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EP-A- 0 000 762
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Description

The present invention relates to a method for making decorative emblems, plaques, and the like (hereafter generically called "decorative shapes") which have a cured plastic layer over a decorative surface. More particularly it relates to a method in which a plurality of individual coated shapes are stamped from a single substrate without damaging the plastic coat or deforming the shape during the die cutting operation.

Our U.S. Patent No.4,292,827 discloses a process for mass producing decorative shapes in which a smooth coating of a radiation curable polyurethane composition is applied by flow coating to a foil substrate decorated with a series of designs in the form of individual emblems or plaques and backcoated with a layer of adhesive. Using a cutting die such as shown in the accompanying Fig. 3 individual shapes are stamped from the substrates by pressing the shape contiguous with the decorative design with a male punch into a female cutting die. This imparts a domed shape to the decorative emblem. While in some instances this dome is of aesthetic value, the depth of the dome is difficult to control and the domed shape is difficult to apply to a flat surface or a surface where the radius of curvature is substantially different than that of the dome. Furthermore, when a dome is imparted to the shape as it is die cut, it is difficult to obtain decorative shapes having a sharply cut vertical edge, occasionally the shape may delaminate, scratch or chip, and there is some edge deformation and slivering of the foil substrate. There is also a tendency for the adhesive to ooze from the substrate and contaminate the mold when it is die cut. All of these drawbacks contribute to a reduction in the weather resistance of the cut shape.

A typical decorative shape produced in accordance with the present invention and the aforementioned U. S. Patent is stamped from a laminate including a sheet of aluminum painted or silk-screened on one side with a decorative insignia or graphic which is over coated with a layer of cured polyurethane and coated on the other side with an adhesive composition. The adhesive layer is overlayed with a sheet of release paper. One example of this laminate is shown in the accompanying Fig. 1. When the cutting die strikes this laminar structure, due to the relative softness of the polyurethane and the adhesive composition in comparison to the aluminum sheet, the coated substrate moves slightly with the cutting edge of the die. This causes the substrate to bow under the face of the male punch. Bowing involves the drawbacks mentioned above. In particular, bowing irreversibly domes the decorative shape and produces a shape with poor edge characteristics, which is subject to delamination and has poor weather resistance.

FR-A-2507949 discloses an apparatus which is similar in some respects to the apparatus used in carrying out the present invention. In this prior document, individual decorative shapes are die cut from a substrate comprising a plastics sheet, or a varnished metal sheet, on which a series of decorative designs are reproduced. A cutting die set is used in which a pressure platform is resiliently mounted in a female cutting die. The substrate is said to be supported flat against the pressure platform, the area of the decorative shape under the punch being sandwiched between the platform and the punch. At the commencement of the cutting cycle, the cutting die set closes on the substrate and the pressure platform biases the substrate against the male punch. As the cutting cycle continues, the male punch forces the substrate into the cutting die by depressing the pressure platform, to cut out the shape from the substrate.

At the completion of the cutting cycle, the press opens, and the platform, under its resilient mounting, returns to its pre-cutting position. In so doing, the shape cut from the substrate is pressed back into the opening in the substrate selvage from which it has been cut, for carriage to a station where the shape is ejected from the substrate and collected.

However, FR-A-2507949 does not solve the other problems previously described concerning the poor edge characteristics of the cut shapes. On the contrary, it is concerned with accommodating, not improving, poor edge characteristics, and with the resultant problem of fitting cut shapes, which possess poor edge characteristics, back into their openings in the substrate at the end of the cutting cycle. It is proposed to solve this fitting problem by using the pressure platform as a stop to limit the penetration of the cutting punch into the substrate to a value which, although sufficient to completely cut the shape from the surrounding substrate, is less than the thickness of the substrate and is insufficient to completely disengage the shape from the substrate.

The present invention relates to a method for producing a decorative shape, which uses apparatus somewhat similar to that disclosed in FR-A-2507949, but which has for its object to produce decorative shapes which are not only essentially flat, but which also have clean, sharp cut vertical edges, improved resistance to delamination, weather and wear, etc.

The present invention consists in a method as defined in appended claim 1.

In accordance with the invention, the mouth of the female cutting die is provided with a steel rule knife edge. The knife edge minimizes the cutting

force and delamination, reduces aluminium burring, and provides a sharp vertical edge, and also cleanly cuts any adhesive and release paper.

In accordance with one embodiment of the invention, a 2-working station cutting die set is employed wherein shapes are simultaneously cut and reinserted into the substrate at one station and punched or ejected from the substrate and collected at the other. In a preferred embodiment, the substrate from which the shapes are cut and ejected is supported on a resilient table for both operations.

In order that the invention may be more readily understood, reference will now be made to the accompanying drawings, in which:-

Fig. 1 is sectional view showing the laminar construction of the decorative shapes produced by a method embodying the present invention.

Fig. 2 is a schematic illustration of one example of a coated, laminated substrate prior to cutting.

Figs. 3a and 3b are schematic views in section of a cutting die set illustrating the method used to produce decorative shapes in a prior process.

Figs. 4a and 4b are schematic views in section of a 2-working station cutting die set for producing decorative shapes by a method embodying the present invention.

Figs. 5a and 5b are schematic views in section of another cutting die set for producing decorative shapes by a method embodying the present invention.

The present invention is directed to a process for forming decorative shapes such as that illustrated in cross-section in Fig. 1. A typical shape comprises a substrate 10 which is coated on the back side with a layer of adhesive 12. To prevent the adhesive from inadvertently becoming adhered to a surface or collecting dust or lint, and to facilitate handling, the shape is shown with a sheet of release paper 14 releasably laminated to the layer of adhesive 12. The top or graphic surface 13 of the substrate 10 is preferably provided with a layer or primer or a subbing layer 16 on which a decorative design or insignia 18 is painted or silk screen printed. This design is overcoated with a clear plastics coating or layer 20 which beautifies the image and imparts wear and weather resistance to the object. Plastic coating 20 is optionally overcoated with a further protective film 22 such as a film of polyethylene.

A composite for mass producing these shapes is shown in Figure 2 wherein an array of designs 24 is formed on graphic face 25 of a sheet of substrate 26. The design areas present a laminar construction as in Figure 1, however, for simplicity only the plastics coat 28 is separately shown and the laminated substrate is generally designated 26 with the understanding that it represents the laminated substrate structure as shown in Fig. 1. Alternatives to coating local areas of the substrate are to coat the entire sheet of substrate 26 or only the individual designs 24 with plastics. To coat only the design area and not the contiguous surrounding area, the designs may be formed with an edge, dyke or other shapes defining a peripheral edge which halts the flow of the plastics at the design edge. The simpler technique however is to deposit an amount of plastics on the design which, when it flows to completion, coats the design and a small amount of the area which immediately surrounds it, as shown in Fig. 2.

The formulation of the layers which make up the above laminate as well as the coating techniques used to fabricate it are discussed in some detail in the aforementioned US patent.

The substrate upon which the fluent plastics is coated may be as plastics or metal foil, preferably an aluminium foil 0.076 to 0.50 mm (0.003 to 0.020 inch) thick. The foil substrate is decorated with an appropriate design or series of designs. More commonly, a series of designs in the form of individual emblems or plaque shapes will be applied to the foil sheet. With a metal foil, the series of designs is preferably applied by silk screen or lithographic printing then the design is enhanced by embossing select areas; although other means for forming the decorative designs may also be used. The foil may be embossed to give a three dimensional effect to the emblem.

It is desirable to prime the top surface of the foil substrate prior to printing. Any suitable primer may be used, such as a silane primer. The decorated-primer substrate is then placed upon a vacuum mat which is situated upon a horizontal vacuum table such as that shown in our U.S. Patent No. 4,034,708. Vacuum is drawn against the bottom surface of the foil substrate through the mat to hold the substrate flat and horizontal.

The flow characteristics of the fluent plastics and the liquid wettability of the foil substrate are used to control the spread of the plastics so that it is contiguous with predetermined areas of the foil substrate as well as being uniformly thick. It is also possible to control the plastics flow by use of sharply defined peripheral sides for the substrate or defined areas of the substrate as disclosed in U.S. Patent No. 4,292,827.

Flow coating is a path-wise deposition. That is, a multiple orifice nozzle (or nozzles) is passed over the decorated-primed surface of the foil substrate at a steady speed as the substrate is held stationary. The number of orifices used may vary depending on the width of the path to be laid down. The thickness sought is between approximately 0.50 to 1.0 mm (0.020 to 0.040 inch).

The plastic is preferably a fluent polyurethane

of two component parts (polyol and isocyanate) which are mixed immediately prior to coating and cure upon heating. A polyurethane of this type is disclosed in our U. S. Patent No. 4,100,010.

Basically, that mixture is one of a polyether polyol component ("A"), which may be a difunctional, trifunctional and/or tetrafunctional polypropylene glycol containing a suitable catalyst, and a diisocyanate component ("B") such as an aliphatic diisocyanate. A catalyst such as a lead or mercury material is used since it promotes a slow cure at room temperature so as to allow time for full flow of the liquid polyurethane before setting. As stated in Patent No. 4,100,010, which is specifically incorporated herein by reference, an example of the diisocyanate is Hylene W from E. I. du Pont de Nemours and Co., and the polyether polyol may be one or more of the Pluracol materials (P-410 or TP-440) from BASF Wyandotte. It may also be a polyether-polyester polyol combination, use of the polyester polyol making the cured polyurethane more flexible. The ratio of components A:B is preferably 50-60:40-50. A polyester polyol or polylactone polyol could be used in place of the polyether polyol.

In formulating the particular plastic composition from among those disclosed in that patent, it is important to use a catalyst which results in a somewhat slow curing time in order to allow the flow coated liquid plastic to flow sufficiently, i.e., to the sharply defined peripheral sides if ones are used, before curing is accomplished. Otherwise, it may not be possible to obtain a uniform thickness, smooth coating.

Likewise, the polyurethane may be compounded from among components listed in the patent as is known to give a more flexible cured plastic. As long as the bond to the substrate remains strong, it is desirable to have a somewhat flexible plastic coat so that the emblem or plaque may be conformed. For example, some decorative automobile panels are applied to a curved surface. With the present invention, it is possible to conform the cured plastic coated panel to that surface.

For most of the types of plastic contemplated, curing will be by irradiation with infra-red or ultraviolet light. The polyurethane compounds mentioned above are heat curable and, thus, infra-red lamps are used; although, obviously other heat sources may also be used. Still, it is desirable to get a through cure, i.e., heat from both the top and bottom of the coated foil. The preferred vacuum table arrangement of U. S. Patent No. 4,034,708 makes this possible because of a capability of heating or cooling it. However, it has been found desirable to use the infra-red lamps themselves as the heat source for both top and bottom heating. This may be done by using an I.R. absorptive mat as the vacuum mat. The mat will, then pick up heat from the infra-red radiation and conduct it back from the bottom through the coated foil substrate.

After curing, the coated substrate is cooled and removed from the vacuum table. Individual emblem or plaque shapes are stamped out by a cutting die around the particular emblem or plaque shape. It has been found that, by providing a steel rule knife edge around the mouth of the cavity of the cutting die, and by preventing the coated substrate from bowing while die cutting the decorative shape, it is possible to obtain a shape which is essentially flat (except in areas where the shape has been pre-embossed to give depth to the decorative pattern) and which has a sharp vertical edge which resists delamination and provides good weather and wear resistance. In this embodiment of the invention the shapes are cut from the coated, laminated substrate using a die set such as the illustrated in Figs. 4 or 5. The die sets shown in Figs. 4 and 5 are 2-working station sets wherein the coated substrate moves from right to left in the figures. It will be clear that using separate dies for the die cutting and ejecting operations discussed below is equivalent to the 2-working station die sets illustrated. Furthermore, it will be evident that the ejecting operation could be performed manually without a die set.

As background, a conventional cutting die set is shown in Fig. 3a. This die set comprises a punch holder 40 which is mounted in die cutting relation with a die holder 42. Punch holder 40 is coupled to a press ram (not shown) by shank 43, and die holder 42 is clamped or otherwise mounted to the press bed at ears 45. The punch holder 40 and die holder 42 are aligned by a plurality of guide posts and guide bushings (not shown). Typically the press is mechanically actuated but a hydraulic press may also be used. A male punch 46 is mounted on the punch holder 40 with a surrounding stripper plate 44. The plate 44 contiguously frames the male punch 46 and is mounted for resilient reciprocation on a set of spring-shoulder screw assemblies comprising die springs 49 and 51 carried on shoulder screws or stripper bolts 48 and 50. In Figs. 3a and 3b, two shoulder screws are shown, another pair of shoulder screws, located on the back side of the stripper plate, is not seen in these schematic sectional views. A threaded connection is provided between the shoulder screws 48 and 50 and the stripper plate 44. The stripper plate 44 holds the substrate in place during the cutting operation and cleans any selvage clinging to the punch 46. The position of the stripper plate may be lowered or raised by inserting a shim under the shoulder or body of the shoulder screw. To increase spring pressure,a shim may be inserted under the die spring or a higher pressure

die spring can be used.

Die holder 42 carries a female die 45 having a cutting edge 56, a die face 58 and a female die cavity 60. The female die 54 is positioned on the die holder 42 such that the female die cavity 60 opens on an outlet passage 62 formed in the holder 42.

Shapes having a laminar construction such as shown in Fig. 1 are cut from a substrate by positioning the substrate 26 on the face 58 of the female die 54 with its graphic side 25 down and its design area in alignment with the mouth or cutting edge 56 of the die. When the press is closed as shown in Fig. 3b, the substrate 26 is engaged by the stripper plate 44 and the punch 46. As the punch 46 descends into the die cavity 60, the springs 49 and 51 on the shoulder screws 48 and 50 are compressed and the area of the substrate contiguous with the design is engaged by the stripper plate 44. Due to the relative softness of the layers on each side of the substrate 26, the substrate is pulled into the die cavity 60 and bows under the punch 46 as shown by the bow 68 in Fig. 3b. As the punch 46 completes is descent it finally cuts a shape 70 from the substrate 26 contiguous with the design. This shape falls from the die cavity 60 through the passage 62 in the holder 46 where it is collected. Due to the bowing which occurs, a dome is imparted to the shape 70 which is shown exiting the press in Fig. 3b.

In the method embodying the invention, bowing is prevented by holding the substrate flat on the punch face using a pressure platform which is resiliently mounted in the female cutting die. Furthermore, because cut shapes can no longer be collected from an opening in the base of the female cutting die cavity, they are reinserted in the substrate selvage by the platform after they are cut, and are subsequently ejected by a separate operation which is conveniently performed at another working station in the die set.

Referring to Fig. 4a, the die set comprises a punch holder 80, a die holder 82, a right working station 84 and a left working station 86. In the right station 84, the shape is cut from and reinserted into the substrate 26. In the left station 86, the cut shape is ejected from the substrate by a punch. The die set is mounted to the press ram by shank 85 and fixed to the press bed at ears 87.

The right station 84 includes a female cutting die 90 which is mounted on the die holder 82. The female cutting die comprises a die cavity 92 in which a pressure platform 94 is resiliently mounted on a spring and shoulder screw assembly comprising spring 96 and shoulder screw 98. Embodiments are also envisioned in which a plurality of spring shoulder screw assemblies are used to support the platform depending on the size of the shape cut. The shoulder screw 98 is threaded and screws into the platform 94. The platform in the die cavity and the compression of the spring 96 can be adjusted to provide just enough pressure to prevent the substrate from bowing without deforming the plastics coating over the graphic using shims in a manner analogous to that previously described for the stripper plate 44 in Fig. 3. In accordance with an important feature of the invention, the mouth of the die cavity 92 is equipped with and defined by a knife edge 100 which projects upwardly towards the upper face of the die 90.

Turning to the head portions of the die set, a punch 102 is mounted on the punch holder 80 and framed by a contiguous stripper plate 104. As in Fig. 3, the stripper plate 104 is mounted on a set of four spring and shoulder screw assemblies wherein two assemblies are shown in the view with springs 106 carried on shoulder screws 108 which are threaded at the bottom where they connect to the stripper plate 104. Engagement of the stripper plate is adjusted as earlier described.

The left station 86 comprises a second punch 110 mounted on the punch holder 80 and a female die 112 having a die face 114 which is mounted on the die holder 82 such that the die cavity 116 opens into a collection passage 120 formed in the die holder 82. Punch 110 is framed by a stripper plate 115 which is mounted for reciprocating movement on spring-shoulder screw assemblies 115a and 115b. Plate 115 functions analogous to plate 104 and holds the substrate flat as the cut shape is ejected and removes selvage from the punch 110.

While, in this and the embodiment of the invention subsequently discussed below, the pressure platform 94 is shown resiliently mounted on a spring and shoulder screw assembly, those skilled in the art will understand that the spring and shoulder screw assemblies illustrated herein may be replaced by other types of resilient mounts including rubber blocks and compressed air or hydraulically actuated cylinders.

Operation of the die press is shown in Fig. 4b wherein the substrate 26, which typically has an array of cured plastics coated designs thereon as shown in Fig. 2, is positioned in the right station 84 with its graphic side 25 facing the punch 102 and its design contiguous with the cutting edge 100 which bounds the mouth of the die cavity 92. The pitch of the designs on the substrate is such that a second cut design is simultaneously located over the die 112 in the left station as the first design is cut. Furthermore, the size of the die assemblies in the right and left working stations usually dictate that a third cut design be idle between the right and left stations as the cutting and ejecting operations proceed.

Turning first to the cutting operation, as the

punch holder 80 closes, the punch 102 engages the substrate 26 and presses it against the pressure platform 94. The tension in the spring 96 is such that the pressure platform 94 resists the descent of punch 102 with sufficient tension to prevent the substrate 26 from bowing under application of the punch 102 without otherwise scratching, compressing or deforming the design shape 24 (Fig. 2) or its clear plastics coating 28. The compression spring 96, and therefore the pressure applied by the platform 94, is adjusted using shims or through the selection of the die spring, such that the substrate is not distorted by cutting and the cut shape or part is returned to the selvage for carriage to the ejecting station. If the spring pressure is too high, the part is distorted, if it is too low, the part is not returned to the selvage.

As the punch holder 80 completes its closure, under pressure from punch 102, the platform 94 is depressed below the upper edge of the knife edge 100 and the substrate 26 is urged against the knife edge 100 whereupon a decorative shape 126 is cut from the substrate 26 and forced into the female die cavity 92. As the press closes, the stripper plate 104 engages the portions of the substrate 26 surrounding the shape 126 to prevent those portions from angling around the knife edge 100 and to assist in obtaining a sharply cut vertical edge.

After cutting decorative shape 126 from the substrate 26, the press opens and punch 102 disengages the substrate. As pressure on platform 94 is released, the platform returns to its original position slightly above the edge of the knife edge 100 and insodoing reinserts the shape 126 into the substrate 26. At this time, stripper plate 104 is still in pressing engagement with the substrate such that the substrate does not cling to the male punch 102 and the platform 94 is able to reinsert the shape 126 into the substrate without lifting the substrate off the face of the female cutting die.

At the same time shapes are cut at the right station 84, shapes which have been resinserted into the substrate are removed at the left station 86. At the left station 86, the die press closes such that the second punch 110 forces the cut shape 126 out of the substrate 26 and into the cavity 116 of the female die 112 from whence the shape 126 falls under its own weight out of the press through the passage 120 where it is collected. While Fig. 4 illustrates a completely automated system in which decorative shapes are continuously cut at the right working station and ejected from the substrate at the left working station with each stroke of the die set, the ejection operation at the second station can be performed manually. In this case, a cutting die set having only the right station 84 produces a substrate from which the cutout shapes can be pushed, for example, by hand.

Figs. 5a and 5b illustrate another embodiment of the invention. In contrast of the previous embodiment, in accordance with this embodiment of the invention, the female cutting die is mounted above the punch and moves into a stationery die punch. Referring to Fig. 5a, as in the case of the aforementioned embodiment, the die set is a two working station die set having a cutting station 140 on the right and a punching station 142 on the left. The punching station 142 may be replaced by its manual equivalent. The cutting station 140 and the punching station 142 share a upper die set holder 144. In the cutting station a female cutting die 146 is mounted on the upper holder 144 in die cutting relation with a male punch 148 mounted on the lower die set holder 150. The upper holder 144 is coupled by shank 152 to a mechanical press (not shown) by a ram cap, and the lower holder 150 is secured to the press bed. Alignment of the upper and lower holders is typically by guide posts, also not shown. The female die 146 includes a die cavity 154 in which a pressure platform 156 is resiliently mounted on a spring and shoulder screw assembly comprising a spring 158 carried on a shoulder screw 160 wherein the shoulder screw has a threaded connection with platform 156. Of course, a plurality of spring and shoulder screw assemblies may be used instead of the one shown depending on the design of the shape. Lower holder 150 supports a resilient table 162 mounted on a set of spring and shoulder screw assemblies 164 each assembly comprising a spring 166 carried on a shoulder screw 168 which is mounted by a threaded connection to the table 162. The height of the table 162 and the tension of the springs can be adjusted using shims as previously discussed. The number of spring and shoulder screw assemblies supporting the table 162 will vary depending upon the size and design of the emblem or plaque being cut. In the embodiments shown six shoulder screws are used - the three seen in the view and three on the backside. The male punch 148 is mounted on the lower holder 150 through an opening 147 in the table 162 such that resilient reciprocal movement is permitted between the table 162 and the punch 148 and the table 162 strips any substrate hanging on the punch 148 after cutting.

To cut the substrate, the substrate 26 is positioned in station 140 with its graphic side 25 facing the punch 148 and its plastic coated design aligned with the cutting edge of a steel rule knife edge 155 with which the mouth of the die cavity 154 is equipped. The upper holder 144 moves the die 146 into engagement with the substrate 26 and the punch 148 whereupon the pressure platform 156 is engaged and prevents the substrate from bowing. Upon further descent of the die 146 onto the male punch 148, the pressure platform 156 is depressed

with some depression of the resilient table 162 on the die holder 150 whereupon the shape is cut from the substrate. As pressure is released, the resilient table 162 maintains the substrate 26 in contact with the face of the female die 146 such that the pressure platform 156 can reinsert the shape into the substrate as it returns to its original undepressed position.

The left station 142 comprises a male punch 174 mounted on upper holder 144, the resilent table 162, and a channel 188 which is formed by a channel-forming wall 178 which is slidably received in passage 180 formed in the lower holder 150. In the left station 142 as the upper holder 144 descends, the substrate is resiliently engaged between the table 162 and a stripper plate 182 which frames the punch 174 and is mounted resiliently and adjustably on spring and shoulder screw assemblies 184. The male punch 174 subsequently pushes the cut shape 183 through the opening 176 in table 162 and into the channel 188 formed by the channel-forming wall 178 from which it falls out of the press through the passage 180 in the lower holder.

There has been a tendency for shapes to chip slightly at their periphery as they are cut and ejected from the substrate in the manner illustrated in Fig. 4. While this tendency has been quite limited and has not seriously detracted from the commercial acceptability of the cut shapes, the embodiment illustrated in Fig. 5 minimizes peripheral chipping. It has been found that the plastic coating 20 (Fig. 2) is radially compressed as it is cut from the substrate and it expands when pressure is released leaving a slight overhang at the edge. In accordance with the embodiment of Fig. 5, by ejecting the cut shape from the side bearing the plastic coating 20, edge chipping is reduced.

While the methods herein described constitute preferred embodiments of this invention, it is to be understood that the invention is not limited thereto, and that changes may be made therein without departing from the scope of the invention claimed.

Claims

1. A method for producing decorative shapes (126, 183) which comprises flow coating a clear, viscous, fluent plastic (20, 28) onto the top surface of a horizontally supported substrate (26) having a series of individual designs (18, 24) provided thereon, curing said fluent plastic (20, 28) and die cutting plastic coated shapes from said substrate contiguous with said designs; the method including:

   die cutting each of said shapes at a first working station (84, 140) which includes a male punch (102, 148), cooperable with a female cutting die (90, 146) having a die cavity (92, 154), the mouth of which is defined by a steel rule knife edge (100, 153) projecting towards the punch, and a pressure platform (94, 156) mounted in the die cavity and biased towards the punch by resilient mounting means (96, 98; 158, 160);

   die cutting each shape by applying the punch and die to opposite surfaces of the substrate and causing the punch and knife edge to cooperate to cut the shape from the substrate whilst holding the shape against the face of the punch with the platform with sufficient force to prevent the shape from bowing, thereby producing a sharply cut edge on the shape, and causing the shape and platform to be pressed into the die cavity; then

   reinserting each of the die cut shapes into the substrate (26) by means of the resiliently mounted platform (94, 156);

   transporting the shapes, reinserted in the substrate, to a second working station (86, 142), and

   ejecting the shapes (126, 183) from the substrate (26) at said second working station (86, 142).

2. The method as claimed in claim 1, which includes engaging the portions of the substrate surrounding each shape, as it is cut from and reinserted in said substrate, with a stripper plate (104, 162) which is resiliently mounted about said punch such that said plate contiguously frames the punch.

3. The method as claimed in claim 1 or 2, wherein said second working station comprises a second punch (110, 174) cooperable with a support member (112, 162) having a punch-receiving opening (116, 176) formed therein, the method including applying the second punch and support member to opposite sides of the substrate in alignment with each die cut shape, and causing the latter punch to eject the shape from the substrate into the opening.

4. The method as claimed in claim 3, which includes engaging the portions of the substrate surrounding each die cut shape, as it is ejected from said substrate, with a stripper plate (115, 182) which is resiliently mounted about said second punch such that said plate contiguously frames said punch.

5. The method as claimed in any preceding claim, including applying a layer of an adhesive (12) and a release liner (14) on the surface of the substrate opposite said plastic (20).

6. The method as claimed in claim 1, wherein said decorative shape is die cut using a die set, wherein said die set comprises:

a first support member (144) on which said female cutting die (146) and an ejection punch (174) are comounted,

a second support member (150) on which a table (162) is resiliently mounted via resilient mounting means (164, 166, 168),

said table having a first opening (147) and a second opening (176) therein,

said male cutting punch (148) being mounted on said second support member (150) through said first opening in said resiliently mounted table, and

a passage (180) formed in said second support member (150) and aligned with said second opening (176) in said resiliently mounted table (162),

wherein said first and second support members are mounted for relative reciprocation, with said female cutting die (146) mounted in die-pressing relation with said male cutting punch (148), and said ejection punch (174) mounted in die-pressing relation with said second opening (176) in said resiliently mounted table (162) such that, upon the application of pressure to effect displacement of said support members towards each other, at said female cutting die said substrate is engaged between said resiliently mounted pressure platform (156) and said male cutting punch (148) with a pressing force which prevents said substrate from bowing without otherwise deforming said substrate, said pressure platform is depressed and said shape is cut from said substrate and pressed into said die cavity, and upon releasing said pressure, said substrate is disengaged by said male cutting punch, and said resiliently mounted pressure platform reinserts said shape into said substrate, and

at said ejection punch (174), said cut reinserted shape is ejected from said substrate and through said passage (180) in said second support member.

Revendications

1. Procédé pour la réalisation de formes décoratives (126,183) qui comprend le dépôt par écoulement d'une matière plastique (20,28) transparente, visqueuse, fluide, à la surface supérieure d'un substrat (26) maintenu horizontalement, portant une série de modèles distincts (18, 24), la polymérisation de cette matière plastique fluide (20,28) et le découpage à l'emporte-pièce dans ce substrat, de formes revêtues de plastique, en position contiguë à ces modèles; le procédé comprenant:

le découpage à l'emporte-pièce de ces formes dans un premier poste de travail (84,140) qui comprend un poinçon mâle (102,148) qui peut coopérer avec un outil de coupe femelle (90, 146) possédant une cavité pour outil (92,154) dont l'embouchure est définie par une lame de coupe en acier (100,153) se projetant en direction du poinçon et une plateforme de pression (94,156) montée dans la cavité de l'outil et poussée vers le poinçon par des moyens de montage élastiques (96,98; 158,160),

le découpage à l'emporte-pièce de chaque forme par application du poinçon et de l'outil sur les faces opposées du substrat et par coopération du poinçon avec la lame de coupe afin de découper la forme dans le substrat tout en maintenant la forme contre la face du poinçon à l'aide de la plateforme avec une force suffisante pour empêcher le cintrage de la forme, donnant ainsi à la forme un bord nettement découpé, et faisant pénétrer la forme et la plateforme dans la cavité de l'outil; ensuite,

la remise en place de chacune des formes découpées dans le support (26) au moyen de la plateforme (94,156) montée par des moyens élastiques;

le transfert des formes, remises en place dans le substrat, vers un deuxième poste de travail (86,142), et

l'éviction des formes (126,183) hors du substrat dans ce deuxième poste de travail (86,142).

2. Procédé selon la revendication 1, comprenant 1 a saisie des parties du substrat qui entourent chaque forme, à mesure qu'elle est découpée dans le substrat et y est remise en place, au moyen d'une plaque dévêtisseuse (104, 162) à montage élastique autour de ce poinçon de telle sorte que cette plaque encadre ce poinçon en contigu.

3. Procédé selon la revendication 1 ou la revendication 2, caractérisé par le fait que ce deuxième poste de travail comprend un deuxième poinçon (110,174), qui peut coopérer avec un élément de support (112, 162) dans lequel est ménagé un orifice (116, 176) pour loger le poinçon, le procédé comprenant l'application du deuxième poinçon et de l'élément de support sur les faces opposées du support, en alignement avec chacune des formes découpées, pour amener ce dernier poinçon à éjecter la forme hors du substrat et la faire pénétrer dans l'orifice.

4. Procédé selon la revendication 3, qui comprend la saisie des parties du substrat qui entourent chaque forme découpée, à mesure qu'elle est éjectée hors du substrat, par une plaque dévêtisseuse (115, 182) à montage élastique autour de ce poinçon, de telle sorte que cette plaque encadre ce poinçon en contigu.

5. Procédé selon l'une quelconque des revendications précédentes, comprenant l'application d'une couche d'un produit adhésif (12) et d'une garniture de déchirure (14) à la surface du substrat du côté opposé à cette matière plastique (20).

6. Procédé selon la revendication 1, caractérisé par le fait que cette forme décorative est découpée au moyen d'un ensemble de matrices qui comprend:

un premier élément de support (144) sur lequel sont montés ensemble cet outil de coupe femelle (146) et un poinçon d'éjection (174),

un deuxième élément de support (150) sur lequel un plateau (162) est monté élastique par des moyens de montage élastique (164, 166, 168),

ce plateau comprenant un premier orifice (147) et un deuxième orifice,

ce poinçon de coupe mâle (148) étant monté sur ce deuxième élément de support (150) en traversant ce premier orifice de ce plateau à montage élastique,

un passage (180) ménagé dans ce deuxième élément de support (150) et en alignement avec de deuxième orifice (176) de ce plateau à montage élastique (162),

caractérisé par le fait que ce premier et ce deuxième élément de support sont montés pour permettre un mouvement alternatif relativement l'un à l'autre, cet outil de coupe femelle (146) étant monté dans un rapport de serrage de l'outil vis-à-vis de ce poinçon de coupe mâle (148) et ce poinçon d'éjection (174) étant monté dans un rapport de serrage de l'outil vis-à-vis de ce deuxième orifice (176) de ce plateau à montage élastique (162), de telle sorte que, lorsque l'on applique la pression pour obtenir le déplacement de ces éléments de support l'un vers l'autre, sur cet outil de coupe femelle, ce substrat est introduit entre cette plateforme de pression à montage élastique (156) et ce poinçon de coupe mâle (148) avec une force de serrage qui empêche ce substrat de cintrer sans autre déformation, cette plateforme de pression est mise sous vide et cette forme est découpée dans ce substrat et enfoncée dans cette cavité d'outil, et lorsque cette pression cesse, ce substrat est libéré par ce poinçon de coupe mâle et cette plateforme de pression à montage élastique réintroduit cette forme dans ce support, et

sur ce poinçon éjecteur (174) cette forme découpée remise en place est ejectée hors de ce support en traversant ce passage (180) pour atteindre ce deuxième élément de support.

Patentansprüche

1. Verfahren zum Herstellen dekorativer Formen (126, 183), welches aufweist: Flüssigbeschichten der Orberfläche eines horizontal gelagerten Substrates (26), welches eine Reihe von individuellen Gestaltungen (18, 24) hat, die darauf vorgesehen sind, mit einem klaren, zähflüssigen Kunststoff (20, 28), Aushärten des flüssigen Kunststoffes (20, 28) und Ausstanzen der kunststoffbeschichteten Formen aus dem Substrat entlang der Grenzen der Gestaltungen, wobei das Verfahren einschließt:

Ausstanzen jeder der Gestaltungen an einer ersten Arbeitsstation (84, 140), welche einen Stanzstempel (102, 148) aufweist, der mit einer Stanzmatritze (90, 146) zusammenwirkt, die eine Stanzvertiefung (92, 154) hat, deren Öffnung von einer Messerkante (100, 153) eines Stahllineals festgelegt wird, welche in Richtung auf dem Stempel vorspringt, und eine Druckplatte (94, 156) aufweist, welche in der Stanzvertiefung montiert und in Richtung des Stempels durch eine federnd nachgebende Befestigungseinrichtung (96, 98; 158, 160) vorgespannt ist,

Ausstanzen jeder Form durch Anwenden von Stempel und Matritze auf den gegenürberliegenden Oberflächen des Substrates und indem der Stempel und die Messerkante so zusammenwirken, daß sie die Form aus dem Substrat ausstanzen, während die Form mit der Plattform mit ausreichender Kraft gegen die Vorderfläche des Stempels gehalten wird, um zu verhindern, daß sich die Form verbiegt, und dadurch Herstellen einer scharfen Schneidkante an der Form, und Bewirken, daß die Form und die Platte in die Matritzenvertiefung gedrückt werden, und

dann Wiedereinsetzen jeder der ausgestanzten Formen in das Substrat (26) mit Hilfe der federnd nachgebend montierten Platte (94, 156),

Transportieren der in das Substrat wieder eingesetzten Formen zu einer zweiten Arbeitsstation (86, 142), und

Ausstoßen der Formen (126, 183) aus dem

Substrat (26) bei der zweiten Arbeitsstation (86, 142).

2. Verfahren nach Anspruch 1, welches den Eingriff mit den Abschnitten des Substrates einschließt, die jede Form umgeben, während sie aus dem Substrat ausgestanzt und wieder eingesetzt wird, mit einer Abstreifplatte (104, 162), die federnd nachgebend um jeden Stempel herum montiert ist, so daß die Platte als Pahmen an den Stempel angrenzt.

3. Verfahren nach Anspruch 1 oder 2, wobei die zweite Arbeitsstation einen zweiten Stempel (110, 174) aufweist der mit einem Halteteil (112, 162) zusammenwirkt, welcher eine den Stempel aufnehmende Öffnung (116, 176) hat, die darin ausgebildet ist, wobei das Verfahren die Anwendung des zweiten Stempels und des Halteteiles auf gegenüberliegenden Seiten des Substrates unter Ausrichtung mit jeder gestanzten Form aufweist, und Bewirken, daß der letztgenannte Stempel die Form aus dem Substrat in die Öffnung ausstößt.

4. Verfahren nach Anspruch 3, welches den Eingriif der Abschnitte des Substrates, die jede gestanzte Form umgeben, mit einer Abstreifplatte (115, 182), während die Form aus dem Substrat ausgestoßen wird, einschließt, wobei die Abstreifplatte federnd nachgebend um den zweiten Stempel herum montiert ist derart, daß die Platte den Stempel in seiner Kontur (angrenzend) umrahmt.

5. Verfahren nach einem der vorstehenden Ansprüche, einschließlich des Anwendens einer Schicht eines Klebstoffs (12) und einer Ablösbeschichtung (14) auf der Oberfläche des Substrates gegenüber von dem Kunststoff (20).

6. Verfahren nach Anspruch 1, wobei die dekorative Form unter Verwendung eines Stanzsatzes ausgestanzt wird, wobei der Stanzsatz aufweist:

ein erstes Stützteil (144), auf welchem die Stanzmatritze (146) und ein Ausstoßstempel (174) gemeinsam montiert sind,

ein zweites Stützteil (150), auf welchem ein Tisch (162) federnd nachgebend über eine federnd nachgebende Befestigungseinrichtung (164, 166, 168) montiert ist,

wobei der Tisch eine erste Öffnung (147) und eine zweite Öffnung (176) hat,

der Stanzstempel (148) auf dem zweiten Stützteil (150) durch die erste Öffnung in dem federnd nachgebend montierten Tisch montiert ist, und

ein Durchgang (180) in dem zweiten Stützteil (150) gebildet ist, welcher mit der zweiten Öffnung (176) in dem federnd montierten Tisch (162) ausgerichtet ist,

wobei die ersten und zweiten Stützteile für eine Hin- und Herbewegung relativ zueinander montiert sind, die Stanzmatritze (146) in Stanzdruckbeziehung zu dem Stanzstempel (148) steht und der Ausstoßstempel (174) in Stanzdruckbeziehung zu der zweiten Öffnung (146) in dem federnd montierten Tisch (162) steht derart, daß beim Aufbringen eines Druckes, um die Verschiebung der Stützteile in Richtung aufeinanderzu zu bewirken, an der Stanzmatritze das Substrat zwischen der federnd montierten Druckplatte (156) und dem Stanzstempel (148) mit einer Druckkraft erfaßt wird, welche vermeidet, daß das Substrat verbogen wird, ohne es anderweitig zu verformen, wobei die Druckplattform herabgedrückt wird und die Form aus dem Substrat ausgestanzt und in die Stanzvertiefung eingedrückt wird, und daß beim Lösen des Druckes der Stanzstempel mit dem Substrat außer Eingriff tritt und die federnd montierte Druckplatte die Form wieder in das Substrat einsetzt,

und wobei die wieder eingesetzte gestanzte Form bei dem Ausstoßstempel (174) aus dem Substrat aus- und durch den Durchgang (180) in dem zweiten Stützteil gestoßen wird.

FIG-1

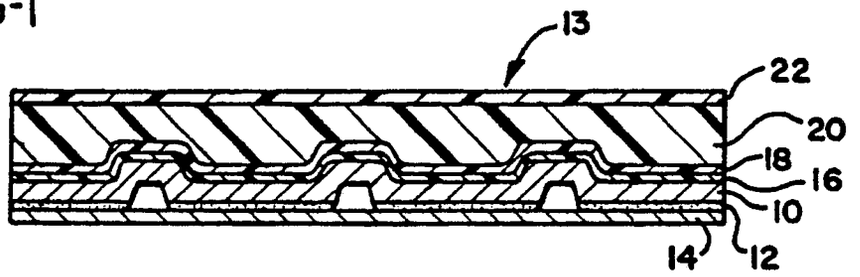


FIG-2

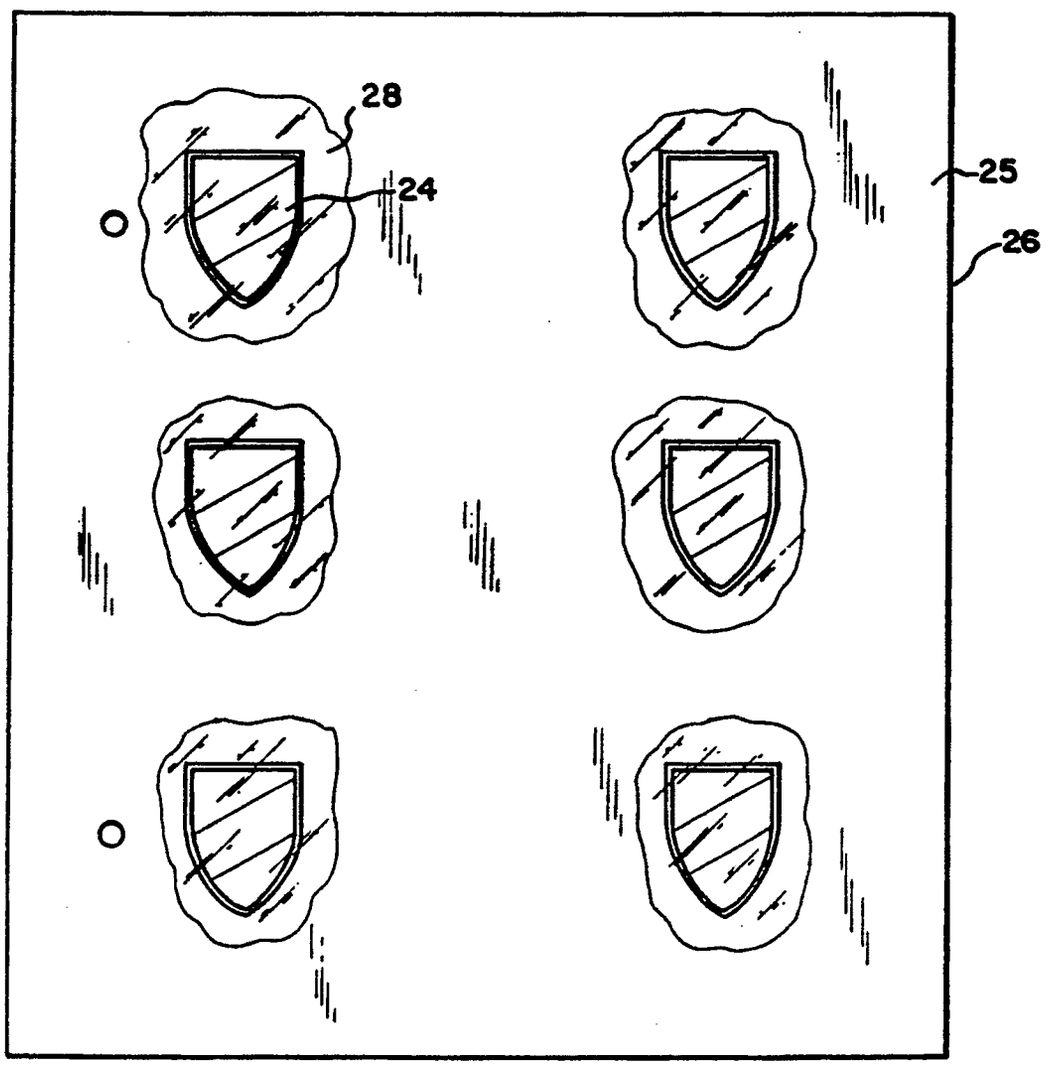
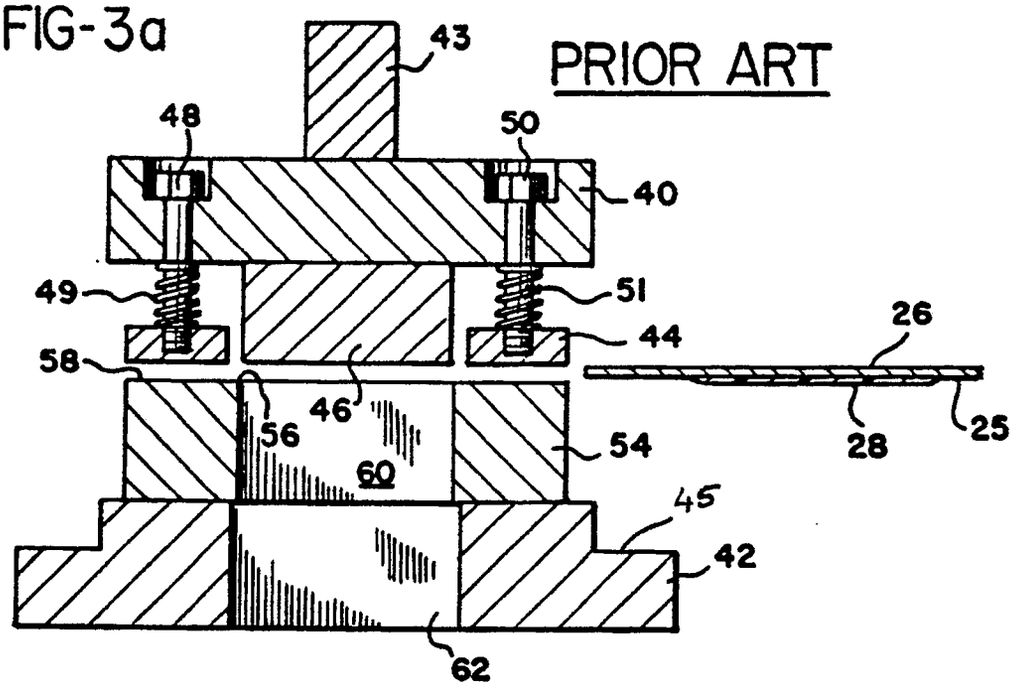


FIG-3a


PRIOR ART
43
48
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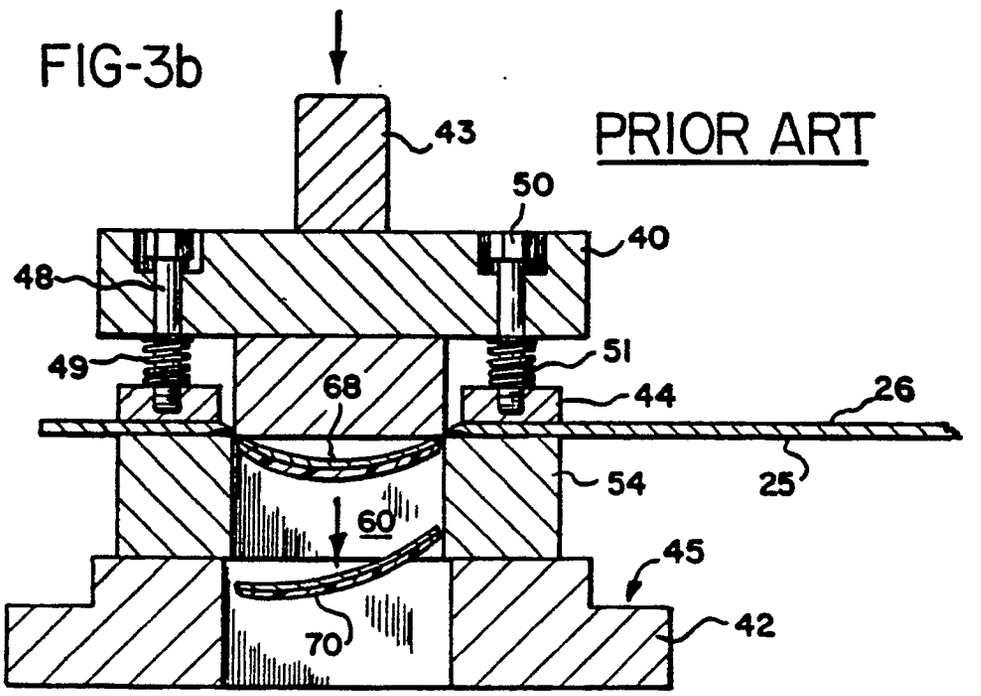
42
62

FIG-3b


PRIOR ART
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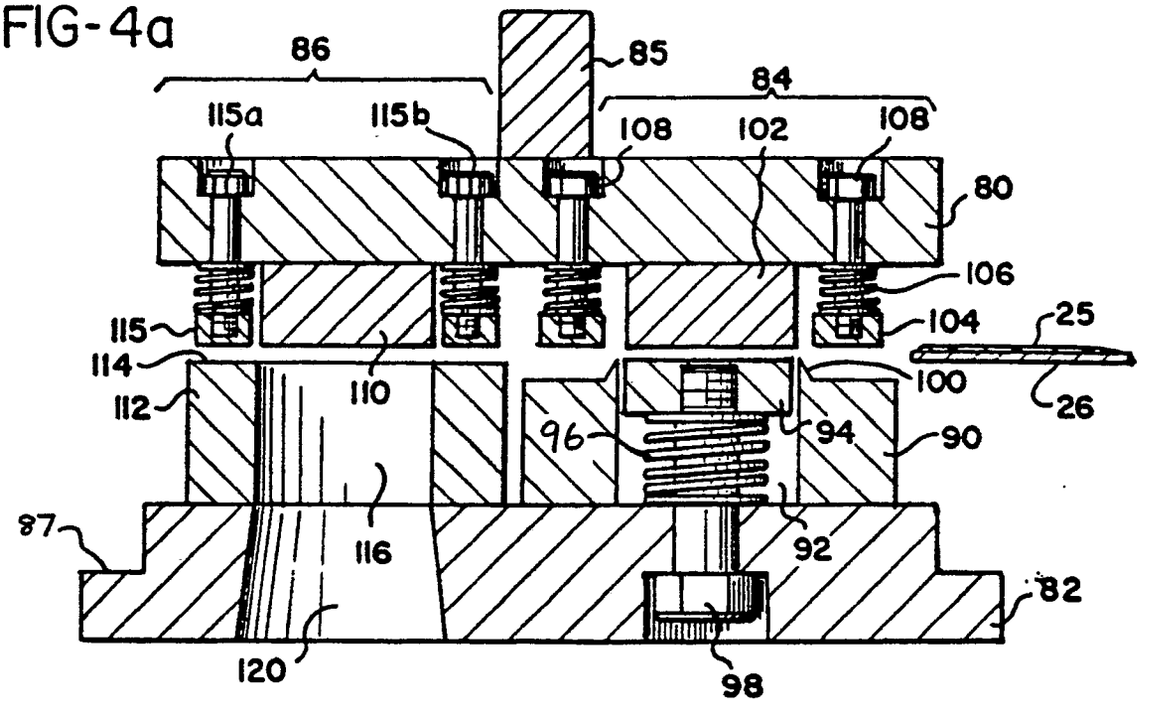
42
70

FIG-4a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85
84
115a
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102
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FIG-4b

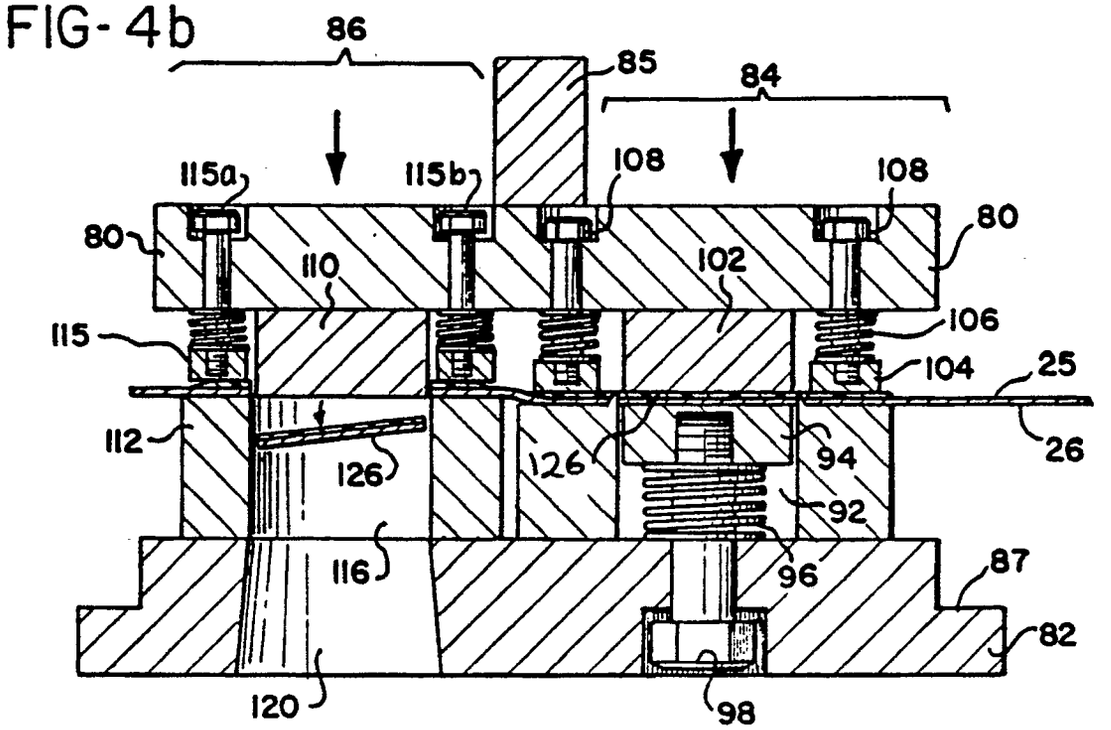
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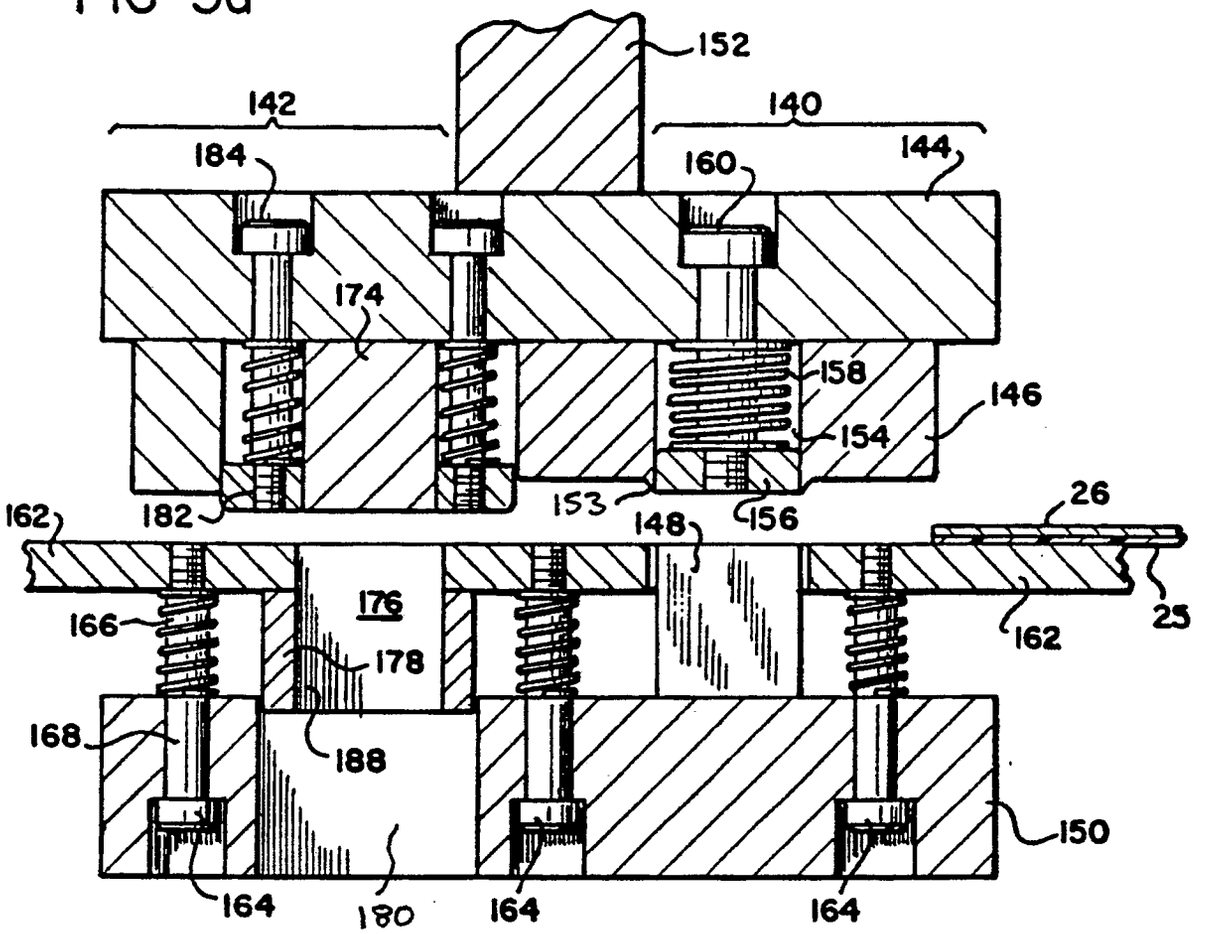
FIG-5a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168
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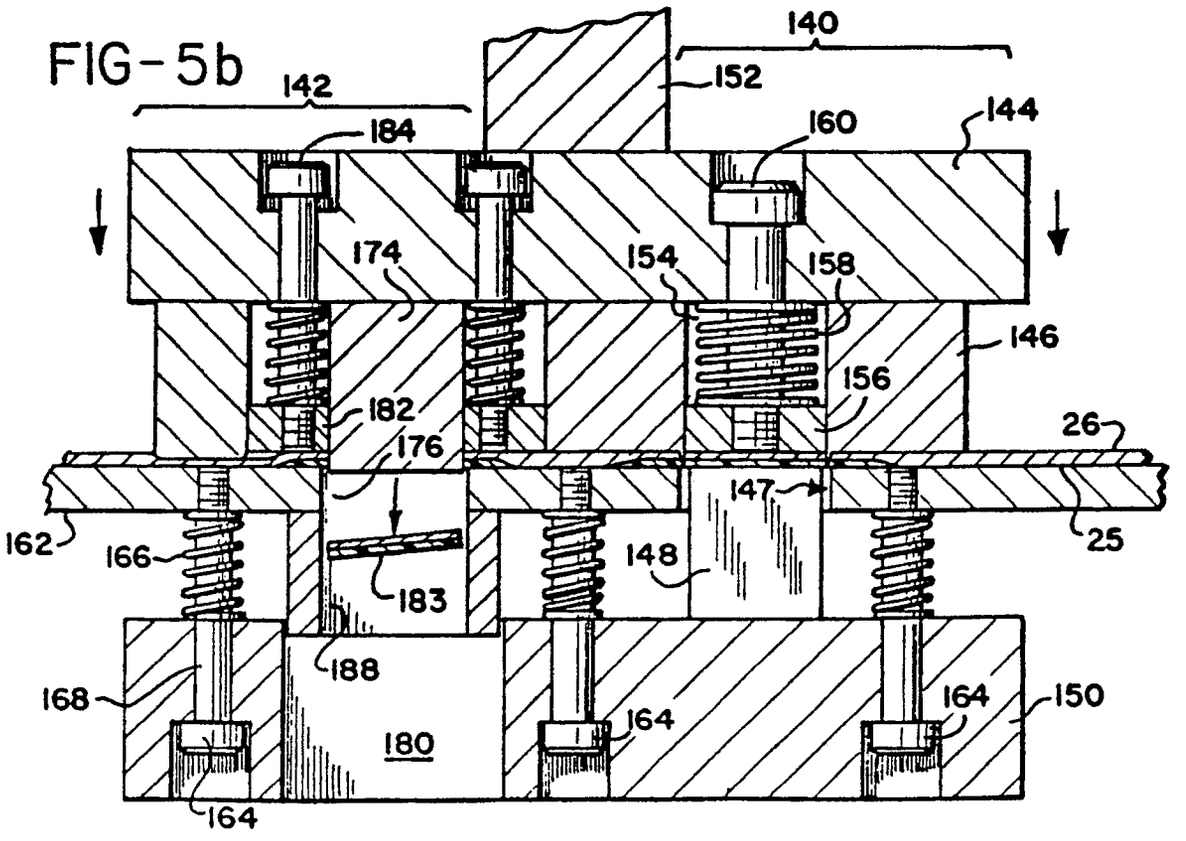
150
164
180
164
164

FIG-5b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164