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(54) **Method and apparatus for manufacturing a graphic product**

Verfahren und Vorrichtung zur Herstellung eines graphischen Produkts

Procédé et dispositif pour fabriquer des produits graphiques

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• **PATENT ABSTRACTS OF JAPAN** vol. 1997, no.
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Description**BACKGROUND OF THE INVENTION**

[0001] This invention relates to a method for manufacturing graphic products such as designs or characters for signs and the like, and an apparatus for performing the method. The types of graphic products to which this invention is directed are characters or designs which adhere to a backing or substrate. The manufacturing of these types of graphic products generally involves the steps of cutting the graphic product from a layer of sheet material on a carrier sheet, removing the product from the carrier sheet and then attaching the product to the substrate.

[0002] The present invention is directed to an automated method and apparatus for removing such graphic products from the carrier sheet and includes the selective removal of either the weed interlaced with the product or the graphic product itself. The invention also includes a unique heat activated bonding web for use with the method and apparatus.

[0003] The removal of weed and a graphic product, such as a group of spaced letters cut from a layer of sheet material on a carrier sheet for transfer of the product to a substrate, has hitherto been a tedious, time consuming, and usually manually performed job. Frequently, tweezers are used for removing small areas of internal weed such as the center of the letter "A" or "R" from the body of the letter. In addition, the larger external weed, the material surrounding the letter bodies, has also been removed in the same manner. After the weed is removed, the transfer of letters from the carrier sheet to a substrate has been accomplished by manually attaching a transfer web to the graphic product, pulling the web and attached product away from the carrier sheet and placing the web and product into proper position for attachment to a sign substrate. The transfer web is then stripped away from the product. A transfer method and web with a dry activatable adhesive for such purposes is disclosed in U.S. Patent 5,026,584 to Logan, having the same assignee as this invention.

[0004] The sign making field includes apparatuses and methods for automated sign making, and includes automatic weeding systems and methods. For example, U.S. Patent 5,143,576 issued on September 1, 1992 to Logan and owned by the assignee of the present invention discloses an apparatus and method for automating weed removal. The apparatus uses stored data in the form of vectors for attaching a bonding web comprising adhesive microcapsules to a graphic product or weed on a carrier sheet along a linear path offset from the periphery of the weed or graphic product. In the apparatus, a pressure applicator tool activates the adhesive microcapsules within the web to temporarily bond the web to the graphic product or weed based on the stored data defining the periphery of the graphic product or weed.

[0005] The linear nature of the adhesive bond formed by the apparatus in U.S. Patent 5,143,576 omits large portions of the surface area of the graphic product or weed, and thus allows limited or unbalanced forces to be applied to the weed or graphic product upon removal from the carrier sheet with the possibility of tearing the graphic product at the unbonded areas. In contrast, the instant invention bonds the web to substantially the entire surface area of the graphic product or weed, and thus allows the adhesive forces to be distributed throughout the graphic product or weed surface. Moreover, the instant invention is compatible and complementary to automated printing devices and cutters having similar feed mechanisms which have already gained popularity in the sign making industry.

[0006] U.S. Patent No. 4,645,555 to Kuboyama discloses a hot stamping method used for the formation of sharp edged characters and/or numerals in a sheet material attached to a base plate for transfer from the base plate to a substrate. That is, raised numerals or characters are joined to a base plate, and a bonding web including a heat activated adhesive is pressed over the substrate and the numerals or letters. Upon heating the sheet material over its entire surface, the raised characters are joined to an adhesive comprising the sheet, and at the areas where no numerals exist the adhesive remains on the base plate. Therefore, heat is applied over the entire surface of the bonding web and base plate for adherence to the entire base plate surface including the surface of the numeral or character. Unlike the present invention, selective heating is not used for attaching the bonding web to the graphic product alone.

[0007] U.S. Patent No. 4,374,691 to Vanden Bergh discloses a material and method for forming pressure transferable graphic designs. The invention includes a composite material and a method of forming characters or numerals in the composite material and removing the same therefrom for attachment to a substrate. The composite material includes a donor layer for supplying the letters or characters and an accepting layer for receiving the letters and characters. One step involves forming the letters and attaching the letters to the accepting layer. The letters are not preformed in a layer of sheet material on a carrier sheet as in the instant invention. Instead the letters are formed in a layer of sheet material on a carrier sheet by applying heat to the accepting sheet over the desired graphic design formation. The accepting sheet includes an adhesive which is activated upon heating, and during contact with the donor sheet, the adhesive causes sections of the donor sheet to attach to the accepting sheet in configurations resembling the graphic designs drawn. The donor sheet is comprised of a material which is easily fragmented and upon the application of the adhesive, sections matching the graphic designs adhere to the accepting layer. The graphic design may then be removed from the donor sheet and is pressure- or heat-transferred to a sign substrate. Unlike the instant invention, the patent to Vanden Bergh does not incorporate selective activation of a bonding web for registration with, and for joining to precut graphic products.

[0008] U.S. Patent No. 5,112,423 to Liebe Jr. discloses a method of making and applying alignment maintaining plastic lettering material. The method in Liebe uses a composite sheet of material comprising an adhesive layer, a display layer and a release layer. The method includes cutting graphic letters or numerals and the like into the adhesive and display layer but not into the release layer, and stripping away the adhesive and display layers not within the desired outline of the numerals, letters or other graphic product. Accordingly, the release layer is left with the lettering thereon for transfer to a substrate. Unlike the instant invention, selective activation and attachment of a bonding web is not used for removing the symbols or letters from the release layer.

[0009] In addition to the above patents using an adhesive for pulling or separating letters or numerals or the surrounding areas from a donor sheet, the art also includes patents directed toward the application of a release layer to a layer of a donor sheet to cause sections of the donor to remain on a carrier sheet while separating other sections. For example, U.S. Patent No. 4,933,124 to Duncun discloses a process for applying a silicon release coating to a polymer film. The Duncun process includes the application of a release film onto a substrate but the selective automated application of such a film to particular areas of the substrate using a selectively activated head is not disclosed.

[0010] As discussed above, the invention also includes a laminated bonding web material having a heat sensitive adhesive and a friction reducing coating thereon for easing the advancement of the web across a heating head in practicing this invention. While U.S. Patent No. 5,082,822 to Uytterhoeven et al. discloses a die donor element having a coating thereon for easing the passage of a sheet material under a thermal head during printing applications, such a material has not been uncovered with respect to selectively activated adhesive webs as disclosed herein.

[0011] The manufacturing and demand for signs comprising letters or designs has become increasingly popular in the sign manufacturing field. In combination with enhanced printing, the resulting graphic products have many applications. With this invention, the removal of graphic products and weed from a carrier sheet by means of a bonding web is no longer a tedious and difficult task. Manual labor including the use of tweezers for removing weed and graphic products from the carrier sheet for transfer of the graphic product to a substrate has been replaced by automation.

[0012] From document "Patent Abstracts of Japan" vol. 1997, no. 06, 30 June 1997 (1997-06-30) & JP 09 044762 A (MIYAKE:KK), 14 February 1997 (1997-02-14) and document US-A-5,645,932 a circuit-like metallic foil sheet for resonant tags and a process for fabricating the same is known. A piece of metallic foil coupled to a carrier sheet is stamped to define a used portion and a weed portion. The foil is overlain with a thermal adhesive resin film which is placed into contact with a support film. A mold contacts an area of the desired portion of the metallic foil so that the area of the adhesive registering with the mold binds to the support. The carrier sheet is then separated from the support film taking with it the portion of the foil that did not bind to the support.

[0013] Accordingly, one object of this invention is to provide a highly accurate method and apparatus for automated removal of characters and other graphic products or the weed associated therewith from a carrier sheet by selectively attaching a bonding web for convenient transfer of the product to a sign substrate.

[0014] A further object of this invention is to provide a method and apparatus for accomplishing automated weeding and graphic product removal without risk of tearing the graphic products.

[0015] A still further object of this invention is to provide an automatic weeding and graphic product transfer apparatus and method that are compatible with and complementary to existing successfully marketed sign manufacturing equipment.

SUMMARY OF THE INVENTION

[0016] The present invention resides in a method and apparatus for manufacturing a graphic product from a layer of sheet material releasably secured to a carrier sheet for subsequent transfer of the graphic product to a substrate. In this invention, one portion of the layer of sheet material defines the graphic product and is severed from the remaining portions of the layer of sheet material along lines of cut at the peripheral edges of the graphic product. More particularly, the present invention is directed to an automated method and apparatus for selectively securing a bonding web to the portions representing the graphic product or weed associated therewith wherein the portions selectively secured are defined by data in a microprocessor which controls the apparatus.

[0017] The invention provides an apparatus according to claim 1, and methods according to claims 11 and 22. Embodiments of the invention are defined in the dependent claims.

[0018] The method of this invention includes placing a bonding web in overlying relationship with a layer of sheet material with a heat activated adhesive between the bonding web and the layer of sheet material. The bonding web is selectively heated over at least one application area which substantially registers with an underlying one of the portions of the layer of sheet material to activate the adhesive and attach the bonding web to the one of the sheet material portions. Thereafter, the bonding web is pulled to remove the attached portion from the carrier sheet. The attached portion may be either the graphic product portion or the weed portion.

[0019] An apparatus for carrying out this method includes storage means for storing data defining the peripheral edges of a graphic product as machine readable data. Feeding means feed the layer of sheet material releasably

secured to the carrier sheet and a bonding web having a heat activated adhesive adjacent one side through the apparatus in an overlying relationship adjacent a heating means to activate the adhesive. The heating means is comprised of a plurality of elements positioned in contact with the bonding web and adjacent the layer of sheet material for activating the adhesive. Control means interfaced with the storage means and connected to the heating means causes the elements to be selectively energized in response to the stored data. The elements activate the adhesive in an application area registering with one of the portions of the layer of sheet material while the feeding means feeds the bonding web and layer of sheet material on the carrier sheet relative to the heating means. Accordingly, the bonding web becomes attached to one portion or the other of the layer of sheet material.

[0020] In one embodiment of the apparatus for performing the method of the present invention, the storage means is a computer memory which stores the peripheral edges of a graphic product as machine readable data which is downloaded to the control means for selectively activating the heating elements arranged linearly in a thermal head of the heating means. The heating elements attach the bonding web to the sheet material on the carrier sheet when the sheet material is moved past the thermal head by the feeding means. With a different type of web, an adhesive inhibitor can be applied to an application area for subsequent removal of the remaining material via an adhesive transfer web.

[0021] The feeding means in one embodiment incorporates belt driven sprockets and a roller platen. The sprockets have pins extending from the peripheries thereof for engaging feed holes extending adjacent the longitudinal edges of the carrier sheet. The sprockets and roller platen move the layer of sheet material, carrier sheet and the overlying bonding web adjacent the heating elements of the thermal head.

[0022] Accordingly, the adhesive is activated and the bonding web attaches substantially exclusively to either the graphic product or weed material to be removed from the carrier sheet. If the portion first removed from the carrier sheet is the weed, the remaining portion of the layer of sheet material on the carrier sheet is run through the apparatus a second time, and a second bonding web is selectively attached to the remaining weed or the graphic product on the carrier sheet. When bonding is complete, the bonding web together with the attached weed or product is separated from the carrier sheet. The bonding web or an adhesive transfer web attached to the graphic product is used to transfer the graphic product to a graphic product substrate.

[0023] In one embodiment, the layer of sheet material attached to the carrier sheet and the bonding web are supplied by the feed means from separate rolls rotatably mounted on the apparatus.

[0024] As a result of the invention, weed or graphic products used for making signs can be removed from a carrier sheet via an automated apparatus and method.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] Fig. 1 is a schematic diagram illustrating a system for cutting a graphic product in a layer of sheet material on a carrier sheet and separating the product from the carrier sheet in accordance with the present invention.

[0026] Fig. 2 is a fragmentary view of a graphic product cut in a layer of sheet material on a carrier sheet having feed holes extending longitudinally along each edge.

[0027] Fig. 3 is an enlarged cross-sectional view of the sheet material on the carrier sheet as viewed along line 3-3 of Fig. 2.

[0028] Fig. 4 is a fragmentary view of a bonding web with internal weed attached thereto after weeding the graphic product in Fig. 2.

[0029] Fig. 5 is an enlarged cross-sectional view of the bonding web taken along line 5-5 of Fig. 4.

[0030] Fig. 6 is a fragmentary view of another bonding web with external weed attached thereto after weeding the product in Fig. 2.

[0031] Fig. 7 is a fragmentary view of a graphic product on the carrier sheet after all the weed has been removed from the carrier sheet.

[0032] Fig. 8 is a fragmentary view of still another bonding web used in a graphic product transfer process with the graphic product attached thereto.

[0033] Fig. 9 is a perspective view of a bonding apparatus used in the system of Fig. 1.

[0034] Fig. 10 is a side elevation view of the interior of the bonding apparatus.

[0035] Fig. 11 is an enlarged fragmentary view of the bonding apparatus in Fig. 10 and shows a feed mechanism for moving the bonding web and layer of sheet material on a carrier sheet through the bonding apparatus.

[0036] Fig. 12 is a fragmentary front view showing a support structure and drive mechanism for a roller platen and drive sprockets in the bonding apparatus.

[0037] Fig. 13 is another side elevation view showing an open and closed position of the upper frame of the bonding apparatus.

[0038] Fig. 14 is an enlarged fragmentary view of the apparatus, similar to Fig. 11, and shows the thermal head, roller platen and drive sprockets.

[0039] Fig. 15 is a schematic diagram of a combined cutting, bonding and separating process in accordance with the present invention.

[0040] Fig. 16 is a fragmentary sectional view of the process in Fig. 15 for separating a bonding web having an attached weed portion or graphic product from a carrier sheet.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0041] Fig. 1 illustrates a microprocessor controlled system, generally designated 10, which controls a bonding apparatus 11 as well as a cutter 12 to manufacture a graphic product in accordance with the present invention. The cutter 12 cuts a graphic product, such as the letters "AR" of a sign or logo from a layer of sheet material releasably secured to a carrier sheet. Based on data 14 input into the system, the bonding apparatus 11 selectively bonds a bonding web to a designated portion of the cut layer of sheet material for subsequent separation and removal of the portion from the carrier sheet.

[0042] The system 10 includes a digitizer 18 for converting graphic data 14 into machine readable data for storage and use by a microprocessor-based computer 19. The machine readable data includes parameters defining the interior and exterior peripheral edges 20 of the graphic product 13 as shown in Fig. 2. The data defining the peripheral edges is displayed on a monitor 22 in the form of a graphic image. The graphic image may be altered by inputting further information into the computer 19 through a keyboard 24 or the like.

[0043] Along with the cutting process and the bonding process disclosed herein, a printing process may be included as a step prior to cutting. Moreover, an enhancement program may be included in the system so as to change the graphic image through the printing of shading, halftones and colors as described in greater detail in U.S. Patent No. 5,537,135 and having the same assignee. The system is open to a variety of different software programs and the like for altering the graphic images manufactured.

[0044] An operating program in the computer 19 interprets the machine readable data and runs a variety of operations from the computer, including the operation of the cutter 12, and the bonding apparatus 11. The computer 19 generates cutting, bonding and possibly printing programs from the machine readable data, and the programs are stored in a memory 26 and read by the controller 28 of Fig. 1. Thus, the controller 28 operates both the cutter 12 and the bonding apparatus 11, and if desired, a printer, based on the graphic data 14 input into the system 10. A suitable cutter 12 for carrying out the cutting operation, is described in U.S. Patents 4,467,525; 4,799,172 and 4,834,276, all owned by the assignee of the present application.

[0045] Based on the machine readable data, the cutter cuts a path defining the peripheral edges 20 of the graphic product 13 in a layer of sheet material 16 which is releasably secured to a carrier sheet 17 as shown in Figs. 2 and 3. The layer of sheet material 16 is preferably formed from vinyl and the carrier sheet 17, which is not cut, is formed from heavy paper or tag board. As shown in Fig. 3, the vinyl layer 16 is releasably attached to the carrier sheet 17 via a pressure sensitive adhesive 38. The carrier sheet 17 is coated with a release agent 32 so that only a temporary bond holds the vinyl layer 16 on the carrier sheet 17. The vinyl layer 16 in one form is HP220 Scotchcal vinyl sheet manufactured by the 3M Corporation. The strip formed by the vinyl layer and the carrier sheet has a row of feed holes 40 extending along each longitudinal edge of the strip for feeding the strip through the cutter 12 and bonding apparatus 11 of Fig. 1.

[0046] When the graphic product is cut into the vinyl layer 16, the material is divided into two portions, the graphic product 13 and the weed. The graphic product 13 consists of the letters "AR" and the weed is the remainder including the internal weed 46 defined by the internal peripheries or edges of the graphic product, and the external weed 48 outside the external peripheries of the graphic product. A border 49 may be cut around the graphic product to define the outer limit of the external weed 48 and to ease removal of the external weed from the carrier sheet 17. The cut border is advantageous, but not required.

[0047] In addition to cutting the graphic product 13 as described above, a registration circle 51 is also cut into the layer of sheet material 16 as shown in Fig. 2. The circle 51 is cut adjacent one of the feed holes 40 along the longitudinal edges of the strip and is used to identify and properly locate the origin of the graphic product in the bonding apparatus 11 after it emerges from the cutter 12.

[0048] In the process of removing the graphic product 13 from the carrier sheet and transferring the graphic product to a signboard or other substrate, the bonding apparatus 11 of Fig. 1 selectively attaches a bonding web by means of a heat activated adhesive to the cut portions of the vinyl layer 16. Generally a bonding web 15 is first attached to the internal weed 46, and the weed is removed from the carrier sheet by pulling the bonding web 15 and the carrier sheet apart with the internal weed clinging to the bonding web as shown in Fig. 4. Then another bonding web 15 is attached to the external weed 48 and the external weed is removed from the carrier sheet by the bonding web as shown in Fig. 6. At this stage the graphic product 13 "AR" remains alone on the carrier sheet 17 within the border as shown in Fig. 7. Finally another bonding web 15 is attached to the graphic product "AR", and the product is then removed from the carrier sheet with the web as shown in Fig. 8 and placed on a sign substrate. The pressure sensitive adhesive 38 (Fig.

3) stays with the vinyl of the graphic product 13 rather than the carrier sheet 17 because of the release agent 32, and is used to secure the product to the substrate.

[0049] If the product is suitably shaped and weed portions 46,48 are large enough, it is possible to omit the steps of removing the weed, and to attach a bonding web initially to the product 13 for removal from the carrier sheet in a single step. Preferably a two step process is used in which the internal weed is first removed from the carrier sheet with a first bonding strip, and the graphic product is then removed with a second bonding strip to leave the external weed on the carrier sheet.

[0050] In one embodiment a bonding web 15 with the adhesive forming an integral part thereof, as shown in Figs. 4 and 5, is comprised of two layers of material. A first layer 52 is formed from a biaxially oriented polyester having a melting temperature of approximately 300° F. The layer is coated with a friction-reducing material 54 to ease advancement of the bonding web adjacent heating elements in the bonding apparatus 11 as described below. The material 54 may be a silicon based material. A second layer 56 of the web 15 is secured to the first layer 52 and is comprised of polyethylene, polypropylene or a polyurethane or other similar material having a melting temperature of approximately 225° F to form a high tack releasable adhesive upon heating. During heating in the bonding apparatus 11, the first layer 52 maintains its structural integrity while the second layer 56 melts and forms an adhesive to attach the web 15 to a selected portion of the cut vinyl layer 16. Alternately, a single layer of polyester can be coated with a heat activated dry adhesive for attaching the bonding web to the weed or product portions, or a heat activated adhesive can be interposed between the sheet material and web in a separate step.

[0051] An embodiment of the bonding apparatus 11 for carrying out the selective bonding operation using the bonding web 15 is described in further detail below and is illustrated in Fig. 9. The bonding apparatus 11 has an outer shell or housing 60 to which the components of the bonding apparatus are attached. The housing is comprised of a hinged cover 61 which has a handle 62 for assisting in opening the cover to expose the internal mechanism. Rolls 64,66 may be used for supplying the strip consisting of the now-cut vinyl layer 16 on the carrier sheet 17 and the bonding web 15, respectively, into the bonding apparatus, and are rotatably mounted in a rack 68 at the rear of the apparatus. The strip and the bonding web 15 are fed from the separate rolls over a dancer roller 69 into the bonding apparatus 11 in overlying relationship, and exit the bonding apparatus 11 at the front side of the machine as shown in Fig. 9. They may be retrieved as desired including, for example, manual retrieval or retrieval via take-up rolls. As an alternative to supplying the bonding web 15 from the roll 64, the web may be manually supplied by opening the cover 61 and placing the web in an overlying manner on the vinyl layer 16. With this alternative, however, the layer is preferably still fed from the roll 64.

[0052] Although the bonding apparatus is automatically controlled from the controller 28, the bonding apparatus also has an additional control panel 70 accessible from outside of the apparatus as shown in Fig. 9 to allow an operator to manually control the feeding and bonding operation.

[0053] As shown in Figs. 10-14, the bonding apparatus has a feed mechanism for advancing the strip of cut vinyl material on the carrier sheet 17 and the bonding web 15 through the bonding apparatus relative to a thermal head 101 which bonds the web 15 selectively to the vinyl layer 16. The feed mechanism includes two driven sprockets 72,74 having a plurality of equally spaced pins 76 extending from and around the periphery of the sprockets, as shown most clearly in Figs. 10 and 12. The pins engage the rows of feed holes 40 extending along both longitudinal edges of the strip. For a more complete description of how the feed holes and drive sprockets are arranged and cooperate to align and position the strip, reference may be had to U.S. Patent No. 4,834,276.

[0054] As shown in Figs. 11 and 12, the drive sprockets 72,74 are fixedly mounted to a drive shaft 88, which is rotatably mounted within the housing 60 of the bonding apparatus and driven by a stepmotor 90 shown in Fig. 11 through a series of drive gears 92,94, two drive pulleys 96,98 and a toothed drive belt 100. In addition, a roller platen 99 is also rotatably mounted within the housing 60 and is driven from the drive shaft 88 by means of drive pulleys 102,104 and an O-ring drive belt 106 at one end of the platen and drive pulleys 108,110 and an O-ring drive belt 112 at the opposite end of the platen. The gears, toothed drive belt and sprockets insure that the bonding web 15 and vinyl layer 16 on the carrier sheet 17 are precisely positioned on the roller platen 99 under the thermal head 101. In addition, they control the speed at which the vinyl layer 16 on the carrier sheet 17 and bonding web 15 move through the bonding apparatus.

[0055] The drive pulleys 102,104,108,110 are selected to establish a peripheral speed of the roller platen 99 that is slightly higher than the peripheral speed of the drive sprockets 72,74 to assist the feeding of the vinyl layer 16 on the carrier sheet and the bonding web 15 past the thermal head 101 shown in Figs. 10 and 14. Since the drive sprockets 72,74 positively engage the layer of sheet material 16 on the carrier sheet 17 and control the speed of the sheet, the O-ring drive belts 106,112 must allow limited slip to prevent tearing.

[0056] As shown clearly in Figs. 13 and 14, a pair of curved, sheet metal plates 114,116 guide the bonding web 15 and the vinyl layer 16 on the carrier sheet 17 circumaxially onto and off of the roller platen 99 and each of the cylindrical support surfaces of the sprockets 72,74 in a U-shaped feed path. The cylindrical surfaces of the sprockets lie in a cylindrical plane much larger in diameter than the cylindrical, strip-engaging surface of the roller platen 99 which is

tangential to the cylindrical plane. Preferably, the cylindrical surface of the roller platen 99 is formed by a hard rubber sleeve which improves the frictional engagement of the platen with the carrier sheet 17.

[0057] Referring still to Fig. 13, in order to keep the bonding web 15 and vinyl layer 16 and the carrier sheet 17 fully engaged with approximately 180° of the sprockets 72,74, a pair of holddown bales 118 (only one shown) support two holddown wipers 124, 126 at the supply and discharge points of the sprockets. The bales are pivotally suspended from the housing 60 on pins 120 as indicated in Fig. 13, so that the bails and wipers can be lifted away from the sprockets and allow the bonding web 15 and vinyl layer 16 on the carrier sheet 17 to be mounted on and removed from the sprockets and roller platen 99. Overcenter springs 122 are connected to the housing adjacent the pivotal ends of the holddown bales and assist in holding the wipers down on the vinyl layer 16 on the carrier sheet 17 and bonding web 15.

[0058] As shown in Fig. 13, an optical sight 127 supported from the housing 60 of the bonding apparatus can be temporarily swiveled over the roller platen 99 to accurately locate the origin circle 51 (Fig. 2) of the graphic product cut into the vinyl layer 16 and bring that origin into registration with the origin of the corresponding bonding program controlling the operation of the bonding apparatus 11. It will be understood that the cutting program which guides the cutter 12 (Fig. 1) and the bonding program which operates the bonding apparatus 11 use the same data defining the peripheral edges of the graphic product 13 so that the bonding web 15 is accurately bonded to either the weed or the graphic product created by the cutting program. Correlation of the cutting and bonding programs on the material is brought about by starting both operations at the registration circle 51 or origin in the vinyl layer.

[0059] Thus, the vinyl layer 16 and underlying carrier sheet are first positioned on the sprockets 72,74 and the sprockets are slewed by the operator of the bonding apparatus until the registration circle 51 is centered in the optical sight 127. The temporary position of the optical sight is in a vertical plane directly above the center of the roller platen 99 at a known position offset from the sprocket pins 76. Once the registration circle is properly located, the bonding operation can be started with assurance that the cut pattern defining the graphic product in the vinyl layer 16 is in proper registration with the programmed bonding pattern that joins the web 15 to selected portions of the vinyl.

[0060] Figure 14 illustrates the layer of sheet material 16 on the carrier sheet 17 and bonding web 15 passing over the roller platen 99 relative to and adjacent the thermal head 101. The thermal head is similar to thermal printing heads used in printing operations such as that disclosed in U.S. Patent No. 5,537,135 and owned by the Assignee of this application. However, unlike printing heads, no printing ribbon or web is used with the thermal head 101 in this invention.

[0061] The thermal head 101 has a plurality of heating elements distributed evenly along the head from one end of the roller platen 99 to the other and the heating elements are densely packed along a line of contact with the head, preferably with a density of 300 elements per inch. One such head is made by Kyocera Industrial Ceramics Incorporated of Kyocera, Japan. The elements can be energized individually to selectively activate the heat-activated adhesive layer of the bonding web 15 and thereby attach the web to the weed or graphic product portion of the vinyl layer 16.

[0062] Referring generally to Fig. 14, the thermal head 101 is mounted in the upper support frame 130 pivotally supported in the housing 60 by a shaft 132. A suspension plate 134 is connected with the frame 130 by means of a series of bolts 136 which are secured to the plate 134 and slidably received within the frame 130 so the plate 134 together with the thermal head 101 can move vertically relative to the support frame. In addition to supporting the thermal head 101, the mounting plate 134 also serves as a heat sink for the heat generated in the thermal head. Surrounding each of the sliding bolts 136 and interposed between the frame 130 and plate 134 are several coil springs 138 which, with the support frame lowered and latched in the closed position as shown in Figs. 10 and 14, apply pressure downwardly on the plate 134 and press the thermal head 101 against the bonding web 15 and vinyl layer 16 on the carrier sheet 17 and the roller platen 99 along a line of contact extending horizontally at the roller platen.

[0063] After cutting and loading the strip of cut vinyl and carrier sheet and the bonding web into the bonding apparatus, the bonding and separating operations can proceed. The cut vinyl layer 16 on the carrier sheet 17 and bonding web 15 are fed in overlying relationship over the roller platen and under the thermal head, as shown in Fig. 14.

[0064] Based on the bonding program developed from the input data 14 (Fig. 1) defining the graphic product, the heating elements of the thermal head 101 are energized in a pattern substantially registering with either the graphic product portion or weed portion cut into the vinyl layer 16. Using the keyboard 24 (Fig. 1), either of the portions can be selected for bonding to the web 15 and subsequent removal from the carrier sheet 17. Accordingly, if the internal weed 46 shown in Fig. 2 is selected for removal, the heating elements are selectively energized at different parts of the thermal head 101 at selected times and for given durations as the web 15 and vinyl layer 16 move under the head to attach the web to the vinyl in an application area or pattern registering in position and shape with all or substantially all of the internal weed.

[0065] In particular the heating elements may be energized over the weed in solid pattern or in other patterns matching the shape of the weed. To save energy or eliminate overheating, the elements and the adhesive of the bonding web can be activated in a plurality of discrete, evenly spaced zones, such as in a striped or checkered board pattern which terminates at the edges of the weed portion and covers the entire portion.

[0066] Thus, upon movement of the vinyl layer 16 and bonding web 15 adjacent the thermal head 101, the bonding web 15 is heated over an application area matching the patterns cut in the vinyl, i.e. the shape of the internal weed or

sections of internal weed designated for removal from the carrier sheet, and the adhesive formed by the bottom layer of the bonding web is activated in a pattern and attaches the web to the internal weed. With the high density heating elements, the selected portion of the cut vinyl is precisely bonded to the bonding web 15 for subsequent lifting and separation from the graphic product and weed portions which remain secured to the carrier sheet 17. In addition to

activating the heat sensitive adhesive of the bonding web, the thermal head also heats the pressure sensitive adhesive between the vinyl and the carrier sheet to assist in loosening the attached portions from the carrier sheet 17.

[0067] When the bonding web 15 and vinyl layer 16 on the carrier sheet 17 are discharged from the bonding apparatus 11, the bonding web 15 and the internal weed attached to it are pulled and separated from the carrier sheet 17. Fig. 4 is indicative of the results of separation, and shows the internal weed 46 attached to the bonding web 15.

[0068] In a similar manner and if necessary or desired, the external weed 48 (Fig. 2) is removed from the carrier sheet 17 by passing the cut vinyl layer 16 on the carrier sheet through the bonding apparatus 11 a second time with a second bonding web 15. The process of external weed removal is similar to that described above for the internal weed except that the heating elements are energized over an application area or pattern substantially registering in position and shape with the external weed 48. The second bonding web and attached weed are then separated from the carrier sheet and appear as shown in Fig. 6.

[0069] With the internal and external weed removed, the only portion of the vinyl layer 16 left on the carrier sheet 17 within the frame is the graphic product 13 as shown in Fig. 7. The graphic product can now be removed in the same manner as the weed portions by processing the vinyl layer and carrier sheet with a third bonding web through the bonding apparatus 11, and energizing the thermal head to heat the bonding web in a pattern corresponding to the product. The product is then lifted from the carrier sheet and is transferred on the bonding web to a sign substrate for attachment.

[0070] Alternatively and if the internal and external weed have been removed, the graphic product can be transferred to a sign substrate by pressing an adhesive transfer web against the product to establish a temporary bond for stripping the product from the carrier sheet. This process is described in U.S. Patent 4,467,525.

[0071] Whether a bonding web or a transfer web is used, the pressure sensitive adhesive joining the vinyl to the carrier sheet stays with the graphic product during stripping due to the release coating on the carrier sheet. Since the pressure sensitive adhesive establishes a stronger bond with a sign substrate than the temporary bond with the transfer or bonding web, the adhesive will secure the graphic product to the substrate and allow the web to be stripped away.

[0072] In some cases, the external weed does not have to be removed from the carrier sheet before the graphic product. With products having large and simple or less intricate weed portions, the cut vinyl layer 16 on the carrier sheet 17 and an overlying bonding web can be processed through the bonding apparatus 11 as described immediately above to join the product to the bonding web without first removing any of the weed. The graphic product portion is designated for removal via the keyboard 24 in Fig. 1. The controller 28 causes the heating elements of the thermal head to energize and activate the heat-activated adhesive of the web in an application area corresponding in position and shape with the graphic product.

[0073] The bonds formed by the various combinations of materials and adhesives must necessarily be stronger or weaker relative to each other. For example, the strength of the temporary bond between the carrier sheet 17 and graphic product 13 in the vinyl layer 16 must be less than the strength of the bond formed between the bonding web 15 and the graphic product so as to accomplish the separation of the graphic product from the carrier sheet 17. These same relative strengths are also necessary for the separation of the weed portion from the carrier sheet. However, when separation has been completed and the graphic product is to be attached to the sign substrate, the resulting bond by the pressure sensitive adhesive must be stronger than the bond formed between the bonding web 15 and the graphic product. That is, the pressure sensitive adhesive 38 must form a bond with the non release coated substrate stronger than the bond between the graphic product and the bonding web 15.

[0074] The combinations of adhesives and substrates which are effective in performing the methods of bonding and separation described above are listed in Table 1 below. Table 1 indicates

TABLE 1

SHEET MATERIAL CHARACTERISTICS			
ELEMENT	MATERIAL	THICKNESS mm (inch)	
Bonding Web- Bottom Adhesive Layer (56)	Polyethylene	0,02032 (.0008)	
Bonding Web- Top Layer (52)	Polyester	0,0127 (.0005)	
Layer of Sheet Material (16)	Vinyl	0,0508 (.002)	
Carrier Sheet (17)	Paper	0,0762 (.003)	
RELATIVE ADHESIVE STRENGTHS			
ELEMENT	MATERIAL	SUBSTRATES ADHERED	PEEL STRENGTH N/cm (lb/inch)
Adhesive (38)	Pressure Sensitive Adhesive	HP220 Scotchcal vinyl and Carrier with Release Agent	2.67 (1.50)
Adhesive (38)	Pressure Sensitive Adhesive	HP220 Scotchcal vinyl and Plastic Sign Substrate	4.34 (2.44)
Bottom Layer (56)	Heat Activated Polyethylene Adhesive	HP220 Scotchcal and Polyethylene	3.11 (1.75)

that when the graphic product portion or weed portion of the layer 16 consisting of HP220 Scotchcal vinyl is joined with the polyethylene of the bonding web 15 by the thermal head 101 as discussed above, a bond having an adhesive strength of 3.11 N/cm (1.75 lb./in) is exhibited. This strength has been found to be highly effective in overcoming the temporary bond between the HP220 Scotchcal vinyl and the carrier sheet of approximately 2,67 N/cm (1.5 lb./in) or less. This 2,67 N/cm (1.5 lb./in.) bond is weak enough to allow the 3,11 N/cm (1.75 lb./in.) bond between the graphic product or weed and the bonding web 15 to be maintained during stripping from the carrier sheet. On the other hand, the bond strength between a non-release coated plastic, when used for the sign substrate 50, and the HP220 Scotchcal vinyl portions coated with the pressure sensitive adhesive is 4,305 N/cm (2.42 lb./in.). This bond is strong enough to overcome the 3.11 N/cm (1.75 lb./in.) bond between the graphic product and the bonding web, and thus permits separation of the vinyl material from the bonding web.

[0075] While the present invention has been described in a preferred embodiment, it should be understood that numerous modifications and substitutions can be had without departing from the spirit of this invention.

[0076] For example, although the cutting, bonding and separating operations described above have been performed as separate operations in the cutter 12 and bonding apparatus 11 in Fig. 1, the entire sign making process including weeding can be performed continuously in a fully automatic, integrated system as illustrated in Fig. 15. The system has four stages: a cutting stage I, a bonding stage II, a bonding stage III and a transfer stage IV. In stage I the cutter 12 cuts the graphic product in the vinyl layer 16 on the carrier sheet 17 as previously described. However the cut vinyl layer on the carrier sheet is processed from the output of the cutter directly to the input of a first bonding apparatus 11 in stage II where a first bonding web 15 from supply spool 66a is overlaid on the cut vinyl for selective attachment, for example, to the internal weed. At the output of the first bonding apparatus, the bonding web with attached weed is stripped from the rest of the cut vinyl by a take-up spool 140, and the carrier sheet with the remaining vinyl is processed directly to the input of a second bonding apparatus 11 in stage III by means of feed sprockets 142. In stage III another bonding web 15 from a supply spool 66b is overlaid on the cut vinyl for selective attachment, for example, to the external weed. At the output of the second bonding apparatus, the bonding web with the attached weed is stripped from the rest of the vinyl by a take-up spool 144, and the carrier sheet and now-weeded graphic product are processed directly to the input of a transfer device in stage IV by the feed sprockets 146. In stage IV a transfer web 150 from spool 148 lifts the graphic product from the carrier sheet which is reeled onto a take-up spool 152 while the graphic product is transferred by the transfer web 150 to a sign substrate 50 where a press 154 applies the graphic product to the substrate to produce the finished sign. The transfer sheet 150 is taken up on spool 156.

[0077] When the carrier sheet 17 and bonding webs 15 are separated at the output stages II and III as discussed above, the most effective method of separation is by pulling the web from the carrier at an angle of 120° as shown in Fig. 16. In addition to the 120° angle, it is desirable that a small radius be maintained at the point where the bonding web 15 is bent for the separation. By using a backing plate 168 adjacent the inside radius formed by the bending of the bonding web, as shown in Fig. 16, good release and separation may be obtained. The plate 168 allows a small radius to be maintained at the bend point of the bonding web during the separation process and assists as well as in maintaining a constant pressure on the web.

[0078] The bonding apparatus 11 can also be employed in a further weeding operation in which a heat-activated release material or adhesive inhibitor is transferred from a carrier web onto the cut vinyl layer 16 in a selected pattern corresponding to the weed. For example, a supply web bearing a heat-releasable silicone or grease is overlaid on the cut vinyl layer 16 and the carrier sheet 17, and the materials so laminated are fed through the bonding apparatus in the same manner as the bonding web overlaid on the cut vinyl layer. In this instance the key board 24 in Fig. 1 calls up the pattern corresponding to the weed to energize the thermal head and cause the heat-activated adhesive inhibitor to be released from the supply web and be deposited on the weed portion only of the vinyl. When the vinyl layer 16 with the inhibitor material is discharged from the bonding apparatus, the supply web is removed from the vinyl and a transfer sheet with pressure sensitive adhesive is applied to the graphic product portion of the vinyl to strip the graphic product from the carrier sheet and the remaining vinyl on the sheet. The adhesive inhibitor overlying the weed portion of the vinyl prevents the transfer web from adhering and, thus, permits the graphic product to be lifted away from the carrier sheet for transfer to a sign substrate.

[0079] As an alternative to feeding the adhesive inhibiting web from an exterior spool, the inhibiting web may be supplied in cassette format. The description of the cassette format is incorporated herein by reference to Patent No. 5,537,135 and owned by the Assignee of the present invention.

Claims

1. An apparatus for manufacturing a graphic product (13) from a layer of sheet material (16) releasably secured to a carrier sheet (17), one portion of the layer of sheet material defining the graphic product (13) severed from the remaining portions (46, 48) of the layer of sheet material on the carrier sheet along lines of cut at the peripheral edges (20) of the graphic product, said apparatus comprising:

- (a) storage means (26) for storing data defining the peripheral edges (20) of said graphic product (13) as machine readable data;
- (b) a bonding web (15) cooperating with a heat activated adhesive at one side of the web;
- (c) feeding means (72, 74, 90) for feeding said layer of sheet material releasably secured to the carrier sheet and said bonding web through said apparatus with said one side of the web bearing the adhesive adjacent the layer of sheet material;
- (d) heating means (101) having a plurality of selectively energizable heating elements positioned relative to the feeding means so as to place the heating elements into contact with the bonding web adjacent the layer

of sheet material; and

(e) control means (28) interfaced with the storage means (26) and connected to the feeding means and the heating means (101) to cause said heating elements to be selectively energized in response to said stored data to activate the adhesive on the bonding web in a substantially continuous pattern registering with one of said portions of the layer of sheet material as the feeding means feeds the bonding web and layer of sheet material releasably secured to a carrier sheet relative to the heating means to attach the web to said one of said portions of the sheet material.

2. An apparatus for manufacturing a graphic product as in Claim 1, wherein said bonding web (15) comprises:

- (a) a first layer formed from a polyester material and having a first melting temperature;
- (b) a second layer (54) formed from a friction reducing material coating said first layer for ease of advancement of said bonding web adjacent said heating means; and
- (c) the heat activated adhesive (56) is a third layer formed from polyethylene secured to said first layer (52) and having a melting temperature lower than the melting temperature of the first layer.

3. An apparatus for manufacturing a graphic product as in Claim 2, wherein said friction reducing material is formed from a silicone material.

4. An apparatus for manufacturing a graphic product as in Claim 1, 2 or 3, wherein said feeding means comprises two sprockets (72; 74) having engaging pins (76) extending therefrom to engage feed holes (40) in said layer of sheet material (16) releasably secured to a carrier sheet (17).

5. An apparatus for manufacturing a graphic product as in Claim 4, wherein said apparatus further comprises a data controlled cutter (12) connected with the storage means (26) and also responsive to said stored data defining the peripheral edges (20) of said graphic product for generating the lines of cut defining the periphery of a graphic product as well as said portions (13, 46, 48), said cutter (12) also having feeding means in the form of sprockets with engaging pins for engaging said feed holes and feeding said layer of sheet material releasably secured to a carrier sheet.

6. An apparatus for manufacturing a graphic product as in Claim 5, further comprising:

- (a) guide means connected between said cutter (12) and the heating means (101) for guiding said layer of cut sheet material (16) releasably secured to a carrier sheet (17) from the cutting means to the heating means; and
- (b) supply means (66a, 66b) for supplying said bonding web (15) onto said layer of sheet material (16) releasably secured to a carrier sheet on said guide means between the cutting means and the heating means.

7. An apparatus for manufacturing a graphic product as in anyone of the foregoing claims, further comprising:

- supply means (64, 66) for holding a supply of said sheet material (16) releasably secured to carrier sheet (17) and said bonding web (15); and
- delivery means (69) for supplying said layer of sheet material releasably secured to a carrier sheet and said bonding web together to said feeding means (72, 74, 90).

8. An apparatus for manufacturing a graphic product as in anyone of Claims 4 to 7, wherein said feeding means further comprises:

- (a) a roller platen (99) rotatable about a central axis and having a smooth roller surface supporting the bonding web (15) and layer of sheet material (16) on the carrier sheet (17) adjacent heating elements of the heating means (101) and frictionally engaging said carrier sheet and supporting said layer of sheet material releasably secured to said carrier sheet and said bonding web adjacent said heating means (101); and
- (b) drive means (90) connected to rotate said sprockets (72, 74) and the roller platen (99) to move said layer of sheet material attached to said carrier sheet and said bonding web past the heating elements.

9. An apparatus according to claim 8, wherein the drive means (90) rotates said roller platen (99) at a slightly greater peripheral speed than said sprockets.

10. An apparatus for manufacturing a graphic product as in anyone of the foregoing claims, further comprising pressure

generating means (138) for pressing said heating means against said layer of sheet material releasably secured to a carrier sheet and said bonding web to assist in attaching said bonding web to said one of said portions.

11. A method of manufacturing a graphic product, comprising the steps of:

- (a) providing a layer of sheet material (16) on a carrier sheet (17) with one portion of the layer of sheet material defining a graphic product (13) severed along lines of cut at the peripheral edges (20) of the graphic product from another portion (46, 48) of the layer of sheet material defining the weed;
- (b) placing a bonding web (15) in overlying relationship with the layer of sheet material (16) with a heat activated adhesive (56) between said bonding web and said layer of sheet material; and
- (c) selectively heating by means of selectively energizeable heating elements said bonding web (15) over at least one heat application area which substantially registers with an underlying one of said portions of the layer of sheet material (16) for activating said adhesive at the periphery and within the periphery of the one of said portions and attaching the bonding web (15) to substantially all of the one (13 or 46, 48) of said portions; and
- (d) separating said bonding web (15) together with the one (13 or 46, 48) of said portions attached thereto from the other portion of said layer of sheet material and the carrier sheet (17) to separate the graphic product (13) from the weed (46, 48).

12. A method for manufacturing a graphic product as in Claim 11, further comprising the steps of:

- (c1) pressing said bonding web (15) against said layer of sheet material (16) during the step of heating for selectively attaching said application area of said bonding web to substantially all of said one (13 or 46, 48) of said portions.

13. A method for manufacturing a graphic product as in Claim 11 or 12, further comprising the steps of:

- (e) defining the peripheral edges (20) of said graphic product (13) in machine readable data;
- (f) storing the machine readable data defining the peripheral edges of said graphic product (13);
- (g) selecting the one (13 or 46, 48) of said portions of said layer of sheet material for separation from said carrier sheet (17); and

the step (c) of selectively heating includes reading said machine readable data to define the application area.

14. A method of manufacturing a graphic product as in Claim 11, 12 or 13, wherein the step (c) of selectively heating includes:

- (c2) providing heating means (101); and
- (c3) feeding said layer of sheet material (16) releasably secured to a carrier sheet (17) and the overlying bonding web (15) relative to said heating means.

15. A method for manufacturing a graphic product as in Claim 14, wherein said heating means is comprised of a thermal head (101) having a plurality of individually activatable heating elements.

16. A method for manufacturing a graphic product as in Claim 15, wherein additional steps include:

- (h) defining the peripheral edges (20) of the graphic product as machine readable data and storing the machine readable data for subsequent retrieval; and
- (i) the step of selectively heating includes energizing the heating elements in accordance with said machine readable data to heat said bonding web (15) over said application area.

17. A method as defined in Claim 16, further including the steps of pressing the thermal head (101) against said bonding web (15) and the layer of sheet material (16) on said carrier sheet (17) during the step of selectively heating to attach said bonding web to said one (13 or 46, 48) of said portions.

18. A method for manufacturing a graphic product as in anyone of Claims 11 to 17, wherein said underlying one of said portions is the weed (46, 48).

19. A method for manufacturing a graphic product as in Claim 18, further including the steps of:

- (k) repeating the steps (a) and (C) of placing and selectively heating wherein said underlaying one of said portions is the graphic product(13); and thereafter
- (l) separating the bonding web (15) and attached graphic product (13) from the carrier sheet (17),
- (m) transferring the graphic product to a sign substrate while attached to the bonding web; and then
- (n) detaching the bonding web from the graphic product on the sign substrate.

20. A method for manufacturing a graphic product as in Claim 18 or 19, wherein said layer of sheet material (16) is comprised of a vinyl sheet and said carrier sheet (17) has a release material on one side, said vinyl sheet being releasably secured to the release material of said carrier sheet via a pressure sensitive adhesive (38) forming a temporary bond, and said heat activated adhesive forms a bond between said bonding web and said weed of greater strength than said temporary bond.

21. A method for manufacturing a graphic product as in Claim 20, wherein:

- the step (c) of selectively heating further includes heating said carrier sheet (17) and loosening said pressure sensitive adhesive (38) along said peripheral edges prior to the step separating for easing the removal of said weed (46, 48).

22. A method of manufacturing a graphic product (13), comprising the steps of:

- (a) providing a layer of sheet material (16) releasably secured by a pressure sensitive adhesive to a carrier sheet (17) with one portion (13) of the layer of sheet material defining a graphic product severed along lines of cut at the peripheral edges (20) of the graphic product from the remaining portion (46, 48) of the layer of sheet material;
- (b) placing a bond inhibiting web bearing a heat activated adhesive inhibitor in overlying relationship with the layer of sheet material (16) with the heat activated inhibitor between said layer of sheet material and said bond inhibiting web;
- (c) selectively heating by means of selectively energizeable heating elements said bond inhibiting web over an application area which registers with substantially all of said remaining portions of the layer of sheet material to deposit the adhesive inhibitor on substantially all of said remaining portion.
- (d) placing a transfer web having an adhesive coating in overlying relationship with said layer of sheet material to join the transfer web to the portion (13) of the layer of sheet material defining the graphic product and not having the adhesive inhibitor deposited thereon;
- (e) separating said transfer web together with the portion (13) defining the graphic product from said carrier sheet; and
- (f) placing the transfer web and the portion defining the graphic product on a graphic product substrate to allow the pressure sensitive adhesive to attach the graphic product to the substrate.

Patentansprüche

1. Vorrichtung zur Herstellung eines graphischen Produkts (13) aus einer Blattmaterialschiicht (16), die lösbar an einer Trägerschicht (17) befestigt ist, wobei ein Bereich der Blattmaterialschiicht das graphische Produkt (13) definiert, das von den verbleibenden Bereichen (46, 48) der Blattmaterialschiicht auf der Trägerschicht entlang Schnittlinien an den Umfangskanten (20) des graphischen Produkts abgetrennt wird, und wobei die Vorrichtung umfaßt:

- a) Speichermittel (26) zum Speichern von Daten, welche die Umfangskanten (20) des graphischen Produkts (13) definieren, als maschinenlesbare Daten;
- b) eine haftende Bahn (15), die auf einer Seite der Bahn mit einem hitzeaktivierbaren Klebemittel wirkt;
- c) Transportmittel (72, 74, 90) zum Transportieren der lösbar an der Trägerschicht befestigten Blattmaterialschiicht und der haftenden Bahn durch die Vorrichtung, wobei die eine Seite der Bahn, welche das Klebemittel trägt, an der Blattmaterialschiicht anliegt;
- d) ein Hitzemittel (101) mit mehreren selektiv anregbare Hitzeelementen, das relativ zu den Transportmitteln derart angeordnet ist, daß die Hitzeelemente die an der Blattmaterialschiicht anliegende haftende Bahn berühren; und

e) Steuermittel (28), die mit den Speichermitteln (26) eine Schnittstelle haben und mit den Transportmitteln und dem Hitzemittel (101) verbunden sind, um zu bewirken, daß die Hitzelemente als Reaktion auf die gespeicherten Daten selektiv angeregt werden, um das Klebemittel auf der haftenden Bahn gemäß einem im wesentlichen kontinuierlichen Muster entsprechend einem der Bereiche der Blattmaterialschi-
 5 chicht zu aktivieren, während die Transportmittel die haftende Bahn und die lösbar an der Trägerschicht befestigte Blattmaterialschicht relativ zu dem Hitzemittel transportieren, um die Bahn mit dem einen der Bereiche des Blattmaterials zu verbinden.

2. Vorrichtung zum Herstellen eines graphischen Produkts nach Anspruch 1, wobei die haftende Bahn (15) umfaßt:

- 10 a) eine erste aus Polyestermaterial gebildete Schicht, die eine erste Schmelztemperatur hat;
 b) eine zweite aus einem reibungsreduzierenden Material gebildete zweite Schicht (54), welche die erste Schicht bedeckt, um das Vorrücken der haftenden Bahn, die an dem Hitzemittel anliegt, zu erleichtern; und
 15 c) daß die hitzeaktivierte Schicht (56) eine dritte Schicht ist, die aus Polyethylen gebildet ist und an der ersten Schicht (52) haftet und eine geringere Schmelztemperatur hat als die erste Schicht.

3. Vorrichtung zum Herstellen eines graphischen Produkts nach Anspruch 2, wobei das reibungsreduzierende Material aus einem Silikonmaterial gebildet ist.

4. Vorrichtung zum Herstellen eines graphischen Produkts nach den Ansprüchen 1, 2 oder 3, wobei das Transportmittel zwei Transportrollen (72, 74) mit Transportstiften (76) hat, wobei die Transportstifte von den Transportrollen abstehen, um mit Transportlöchern (40) in der lösbar an einer Trägerschicht (17) befestigten Blattmaterialschicht (16) in Eingriff zu kommen.

5. Vorrichtung zum Herstellen eines graphischen Produkts nach Anspruch 4, die ferner eine datengesteuerte Schneidvorrichtung (12) hat, die mit dem Speichermittel (26) verbunden ist und auch auf die gespeicherten Daten reagiert, welche die Umfangskanten (20) des graphischen Produkts definieren, um die Schneidlinien zu erzeugen, die den Umfang eines graphischen Produkts sowie die Bereiche (13, 46, 48) definieren, wobei die Schneidvorrichtung (12) auch Transportmittel in Form von Transportrollen mit Transportstiften umfaßt, die mit den Transportlöchern in Eingriff kommen und die lösbar an einer Trägerschicht befestigte Blattmaterialschicht transportieren.

6. Vorrichtung zum Herstellen eines graphischen Produkts nach Anspruch 5, ferner umfassend:

- 35 a) Führungsmittel, die zwischen der Schneidvorrichtung (12) und dem Hitzemittel (101) angeordnet sind, um die lösbar mit der Trägerschicht (17) verbundene geschnittene Blattmaterialschicht (16) von der Schneidvorrichtung zu dem Hitzemittel zu transportieren; und
 b) Zufuhrmittel (66a, 66b) zum Leiten der haftenden Bahn (15) auf die lösbar einer Trägerschicht befestigte Blattmaterialschicht (16) auf den Führungsmitteln zwischen der Schneidvorrichtung und dem Hitzemittel.

7. Vorrichtung zum Herstellen eines graphischen Produkts nach einem der vorhergehenden Ansprüche, ferner umfassend:

Zufuhrmittel (64, 66) zum Halten einer Menge des lösbar an der Trägerschicht (17) befestigten Blattmaterials und der haftenden Bahn (15); und
 45 Abgabemittel (69) zum gemeinsamen Zuführen des Blattmaterials (16), das lösbar der Trägerschicht befestigt ist, und der haftenden Bahn an die Transportmittel (72, 74, 90).

8. Vorrichtung zum Herstellen eines graphischen Produkts nach einem der Ansprüche 4 bis 7, wobei die Transportmittel ferner umfassen:

- 50 a) eine Auflagerolle (99), die um eine zentrale Achse drehbar ist und eine glatte Auflagefläche hat, welche die haftende Bahn (15) und die Blattmaterialschicht (16) derart auf der Trägerschicht (17) trägt, daß sie an Hitzelementen des Hitzemittels (101) anliegen, wobei die Auflagerolle mit der Trägerschicht reibschlüssig in Eingriff ist und die lösbar an der Trägerschicht befestigte Materialschicht und die haftende Schicht anliegend an dem Hitzemittel (101) trägt; und
 55 b) eine Antriebsvorrichtung (90), die derart mit den Transportrollen (72, 74) und der Auflagerolle (99) verbunden ist, daß sie die Transportrollen und die Auflagerolle dreht, um die an der Trägerschicht befestigte Blattmaterialschicht und die haftende Bahn an den Hitzelemente vorbei zu bewegen.

9. Vorrichtung nach Anspruch 8, wobei die Antriebsvorrichtung (90) die Auflagerolle (99) mit einer leicht schnelleren Umfangsgeschwindigkeit als die Transportrollen dreht.

10. Vorrichtung zum Herstellen eines graphischen Produkts nach einem der vorhergehenden Ansprüche, ferner umfassend ein druckerzeugendes Mittel (138) zum Pressen des Hitzemittels gegen die lösbar an einer Trägerschicht befestigte Blattmaterialschi-
 5 cht und die haftende Bahn, um dazu beizutragen, daß sich die haftende Bahn mit einem der Bereiche verbindet.

11. Verfahren zum Herstellen eines graphischen Produkts, umfassend die folgenden Schritte:

a) zur Verfügung Stellen einer Blattmaterialschi-
 10 cht (16) auf einer Trägerschicht (17), wobei ein Bereich der Blattmaterialschi-
 cht ein graphisches Produkt (13) definiert, das von einem anderen Bereich (46, 48) der Schicht des Blattmaterials, das den Ausschuß bildet, entlang Schnittlinien an den Umfangskanten (20) des graphischen Produkts abgetrennt wird;

b) Plazieren einer haftenden Bahn (15) derart, daß es die Blattmaterialschi-
 15 cht (16) überdeckt, wobei zwischen der haftenden Bahn und der Blattmaterialschi-
 cht ein hitzeaktiviertes Klebemittel (56) angeordnet ist; und

c) selektives Erhitzen der haftenden Bahn (15) mittels selektiv anregbarer Hitzeelemente über mindestens eine Auftragefläche, die im wesentlichen einem darunterliegenden Bereich der Bereiche der Blattmaterial-
 20 schicht (16) entspricht, zum Aktivieren des Klebemittels am Umfang und innerhalb des Umfangs des einen Bereichs der Bereiche und Verbinden der haftenden Bahn (15) mit dem im wesentlichen gesamten einen Bereich (13 oder 46, 48) der Bereiche; und

d) Abtrennen der haftenden Bahn (15) zusammen mit dem einen Bereich (13 oder 46, 48) der Bereiche, der daran befestigt ist, von dem anderen Bereich der Blattmaterialschi-
 25 cht und der Trägerschicht (17), um das graphische Produkt (13) von dem Ausschuß (46, 48) zu trennen.

12. Verfahren zum Herstellen eines graphischen Produkts nach Anspruch 11, ferner umfassend die folgenden Schritte:

c1) Pressen der haftenden Bahn (15) gegen die Blattmaterialschi-
 30 cht (16) während des Schrittes des Erhitzens zum selektiven Verbinden der Auftragefläche der haftenden Bahn mit dem im wesentlichen gesamten einen Bereich (13 oder 46, 48) der Bereiche.

13. Verfahren zum Herstellen eines graphischen Produkts nach den Ansprüchen 11 oder 12, ferner umfassend die folgenden Schritte:

e) Definieren der Umfangskanten (20) des graphischen Produkts (13) als maschinenlesbare Daten;
 35 f) Speichern der maschinenlesbaren Daten, welche die Umfangskanten des graphischen Produkts (13) definieren;
 g) Selektieren des einen Bereichs (13 oder 46, 48) der Bereiche der Blattmaterialschi-
 40 cht zum Trennen von der Trägerschicht (17); und

Schritt c), wobei das selektive Erhitzen das Lesen der maschinenlesbaren Daten umfaßt, um die Auftragefläche zu definieren.

14. Verfahren zum Herstellen eines graphischen Produkts nach den Ansprüchen 11, 12 oder 13, wobei Schritt c) des selektiven Erhitzens umfaßt:

c2) zur Verfügung Stellen des Hitzemittels (101); und

c3) Transportieren der lösbar an einer Trägerschicht (17) befestigten Blattmaterialschi-
 50 cht (16) und der darüberliegenden haftenden Bahn (15) relativ zu dem Hitzemittel.

15. Verfahren zum Herstellen eines graphischen Produkts nach Anspruch 14, wobei das Hitzemittel einen Thermokopf (101) mit mehreren einzeln aktivierbaren Hitzeelementen umfaßt.

16. Verfahren zum Herstellen eines graphischen Produkts nach Anspruch 15, das folgende zusätzliche Schritte um-
 55 faßt:

h) Definieren der Umfangskanten (20) des graphischen Produkts als maschinenlesbare Daten und Speichern der maschinenlesbaren Daten zum darauffolgenden Abrufen; und

i) den Schritt des selektiven Erhitzens, wobei dieser das Anregen der Hitzeelemente entsprechend der maschinenlesbaren Daten umfaßt, um die haftende Bahn (15) über die Auflagefläche zu erhitzen.

17. Verfahren nach Anspruch 16, ferner umfassend die Schritte des Pressens des Thermokopfs (101) gegen die haftende Bahn (15) und die Blattmaterialschi-
 5 cht (16) auf der Trägerschicht (17) während des Schritts des selektiven Erhitzens, um die haftende Bahn mit dem einen (13 oder 46, 48) der Bereiche zu verbinden.

18. Verfahren zum Herstellen eines graphischen Produkts nach einem der Ansprüche 11 bis 17, wobei der darunter-
 10 liegende Bereich der Bereiche den Ausschluß bildet (46, 48).

19. Verfahren zum Herstellen eines graphischen Produkts nach Anspruch 18, ferner umfassend die folgenden Schritte:

k) Wiederholen der Schritte a) und c) des Plazierens und selektiven Erhitzens, wobei der darunterliegende Bereich der Bereiche das graphische Produkt (13) ist; und anschließend

l) das Abtrennen der haftenden Bahn (15) und des haftenden graphischen Produkts (13) von der Trägerschicht (17);

m) Übergabe des graphischen Produkts an ein Zeichensubstrat, während das graphische Produkt an der haftenden Bahn haftet; und sodann

n) Abnehmen der haftenden Bahn von dem graphischen Produkt auf dem Zeichensubstrat.

20. Verfahren zum Herstellen eines graphischen Produkts nach den Ansprüchen 18 oder 19, wobei die Blattmaterial-
 25 schicht (16) ein Vinylblattmaterial umfaßt und die Trägerschicht (17) auf einer Seite ein Lösematerial hat, und wobei das Vinylblattmaterial durch ein druckempfindliches Klebemittel (38), das eine temporäre Haftung bildet, lösbar an dem Lösematerial der Trägerschicht befestigt ist, und das hitzeaktivierbare Klebemittel zwischen der haftenden Bahn und dem Ausschluß eine Haftung erzeugt, die stärker ist als die temporäre Haftung.

21. Verfahren zum Herstellen eines graphischen Produkts nach Anspruch 20, wobei
 Schritt c) des selektiven Erhitzens ferner das Erhitzen der Trägerschicht (17) und das Lösen des druckempfindlichen Klebemittels (38) entlang der Umfangskanten vor dem Schritt des Abtrennens umfaßt, um das Entfernen
 30 des Ausschusses (46, 48) zu erleichtern.

22. Verfahren zum Herstellen eines graphischen Produkts (13), umfassend die folgenden Schritte:

a) zur Verfügung Stellen eines Blattmaterials (16), das mittels eines druckempfindlichen Klebemittels lösbar an einer Trägerschicht (17) befestigt ist, wobei ein Bereich (13) der Blattmaterialschi-
 35 cht ein graphisches Produkt definiert, das entlang Schnittlinien an den Umfangskanten (20) des graphischen Produkts von dem übrigen Bereich (46, 48) der Blattmaterialschi-
 cht abgetrennt wird;

b) Plazieren einer Anti-Haft-Bahn mit einem Hemmstoff für hitzeaktivierte Klebemittel derart, daß sie die Blattmaterialschi-
 40 cht (16) überdeckt, wobei der Hemmstoff für hitzeaktivierte Klebemittel zwischen der Blattmate-
 rialschi-
 cht und der Anti-Haft-Bahn angeordnet ist;

c) Selektives Erhitzen der Anti-Haft-Bahn mittels selektiv anregbarer Hitzeelemente über eine Auflagefläche, die dem im wesentlichen gesamten übrigen Bereich der Blattmaterialschi-
 cht entspricht, um den Haft-Hemmstoff auf den im wesentlichen gesamten übrigen Bereich aufzutragen;

d) Plazieren einer Übergabebahn mit einer Haftbeschichtung, derart, daß sie die Blattmaterialschi-
 45 cht überdeckt, um die Übergabebahn mit dem Bereich (13) der Blattmaterialschi-
 cht, der das graphische Produkt definiert und auf dem kein Haft-Hemmstoff aufgetragen ist, zu verbinden;

e) Abtrennen der Übergabebahn zusammen mit dem Bereich (13), der das graphische Produkt definiert, von der Trägerschicht; und

f) Plazieren der Übergabebahn und des Bereichs, der das graphische Produkt definiert, derart auf einem Graphikprodukt-Substrat, daß ermöglicht wird, daß das druckempfindliche Klebemittel das graphische Produkt an das Substrat bindet.

Revendications

1. Dispositif destiné à fabriquer un produit graphique (13) à partir d'une couche de matériau en feuille (16) fixé de façon amovible à une feuille support (17), une partie de la couche de matériau en feuille définissant le produit graphique (13) séparé des parties restantes (46, 48) de la couche de matériau en feuille sur la feuille support le

long de lignes de coupe aux bords périphériques (20) du produit graphique, ledit dispositif comprenant :

- (a) un moyen de mémorisation (26) destiné à mémoriser des données définissant les bords périphériques (20) dudit produit graphique (13) sous forme de données compréhensibles par une machine,
- (b) une bande de collage (15) coopérant avec un adhésif activable à chaud sur une face de la bande,
- (c) un moyen d'avance (72, 74, 90) destiné à avancer ladite couche de matériau en feuille fixée de façon amovible à la feuille support et ladite bande de collage au travers dudit dispositif, ladite une face de la bande portant l'adhésif étant adjacente à la couche de matériau en feuille,
- (d) un moyen de chauffage (101) comportant une pluralité d'éléments de chauffage pouvant être activés sélectivement, positionnés par rapport au moyen d'avance de façon à mettre les éléments de chauffage au contact de la bande de collage adjacente à la couche de matériau en feuille, et
- (e) un moyen de commande (28) ayant une interface avec le moyen de mémorisation (26) et relié au moyen d'avance et au moyen de chauffage (101) pour amener lesdits éléments de chauffage à être activés sélectivement en réponse auxdites données mémorisées pour activer l'adhésif sur la bande de collage suivant un motif pratiquement continu en correspondance avec l'une desdites parties de la couche de matériau en feuille lorsque le moyen d'avance fait avancer la bande de collage et la couche de matériau en feuille fixée de façon amovible à une feuille support par rapport au moyen de chauffage pour fixer la bande à ladite une desdites parties du matériau en feuille.

2. Dispositif destiné à fabriquer un produit graphique selon la revendication 1, dans lequel ladite bande de collage (15) comprend :

- (a) une première couche formée d'un matériau en polyester et présentant une première température de fusion,
- (b) une seconde couche (54) formée à partir d'un matériau réduisant le frottement recouvrant ladite première couche pour faciliter l'avancement de ladite bande de collage de façon adjacente au voisinage du moyen de chauffage, et
- (c) l'adhésif activable à chaud (56) est une troisième couche formée à partir de polyéthylène fixé sur ladite première couche (52) et présentant une température de fusion inférieure à la température de fusion de la première couche.

3. Dispositif destiné à fabriquer un produit graphique selon la revendication 2, dans lequel ledit matériau réduisant le frottement est formé d'un matériau de silicone.

4. Dispositif destiné à fabriquer un produit graphique selon la revendication 1, 2 ou 3, dans lequel ledit moyen d'avance comprend deux roues à dents (72, 74) comportant des doigts d'engagement (76) s'étendant depuis celles-ci pour pénétrer dans des trous d'avance (40) dans ladite couche du matériau en feuille (16) fixé de façon amovible à une feuille support (17).

5. Dispositif destiné à fabriquer un produit graphique selon la revendication 4, dans lequel ledit dispositif comprend en outre un couteau commandé par des données (12) relié au moyen de mémorisation (26) et répondant également auxdites données mémorisées définissant les bords périphériques (20) dudit produit graphique en vue de générer les lignes de coupe définissant la périphérie d'un produit graphique de même que lesdites parties (13, 46, 48), ledit couteau (12) comportant également un moyen d'avance sous forme de roues à dents avec des doigts d'engagement destinés à pénétrer dans lesdits trous d'avance et à faire avancer ladite couche de matériau en feuille fixée de façon amovible à une feuille support.

6. Dispositif destiné à fabriquer un produit graphique selon la revendication 5, comprenant en outre :

- (a) un moyen de guidage relié entre ledit couteau (12) et le moyen de chauffage (101) en vue de guider ladite couche de matériau en feuille coupé (16) fixée de façon amovible à une feuille support (17) depuis le moyen de coupe vers le moyen de chauffage, et
- (b) un moyen d'alimentation (66a, 66b) destiné à fournir ladite bande de collage (15) sur ladite couche de matériau en feuille (16) fixée de façon amovible à une feuille support sur ledit moyen de guidage entre le moyen de coupe et le moyen de chauffage.

7. Dispositif destiné à fabriquer un produit graphique selon l'une quelconque des revendications précédentes, comprenant en outre :

un moyen d'alimentation (64, 66) destiné à contenir une réserve dudit matériau en feuille (16) fixée de façon amovible à une feuille support (17) et ladite bande de collage (15), et
un moyen de fourniture (69) destiné à fournir ensemble ladite couche de matériau en feuille fixé de façon amovible à une feuille support et ladite bande de collage audit moyen d'avance (72, 74, 90).

8. Dispositif destiné à fabriquer un produit graphique selon l'une quelconque des revendications 4 à 7, dans lequel ledit moyen d'avance comprend en outre :

(a) un rouleau (99) pouvant tourner autour d'un axe central et comportant une surface de rouleau lisse supportant la bande de collage (15) et la couche de matériau en feuille (16) sur la feuille support (17) au droit des éléments de chauffage du moyen de chauffage (101) et coopérant par friction avec ladite feuille support qui supporte ladite couche de matériau en feuille fixée de façon amovible à ladite feuille support et ladite bande de collage au voisinage dudit moyen de chauffage (101), et

(b) un moyen d'entraînement (90) relié de façon à faire tourner lesdites roues à dents (72, 74) et le rouleau (99) pour déplacer ladite couche de matériau en feuille fixée à ladite feuille support et ladite bande de collage devant les éléments de chauffage.

9. Dispositif selon la revendication 8, dans lequel le moyen d'entraînement (90) fait tourner ledit rouleau (99) à une vitesse périphérique légèrement supérieure à celle desdites roues à dents.

10. Dispositif destiné à fabriquer un produit graphique selon l'une quelconque des revendications précédentes, comprenant en outre un moyen de génération de pression (138) destiné à presser ledit moyen de chauffage contre ladite couche de matériau en feuille fixée de façon amovible à une feuille support et ladite bande de collage pour aider à fixer ladite bande de collage à l'une desdites parties.

11. Procédé de fabrication d'un produit graphique, comprenant les étapes consistant à :

(a) disposer une couche de matériau en feuille (16) sur une feuille support (17) une partie de la couche du matériau en feuille définissant un produit graphique (13), détacher le long de lignes de coupe aux bords périphériques (20) du produit graphique d'une autre partie (46, 48) de la couche de matériau en feuille définissant le reliquat,

(b) placer une bande de collage (15) en recouvrement de la couche de matériau en feuille (16) avec un adhésif activable à chaud (56) entre ladite bande de collage et ladite couche de matériau en feuille, et

(c) chauffer sélectivement au moyen d'éléments de chauffage pouvant être activés sélectivement ladite bande de collage (15) sur au moins une zone d'application de chaleur qui est sensiblement en correspondance avec une partie sous-jacente desdites parties de la couche de matériau en feuille (16) en vue d'activer ledit adhésif à la périphérie et à l'intérieur de la périphérie de l'une desdites parties et fixer la bande de collage (15) à pratiquement la totalité de l'une (13 ou 46, 48) desdites parties, et

(d) séparer ladite bande de collage (15) de même que l'une (13 ou 46, 48) desdites parties fixée à celle-ci de l'autre partie de ladite couche de matériau en feuille et la feuille support (17) afin de séparer le produit graphique (13) du reliquat (46, 48).

12. Procédé de fabrication d'un produit graphique selon la revendication 11, comprenant en outre les étapes consistant à :

(c1) presser ladite bande de collage (15) contre ladite couche de matériau en feuille (16) durant l'étape de chauffage en vue de fixer sélectivement ladite zone d'application de ladite bande de collage à pratiquement la totalité de ladite une (13 ou 46, 48) desdites parties.

13. Procédé destiné fabriquer un produit graphique selon la revendication 11 ou 12, comprenant en outre les étapes consistant à :

(e) définir les bords périphériques (20) dudit produit graphique (13) sous forme de données compréhensibles par une machine,

(f) mémoriser les données compréhensibles par une machine définissant les bords périphériques dudit produit graphique (13),

(g) sélectionner l'une (13 ou 46, 48) desdites parties de ladite couche de matériau en feuille en vue d'une séparation de ladite feuille support (17), et

l'étape (c), consistant à chauffer sélectivement comprenant la lecture desdites données compréhensibles par une machine pour définir la zone d'application.

- 5 **14.** Procédé de fabrication d'un produit graphique selon la revendication 11, 12 ou 13, dans lequel l'étape (c) consistant à chauffer sélectivement consiste à :

(c2) fournir un moyen de chauffage (101), et
(c3) avancer ladite couche de matériau en feuille (16) fixée de façon amovible à une feuille support (17) et la bande de collage de recouvrement (15) par rapport audit moyen de chauffage.

- 10 **15.** Procédé de fabrication d'un produit graphique selon la revendication 14, dans lequel ledit moyen de chauffage est constitué d'une tête thermique (101) comportant une pluralité d'éléments de chauffage pouvant être activés individuellement.

- 15 **16.** Procédé de fabrication d'un produit graphique selon la revendication 15, dans lequel des étapes supplémentaires comprennent :

(h) la définition des bords périphériques (20) du produit graphique sous forme de données compréhensibles par une machine et mémoriser les données compréhensibles par une machine en vue d'une récupération ultérieure, et

(i) l'étape consistant à chauffer sélectivement, l'activation des éléments de chauffage conformément auxdites données compréhensibles par une machine afin de chauffer ladite bande de collage (15) sur ladite zone d'application.

- 25 **17.** Procédé selon la revendication 16, comprenant en outre les étapes consistant à presser la tête thermique (101) contre ladite bande de collage (15) et la couche de matériau en feuille (16) sur ladite feuille support (17) durant l'étape consistant à chauffer sélectivement pour fixer ladite bande de collage sur ladite une (13 ou 46, 48) desdites parties.

- 30 **18.** Procédé de fabrication d'un produit graphique selon l'une quelconque des revendications 11 à 17, dans lequel ladite partie sous-jacente desdites parties représente le reliquat (46, 48).

- 35 **19.** Procédé de fabrication d'un produit graphique selon la revendication 18, comprenant en outre les étapes consistant à :

(k) répéter les étapes (a) et (c) consistant à placer et à chauffer sélectivement dans lesquelles ladite une partie sous-jacente desdites parties est le produit graphique (13), et ensuite
(l) séparer la bande de collage (15) et le produit graphique fixé (13) de la feuille support (17),
(m) transférer le produit graphique vers un substrat de signalisation pendant qu'il est fixé à la bande de collage, et ensuite
(n) séparer la bande de collage du produit graphique sur le substrat de signalisation.

- 45 **20.** Procédé de fabrication d'un produit graphique selon la revendication 18 ou 19, dans lequel ladite couche de matériau en feuille (16) est constituée d'une feuille de vinyle et ladite feuille support (17) comporte un matériau de séparation d'un côté, ladite feuille de vinyle étant fixée de façon amovible sur le matériau de séparation de ladite feuille support par l'intermédiaire d'un adhésif sensible à la pression (38) formant un collage temporaire, et ledit adhésif activable à chaud forme un collage entre ladite bande de collage et ledit reliquat de résistance supérieure à celle dudit collage temporaire.

- 50 **21.** Procédé de fabrication d'un produit graphique selon la revendication 20, dans lequel :

l'étape (c) consistant à chauffer sélectivement comprend en outre le chauffage de ladite feuille support (17) et le décollage dudit adhésif sensible à la pression (38) le long desdites bords périphériques avant l'étape de séparation en vue de faciliter l'enlèvement dudit reliquat (46, 48).

- 55 **22.** Procédé de fabrication d'un produit graphique (13), comprenant les étapes consistant à :

(a) fournir une couche de matériau en feuille (16) fixée de façon amovible par un adhésif sensible à la pression

sur une feuille support (17), une partie (13) de la couche du matériau en feuille définissant un produit graphique séparé le long de lignes de coupe aux bords périphériques (20) du produit graphique de la partie restante (46, 48) de la couche de matériau en feuille,

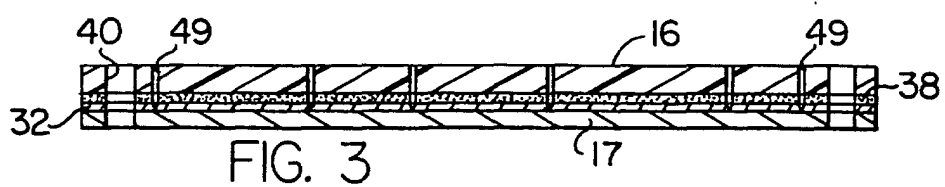
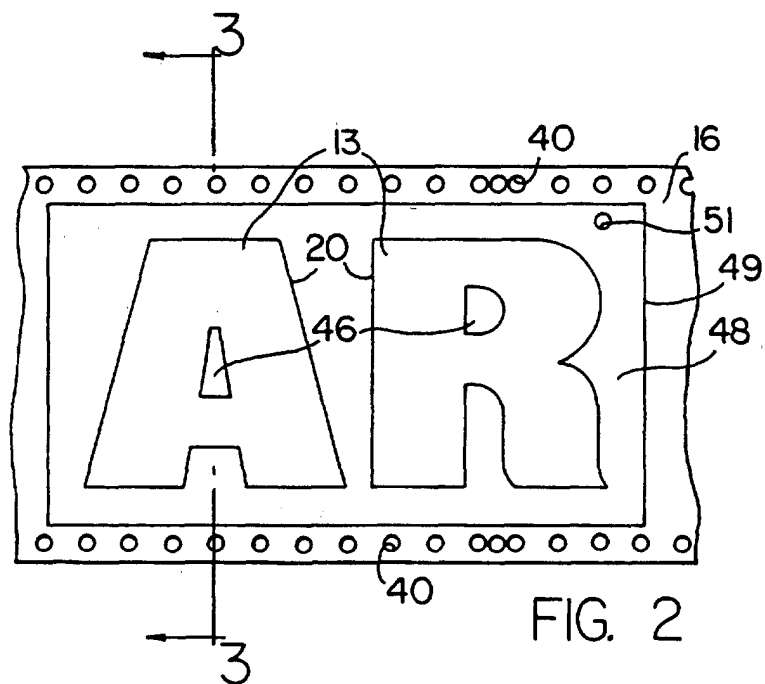
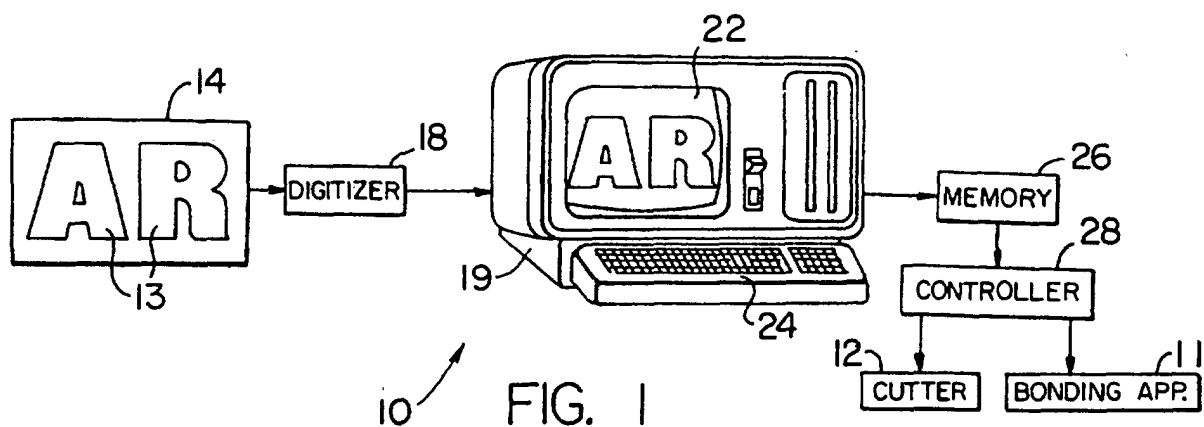
(b) placer une bande d'inhibition de collage portant un inhibiteur d'adhésif activable à chaud en recouvrement de la couche de matériau en feuille (16), l'inhibiteur d'adhésif activable à chaud étant entre ladite couche de matériau en feuille et ladite bande d'inhibition de collage,

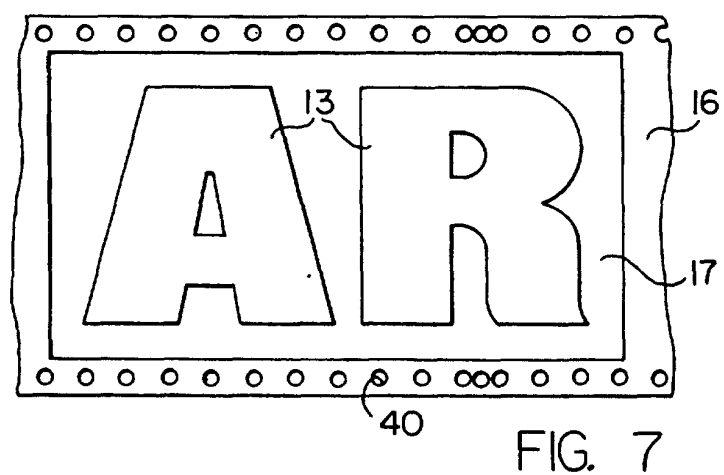
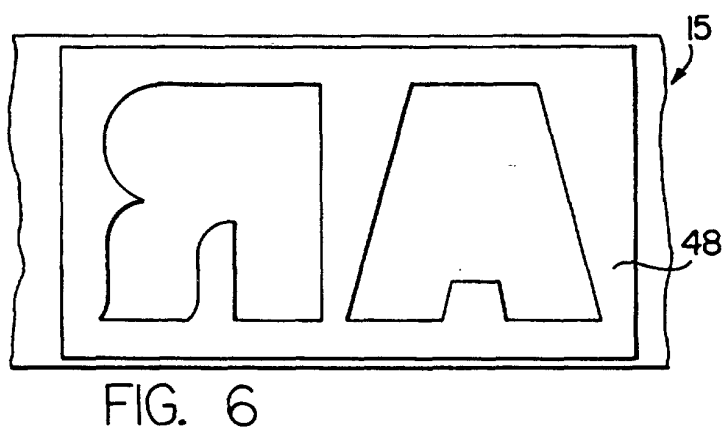
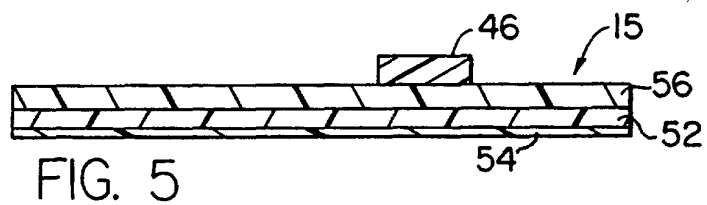
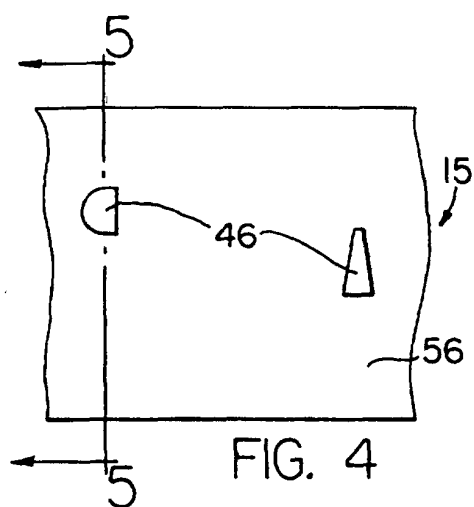
(c) chauffer sélectivement au moyen d'éléments de chauffage pouvant être activés sélectivement, ladite bande d'inhibition de collage sur une zone d'application qui correspond pratiquement à toutes lesdites parties restantes de la couche de matériau en feuille pour déposer l'inhibiteur d'adhésif sur sensiblement toutes lesdites parties restantes.

(d) placer une bande de transfert comportant un revêtement adhésif en recouvrement de ladite couche de matériau en feuille afin de joindre la bande de transfert à la partie (13) de la couche de matériau en feuille définissant le produit graphique et ne comportant pas l'inhibiteur d'adhésif déposé sur celle-ci,

(e) séparer ladite bande de transfert en même temps que la partie (13) définissant le produit graphique de ladite feuille support, et

(f) placer la bande de transfert et la partie définissant le produit graphique sur un substrat de produit graphique afin de permettre à l'adhésif sensible à la pression de fixer le produit graphique sur le substrat.





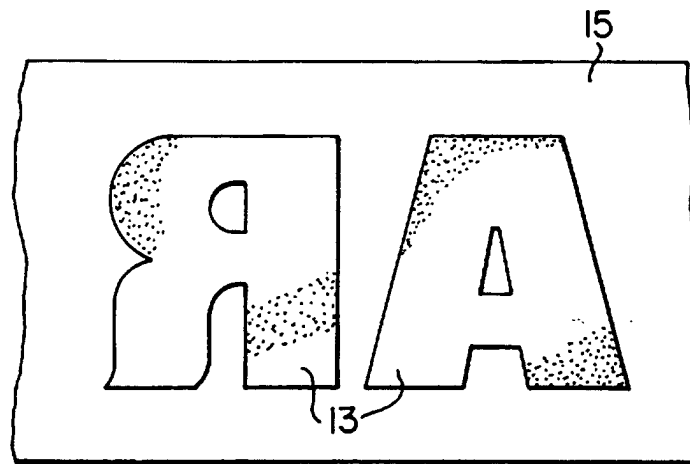


FIG. 8

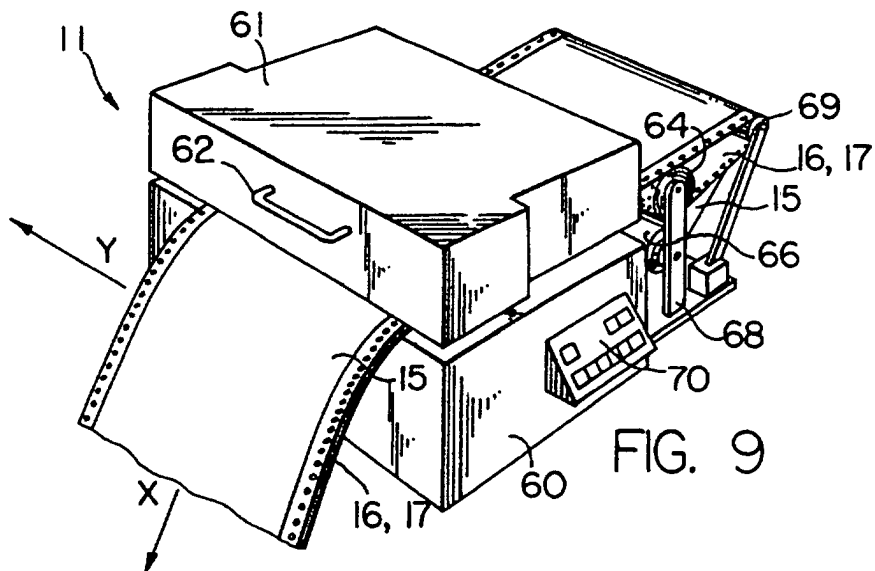


FIG. 9

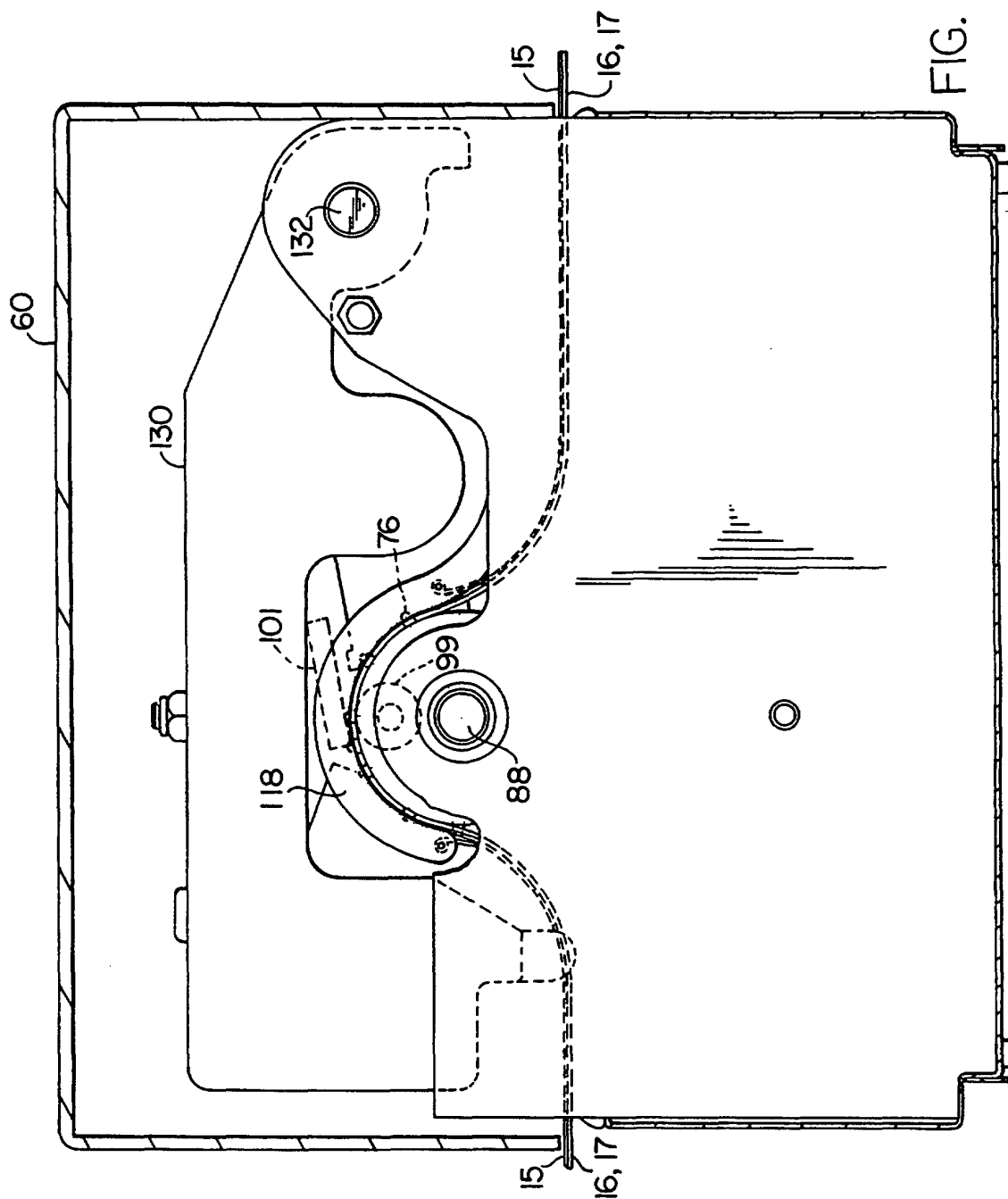
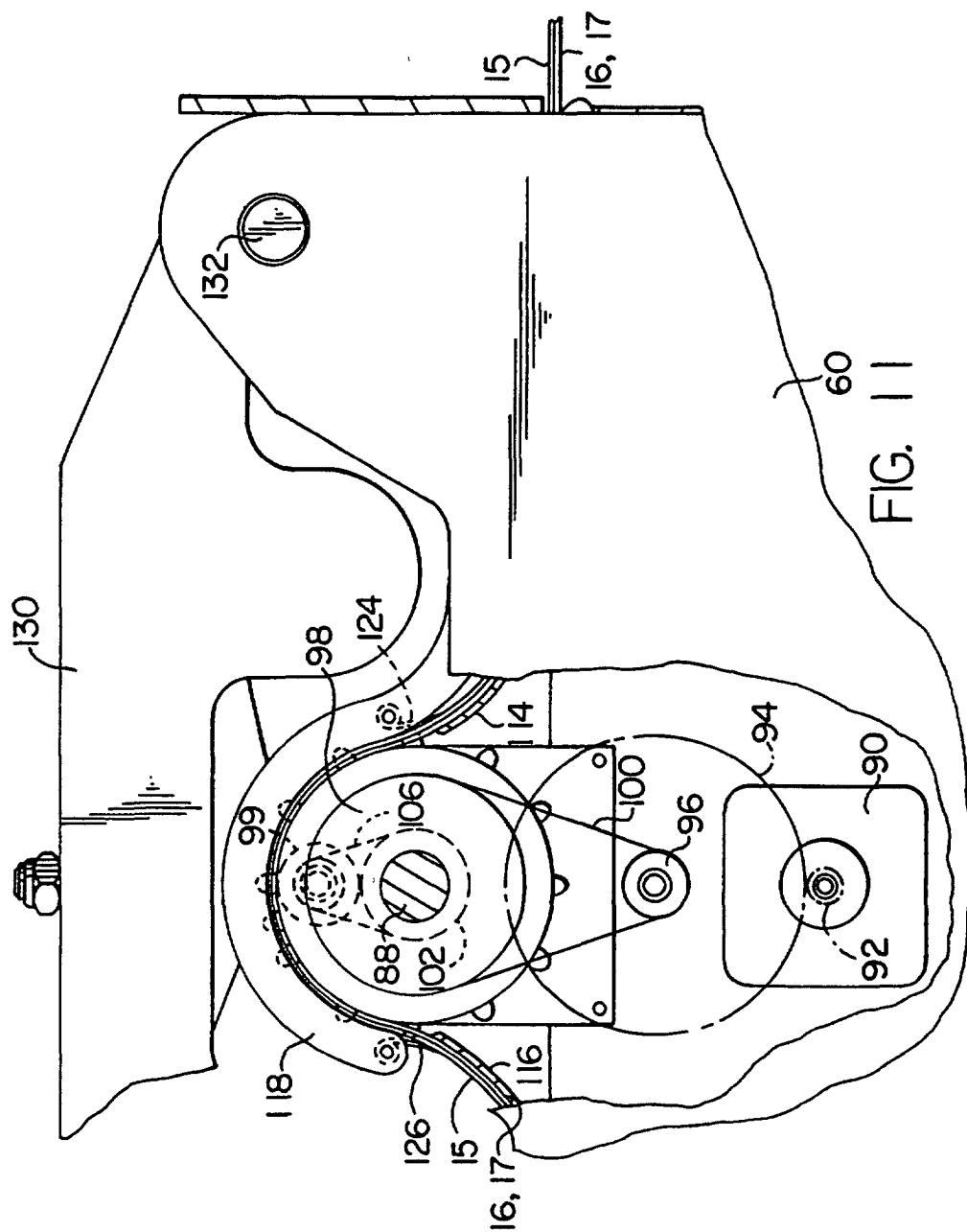
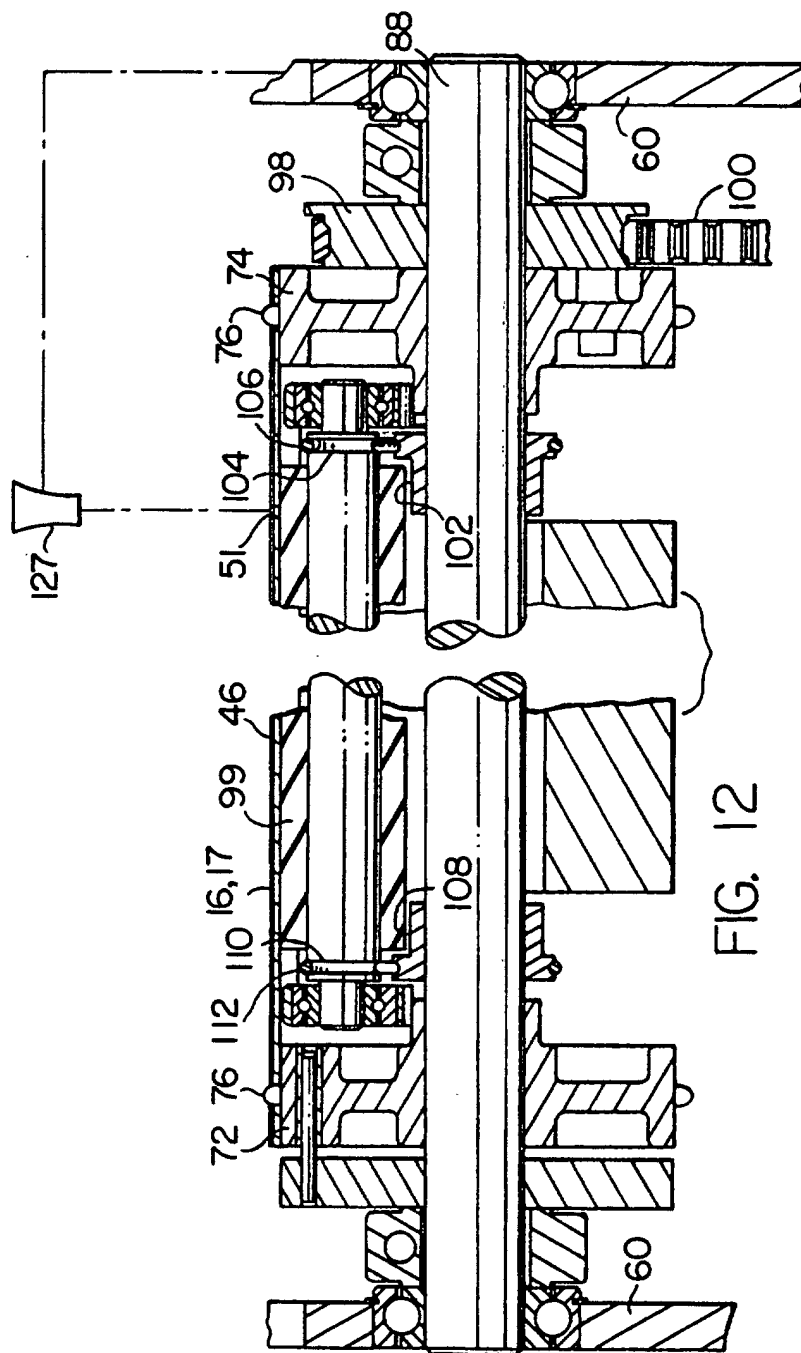


FIG. 10





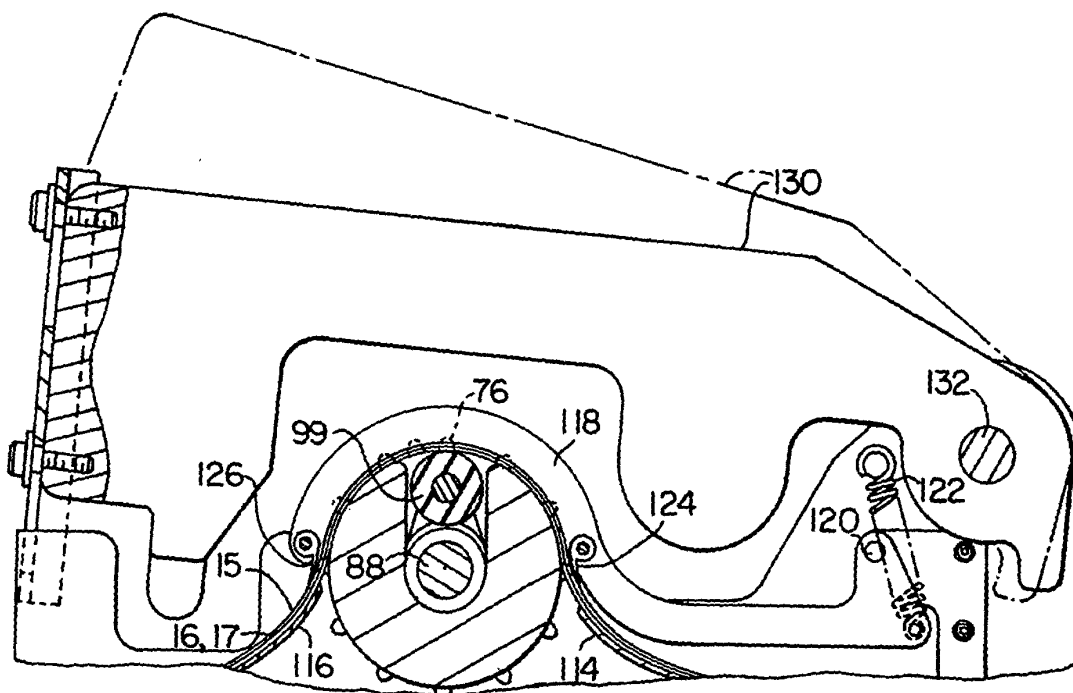


FIG. 13

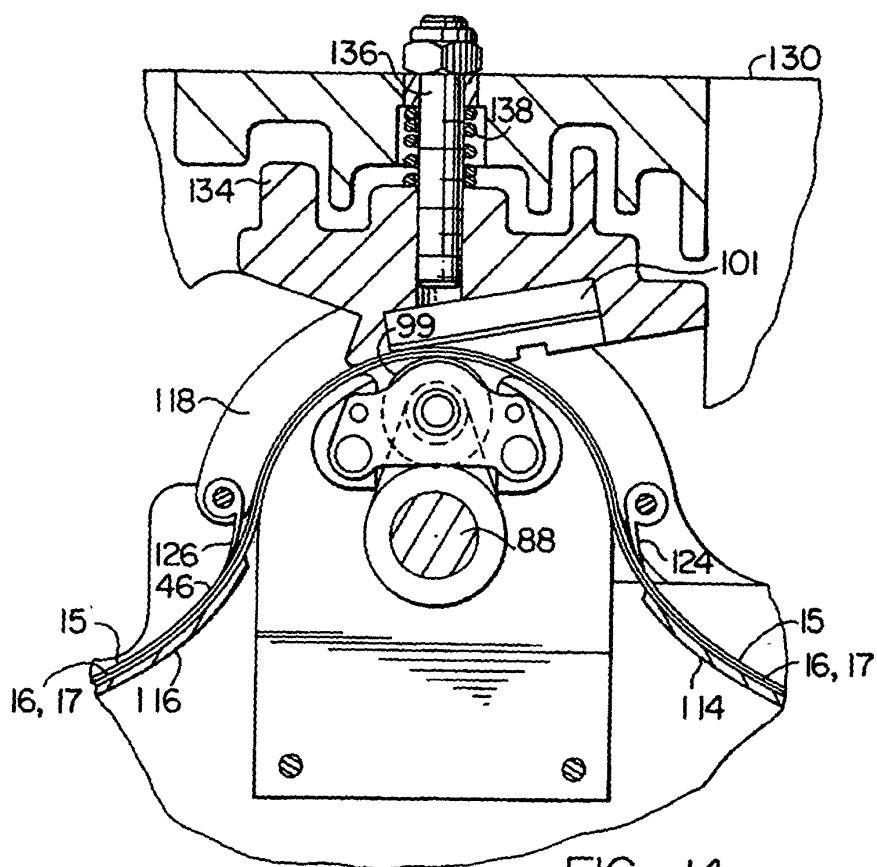


FIG. 14

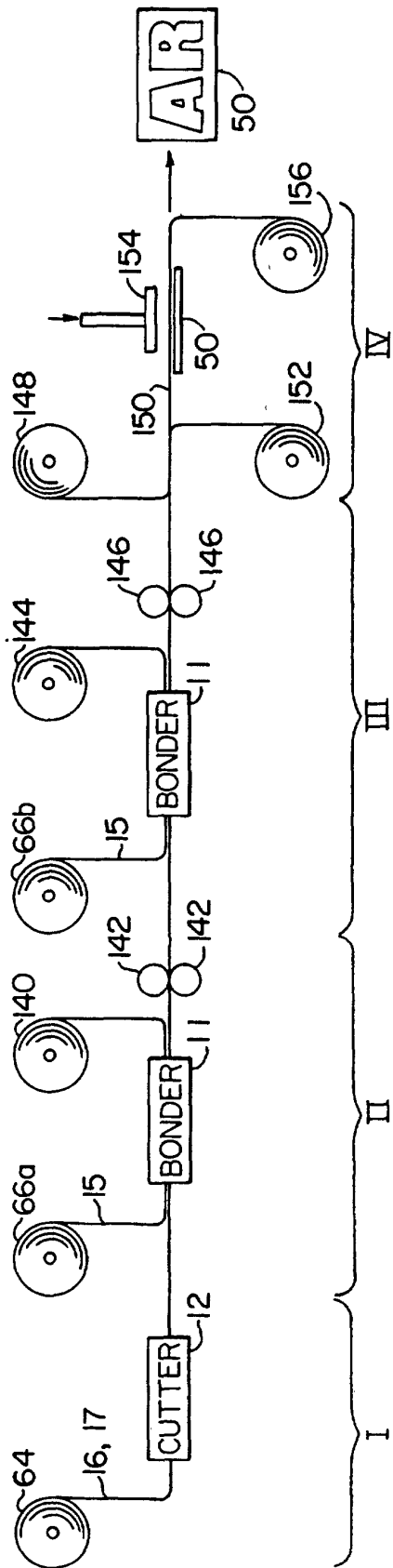


FIG. 15

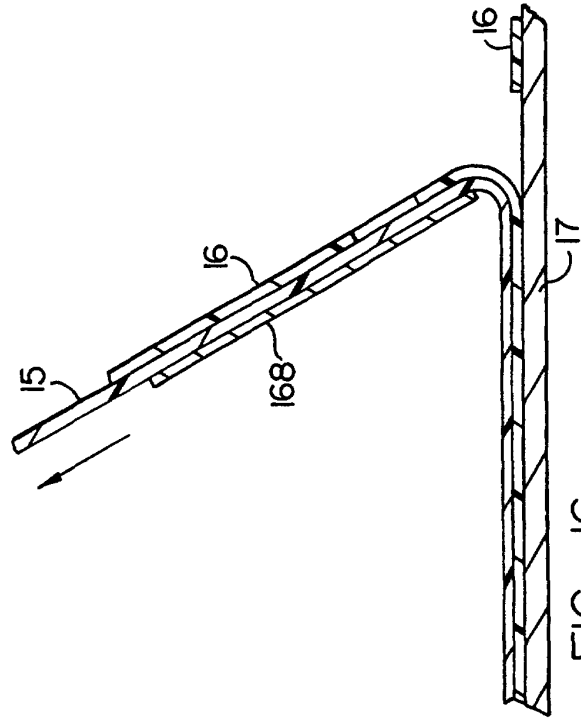


FIG. 16