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(54) Pad, tape and forming methods

(57) A method for forming pads of sheets which includes providing a digital electronic printing mechanism (11) capable of printing infinitely variable indicia along a length of sheet material (12) passed through the printing mechanism in response to a series of digital electronic signals to the printing mechanism; coating a side surface of a length of sheet material with pressure sensitive adhesive (14); passing the length of sheet material through the printing mechanism (11) while sending a series of digital electronic signals to the printing mechanism so that the printing mechanism will print various indicia (16) along the length of the length of sheet material, with at least portions of the indicia being varied in a non repetitive pattern along the length of sheet material; and converting the coated and printed length of sheet material into a plurality of pads (10) with portions of the coating of repositionable pressure sensitive adhesive on the sheets releasably ahdering the sheets together in the pads, or a master pad (24) from which such pads (10) can be cut, or a plurality of rolls of tape (60) each comprising an elongate strip cut from the length of sheet material and having a coating of pressure sensitive adhesive on a first surface by which the wraps of the printed elongate strip in the roll of tape are releasably adhered together and with the elongate strip in the roll having indicia (64) with at least portions of the indicia varying in a non repetitive pattern along its length.

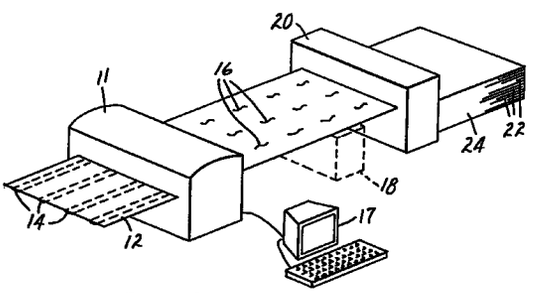

FIG. 1

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Description

Technical Field

The present invention relates to sheets or strips having coatings of repositionable pressure sensitive adhesive that releasably adhere the sheets together in the pad or the strips in a roll, which sheets or strips have indicia on one major surface; to master stacks from which pads are cut; and to methods for forming such master stacks, pads or rolls.

Background Art

Pads of sheets are known in which the sheets have coatings of repositionable pressure sensitive adhesive on one major surface that releasably adhere the sheets together in the pad, and the sheets have indicia on their major surfaces opposite the coatings of adhesive that may include, for example, graphics, pictures, designs, or alpha numeric information including printed words or numbers. One conventional method that has been used for making such pads includes the steps of (1) providing a printing press capable of printing indicia along a web or length of sheet material passed through the press utilizing printing plates mounted on the press; (2) passing a web or length of sheet material having a coating of repositionable pressure sensitive adhesive along a first side surface through the printing press to print the side surface of the length of sheet material opposite the coating of repositionable pressure sensitive adhesive with the indicia; and (3) converting the printed web or length of sheet material into a plurality of pads with portions of the coating of repositionable pressure sensitive adhesive on the sheets releasably adhering the sheets together in the pads and with the sheets in the pad having indicia on the various sheets in the pad. The converting step in this method is typically performed by (1) cutting the printed length of sheet material into parts of a predetermined size; (2) stacking the parts together to form a master stack; and (3) cutting the master stack into portions to form the plurality of pads.

Pads have been made using the method described above in which the coating of repositionable pressure sensitive adhesive on each of the sheets is in a band on one of its major surfaces adjacent one of its edges with the sheet being free of adhesive on that major surface adjacent its opposite edge, and the sheets are stacked either (1) with the adhesive coating on each successive sheet in the pad being disposed along alternate opposite sides of the pad, or (2) with the bands of adhesive coating on the sheets in the stack disposed along the same side of the pad.

Disclosure of Invention

The present invention provides a pad comprising a plurality of sheets of the types described above which have indicia on their major surfaces, or a master stack from which such pads can be cut, or rolled strips having indicia on their major surfaces, at least portions of which indicia on each master stack, pad or rolled strip varies in a non repetitive pattern on the various sheets in the pad or master stack or along the strips; and a simple and highly versatile method for forming such pads, master stacks and rolls.

The method for forming such pads, master stacks or rolls according to the present invention includes the steps of (1) providing a digital electronic printing mechanism capable of printing infinitely variable indicia along a web or length of sheet material passed through the printing mechanism in response to a series of digital electronic signals to the printing mechanism; (2) coating a first side surface of a web or length of sheet material with pressure sensitive adhesive; (3) passing the length of sheet material through the printing mechanism while sending a series of digital electronic signals to the printing mechanism so that the printing mechanism will print various indicia on either or both of the side surfaces of the length of sheet material, with at least portions of the indicia being varied in a non repetitive pattern along the length of sheet material; and (4) converting the coated and printed length of sheet material either (a) into a plurality of the pads with portions of the coating of repositionable pressure sensitive adhesive on the sheets releasably adhering the sheets together in the pads, or (b) into a plurality of rolls of tape each comprising an elongate strip cut from the length of sheet material having a coating of pressure sensitive adhesive by which the wraps of the printed elongate strip in the roll of tape are releasably adhered together. That converting step to make the pads can be done by cutting the printed length of sheet material into parts of a predetermined size; stacking the parts together to form a master stack; and cutting the master stack into portions to form the plurality of pads.

Such a method provides several significant advantages over prior art methods. It allows the easy manufacture of pads in which at least a portion of the indicia on some sheets in the pad is different from the indicia on other sheets in the pad which, for example, would allow certain sheets in the pads to be calendars for different months or weeks or days, and could provide different massages or blank sheets between such calendar sheets, or would allow different sheets to bear a different pictures (e.g., sequential cartoons or sequential pictures or other images that are sufficiently different to provide the illusion of motion by sequentially bending back and releasing portions of the sheets on which the pictures are printed, which cartoons, pictures or images could be all at one location or change locations on the sheet to provide, for example, the illusion of a person walking across the sheet) or different messages which may be in an infinite variety of different type sizes, styles, weights or widths, such as different sayings or religious messages (i.e., different Bible quotations or

prayers), or different advertisements for different ones of a manufacturers products which may include different logos or other corporate or commercial marks such as brand names or trademarks. Also, it allows the relatively inexpensive manufacture of pads with customized indicia in limited quantities, which limited quantities, if printed on a conventional printing press requiring printing plates, would be significantly more expensive because of the labor and materials (i.e., negatives and plates) need to make the printing plates, and the need for stopping the press to change the plates and thereby the images that will be printed between press runs.

Brief Description of Drawing

The present invention will be further described with reference to the accompanying drawing wherein like reference numerals refer to like parts in the several views, and wherein:

Figure 1 and 2 are schematic views illustrating a first embodiment of a method according to the present invention for forming a pad;
Figure 3 is a perspective view illustrating a first embodiment of a pad according to the present invention made by the method of Figure 1 and 2;
Figure 4 is a perspective view illustrating a second embodiment of a pad according to the present invention;
Figure 5 is a schematic view illustrating a second embodiment of a method according to the present invention that can be used for forming the pad illustrated in Figure 4;
Figure 6 is an enlarged fragmentary sectional view taken approximately along line 6-6 of Figure 5;
Figures 7 and 8 are schematic views illustrating a third embodiment of a method according to the present invention for forming a roll of material; and
Figure 9 is a schematic view illustrating a fourth embodiment of a method according to the present invention for forming both a pad and a roll of material according to the present invention.

Detailed Description

Referring now to Figures 1 and 2 of the drawing, there is schematically illustrated a method according to the present invention for forming pads 10 of sheets of the type illustrated in Figure 3. Generally that method comprises the steps of (1) providing a digital electronic printing press or mechanism 11 capable of printing infinitely variable indicia on one or both sides along a length of sheet material passed through the printing mechanism 11 in response to a series of digital electronic signals sent to the printing mechanism 11; (2) coating a first side surface of a web or length 12 of sheet material (e.g., paper or polymeric film) with a coating 14 of pressure sensitive adhesive; (3) passing the length 12 of sheet material through the printing mechanism 11 while sending a series of digital electronic signals to the printing mechanism 11 so that the printing mechanism 11 will print various indicia 16 on one or both side surfaces of the length 12 of sheet material, with at least portions of the indicia 16 being varied in a non repetitive pattern along the length 12 of the sheet material; and (3) converting the coated and printed length 12 of sheet material into a plurality of the pads 10 each comprising a plurality of sheets with portions 26 of the coating 14 of pressure sensitive adhesive on the sheets releasably adhering the sheets together in the pads 10.

The first side surface of the web or length 12 of sheet material could be coated with the coating 14 of repositionable pressure sensitive adhesive either totally or in a predetermined pattern (e.g., in strips as illustrated) before it is printed using an adhesive coating mechanism (not shown) such as a hot melt coater for pressure sensitive adhesive of the type sold by Mercer Corporation, Hendersonville, TN; a slot coater for U.V. curable pressure sensitive adhesives, or a rotogravure printing system for applying pressure sensitive adhesives. Alternatively, the first side surface of the web or length 12 of sheet material could be coated either totally or in a predetermined pattern with either repositionable or permanent pressure sensitive adhesive after it is printed by the printing mechanism and before it is converted using one of the afore mentioned types of adhesive coating mechanisms positioned as indicated by the dotted outline 18.

As illustrated in Figures 1 and 2, the converting step comprises the steps of (a) sequentially cutting the coated and printed length 12 of sheet material into parts 22 of the same predetermined size; (b) stacking the parts 22 together to form a master stack 24, which cutting and stacking steps are done using a cutting and stacking mechanism 20 of the type described in U.S. Patent No. 4,102,253 incorporated herein by reference that is schematically illustrated in Figure 1); and (c) cutting the master stack 24 into portions with a conventional guillotine cutter 23 (Figure 2) to form the plurality of pads 10.

The digital electronic printing press or mechanism 11 used in the method illustrated in Figures 1 and 2 could be any one of a number of commercially available printing mechanisms including the electrographic "ElectroPress" digital electronic printing press, sold by Advanced Imaging Products, a business unit of AM Graphics, AM International, Inc., Dayton, Ohio; the 3500 "Ink-jet High Speed Printing System" sold by Eastman Kodak, Dayton, Ohio; the "Presidax Ion-deposition" printing mechanism sold by Delphax Systems, Inc., Canton, Massachusetts; or the "Magnetographic Varypress" printing mechanism sold by Bull Printing Systems, Inc., Billerica, Massachusetts. Typically, such printing mechanisms 11 sequentially form the indicia along the surface of the length 12 of sheet material either directly (e.g., as through the use of ink jet printing)

or by initially forming indicia on the surface of a drum within the printing mechanism and then transferring and fixing the indicia along the surface of the length 12 of sheet material. Such printing mechanisms 11 can be operated at normal printing press operating speeds and with significant speed variations to print various indicia 16 on the surface of the length 12 of sheet material corresponding to a series of digital electronic signals generated by a computer 27. The computer 27 can generate the series of digital electronic signals from direct operator input through custom software or any of many commercially available software programs such as "Microsoft Word", "Aldus' PageMaker", or Xerox's Ventura Publisher", or from electronically scanned material, or from stored memory, or a combination of these or similar sources using a EPS or electronic prepress system by which digital electronic signals from different sources (e.g., signals which form a repetitively used portion of the indicia and signals that form a changing portion of the indicia) are combined electronically to provide the digital electronic signals from which the indicia 16 are sequentially printed along the length 12 of sheet material. The use of such digital electronic signals to control such a printing mechanism 11 allows the operator of the system to easily prepare and/or change the content or arrangement or positioning of the indicia to be printed on the length 12 of sheet material moving through the printing mechanism 11, even without stopping the printing mechanism 11.

If the printing mechanism 11 used is capable of printing only on the side of the web or length 12 of sheet material opposite the coating 14 of pressure sensitive adhesive, the length 12 of sheet material can, if desired, be printed with indicia on its adhesive coated side by providing a second printing mechanism (not shown) along the side of the path for the length 12 of sheet material opposite the printing mechanism 11, which second printing mechanism might or might not be a digital electronic printing mechanism and could apply printing on the side of the length 12 of sheet material on which the adhesive is coated either over the adhesive coating 14, or, if the coating of adhesive is applied from the location 18, before the adhesive coating is applied so that at least portions of the printing may be seen through the adhesive coating.

As an example, the method illustrated in Figures 1 and 2 can be used to make the pad 10 illustrated in Figure 3 which comprises a plurality of sheets 25 that are parts of the length 12 of sheet material and each have a coating 26 of pressure sensitive adhesive (e.g., either repositionable or permanent Pressure sensitive adhesive, which coating 26 is a part of one of one of the strips in the coating of pressure sensitive adhesive 14 illustrated in Figure 1) on one of its major surfaces with the coatings 26 of repositionable pressure sensitive adhesive on the sheets 25 releasably adhering together the sheets 25 in the pad 10 and the sheets 25 in the pad 10 having the indicia 16 on their major surfaces opposite the coatings 26 of repositionable pressure sensitive adhesive with at least portions of the indicia 16 varying in a non repetitive pattern on the various sheets 25 in the pad 10.

As illustrated in Figure 3, the indicia 16 on the sheets 25 include (1) repetitive portions in the form of a company name or logo 27 that is printed the same and in the same location centered along the top portion of each sheet 26, (2) a first variable portion providing a calendar 28 in which the days of each successive month and the name of each successive month is printed in sequence on the successive sheets 26 in the pad 10, and (3) a second variable portion centered along the bottom portion of each sheet which on each sheet is a printed name and picture or illustration 29 of a different product sold by the company named by the company name 27 at the top center of the sheet 26. To form a pad 10 in the form of such a customized calendar for a customer, an operator of the computer 27 that generates the series of digital electronic signals for the printing mechanism 11 can, for example, supply the company name 27 using a data entry program, or a word processing program or from a data base file; provide the sequential calendars 28 from pre-prepared stored memory in the computer 27 or in a compatible magnetic or optical storage media; supply the names 29 of the products from data and/or text files generated by data bases and/or word processing programs; and supply the pictures 29 of the products to the system from image files created by image generating software, scanning of photographic images, illustration/drawing programs, files of digitized images, or from a computer aided design system (e.g., "CAD/CAM").

In the pad 10 illustrated in Figure 3, the coating 26 of pressure sensitive adhesive on each of the sheets 26 is in a band on one major surface adjacent one edge of the sheet 26 with the sheet 26 being free of adhesive on a major portion of that major surface adjacent its opposite edge, and the sheets 26 are stacked with the bands of pressure sensitive adhesive coating on the sheets 26 in the stack 24 disposed along the same side of the pad 10. Pads 10 of this type can be made by the method illustrated in Figures 1 and 2 by providing the coating 14 of pressure sensitive adhesive on the length 12 of sheet material as illustrated in transversely spaced longitudinally extending strips, parts of which strips are registered to provide the adhesive pattern described for the sheets 25 when the pads 10 are formed. If the adhesive used is permanent pressure sensitive adhesive, it may also be necessary to print coatings of a suitable release material on at least the portions of the sheets 26 contacted by the coatings 14 of pressure sensitive adhesive in the pad 10.

An alternative form of a pad 30 of sheets 32 that can be made by the method according to the present invention is illustrated in Figure 4, which pad bears the types of indicia 27, 28 and 29 described above. In the pad 30, a coating 31 of pressure sensitive adhesive

(which could be repositionable or permanent) on each of the sheets 32 is in a band on one major surface adjacent one edge of the sheet 32 with the sheet 32 being free of adhesive on that major surface adjacent its opposite edge, and the sheets 32 are stacked with the adhesive coating on each successive sheet 32 in the pad 30 being disposed along alternate opposite sides of the pad 30 and releasably adhering the major surfaces of the adjacent sheets 32 in the pad 30 together to maintain the sheets 32 in the pad 30. If the adhesive used is permanent pressure sensitive adhesive, it may also be necessary to print coatings of suitable release material on the portions of the sheets 32 contacted by the coatings 31 of pressure sensitive adhesive. The pad 30 provides the advantage that the sheets 32 from the pad 30 are easily dispensable from dispensers of the type illustrated in U.S. Patent No. 4,921,127.

The method for making the pad 30, which is similar to the method illustrated in Figures 1 and 2, is illustrated in Figure 5. That method comprises the steps of (1) providing two electronically operated printing mechanisms or printing presses 40 and 41 each of which could be of the type described above with reference to the printing mechanism 11 and is capable of printing infinitely variable indicia on one or both major surfaces along a length of sheet material passed through the printing mechanism 40 or 41 in response to a series of digital electronic signals sent to the printing mechanism 40 or 41; (2) passing two lengths 42 and 43 of sheet material (e.g., paper or polymeric material) having coatings 44 and 45 of pressure sensitive adhesive along a first side surface through the printing mechanisms 40 or 41 while sending a series of electronic signals from a computer 48 to each of the printing mechanisms 40 and 41 so that each printing mechanism 40 and 41 will print various indicia 46 on the side surface of the length 42 or 43 of the sheet material passing through it, with at least portions of the indicia 46 being varied in a non repetitive pattern along the lengths 42 and 43 of sheet material; and (3) converting the printed lengths 42 and 43 of sheet material into a plurality of the pads 30 each comprising a plurality of the sheets 32 with portions 31 of the coating 14 of repositionable pressure sensitive adhesive on the lengths 42 and 43 of sheet material adhering the sheets 32 together in the pads 30.

The converting step comprises the steps of (1) sequentially cutting parts 52 and 54 from the ends of the printed lengths 42 and 43 of sheet material that are of the same predetermined size; (2) stacking the parts 52 and 54 together with each of the parts 52 between two of the parts 54 and each of the parts 54 between two of the parts 52 to form a master stack 44, which cutting and stacking steps are done using a cutting and stacking mechanism 56 of the type described in U.S. Patent No. 4,102,253 that is schematically illustrated in Figure 5; and (3) cutting the master stack 44 into portions using a conventional guillotine cutter (not shown, but essentially the same as the cutter illustrated in Figure 2) to form the plurality of pads 30. In the method illustrated in Figure 5, the coatings 44 and 45 of pressure sensitive adhesive on both of the lengths 42 and 43 of sheet material are in longitudinally extending spaced strips of the pressure sensitive adhesive. Those spaced strips are registered or positioned with respect to each other as is illustrated in Figure 6 which shows two of the parts 42 and two of the parts 44 in the stack 44 to provide the adhesive pattern described above for the sheets in the pads 30 when the pads 30 are formed by cutting the stack 44 generally along the dotted lines 58 illustrated in Figure 6.

In the method as illustrated in Figure 5 the coatings 44 and 45 are of repositionable pressure sensitive adhesive and are applied to the lengths 42 and 43 of sheet material before they are printed by the printers 40 and 41. Alternatively, the coatings 44 and 45 of pressure sensitive adhesive could be repositionable or permanent and could be applied to the lengths 42 and 43 of sheet material after they are printed by the printers 40 and 41 and before they are converted by placing adhesive coating devices along the paths for the lengths 42 and 43 of sheet material after the printers 40 and 41. Also, if the printing mechanisms 40 and 41 used are capable of printing only on the sides of the webs or lengths 42 and 43 of sheet material opposite the coatings 44 and 45 of pressure sensitive adhesive, the lengths 42 and 43 of sheet material could, if desired, be printed with indicia on their adhesive coated sides by providing third and fourth printing mechanisms (not shown) along the sides of the paths for the lengths 42 and 43 of sheet material opposite the printing mechanisms 40 and 41 respectively, which printing mechanisms might or might not be digital electronic printing mechanisms and could apply printing on the sides of the lengths 42 and 43 of sheet material on which the adhesive is coated either over the coatings 44 and 45 of adhesive, or, if the coatings of adhesive are applied after the printing mechanisms 40 and 41, before the adhesive coatings are applied so that at least portions of the printing may be seen through the coatings of adhesive.

As is illustrated in Figures 7 and 8, the method according to the present invention can also be adapted for forming helically wound rolls 60 of tape. In that adaptation, the method includes the steps of (1) providing a digital electronic printing mechanism 61 capable of printing infinitely variable indicia along a web or length of sheet material passed through the printing mechanism 61 in response to a series of digital electronic signals sent to the printing mechanism 61; (2) coating a first side surface of a web or length 62 of sheet material with a coating 63 of pressure sensitive adhesive; (3) passing the length 62 of sheet material through the printing mechanism 61 while using a computer 65 to send a series of digital electronic signals to the printing mechanism 61 so that the printing mechanism 61 will print various indicia 64 on one or both side surfaces of

the length 62 of sheet material, with at least portions of the indicia 64 being varied in a non repetitive pattern along the length 62 of sheet material; and (4) converting the coated and printed length 62 of sheet material into a plurality of rolls of tape 60 of the type illustrated in Figure 8, each of which rolls of tape 60 comprises an elongate strip 68 cut from the length 62 of sheet material and has a coating 66 of pressure sensitive adhesive on a first surface by which the wraps of the printed elongate strip 68 in the rolls 60 of tape are releasably adhered together and with the printed elongate strip 68 in the roll 60 having indicia with at least portions of the indicia varying in a non repetitive pattern along its length. That conversion step, as is illustrated in Figures 7 and 8 comprises the steps of (1) rolling the printed length 62 of sheet material into a jumbo roll 63 as is illustrated in Figure 7; (2) unrolling the printed length 62 of sheet material from the jumbo roll 63 as is illustrated in Figure 8, which typically is done at a separate location; (3) slitting the unrolled printed length 62 of sheet material into the elongate strips 68; and (4) rolling the elongate strips 68 into the rolls 60. Alternatively, the step of rolling the printed length 62 of sheet material into a jumbo roll 63 as is illustrated in Figure 7 and unrolling the printed length 62 of sheet material from the jumbo roll 63 as is illustrated in Figure 8 could be eliminated, and the slitting and rolling steps could be done on the same production line that includes the printing mechanism 61.

As illustrated, one major surface of the length 12 of sheet material is totally coated with a coating of repositionable pressure sensitive adhesive before it is printed, however, alternatively the length 12 of sheet material could be coated with pressure sensitive adhesive (which could be repositionable or permanent) after it is printed and before it is converted by placing an adhesive coating device along the path for the length 12 of sheet material after the printing mechanism 61, or by adhesive coating the printed length 12 of sheet material at a separate location. Also, the length of sheet material could be printed with indicia on both sides by providing a second printing mechanism 70 (shown in dotted outline) along the side of the path for the length 12 of sheet material opposite the printing mechanism 61 which might or might not be a digital electronic printing mechanism, which printing on the on which the adhesive is coated could be done over the adhesive coating, or could be done before the adhesive coating is applied so that at least a portion of the printing may be seen through the coating of adhesive.

Referring now to Figure 9 there is illustrated a fourth embodiment of a method according to the present invention that can be used to form both pads similar to the pads 10 described above and rolls of material similar to the rolls of material 60 described above, which method is essentially a combination of the methods described above with reference to Figures 1, 2, 7 and 8. Generally, the method illustrated in Figure 9 includes the steps of (1) providing a digital electronic printing mechanism 81 capable of printing infinitely variable indicia along a web or length of sheet material passed through the printing mechanism 81 in response to a series of digital electronic signals sent to the printing mechanism 81; (2) coating a first side surface of a web or length 82 of sheet material with a coating 83 of pressure sensitive adhesive; (3) passing the length 82 of sheet material through the printing mechanism 81 while using a computer 85 to send a series of digital electronic signals to the printing mechanism 81 so that the printing mechanism 81 will print various indicia 84 on one or both side surfaces of the length 82 of sheet material, with at least portions of the indicia 84 being varied in a non repetitive pattern along the length 82 of sheet material; converting a first longitudinally extending side portion 87 of the coated and printed length 82 of sheet material into a plurality of pads with portions of the coating 83 of repositionable pressure sensitive adhesive on the sheets releasably adhering the sheets together in the pads; and converting a second or the other elongate side portion 88 of the coated and printed length 82 of sheet material into a plurality of rolls of tape similar to the rolls 70 each comprising an elongate strip cut from the length 82 of sheet material and having a coating of pressure sensitive adhesive on a first surface by which the wraps of the printed elongate strips in the rolls of tape are releasably adhered together and with the elongate strips in the rolls having indicia with at least portions of the indicia varying in a non repetitive pattern along their length.

The converting step for converting the coated and printed first side portion 87 of the length 82 of sheet material into pads comprises the steps of (a) sequentially cutting the first side portion 87 into parts 92 of the same predetermined size; (b) stacking the parts 92 together to form a master stack 94 (which cutting and stacking steps are done using a cutting and stacking mechanism 90 of the type described in U.S. Patent No. 4,102,253 that is schematically illustrated in Figure 9); and (c) cutting the master stack 94 into portions with a conventional guillotine cutter to form the plurality of pads in the manner the master stack described above was cut using the cutter 23 illustrated in Figure 2.

The converting step for converting the coated and printed second side portion 88 of the length 82 of sheet material into rolls comprises the steps of (1) rolling the printed second side portion 88 into a jumbo roll 93; (2) unrolling the printed second side portion 88 of sheet material from the jumbo roll 93; (3) slitting the unrolled printed second side portion 88 into the elongate strips; and (4) rolling the elongate strips into the rolls in the same manner the jumbo roll 63 is unrolled, slit and the resulting strips rolled as was described above with reference to Figure 8. Alternatively, the steps of rolling and unrolling the printed side portion could be eliminated, and the slitting step and the step of rolling the strips could be done on the same production line that includes

the printing mechanism 81.

As illustrated, one major surface of the length 82 of sheet material is coated in strips along the side portion and is totally coated along the side portion with repositionable pressure sensitive adhesive before it is printed, however, alternatively the length 82 of sheet material could be coated with pressure sensitive adhesive (which could be repositionable or permanent) after it is printed and before it is converted by placing an adhesive coating device 98 (indicated by a dotted outline) along the path for the length 82 of sheet material after the printing mechanism 81, or by adhesive coating the printed length 82 of sheet material at a separate location. Also, the length of sheet material could be printed with indicia on both sides by providing a second printing mechanism (not shown) along the side of the path for the length 82 of sheet material opposite the printing mechanism 81 which might or might not be a digital electronic printing mechanism, which printing on the on which the adhesive is coated could be done over the adhesive coating, or could be done before the adhesive coating is applied so that at least a portion of the printing may be seen through the coating of adhesive.

The present invention has now been described with reference to several embodiments thereof. It will be apparent to those skilled in the art that many changes can be made in the embodiments described without departing from the scope of the present invention. Thus the scope of the present invention should not be limited to the structures methods described in this application, but only by structures and methods described by the language of the claims and the equivalents of those structures and methods.

Claims

1. A pad comprising a plurality of sheets having opposite major surfaces, each of said sheets having a coating of pressure sensitive adhesive (14) on one of said major surfaces with the coatings of pressure sensitive adhesive (14) on the sheets releasably adhering together the sheets in the pad and the sheets in the pad having indicia (16) on one of said major surfaces with at least portions of the indicia (16) varying in a non repetitive pattern on the various sheets in the pad.

2. A pad according to claim 1 wherein said sheets have opposite edges and said coating of pressure sensitive adhesive (14) on each of the sheets is in a band on said major surface adjacent one of the opposite edges of the sheet with the sheet being free of adhesive on said major surface adjacent the other of said opposite edges, and the sheets are stacked with the adhesive coating on each successive sheet in the pad being disposed along alternate opposite sides of the pad and releasably adhering the major surfaces of the adjacent sheets in the pad together to maintain the sheets in the pad.

3. A pad according to claim 1 wherein said sheets have opposite edges and each of said sheets has a band of pressure sensitive adhesive (14) coated on one of said major surfaces adjacent one of the opposite edges of the sheet and is free of adhesive on said major surface adjacent the other of said opposite edges, and the sheets are stacked with the bands of adhesive coating on the sheets in the stack disposed along the same side of the pad.

4. A master stack comprising a plurality of master sheets having opposite major surfaces, each of said master sheets having coatings of pressure sensitive adhesive (14) on one of said major surfaces with the coatings of repositionable pressure sensitive adhesive (14) on the master sheets releasable adhering together the master sheets in the master stack, each of the master sheets having a plurality of predetermined portions corresponding to and being positioned in alignment with predetermined portions on the other master sheets, with the master stack (24) being adapted to be cut between the predetermined portions of the master sheets to form a plurality of pads, master sheets in the master stack having indicia (16) on one of said major surfaces with at least portions of the indicia (16) varying in a non repetitive pattern on the various master sheets in the master stack.

5. A master stack according to claim 4 wherein said master sheets have opposite first and second edges, each of said predetermined portions has first and second edges parallel to the first and second edges of the master sheet and said coatings of pressure sensitive adhesive (14) on each of the master sheets are in bands parallel to the opposite edges of the sheet with each of the predetermined portions having a portion of one of the bands of adhesive adjacent one of the opposite edges of the predetermined portion and being free of adhesive adjacent the other of the opposite edges of the predetermined portion.

6. A master stack according to claim 5 wherein the bands of adhesive coating on each successive master sheet in the master stack are disposed along alternate opposite sides of the corresponding portions of the master sheets.

7. A master stack according to claim 5 wherein the bands of adhesive coating on each successive master sheet in the master stack are disposed along the same sides of the corresponding portions of the master sheets.

8. A roll of tape comprising an elongate strip of sheet material helically wound in wraps and having a coating of pressure sensitive adhesive on a first surface by which the wraps of the elongate sheet in the roll are releasably adhered together, said elongate strip having indicia on its surface opposite the coating of pressure sensitive adhesive with at least portions of the indicia varying in a non repetitive pattern along the length of the elongate strip.

9. A pad made by a method including the steps of:

providing a printing mechanism (11) capable of printing indicia (16) along a length (12) of sheet material passed through the printing mechanism (11);

coating a side surface of a length (12) of sheet material with pressure sensitive adhesive (14);

passing the length (12) of sheet material through the printing mechanism (11) while the printing mechanism (11) prints indicia (16) along the length of the length (12) of sheet material; and

converting the coated and printed length (12) of sheet material into a plurality of pads (10) with portions (26) of the coating of repositionable pressure sensitive adhesive (14) on the sheets releasably adhering the sheets together in the pads;
wherein said printing mechanism (11) provided in said providing step is a digital electronic printing mechanism (11) capable of printing infinitely variable indicia (16) along a length (12) of sheet material passed through the printing mechanism (11) in response to a series of digital electronic signals to the printing mechanism (11); and during said passing step a series of digital electronic signals are sent to the printing mechanism (11) so that the printing mechanism (11) will print various indicia (16) along the length of the length (12) of sheet material, with at least portions of the indicia (16) being varied in a non repetitive pattern along the length (12) of sheet material,
wherein the pad further comprises a plurality of sheets having opposite major surfaces, each of said sheets having a coating of pressure sensitive adhesive (14) on one of said major surfaces with the coatings of pressure sensitive adhesive (14) on the sheets releasably adhering together the sheets in the pad and the sheets in the pad having indicia (16) on one of said major surfaces with at least portions of the indicia (16) varying in a non repetitive pattern on the various sheets in the pad.

10. A pad according to claim 9 wherein said converting step comprises the steps of:

cutting the printed length (12) of sheet material into parts (22) of a predetermined size;

stacking the parts (22) together to form a master stack (24); and

cutting the master stack (24) into portions to form the plurality of pads (10).

11. A pad according to claim 9 wherein said coating step coats the side surface of the length (12) of sheet material with repositionable pressure sensitive adhesive (14).

12. A pad according to claim 11 wherein said coating step is done prior to said passing step.

13. A pad according to claim 9 wherein said coating step coats the side surface of the length (12) of sheet material with permanent pressure sensitive adhesive (14) and said coating step is done after said passing step.

14. A pad according to claim 9 wherein in said passing step the printing mechanism (11) prints various indicia (16) along both sides of the length (12) of sheet material.

15. A pad according to anyone of claims 9 to 14 wherein said sheets have opposite edges and said coating of pressure sensitive adhesive (14) on each of the sheets is in a band on said major surface adjacent one of the opposite edges of the sheet with the sheet being free of adhesive on said major surface adjacent the other of said opposite edges, and the sheets are stacked with the adhesive coating on each successive sheet in the pad being disposed along alternate opposite sides of the pad and releasably adhering the major surfaces of the adjacent sheets in the pad together to maintain the sheets in the pad.

16. A pad according to anyone of claims 9 to 15 wherein said sheets have opposite edges and each of said sheets has a band of pressure sensitive adhesive (14) coated on one of said major surfaces adjacent one of the opposite edges of the sheet and is free of adhesive on said major surface adjacent the other of said opposite edges, and the sheets are stacked with the bands of adhesive coating on the sheets in the stack disposed along the same side of the pad.

17. A master stack from which pads of sheet may be cut and made by a method including the steps of

providing a printing mechanism (11) capable of printing indicia (16) along a length (12) of sheet material passed through the printing mechanism (11);

coating a side surface of a length (12) of sheet material with pressure sensitive adhesive (14);

passing the length (12) of sheet material through the printing mechanism (11) while the printing mechanism (11) prints indicia (16) along the length of the length (12) of sheet material; and

cutting the printed length (12) of sheet material into parts of a predetermined size; and

stacking the parts together to form a master stack (24) which may be cut into portions to form a plurality of pads;
wherein said printing mechanism (11) provided in said providing step is a digital electronic printing mechanism (11) capable of printing infinitely variable indicia (16) along a length (12) of sheet material passed through the printing mechanism (11) in response to a series of digital electronic signals to the printing mechanism (11); and during said passing step a series of digital electronic signals are sent to the printing mechanism (11) so that the printing mechanism (11) will print various indicia (16) along the length of the length (12) of sheet material; with at least portions of the indicia (16) being varied in a non repetitive pattern along the length (12) of sheet material,
wherein the master stack further comprises a plurality of master sheets having opposite major surfaces, each of said master sheets having coatings of pressure sensitive adhesive (14) on one of said major surfaces with the coatings of repositionable pressure sensitive adhesive (14) on the master sheets releasably adhering together the master sheets in the master stack, each of the master sheets having a plurality of predetermined portions corresponding to and being positioned in alignment with predetermined portions on the other master sheets, with the master stack (24) being adapted to be cut between the predetermined portions of the master sheets to form a plurality of pads, master sheets in the master stack having indicia (16) on one of said major surfaces with at least portions of the indicia (16) varying in a non repetitive pattern on the various master sheets in the master stack.

18. A master stack according to claim 17 wherein said coating step coats the side surface of the length (12) of sheet material with repositionable pressure sensitive adhesive (14).

19. A master stack according to claim 18 wherein said coating step is done prior to said passing step.

20. A master stack according to claim 17 wherein said coating step coats the side surface of the length (12) of sheet material with permanent pressure sensitive adhesive (14) and said coating step is done after said passing step.

21. A master stack according to claim 17 wherein in said passing step the printing mechanism (11) prints various indicia (16) along both sides of the length (12) of sheet material.

22. A master stack according to anyone of claims 17 to 21 wherein said master sheets have opposite first and second edges, each of said predetermined portions has first and second edges parallel to the first and second edges of the master sheet and said coatings of pressure sensitive adhesive (14) on each of the master sheets are in bands parallel to the opposite edges of the sheet with each of the predetermined portions having a portion of one of the bands of adhesive adjacent one of the opposite edges of the predetermined portion and being free of adhesive adjacent the other of the opposite edges of the predetermined portion.

23. A master stack according to anyone of claims 17 to 22 wherein the bands of adhesive coating on each successive master sheet in the master stack are disposed along alternate opposite sides of the corresponding portions of the master sheets.

24. A master stack according to anyone of claims 17 to 23 wherein the bands of adhesive coating on each successive master sheet in the master stack are disposed along the same sides of the corresponding portions of the master sheets.

25. A helically wound roll of tape made by a method including the steps of

providing a printing mechanism (61) capable of printing indicia along a length of sheet material passed through the printing mechanism (61);

coating a side surface of a length (62) of sheet material with pressure sensitive adhesive (63);

passing the length (62) of sheet material through the printing mechanism (61) while the printing mechanism (61) prints indicia along the length of the length (62) of sheet material; and

converting the coated and printed length (62) of sheet material into a plurality of rolls (60) of tape each comprising an elongate strip cut from the length (62) of sheet material and having a coating of pressure sensitive adhesive (63) on a first surface by which the wraps of the printed elongate strip in the roll of tape (60) are releasably adhered together,
wherein said printing mechanism (61) provided in said providing step is a digital electronic printing mechanism (61) capable of printing infinitely variable indicia along a length (62) of sheet material passed through the printing mechanism (61) in response to a series of digital electronic signals to the printing mechanism (61); and during said passing step a series of digital electronic signals are sent to the printing mechanism (61) so that the printing mechanism (61) will print various indicia along the length of the length (62) of sheet material, with at least portions of the indicia being varied in a non repetitive pattern along the length (62) of sheet material so that the elongate strip in the roll has indicia with at least portions of the indicia varying in a non repetitive pattern along its length,
wherein the roll of tape comprises an elongate strip of sheet material helically wound in wraps and having a coating of pressure sensitive adhesive on a first surface by which the wraps of the elongate sheet in the roll are releasably adhered together, said elongate strip having indicia on its surface opposite the coating of pressure sensitive adhesive with at least portions of the indicia varying in a non repetitive pattern along the length of the elongate strip.

26. A helically wound roll of tape according to claim 25 wherein said converting step comprises the steps of

rolling the coated and printed length (62) of sheet material into a jumbo roll;

unrolling the coated and printed length (62) of sheet material from the jumbo roll;

slitting the unrolled coated and printed length (62) of sheet material into a plurality of elongate strips; and

rolling each of the elongate strips into one of the rolls (60) of tape.

27. A helically wound roll of tape according to claim 26 wherein said converting step comprises the steps of

slitting the coated and printed length (62) of sheet material into a plurality of elongate strips; and

rolling each of the elongate strips into one of the rolls (60) of tape.

28. A helically wound roll of tape according to claim 25 wherein said coating step coats the side surface of the length (62) of sheet material with repositionable pressure sensitive adhesive.

29. A helically wound roll of tape according to claim 25 wherein said coating step is done prior to said passing step.

30. A helically wound roll of tape according to claim 25 wherein said coating step coates the side surface of the length (62) of sheet material with permanent pressure sensitive adhesive and said coating step is done after said passing step.

31. A helically wound roll of tape according to claim 25 wherein in said passing step the printing mechanism (61) prints various indicia along both sides of the length (61) of sheet material.

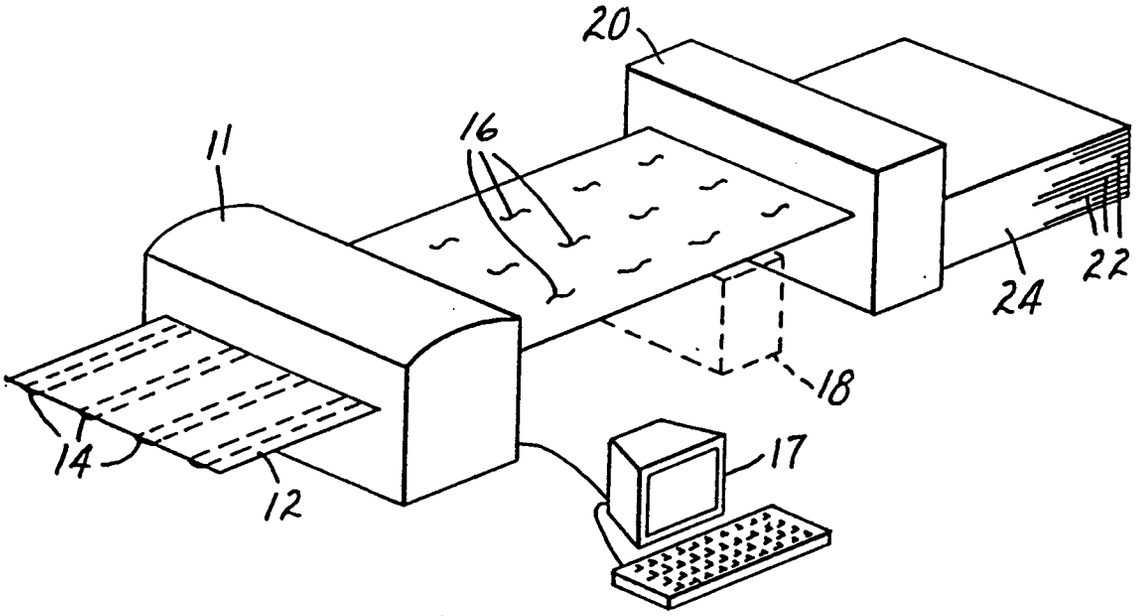

FIG. 1

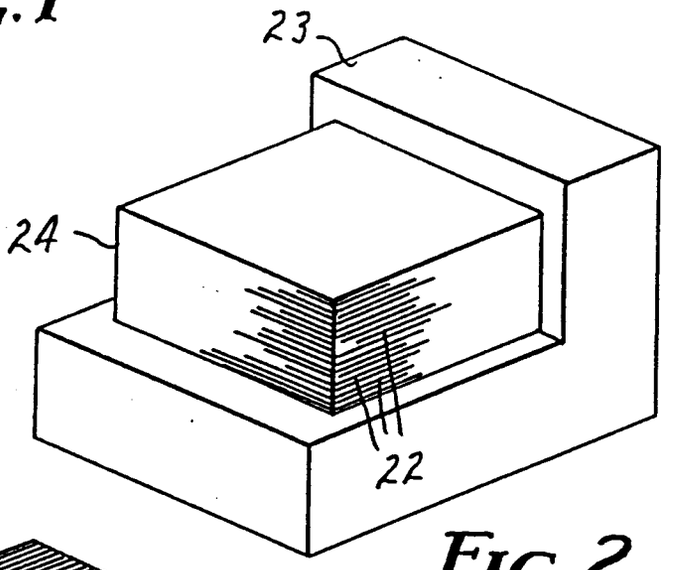

FIG. 2

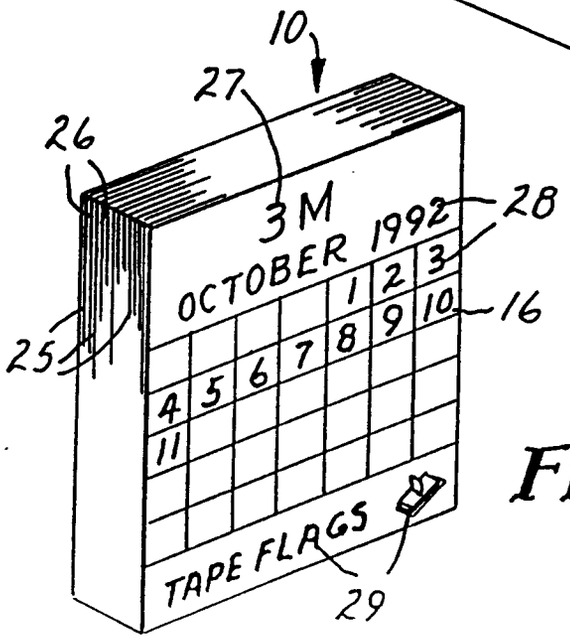

FIG. 3

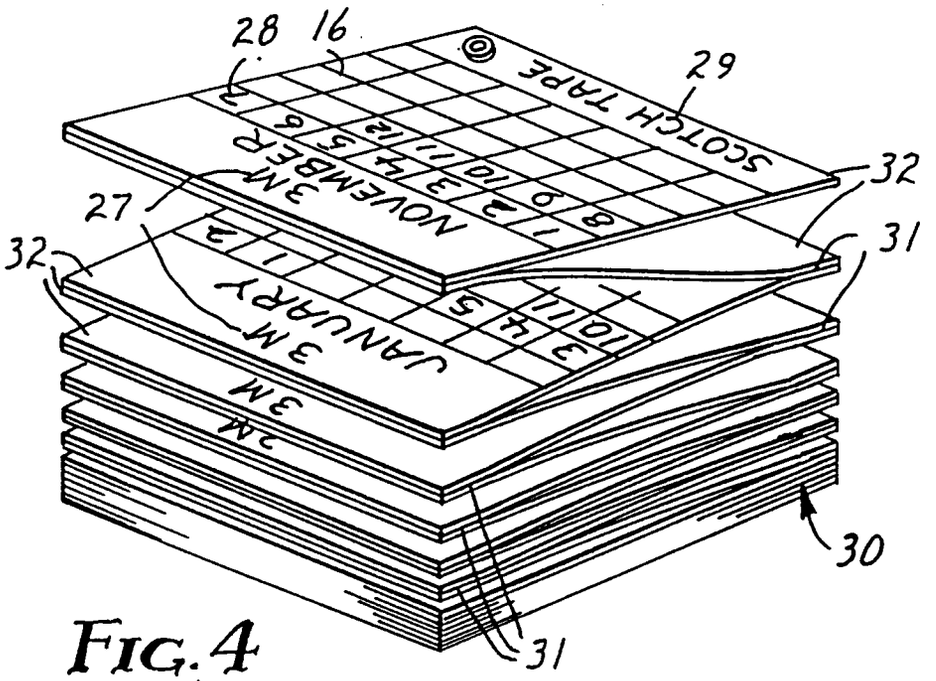

FIG. 4

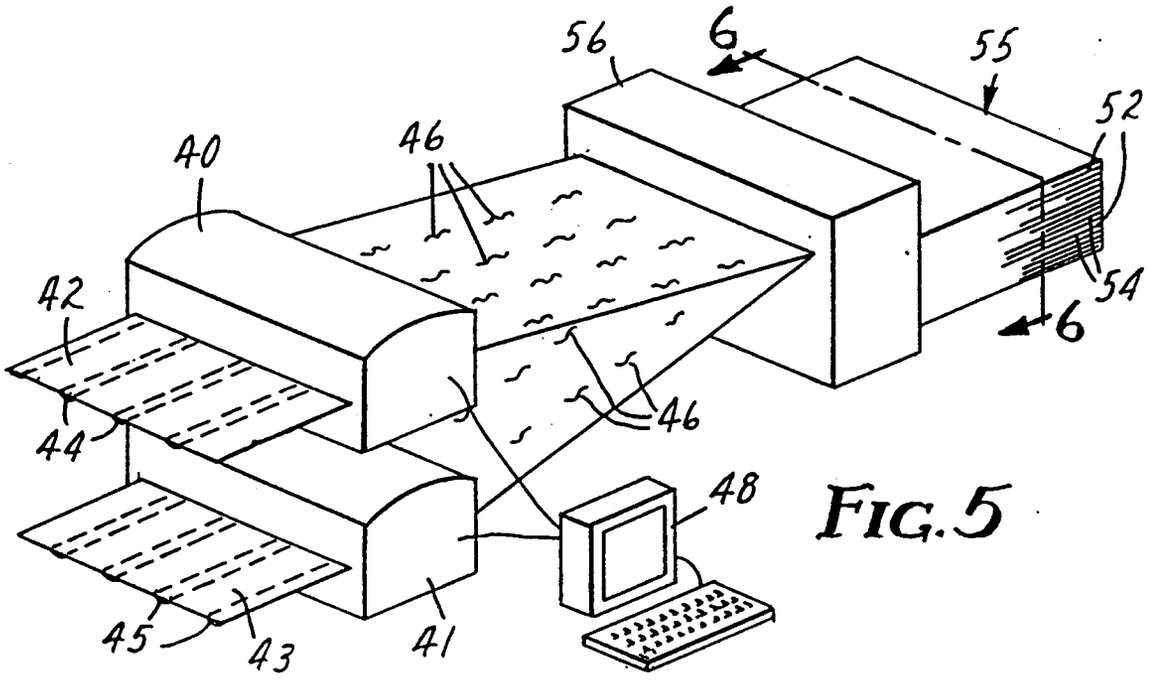

FIG. 5

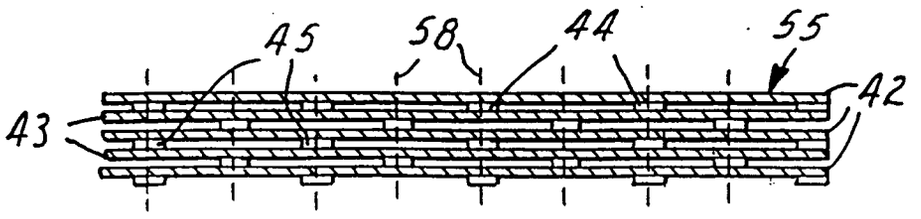

FIG. 6

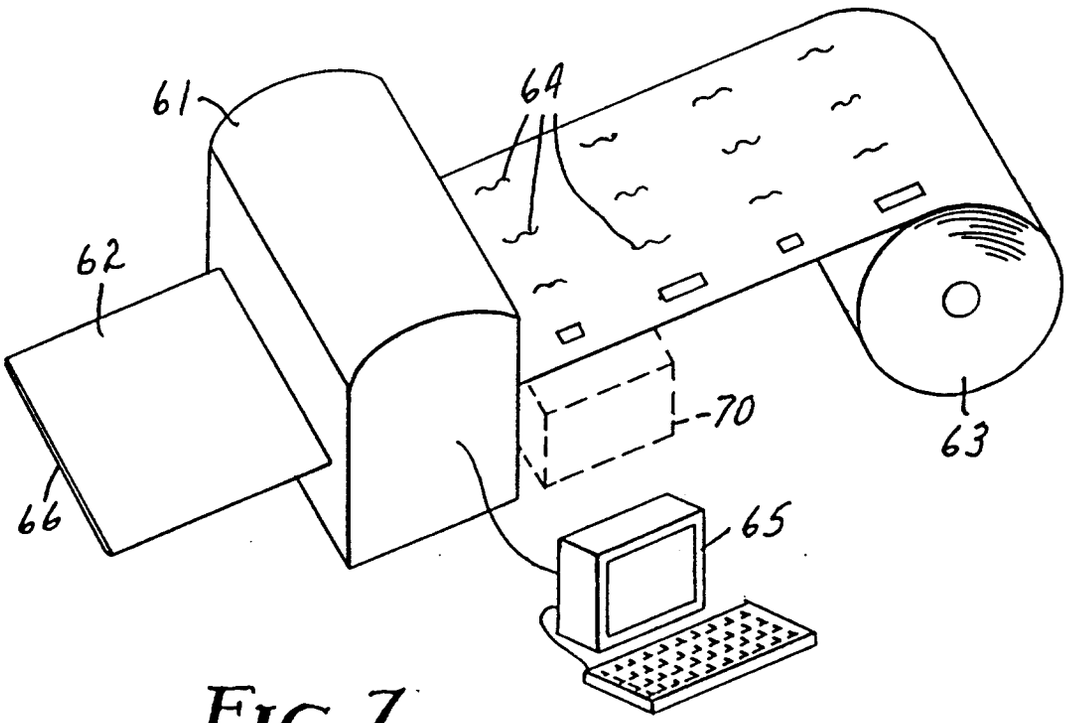

FIG. 7

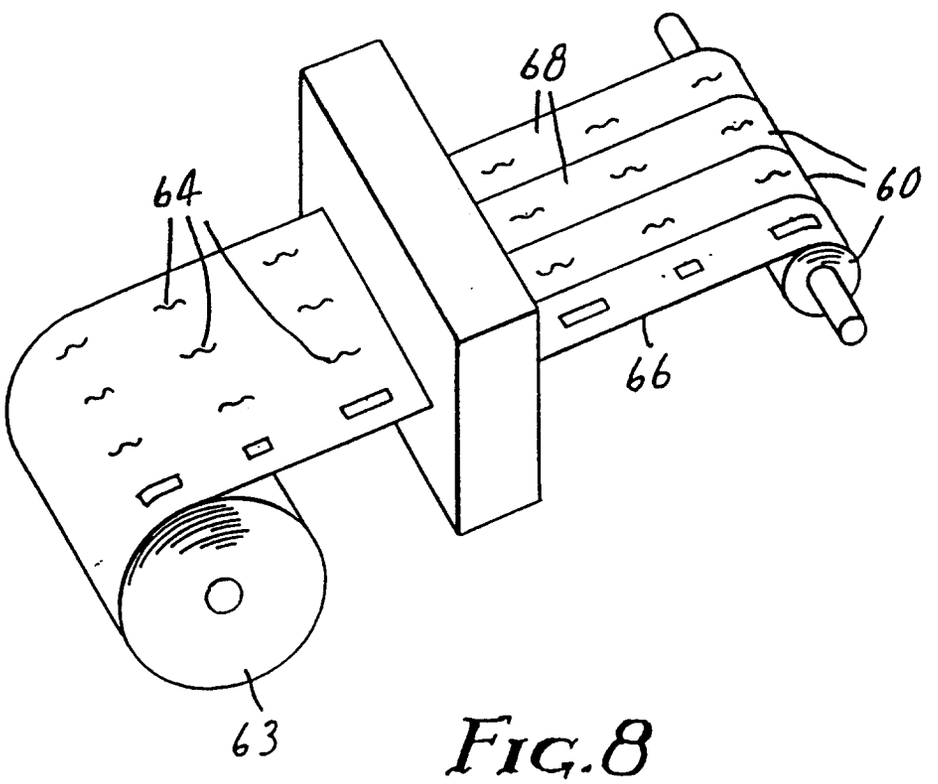

FIG. 8

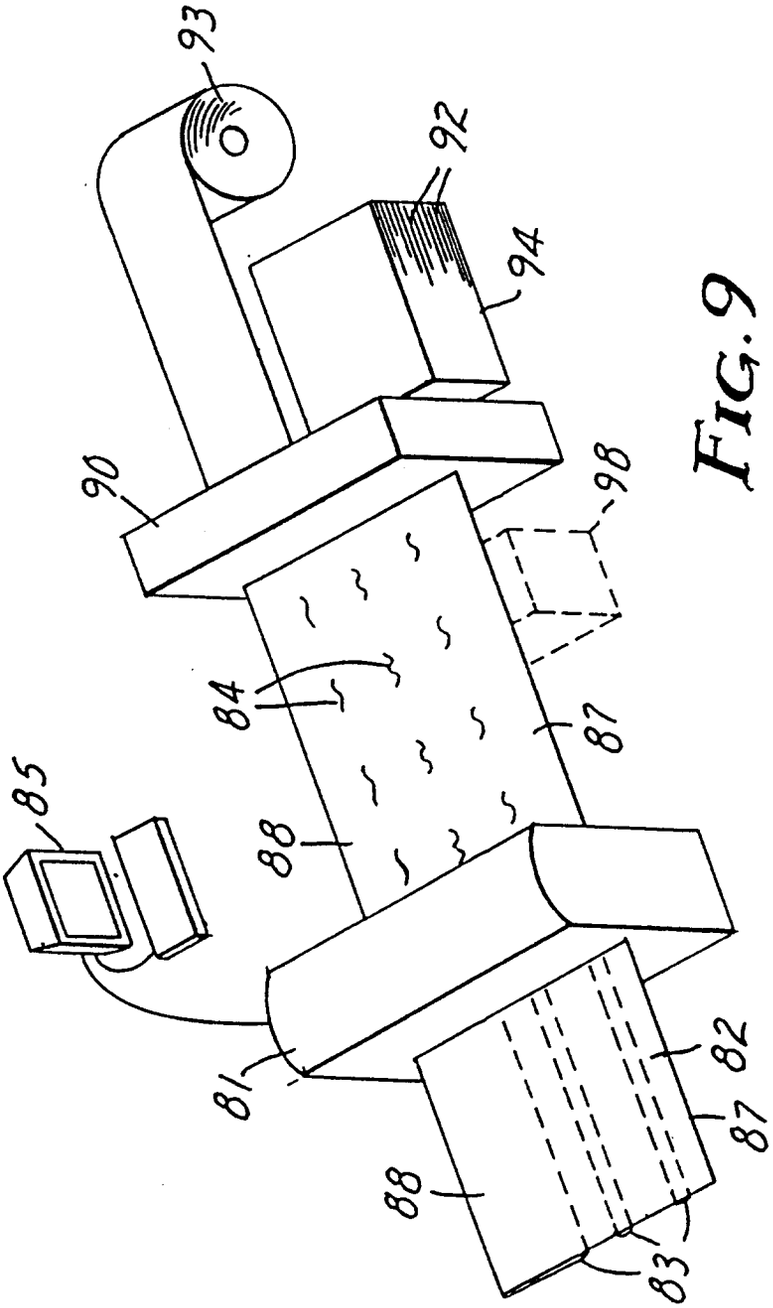

FIG. 9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 11 6071

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	US 4 714 276 A (GREIG) * the whole document * & EP 0 261 817 A (MOORE BUSINESS FORMS)	1,3 2,4-8	B42D5/00 B42C3/00 B41F17/02
Y	US 4 781 306 A (SMITH) * the whole document *	2,6	
X	FR 2 656 834 A (OSAKA SEALING PRINTING CO. LTD.) * page 10; figures 7A-7D *	1,3	
X	WO 91 08909 A (OSAKA SEALING PRINTING CO. LTD.) abstract * figures 1-11 *	1,3	
Y	US 3 902 655 A (HUFFMAN) * the whole document *	4-7	
Y	FR 2 320 190 A (LIBERATORE PETETTI) * the whole document *	8	
A D	FR 2 612 901 A (MINNESOTA MINING AND MANUFACTURING COMPANY) * the whole document * & US 4 921 127 A	2	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B42D B42C B41F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28 October 1997	DIAZ-MAROTO, V

CATEGORY OF CITED DOCUMENTS

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