouring sheet material into a plurality of sinuously formed loops, the combination comprising a machine having forming means for imparting a sinuous contour to said material, and mechanism for dislodging said material from said means, said mechanism comprising a trough for receiving and frictionally engaging said formed material, a rod spaced relative to said trough and rotatable about its longitudinal axis, means rotating said rod, and a member radially mounted on said rod and adapted to engage a loop of said material to urge said loops outwardly from said machine into a packed position in said trough, said material being retained in said packed position by the frictional engagement with said trough.

6. In apparatus for contouring sheet material into a plurality of sinuously formed loops, the combination comprising a machine having forming means for imparting a sinuous contour to said material and mechanism for dislodging said material from said means, said mechanism comprising a trough for receiving and frictionally engaging said formed material, a rod spaced relative to said trough and rotatable about its longitudinal axis, means rotating said rod and a member radially mounted on said rod and adapted to engage a loop of said material to urge said loops outwardly from said machine into a packed position in said trough, said material being retained in said packed position by the frictional engagement with said trough.

7. In apparatus for contouring sheet material into a plurality of sinuously formed loops, the combination comprising a machine having forming means for imparting a sinuous contour to said material and mechanism for dislodging said material from said means, said mechanism comprising a trough for receiving and frictionally engaging said formed material, a rod spaced relative to said trough and rotatable about its longitudinal axis, means rotating said rod and a member radially mounted on said rod and adapted to engage a loop of said material to urge said loops outwardly from said machine into a packed position in said trough, said material being retained in said packed position by the frictional engagement with said trough, and a container for adhesive substance disposed over said trough for discharging said substance on said material while it is in its packed position.

8. A mechanism for dislodging and packing sinuously contoured material from a forming machine comprising a trough for receiving said material having an open face, a rod rotatable along its longitudinal axis by said machine and mounted above said trough, a plurality of members radially mounted in spaced relation on said rod for pulling said material from said machine and packing it in said trough, a forked element disposed over said open face of said trough for guiding the passage of said material through said trough, and a container for adhesive substance positioned above said trough and adapted to discharge said substance on said material.

9. In apparatus for contouring sheet material, a plurality of movable elements adapted to respectively engage successive portions of the material and loop the same substantially thereabout, and mechanism movable in timed relationship with said elements comprising spaced first and second shafts, a belt movable with and connecting said shafts, a plurality of blades mounted on said belt and adapted to engage certain of said loops and exert a force thereon tending to so open other of said loops as to facilitate separation of the latter from the respective loop forming elements, said shafts being so positioned relative to said material that the blades engage the loops when the blades are adjacent said first shaft and thereafter increasingly withdrawn from engagement therewith until finally withdrawn therefrom when adjacent said second shaft.

10. In apparatus for contouring sheet material into a plurality of sinuously formed loops, the combination comprising a machine having forming means for imparting a sinuous contour to said material and mechanism for dislodging said material from said means, said mechanism comprising a trough for receiving and frictionally engaging said former material, first and second shafts positioned relative to said trough, a belt movable with and connecting said shafts, a plurality of blades mounted on said belt and adapted to engage certain of said loops of said material to urge said loops outwardly from said machine unto a packed position in said trough, said shafts being so positioned relative to said ma-

terial that the blades engage the loops of said material when the blades are adjacent said first shaft and thereafter increasingly withdrawn from engagement therewith until finally withdrawn therefrom when adjacent said second shaft.

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