No. 694,099. Patented Feb. 25, 1902.

# B. O. HALE.

## BELT FOLDING MACHINE.

(Application filed July 2, 1901.)

(No Model.) 4 Sheets—Sheet 1.

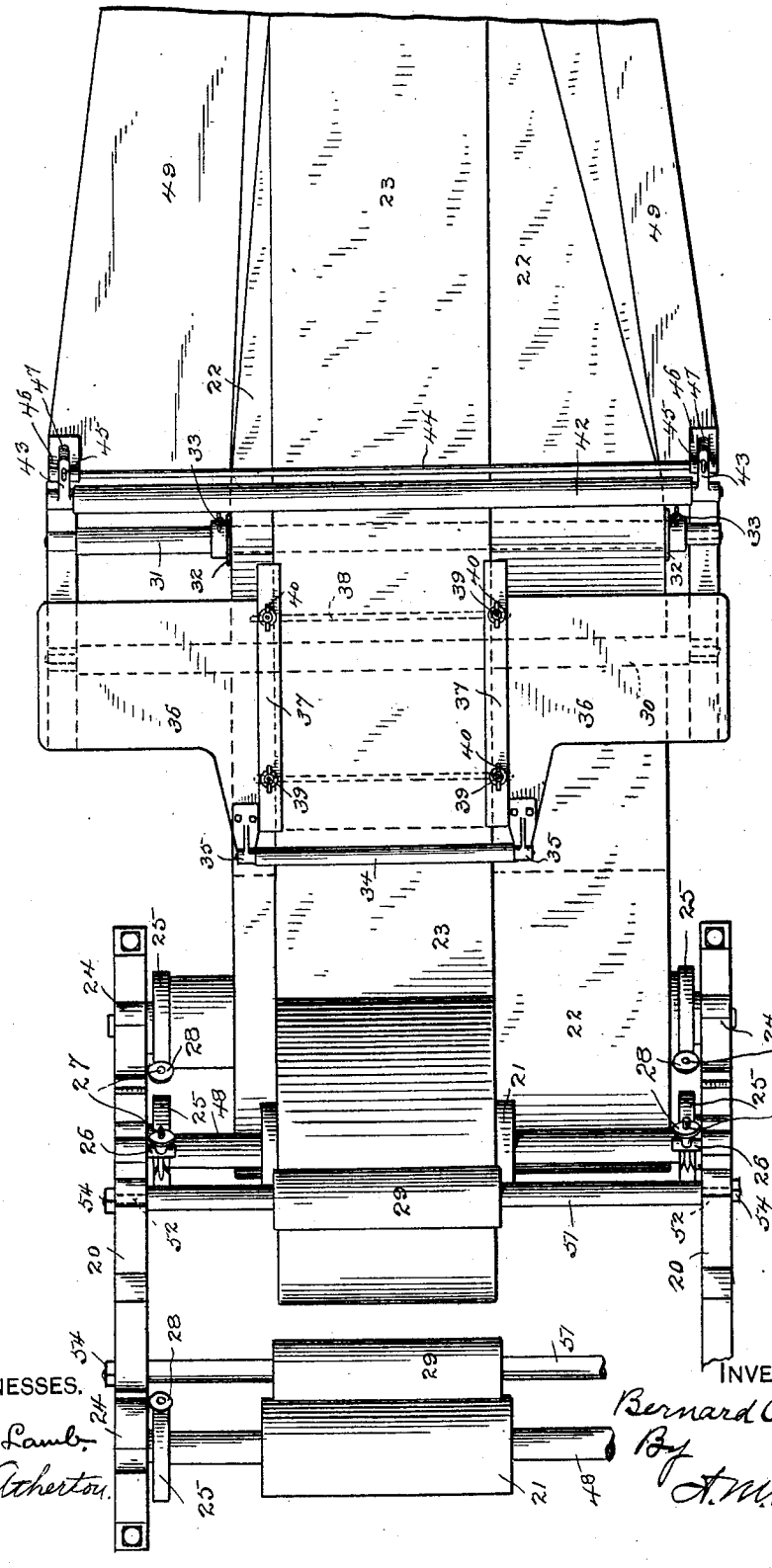


Fig. 1.

WITNESSES.

H. A. Lamb.

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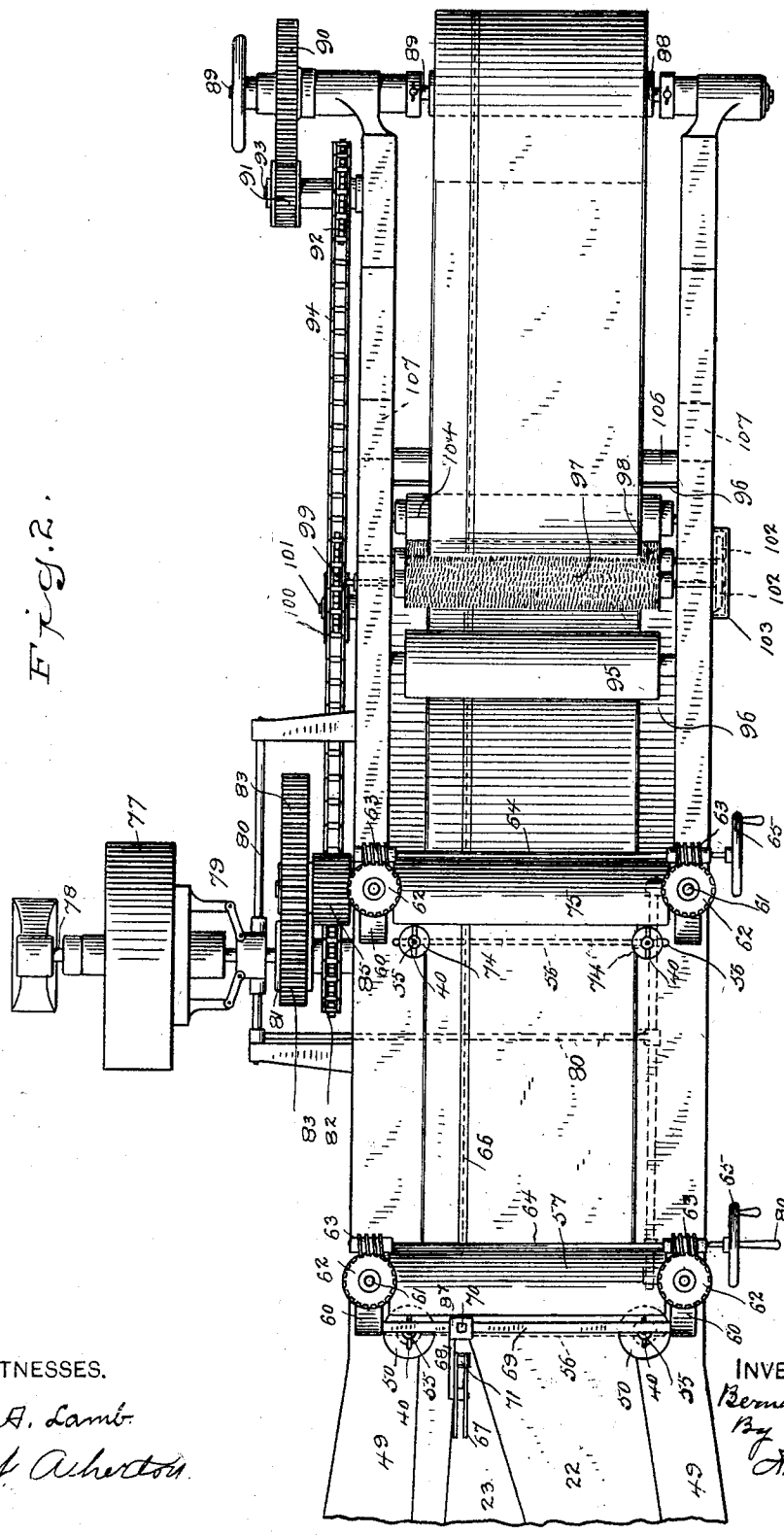
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## BELT FOLDING MACHINE.

(Application filed July 2, 1901.)

(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



WITNESSES.

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## BELT FOLDING MACHINE.

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(No Model.) 4 Sheets—Sheet 3.

Fig. 6.

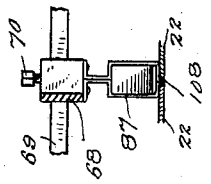


Fig. 5.

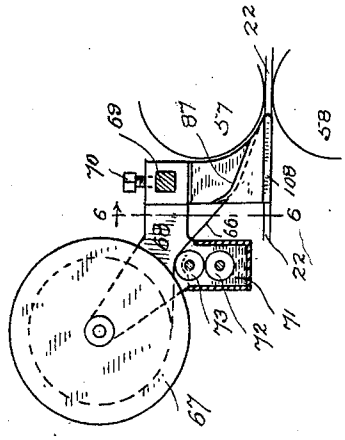


Fig. 3.



WITNESSES.

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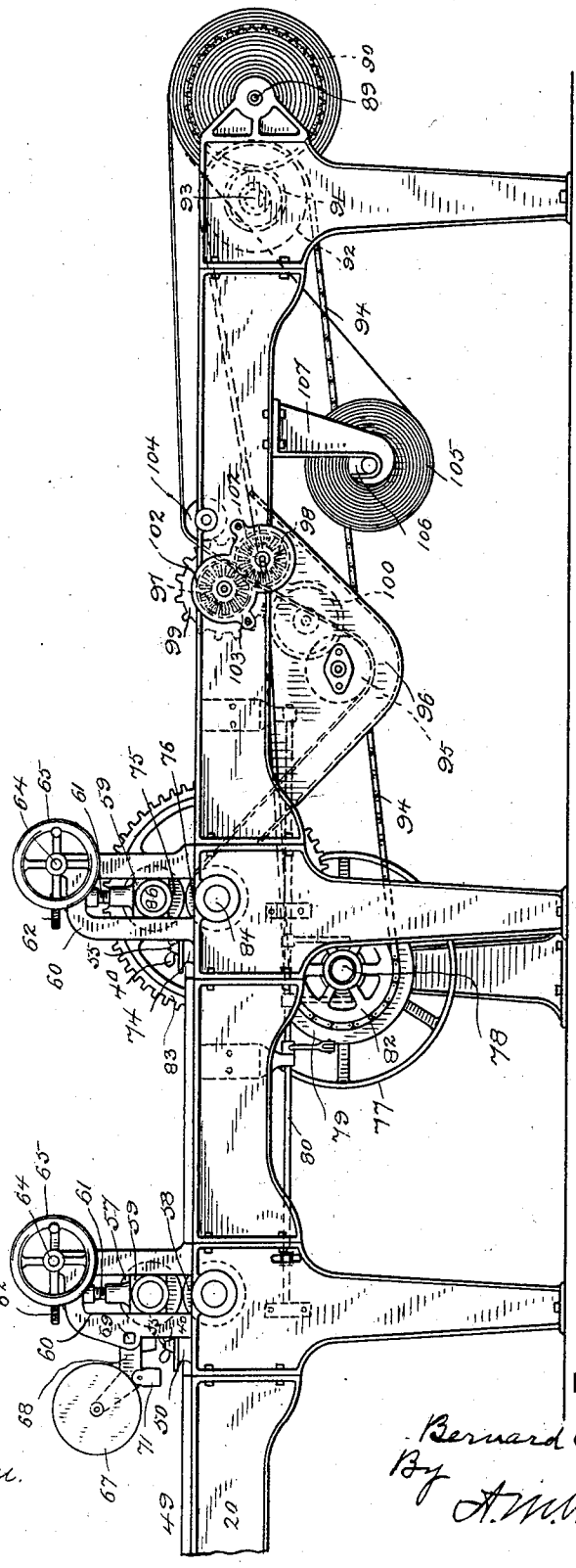
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## BELT FOLDING MACHINE.

(Application filed July 2, 1901.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 4.




WITNESSES.

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# UNITED STATES PATENT OFFICE.

BERNARD O. HALE, OF ANSONIA, CONNECTICUT, ASSIGNOR TO FARREL FOUNDRY AND MACHINE COMPANY, OF ANSONIA, CONNECTICUT, A CORPORATION OF CONNECTICUT.

## BELT-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 694,099, dated February 25, 1902.

Application filed July 2, 1901. Serial No. 66,896. (No model.)

*To all whom it may concern:*

Be it known that I, BERNARD O. HALE, a citizen of the United States, residing at Ansonia, county of New Haven, State of Connecticut, have invented a new and useful Belt-Folding Machine, of which the following is a specification.

My invention relates to the class of machines ordinarily known to the trade as "belt-folding" machines—that is, machines used in the manufacture of rubber belting and whose function is to fold an outer ply of material about one or more inner plies of material; and my invention has for its object to produce a relatively simple and inexpensive machine which shall be so constructed that the product of the machine shall be greatly increased and the cost of running the machine greatly reduced, my novel machine being adapted to be run at a relatively high speed and the number of operators required being reduced to two, owing to the fact that the machine enables the heavy plies of material to be so conveniently manipulated during the process of folding.

With these ends in view I have devised the novel belt-folding machine which I will now describe, referring to the accompanying drawings, forming part of this specification, and using reference characters to designate the several parts.

Figures 1 and 2 together comprise a plan view of the machine complete; Fig. 3, a side elevation of the portion of the machine which appears in Fig. 1; Fig. 4, a side elevation of the portion of the machine which appears in Fig. 2; Fig. 5, a detail view, partly in section and on an enlarged scale, illustrating the manner in which the seam in the outer ply is covered; and Fig. 6 is a detail sectional view on the line 6 6 in Fig. 5.

20 denotes framework which may be of any ordinary or preferred construction, the style or design of this framework being wholly immaterial so far as the principle of my invention is concerned. The material comprising the inner and outer plies is supplied to the machine in rolls, each roll of material being wound on a block 21. In the present instance for convenience I have illustrated the making up of the belt from an outer ply and a single inner ply. It should be understood, however, that the number of inner plies about which the outer ply is folded is wholly immaterial and that, if preferred, an outer ply may be folded about a ply which itself consists of an inner ply with an outer ply folded about it. As a portion of the framework I have illustrated a stand adapted to carry three rolls of material, but in the present instance carrying but two.

22 denotes the outer ply, and 23 the inner ply, both of which are wound on blocks 21, adapted to be mounted on shafts 48, journaled in brackets 24 upon the framework.

25 denotes tension-bands which inclose the blocks. One end of each tension-band is rigidly attached to a fixed part, as to a lug 26, extending from the bracket, the other end of the band being provided with a threaded rod 27, which passes through the lug and is provided with a tightening-nut 28, which engages the lug, as is clearly shown.

Each ply of the material has rolled up with it a strip of light non-adhesive material to prevent the plies from adhering to each other.

29 denotes take-off rolls, upon which the protecting-strips are self-winding as the plies of material are drawn into the machine, as will be more fully explained. It will be noted that each of the rolls 29 rests upon a roll of the material between a vertical line drawn through the axis of the block and the framework. In other words, each roll 29 rests upon the roll of material at a point at one side of the vertical radius of the said roll of material, and therefore the roll 29 will lie in a slight depression between the highest surface of the roll of material and the framework and will be self-winding as the result of its frictional contact with the roll of material, said frictional contact being greater, due to the construction described, than if said roll 29 rested at a point on the vertical radius of the roll of material. The rolls 29 are carried by shafts 51, whose reduced ends 52 engage slots 53 in the framework, said slots extending in

a direction non-radial to the axis of rotation of the shaft 48. Nuts 54 at the ends of the shafts retain them in place and permit the rolls 29 to follow and remain in contact with the rolls of material as the latter become reduced in size as they are unwound.

The outer ply of material is shown as passing under a guide-roll 30, journaled in the framework, and then over a guide-roll 31, provided with adjustable flanges 32, between which the outer ply passes, the edges of the ply being guided by the flanges. These flanges may be made adjustable in any simple and convenient manner and are shown as locked in place by set-screws 33. The inner ply is shown as passing under a guide-roll 34, which is journaled in brackets 35, bolted to a plate 36, which is itself rigidly secured to the framework. Beyond guide-roll 34 the inner ply passes between laterally-adjustable guides 37. In the present instance I have shown plate 36 as provided with slots 38. Bolts 39 pass through these slots and through the guides and are provided with thumb-nuts 40, by which the guides are locked to the plate after adjustment. After leaving guides 37 the inner ply passes upon the outer ply as the latter passes over guide-roll 31. The superposed plies then pass between a lower fixed roll 41 and a roll 42, journaled in arms 43, which are themselves rigidly secured to a cross-rod 44 and are provided with hand-levers 45. The arms and hand-levers comprise, in fact, bell-crank levers. The ends of the cross-rod are pivoted in brackets 46 upon the framework, so that by manipulation of either of the arms roll 42 may be lifted upward away from roll 41. Springs 47, bearing against either the rear ends of arms 43 or the hand-levers, act to press roll 42 down upon the plies and compress them between the two rolls, so that the plies will adhere to each other firmly enough to prevent displacement. I have shown block 21, upon which the inner ply is wound, as mounted at one side of the center of the outer ply, so that after the outer ply has been folded about the inner ply the seam will be at one side of the center, as clearly shown in Fig. 2. This, however, is of no importance so far as the principle of the invention is concerned, and may depend upon the judgment of the manufacturer or any special use for which the belt may be intended, the location of the seam of the completed belt at the center or either side thereof depending merely upon the relative adjustment of the block carrying the inner ply. After leaving rolls 41 and 42 the plies pass forward over a table 49, upon which the operation of folding the outer ply over the inner ply is performed by grooved folding-rollers 50, assisted, if required, by the operators, one standing on each side of the machine. These folding-rollers are carried by studs 55, which are adjustable transversely of the table in a slot 56. (Shown only in dotted lines in Fig. 2.) The studs and rollers are locked in position after adjustment by thumb-nuts 40. I have not illustrated this adjustment in detail, for the reason that the special mode in which it is effected is unimportant so far as the principle of the invention is concerned. As soon as the folding of the outer ply about the inner ply is effected the folded belt is passed between upper and lower pressure-rolls, (designated, respectively, by 57 and 58.) One of these rolls may be journaled in fixed boxes, and the other roll, 57, as shown in the drawings, journaled in boxes 59, adapted to slide in ways 60 upon the framework. Boxes 59 are engaged by pressure-screws 61, seated in the framework and having at their upper ends worm-wheels 62, which are engaged by worms 63 on a cross-shaft 64, having a hand-wheel 65 for convenience in operation. It will be readily understood from the drawings that the pressure of upper roll 57 upon the folded belt may be adjusted to the utmost nicety by the rotation of the cross-shaft and the worms in either direction as may be required.

In practice the seam in the outer ply is ordinarily covered by a narrow adhesive strip 66. This covering-strip is carried by a drum or spool 67, mounted to turn on a bracket 68, which is adapted to slide on an angular cross-bar 69 and is locked in place thereon after adjustment to cause the strip to register with the seam by a set-screw 70.

71 denotes a tank for benzine or any other suitable solvent, which is carried by bracket 68. Within this tank is journaled a roller 72, which is partially immersed in the solvent, and the roller 73 not immersed in the solvent, but having peripheral contact with roller 72. The seam-strip 66 passes over roller 73, as clearly shown in Fig. 5, and is sufficiently moistened by the solvent it takes up from said roller so that it will adhere to the outer ply when pressed down upon the seam by rolls 57 and 58.

87 denotes a guide, also carried by bracket 68, which centers the strip over the seam and renders displacement before the strip is set by the pressure-rolls impossible. The special construction of this guide is not of the gist of the invention. In the drawings I have illustrated a guide made from sheet metal and riveted to the bracket. An important feature of my invention, however, is a thin blade or tongue 108, which projects downward centrally from the bottom of the guide. This blade or tongue lies between the edges of the outer ply and by holding them just separated from each other renders it impossible for the folding-rollers or the manipulation of the operators to cause either edge to ride up on the other and make a ridge at the seam, as will be clearly understood from Figs. 5 and 6. After passing the tongue the edges of the outer ply will abut and an instant later will be pressed firmly together by the pressure-rolls and covered by the strip. After passing pressure-rolls 57 and 58 the folded belt passes between another pair of grooved

folding-rollers 74, which are adjustable in the same manner as folding-rollers 50, the parts comprising the adjustment being indicated by the same reference characters, and thence between drawing-rolls 75 and 76. The upper drawing-roll is vertically adjustable in precisely the same manner as the upper pressure-roll 57, and I have indicated the parts which comprise the adjustment by the same reference characters. The drawing-rolls receive motion in the manner which I will now describe.

A belt (not shown) passes over a belt-pulley 77 on a shaft 78. The belt-pulley is loose on the shaft and is adapted to be connected thereto by means of a clutch 79, (not illustrated in detail, as specifically it forms no portion of my present invention,) said clutch being operated from any convenient position or positions by means of suitable connections 80. Shaft 78 also carries a pinion 81 and a sprocket-wheel 82. Pinion 81 meshes with a gear-wheel 83 on the lower drawing-roll shaft, which I have specifically indicated by 84. Shaft 84 also carries a pinion. (Not shown in the drawings, as it is covered by a pinion 85 on the upper drawing-roll shaft, with which it meshes, the upper drawing-roll shaft being indicated in Fig. 4 by 86.)

88 denotes the winding-block, upon which the completed belt is wound. This block is carried by a shaft 89 and is made conveniently removable. Shaft 89 also carries a gear-wheel 90, which meshes with a pinion 91, mounted to turn with a sprocket-wheel 92 on a stud 93, which projects from the framework.

94 denotes a sprocket-chain which passes over sprocket-wheels 82 and 92, whereby motion is communicated from shaft 78 to winding-shaft 89.

After passing the drawing-rolls, but before being wound upon the block on the winding-shaft, the folded belt is passed under a roll 95 in a talcum-box 96. This box is provided with a quantity of pulverized talcum, soapstone, or similar material, through which the belt is passed, after which it is passed between rotary brushes 97 and 98 and the surplus talcum removed. The shaft of one of these brushes—in the present instance brush 97—is provided with a sprocket-wheel 99, which engages the sprocket-chain. The portion of the sprocket-chain that is engaged by sprocket-wheel 99 is shown as supported and guided by a grooved pulley 100, mounted to turn on a stud 101, which projects from the framework. At the opposite ends of the brush-shafts are intermeshing pinions 102, appearing in dotted lines in Figs. 2 and 4 and shown as covered by a case 103. It will be understood, therefore, from the drawings that one of the rotary brushes receives motion by means of a sprocket-wheel from the sprocket-chain, which motion is conveyed to the other brush by the intermeshing pinions.

104 denotes a roller over which the folded belt passes after leaving the brushes and before passing to the winding-block.

105 denotes a strip of non-adhesive filling material, shown as wound upon a block 106, mounted to turn in brackets 107, which depend from the framework. This filling-strip is wound with the completed belt and prevents the plies of the belt from adhering to each other on the winding-block.

Having thus described my invention, I claim—

1. In a belt-folding machine having suitable bearings for the roll of material which is to be converted into a belt, a take-off roll adapted to rest on the roll of material and to descend by gravity as the latter decreases in size, and guides to direct the path of movement of said take-off roll, said guides being straight and non-radial to the axis of the roll of material, for the purpose described.

2. In a machine of the character described the combination with framework and drawing-rolls, pressure-rolls and folding-rollers journaled thereon, of an adjustable bracket adapted to carry a seam-covering strip, a solvent-tank through which the strip passes and a guide by which the strip is centered, said tank and guide being supported by the bracket, the tank being intermediate the guide and the support for the seam-covering strip.

3. In a machine of the character described the combination with framework and drawing-rolls, pressure-rolls and folding-rollers journaled thereon, of an adjustable bracket having mounted thereon a spool for a seam-covering strip and also carrying a solvent-tank and a guide through which the strip passes, said tank having within it a roller partially submerged and a roller having peripheral contact therewith and adapted to be engaged by the strip.

4. In a machine of the character described the combination with framework having an angular cross-bar 69 and drawing-rolls, pressure-rolls, and folding-rollers journaled on said framework, of a bracket adjustable on the cross-bar and adapted to carry a seam-covering strip, a solvent-tank through which the strip passes and a guide by which it is centered.

5. In a machine of the character described the combination with drawing-rolls, pressure-rolls and folding-rollers, of an adjustable bracket adapted to carry a seam-covering strip, a hollow guide by which the strip is centered and a longitudinal blade on the under side of the guide, substantially as shown, for the purpose specified.

6. In a machine of the character described the combination with folding-rollers, pressure-rolls and drawing-rolls, of an adjustable bracket adapted to carry a spool having a seam-covering strip wound thereon, a hollow guide contiguous to the pressure-rolls by which the strip is centered and a longitudinal blade on the under side of the guide by which the edges of an outer belt ply are held slightly

separated until the seam with the strip laid thereon passes between the pressure-rolls.

7. In a machine of the character described the combination with folding-rollers, pressure-rolls and drawing-rolls, of an adjustable bracket adapted to carry a seam-covering strip, and a solvent-tank and guide also carried by said bracket, said tank having within it a roller partly immersed and a roller having peripheral contact therewith which is engaged by the strip, and a blade on the under side of the guide by which the edges of an outer belt ply are held slightly separated until the strip is laid over the seam by the guide, substantially as described.

8. In a machine of the character described the combination with folding-rollers, pressure-rolls, drawing-rolls and a winding-shaft, of a hollow seam-covering-strip guide having on its under side a blade for the purpose set forth, a talcum-box through which the folded belt is passed and rotary brushes for removing the surplus talcum.

In testimony whereof I affix my signature in presence of two witnesses.

BERNARD O. HALE.

Witnesses:
LAWRENCE K. BLACKMAN,
FRANK E. HOADLEY.