Jan. 23, 1940. D. C. SPAULDING, JR 2,188,064

MECHANISM FOR MAKING LAMINATED PRODUCTS

Filed Sept. 24, 1937 2 Sheets-Sheet 1

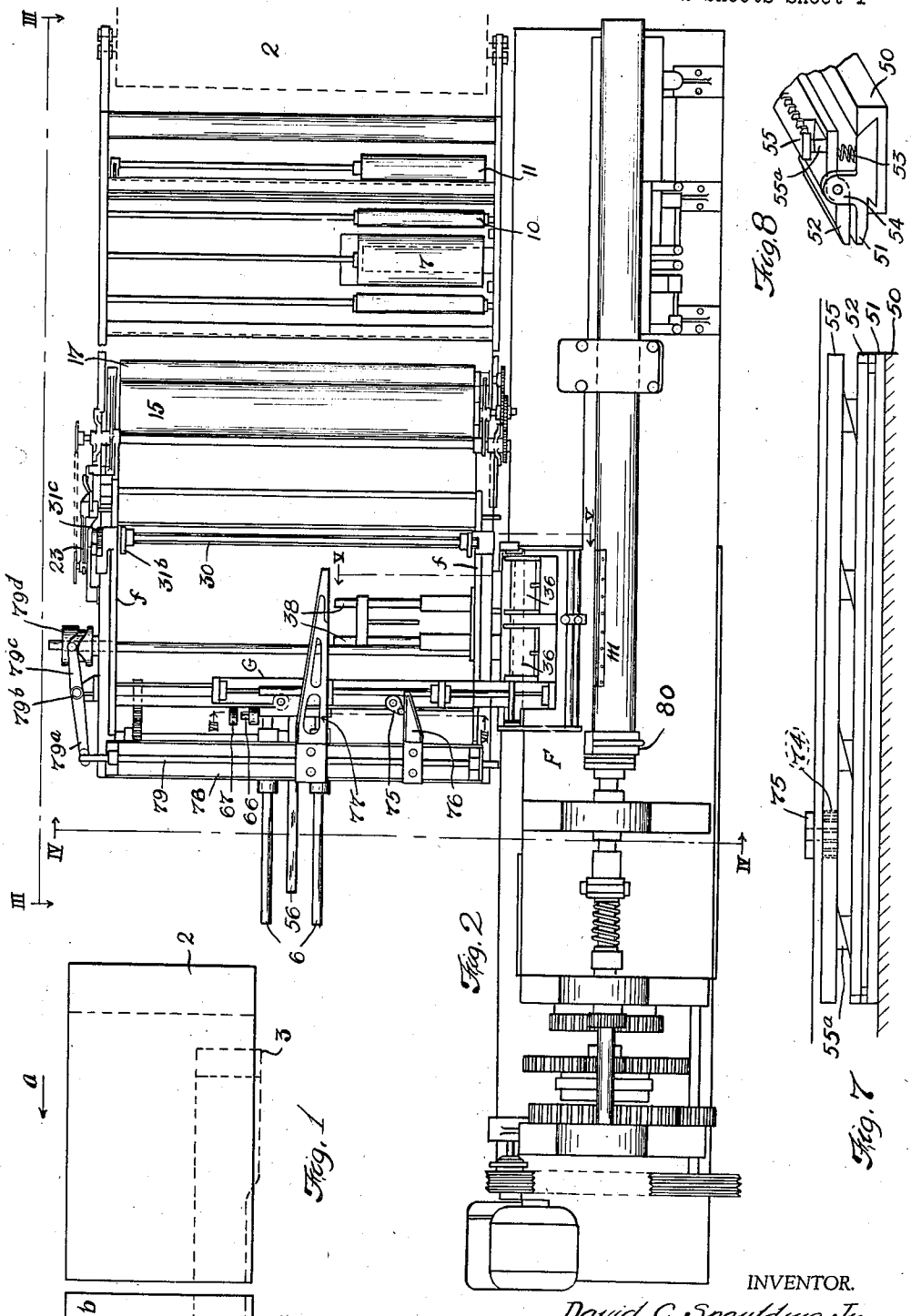


Fig. 2

Fig. 1

Fig. 8

Fig. 7

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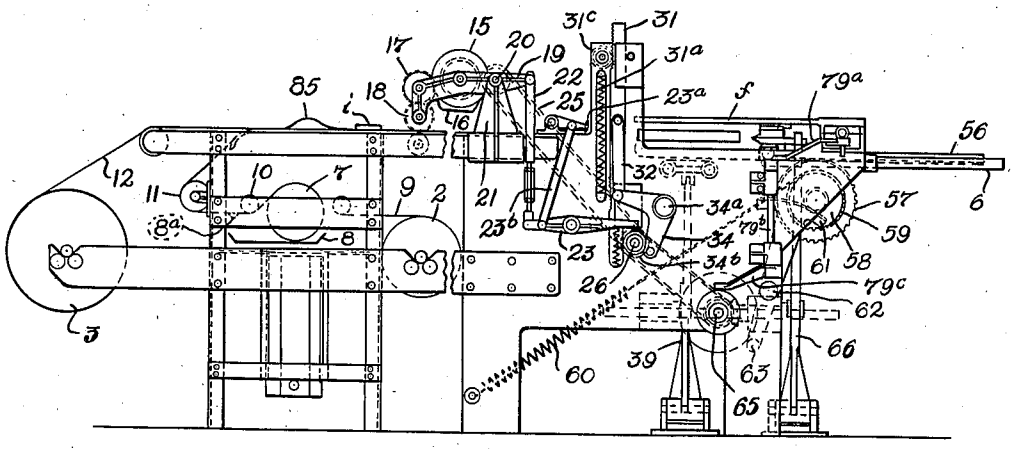


Fig. 3

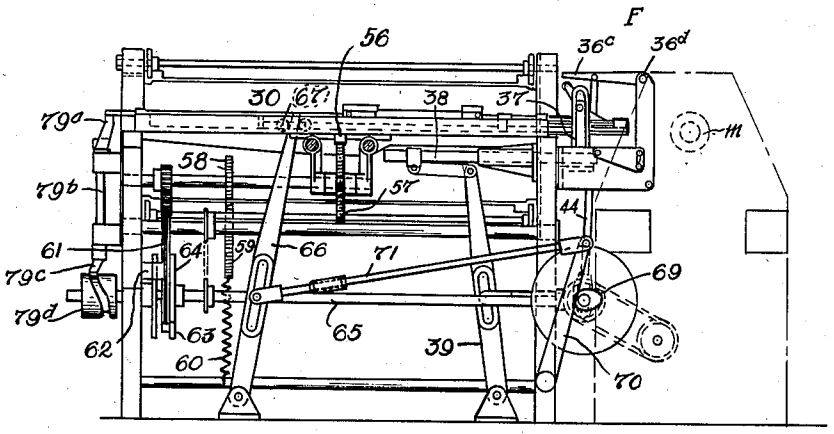


Fig. 4

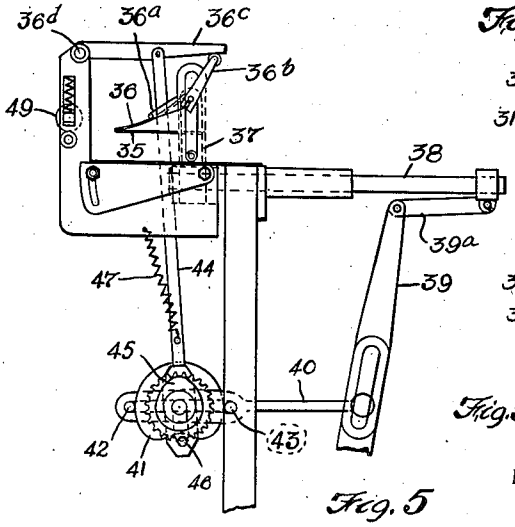


Fig. 5

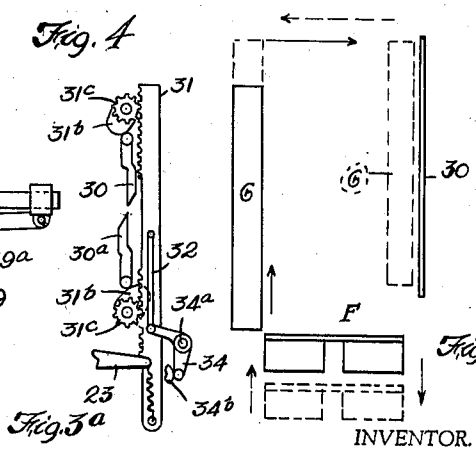


Fig. 3a

Fig. 6

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2,188,064

MECHANISM FOR MAKING LAMINATED PRODUCTS

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Application September 24, 1937, Serial No. 165,541

22 Claims. (Cl. 93—81)

This invention relates to the preparation of laminated products, and more particularly those in which a layer of special surfacing material may be included, so as to obtain a surface having a special finish on one side or having resistance against particular material with which it may contact. As a further refinement also, such composite sheet material may be formed into structures of tubular character to present a desired facing material internally or externally. Other objects and advantages will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawings:

Fig. 1 is a diagrammatic plan view illustrating the assemblage of a plurality of layers of sheet stock in accordance with the invention; Fig. 2 is a plan view of mechanism contemplated in the invention; Fig. 3 is a detail side elevation, taken as substantially indicated at line III, Fig. 2; and Fig. 3*a* is an enlarged fragmentary detail thereof; Fig. 4 is a vertical section, taken on a plane substantially indicated by line IV, Fig. 2; Fig. 5 is a vertical section on enlarged scale, taken on a plane substantially indicated by line V, Fig. 2; Fig. 6 is a diagrammatic plan view showing the feed movements between the severing means and the mandrel; Fig. 7 is an enlarged detail on a plane substantially indicated at line VII, Fig. 2; and Fig. 8 is an end view thereof.

In accordance with the invention, sheet material is laminated together, a special facing layer as desired being assembled with a body layer, and for illustration a web of cellulosic material as supplied from a roll 2, Fig. 1, has an adhesive applied to one surface and is brought into assembly with another web of cellulosic material from a roll 3, the assembled sheets forming a composite, which is then further handled in accordance with the invention. Depending upon the particular usage in view, the web from the roll 3 may be of the same width as that from the roll 2, or less. For illustration, it is taken as of less width in order to show how special effects may be obtained in the further assembly; and the composite as formed from the webs from rolls 2 and 3 in glued together relation may be considered as traveling in the direction of the arrow *a*, Fig. 1, the composite being then for instance severed into transverse strips 4 which will have the peculiarity of two layers at one end, the under layer *f* as viewed in Fig. 1, being the special surfacing material, which extends from the edge in to the dotted line 5, while the remainder of the sheet 1 is of the general body material. As readily seen, various effects may be had, depending upon the particular materials introduced by rolls 2 and 3 respectively. As an illustration, the roll 3 may be of cellulosic material particularly resistant to oils and greases, and the roll 2 may be of cellulosic material of lower grade paper stock suitable for body usage. Thus, the roll 3 may be of oil-proofed paper, hydrated cellulose, parchmentized paper etc., and the roll 2 may be of kraft, chipboard, chestnut board or other relatively cheap paper stock. By employing a water-proof material as the stock roll 2, a water-proof faced composite material may equally well be assembled, as readily seen. And by one roll of facing material on one side having oil-proof properties, and another roll in application for the other side having water-proof properties for instance, a composite of corresponding respective surfaces may be had. And, by advancing the sheets 4 for instance in the direction of the arrow *b* to a further laminating means bringing the material together in the form of a wound-up tube, the latter may correspondingly have a special facing inside or out, or both, as may be desired. The mechanism effecting these functions may vary in its detail, but one desirable form is illustrated, in which, as seen in Fig. 3, the roll of paper 3 is placed in a suitable framing from which it is fed forwardly, while a roll 2, suitably supported in the framing at a point in advance of the roll 3, is fed to contact one surface with a gluing roller 7 and is then brought together into assembly with the web from roll 3. This portion of the mechanism may involve adhesive applying means including an adhesive supply-pan 8 of suitable character in association with the gluing roller 7, and the web of paper 9 proceeding from the roll 2 passes over such gluing roller and receives an application of the adhesive therefrom, and thence is diverted by guide rollers 10, 11, also passing a doctor scraper 8*a*, into assembly with the web 12 from the roll 3. Beyond the point of assembly, an adhesive applicator is arranged to apply adhesive across the exposed face of the com-

posite traveling thereunder, and such applicator may comprise a glue-supplying roller 15 arranged to pick up the adhesive from a suitable pan 16 in association therewith, and then feed the adhesive by means of distributing rollers 17, 18, to the paper traveling thereunder. By mounting the rollers 15, 17, 18, in a pair of arms 19 which may be pivotally mounted at 20 in a pair of brackets 21, the rollers may be rocked away from the paper. Such movement may be effected by link 22 and lever 23 and any suitable operating means therefor, such as a cam on shaft 26 to give the small movement required. Conveniently a hold-down arm 23a may also be operated by lever 23 through a link 23b, and thereby the paper is prevented from slipping when a cutter operates upon it. The rollers 15, 17, 18, may be driven through suitable gearing from a sprocket chain 25 receiving its drive in turn from the shaft 26.

Beyond the gluing means is a cutter, which may be in the form of a knife or rather a pair of knives 30, 30a, Fig. 3a, extending across the width of the composite sheet material and being workable shear-wise by suitable means, as for instance a rack 31, Figs. 3, 3a, operated by a link 32 through the bell crank lever 34 fulcrumed on the frame at 34a and having its free arm operated by a cam 34b on shaft 26. The severing blades, urged apart by a spring 31a between projections on the respective blades, may be moved together by cams 31b on cross shafts carrying pinions 31c operated by the rack 31, the cams being set appropriately. By cutting the composite sheet material into transverse strips of adapted width a suitable dimension thus may be had for further laminating in wind-up operation to the formation of a tubular body. To carry the cut strip for the further operations, a gripper is provided which is movable to a position adjacent and parallel to the severing knife, the gripper G being suitably mounted to then move in primary path, as indicated in Fig. 6 back to a position remote from the cutter and parallel, and then be moved axially in a secondary path to carry the cut sheet into the jaws of the mandrel-feeder F, which being in a position to receive the end of the cut sheet then moves forwardly to present it to the wind-up mandrel m, Fig. 2. Thus, as seen in Fig. 6, the gripper G in its dotted line position seizes the web and carries it back to the position at the left of Fig. 6, in dotted line, and the knife means 30, etc., severs the web, then the gripper G moves axially to the full line position shown, whereby the end of the cut sheet is put into the feeder F in its full line position shown, and thereupon the feeder F advances forward to the dotted line position, adjacent to the mandrel, to carry the sheet to the mandrel-gripper. The gripper G, Figs. 2, 7 and 8, may involve a movable carriage assembly and comprise a lower jaw 51, an upper jaw 52 movable relatively thereto in gripping and releasing action, and operating mechanism; the latter being of detail as desired. For instance, spring means 53, Fig. 8, at the back beyond the pivot fulcrum of the upper jaw in lugs 54 may serve to close the upper jaw, while a rack bar 55 movable axial-wise of the jaws and carrying inclined wedges 55a which slide against coacting wedges on the back of the jaw 52 may be provided to effect release. The jaw structure or gripper can slide axial-wise in the guide carriage 50 and the carriage can slide bodily in frame guide f. While the gripper carriage is going through its travel movement from the cutter 30 back and across to the mandrel-feeder F and return for a new charge, undesirable prolonged action of the glue roller 18 on the paper is prevented by the roller being raised from the paper by cam 34b, lever 23 and mounting 19, etc. At the same time, the lever raises the hold-down 23a so that the paper is feedably pulled along in feed-movement in timed cycle; and it will be observed that the end of the paper (the cutter 30 being now open), is in position to be seized by the gripper G appropriately and be then pulled out thereby, whereupon the cutter 30 operates again, and the gripper goes across with its cut strip to the mandrel-feeder F, thence to return to the end of the paper web again for a repetition of the cycle. The movement of the gripper carriage G back and forth in the slide guides f is effected in timed relation by suitable means, as for instance the carriage having a rack 56, Figs. 2 and 3, operated by a pinion 57 whose shaft is rotated for movement of the carriage toward the cutter by sprocket 58 and unwind chain 59 pulled by a tension spring 60, while for reverse movement the shaft of the pinion 57 is turned by gear segment 61 which is fulcrumed at 62 on the frame and its extending arm has a cam follower 63 operated by a suitable cam 64 on shaft 65. The carriage desirably has guide rods 6 slidable in the frame. Movement of the gripper axial-wise in the carriage is effected by a suitable means, as lever arm 66 having its lower end pivoted and its upper end to be received between idler rollers 67 projecting from the gripper, the lever arm 66 part of the time resting passive, the timing being such that the end of the lever arm 66 is in a position to come between the idler rollers 67 when the gripper is moved from the cutter to its remote position. Reversely, the lever arm 66 is thrown back by the cam 69 and slides the gripper back to a position away from the mandrel-feeder F, and the gripper carriage may then be moved bodily back to the cutter in repetition of the cycle with the lever-arm 66 in readiness for use. In detail further, for actuation of the movable jaw 52 of the gripper, while the jaw-closing spring 53 has a constantly-acting tendency, the jaw-opening in timed relation may be provided by movement of the rack 55 by means of pinion 74 carried with the upper jaw and having on its stub shaft a crank 75 in position to be appropriately turned by tripper-arms 76, 77, these being mounted for sufficient slide movement in slideway 78, Fig. 2, and the tripper-arms being connected to a slide rod 79 having operating lever 79a on a short vertical shaft 79b whose lower end is provided with a cam-arm 79c engaging cam 79d. With this, after the gripper presents its cut strip to the mandrel-feeder F, the tripper-arm 76 is pulled back by the mechanism recited, it having been sufficiently advanced toward the mandrel-feeder F to allow free transit of the gripper-crank 75, and then in such movement in the direction away from the mandrel-feeder F the arm 76 turns the crank 75 and the pinion 74 and thereby moves the jaw-rack 55 to release jaw 52 of the gripper so that the mandrel-feeder F can maintain the cut strip. Further movement of the arm 76 shoves the crank 75 and the gripper with it back to position remote from the mandrel-feeder, ready for bodily movement of the gripper carriage G back to the cutter 30. After the gripper has received a new charge and is ready to be returned back away from the cut-

ter, the arm 77 comes into operation and in its sliding movement in the direction of the mandrel-feeder F immediately strikes the crank 75 and effects release so that the spring means 53 may set the gripper jaw and hold the cut strip while the carriage is then moved away from the cutter, the cutter being open. Continuing movement of the arm 77 now shoves the crank 75 and gripper mechanism in its carriage G forward to position adjacent the mandrel-feeder F. Return of the carriage away from the mandrel-feeder is effected by the cam 69 operating the lever 66 through the cam-lever 70 and compensating link 71. The feeder F may involve a pair of fingers 35, 36, Fig. 5, the latter being openable relative to the former, and both being carried by suitable bracket means 37 on slide rods 38, whereby in retracted position of the finger-carrying bracket means 37, the fingers may receive the cut sheet, and carry it forwardly to the wind-up mandrel *m*. The reciprocating movement of the feed fingers may be provided by suitable drive means, such as a lever 39 which may be operated in turn through a slot-wise connection by a link 40 which is reciprocated by a cam 41 operating on cam-followers 42, 43, on the link. The movable feed finger 36 is opened and closed in timed relation with the movement of the slide, such as to be open at the moment of being in position to receive the end of the cut sheet, that the latter may ride into the opening between the fingers, but on the starting of the return movement of the slide the finger 36 is pressed against the sheet, and from its shape and relative weight, frictionally engages the sheet during the moving in the feed-direction, toward the left as illustrated in Fig. 5. Operating means for this may be for instance a pressure arm 36*a* bearing upon the feed finger 36 which desirably may be in the form of a resilient metal plate, and with the pressure arm 36*a* in effect and form of a bell-crank lever centrally fulcrumed and having its other arm 36*b* extending angularly, pressure may normally be applied to the feed finger 36, but on periodic engagement of the arm 36*b* by a release lever 36*c* the holding pressure on the feed finger 36 may be momentarily released to allow feed of a fresh sheet in appropriate timed relation. With the lever 36*c* fulcrumed at 36*d*, its movement may be controlled by a link 44, pulled down by cam 45 operating against cam-follower 46 on the link, while the reverse or raising movement may be accomplished by tension spring 47 extending from the link 44 to a fixed point on the framing. If the feed finger 36 be a pair of feed fingers arranged side by side, as shown in Fig. 2, two strips as split by a slitter 49 may be fed to the mandrel *m* simultaneously and two tubes may be wound up at the same time, instead of one, if preferred.

Arrived at the wind-up mandrel *m*, the timing is such that the latter presents open gripping means ready to seize the advance end of the sheet. Such gripping means may comprise gripper elements having intermeshing gear teeth, and driven through intermediary gear elements from an axially-extending internal stem which at its outer end receives intermittent motion oscillatingly at appropriate timed intervals to open and close the gripper elements. An advantageous construction is set forth in detail in my co-pending application Ser. No. 160,029, filed August 20, 1937.

In the operation of making up a laminated material through the successive stages, as readily seen from the foregoing a special surface material is fed from the stock-roll 2, and receiving a coating of adhesive by the adhesive applicator 7, is brought into contact with the sheet material from the stock roll 3, and if the width of the latter is greater than that of the former, as is desirable in the case of making up composite sheet material to be further laminated into tubular bodies such as to give a special lining, the assembled material now in the stage of two layer thickness at one edge, as seen in Fig. 1, and single layer thickness at the other edge, is advanced under the adhesive applicator 15, 17, 18, and receives a coating of adhesive on the exposed face opposite from the special surface layer. Thence proceeding to the cutter 30, the composite sheet material is cut into strips which are relatively narrow as compared with their length, their length in this case being transverse of the originally-directed travel of the sheet material, such dimension, as indicated, being particularly suitable for feed to a tubular winding-up mandrel, and to this end, the cut strip is carried by the gripper carriage G to the feed fingers 35, 36, which then carry it into the gripper jaw of the mandrel *m* suitably positioned at that moment, and the latter in its rotation winds the strip over and upon itself, the special facing layer being internally against the mandrel surface, while the adhesive-coated surface is on the outside and thereby the successive layers as laid on are joined together into a laminated tubular structure. Further compacting may be had if desired by a pressure roller which may be spring-tensioned against the mandrel and material thereon. At the completion of the winding operation, a slide-collar 80 pushes the wound tubular body axially along the mandrel one step, in order to clear the mandrel for the next oncoming strip to be wound. The collar 80 may be reciprocatively moved by any suitable means, for instance a cam and lever and link connections to a slide carrying the collar, as need not be particularly detailed here. If desired, the tubular body may be further surface-finished exteriorly by application of a cover layer, or the surface may be treated by liquid, or both, in accordance with particularly-desired character and intended usages.

As a further refinement, in assembling the sheet material from the stock-roll 3 with that from the stock-roll 2, it is advantageous in some instances to so relate the respective layers that a special surfacing layer from the roll 2 slightly extends beyond the margin of the sheet material from roll 2, as indicated in dotted line at the lower edge of Fig. 1. Then, in being directed into assembly with the web 12, such projection in the margin is turned up and over in traveling against a suitable guide 85, Fig. 3, and is flattened into place by running under smoother *i* and is pasted down, covering and guarding the free edge of the sheet 12. In this way, the seam which is initially formed on the inside where the winding-up starts on the mandrel, is such that there is no possible exposure of the poorer body stock layer, but only the special liner material is in exposure, and thereby when used as a container, with suitable closure heads, liquid contents as for instance oils, may be excluded from working into the backing layers by any possible exposure of unprotected material, even in very slight extent, at the seam.

Other modes of applying the principle of the invention may be employed, change being made

as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means, including a cutter, a cam actuating said cutter, and a pinion and rack operating said cam; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw, a rack and pinion for moving said wedge-inclined means; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; a rack and pinion for moving said carriage to one of said positions in the primary path and an un-wind chain and sprocket and pull-spring for returning the carriage to the other of such positions; a lever having an end to engage said gripper when the latter is in its position back from the severing means, and means for operating said lever to move the gripper in its plane therein; a crank arm on a stub shaft with said movable gripper jaw-operating pinion; tripper arms movable against said crank for operating its pinion and rack; a slide carrying said arms; cam means for reciprocating said slide; means for moving the gripper in its secondary path; a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means; and a mandrel for winding the fed material into tubular form.

2. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means, including a cutter, a cam actuating said cutter, and a pinion and rack operating said cam; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw, a rack and pinion for moving said wedge-inclined means; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; a rack and pinion for moving said carriage to one of said positions in the primary path and an un-wind chain and sprocket and pull-spring for returning the carriage to the other of such positions; a lever having an end to engage said gripper when the latter is in its position back from the severing means, and means for operating said lever to move the gripper in its plane therein; a crank arm on a stub shaft with said movable gripper jaw-operating pinion; tripper arms movable against said crank for operating its pinion and rack; a slide carrying said arms; cam means for reciprocating said slide; means for moving the gripper in its secondary path; a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means; and a mandrel for winding the fed material into tubular form.

3. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller; severing means, including a cutter, a cam actuating said cutter, and a pinion and rack operating said cam; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw, a rack and pinion for moving said wedge-inclined means; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; a rack and pinion for moving said carriage to one of said positions in the primary path and an un-wind chain and sprocket and pull-spring for returning the carriage to the other of such positions; a lever having an end to engage said gripper when the latter is in its position back from the severing means, and means for operating said lever to move the gripper in its plane therein; a crank arm on a stub shaft with said movable gripper jaw-operating pinion; tripper arms movable against said crank for operating its pinion and rack; a slide carrying said arms; cam means for reciprocating said slide; means for moving the gripper in its secondary path; a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means; and a mandrel for winding the fed material into tubular form.

4. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means, including a cutter, a cam actuating said cutter, and

a pinion and rack operating said cam; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw, a rack and pinion for moving said wedge-inclined means; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; a rack and pinion for moving said carriage to one of said positions in the primary path and an un-wind chain and sprocket and pull-spring for returning the carriage to the other of such positions; a lever having an end to engage said gripper when the latter is in its position back from the severing means, and means for operating said lever to move the gripper in its plane therein; a crank arm on a stub shaft with said movable gripper jaw-operating pinion; tripper arms movable against said crank for operating its pinion and rack; a slide carrying said arms; cam means for reciprocating said slide; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means.

5. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means, including a cutter, a cam actuating said cutter, and a pinion and rack operating said cam; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw, a rack and pinion for moving said wedge-inclined means; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; a rack and pinion for moving said carriage to one of said positions in the primary path and an un-wind chain and sprocket and pull-spring for returning the carriage to the other of such positions; a lever having an end to engage said gripper when the latter is in its position back from the severing means, and means for operating said lever to move the gripper in its plane therein; a crank arm on a stub shaft with said movable gripper jaw-operating pinion; tripper arms movable against said crank for operating its pinion and rack; a slide carrying said arms; cam means for reciprocating said slide; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means.

6. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means, including a cutter, a cam actuating said cutter, and a pinion and rack operating said cam; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw, a rack and pinion for moving said wedge-inclined means; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; a rack and pinion for moving said carriage to one of said positions in the primary path and an un-wind chain and sprocket and pull-spring for returning the carriage to the other of such positions; a lever having an end to engage said gripper when the latter is in its position back from the severing means, and means for operating said lever to move the gripper in its plane therein; a crank arm on a stub shaft with said movable gripper jaw-operating pinion; tripper arms movable against said crank for operating its pinion and rack; a slide carrying said arms; cam means for reciprocating said slide; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means.

7. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw, a rack and pinion for moving said wedge-inclined means; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; a rack and pinion for moving said carriage to one of said positions in the primary path and an un-wind chain and sprocket and pull-spring for returning the carriage to the other of such positions; a lever having an end to engage said gripper when the latter is in its position back from the severing means, and means for operating said lever to move the gripper in its plane therein; a crank arm on a stub shaft with said movable gripper jaw-oper-

ating pinion; tripper arms movable against said crank for operating its pinion and rack; a slide carrying said arms; cam means for reciprocating said slide; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means.

8. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; a rack and pinion for moving said carriage to one of said positions in the primary path and an un-wind chain and sprocket and pull-spring for returning the carriage to the other of such positions; a lever having an end to engage said gripper when the latter is in its position back from the severing means, and means for operating said lever to move the gripper in its plane therein; a crank arm on a stub shaft with said movable gripper jaw-operating pinion; tripper arms movable against said crank for operating aforesaid movable jaw; a slide carrying said arms; cam means for reciprocating said slide; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means.

9. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; means for moving said carriage to one of said positions in the primary path and an un-wind chain and sprocket and pull-spring for returning the carriage to the other of such positions; a lever having an end to engage said gripper when the latter is in its position back from the severing means, and means for operating said lever to move the gripper in its plane therein; a crank arm on a stub shaft with said movable gripper jaw-operating pinion; tripper arms movable against said crank for operating aforesaid movable jaw; a slide carrying said arms; cam means for reciprocating said slides; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means.

10. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; means for moving said carriage to one of said positions in the primary path and an un-wind chain and sprocket and pull-spring for returning the carriage to the other of such positions; a lever having an end to engage said gripper when the latter is in its position back from the severing means, and means for operating said lever to move the gripper in its plane therein; a crank arm on a stub shaft with said movable gripper jaw-operating pinion; tripper arms movable against said crank for operating aforesaid movable jaw; a slide carrying said arms; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means.

11. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; means for moving

said carriage to one of said positions in the primary path, and means for returning the carriage to the other of such positions; a lever having an end to engage said gripper when the latter is in its position back from the severing means, and means for operating said lever to move the gripper in its plane therein; a crank arm on a stub shaft with said movable gripper jaw-operating pinion; tripper arms movable against said crank for operating aforesaid movable jaw; a slide carrying said arms; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means.

12. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; means for operating said carriage; means for moving the gripper in the carriage plane; a crank arm on a stub shaft with said movable gripper jaw-operating pinion; tripper arms movable against said crank for operating aforesaid movable jaw; a slide carrying said arms; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means.

13. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; means for operating said carriage; means for moving the gripper in the carriage plane; means for operating said movable gripper jaw; tripper arms movable against said crank for operating aforesaid movable jaw; a slide carrying said arms; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means.

14. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; means for operating said carriage; means for moving the gripper in the carriage plane; means for operating said movable gripper jaw; tripper arms movable against said crank for operating aforesaid movable jaw; a slide carrying said arms; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means.

15. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for turning a margin of one web over the edge of the other web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means; a gripper, including a base jaw, and a jaw movable with respect thereto; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; means for operating said carriage; means for moving the gripper in the carriage plane; means for operating said movable gripper jaw; tripper arms movable against said crank for operating aforesaid movable jaw; a slide carrying said arms; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means.

16. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging

the web beyond said roller, and operated by the same means; severing means; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; means for operating said carriage; means for moving the gripper in the carriage plane; a crank arm on a stub shaft with said movable gripper jaw-operating pinion; tripper arms movable against said crank for operating aforesaid movable jaw; a slide carrying said arms; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means.

17. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means; a gripper, including a base jaw, a jaw movable with respect thereto, spring means for closing said movable jaw, wedge-inclined means movable longitudinally of said movable jaw to open same from the base jaw; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; means for operating said carriage; means for moving the gripper in the carriage plane; means for operating said movable gripper jaw; tripper arms movable against said crank for operating aforesaid movable jaw; a slide carrying said arms; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means and means for reciprocatively moving said finger means.

18. In the manufacture of laminated products, advancing a web of paper in the direction of its length and assembling with another web in partial lapping therewith, and changing the orientation of sections of the latter successively by cutting the composite transversely into strips and winding each cut strip in direction transverse of such other web in further lamination.

19. In mechanism of the character described, means for supplying a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for applying adhesive to the exposed surface of said other web, including an applicator roller, a mounting for said roller movable to and from the web, means for operating said movable mounting; a hold-down intermittently engaging the web beyond said roller, and operated by the same means; severing means; a gripper, including a base jaw, and a jaw movable with respect thereto; a carriage on which said jaws are mounted; guides permitting said carriage to move in a primary path to a position adjacent and parallel to said severing means and back to a position to be moved therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position; means for operating said carriage; means for moving the gripper in the carriage plane; means for operating said movable gripper jaw; tripper arms movable against said crank for operating aforesaid movable jaw; a slide carrying said arms; means for moving the gripper in its secondary path; and a mandrel-feeder served by the aforesaid gripper, including finger means.

20. In mechanism for making laminated products, means for feeding a web of paper; means for applying adhesive to one surface thereof; means for assembling the same with another web; means for applying adhesive to the exposed surface of the composite; and means for re-orienting sections of such other web successively, including a cutter for cutting the composite into transverse sheets, and means for winding each such sheet in direction transverse of such other web into a tubular body.

21. In mechanism for making laminated products, means for feeding a web of paper; means for applying adhesive to one surface thereof; means for assembling with another web; and means for re-orienting the paper, including means for cutting the composite into transverse sheets, a gripper including a base jaw and a jaw movable with respect thereto, a carriage on which said jaws are mounted, guides permiting said carriage to move in a primary path to a position adjacent and parallel to said cutting means and back to a position removed therefrom and permitting the jaws to then move back and forth in a secondary path in the plane of last position, means for operating said carriage, and means for moving the gripper in the carriage plane, including tripper arms.

22. In mechanism for making laminated products, means for feeding a web of paper in the direction of its length; and means for re-orienting the paper, including means for cutting the web into transverse sheets, a gripper including a base jaw and a jaw movable with respect thereto, a carriage on which said jaws are mounted, guides for said carriage, means for moving the carriage back and forth in a path between a position adjacent and parallel to said cutting means and a position removed therefrom, and means for moving the jaws bodily back and forth in a path in the plane of said last position, and means for operating said movable jaw.

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