July 4, 1972 E. D. NYSTRAND 3,674,608

APPARATUS FOR APPLYING ADHESIVE SEAMS TO WEBS

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FIG. 1

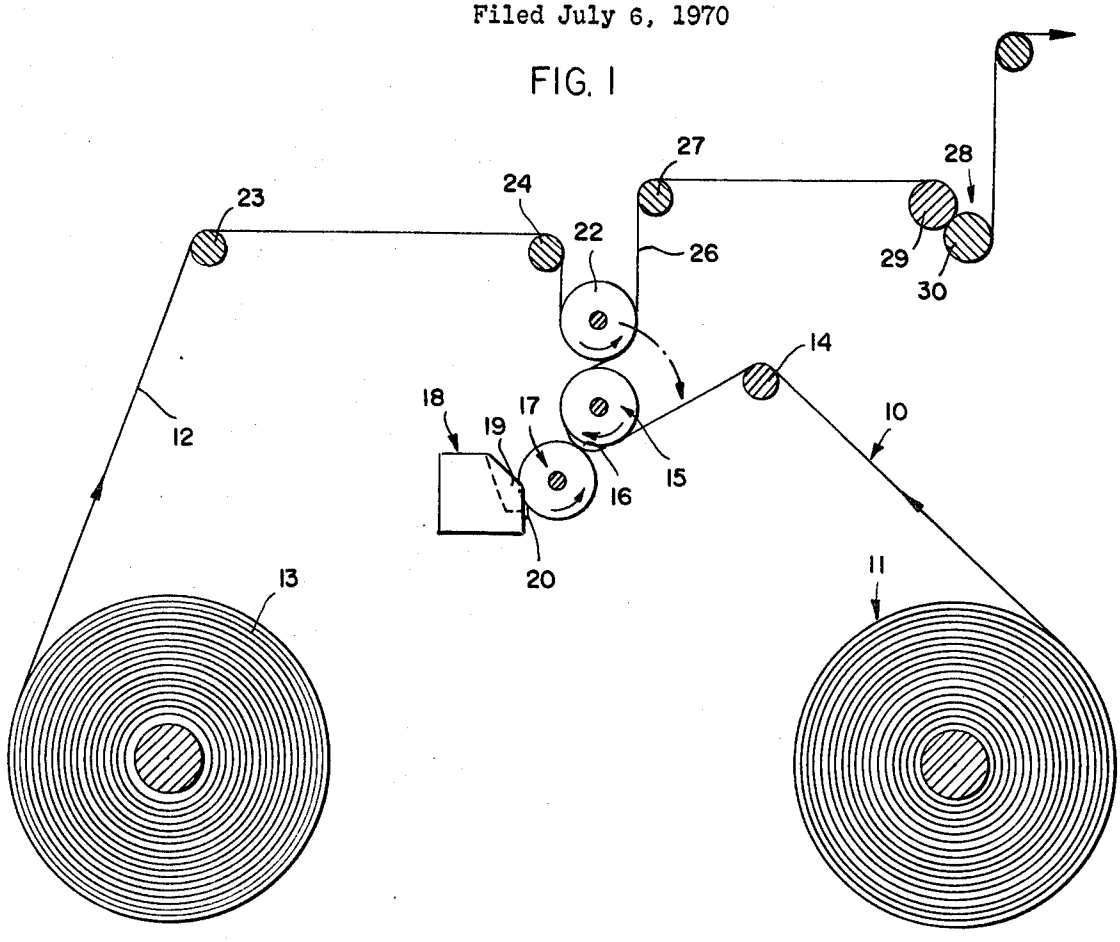
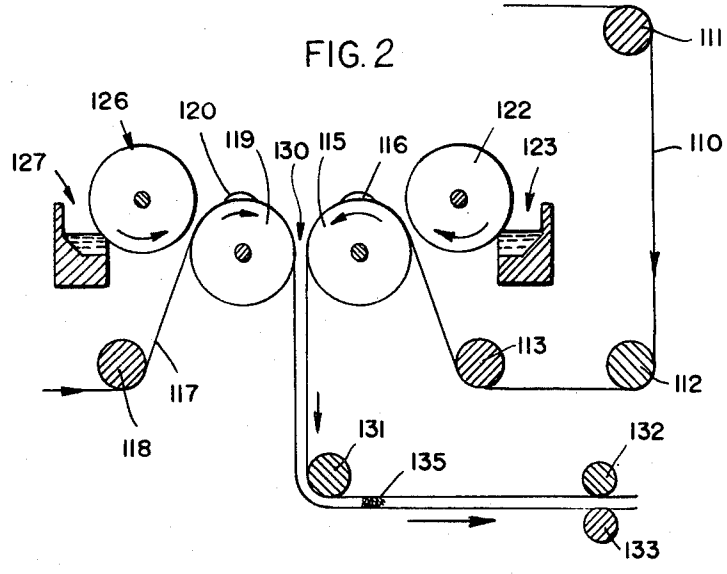


FIG. 2



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APPARATUS FOR APPLYING ADHESIVE SEAMS TO WEBS

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ABSTRACT OF THE DISCLOSURE

Apparatus is disclosed for applying adhesive seams to high speed webs for securing them together. An even coating of the adhesive, heated, if necessary is applied to a rotating gravure roll; and one web is fed in partial wrapping engagement about a rotating plate cylinder having a raised transfer bar fixed to its periphery. As the rolls rotate, the transfer bar engages the traveling web and elevates it above the surface of the plate cylinder and into contact with the gravure roll to deposit a seam of adhesive to the outer convex surface of the web according to the pattern defined by the transfer bar. The two webs are then pressed together and secured by the adhesive. Adhesive seams may also be applied to both webs, if desired, with the applied seams being in register with each other, then pressed together.

BACKGROUND OF THE INVENTION

(1) Field of the invention

The present invention relates to applying adhesive to webs; and more particularly, it relates to the application of adhesive seams to webs traveling at high speeds. The invention has particular advantage in applying adhesive seams transverse to the direction of travel of the web.

Normally, after an adhesive seam is applied to one or both of two webs they will be brought into contact under pressure to secure the webs together along the adhesive seams.

Techniques for applying adhesive seams in longitudinal as well as transverse directions in order to secure two webs together along the seams are used in the production of disposable articles, such as pillow cases. The webs in this case are paper; however, the types of adhesives compatible with the present system may be used on tissue, polyethylene, SRM, and other non-woven materials.

(2) Prior techniques

Many of the materials used in this field require adhesives which melt only at high temperatures (so-called "hot melt" adhesives). Normally, in the formation of longitudinal seams, a bead of melted adhesive is extruded onto one of the webs. It is possible to extrude a similar bead of adhesive for the forming of transverse seams, but it is not practical for high speed application. It will be appreciated by persons skilled in the art that it is desirable to form the adhesive seams in disposable articles at very high speeds.

Printing of the transverse adhesive seams has been tried, but conventional printing techniques have failed because of the particular characteristics of the hot melt adhesives and because of the need to maintain the adhesive within very narrow and well-defined temperature limits for proper application.

The use of transverse printing plates made of rubber or other flexible material coated with the adhesive and then pressed against the web has been found to be unsatisfactory because the plate becomes filled with lint from the web. Another difficulty with rubber printing plates is that the surface of the printing plate must be maintained

at the required temperature, and this becomes difficult to achieve for operation at different speeds. Conventional gravure systems have also been tried, but it is very difficult to keep the gravure cylinder completely free from adhesive in the areas in which it is not desired to transfer the adhesive.

SUMMARY

In the present system adhesive is applied to a rotating gravure roll which has a full print surface—that is, the adhesive is applied to the entire usable surface of the gravure roll. Preferably, a small fountain of the adhesive with a reverse doctor blade is used. One of the webs to be secured together is fed in partial wrapping engagement about a rotating plate cylinder having a raised transfer bar fixed to its periphery. As the rolls rotate, the transfer bar (which may be arranged in any desired pattern so as to provide either transverse or longitudinal seams or even inclined seams) engages the traveling web and elevates it above the surface of the plate cylinder and into contact with the gravure roll to transfer the adhesive to the outer convex surface of the traveling web according to the pattern defined by the transfer bar.

The two webs may then be brought together and pressed so that they become secured by the adhesive seam. In certain applications where it is desired, the adhesive seams may be applied to both webs in register. When required, the fountain containing the adhesive and the gravure roll are both heated by passing a liquid through them.

The transfer bar on the plate cylinder may also be used to apply the pressure for bonding the web bearing the adhesive seam to a second web brought into contact with it. The transfer bar, being on the plate cylinder, stays clean because it never comes into contact with the adhesive.

I have also found that the system works equally well with cold adhesives. Other features and advantages of the present invention will be apparent to persons skilled in the art from the following detailed description of a preferred embodiment together with the accompanying drawing.

THE DRAWING

FIG. 1 is a diagrammatic view, taken from the side, of a system incorporating the present invention;

FIG. 2 is a diagrammatic view of a modified version of the system wherein adhesive is applied to two webs.

DETAILED DESCRIPTION

Turning first to the diagrammatic showing of FIG. 1, reference numeral **10** designates a first web being unwound from a source designated **11**. Numeral **12** designates a second web being unwound from a source **13**.

The web **10** is fed around an idler roller **14** and into partial wrapping engagement with a plate cylinder **15**. The plate cylinder **15** has attached to its peripheral surface a transverse transfer bar or plate **16**. In the illustrated embodiment, the transfer bar **16** extends in a direction parallel to the axis of the cylinder **15**, and a wide range of materials may be used such as stainless steel or other hard metals as well as resilient materials such as rubber, etc.

The plate cylinder **15** rotates in a clockwise direction, as shown in the drawing. Also rotatably mounted adjacent the plate cylinder **15** is a gravure roll **17** mounted for rotation in a counterclockwise direction and spaced from the plate cylinder **15** such that the transfer bar **16** will elevate the web **10** as the rolls rotate and bring the web into contact with the surface of the gravure roll **17**.

The gravure roll **17** has a full print surface—that is, its surface is such that it will be covered everywhere with adhesive so that wherever the web contacts the gravure

roll, it will pick up adhesive. Located adjacent the gravure roll **17** is an adhesive pot or fountain generally designated **18** and containing a supply of adhesive **19** contacting the surface of the gravure roll **17**. A doctor blade **20** located on the fountain **18** and inclined at a reversed angle relative to the direction of rotation of the periphery of the gravure roll **17** is located downstream of the position of contact of the gravure roll with the adhesive **19**. Thus, the doctor blade **17** provides a uniform layer of adhesive on the full print gravure plate.

It will be thus appreciated that the coating of adhesive will be applied to the exterior (i.e. convex) surface of the web **10** as it is elevated by the transfer bar **16** to come into contact with the surface of the gravure roll **17**. The transfer bar **16** of the illustration will provide a complete transverse seam or ribbon of adhesive; however, it has been found that the pattern of the transfer bar may be varied to any desired pattern required for the adhesive seam. For example, if it is desired, the transfer bar **16** could be in the form of peripheral rings extending about the cylindrical surface of the plate cylinder **15** to provide continuous longitudinal seams.

Located above the plate cylinder **15** is a press roll **22** rotating in a counterclockwise direction. The web **12** is fed about idler rollers **23** and **24** into partial wrapping engagement about the cylindrical surface of the press roll **22**. The feeding of the webs **10** and **12** is synchronized so that the webs are traveling at the same speed. As the plate roll **25** rotates so that the transfer bar **16** is in an upright position, the adhesive seam on the outside of the web **10** will contact and be pressed against the outer surface of the web **12**, while both are traveling at high speed; and I have found that one is able to run the webs at a speed of up to 500 feet per minute with satisfactory results. The laminated webs, designated by reference numeral **26** are then fed over an idler roller **27** and into the nip **28** of two nip rollers **29** and **30** where they may be further pressed, if desired.

Turning now to FIG. 2, there is shown a diagrammatic view of a modification wherein a seam of adhesive is applied to both webs prior to laminating. A first web designated **110** is fed over the idler rollers **111**, **112** and **113** into partial wrapping engagement with a plate cylinder designated by reference numeral **115** and including a raised transfer bar **116**. A second web **117** is fed over an idler roller **118** and into partial wrapping engagement with a second plate cylinder **119** provided with a raised transfer bar **120**. The plate cylinder **115** rotates in a counterclockwise direction whereas the plate cylinder **119** rotates in a clockwise direction; and the two are rotated in synchronism so that their respective transfer bars **116** and **120** contact during each revolution. Associated with the plate cylinder **115** is a full print gravure roll **122** provided with a source of adhesive generally designated **123**. The plate cylinder **119** is provided with an associated full print gravure roll **126** which, in turn, is provided with a source of adhesive generally designated **127**. The transfer bar **116** engages the inner surface of the web **110** and raises it to bring it into contact with the smooth coating of adhesive on the exterior of the gravure roll **122**. Likewise, the raised surface of the transfer bar **120** engages the inner surface of the web **117** to elevate it into contact with the rotating gravure roll **126**. Each web thereby has a transverse seam of adhesive; and these two are brought together in the nip, generally designated by the reference numeral **130** between the two plate cylinders **115** and **119**, where they are pressed together. Thereafter, the laminated webs are fed about an idler roll **131** and between two nip rolls **132** and **133**, if desired. A previously-deposited double layer of adhesive between the webs **110** and **117** is designated by reference numeral **135** in FIG. 3.

I have found it desirable to apply a smaller amount of adhesive on each web to be bonded with the seams in register, as disclosed in connection with the embodiment of FIG. 2. This is particularly advantageous when strike-through of the adhesive relative to the web is a factor. As has already been mentioned, although the system is particularly advantageous for applying transverse seams of adhesive to webs traveling at high speed, it has also been found to yield excellent results for many kinds of patterns, each pattern being represented by its own transfer bar.

I claim:

1. In a system for uniting webs along spaced-apart generally transverse lines, the combination of a plate cylinder with a raised generally transversely elongated transfer surface rotating about an axis, source means feeding a web in partial wrapping engagement about said plate cylinder, nip roll means operably associated with said plate cylinder and in the path of travel of said web as it leaves said plate cylinder to tension said web between said nip roll means and said source means, one surface of said web engaging said transfer surface to raise selective portions of said web above the surface of said cylinder, and a gravure roll coated with a uniform layer of adhesive and rotating in spaced relation with said plate cylinder for contacting the portions of said web elevated by said transfer surface to apply an adhesive ribbon generally transversely thereto.

2. The system of claim **1** further comprising second source means for feeding a second web in synchronism with said first web, a press roll rotating adjacent said plate cylinder and receiving said second web, the spacing of said plate cylinder and press roll causing said adhesive ribbon to contact said press roll under pressure of said transfer surface.

3. The system of claim **1** further comprising a second plate cylinder with a raised transfer surface complementary to the transfer surface of the first plate cylinder, second source means feeding a second web into partial wrapping engagement about said second plate cylinder, one surface of said second web engaging the transfer surface of said second plate cylinder to raise selected portions of said second web above the surface of said second plate cylinder, a second gravure roll coated with a uniform layer of adhesive and rotating in spaced relation with said second plate cylinder for contacting the portions of the second web elevated by said transfer surfaces of said second plate cylinder to apply an adhesive ribbon thereto, said first and second plate cylinders cooperating to bring said webs together with their associated adhesive ribbons in register.

References Cited

UNITED STATES PATENTS

1,837,841	12/1931	Swift	156—543
2,742,080	4/1956	Cloud	156—549
2,275,157	3/1942	Morgan	156—295
3,408,248	10/1968	Maass	156—277

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156—324, 548