July 20, 1948. R. J. WILLIAMS 2,445,703

WEB ASSOCIATING MECHANISM

Filed May 3, 1944 4 Sheets-Sheet 1

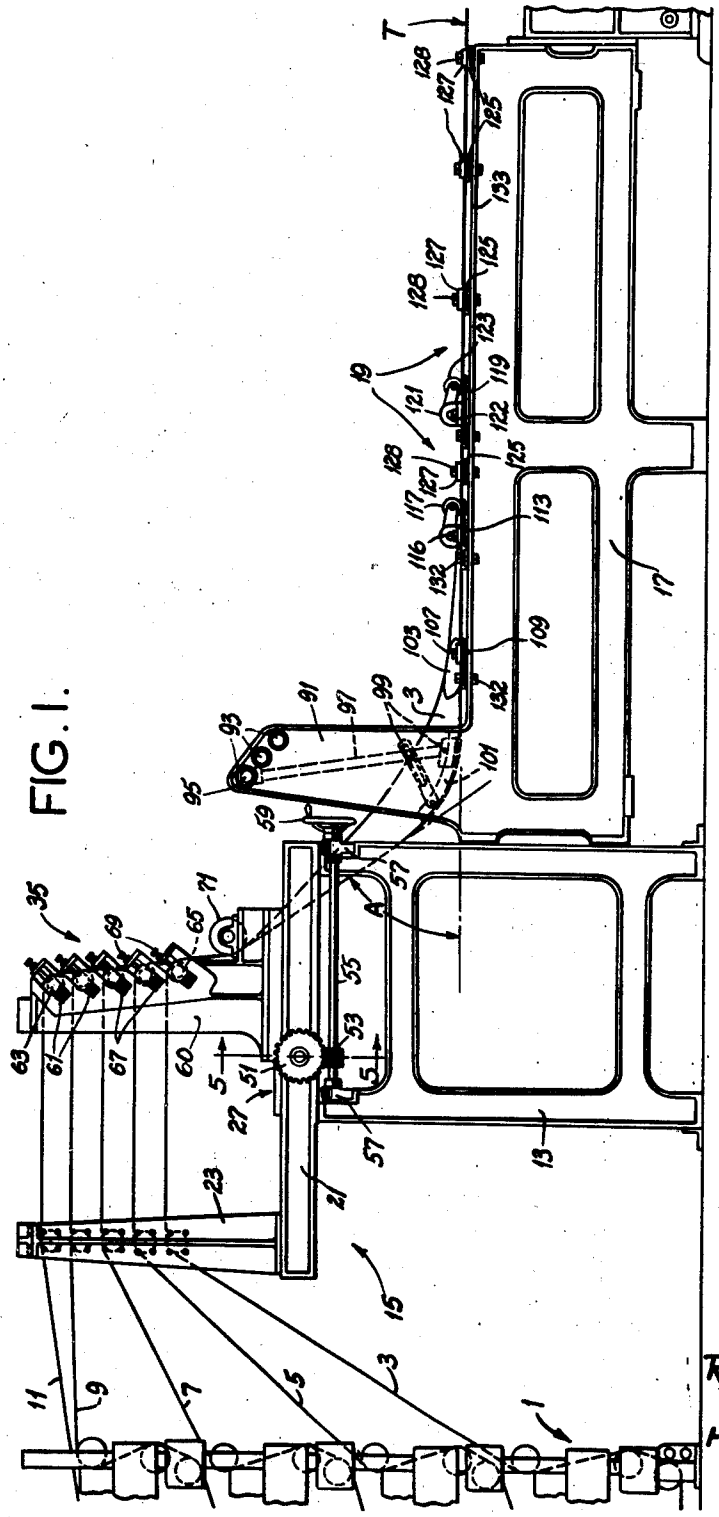


FIG. 1.

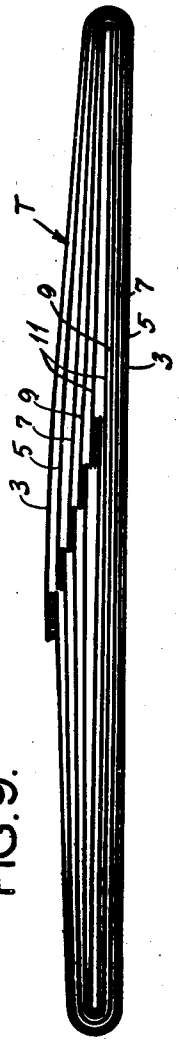


FIG. 9.

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FIG. 8.

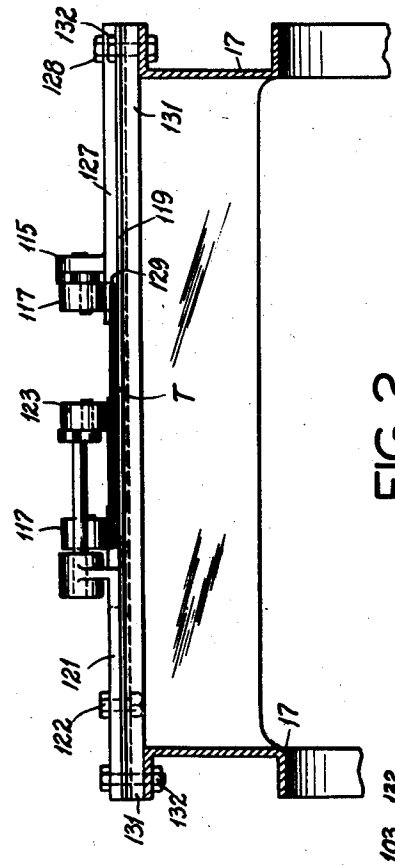


FIG. 2.

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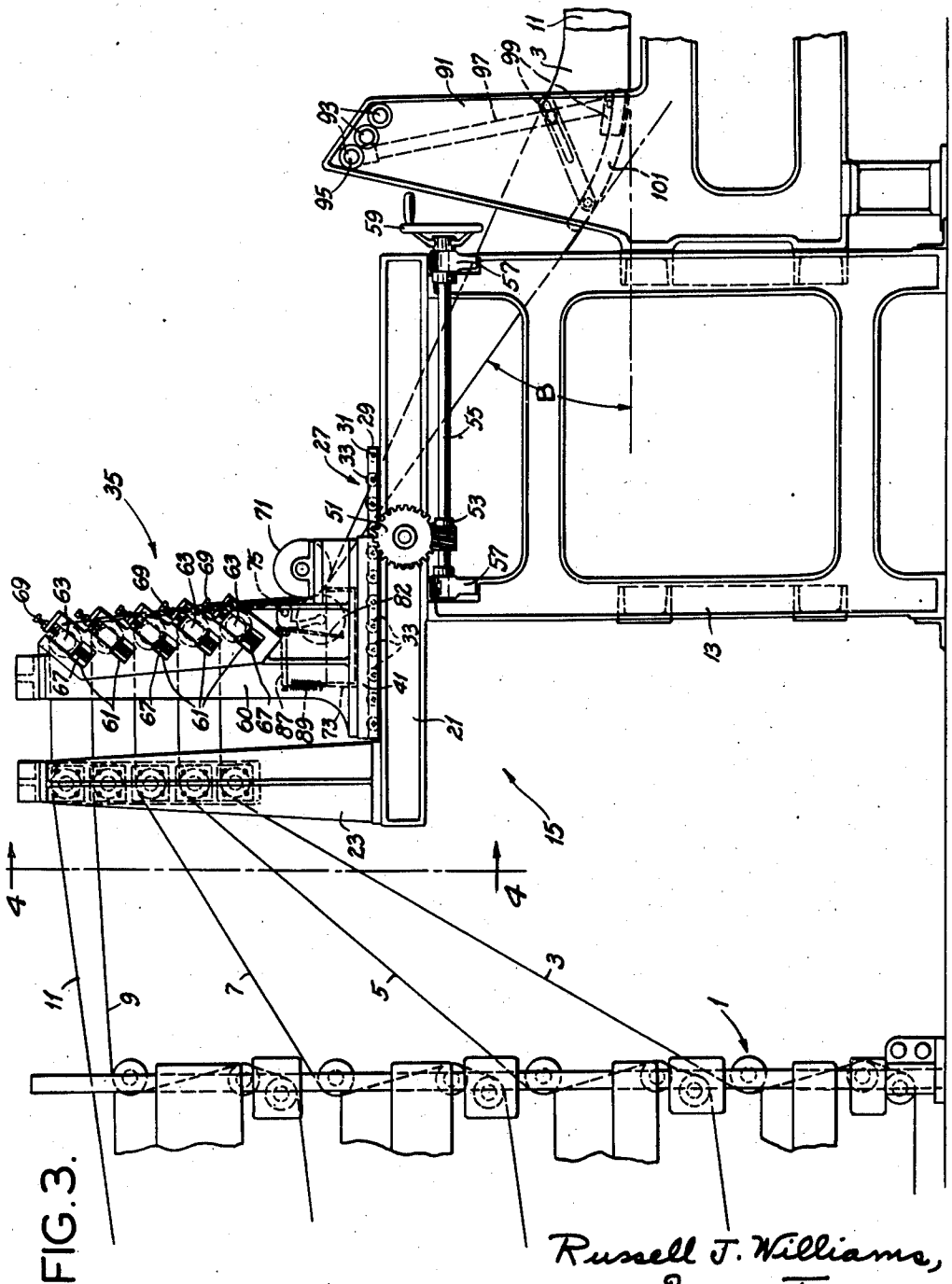


FIG. 3.

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WEB ASSOCIATING MECHANISM

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FIG. 4.

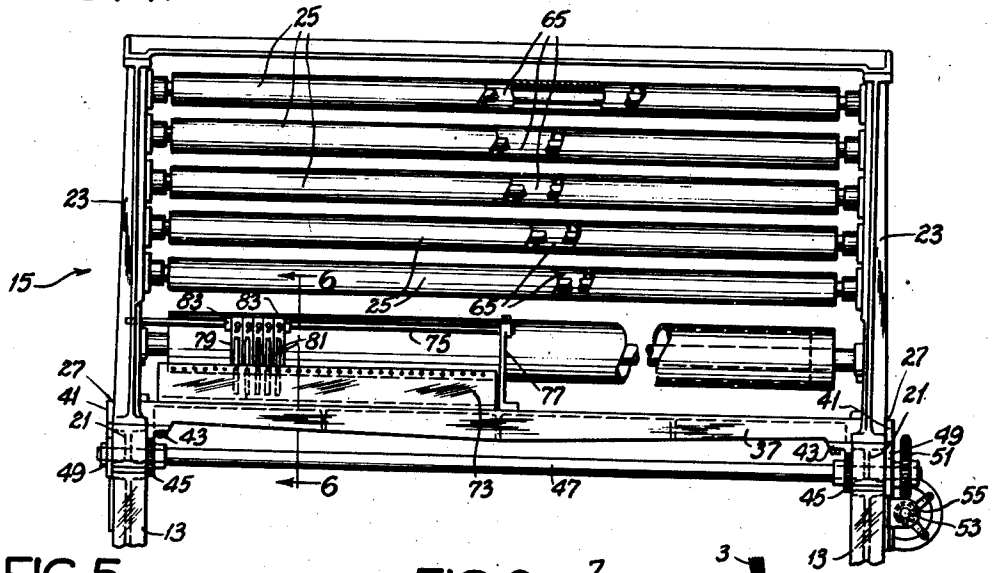


FIG. 5.

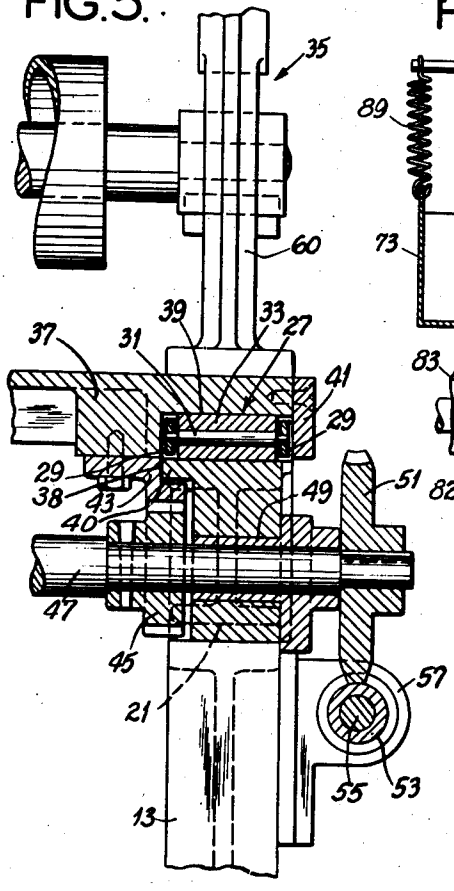


FIG. 6.

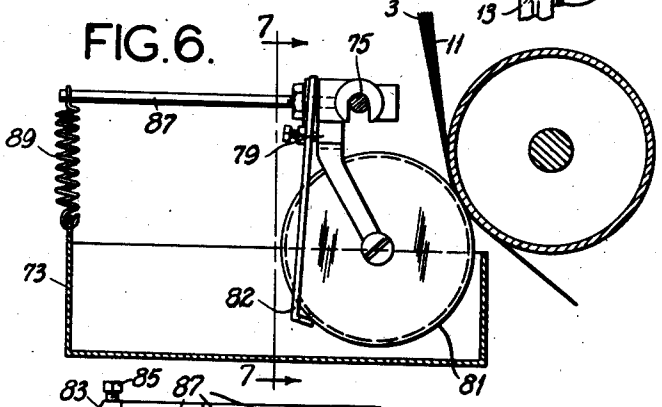
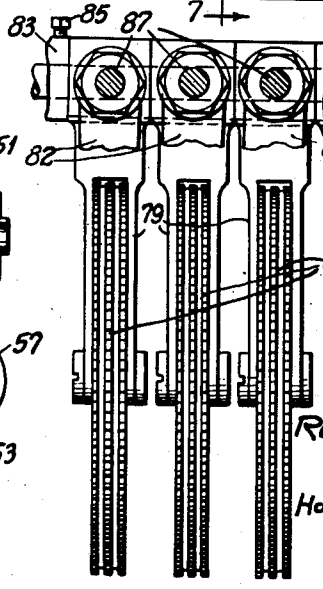


FIG. 7.



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Patented July 20, 1948

2,445,703

UNITED STATES PATENT OFFICE

2,445,703

WEB ASSOCIATING MECHANISM

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Application May 3, 1944, Serial No. 533,955

8 Claims. (Cl. 270—52)

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This invention relates to web associating mechanism particularly for use in apparatus for forming tubing from webs, and with regard to certain more specific features in such apparatus, to a new movable roll tower.

The invention is an improvement upon the apparatus shown in U. S. Patent 1,634,067, dated June 28, 1927.

Among the several objects of the invention may be noted the provision of a new form of movable roll tower which when moved, as is necessary for certain adjustments with respect to a folder, will not adversely affect certain desired phase relationships between multi-ply webs traversing the apparatus; and the provision of apparatus of the class described which is simple in construction and readily adaptable to standard associated apparatus. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a side elevation of the pertinent parts of tuber apparatus in which the present invention is employed;

Fig. 2 is a perspective view showing the top of the tuber bed shown in Fig. 1;

Fig. 3 is an enlarged front elevation of parts shown at the left of Fig. 1, showing certain details not shown in Fig. 1, and showing a differently adjusted position of certain guide rolls;

Fig. 4 is a vertical section taken on line 4—4 of Fig. 3, except that the webs shown in Fig. 3 are removed, and showing a rear elevation of a roll mechanism, with parts broken away for more complete illustration;

Fig. 5 is an enlarged vertical section taken on line 5—5 of Fig. 1;

Fig. 6 is an enlarged vertical section taken on line 6—6 of Fig. 4, showing certain paste-applying equipment;

Fig. 7 is a vertical section taken on line 7—7 of Fig. 6, certain scraper elements being broken away for clarity;

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Fig. 8 is a diagrammatic vertical section taken on line 8—8 of Fig. 2; and,

Fig. 9 is an enlarged cross section taken on line 9—9 of Fig. 2, showing a resulting multi-ply tube product.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

In apparatus for forming multi-ply paper tubes, means is used to feed a plurality of webs of paper into contacting superposed stepped relation to one another. These travel against the under side of a combining roller, where means is located to apply adhesive to the stepped edges of the sheets. Folder means is provided beyond the roller for folding upward and inward and lapping the edges of the superposed sheets to form a multi-ply tube having a multi-ply pasted longitudinal seam. The combining roller delivers directly to the folder. Patent 1,634,067 (above mentioned) shows such apparatus.

As shown in said patent, a plurality of webs of paper are drawn from a plurality of paper supply rolls and after passing over individual guide rolls pass into what may be designated as a roll tower which carries guide rolls, an assembly roll and edge-adhesive-applying apparatus. This roll tower is adjustable back and forth in its entirety, so that the angle of the assembled webs may be changed with respect to the folder used. The necessity for this adjustment arises because of the different widths of web used and the fact that the folder, for perfect operation, requires different angles of approach of the assembled web. No inter-ply pasting is indicated between webs.

The roll tower adjustment used in the Patent 1,634,067 was satisfactory as long as the longitudinal phasing between webs was not important, as was the case without inter-ply pasting. Today such phasing is important because it is common practice, for example, to apply between webs certain inter-ply paste or adhesive patterns which should be predeterminately related to one another and with respect to ends of bag blanks subsequently cut from the tubing. This predetermined relationship should extend throughout all of the multi-ply layers of the tube, regardless of adjustment required between the roll tower and the folder.

An example of where predetermined inter-ply

paste-pattern relationships need to be maintained are shown in the United States patent to Finn et al., No. 2,092,602, dated September 7, 1937. For example, if in a three-ply bag, all plies are to be joined at a band near the bag mouth, a band of adhesive between a first and second ply, and a band of adhesive between a second and third ply must be directly opposite one another and at equal distances from the bag end. If the moving webs to which these bands are applied do not run in proper predetermined phase relationship so as longitudinally to register the adhesive bands, the desired registration will be lost and the first and second ply may be joined at an adhesive area which is not next to, nor registered with the adhesive area between the second and third plies. The present invention assures such registry.

Referring now more particularly to Fig. 1, there is shown at numeral 1 the end of an inter-ply pasting section from which webs of paper 3, 5, 7, 9 and 11 emerge. The details of the apparatus 1 for applying the desired inter-ply paste patterns are not shown since these are known and per se form no part of the present invention.

At numeral 13 is a supporting frame for a guide roll tower forming one new element of the present invention. This tower is in general indexed as 15.

At numeral 17 is shown the supporting frame for the tuber bed. This is indexed in general by numeral 19.

The roll tower section 15 consists of two longitudinal beams 21 fastened to the top of the frame 13. These beams 21 are fixed in position and support fixed posts 23. Between the posts 23 are mounted five rotary guide rollers 25 over which pass the webs 3, 5, 7, 9 and 11 respectively. From these rollers 25 said webs extend forward in parallelism as shown.

On the top of each beam 21 is a roller coaster unit 27 which consists of side bars 29, cross pins 31 and rollers 33 rotary on the pins. The coasters 27 constitute anti-friction devices which roll along the flat top surfaces of the beams 21. They support a movable roll assembly indexed in general by the numeral 35. In particular, the movable roll assembly 35 consists of a bed 37 having recesses 39 where the bed rests upon the coasters 27. Outside skirts 41 attached to the bed 37 maintain alignment of the coasters 27.

Inside of the beams 21, the bed 37 has bolted thereto two toothed rack members 43. One of these is detailed in Fig. 5. These members are recessed at 38 and engage flanges 40 on the insides of the beams 21. This guides the bed 37 in its longitudinal movements. The teeth of the racks 43 are engaged by pinions 45 carried on a cross-shaft 47. Shaft 47 is supported in bearings 49 carried in the beams 21.

On the outside of one of the bearings 49 (Fig. 5) the shaft 47 carries a worm wheel 51 meshing with a worm 53 carried on a longitudinal control shaft 55. Shaft 55 is supported in bearings 57 and is controlled from a handwheel 59. From the above it will be clear that by operating the handwheel 59, the bed 37 may by means of the mechanical train 55, 53, 51, 47, 45 and 43 be moved back and forth.

Supported upon the bed 37 are lateral supports 60 in which are angular guide sockets 61 for sliding bearings 63. These bearings carry rollers 65. Springs 67 normally bias the bearings 63 upward. Screws 69, which may be locked in adjusted positions, form stops for adjusting the elevations of the rollers 65 until they are tangent at their tops with the tops of the rollers 25. This accounts for the stated parallelism of the webs 3, 5, 7, 9 and 11 in their reaches between the posts 23 and the movable supports 60. It will be noted that the sockets 61 are arranged at angles and that the centers of the rollers 65 are offset progressively from the vertical so that the webs issuing from the rollers 65 will not interfere. In this condition they proceed to a combining roll 71 carried between the supports 60. On the surface of the combining roll the webs come into combining contact. It will be seen that the rolls 65 on the carriage are arranged, starting with the bottommost roll, in receding echelon relationship with respect to the combining roll 71.

Behind the combining roll 71 on the bed 37 is carried a paste container 73 above which is a cross-shaft 75. Shaft 75 extends from a support at one end in one of the members 60 and to a separate support 77 (Fig. 4). The support 77 is also carried upon the bed 37.

Hooked over the rod 75 are adjustable brackets 79, each of which carries a grooved paste or adhesive applying wheel 81 with a suitable scraper 82. The brackets 79 are held in predetermined lateral positions by collars 83 held in place by suitable set screws 85. Arms 87 reaching from the brackets 79 are biased counterclockwise by means of attached springs 89 which react from openings in the edge of the pan 73.

As many paste rolls 81 are used as there are webs of paper and they are adjusted laterally to apply the paste to one set of the offset edges of the webs. The paste does not join the opposite edges of the webs until they have proceeded through the folder which will next be described. However, any paste patterns which have been applied to the webs ahead of the paster unit 1 do so join them when the combining roll 71 is reached.

The folder is located at the entrance to the tuber unit 19 which is shown particularly in Fig. 2. The frame 17 of the tuber unit carries supports 91 with openings 93 for selectively locating a cross bar 95. From the cross bar 95 extend arms 97 which carry adjustable supports 99 for a curved guide shoe 101 under which pass the offset webs. It will be understood that in Fig. 2 the separate webs may be treated as a composite one.

From shoe 101 the web passes over a plate 109 and through turning guides 103. The latter are slotted at 105 and adjustably held by cap screws 107. The turning guides 103 are notched as shown at 111 to edge or fold the turned web as it is drawn beneath them.

From plate 109 the turned and edged web passes to a spaced plate 113 upon which are adjustable angle supports 115 for pivoted rollers 117 which iron a crease into the turned edges of the tube. These rollers are laterally adjustable through slots 114 and cap screws 116.

From plate 113 the tube passes to a spaced plate 119 carrying an adjustable support 121 for a pivoted roller 123 which irons the composite pasted seams so as to cause the opposite lapped edges of a given web to be joined, as indicated in Fig. 9. Support 121 is adjustable from slots 120 and cap screws 122.

Auxiliary spaced plates 125 upon which are adjustable guides 127 notched at 129 further guide passage of the tube. These plates 125, like plates 109, 113, 119, extend entirely across the

space defined by the side frames 17. Guides 127 are adjusted from slots 126 and cap screws 128. As many of these auxiliary plates as necessary may be used.

The upper rails 133 of the frame 17 are provided with rows of openings 135 for accommodating the fastener plates which are supported upon ribs 131. As to plates 125, the adjusting cap screws 128 are also used as fasteners. In the cases of plates 109, 113 and 119, auxiliary fasteners 132 are used. Thus the various folding, creasing, pressing and guiding elements are adjustably held in spaced relationships.

An important feature of the tuber is that the plates 109, 113, 119 and 125 are spaced with respect to the supports 133 and relatively to one another. Thus instead of the tube engaging a continuous flat surface throughout the entire bottom area of the tube over the tuber, it is only in contact over limited areas above the plates 109, 113, 119 and 125. This greatly reduces the frictional drag which has heretofore occurred on the formerly continuous upper face of the tuber. In addition, it reduces the cost formerly involved in machining the top face of the tuber. It will be understood that the finally formed tube T is drawn through the apparatus by suitable draw rolls beyond the tuber. Since these are old and are located at some distance, they have not been shown.

The adjustments indicated in Fig. 2 are for the purpose of accommodating webs of various widths to make tubes of various sizes for different size bags and the like. For each different width of web and resulting composite tube encountered, there is an optimum angle (for best action by shoe 101 and turning guide 103) at which the composite web emerging from the roll 71 should approach the folder guide 101. Also, for each angle there is a best adjustment for said shoe. For example, in Fig. 1 a desirable larger angle of approach A is shown and in Fig. 3 a desirable smaller angle of approach B is shown. By adjusting the roll assembly 35 back and forth along the beams 21 the desired angle may be obtained, adjustment being made from said wheel 59 as above described. It is in this connection that an important feature of the invention should be observed. This is that the gang of rolls 65 are adjusted independently and relatively to the gang of fixed rolls 25. Heretofore, as in said Patent 1,634,067, adjustments were made simultaneously in both gangs of rolls without relative adjustment between them. That is to say, both gangs were moved as a unit along with the combining roll. The difference in the results obtained is important in cases where predetermined phasing and registry must be maintained between webs throughout their progress from the inter-ply paster to the folder. The reason is that if the gang of rolls 25 were to be adjusted back and forth, this would change the various angles of approach of the webs 3, 5, 7, 9 and 11 to the rolls 25. This would non-proportionally change the distances which the various inter-ply paste patterns would need to move at constant speed in proceeding from where these webs receive their patterns to the points where they come together. In other words, the relative positions of these patterns on the webs would change at each adjustment of the rolls 25. By maintaining the rolls 25 stationary, the angles of approach of the webs 3, 5, 7, 9 and 11 to said rolls 25 are maintained constant and this factor of registry error is therefore eliminated.

Considering now the gang of rolls 65, it will be seen that their simultaneous adjustment by movement of the carriage 37 only proportionally changes the length of the parallel lines of webs traveling from the stationary rolls 25. Therefore no change is caused in the relative positions of any patterns on the webs 3, 5, 7, 9, 11 by relatively adjusting the gang of rolls 65 with respect to the gang 25. This is true as long as the substantially parallel web relationship is maintained between the roll gangs 25 and 65. It will be noted that an echelon set-back arrangement is used between successive ones of the rolls 65 as indicated. This is for the purpose of providing a more favorable set of tension forces on the standards 23 than would be obtained by having the rolls vertically arranged or arranged with successively higher rolls overhung toward roll 71.

However, the arrangement of the rolls 65 must be such that each web may pass from its respective roll 65 without interference from the adjacent web in passing to the roll 71. The arrangement of rolls 65 with respect to roll 71 for accomplishing this is clear from the drawings. That is, the echelon set-back is not enough to cause the reaches of web to come together before reaching roll 71.

It will be understood that the variation, such as illustrated, of angles A and B has no effect in changing the web phasing, that is, in registry of patterns thereon. This is because by use of the invention all of the webs remain in phase up to roll 71 and thereafter remain substantially collinear in their passage from roll 71 to the turning apparatus. Any change in the web length due to angle change between roll 71 and the turner affects all webs the same. Also, the adjustment of assembly 35 affects all webs the same. Hence any predetermined registry of patterns on the webs is not destroyed.

The term applicator for the unit 1 is not intended to be limiting. The unit may apply paste adhesive or even holes or other items and come within the meaning intended for the term applicator.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In apparatus for forming composite multiply material from several plies, a unit for guiding a plurality of webs passing from an inter-ply applicator to a folder comprising an upright gang of guide rolls respectively guiding the webs and receiving them at various angles, said gang of receiving rolls being fixed in position, a carriage movable with respect to the folder, a delivery roll on the carriage on which said webs are organized into a single composite web moved substantially collinearly to the folder, a gang of guide rolls uprightly mounted on said carriage and respectively related to said fixed rolls to define spaced, parallel paths of travel for the webs, and means for adjustably moving the carriage in a direction parallel to said paths of travel to various positions longitudinally of said web and between said fixed rolls and said folder equally to vary the lengths of the reaches of webs travelling from said fixed rolls to the guide rolls on the carriage,

whereby the angle of approach of the composite web from the delivery roll to the folder may be changed without changing the longitudinal phase relationship between the webs.

2. In apparatus for forming composite multi-ply material from several plies, a unit for guiding a plurality of webs passing from an inter-ply applicator to a folder comprising an upright gang of guide rolls respectively guiding the webs and receiving them at various angles, said gang of receiving rolls being fixed in position, a carriage movable with respect to the folder, a delivery roll on the carriage on which said webs are organized into a single composite web moved substantially collinearly to the folder, a gang of guide rolls uprightly mounted on said carriage and respectively related to said fixed rolls to define spaced, parallel paths of travel for the webs, and means for adjustably moving the carriage in a direction parallel to said paths of travel to various positions longitudinally of said web and between said fixed rolls and said folder equally to vary the lengths of the reaches of webs travelling from said fixed rolls to the guide rolls on the carriage, whereby the angle of approach of the composite web from the delivery roll to the folder may be changed without changing the longitudinal phase relationship between the webs, said rolls on the carriage, starting with the bottommost roll being arranged in upright receding echelon relationship with respect to said delivery roll.

3. Apparatus for forming multi-ply tubing comprising web guiding means between an inter-ply applicator and a folder, said guiding means comprising a stationary bed between the applicator and the folder, a fixed support on the bed toward the applicator, a series of web-receiving rolls arranged fixedly on said support, a carriage movable longitudinally on said bed between said fixed support and the folder, an upwardly extending support on and movable with the carriage, a series of rolls in and movable with said last-named support respectively related to the fixed rolls to define spaced, parallel paths of travel for webs between the fixed and movable rolls, and means for adjusting the carriage to various positions in a direction parallel to said paths of travel equally to vary the lengths of the reaches of webs travelling from the fixed to the movable rolls.

4. Apparatus for forming multi-ply tubing comprising web guiding means between an inter-ply applicator and a folder, said guiding means comprising a stationary bed between the applicator and the folder, a fixed support on the bed toward the applicator, a series of web-receiving rolls arranged fixedly on said support, a carriage movable longitudinally on said bed between said fixed support and the folder, an upwardly extending support on and movable with the carriage, a series of rolls in and movable with said last-named support respectively related to the fixed rolls to define spaced, parallel paths of travel for webs between the fixed and movable rolls, means for adjusting the carriage to various positions in a direction parallel to said paths of travel equally to vary the lengths of the reaches of webs travelling from the fixed to the movable rolls, and a delivery roll on said carriage on which roll said webs are organized to form a composite web moving from the movable rolls to the folder.

5. In apparatus for forming multi-ply tubing, a horizontal bed located between an inter-ply paste applicator and a folder, a fixed support attached to said bed at a portion adjacent to said applicator, a vertically arranged series of web-receiving rolls fixed in said support and arranged to receive said webs at various individual angles, a carriage on said bed movable horizontally between said fixed support and the folder, a combining roll on said carriage, a support on the carriage, an upright series of rolls carried in said support each respectively being located with respect to one of said fixed rolls to maintain the reaches of the webs between rolls substantially horizontal and parallel and to provide for equal variations in the lengths of said reaches of webs travelling from the web-receiving rolls to the carriage-supported rolls upon movement of the carriage, said carriage-supported rolls being arranged in ascending receding echelon formation with respect to said delivery combining roll and adapted to deliver the web substantially collinearly to said delivery rolls, said webs forming a single composite web between the combining roll and said folder.

6. In apparatus for forming multi-ply tubing, a horizontal bed located between an inter-ply paste applicator and a folder, a fixed support attached to said bed at a portion adjacent to said applicator, a vertically arranged series of web-receiving rolls fixed in said support and arranged to receive said webs at various angles, a carriage on said bed movable horizontally between said fixed support and the folder, a combining roll on said carriage, a support on the carriage, an upright series of rolls carried in and movable with said support each respectively being located with respect to one of said fixed rolls to maintain the reaches of the webs between fixed and movable rolls substantially horizontal and parallel and to provide for equal variations in the lengths of said reaches of webs travelling from the web-receiving rolls to the carriage-supported rolls upon movement of the carriage, said carriage-supported rolls being arranged in ascending receding echelon formation with respect to said delivery rolls and adapted to deliver the web substantially collinearly to said combining roll, said webs forming a single composite web between the delivery roll and said folder, means for adjusting the elevations of the rolls supported by the carriage, and means for adjusting the position of the carriage on the bed.

7. In apparatus of the class described, a first series of spaced, fixed web guides for receiving webs from a source thereof, and a second series of spaced web guides for receiving webs from said first series, each guide of said first series being correlated with a guide of said second series to define spaced, parallel paths of travel for the webs, said second series of guides being mounted on a movable carriage, said carriage being movable in a direction parallel to said paths of travel toward and away from said first series of guides equally to vary the lengths of the reaches of webs travelling from the fixed guides to the guides on the carriage, and a guide on said carriage for receiving the webs from said second series of guides and combining them into a single, composite web.

8. In apparatus of the character described, a gang of spaced, fixed web guide rolls for receiving webs from a source thereof, the axes of said rolls lying substantially in a single vertical plane, a carriage movable in a horizontal direction toward and away from said rolls, a gang of spaced web guide rolls mounted on said carriage for receiving webs from said fixed guide rolls, each fixed roll being correlated with a roll on said carriage to define spaced, parallel paths of travel for the webs, horizontal movement of the carriage resulting in equal variations of the lengths of the reaches of

webs travelling from the fixed rolls to the rolls on the carriage, and a guide roll on said carriage for receiving the webs from said rolls on the carriage and combining them into a single, composite web.

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