

Aug. 22, 1972

G. ORTEL

3,686,057

APPARATUS FOR POSITIONING SHEETS

Filed Feb. 18, 1969

5 Sheets-Sheet 1

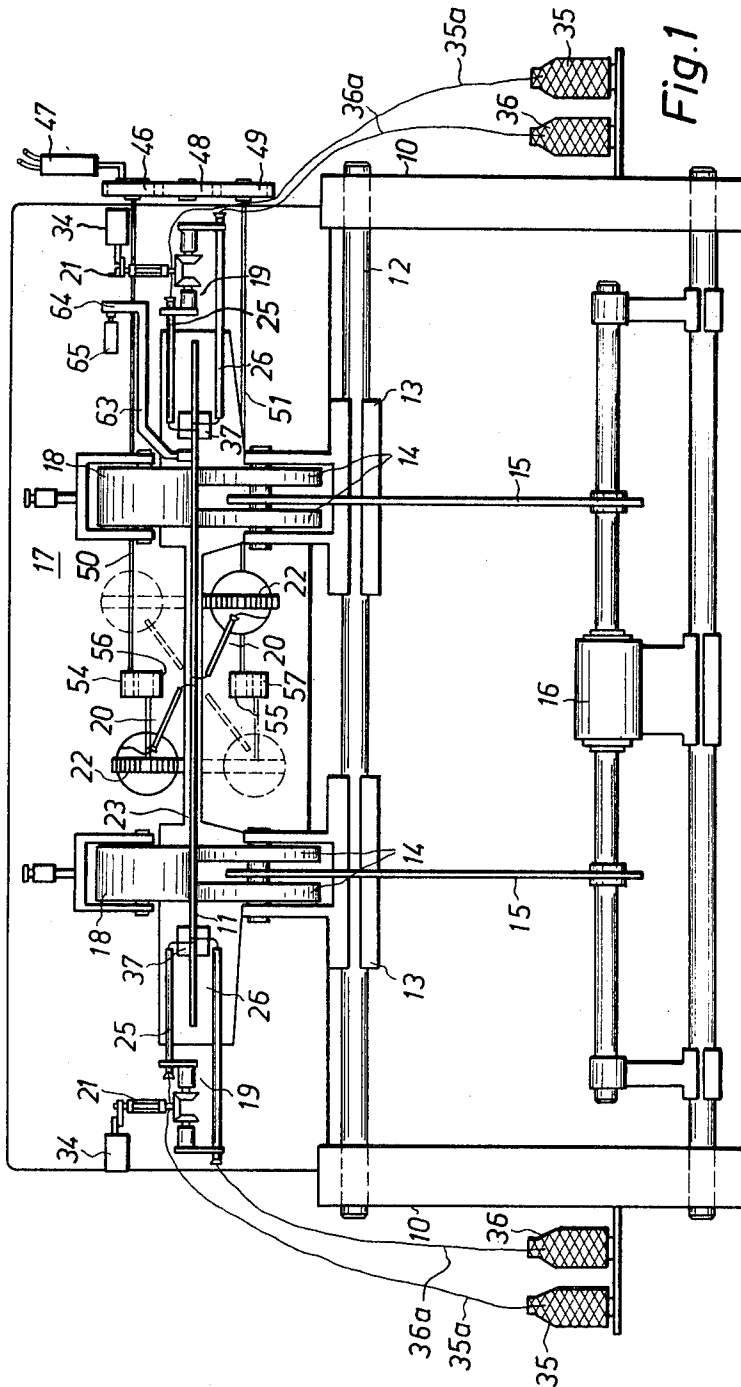


Fig. 1

INVENTOR:
Gerhard Ortel

Aug. 22, 1972

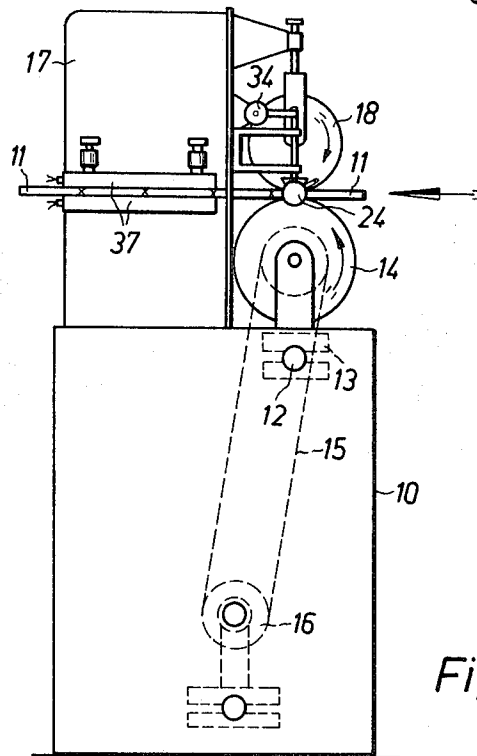
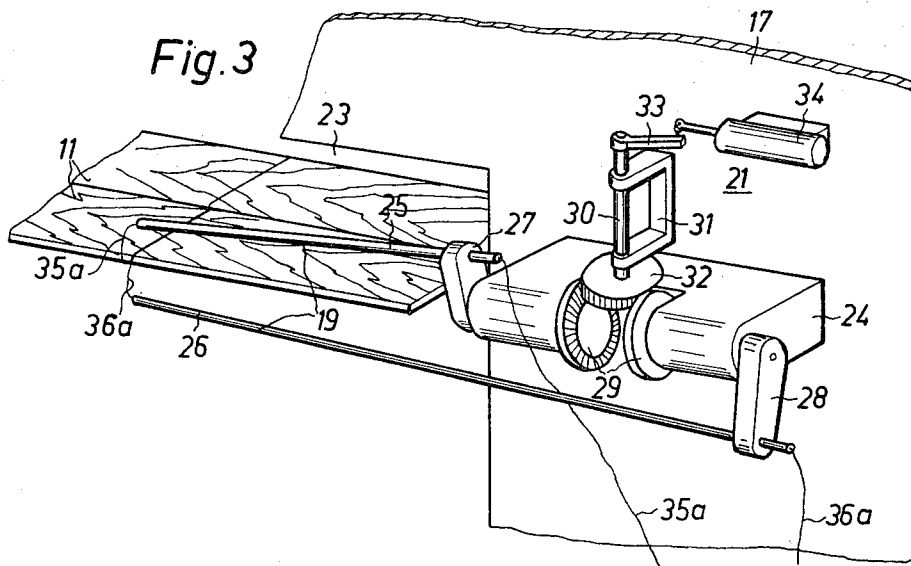
G. ORTEL

3,686,057

APPARATUS FOR POSITIONING SHEETS

Filed Feb. 18, 1969

5 Sheets-Sheet 2



INVENTOR:
Gerhard Ortel

Aug. 22, 1972

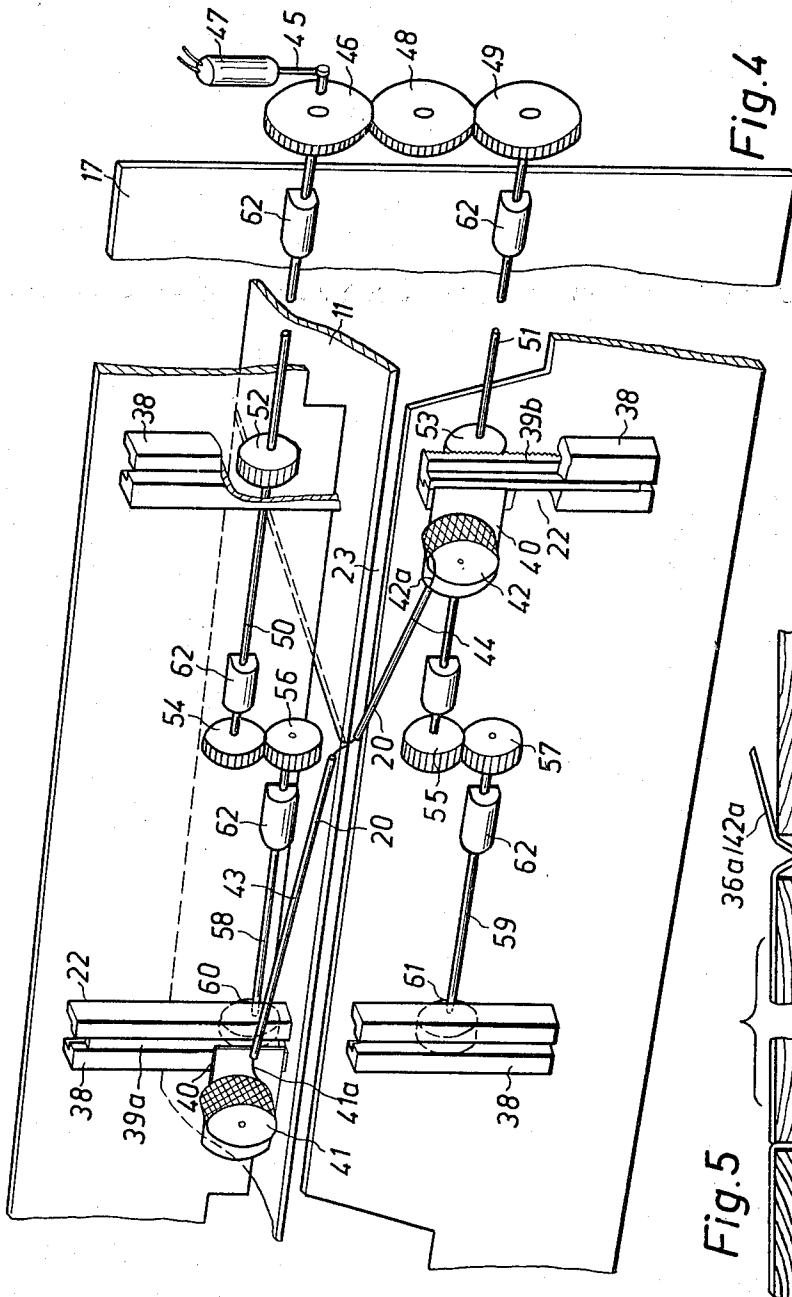
G. ORTEL

3,686,057

APPARATUS FOR POSITIONING SHEETS

Filed Feb. 18, 1969

5 Sheets-Sheet 3



INVENTOR:
Gerhard Ortel

Aug. 22, 1972

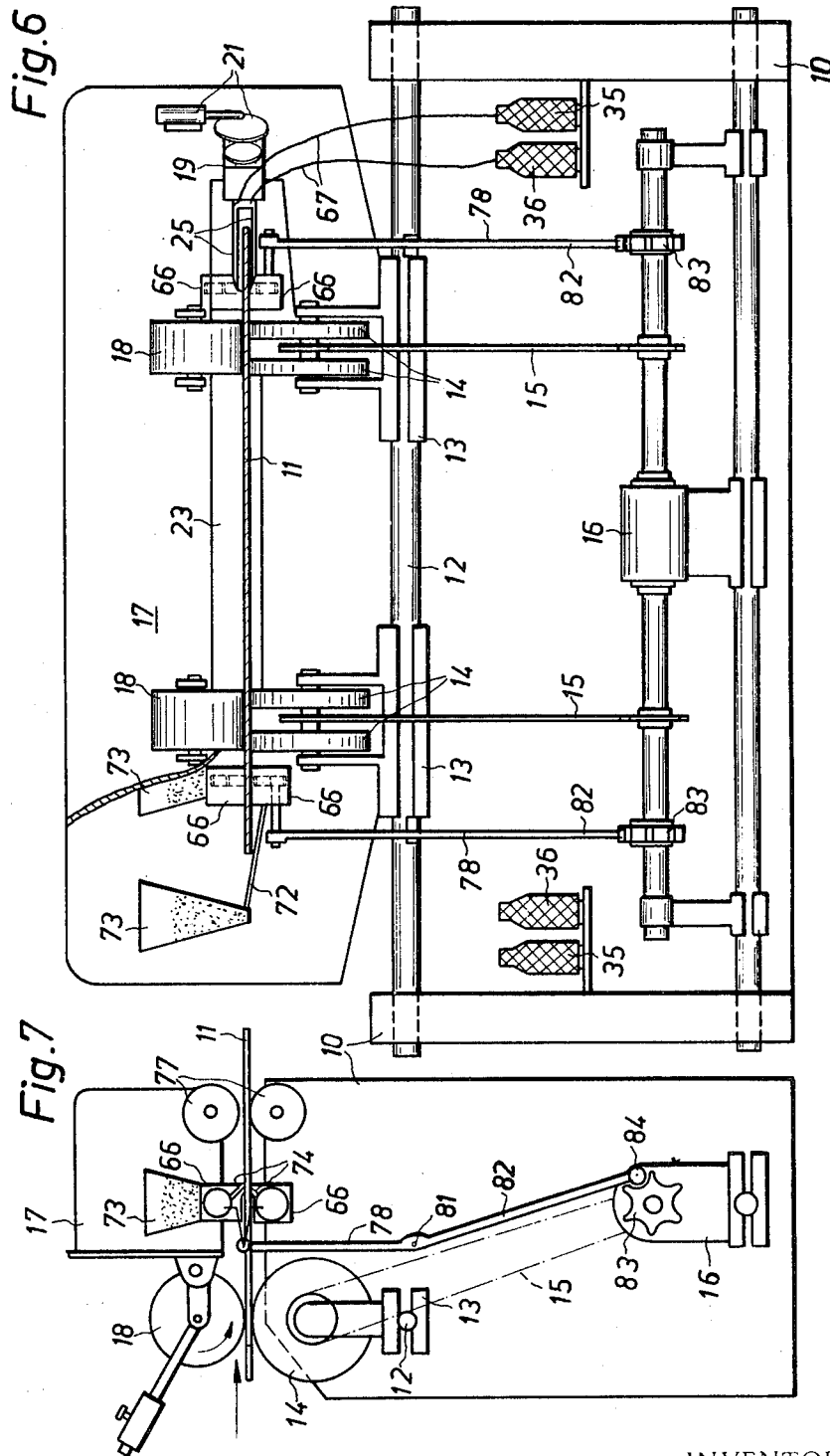
G. ORTEL

3,686,057

APPARATUS FOR POSITIONING SHEETS

Filed Feb. 18, 1969

5 Sheets-Sheet 4



Aug. 22, 1972

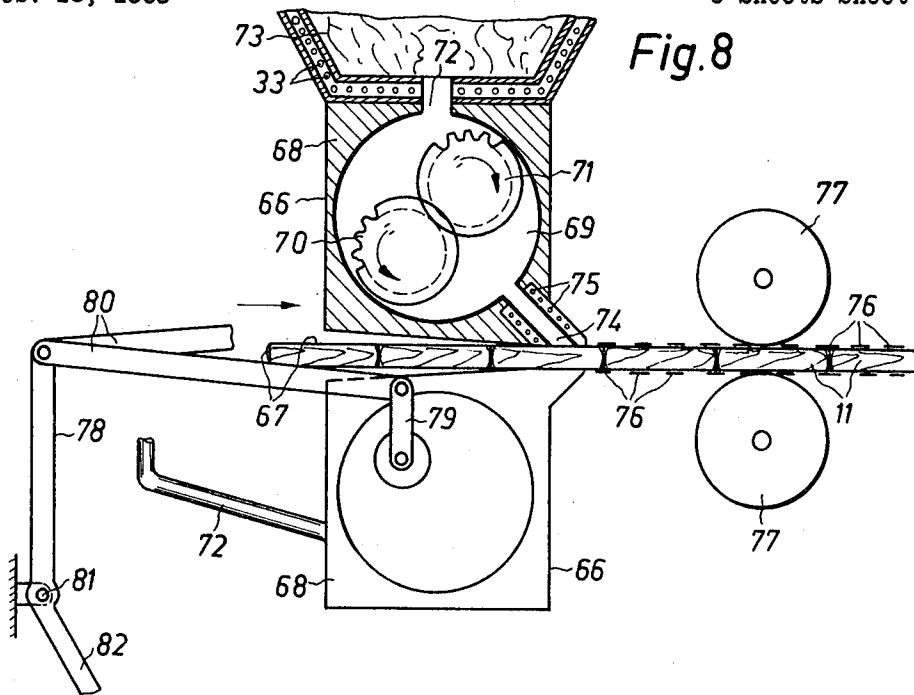
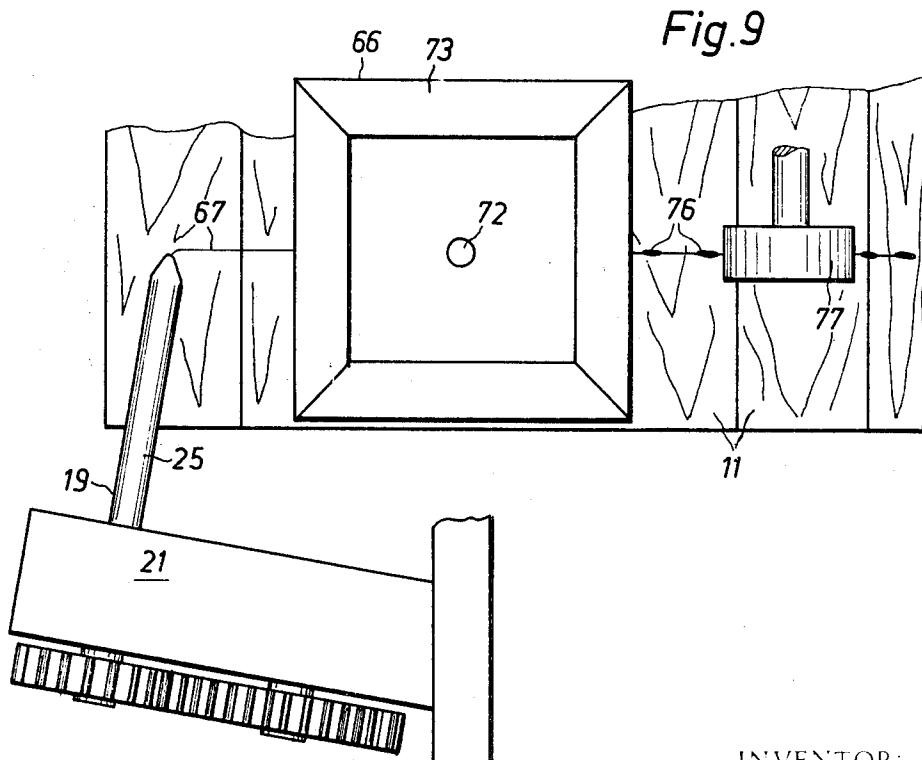
G. ORTEL

3,686,057

APPARATUS FOR POSITIONING SHEETS

Filed Feb. 18, 1969

5 Sheets-Sheet 5



INVENTOR:
Gerhard Ortel

1

3,686,057

APPARATUS FOR POSITIONING SHEETS

Gerhard Ortel, Rietberg, Westphalia, Germany, assignor to Heinrich Kuper, Rietberg, Westphalia, Germany

Filed Feb. 18, 1969, Ser. No. 800,157

Claims priority, application Germany, Feb. 21, 1968, P 16 28 989.7; Austria, Aug. 20, 1968, A 8,104/68

Int. Cl. B32b 31/10, 31/06

U.S. Cl. 156—548

21 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for transversely assembling sheet strips of veneer, cardboard or the like, in which a thread is cemented at right angles to the longitudinal extension of said strips by laying a thread on both sides of each strip cementing said threads to said strips, and reversing the positions of said threads at the trailing edge of each strip so that each thread is alternately placed on the upper or lower face of adjacent strips.

The present invention relates to a method and apparatus for transversely assembling sheet strips such as veneers, strips of cardboard or the like, in which or with which threads are secured by adhesive to said strips at right angles to their length.

It is an object of the invention to provide a method and apparatus for assembling strips side by side to form large-surface pieces, the strips being strongly connected together edgewise.

The present invention concerns a method of transversely assembling sheet strips of veneer, cardboard or the like, in which an adhesive thread is cemented to the strips at right angles to their length, comprising the steps of laying a thread on both sides of the strips, cementing said threads to said strips, and reversing the positions of said threads at the trailing edge of each strip.

An apparatus for carrying out said method is characterized by a guide device guiding said two adhesive threads to opposite faces of said strips, means for varying the positions of said two threads relative to the plane of movement of said strips, a movement device alternating this guide device with respect to both upper and lower faces of said strips.

Reference should now be made to the accompanying drawings, in which:

FIG. 1 shows an end view of an apparatus for transversely assembling sheets, provided in the plane of movement of the sheets with thread guiding devices arranged above and below;

FIG. 2 shows a side view of the same device;

FIG. 3 is a perspective view of a device provided with a movement device guiding the thread onto the lateral region of the sheets;

FIG. 4 is a perspective view of a device provided with a movement device guiding the thread on to central region of the sheets;

FIG. 5 is a cross-section through adjacent sheets connected at their joints by means of crossing threads;

FIG. 6 is an end view of an alternative embodiment of a device for transversely assembling sheets, having thread guide devices and adhesive application devices arranged above and below in the region of the movement plane of the sheets;

FIG. 7 is a side view of the device of FIG. 6;

FIG. 8 is a side view partly in section of the adhesive application devices arranged above and below the sheets;

FIG. 9 shows a plan view of the adhesive application device and thread guide device of FIG. 8.

2

An apparatus for transversely assembling strips of sheet in accordance with the invention, such as veneers, strips of cardboard or the like has a machine stand 10 (FIG. 1) in the upper region of which a bearer shaft 12 extending at right angles to the direction of passage of the strips 11 of sheet to be assembled is located. There are two feed rollers 14 displaceably mounted on this shaft by means of brackets 13, the rollers being moved by means of belt drives 15 from a driving motor 16 located in the lower region of the machine stand, the belt drives 15 being displaceable to correspond with the feed rollers 14. Supported on the machine stand 10 is a machine head 17 which has pressure rollers 18 above the feed rollers 14. These rollers, being resiliently mounted, hold the strips of sheet 11 firmly against the feed rollers 14.

For transversely assembling strips of sheet 11 of equal or varying in width, guide devices 19 or 20 having movement devices 21 or 22 for moving two threads alternately over or under the strips of sheet 11, are provided in the lateral regions, or in the lateral regions and the central region, of the strips of sheet 11. The guide devices 19, which are arranged in the plane of movement of the strips 11, at the side of the moving strips of sheet 11, are identically formed and lead the thread from each side to the two surfaces of the strips 11.

The machine head 17 has a passage aperture 23 formed therein extending substantially over its width, through which the strips 11 are moved on horizontally; in each of the end regions of the passage aperture 23 there is a support 24 (FIG. 3) for the lateral guide devices 21.

The guide device 21 (see especially FIG. 3) is formed by two tubular guides 25, 26 extending in parallel to or at an angle relative to the plane of movement of the strips the guides being displaceably mounted on the holding body 24 by swivel arms 27, 28.

The tubular guide 25 extends from one end of the holding body 24 towards the strips, and the tubular guide 26 extends from the opposite end face of the holding body, the tubular guide 26 being longer than the tubular guide 25.

The swivel levers 27, 28 each engage with an axle through the holding body 24 and in the recessed central region thereof is a bevel gear 29; the two coaxially arranged bevel gears 29 mesh with a gear 32, the latter being mounted with its axis of rotation 30 at right angles to the other gears in a bearing yoke 31. The axle 30 is connected by way of a lever arm 33 to a thruster, shown as a pressure actuated cylinder 34. The pressure cylinder 34 is arranged on the machine head 17, and the gears 29, 32 and the levers 27, 28 form the drive 21 for the guides 19. The threads 35a, 36a are unwound from the thread rollers 35, 36 and are supplied to the strips 11 to be connected through the two tubular guides 25, 26. The threads 35a, 36a are provided with an adhesive agent, and after being passed over or under a strip, they are firmly connected to the surfaces of the strip by a heating device 37 (FIG. 1) which is vertically displaceable near the lateral guiding devices 19 and extends above and below the movement plane of the strips 11.

On the machine head 17, above the plane of the strip movement there is an operating device 63 acting in dependence upon the movement of the strips (FIG. 1), the device being formed by a feeler pivotally mounted on a shaft 64 and which for example, the feeler being a cranked lever connected at one end to a switch 65. The switch 65 controls the movement of the tubular thread guides 25, 26, the switch 65 actuating the pressure cylinder 34 in response to the position of the feeler.

The guides 19 described above, and their associated moving means 21 operate in synchronism, and their mode of operation is as follows:

The strips 11 to be assembled are slipped by hand between the feed rollers 14 and the pressure rollers 18 (FIG. 2). The tubular guide 25 extends above and the tubular guide 26 below the strips 11, and the two threads 35a, 36a are knotted together or otherwise connected so that the leading edge of the strip 11 passing through, engages the threads 35a, 36a. The thread 35a is laid on the upper surface and threads 36a on the lower surface of the strip 11, the two adhesive threads 35a, 36a being guided by means of the tubular guides 25, 26. During the passage of the strips, the feeler 63 slides over the surface of the strips. When the feeler reaches the rear edge of the strip, it tilts on its shaft 64 and actuates the switch 62 which in turn sets the pressure cylinder 34 in motion. This pressure cylinder 34 and its connecting rod carries out a rectilinear displacement movement resulting in rotation of the lever arm 33 through 90° to 120°; this causes the gear wheels 29 to be rotated by the gear wheel 32, the levers 27, 28 connected therewith being similarly rotated, so that the tubular thread guide 25 moves downward below the strip 11 and the tubular guide 26 is moved upwards, so that the guides change their locations. This movement of the guides 25, 26 crosses the two adhesive threads 35a, 36a at the trailing edge of the strip 11. After the change-over of the tubular thread guides 25, 26 has been effected, a subsequent strip 11 is slid against the rear edge of the first strip and this second strip also passes through the device during which the threads 35a, 36a, pass across its upper and lower faces.

The threads 35a, 36a by alternately overlapping the strips 11, firmly locate them side by side. Subsequently in the heating device 37 a rigid bond is effected by adhesion between threads 35a, 36a and the strips 11. The guide devices 19 and their movement devices 21 may be moved along the machine head 17, so as to provide variation of the thread location over a certain length of the strips. The tubular guides 25, 26 may be displaceably mounted in the swivel levers 27, 28, providing a thread location corresponding to the widths of the strips.

In the central region of the strips 11 there is a thread guiding device 20 of different design, with movement device 22 passing through above and below their movement plane (FIG. 4). The movement device 22, has four guides 38 arranged on the machine head 17, two of which are arranged vertically on both sides of the central plane normal to the strips 11. The guides 38, arranged in pairs, are juxtaposed with a predetermined spacing; in the guides 38 there is a racked bar 39a, 39b provided so as to be displaceable relative to the vertical guides 38.

In an upper guide pair 38 there is a racked bar 39a and in a diagonally opposite lower guide pair 38 there is a racked bar 39b. On the upper or lower end of these two racked bars 39a, 39b there is a holding plate 40, which is retained outside of the guides 38 and is displaceable with the racked bars 39a, 39b.

These holding plates 40 support a thread roller 41, 42 and a tubular guide 43, 44 forming a guide device 20, through which tubular guides the threads 41a, 42a pass from the thread rollers 41, 42 and are laid on the surfaces of the strips. The two tubular thread guides 43, 44 are pivotally mounted at one end in a hinge point on the associated holding plate 40 and are held by stops, not shown, in position (above and below the plane of movement of the strips) with their ends at the thread outlet side held close to the surface of the strips, so that the tubular guides 43, 44 are each slightly tilted.

The movements of the racked bars 39a, 39b are effected by a pressure cylinder 47 (driving device) engaging a gear wheel 46 by a connecting rod 45 the gear wheel being mounted on the machine head 17. Each tubular thread guide 43, 44 has a gear drive provided as part of the movement device 22 associated therewith, these two gear drives extending above and below the movement plane of the strips and parallel therewith.

The gear wheel 46 drives a second gear wheel 49 via

an intermediate gear 48 the gear wheels 46, 49 with their driving shafts 50, 51 are located above and beneath the strip 11, and each has a transmission gear 52, 53 in the region of their guides 38. The free ends of the driving shafts 50, 51 each mesh with a transmission gear 54, 55 by gear wheels 56, 57 on further driving shafts 58, 59; these driving shafts 58, 59 also carry transmission gears 60, 61 in the region of the other guides 38. The driving shafts 50, 51 and 58, 59 are rotatably mounted in bearings 62 secured to the machine head 17.

The transmission gears 52, 53 and 60, 61, rotatably mounted in the region of the guides 38, engage in the racked bars 39a, 39b, which converts their rotary movements into displacement movements of the racked bars 39a, 39b. This up and down movement of the racked bars 39a, 39b causes the tubular guides 43, 44 to periodically reverse their positions, whereby they are alternately above and below the plane of the strips.

The guides 20 and movement devices 22 are arranged in the centre region of the strips; they are displaceable parallel to the plane of the strips of sheet and at right angles to the direction of feed. They operate as follows:

The strips 11 to be joined are pushed by hand between feed rollers 14 and pressure rollers 18, and in their centre region are held together by means of adhesive threads 43, 44. The tubular guide 43 is located over and the tubular guide 44 below the plane of the strip, and the two threads 41a, 42a are joined at their ends, so that the strip 11 in passing through engages the threads so that they finally rest on the upper and lower faces of the strips.

The switching device 63 actuates the switch 65 when passing over the rear edge of the strip 11, which switch sets the pressure cylinder 47 in motion. This cylinder 47 imparts to the two driving shafts 50, 51 a rotary movement which is transmitted by means of the transmission gears 54, 55 to the two other driving shafts 58, 59; the transmission gears 52, 53 rotate in an opposite direction to the transmission gears 60, 61. The transmission gear 53 moves the racked bar 39b vertically upwards and the transmission gear 60 moves the racked bar 39a straight downwards.

The two racked bars 39a, 39b are hence moved from an upper into a lower position, or vice versa, by the transmission gears 52 or 61, each being brought into its lowermost or uppermost end position. During the displacement movement of the racked bars 39a, 39b the tubular thread guides 43, 44 carried by them are subject to a positional change. The displacement movement of the tubular guides 43, 44 is in the same direction as their racked bars 39a, 39b; since the tubular guides 43, 44 execute a pivotal movement as well as a displacement movement, the path of displacement of the racked bars 39a, 39b is greater than the path of displacement of the tubular guides 43, 44. These tubular guides are pivoted about their pivots (hinge points) on the holding plates 40 by means of stops, so that the thread outlet ends of the tubular guides 43, 44 also are located close to the strip 11, with the guides 43, 44 oppositely inclined.

This alternation of the tubular guides 43, 44 occurring at the rear edge region in the direction of passage has caused the threads 41a, 42a to cross (FIG. 5). In the subsequent strip 11 the threads 41a, 42a are supported in reverse arrangement on the faces of the strips. As each strip of sheet 11 passes through, reversal of the tubular guides 43, 44 occurs at the rear edge, so that the strips 11 are held together by the threads 41a, 42a. A heating device (not shown in the figure) attaches the adhesive threads 41a, 42a firmly to the strips, since this heating device heats the adhesive provided on the threads 41a, 42a, and rolls or presses it against the strips.

The two thread guiding devices 19 and 20 may be of other forms, with the associated movement devices 21 and 22 mutually or separately moved in accordance with the width of the strips, with a plurality of guide devices 20 in juxtaposition on the apparatus.

5

In a further embodiment of a device for transversely assembling strips as 11 shown in FIGS. 6 to 9 of the drawings and which in basic structure corresponds to the device shown in FIGS. 1 to 5, each thread guide device 19 or 20 has associated therewith, above and below the plane of movement of the strips, an adhesive application device 66 which is displaceable along the length of the strips, these devices apply spots of adhesive at spaced intervals along the threads.

The adhesive application devices 66 are preferably identical in structure and symmetrically oppositely arranged. Each adhesive application device 66 is provided with a gear pump 68 in a cylindrical pump chamber 69, with two gear wheels 70, 71 meshing with one another; they are also in sliding contact with the wall surface of the pump chamber. The cylindrical pump chamber 69 of each gear pump 68 communicates by means of a feed passage 72 with an adhesive reservoir 73. From the pump chamber 69 an adhesive passage 74 supplies the adhesive to the surfaces of the strips, the passage extending inclined relative to the plane of the strips, the supply passage 72 being arranged on one side and the adhesive application passage 74 on the other side of the two gear wheels 70, 71.

The adhesive reservoir 73 and the adhesive application passage 74 may each be fitted with a heating device 75, so that a thermoplastic granular adhesive (polyester, polyamide) becomes liquified and is applied in the form of thick liquid spots 76 on the surfaces of the strips. Above and below the movement plane of the strips there are pressing rollers 77 pressing the adhesive and the thread 67 against the surfaces of the strips.

The two adhesive application devices 66 (arranged above and below the strips) are driven in synchronism by the driving device 16, the two gear pumps 68 being controlled by means of a lever linkage 78 to the driving device 16 and are synchronised therewith.

One gear wheel 70 of the adhesive application device 66 is connected by means of a linkage 79, 80 to a pivot point 81; it is thereafter connected with the driving device 16 by a double-armed pivot lever 82 pivotal about a bearing 81, the lever 82 being positively connected to the driving device 16; both adhesive application devices 66 have a cam gear 83 adapted to cause the pivot lever 82 to execute reciprocating pivotal movements, the cam being in the form of a star wheel against which the pivot lever 82 is retained under tension with a roller 84.

The end of the pivot lever 82 away from the control gear 83 is connected with the gear wheel 70 by means of the linkage 79, 80. Between the link 79 and the gear wheel 70 there is a one way clutch whereby the gear wheel 70 is displaced by a forward movement of link 80 towards the thrust rollers 77, but remains stationary during the opposite displacement movement.

The apparatus described above by way of FIGS. 6 to 9 operates as follows:

The strips 11 to be assembled at right angles to their longitudinal extension, are slid by hand between the transport rollers 14 and the pressure rollers 18 and pass through the apparatus in the direction of the arrow (FIGS. 7 and 8). The thread guiding devices 19 or 20 supply a thread 67 on both sides to the strips causing the thread to be laid alternately on the upper and lower faces of the strips.

After supplying the thread, an adhesive is applied in spots on the sheet surfaces and subsequently pressed together with the threads 67 against the sheet faces.

The driving device 16 with its control gear 83 causes the lever 82 to carry out a pivotal movement about bearing 81, which movement is transmitted to the two levers 80 connected thereto. These levers 80 in turn cause the links 79 connected thereto to execute a pivotal reciprocating movement which is transmitted by the slip clutch to the meshing gear wheels 70, 71 as a rotary movement. The gear wheels 70, 71 of the gear pump 68 are moved

6

through a certain rotary angle at equal time intervals, the adhesive entering the pump chamber 69 from the reservoir 73 being forced between the gear wheels 70, 71 and the adjacent pump chamber wall surfaces from the pump chamber section formed by the gear wheels 70, 71 into the other pump chamber section communicating with the adhesive application passage 74. This pump chamber and the adhesive application passage 74 are constantly filled with adhesive and the latter is supplied by a rotary movement of the gear wheels 70, 71 forcing a proportion of adhesive out of the adhesive passage 74 and onto the surface of the strips where it is discharged as spots 76. The viscosity of the adhesive and its surface tension prevent accidental leakage of adhesive.

The drops 76 of adhesive applied in successive intervals in the region of the threads 19 placed on the surfaces of the strips, are pressed by the pressure rollers 77 against the faces of the strips, so as to produce a rigid bond between threads 67 and strips 11 so that the strips are joined side by side.

I claim:

1. An apparatus for transversely assembling sheet strips of veneer, cardboard and the like, by positioning binding means such as threads or strips at right angles to the longitudinal extensions of the sheet strips being joined, comprising:

- (a) at least, two reversibly movable thread or strip guide devices, each guide device having two binding thread or strip outlets, said strip outlets of each thread or strip guide device being spaced apart from each other at a distance from the plane of movement of said sheet strips being joined on opposite sides thereof and reciprocable from one side to the other between successive strips being joined,
- (b) means for reciprocating the strip outlets of each of said strip guide devices alternately from one side to the other side of the plane of movement of said sheet strips being joined, each of said strip outlets being alternately positioned on opposite sides of successive sheet strips being joined,
- (c) a movement device for alternating the positions of the strip outlets of each of said guide devices with respect to both sides of said sheet strip being joined,
- (d) two glue applicators for each pair of binding means, one applicator positioned on either side of the sheet strip plane of movement within the area of attachment of the binding strips to the sheet strips being joined, said glue applicators being located along the plane of movement of the sheet strips at a point which follows the location of said strip guides, each of said glue applicators adapted to apply glue to one of the binding strips previously applied to the sheet strip,
- (e) pressure applicators positioned along the sheet strip plane of movement at a point following the location of said glue applicators, said pressure applicators adapted to apply a pressing force to the binding strips having adhesive applied thereto to force said binding strips onto the sheet strip surface, and
- (f) means for conducting the assembled sheet strips away from the pressure applicators.

2. An apparatus as recited in claim 1, wherein at least one guide device with associated movement device is arranged at right angles to the direction of passage of said strips, and near the ends thereof.

3. An apparatus as recited in claim 1, in which each of said guide devices is formed as two tubular guides, and comprising a common movement device for said guides and a passage in each guide to receive said threads.

4. An apparatus as recited in claim 3, in which the longitudinal axes of the tubular guides of the guide devices are arranged parallel to the plane of the strip of sheet and with a certain length of overlap with the edge region of the strip of sheet.

7

5. An apparatus as recited in claim 3, wherein said tubular guides of the guide devices are vertically displaceable in a straight line and pivotal through a certain angular range; means for connecting said guides to said common movement device, and racked bars displaceably mounted in slider guides retaining said thread guides displaceably opposite one another.

6. An apparatus as recited in claim 5, wherein said movement device is provided with a plurality of slider guides mounted in pairs one above another, in each pair of guides a racked bar provided with a tubular guide, and rotatably mounted transmission gears for said racked bars.

7. An apparatus as recited in claim 6 comprising gear drives for actuating said transmission gears of the movement device from a pressure cylinder, and means connected with said drives to drive said transmission gears alternately in opposite directions of rotation.

8. An apparatus as recited in claim 3 comprising a racked bar operatively connected to said tubular guides for reciprocating same, and stops for limiting the movement of said tubular guides of the thread guiding device during displacement of said racked bar, said tubular guides being retained in a certain slant position relative to said strips.

9. An apparatus as recited in claim 8 wherein said guide device is displaceably mounted parallel to the direction of movement of said strips, and additionally comprising a heating and pressure device located above and below the movement plane of said strips.

10. An apparatus as recited in claim 3, in which the tubular guides of the guide device are arranged at a certain inclined position relative to the plane of the strip of sheet and with a certain length of overlap with the edge region of the strip of sheet.

11. An apparatus as recited in claim 1 comprising a switching device controlled in dependence upon the passage of said strips, said switching device comprising a feeler in contact with the surface of the strips, a switch connected to said feeler, and a driving device actuated by said switch.

12. An apparatus as recited in claim 1 wherein each of said guide devices comprise two tubular guides, said tubular guides being pivotally arranged to move through a predetermined angular region on said common movement device, a driving device for actuating said movement device, a crank operatively connected between said driving device and said movement device by first levers connected to said crank and said movement device and a lever movably connected between said driving device and said crank.

13. An apparatus as recited in claim 1 comprising a gear pump for each adhesive application device said pump being adapted to apply adhesive at spaced intervals to the surfaces of said strips under pressure supply, said gear pump comprising two gear wheels meshing with one another, and means for rotating said gear wheels in a pump chamber with the surface of which said gear wheels are in contact.

14. An apparatus as recited in claim 13, wherein said pump of each adhesive application device has an adhesive reservoir, a heating device therefor, and a heated adhesive outlet passage and an adhesive supply passage said supply and outlet passages being located on opposite sides of said gear wheels.

15. An apparatus as recited in claim 14 one gear wheel of the gear pump of the adhesive application devices at a time being non-rotatably connected comprising a double-armed lever pivotable about a fixed bearing, connections from said lever to a gear wheel of said pump and a cam rotated by said driving device, said cam

8

being shaped to cause said lever to execute a reciprocating movement.

16. An apparatus as recited in claim 15, in which said cam is formed as a star wheel, said lever has a roller on one end located under tension against said cam, and a link connecting the other end of said lever to said gear pump.

17. An apparatus as recited in claim 16, comprising a one-way slipping clutch between said link and said gear pump.

18. An apparatus as recited in claim 1, comprising two adhesive application devices located one above and one below the movement plane of said strips, two gear pumps for supplying adhesive, means for connecting said two gear pumps to the driving device moving said strips to operate said pumps in synchronism, said connecting means having an intermittent operation.

19. An apparatus as recited in claim 1, comprising pressure rollers above and below the plane of movement of said strips and after said adhesive application devices to press said threads and said adhesive against the surfaces of said strips.

20. An apparatus as recited in claim 19, comprising adjusting means whereby said adhesive application devices, thread guiding devices and said pressure application rollers are displaceable along the lengthwise direction of said strips.

21. An apparatus for transversely assembling sheet strips of veneer, cardboard or the like, whereby at least two pairs of threads are cemented at right angles to the longitudinal extension of said sheet strips, comprising:

- (a) at least two guide devices to guide said threads to the opposite faces of successive sheet strips by reciprocating said threads between each succeeding sheet strip, said guide devices reciprocating between the trailing edge and leading edge of successive strips,
- (b) means for changing the position of said guide devices relative to the plane of movement of said sheet strips,
- (c) a movement device reciprocating the guide devices with respect to both upper and lower faces of said sheet strips,
- (d) two adhesive application devices for each pair of threads connected ahead of said guide device and arranged above and below the movement plane of said sheet strips, said application devices being adapted to apply spots of adhesive in spaced intervals successively on the faces of said sheet strips in the regions where said threads are laid,
- (e) pressure applicators positioned along the sheet strip plane of movement at a point following the location of said adhesive application devices, and
- (f) means for conducting the assembled sheet strips away from the pressure applicators.

References Cited

UNITED STATES PATENTS

1,977,199	10/1934	Osgood.	
3,034,938	5/1962	Puhr	156—91 X
3,360,410	12/1967	Romanin	156—179 X
3,377,223	4/1968	Clausen et al.	
3,447,987	6/1969	Williams	156—357 X
3,490,974	1/1970	Jacobson	156—304 X

BENJAMIN A. BORCHELT, Primary Examiner

J. M. HANLEY, Assistant Examiner

U.S. Cl. X.R.

156—91, 179, 439, 558