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3,730,798

METHOD OF FORMING AND ADHERING A WEB OF MATERIAL
TO THE LOWER SURFACE OF A PAD OR THE LIKE

Filed Aug. 26, 1970

2 Sheets-Sheet 1

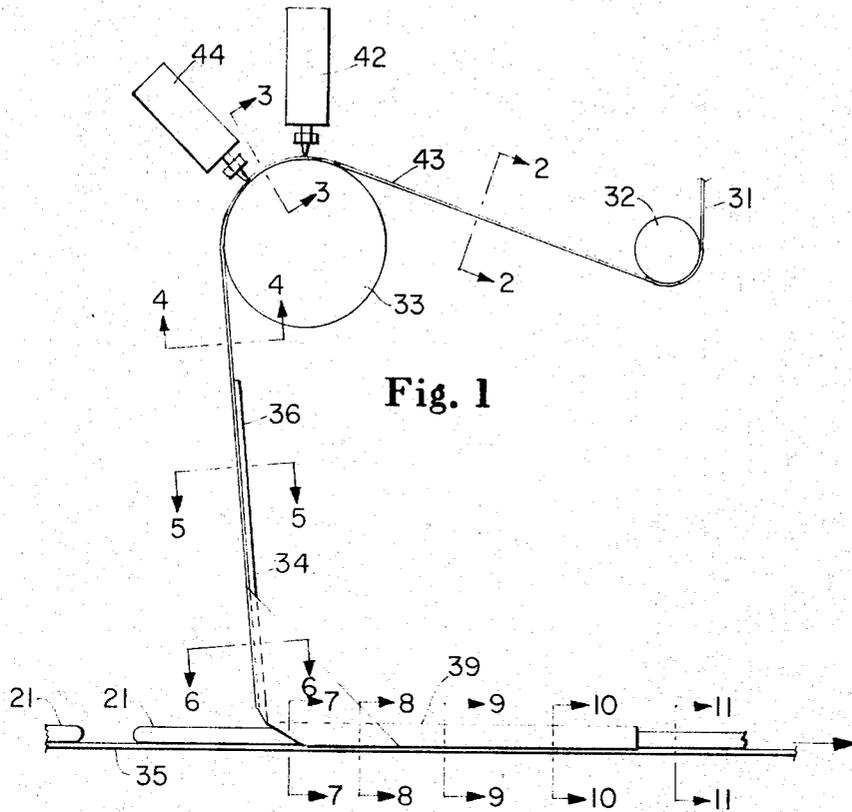


Fig. 1

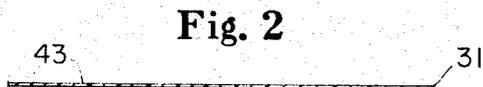


Fig. 2

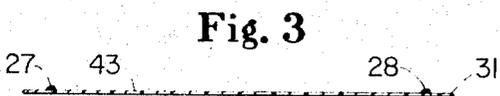


Fig. 3

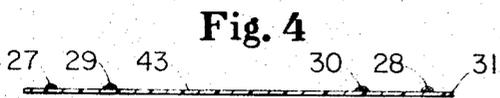


Fig. 4

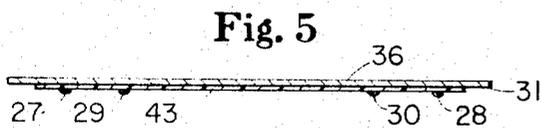


Fig. 5

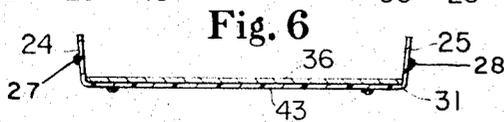


Fig. 6

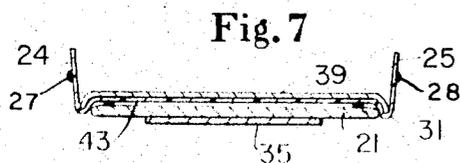


Fig. 7

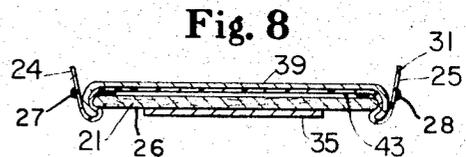


Fig. 8

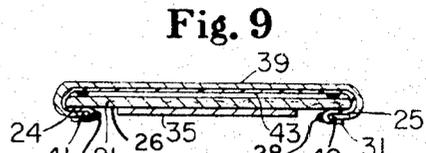


Fig. 9

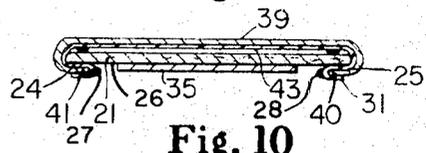


Fig. 10

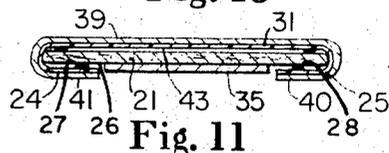
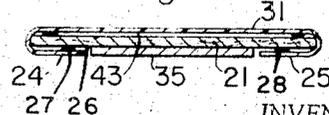


Fig. 11



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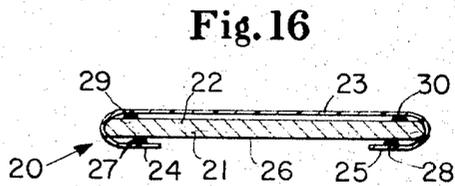
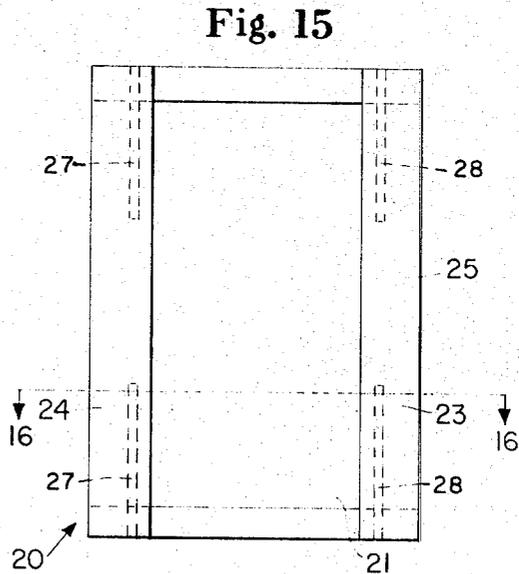
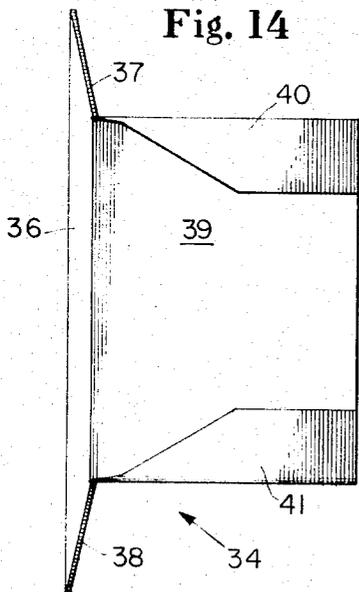
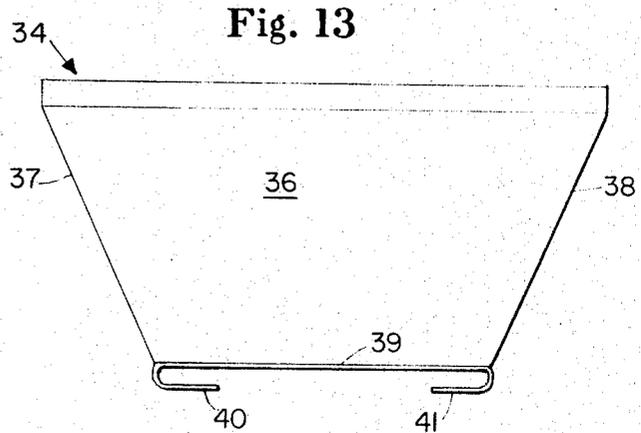
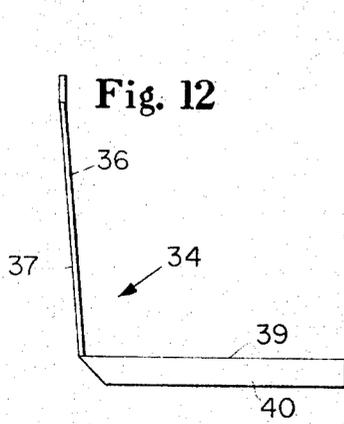
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METHOD OF FORMING AND ADHERING A WEB OF MATERIAL TO THE LOWER SURFACE OF A PAD OR THE LIKE

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8 Claims

ABSTRACT OF THE DISCLOSURE

A continuous web of material, e.g. polyethylene or the like, is moved in a substantially horizontal path for at least a portion of its total path of travel such that its ultimate lower surface faces upwardly. In this portion of its travel path, one or more adhesive beads may be intermittently or continuously deposited at or near the web edges whereupon the web is passed over a suitably configured folding board. As the web passes over the folding board, its ultimate lower surface is folded down and around a pad or the like element, e.g. an absorbent diaper pad, such that the edge extremities of the web containing the adhesive beads are folded around and adhered to the lower surface of the pad. The method permits deposition of the adhesive bead on the ultimate lower surface of the web when it faces upwardly thus making the application of adhesive more positive and reducing substantially the possibility of adhesive fouling on the various elements used to carry out the method.

BACKGROUND OF THE INVENTION

In the continuous processing of webs for the purpose of adhering an edge to another element, e.g. an absorbent pad or the like, it is sometimes necessary to apply an adhesive bead to the lower surface of the web to form an adhesive seam between the lower surface of the pad and the superposed web portion. When the adhesive seam is ultimately on the lower surface between the pad and web, it has been the customary practice to employ a method of bead application whereby the adhesive is deposited on the lower surface of the web as it is moved in its customary path of travel such that the lower surface faces downwardly. In the practice of this prior method, it was necessary to provide and mount extrusion nozzles for the adhesive in very awkward positions. As a consequence, the adhesive nozzles would, in effect, be extruding and applying adhesive in an upwardly direction and thus were working against the forces of gravity.

In the practice of the prior method as aforesaid, there was an ever present and continuing problem associated with the application of the adhesive bead on the lower surface of the web. That is, the application of the bead on the lower surface of the web resulted in a high degree of dripping, running, smudging and the like. This resulted in a substantial and undesirable amount of adhesive smearing and fouling on the elements or machine parts used in carrying out the prior method. It will be apparent that the practice of this prior system left much to be desired from the standpoint of smooth continuous operation on a production basis.

SUMMARY OF THE INVENTION

The nature and substance of the invention will be more readily appreciated after giving consideration to its major aims and purposes. The principal objects of the invention are recited in the ensuing paragraphs in order to provide a better appreciation of its important aspects prior to de-

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scribing the details of a preferred embodiment in later portions of this description.

A major object of the invention is the provision of a method of forming and adhering a web of material to the lower surface of a pad or the like with a minimum of adhesive smearing, smudging and dripping.

Another object of the invention is the provision of a method of the aforesaid character which can be carried out such that the adhesive may be applied to the web in an easily accessible location before folding in order to minimize and, preferably eliminate adhesive contact with any elements of the device used in carrying out the method.

Still another object of the invention is the provision of an improved method of applying adhesive to a web and thereafter folding it such that the adhesive makes contact with the lower surface of an element such as a pad or the like by applying the adhesive to the ultimate lower surface of the web during that portion of its path of travel that it is facing upwardly and thereby permitting downward deposition of the adhesive and reducing the possibility of running and dripping thereof.

A further object of the invention is the provision of a method of forming and adhering a web of material to the lower surface of a pad or the like that incorporates each of the several previously recited advantages such that the method can be carried out continuously with a minimum of interruption thereby facilitating continuous high speed operation of the method in a commercial production process.

BRIEF DESCRIPTION OF THE DRAWING

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter regarded as forming the present invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a schematic side elevation illustrating the manner in which the method of the invention can be carried out.

FIGS. 2 through 11 inclusive are cross sections taken on the lines 2—2 through 11—11 inclusive, respectively illustrating the position of the web, the adhesive beads, the pad, and, in general, the corresponding position of the elements of the device used in carrying out the method of the invention.

FIG. 12 is a side elevation of the construction of a suitable folding board used in carrying out the invention.

FIG. 13 is an end elevation of the folding board illustrated in FIG. 12.

FIG. 14 is a bottom plan view of the folding board of FIGS. 12 and 13.

FIG. 15 is a bottom view of a disposable diaper illustrating the position of the adhesive beads on the bottom surface thereof as applied by the method of the invention.

FIG. 16 is a cross section taken on the line 16—16 of FIG. 15 showing the location of the several adhesive beads applied by the method of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present method is particularly adapted for the application of adhesive (either continuously or intermittently) to a surface of a moving web that will ultimately be folded around and adhered to the lower surface, i.e. a downwardly facing surface, of an element to which it is to be adhered. In a preferred embodiment of the method, it can be used in applying adhesive beads downwardly upon a thin continuous web of plastic material, e.g. polyethylene or the like, in intermittent fashion and thereafter

folding the edge portions of the web around and into engagement with the lower surface of a coating absorbent pad in the assembly of the plastic backing sheet to the absorbent element of a disposable diaper.

This preferred application of the invention can be best visualized by considering FIGS. 15 and 16 which generally illustrate a disposable diaper 20 consisting of an absorbent pad 21 having its upper surface 22 covered by a thin plastic backing sheet 23. The edge areas 24 and 25 of the plastic backing sheet 23 are folded around and adhered to the lower surface 26 of the absorbent pad 21 by means of the lower adhesive beads 27 and 28, respectively. If desired, it is also possible to apply upper adhesive beads 29 and 30 between the plastic backing sheet 23 and the upper surface 22 of the absorbent pad 21.

While both lower and upper adhesive beads 27, 28, 29 and 30 are illustrated in the diaper construction since it is shown in its preferred form, it will be understood that the primary advantages of the present method are in applying the lower adhesive beads 27 and 28 between the edge areas 24 and 25, respectively, of the plastic backing sheet 23 and the lower surface 26 of the absorbent pad 21. It will also be apparent from an examination of FIG. 15 that the lower adhesive beads 27 and 28 are applied intermittently. It will be understood, of course, that these adhesive beads can be continuous, if desired, and the same is true of the upper adhesive beads 29 and 30.

The several manipulative steps used in carrying out the method of the invention will now be described in relation to FIGS. 1 through 11 of the drawings which illustrate schematically a device containing the necessary elements for the practice of the method.

Referring initially to FIG. 1, the plastic film of material in the form of a continuous web 31 is supplied from a suitable source (not shown) and is passed under the idler roller 32 whereupon it moves over the support roller 33. The web 31 then is directed downwardly to the folding board 34 which causes the edge areas 24 and 25 of the web 31 to be folded around successive absorbent pads 21 moving forward in spaced relation on the vacuum belt 35.

The elements of the folding board 34 are best illustrated in FIGS. 12 through 14. An examination of these figures of the drawings will make it apparent that the folding board 34 includes a tapered, vertically disposed planar portion 36 having tapered side edges 37 and 38. Extending horizontally from the planar portion 36 is a horizontally disposed guide portion 39, the side portions of which are curled around as at 40 and 41. The manner in which the folding board 34 functions will be described as the description of the method proceeds.

The surface 43 of the web 31 will be characterized herein as the ultimate lower surface since in the practice of the method it is manipulated such that it faces downwardly when ultimately adhered to the absorbent pads 21.

Referring again now to FIG. 1, the method is carried out by the provision of a bead applicator 42 for the deposition of the lower adhesive bead 27 on the ultimate lower surface 43 of the web 31. It will be understood that a similar applicator (not shown) is mounted and aligned with the applicator 42 for the deposition of the lower adhesive bead 28 such that the two applicators in effect deposit the lower adhesive beads 27 and 28 on the edge areas 24 and 25, respectively, of the web 31. Adhesive applicators are provided for applying the upper adhesive beads 29 and 30 in spaced relation on the web 31. The applicator 44 is used to deposit the upper adhesive bead 29 and it will be understood that a second applicator (not shown) is mounted in alignment with the applicator 44 for use in depositing the other upper adhesive bead 30.

The unique aspect of the present method will be appreciated by considering the location of the adhesive applicators 42 and 44 with respect to the ultimate lower surface 43 in the deposition of the adhesive beads. That

is, the adhesive beads are deposited downwardly on the ultimate lower surface 43 while the web 31 is moving in a substantially horizontal path with the ultimate lower surface 43 facing essentially upwardly. This manner of applying the adhesive beads achieves the major objectives of the invention since it is apparent that the beads 27, 28 and 29, 30 are all deposited downwardly while the ultimate lower surface 43 is facing upwardly and the web is moving in a substantially horizontal path.

In characterizing and defining the present invention, it will be understood that the deposition of adhesive beads on the web moving in a substantially horizontal path is intended to include the path of movement of the web 31 in essentially any plane from the horizontal to the point where it passes downwardly from the support roller 33. In fact, it can include the path of movement of the web 31 in essentially any position such that the adhesive beads are deposited from an upper position downwardly until the web is moving in substantially a vertical path. In a practical sense then, the definition of a horizontal path for purposes of this invention will be understood to be inclusive of an absolutely horizontal path to any path deviating by as much as 85° from the absolutely horizontal. The primary consideration in the definition of a horizontal path will be understood to mean any portion of the path wherein adhesive beads can be applied downwardly on the ultimate lower surface 43 of the web 31.

The application of the adhesive beads as previously described will result in the placement of the lower adhesive beads 27 and 28 as illustrated in FIG. 3 and the upper adhesive beads 29 and 30 as illustrated in FIG. 4. As the web 31 moves around the support roller 33, it will then pass over the planar portion 36 of the folding board 34 in the manner illustrated in FIG. 5. The side areas 24 and 25 of the web 31 are initially folded by the side edges 37 and 38 of the folding board 34 in the manner illustrated in FIG. 6.

On continued movement of the web 31 it passes beneath the horizontally disposed guide portion 39 of the folding board 34 in the manner illustrated in FIG. 7 whereupon the upper adhesive beads 29 and 30 are brought into contact with an absorbent pad 21 which is moving forward continuously on the vacuum belt 34. The curled over side edges 40 and 41 then cause the edge areas 24 and 25 of the web 31 to be folded around the edges of the absorbent pad 21. The initiation of this folding step is illustrated in FIGS. 7 and 8.

As the web 31 and pad 21 continue in their path of travel, the lower adhesive beads 27 and 28 are brought around and caused to contact the lower surface 26 of the absorbent pad 21 as illustrated in FIGS. 9 and 10. The ultimately assembled pad 21 and web 31 is illustrated in FIG. 11. It will be understood that after passing beyond the folding and manipulating sequence heretofore described, the continuous web 31 can be cut into individual lengths to form the plastic backing sheet 23 for a disposable diaper 20 as illustrated in FIG. 15.

Absorbent pads 21 are moved forward in spaced relation by the vacuum belt. Therefore, of course, it is necessary that the adhesive beads 27, 28 and 29, 30 be deposited intermittently by the adhesive applicators 42 and 44. Furthermore, as illustrated in FIG. 15, the adhesive beads are preferably intermittent in nature on the completed disposable diaper 20 and thus the discharge of adhesive from the applicators 42 and 44 must be carried out and controlled in timed sequence with the movement of the pads 21. It will, of course, be apparent to persons skilled in the art that suitable conventional controls can be applied in the practice of the method to time the extrusion of intermittent adhesive beads from the applicators 42 and 44 in order to obtain the desired adhesive bead patterns on the web 31 which correspond with the spacing of the pads 21 which are moved in timed sequence by the vacuum belt 35.

The method has heretofore been described in its preferred form wherein four adhesive beads, viz the beads 27, 28, 29 and 30, are applied to the web. It will be understood that the benefits of the invention are not limited to the number of applied adhesive beads. In some cases, these benefits will be provided when only one adhesive bead is used, e.g. the bead 27 only or the bead 28 only, etc. In a broad sense then, the invention covers the application of a single adhesive bead to the ultimate lower surface of a web when moving in a horizontal portion of its path of travel with the ultimate lower surfacing facing upwardly.

As will be apparent in consideration of the foregoing description, the adhesive beads 27 and 28 are deposited on the plastic web 31 while its ultimate lower surface 43 is facing upwardly whereby direct application by the applicators 42 and 44 can be carried out with the greatest degree of control and with a minimum amount of dripping. Thus the only contact of the adhesive beads 27 and 28 which ultimately engage the lower surface 26 of the pads 21 occurs when the beads 27 and 28 initially touch the lower surface 26 of the pad 21. This aspect of the method allows continuous trouble free operation and eliminates smearing of adhesive on the manipulative elements and thus prevents fouling and unnecessary interference with the operation of the method on a continuous basis.

Another benefit obtained in the practice of the method is that the ultimate lower surface 43 of the web 31 never contacts any element used in practicing the method such as the support roller 33 or the surfaces of the folding board 34. This is extremely beneficial since it eliminates transfer of adhesive from the beads 27, 28 and 29, 30 onto any surface of the operating elements. Continuous and trouble free operation of the method is thereby assured.

While particular embodiments of the invention have been illustrated and described, it will be obvious to those skilled in the art that various changes and modifications can be made without departing from the spirit and scope of the invention and it is intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

What is claimed as new is:

1. A method of forming and adhering a web of material to the lower surface of a pad comprising the steps of:
 - (a) moving a web of material having oppositely disposed edge areas in a substantially horizontal path with its ultimate lower surface facing upwardly,
 - (b) extruding at least one lower adhesive bead downwardly for deposition with gravity assistance on at least one of the edge areas of said ultimate lower surface of said web while said web is moving in said substantially horizontal path,
 - (c) changing the direction of movement of said web from its substantially horizontal direction to a substantially downward direction,
 - (d) moving the web over the planar portion of a folding board having tapered side edges,
 - (e) folding the edge areas of said web of material over the tapered side edges of the folding board,
 - (f) moving the web beneath a horizontally disposed guide portion having curled over side edges, said guide portion extending rearwardly from said folding board, and
 - (g) folding over the edge areas of said web of material as it passes within said curled over side edges thereby causing said edge areas to be folded around one of a plurality of pads moving forward at spaced intervals such that the adhesive bead previously de-

posited on said web is moved into adhesive contacting engagement with the lower surface of the pad.

2. A method of forming and adhering a web of material to the lower surface of a pad as claimed in claim 1 including the step of extruding downwardly a second lower bead of adhesive for deposition with gravity assistance to the other edge area of said web while moving in said substantially horizontal path and adhering both edge areas of said web to the lower surface of the pad when folding over the edge areas.

3. A method of forming and adhering a web of material to the lower surface of a pad as claimed in claim 1 including the step of intermittently extruding the lower adhesive bead on the web in predetermined spaced relation to its ultimate position of adherence with respect to said pad.

4. A method of forming and adhering a web of material to the lower surface of a pad as claimed in claim 2 including the step of intermittently extruding both the lower adhesive beads on the web in predetermined spaced relation to their ultimate position of adherence with respect to said pad.

5. A method of forming and adhering a web of material to the lower surface of a pad as claimed in claim 2 including the step of extruding at least one upper adhesive bead downwardly for deposition with gravity assistance on the upwardly facing ultimate lower surface of the web along a line inwardly of the edge areas, and adhering said upper adhesive bead to the upper surface of the pad when moving the web beneath said horizontally disposed guide.

6. A method of forming and adhering a web of material to the lower surface of a pad as claimed in claim 5 including the step of intermittently extruding both the upper and lower adhesive beads on the web in predetermined spaced relation to their ultimate position of adherence with respect to said pad.

7. A method of forming and adhering a web of material to the lower surface of a pad as claimed in claim 5 including the step of extruding downwardly a second upper adhesive bead for deposition with gravity assistance on the upwardly facing ultimate lower surface of the web along a line inwardly of the edge areas, and adhering said second upper adhesive bead to the upper surface of the pad when moving the web beneath said horizontally disposed guide.

8. A method of forming and adhering a web of material to the lower surface of a pad as claimed in claim 7 including the step of intermittently extruding both the upper and lower adhesive beads on the web in a predetermined spaced relation to their ultimate position of adherence with respect to said pad.

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