Jan. 23, 1973 E. L. CLARK 3,712,842

APPARATUS FOR MAKING WELTS

Original Filed Jan. 8, 1968 2 Sheets-Sheet 1

FIG. 1

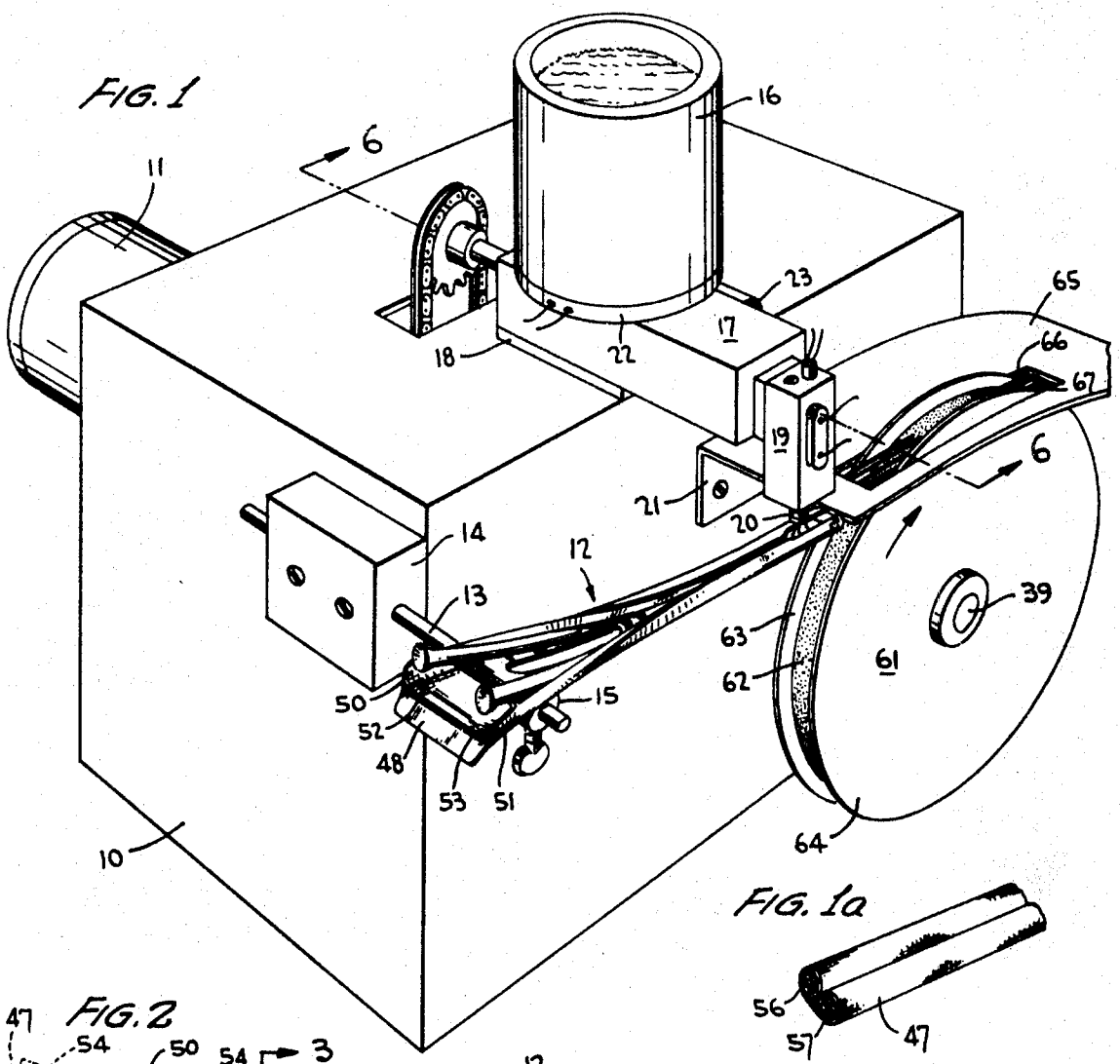


FIG. 1a

FIG. 2

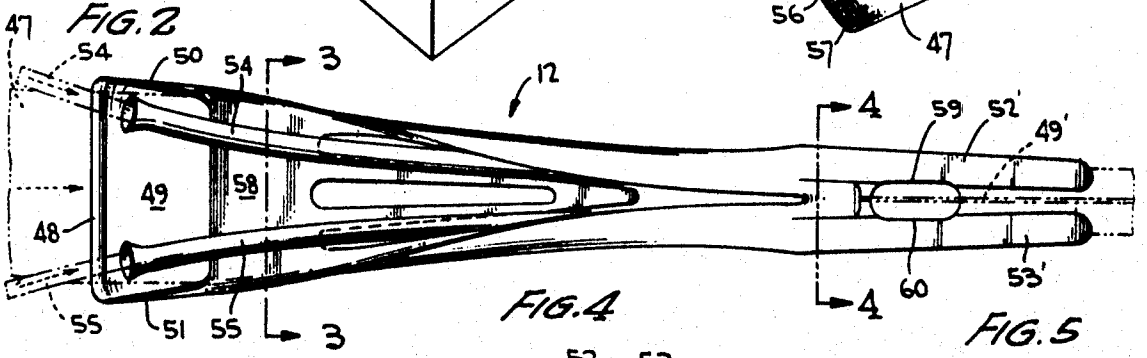


FIG. 3



FIG. 4

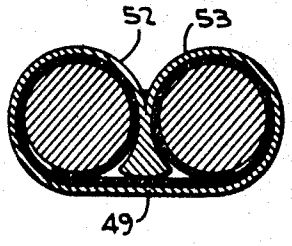


FIG. 5



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FIG. 6

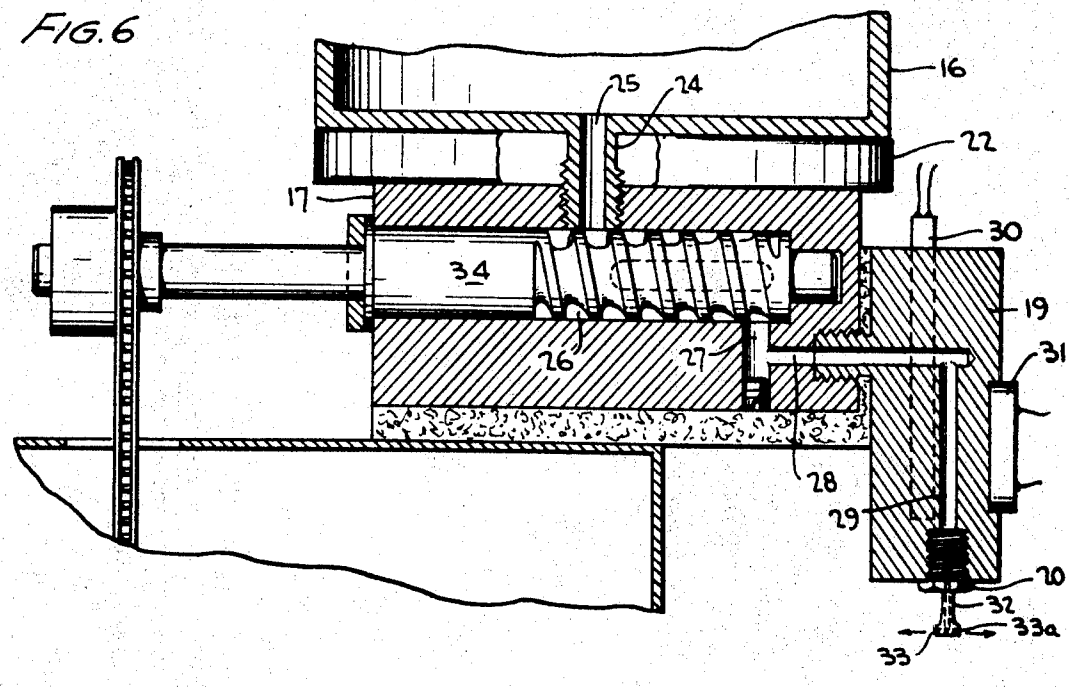


FIG. 7

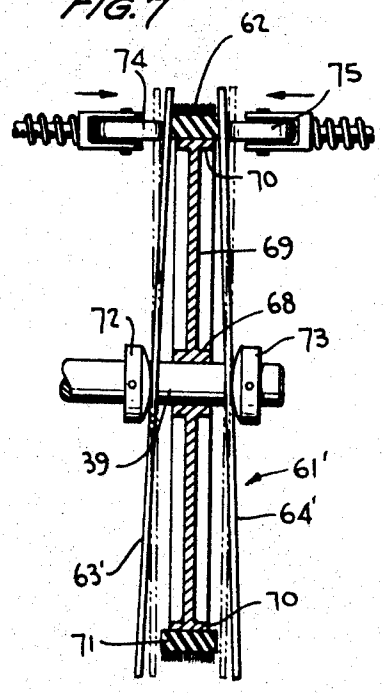
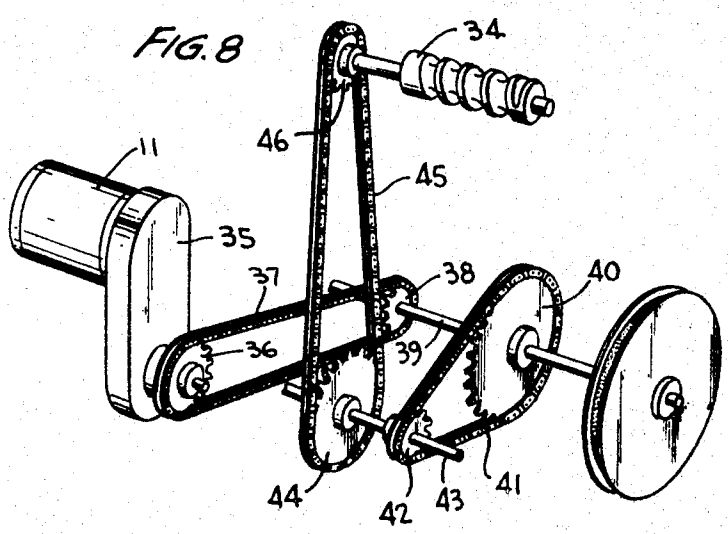


FIG. 8



United States Patent Office 3,712,842
Patented Jan. 23, 1973

3,712,842

APPARATUS FOR MAKING WELTS

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Original application Jan. 8, 1968, Ser. No. 696,339.
Divided and this application June 28, 1971, Ser. No. 157,629
Int. Cl. B32b 3/04
U.S. Cl. 156—464 5 Claims

ABSTRACT OF THE DISCLOSURE

A double or single welt for use in the upholstered furniture and other industries, as well as a method and an apparatus for making such welts. The double welt comprises an elongated strip of textile or other material with its longitudinal edges folded or rolled inwardly toward each other to form two tubes, into which cords are preferably introduced, the outer surface of each infolded edge portion engaging the inner surface of the unfolded central portion of the strip and being permanently secured thereto as by adhesive, the cords being free to move longitudinally within the strip material. The single welt may be formed by slitting a double welt made as stated, or by forming a single fold or tube from a narrower strip of material, utilizing essentially the same method of folding or rolling the material upon itself, inserting a cord if desired, and securing the outer surface of the folded material to the inner surface of the unfolded material. An apparatus suitable for performing the stated method comprises a folder mechanism, an adhesive applying means, and means for advancing the material (and cords if used) through said mechanism and past said adhesive applying means.

This is a division of application Ser. No. 696,339, filed Jan. 8, 1968, now U.S. Pat. No. 3,622,433.

BACKGROUND OF THE INVENTION

(1) Field of the invention

Double welt is used as a trim to cover the staples or tacks which hold the upholstery material to the wood frame of a piece of upholstered furniture. In some instances the wood frame is grooved, the edge of the upholstery material being fastened in the groove, and in such cases a single welt is inserted in the groove to cover the staples or tacks as well as to assist in holding the upholstery material in place. In either case the welt is customarily glued to the furniture frame. Double or single welts may also be employed for analogous purposes in industries other than the upholstered furniture industry as, for example, the interior decorating, automobile, aircraft, railway vehicle, and similar industries.

(2) Description of the prior art

Double and single welts of the type mentioned above are customarily made of the same fabric as the rest of the upholstery. The conventional double welt is made on a specialized sewing machine, and consists of a strip of fabric which passes through a rather complicated folder and is then sewn while in the folded position. The thread color should be selected to match the fabric. There is a lip or ridge on the bottom of the welt caused by the necessity of a return fold to prevent raveling of the fabric edges. The conventional single welt is also made by folding a strip of fabric, usually containing a cord, and joining the edges of the fabric by sewing, the edges of the fabric of course projecting beyond the line of stitching. In either case there is a rough or uneven surface which must be glued to the wood of the furniture frame. In the case of conventional sewn welts, basting staples

or tacks are used for holding the welt to the frame while the glue dries, after which, being in plain view, they must be removed.

SUMMARY OF THE INVENTION

According to the present invention there is provided a double welt comprising an elongated strip of material, each longitudinal edge of which is folded inwardly so that the outer surface of each folded portion adjacent its edge engages the opposite or inner surface of the unfolded center portion of the strip, the said outer surfaces being permanently secured, as by an adhesive or other suitable means, to the said inner surface. Such a double welt presents a flat lower surface for gluing to the furniture frame and provides the deepest possible groove or recess between the two welts. This enables the use, if desired, of well-hidden staples in addition to, or in place of, glue for holding the welt to the furniture frame, thus providing a stronger construction. Use of the welt of the present invention eliminates the time-consuming operation of removing the basting staples or tacks. Another advantage of the invention is that it eliminates the necessity of matching a thread to the upholstery material, as is necessary in the manufacture of a sewn welt.

According to the present invention, a single welt of improved type may be obtained by making a double welt as aforesaid and slitting the fabric between the two welts. Alternatively, the single welt may be formed by rolling a narrow strip of material from one edge toward the other, preferably enclosing a cord, after which the outer surface of the folded or rolled edge is secured to the inner or upper surface of the other edge as by adhesive.

The invention also includes the provision of a method of forming a double or single welt of the type described. The method of forming the double welt comprises the steps of folding an elongated strip of material inwardly from each longitudinal edge thereof to being the outer surface of each folded portion, adjacent the respective edge of said material, into close proximity to the inner surface of the unfolded material between such folded portions, and securing the said edge-adjacent outer surfaces to the said inner surface, as by means of a suitable adhesive material. Preferably a cord is enclosed within each of the folded edge portions during the folding process. The cords, not being adhered to the textile material, are free to move longitudinally within the latter, thus allowing better accommodation of the welt to curves and bends, without puckering or buckling.

The method of the present invention eliminates the need for special purpose sewing machines with the attendant problems of thread breakage, bobbin changes, etc. The double welt of the invention possesses the advantage of an improved appearance because of the deepest possible groove between the cords, which groove is narrow and uniform. A second advantage is that it provides a flat base with no folded undersurface or other projections to prevent smooth application of the welt to the furniture frame. If glue is used to hold the welt to the furniture, there is a smooth gluing surface. Also, as mentioned above, mechanical fasteners such as staples may be used, with or without adhesives, to hold the welt to the furniture, and such fasteners would be completely hidden in the deep groove. The use and subsequent removal of basting fasteners is completely eliminated. It is estimated that the improved welt of the present invention can be applied to the furniture at least 25% faster than the conventional welt, not counting the additional time saved by eliminating the necessity for removal of basting fasteners.

The invention further includes the provision of a suitable apparatus for carrying out the novel method men-

tioned above. Such apparatus includes a folder mechanism, an adhesive applying means, and a material advancing means for causing the textile material and the cords, if used, to pass through the folder mechanism and past the adhesive applying means. The folder mechanism includes a trough-like passage for strip material which passage at its entering end has a relatively wide bottom and narrow side walls, the bottom portion adjacent each side wall being inclined upwardly and outwardly at a slight angle which increases progressively with the distance from the entering end, so that the said inclined portions gradually turn inwardly toward each other and then downwardly toward the center of said bottom portion, the central portion of which narrows progressively with the distance from the entering end. This progressive inward and downward turning of the lateral edges of the trough bottom results in the formation of substantially separate passageways for progressively infolding the respective edges of the strip material. Preferably, the folder mechanism includes a pair of tubes for the introduction of cords, each tube extending from a point near the entering end of the folder mechanism to a point within one of the said separate passageways, so that a cord is enclosed within each of the infolded edges of the strip material as the folding step approaches completion. The folder mechanism also includes means for tucking the infolded edges of the material under the cords and adhesive applying means including nozzle means extending into the mechanism midway transversely thereof and near the exits from the said separate passageways, which nozzle means is provided with lateral orifices for extruding adhesive material onto and between the outer surface of each infolded edge portion and the upper or inner surface of the unfolded central portion of the strip material. Lastly, the folder mechanism includes means for pressing the adhesive bearing surfaces together as the material completes its travel through the mechanism. If a low profile welt is desired, with no exposed edges, the welt cords can be eliminated, in which case the above-mentioned tubes are not used.

The adhesive may be applied as described above, or, alternatively, the adhesive may be applied to the outer surface of each infolded portion during the folding process, or to suitable areas of the fabric prior to its entry into the folder mechanism. In the latter case, the adhesive may be in solid or dry ribbon or filamentary form and fed into the folder mechanism with the strip material, to be activated by heat or otherwise after the folding is completed. In the case of vinyls and other plastic materials, adhesion may be accomplished by self welding or reactivation of the material by various means. In the case of the apparatus to be described below, the adhesive to be employed is preferably of the "hot melt" variety, and the apparatus includes means for maintaining a supply of such adhesive at an elevated temperature, together with means for feeding a stream of adhesive material, at a somewhat higher temperature and under pressure, to the above-mentioned nozzle means.

The means for advancing the material through the folder mechanism preferably comprises a rotary member presenting a cylindrical surface adjacent the exit end of the folder mechanism, which cylindrical surface is covered with a material of strong frictional characteristics, for gripping the undersurface of the welt issuing from the folder mechanism, the rotary member being driven from a suitable power source. The required frictional characteristic may be conveniently provided by covering the cylindrical surface of the rotary member with the well-known "card cloth" used in the textile industry for carding fibrous material.

The provision of the welts, methods, and apparatus mentioned above are among the objects of the present invention. Other and further objects, features and advantages will appear from the description of the preferred embodiments as set forth below.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an apparatus according to the present invention;

FIG. 1*a* is a perspective view of a piece of double welt made in accordance with the invention;

FIG. 2 is a plan view of the folder mechanism of said apparatus, with the material and cords of the welt being shown in phantom;

FIGS. 3 and 4 are transverse sections on lines **3—3** and **4—4**, respectively, of FIG. 2;

FIG. 5 is an end view of the double welt of FIG. 1*a*;

FIG. 6 is a fragmentary vertical section on line **6—6** of FIG. 1;

FIG. 7 is a vertical section illustrating an alternative form of material advancing means; and

FIG. 8 is a perspective view of the power transmission for the adhesive pump and the material advancing means of the device illustrated in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 of the drawings illustrates, in perspective, the preferred embodiment of the apparatus for carrying out the method and producing the article of the present invention. For convenience and safety, the moving parts of the apparatus are enclosed, so far as possible, within a casing **10**, the enclosed parts being illustrated in FIG. 8 and described hereinafter. A motor **11**, supported externally of the casing **10** provides the small amount of power necessary for driving the moving parts of the device. A folder mechanism **12** is supported by any suitable means outside the casing **10**, such support being provided, in the present instance, by a rod **13** mounted in a block **14** secured to the casing **10**, the folder **12** being slidably supported on the rod **13** by means of a screw clamp **15**.

A glue pot **16** is mounted upon a glue pump **17** which in turn is supported by the top wall of the casing **10**, a suitable thickness of heat insulating material **18** being interposed between the pump **17** and the casing **10**. One end of the pump **17** projects outwardly beyond the side wall of the casing **10** and carries, at its outer end, a glue distributor **19** which in turn carries, at its lower end, a nozzle **20**. The outer end of the pump **17** and associated parts are supported by a bracket **21** secured to the adjacent wall of the casing **10**.

A ring-type electric heater **22** for the glue pot **16** is interposed between the bottom of the latter and the top of the pump **17**, and is energized from any suitable source of electricity, the temperature of the adhesive material within the pot **16** being maintained constant through the use of a thermostat **23** controlling the energy supplied to the heater element **22**. In the present instance the "hot melt" adhesive employed is maintained at a temperature between 250° and 300° F., depending on the formulation of the adhesive, at which temperature it is in a fluid but viscous state.

As best seen in FIG. 6, the centrally disposed threaded stud **24** by means of which the pot **16** is secured to the pump **17** is centrally bored to provide a conduit **25** connecting the interior of the pot **16** with a longitudinal cavity **26** formed in the pump **17**. The cavity **26** is similarly connected through conduits **27** and **28** with the glue distributor **19**, which is bored to provide a portion of the conduit **28** and a connecting conduit **29** leading to the nozzle **20**. The glue distributor **19** is provided with a rod-type electric heating element **30** controlled by a thermostat **31** to maintain the adhesive passing to the nozzle **20** at a temperature somewhat above the temperature maintained in the pot **16**, whereby the adhesive issuing from the nozzle **20** is sufficiently fluid to be distributed easily and evenly upon the surfaces to be adhered together. The nozzle **20** is provided with a central longitudinal conduit **32** connecting at its lower end with oppositely disposed lateral orifices **33**, **33***a*.

Disposed within the longitudinal cavity **26** of the pump **17** is a screw threaded pump member **34** which is driven in rotation by the motor **11** through a gear transmission **35**, sprocket **36**, chain **37**, sprocket **38** on driven shaft **39**, sprocket **40** on the same shaft, chain **41**, sprocket **42** on countershaft **43**, sprocket **44** on the latter shaft, chain **45** and sprocket **46** fixed on the outer end of the threaded member **34**. The lands and grooves of the threaded portion of the member **34** are so proportioned, progressively, as to exert a somewhat higher pressure upon the advancing adhesives as it approaches the discharge end of the member **34** and enters the conduit **27**, thus imparting the necessary pressure to extrude the adhesive at the desired rate through the orifices **33**, **33***a*. The desired speed of rotation of the member **34** and resulting pressure upon the advancing adhesive may, of course, be achieved through any suitable means alternative to the gear transmission and sprocket chain drive illustrated and described.

Referring now to FIG. 2 of the drawing the folder mechanism **12** may be described as trough-like in form, and having a transverse section which narrows progressively to the point at which the folding step is completed, just in advance of the point at which the adhesive material is applied. The entering end of the folder mechanism is preferably formed with a downturned lip **48** and a bottom portion **49** which is substantially flat at its juncture with the lip **48**. The entering end of the bottom portion **49** is flanked by narrow side walls **50** and **51**, the folder mechanism, at this point, being open at the top. Immediately beyond the juncture of the bottom portion **49** with the lip **48**, the respective lateral edge portions **52** and **53** of the bottom portion **49** are angled upwardly at a slight inclination, which inclination increases progressively with the distance from the entering end, and inclined portions **52** and **53** gradually turning inwardly toward each other and then downwardly toward said bottom **49**, the central portion of which narrows progressively with the distance from said entering end. Thus, the folder mechanism gradually progresses, in transverse section, from a flat trough for the admission of the strip material **47** into two substantially separate passageways for progressively infolding the respective edges of the strip material as seen in FIG. 4, this progression being illustrated at an intermediate stage in FIG. 3. Beginning at a point slightly beyond the entering end, the folder mechanism is provided with two tubes **54** and **55** through which cords **56** and **57** are introduced. The tubes **54** and **55** terminate within the aforesaid substantially separate passageways, at a point slightly in advance of the section line **4—4** of FIG. 2, at which point the cords are completely enclosed within the infolded edge portions of the strip material **47** as seen in FIG. 4. Between the tubes **54** and **55**, there is provided a tongue **58** which is secured to said tubes at its rear or left end, but is free for the remainder of its length, and serves as a light hold down spring to maintain the central portion of the strip material **47** against the bottom **49** as the material advances through the folder mechanism.

As will be seen in FIG. 4, the downturned edges of the inclined portions **52** and **53** are joined, at a point just in advance of the section line **4** of FIG. 2, to form a short central partition separating the aforesaid substantially separate passageways for the respective infolded edges of the strip material, each enclosing a cord. From this point onward, the downturned portions **52** and **53** are discontinued, the remaining length of the folder mechanism comprising a bottom portion **49'** which progressively narrows to a slight degree, and upwardly and inwardly extending side walls **52'** and **53'**. The latter may be spaced apart at their upper extremities and their edges may be recessed as at **59** if necessary to accommodate the entry therebetween of the nozzle **20** of the adhesive applying means. If desired the bottom portion **49'** may be apertured as at **60** beneath the nozzle **20** to facilitate determination of the proper adjustment of the folder mechanism relative to the nozzle. The converging form of the folder mechanism beyond this point serves to maintain in close engagement the surfaces to which adhesive has been applied through the nozzle **20**, for the short duration of time necessary to enable the adhesive to set firmly.

Just beyond the exit end of the folder mechanism **12** the welt which has now been fully formed is gripped by the material advancing means comprising a narrow roller **61** secured to a projecting end of the shaft **39** which is driven as described above. The roller **61** may be of any suitable construction and preferably presents a cylindrical surface **62** flanked by projecting annular portions of side plates **63** and **64**. The surface **62** is formed of the well-known card cloth provided with projecting wires or bristles which are inclined forwardly and outwardly so as to frictionally engage the underside of the welt as it leaves the folder mechanism **12**. In order to strip the welt from the surface **62**, to which it would otherwise cling, a stripper **65** is provided, in the form of a slotted plate through which the upper portion of the roller **61** projects. The slot **66** is provided with one or more wires **67** which serve to strip the advancing welt from the surface **62** after a short travel thereon, during which rotation of the roller **61** provides the necessary traction to draw the strip material and cords into and through the folder mechanism **12**.

A preferred form of the material advancing means is illustrated in FIG. 7 in which the roller **61'** comprises a hub **68** secured on the shaft **39** and a disc **69** integral with the hub **68** and having a peripheral flange **70**. The latter carries a ring of resilient material **71**, for example, of rubber, which is slightly wider than the flange **70**, and the outer surface of which carries the aforesaid card cloth surface **62**. In the case of the embodiment of FIG. 7, the side plates **63'** and **64'** are loosely mounted on the shaft **39**, being retained by collars **72** and **73** secured to the shaft **39** by set screws. The collars **72** and **73** are preferably provided with parti-spherical facing surfaces, to permit angular movements of the plates **63'** and **64'**.

Means are provided adjacent the upper portion of the roller **61'** for pressing the plates **63'**, **64'** toward each other so that their outer edges will grip and confine the respective sides of the welt as it issues from the folder mechanism. Such means may consist of spring pressed rollers **75**, **75**, supported in any suitable manner, which serve to urge the peripheral portions of side plates **63'**, **64'** toward each other at the top of their travel. Rotation of the loosely mounted plates is brought about through their frictional engagement with the lateral edges of the layer **71** of resilient material carried by the flange **70** of the disc **69**.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. Apparatus for making welts, comprising a folder mechanism, adhesive applying means, and material advancing means, said folder mechanism including a trough-like passage for strip material which passage at its entering end has a relatively wide bottom and relatively narrow side walls, the bottom portion adjacent each side wall being inclined upwardly and outwardly at a slight angle, which angle increases progressively with the distance from said entering end, said inclined portions gradually turning inwardly toward each other and then downwardly toward said bottom, the central portion of which narrows progressively with the distance from said entering end, to form substantially separate passageways for progressively infolding the respective edges of said strip material, and said folder mechanism including a pair of tubes for the introduction of cords, each said tube extending from a point near the entering end of said passage to a point within one of said last mentioned passageways, means between said passageways for tucking the respective infolded edges of said material under said cords as said material and cords pass through said mechanism, said adhesive applying means including nozzle means extending into said mechanism midway transverse-

ly thereof and adjacent the exits from said passageways, said nozzle means having lateral orifices for extruding adhesive material onto and between the outer surface of each infolded edge portion and the unfolded central portion of said strip material, and said folder mechanism including means for pressing said adhesive bearing surfaces together as said material completes its travel through said mechanism.

2. Apparatus according to claim 1, said adhesive applying means including means for supplying a hot melt adhesive material in heated condition and under pressure to said nozzle means.

3. Apparatus according to claim 1, said material advancing means comprising a member supported for rotation adjacent the exit end of said folder mechanism, said member having a cylindrical surface of enhanced frictional characteristics for engaging the welt leaving said mechanism, and means for rotating said rotary member.

4. Apparatus according to claim 3, said cylindrical surface consisting of carding cloth.

5. Apparatus according to claim 4, including means for separating the welt from said cylindrical surface at a point beyond the rotation axis of said rotary member in the direction of travel of said welt.

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U.S. Cl. X.R.

156—201, 204, 213, 215, 465, 468, 485