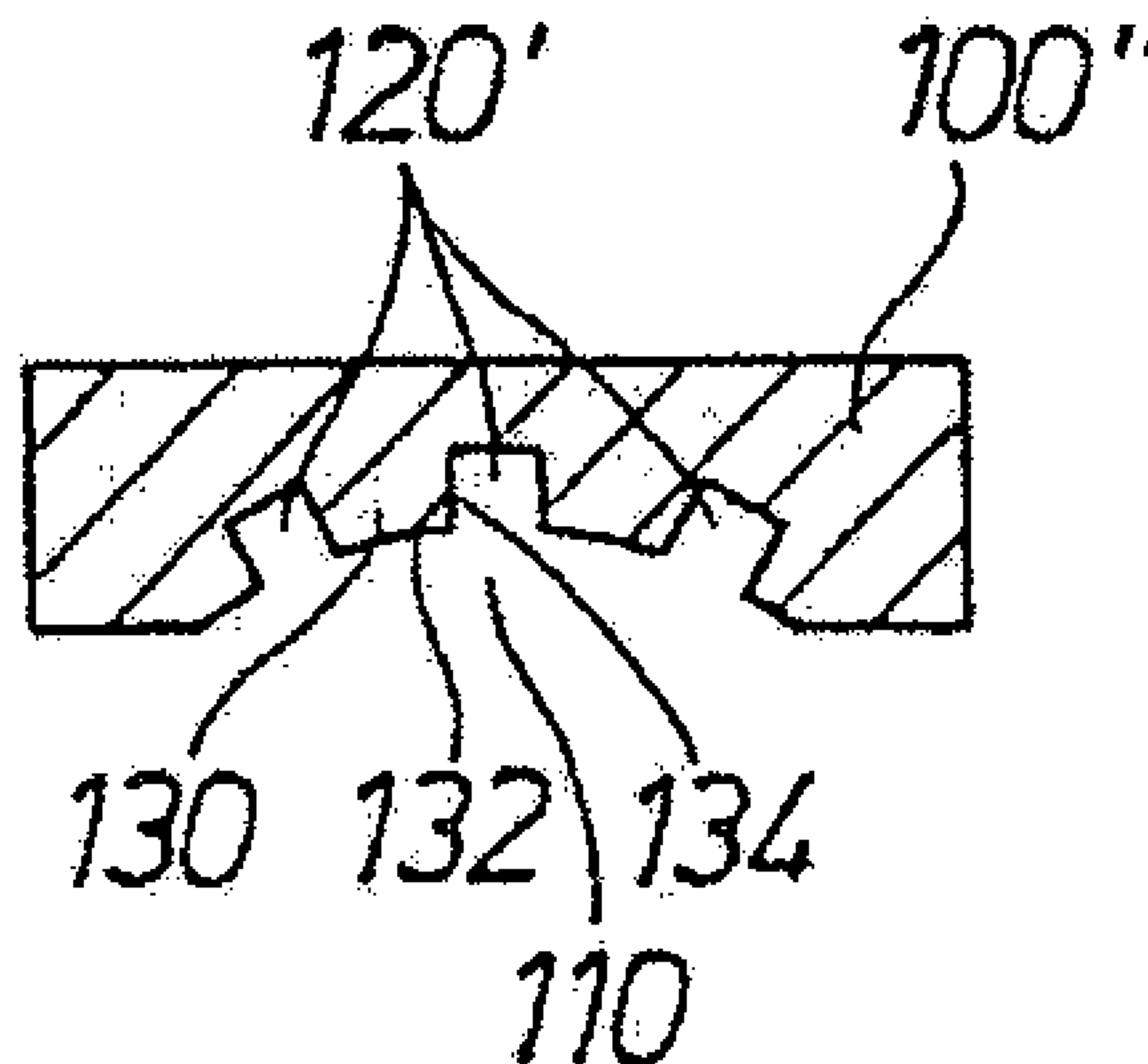




(86) Date de dépôt PCT/PCT Filing Date: 2008/04/28
(87) Date publication PCT/PCT Publication Date: 2008/11/13
(45) Date de délivrance/Issue Date: 2013/03/12
(85) Entrée phase nationale/National Entry: 2009/11/02
(86) N° demande PCT/PCT Application No.: EP 2008/003415
(87) N° publication PCT/PCT Publication No.: 2008/135191
(30) Priorités/Priorities: 2007/05/02 (DE10 2007 020 850.4);
2007/07/21 (DE10 2007 034 136.0)

(51) Cl.Int./Int.Cl. *B29C 44/56* (2006.01),
B26D 3/28 (2006.01)
(72) Inventeur/Inventor:
KOEHLER, PETER, DE
(73) Propriétaire/Owner:
KOEHLER & KRAFFT GMBH & CO. KG, DE
(74) Agent: FETHERSTONHAUGH & CO.

(54) Titre : METHODE DE FABRICATION D'UN OBJET DECOUPE DANS LA MOUSSE
(54) Title: METHOD OF MAKING A DIE-CUT OBJECT MADE OF FOAM



(57) Abrégé/Abstract:

The invention relates to a method for producing a form-cut object made of foam. The invention is based on the aim of refining a known method for producing a form-cut object made of foam in that it also allows the precise creation of complex shaped form cuts in the foam. This aim is achieved by the method according to the invention in that the first preliminary version of the object in the region of a first form or contour cut is provided with a (second) form cut, which is superimposed on the first form or contour cut and extends down to larger depths than the first cut. Preferred application areas of the claimed method and the resultant objects made of foam are pillows, for example.

ABSTRACT

The invention relates to a method for producing a form-cut object made of foam. The invention is based on the aim of refining a known method for producing a form-cut object made of foam in that it also allows the precise creation of complex shaped form cuts in the foam. This aim is achieved by the method according to the invention in that the first preliminary version of the object in the region of a first form or contour cut is provided with a (second) form cut, which is superimposed on the first form or contour cut and extends down to larger depths than the first cut. Preferred application areas of the claimed method and the resultant objects made of foam are pillows, for example.

24606 SN 12/597,191

Transl. of WO2008/135191

METHOD OF MAKING A DIE-CUT OBJECT MADE OF FOAM

The invention relates to a method of making a die-cut object from foam, for example a pillow, mattress, or a molded receptacle for cameras, measuring instruments, or other products sensitive to impact.

A die is known from DE 1,758,789 for producing curved surfaces on objects made of porous, elastic materials such as foam, foam rubber, and the like. The die has or is a plunger that is provided with cutouts for the curved surfaces to be produced, and the parts of the material that are not being compressed by the die bulge out into these cutouts and are cut off, whereupon after the pressure is relieved the cut edges form the desired curved surfaces.

A device is known from DE 1,891,607 for mechanically cutting out symmetrical and asymmetrical three-dimensional bodies made of synthetic foam plates and similar materials, in which a band saw cuts the pressed foam into a shape. A cylindrical press roller that presses the workpiece into a flat shape is provided that is transported in a straight line on a work platform just below the roller die at a speed that is equal to the circumferential speed of the roller. Downstream from the roller a blade rotating transversely with respect to the transport direction of the die is provided that cuts the foam approximately in the center plane thereof, and an adjuster is provided for setting the distance between the upper edge of the die and the lower edge of the roller, and also the height of the blade.

24606 SN 12/597,191

Transl. of WO2008/135191

A press die is known from DE 1,709,739 for forming bodies from porous substances such as foam rubber, sponge rubber, synthetic foam, or the like, having a concave lower surface and a flat top surface. The die, which has a box or tubular shape, for example, has a base at the bottom with an opening whose outer edge has the shape of the largest circumference of the cavity that is intended to receive the body to be shaped. A disk that is fitted into the die parallel to the base and that can be moved inward is used as a pressure ram, so that the material to be pressed is pressed between the ram and the base, and a section of the pressed material that bulges out from the cover opening can be cut off using a blade guided on the surface of the base.

A method is known from DE 3,522,192 for making a body composed of a blank made of foam, rigid foam, or the like by using a hot wire or thermal cutting device or the like. Several imaginary planes through the blank are provided. Defined points at each tangent to a plane are connected, on or outside the blank, to corresponding defined points at the corresponding tangent to the adjacent plane, on or outside the blank, by use of flexible, heat-resistant connections, and the cutting element is guided along these connections.

The cutting of contours in foam is known. It is also known to make die cuts in foams using an extrusion or die cutting machine. To this end, in one work step a section of a foam blank originally in the shape of a block, for example, is pressed into a first negative die, also referred to as a first die. The section of the foam pressed into the negative die is then cut off using an

25011-162

oscillating or rotating blade, for example. After further transport the foam re-expands, at which point at least one first die cut corresponding to the first negative die is made in the foam. The negative die may be made of wood or aluminum, for example.

A disadvantage of this procedure is that it is not suitable for making complex die cuts, i.e. sharply angled cutouts, for example, in the foam at great or different depths. The cut is rough at the edges and the surfaces are not smooth.

US 4,240,240 discloses a method of making a box with an inner, upper and lower foam insert, the upper insert being cut out of the lower insert. The cutting is done in that the original one-piece insert is pushed by a plunger into a negative die and then those parts that are pushed into the negative die are at least partially cut off.

French publication 2,674,183 discloses a method of making a die-cut object from foam, at least a first preliminary workpiece being produced by cutting out of a first part of a foam blank pressed into a negative die. The first preliminary workpiece of the object corresponds to the cut-off part of the foam blank. It is then turned around and pushed into a second negative die. The pushed-in part of the first preliminary workpiece is cut off and the remaining part forms the desired die-cut object.

Based on this prior art, some embodiments of the invention may refine a known method of making a die- or contour-cut object from foam so as to also allow the precise creation of complex shaped die cuts in the foam.

25011-162

Some embodiments disclosed herein relate to a method of making a die-cut object from foam, comprising at least the following steps: a) producing a first preliminary version of the object by means of a first die cut by cutting off a first section of a foam blank pressed into a first negative die; or a') producing a first preliminary version of the object by cutting off a first section of the foam blank by means of a contour cut; b) pressing a section of the first preliminary version of the object in the region of the first die or contour cut into a second negative die with a plunger formed as a positive die at least approximately corresponding in shape to the first section of the foam blank cut off by the die or contour cut; and c) producing the object by means of a die cut that is superimposed on the respective first die or contour cut by cutting off the section of the first preliminary version that is pressed into the second negative die.

Within the scope of the present invention, the term "die cut" also refers to cutouts or any given profiles or contours imparted to the foam. A negative die is also referred to as a die.

An embodiment of the invention provides that after a first die or contour cut as a first work step the foam is subjected to at least one second work step. In the second work step a section of the foam remaining after the first work step is pressed into a negative die, i.e. a die, using a die cutting machine. If a die cutting machine has also been used in the first work step, the first and the second negative dies are preferably different.

In order to achieve good pressure distribution at the bottom as well as at the sides in the region of the first die or contour cut while the foam is pressed into the negative die used in the second work step, the pressing is preferably carried out using a plunger, which as a positive die at least approximately corresponds to the first section of the foam blank cut off by the die or contour cut. This ensures that during the second work step the foam is also pressed in at narrow or angled regions of the negative die.

25011-162

The plunger may be made of the same material as the machined foam, or of some other material such as wood, aluminum, or a higher-density foam, for example.

5 During the second work step the plunger is placed between the press roller and the foam, preferably in the region of the first die or contour cut, with its positive contour on the foam.

24606 SN 12/597,191

Transl. of WO2008/135191

The section of the foam that is thus pressed into the negative die is then cut off along a cut line, resulting in a die cut in the same foam. The die or contour cut produced during the second work step is superimposed on the first die cut, and extends more deeply into the foam than the first cut.

In general, the method according to the invention, by means of n repetitions of the described work steps, preferably using differently shaped dies in each case, allows any given number and shape of cuts to be superimposed for the same piece of foam. By use of this stepwise machining, a complex shape of an overall die cut, having sharp contours/borders/edges and smooth surfaces, may ultimately be introduced into the foam, also at considerable depths.

The method according to the invention is suitable for foams having different density and surface characteristics, for example for viscoelastic foams, polyether foams, or latex foams.

The method according to the invention described in general above is explained below with reference to the accompanying figures, wherein:

FIG. 1 shows a first work step according to the invention;

FIG. 2 shows the first preliminary version of the die- or contour-cut foam object resulting from the first work step;

FIG. 3 shows a second work step;

FIG. 4 shows the die-cut object after the second work step; and

FIG. 5 shows a use of the die-cut object.

24606 SN 12/597,191

Transl. of WO2008/135191

FIGS. 1B5 show the production of a pillow as an example of a die-cut object. Identical technical elements are denoted by the same reference numerals in all the figures.

FIG. 1 illustrates a first work step in which a first section 110 of a foam blank 100 originally having a parallelepipedal shape is pressed into a first negative die 200'. The pressing is performed with a force F' by means of a roller 300. The force F' and the resulting pressure are individually adjusted.

The section 110 of the foam pressed into the negative die is cut off along cut line S.

After relaxation, the first die cut made in the foam forms a first cutout 110' as shown in FIG. 2. The relaxed foam then constitutes a first preliminary version 100' of the final end product of the die-cut object.

FIG. 3 shows a second work step in which a (second) sections 120 of the foam from the first preliminary version 110' [100'] of the object are pressed into a second negative die 200". The pressing is performed with a force F'' . In order to achieve good pressure distribution at the bottom as well as at the sides, in particular in the region of the first die or contour cut, while the foam is pressed into the negative die 200", the pressing is preferably carried out using a plunger 400, which as a positive die at least approximately corresponds to the first formed section 110'. The foam pressed into the second negative die is then cut off along cut line S".

In the second work step, in the region of the first die cutout 110['] second die cutouts or indentations 120' are made in

24606 SN 12/597,191

Transl. of WO2008/135191

the pillow surface as shown in FIG. 4. This results in ridges 130 next to the indentations, each having an outer face 132 and side flanks 134. The flanks may extend in at an angle or perpendicular, thereby making the ridges 130 trapezoidal or rectangular.

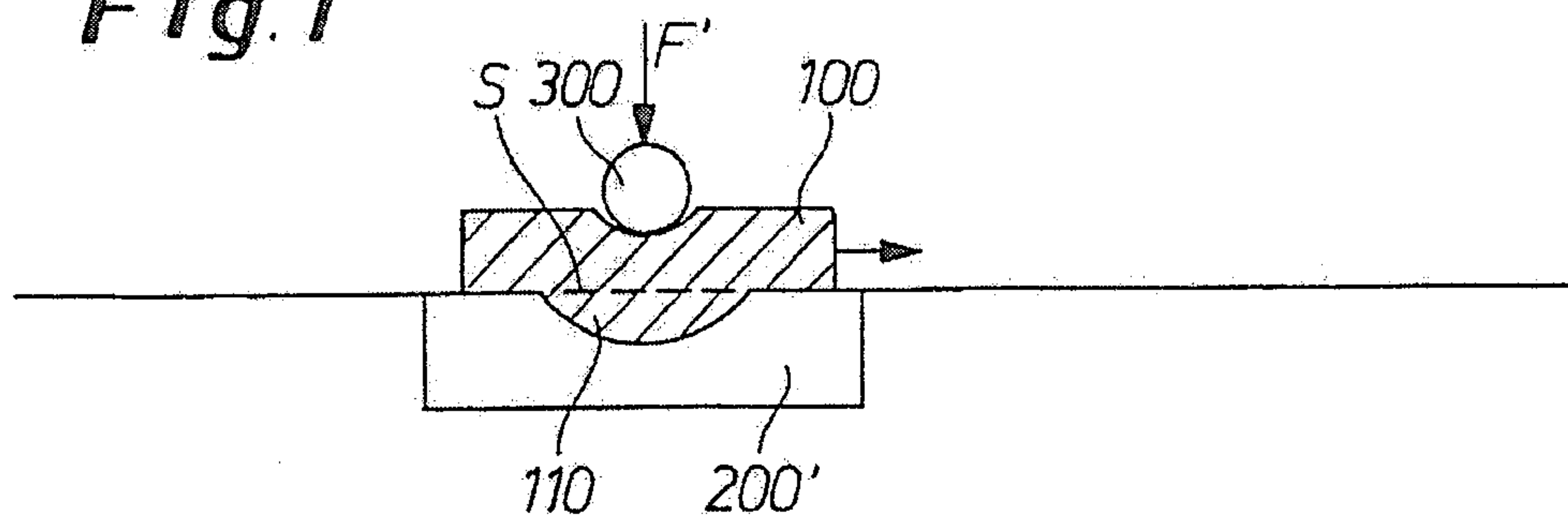
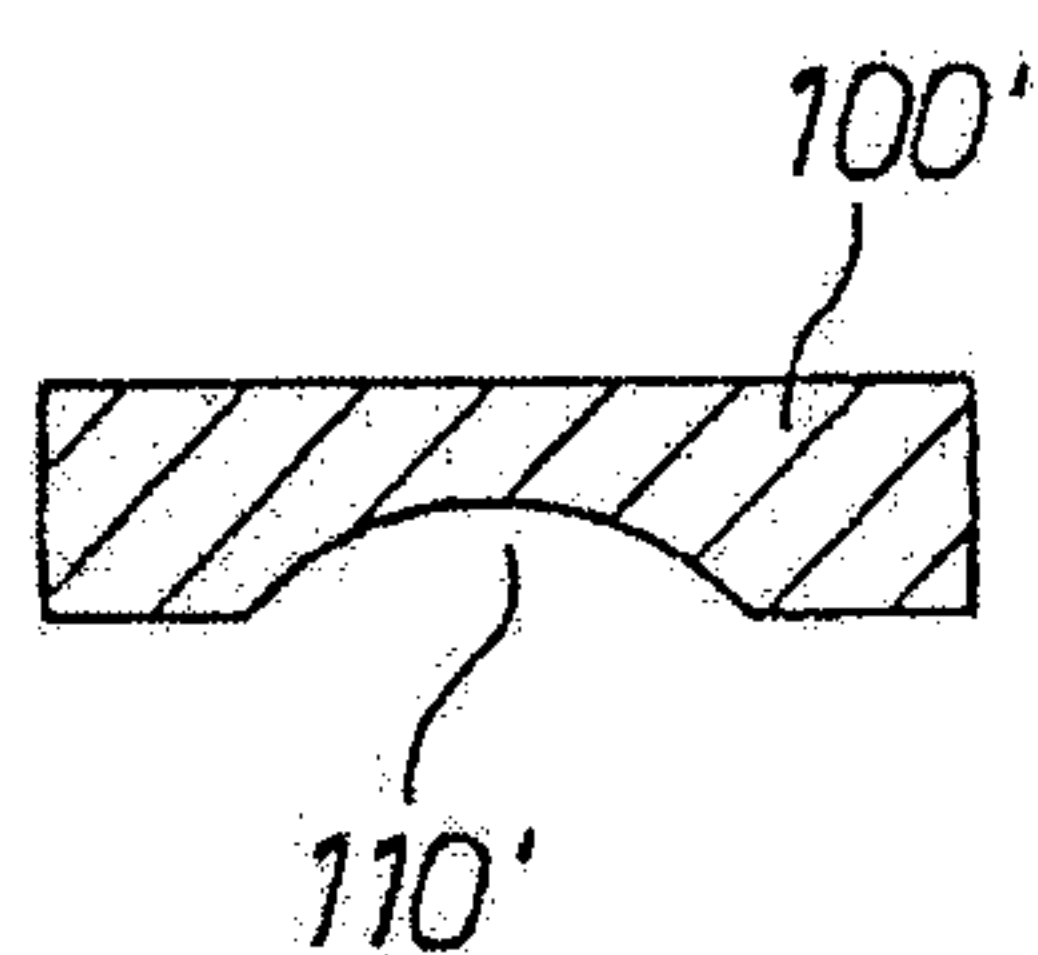
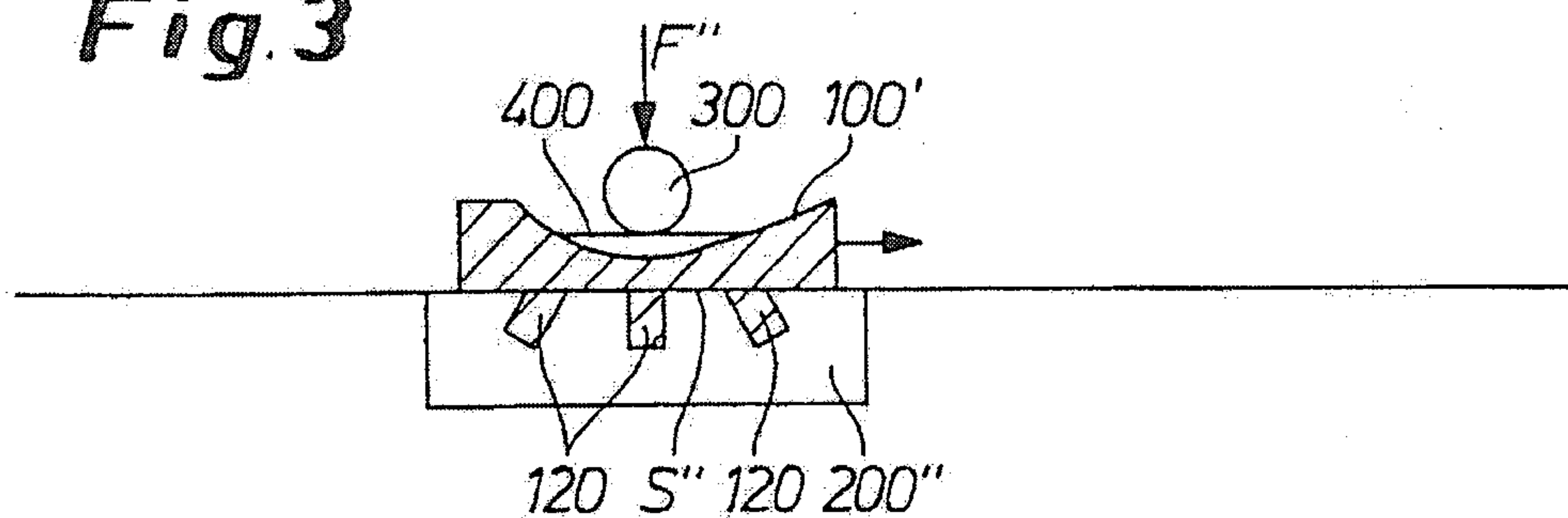
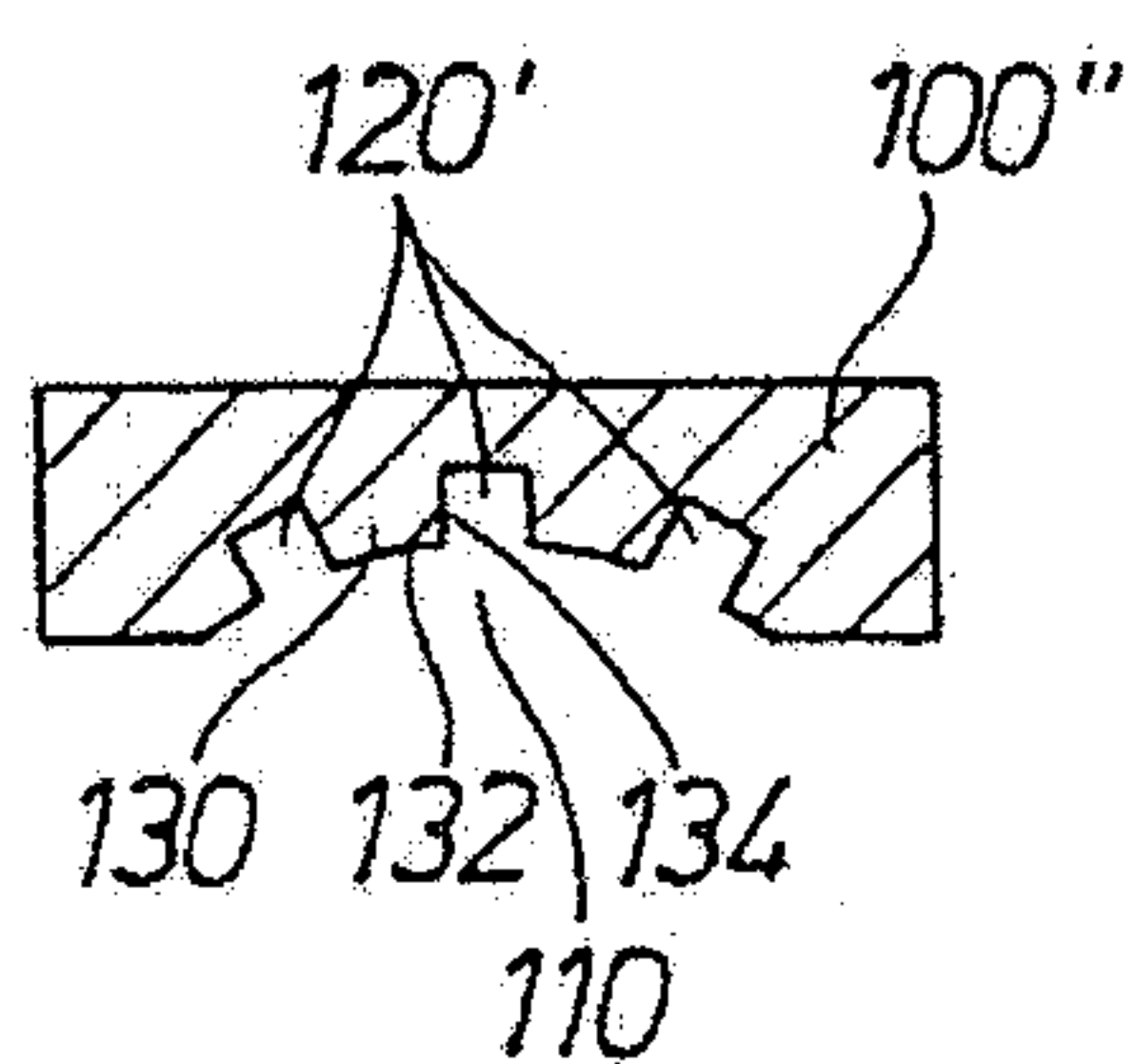
FIG. 4 shows the results of the second work step; in the present case the finished die-cut pillow is upside down. In other cases additional work steps may be performed to make further die cuts in the pillow, each of which are superimposed on the respectively previous die cuts and extend progressively deeper into the foam.

FIG. 5 shows one use of the pillow that is die-cut according to the invention, in which a person 500 rests his head on the pillow 100". The first die cut 110' in the pillow provides an optimal seat for the curved head of the person. In addition, the second die cut provides improved ventilation in the head region, resulting in less perspiration by the person when resting on the pillow.

25011-162

CLAIMS:

1. A method of making a die-cut object from foam, comprising at least the following steps:
 - a) producing a first preliminary version of the object by means of a first die cut by cutting off a first section of a foam blank pressed into a first negative die; or
 - a') producing a first preliminary version of the object by cutting off a first section of the foam blank by means of a contour cut;
 - b) pressing a section of the first preliminary version of the object in the region of the first die or contour cut into a second negative die with a plunger formed as a positive die at least approximately corresponding in shape to the first section of the foam blank cut off by the die or contour cut; and
 - c) producing the object by means of a die cut that is superimposed on the respective first die or contour cut by cutting off the section of the first preliminary version that is pressed into the second negative die.
2. The method according to claim 1, wherein different negative dies are used as first and second negative dies.
3. The method according to claim 1 or claim 2, wherein the pressing of a section of the foam into one of the negative dies is performed with a pressure that is individually adjusted.
4. The method according to claim 3 wherein the pressure is adjusted as a function of the particular foam material used or the depth of the die or contour cuts previously made in the foam.

Fig. 1**Fig. 2****Fig. 3****Fig. 4****Fig. 5**