

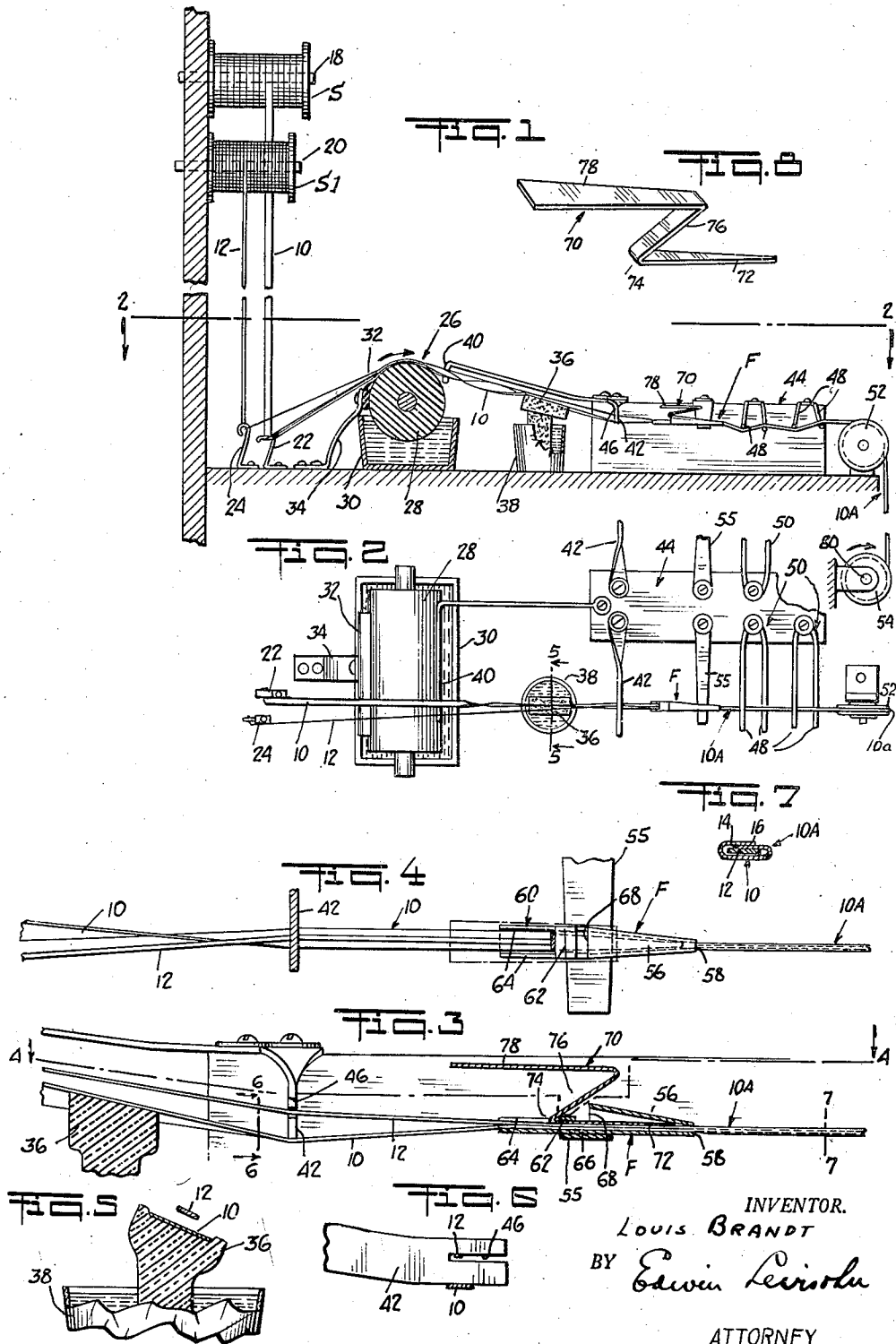
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APPARATUS FOR FOLDING SHEET MATERIAL

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APPARATUS FOR FOLDING SHEET MATERIAL

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This invention relates to apparatus for folding lengths of sheet material.

While the present invention may be applied generally in the art of folding a web or strip of sheet material longitudinally upon itself to produce a multi-ply web or strip, the invention is particularly useful in the production of narrow bands for making hat or other braids or for weaving hat bodies, etc.

The flexible band made in accordance with the present invention comprises a folded strip of film-like material, such, for example, as Cellophane or other synthetic cellulosic material, and preferably an inner core strip or member of the same or different material, the folded strip being adhesively secured to the core strip and the folded portions of the folded strip being adhesively secured to each other in overlapped relation at one side of the band.

Bands of this construction are produced by passing the inner and outer strips through a stationary folder which operates to fold the outer strip about the inner strip. By reason of the movement of the strip through the folder, the latter is subjected to considerable wear, especially when the strip material of the outer strip is formed of Cellophane or similar material, with the result that the folder must be replaced at comparatively frequent intervals. One of the objects of the present invention, therefore, is to eliminate or to substantially reduce the impairment of the folder due to the wearing action thereon by the strip material as it passes therethrough in the folding of said material. More specifically, pursuant to this object of the invention, a lubricant, preferably any suitable oil, is applied to the sheet material which is folded whereby to prevent wear of the folder and to ease the movement of the sheet material through the folder.

When the folded strip is formed of Cellophane or the like, it is necessary to treat the same, usually with an oil, for the purpose of conditioning the folded strip for manipulation by various elements of the braiding or knitting machine in producing from a plurality of strands of the folded material a braided or knitted fabric. Heretofore, the oil was applied, in a separate operation, to the material after the same was formed into the folded bands. In accordance with the present invention, the oil is applied to the band-forming material and more particularly to the outer strip or web, as part of the folding operation, during the travel of the sheet material to the folder and prior to the passage thereof through the

folder, thus eliminating the separate oiling operation heretofore practised, and at the same time accomplishing the above mentioned object of the invention, namely, the elimination or decrease of the wearing action of the web on the folder during its passage therethrough. This constitutes another object of the present invention.

A further object of this invention is to provide for the application of an adhesive and of a lubricant to the opposite surfaces, respectively, of the strip, which is folded in the folder, the adhesive and the lubricant being applied to said strip while the latter travels to the folder.

The above and other objects, features and advantages of the invention will best be understood from the following description, reference being had to the accompanying illustrative drawing.

In the drawing:

Fig. 1 is a side view in elevation, and partly in section, of the apparatus embodying the present invention;

Fig. 2 is a plan view of the apparatus on the line 2—2 of Fig. 1;

Fig. 3 is a view partly in elevation and partly in section, on a larger scale, of part of the apparatus;

Fig. 4 is a plan view, partly in section, on the line 4—4 of Fig. 3;

Fig. 5 is a sectional view on the line 5—5 of Fig. 2, on a larger scale;

Fig. 6 is a sectional view on the line 6—6 of Fig. 3;

Fig. 7 is a substantially enlarged cross sectional view of the folded material on the line 7—7 of Fig. 3;

Fig. 8 is a perspective view of an attachment for the folder, removed therefrom.

Referring now to the drawing in detail, in practicing the method of the present invention, the strip 10 of Cellophane or other sheet material is caused to travel from the supply spool S through the folder F and in the course of the travel of said strip to said folder, a lubricant, and more particularly any suitable oil, is applied to one surface of said strip and an adhesive, preferably a water soluble adhesive, is applied to the opposite surface of said strip. The strip which is thus treated with the adhesive and with the lubricant is, as illustrated herein, folded around an inner strip or core 12, for producing the flexible band material 10A of the construction illustrated in cross section in Fig. 7. Strip 12 can be formed of Cellophane or other sheet material or can be a textile thread. As here shown, the outer strip 10 is folded longitudinally upon itself around the

inner strip 12, producing the band 10A (Figs. 3 and 7), said outer strip being adhesively secured to said inner strip by the adhesive applied to one of the surfaces of strip 10, as hereinbefore stated, and the overlapped marginal edge portions 14 and 16 of strip 10 being adhesively secured to each other by said adhesive.

The preferred form of apparatus for producing the band material 10A and for applying the adhesive and the lubricant to the opposite surfaces, respectively, of the folded strip while the latter travels to the folder, will now be more particularly described. As here shown, the supply spools S and S-1 for the strips 10 and 12 are mounted for rotation on the spindles 18 and 20, respectively. Fixed guides 22 and 24 are provided for directing the strips 10 and 12, respectively, from the spools to the adhesive applying means 26. Said adhesive applying means comprises, as here shown, a roller 28 which dips in adhesive receptacle 30 and picks up adhesive therefrom for application to strips 10 and 12 which, in their travel to the folder, are pressed against the surface of roller 28. A blade 32 is resiliently held against roller 28 by a spring 34 for removing excess adhesive from roller 28.

The means for applying the lubricant to the strip 10 comprises a wick 36 which dips into the lubricant container 38. The strip 10 in passing from the adhesive applying roller 28 to the lubricant applying wick 36, is twisted to present the opposite surface of strip 10 to the oil applying device for application to said opposite surface of the lubricant. For this purpose, strip 10 is engaged over arm 40 and under arm 42 which are affixed to the supporting plate 44. It will be observed by reference to Fig. 5 that the surface of oiling wick 36 which is engaged by strip 10 is inclined in a direction transversely of the longitudinal line of movement of the strip so that only a partial twist, less than 180°, of said strip between the roller 28 and wick 36 is required to present said opposite surface of strip 12 to the oiling wick. The twisting of strip 10 through the rest of the 180° required to position the adhesive coated surface thereof next to the strip 12 is completed while strip 10 passes from wick 36 to arm 42. Arm 42 is provided with a slot 46 through which the strip 12 passes on its way to the folder F. From the folder F, the folded band 10A passes over the fingers 48 of the guide members 50 which are secured to plate 44 and then over the guide roller 52 to the driven take-up roller 54. It will be understood that the driven take-up roller 54 on which the band 10A is wound, constitutes means for moving the strips 10 and 12 from their supply spools S and S-1, respectively, through the apparatus, for the application of the adhesive and lubricant to the opposite sides, respectively, of strip 10 and for effecting the folding of strip 10 about strip 12 in the stationary folder F. It will be understood that any suitable means may be provided for tensioning strips 10 and 12 in opposition to the pull of take-up roller or spool 54; and that such take-up means may be a braking device applied to spools S and S-1 to prevent free rotation thereof on their companion spindles 18 and 20, respectively. As tensioning means in folding apparatus are well known, the illustration or further description thereof is believed to be unnecessary.

The folder F can be of any suitable construction. As here shown, said folder is supported by

the bracket 55 fixed to plate 44 and comprises a tapered tubular portion 56 having an outlet opening 58 through which the folded material passes while the latter is drawn through the folder by the take-up roller 54. The inlet end 60 of folder F is channel-shaped, being open at the top. A cross strap 62 is fixed to the opposite sides 64 of the open top channel-shaped inlet part 60 of the folder near the inlet end 68 of tubular member 56. A pressure member 70 is provided as an attachment for folder F to aid in holding strips 10 and 12 in position at the inlet end of the folder. Said pressure member which can be formed of sheet metal or any other suitable material, comprises a flat pointed part 72 (Figs 3 and 8) which extends into the tubular member 56 of the folder. Upward and forward movement of part 72 in the folder is prevented by strap 62 which lies over part 72 and engages the bent portion 74. Said pressure member is weighted by the parts 16 and 78.

In actual practice, the above described apparatus is one of a plurality of units which are provided for producing simultaneously a plurality of bands 10A. Thus, as illustrated in Fig. 2, plate 44 has secured thereto an additional folder supporting bracket 55, an arm 42 and guide members 50 of an adjacent unit. A shaft 80 which drives the take-up spool 54 of the illustrated unit also has secured thereto a plurality of similar take-up rolls 54 for the other units of the apparatus.

While I have described and illustrated the preferred embodiment of my invention, including the preferred form of the apparatus and the preferred form of practicing the method of this invention, it will be understood that various changes may be made therein. Accordingly, I do not wish to be limited to the specific apparatus or precisely to the method described except to the extent which may be required by the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In folding apparatus comprising a stationary folder through which a web of sheet material is caused to travel for the folding of said web longitudinally upon itself, the combination with said folder of means for applying an adhesive to one surface of said web, means for applying a lubricant to the opposite surface of said web, and means for twisting said web between said adhesive-applying means and said lubricant-applying means for presenting said opposite surfaces of the web to said adhesive-applying means and to said lubricant-applying means, respectively, during the travel of said web to said folder.

2. In folding apparatus comprising a folder through which a web of sheet material is caused to travel for the folding of said web longitudinally upon itself, the combination with said folder of means for applying an adhesive to one surface of said web, means for applying a lubricant to the opposite surface of said web, both of said means being disposed at one side of the line of travel of said web to the folder in position to apply said adhesive and said lubricant to said web, and means for twisting said web between said adhesive applying means and said lubricant applying means for presenting said opposite surfaces of the web to said adhesive applying means and to said lubricant applying means, respectively, during the travel of said web to said folder.

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