

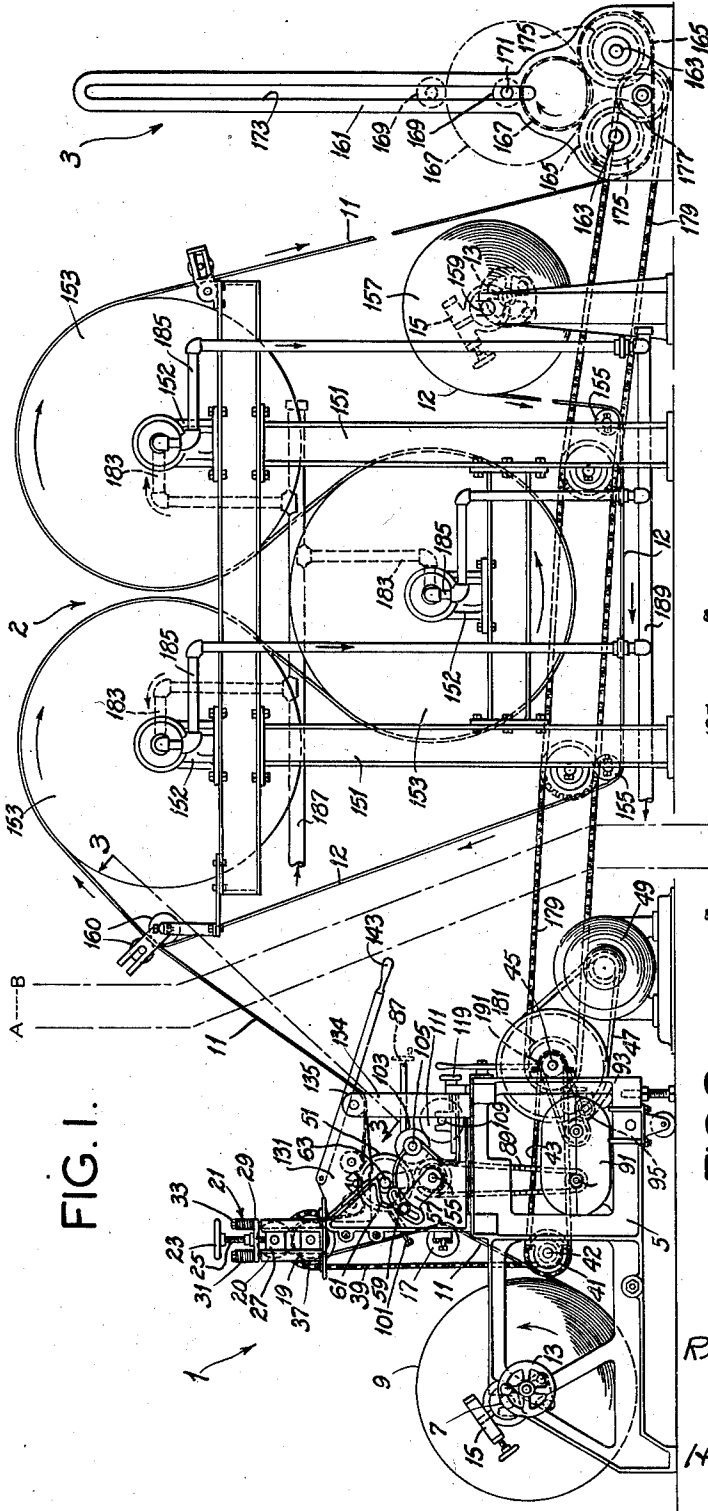
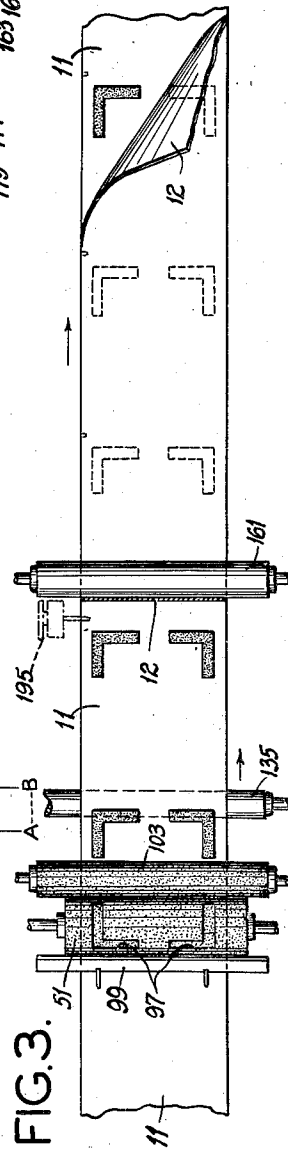
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R. J. WILLIAMS
WEB PASTING APPARATUS

Filed May 31, 1943

2,382,929

3 Sheets-Sheet 1



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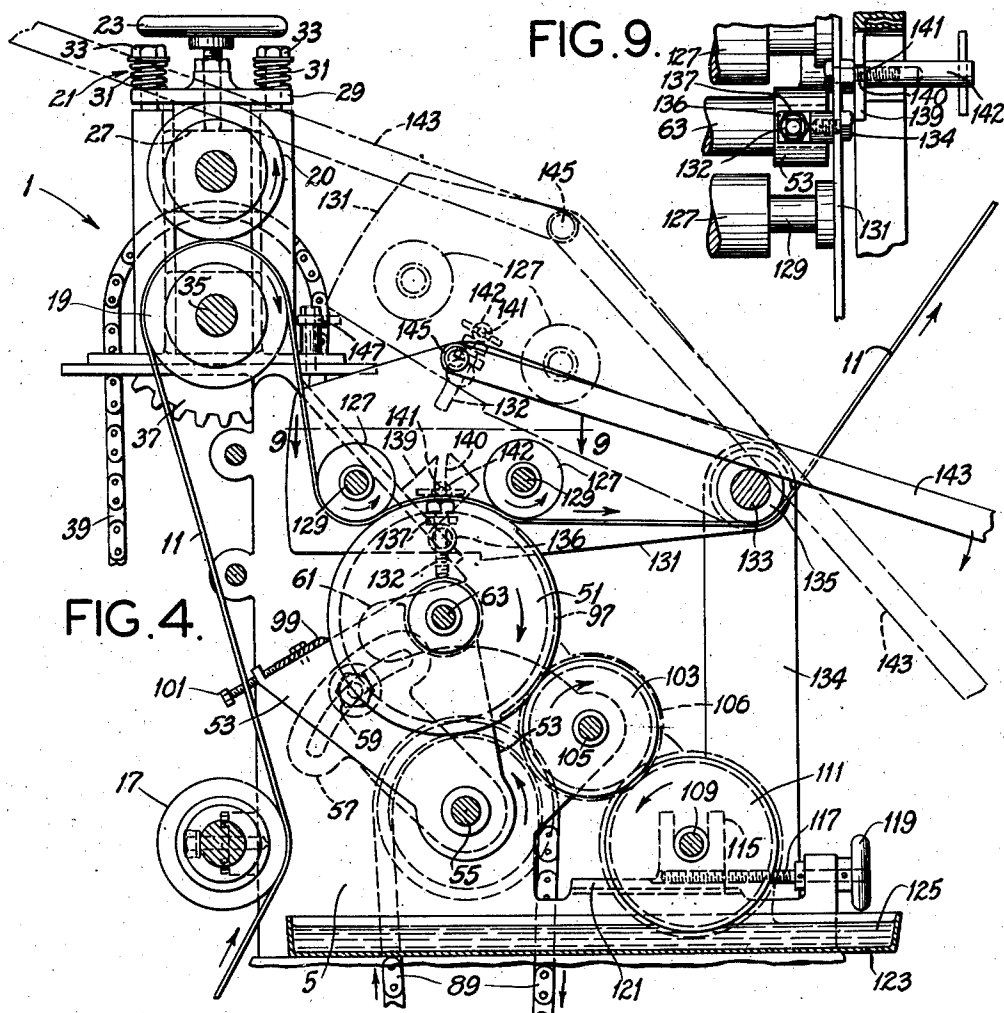
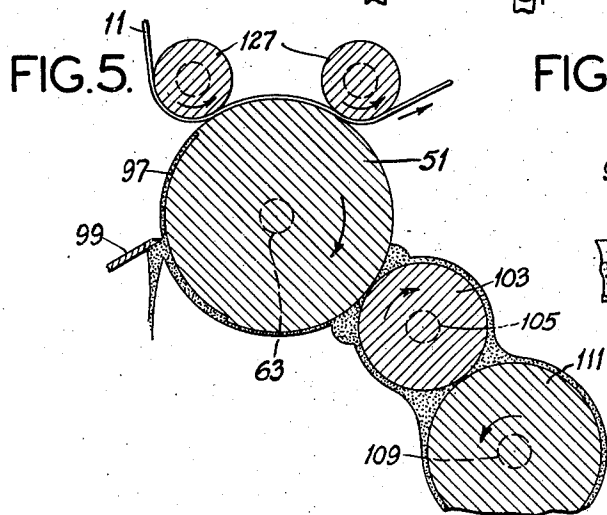
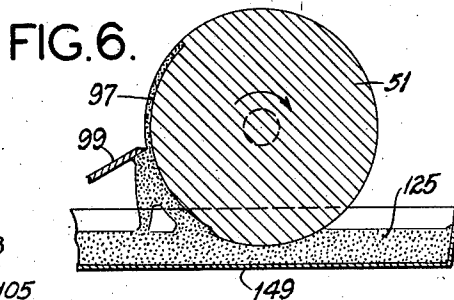
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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WEB PASTING APPARATUS

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Application May 31, 1943, Serial No. 489,222

3 Claims. (Cl. 91—50)

This invention relates to web pasting apparatus, and with regard to certain more specific features, to apparatus of this class for applying to web materials patterns of adhesive.

Among the several objects of the invention may be noted the provision of web pasting apparatus which lays on a clean cut pattern of adhesive with any desired practical thickness of adhesive; and the provision of apparatus of this class which by means of a fairly simple construction is adaptable to produce variable pattern lengths on the web from which variable sized blanks may be produced for various purposes. 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 are illustrated several of various possible embodiments of the invention,

Fig. 1 is a side elevation of my new apparatus;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is an enlarged biased section looking up from line 3—3 of Fig. 1;

Fig. 4 is an enlarged detailed view of an adhesive applying mechanism, viewed as in Fig. 1;

Fig. 5 is a vertical section taken on line 5—5 of Fig. 2 but drawn on the scale of Fig. 4;

Fig. 6 is a view similar to Fig. 5 but showing a modification;

Fig. 7 is a sectional detail of a differential control mechanism, being taken on line 7—7 of Fig. 2;

Fig. 8 is a detailed view of a driving gear train taken substantially on line 8—8 of Fig. 2; and,

Fig. 9 is a horizontal section taken on line 9—9 of Fig. 4.

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

Referring now more particularly to Fig. 1, numeral 1 generally shows an adhesive applying unit, numeral 2 an adhesive drying or solidifying unit, and numeral 3 a wind up unit. These may be farther spaced than shown, particularly if it is desired to use a plurality of units 1 to increase the number of adhered webs in the final laminated article. In this event more space is provided between planes A and B for bringing in more webs from more units 1. Only one unit 1 is shown by way of example.

The adhesive applying unit 1 consists of a frame 5 on which is a removable supporting shaft 7 for a supply roll 9 of the paper, cloth or like web 11 to which adhesive is to be applied. This shaft 7 is laterally adjustable in frame 5 from a control mechanism 13 for properly positioning the supply roll 9 so that the web 11 is properly aligned in the machine. The mechanism 13 includes an adjustable tension brake 15 for providing proper reaction from the roll 9 on the web 11. Further description of the device 13; 15 will not be given since its form and function are already known in the art.

The web 11 passes from the supply roll 9 behind an idler roll 17 and then up and over a lowermost one of a pair of draw rolls 19, 20. The upper draw roll 20 is adjustably biased toward the lower draw roll 19 by a spring pressure mechanism 21. This mechanism 21 includes adjusting wheels 23 which permit any degree of pressure to be set up between the rolls 19 and 20, or no pressure at all. Briefly the mechanism 21 consists in screws 25 operating against sliding bearings 27 for the upper roll 20. These screws are threaded through plates 29 which are held down by springs 31 reacting against the heads of fixed studs 33. Thus when desired the bias on roll 19 may be completely relaxed or adjusted to any practical value.

The shaft 35 supporting the lower draw roll 19 is driven from a sprocket and chain drive 37, 39, from a lower sprocket 41 (Fig. 1). The lower sprocket 41 is on a shaft 42 which is driven through a chain drive 43 from a shaft 45. Shaft 45 in turn is driven by means of a belt drive 47 from a motor 49. Thus is provided means for drawing paper from the supply 9 into the upper part of the adhesive applying apparatus.

A feature of this adhesive applying apparatus is its adhesive applying intaglio roll 51 which is mounted on a shaft 53 supported upon a swinging frame 55. Frame 55 is pivoted on shaft 55 in frame 5. Outside of the frame 5, the shaft 55 is provided with a sector arm 57 through which the swinging frame 55 may be adjusted to any desired angular position. A locking bolt 59 holds the assembly in any desired position. Suitable slots 61 in the adjacent part of frame 5 accommodate adjusting movements of the ends of the shaft 53. From the above, it is clear that the shaft 53 supports the roll 51 and is itself supported in said swinging frame 55.

A gear 65 (Fig. 8) is carried on the shaft 53 and meshes with a drive gear 67 carried on the shaft 55 (Fig. 7). This gear 67 is driven from a

sprocket 69 through an ordinary differential gear 71 consisting of a driving bevel gear 73, a driven bevel gear 75 and intermediate bevel pinions 77 which are rotary on radial pins 79 carried in a rotary cage or frame 81, the latter being cut on the outside as a worm wheel 83. This worm wheel 83 meshes with a worm 85 having a rotary adjustment from a hand wheel 87. The purpose of the differential is to allow for advancing or retarding the motion phase of the surface of the intaglio roll with respect to the web 11 while the intaglio roll is rotating. Any given adjustment is held because while the worm 85 may drive the wheel 83, the reverse is not true. Hence the roll 51 may be properly phased by adjustment from wheel 87, any given adjustment being maintained.

The sprocket 69 is driven by means of a chain 89. Chain 89 is driven from a variable speed transmission gear box 91, and the latter is driven from the shaft 45 by means of a separate chain drive 93. Gear boxes such as 91 are known. For example, see Link Belt Company's so-called "P. I. V." gear referred to in its catalog book No. 1574, 1939 edition. Changes in the speed ratio through the box 91 may be effected from a vernier-hand control device shown at 95 (see page 35 of said catalog for details). Thus from the device 95 may be controlled the speed of the rotation of the intaglio roll, and from the handle 87 its phase position may be changed.

The surface of the intaglio roll 51 is recessed preferably by milling as indicated at 97. The shape is according to the pattern of adhesive desired on the web 11. The depth of each recess is of the order of $\frac{1}{2}$ of an inch or so for pocketing the requisite amount of adhesive needed in the pattern of adhesive which is to be applied. The remainder of the roll surface is left as a smooth cylinder. A scraper blade for removing adhesive from the surface of the roll (but not from these intaglio depressions 97) is shown at numeral 99, the same being adjustable from adjusting screws 101. The blade is supported on the swinging frame 53, as is roll 51.

At numeral 103 is shown an idler adhesive roll supported on a shaft 105 which is supported in bearings fixed on the frame 5. This roll 103 is driven from a gear 106 on shaft 105. Gear 106 meshes with the pinion 67 (Fig. 8). The gear 106 also drives a gear 107 on the shaft 109 of an adjacent adhesive pick-up roll 111. The latter roll 111 is carried on a shaft 109 which is supported in sliding bearings 115 under control of screws 117 which are adjustable from handles 119. The bearings 115 slide in supports 121.

Beneath the roll 111 is located a removable pan 123 for a suitable adhesive 125 into which the roll 111 dips. The directions of rotation are shown in Figs. 4 and 5 and from these it will be seen that the roll 111 picks up adhesive and delivers it to roll 103 from whence it is delivered to the surface of the intaglio roll 51. Such adhesive as is on the outer surface of the intaglio roll is scraped off clean by the scraper 99, leaving only the adhesive in the intaglio depressions 97.

In order to transfer the adhesive from the depressions 97 to the passing web 11, the latter is caused to pass under two spaced idler rolls 127 which are carried on shafts 129 located in a vertically swinging cradle 131, the latter being pivoted on a fixed shaft 133 on supports 134. The shaft 133 also carries an idler roll 135 under which the web 11 is threaded. In its normal operation, the cradle 131 is swung down into

the solid-line position shown in Fig. 4, wherein the reach of web 11 between the rolls 127 is pressed into an arch or arcuate shape over the upper side of the intaglio roll 51. The descent of the cradle 131 is limited by rotary and axially adjustable jack screws 132 (Fig. 9). These are threaded through rotary pieces 136 adapted to be adjusted and clamped to the cradle 131 by bolts 134. Thus rotary pieces 136 may be locked in any angular position desired and the jack screws 132 may in turn be axially adjusted in the rotary pieces. The purpose of the rotary support for each jack screw 132 is to permit the lower end of the respective jack screw to find a suitable rest on the frame 53 which it will be remembered is angularly adjustable. Lock nuts 137 maintain given axial adjustments of screws 132.

A slotted extension 139 from the frame 5 accommodates a lock screw 141 and clamp 142 of the cradle 131, so that when the cradle is placed in its downward (solid line) position shown in Fig. 4, it may be held down by screwing up clamp 142 (Fig. 9) at a suitable location of screw 141 in the slot 140 of extension 139.

The alternate and raised position of the cradle 131 is shown by dotted lines in Fig. 4. In this position it allows withdrawal of the web 11 from the surface of the intaglio roll 51. In order to move the cradle, a handle 143 is pivoted at 145 on the cradle. When this handle is swung to the right-hand (solid-line) position shown in Fig. 4 it contacts the shaft 133. The shaft 133 then acts as a fulcrum for the lever 143 which may lift the cradle to the dotted-line cradle position shown. To hold the cradle in this position, a pivoted latch 147 is swung into position beneath the cradle. This latch may be cleared for allowing the cradle to descend to its solid line position. The lever 143 may be swung to the left-hand (dotted line) position shown in Fig. 4 where it is out of the way.

The purpose of placing the intaglio roll 51 in a swinging frame such as 53 is to allow for its replacement in different sizes (diameters) and at the same time for bringing it into juxtaposition with respect to the idler adhesive delivery roll 103.

It will be seen that the frame 53 when rocked is moved generally laterally, while the cradle 131 when rocked is moved generally vertically. That is, the movements of the two are substantially at right angles so that regardless of what size of intaglio roll 51 is used in the frame 53, the spaced rollers 127 will approach the intaglio roll so as to place the web therebetween in an arcuate position on said intaglio roll. For example, if a smaller intaglio roll 51 is used than the one shown, it will be positioned more to the right (toward the roll 103) and the cradle 131 will cause the rollers 127 to swing further down but still maintaining the desired arcuate contact of web 11 with the smaller intaglio roll.

In Fig. 6 is shown how, if it is desired to dispense with the rolls 103 and 111, the intaglio roll may be dipped directly into the adhesive 125 in a pan 149 which is carried beneath the shaft 63.

As long as the cradle 131 is down, the web 11 is in concavely arcuate contact with the intaglio roll 51, from whence the web 11 picks up adhesive from the intaglio depression 97 while being unaffected by the clean outer surface of the roll. The result is the application of adhesive patterns to the bottom of the web 11 as shown in Fig. 3. These are clean-cut, and contain an ample

amount of adhesive for performing subsequent adhering functions. It is of course understood that the intaglio impression may be made of any depth suitable for obtaining the amount of adhesive desired without smudging the impressions.

To prevent application of adhesive impressions from the intaglio roll to the web 11, the cradle 131 needs only to be lifted to its dotted line position. Pressure is at this time taken off the draw roll 27 so that web feed is at this time stopped.

The web on which are the adhesive impressions travels to the drying section 2. This consists in a supporting frame 151 for rotary idling drying drums 153 carried in suitable bearings 152 and over which the web 11 is threaded as shown. As the web 11 approaches the drums, it is brought into juxtaposition with a second web 12. Web 12 is introduced from beneath drums 153 being guided by idler rolls 155. It comes from a supply roll 157 mounted upon a shaft 159 also beneath. Shaft 159 like shaft 75 is under control of an adjustment and brake mechanism 13, 15, such as the one above described.

Both webs 11 and 12 pass through ironing rolls 160 which squeeze out any bubbles which may be in the adhesive patterns. After passing over the drums 153 the multi-ply web 11, 12 proceeds to wind up apparatus shown at 3. This apparatus consists of a frame 161 in which are shafts 163 upon which are supporting rolls 165. The supporting rolls 165 support the roll 167 which is being wound up. Two sizes of the roll 167 are shown in Fig. 1 to illustrate the point that as the roll size increases, its center rises. The linear velocity of its surface is always equal to the linear velocity of the surfaces of the rolls 165. A gravity operated roller 169 biases down the roll 167 as it is formed. The roller 169 has gudgeons 171 in slots 173 in the frame 161. The rolls 165 are driven by gears 175 and a pinion 177. The pinion 177 is driven through a sprocket and chain drive 179 from a sprocket 181 on the shaft 45. The drive ratio between draw rolls (19, 20) and wind-up rolls 165 is such that the surface speed of the wind-up rolls 165 is 3% or 4% greater than the surface speed of the draw rolls 19, 20. Hence the web is always maintained in good tension throughout the apparatus. A slight amount of slippage between the surfaces of the rolls 165 and surface of the web roll 167 results, but this is not harmful.

The drums 153 are driven only by the webs 11, 12 and do not drive them. Not only does this simplify the mechanical structure, but it results in prevention of wrinkling of the web, as occurs when the drying rolls are power driven. Furthermore they are not used as pressure rolls, which heretofore has favored wrinkling.

The rolls 153 are supplied through suitable glands at their bearings with a heating fluid such as steam or hot water, the inlet lines being shown at numerals 183 and the outlet lines at 185. Supply and exhaust headers are shown at 187 and 189 respectively. Instead of heating the idler drying rolls 153, they may be supplied with a cooling medium, should the character of the adhesive require it for setting purposes.

Various classes of adhesive may be used, such as, for example, animal glue. In such case, heat may also be required at the pan 123 to maintain it in liquid condition for application to the web. Or, cold adhesive may be used, such as casein, vegetable glues, etc.

It is also to be understood that with certain adhesives it may be possible to dispense with the

drying rolls 153, in which event the web after assembly may be led directly from the unit 1 to the wind-up unit 3.

A clutch is provided as indicated at 191 for de-clutching the drive 179 thereby providing for stopping wind-up of the web. At this time the cradle 131 is lifted and pressure released from the rolls 19 and 20. However, the intaglio roll 51 and the adhesive transfer rolls 103 and 111 may continue to operate during recesses, such as a lunch hour or the like. Thus there is no danger of having adhesive dry on the rolls. Hence when it is desired again to start production, the cradle 131 is depressed, the rolls 19 and 20 tightened and the wind-up roll again thrown into operation by closing the clutch 191. Thus the adhesive will be continuously rotating and ready at all times for starting production.

It will be noted that the position of the web 12 and its supply roll 157 beneath the drying rolls 153 results in the possibility of close-coupling of the unit 1 with the unit 2.

While one web is shown assembled with one covering web 12, with adhesive therebetween, several adhesive-applying units such as 1 may be set up for delivering webs such as 11 which may be adhered together so as to form a multi-ply structure containing greater than two plies. In such event, several sheets would pass through adhesive-applying units such as 1.

Patterns of adhesive between the webs such as 11 and 12 are ordinarily associated with individual blanks to be cut from such a web, so that bags or the like may be formed therefrom. (See for example, my United States Patent 2,157,392, dated May 9, 1939.) The present machine allows of production of various pattern lengths for various bag sizes and the like, by providing for the use of various sizes of the intaglio roll 51. The rocking frame 53 allows for using various sizes of these while maintaining a proper positional relationship with respect to the transfer roll 103. The rocking cradle 131 at the same time allows of arcuately meeting any size roll with the web 11 and for removing the web from the intaglio roll when desired.

An advantage of the invention is the fact that the cradle 131 along with the rolls 127 effects a concavely arcuate contact with the web and the intaglio roll 51, instead of the ordinary straight line "kissing" tangent. This arcuate condition assures that the most efficient transfer of adhesive from the intaglio depression is obtained from the intaglio impression 97 to the web, even with the deep intaglio recesses required for adhesive.

Intaglio rolls may be changed not only to make provision for a change in bag length but also for making a change in depth of the impression 97 to meet various conditions of adhesive, paper web surface and the like, and so as to allow for a 1:1 linear velocity ratio between the intaglio roll 51 and web 11.

If the printing is to be done later on the web, the necessary marks may be applied to the web 11 by means of marking apparatus indicated diagrammatically at 195 in Fig. 3. Such apparatus will be driven from means which moves at a rate proportional to the surface speed of the intaglio roll 51. Further description of such apparatus is not given since its character is known. When necessary, various types of crease bars, slitters and the like may be used in association with the web.

Herein the terms adhesive, paste and glue are to be taken as synonymous.

Under the provisions of Rule 43 reference is hereby made to my copending application Serial No. 507,961, filed October 28, 1943, for Laminating apparatus.

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. Web pasting apparatus comprising an intaglio paste roll, a frame mounted for rocking adjustments about an axis and carrying said roll, means for driving said roll in any position of the frame comprising a gear train starting with a gear on said axis, means for delivering paste to said roll, a cradle mounted for rocking movement around an axis and substantially at right angles to the rocking movement of said roll frame, and spaced guide rollers in said cradle for guiding a web into arcuate position against the intaglio roll when the cradle is adjusted toward said intaglio roll.

2. Web pasting apparatus comprising a paste roll having an intaglio depression, a frame supporting said roll for rocking adjustments about an axis, paste supply means for the intaglio roll with respect to which said adjustment is made, a scraper carried on said adjustable frame and cooperating with the surface of the roll to re-

move paste at points except those in the depression, means for rotating the roll in the frame comprising a gear train including a gear centered on said axis, a power source, variable speed means for driving said gear from said power source, means driven from said power source for drawing a web past said roll at a fixed relative speed as determined by said variable speed means, and means for directing said web to arcuate engagement with the roll.

3. Web pasting apparatus comprising an intaglio paste roll, a frame supporting said roll for rocking adjustments about an axis, paste supply means for the intaglio roll, a scraper carried on said adjustable frame and cooperating with the surface of the roll to remove paste at points except those cooperating with the surface of said roll, means for rotating the roll in the frame comprising a gear train including a gear centered on said axis, a power source, variable speed means for driving said gear from said power source, means driven from said power source for drawing a web past said roll at a fixed relative speed to the surface speed of the roll as determined by said variable speed means, means for directing said web into arcuate engagement with the roll, said last-named means comprising a rocking cradle movable to and from said intaglio roll, spaced guide rolls in the cradle over which the web is threaded, said spaced guide means when arcuate to the intaglio roll bringing about said arcuate engagement with the surface of said intaglio roll.

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