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(54) Benævnelse: **Fremgangsmåde til videreforarbejdning af et præfabrikeret produkt, såvel som tilhørende præfabrikeret produkt**

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Description

The invention relates to a method for the further processing of an at least partly prefabricated product having an individualising surface according to the preamble of Claim 1, and a prefabricated product according to the preamble of Claim 14.

Within the context of this application, the term “individualising surface” should be understood as including any desired surfaces that are also curved or shaped in three dimensions and are intended and suitable for the application of a multi-dimensional individualisation.

The term “individualisation”, within the context of this application, should be understood to mean that a prefabricated product, such as an injection moulded part as a consumer product, is singly further processed, identified and individualised to result in any prefabricated product. An individualisation is applied such that an individual product is produced from a product that is prefabricated in relatively large numbers and in anonymous manner.

As a starting point, the task repeatedly arises of individualising, in the most diverse ways, products that have already been prefabricated in relatively large numbers, be it a semi-finished product or an article that is manufactured in any desired manner. The individualisation may be a serial number, a signature or another item of personal information, but it is equally conceivable for the individualisation to serve to provide the product with a protection against copying.

WO 2013/154723 A1, which forms the basis of the preamble of Claim 1, discloses a method and a product in which insert parts are encapsulated by additive manufacturing. First, and preferably likewise additively, a base is manufactured onto or into which the subsequently embedded insert part is introduced. The method is intended for the simultaneous processing of 10 to 40 parts, wherein a UV-curing material is ejected in layers and applied in order to embed the insert part. There is no provision for individualisation to result in the respective single product from a plurality of identical prefabricated products.

WO 2014/005591 A1 discloses providing, on a product that is manufactured by the injection moulding of plastics, a mounting surface on which a further part, subsequently detachable from this product again, is applied by additive manufacture such that individually shaped components are produced. The objective is a high degree of freedom in shaping, while at the

same time producing a reliable connection between the components of the starting product and the further component that is manufactured on the mounting surface.

WO 2010/071445 A1 discloses manufacturing complex parts using 3D techniques and then injection moulding around them. To put it another way, a 3D printed product is taken as the basis and a surface is then applied thereto by injection moulding it on as appropriate. The objective is to obtain a surface as in the case of an end product that is manufactured by injection moulding, but without individualisation.

US 2001/0035597 A1 discloses the application of marks, including those in three dimensions, to semiconductor products by stereolithography, in order in this way to determine the position and orientation of the semiconductors during the processing procedure.

Document EP 2 620 289 A2 discloses the application of drops of fluid to form a motif on at least a part of an object at least partially provided with a three-dimensional structure.

An additive manufacturing method for the application of drops that are joined together is known in particular from EP 1 886 793 A1. There, a plasticising unit that is known in the injection moulding technique and which prepares, mixes and homogenises the material is coupled to a pressurisable material reservoir. In order to produce an article on an object carrier, this material is discharged in the form of drops, via a discharge opening. Because of the adhesive forces of the material and the required small drop size, in the range of 0.01 to 0.05 mm^3, in this case a pressure at a level of more than 10 to 100 MPa is required with high melting points. However, the plasticising unit has the advantage that conventional injection moulding materials can be used, since as a result of the preparation raw materials of this kind, which are usually free-flowing, can be put in a liquid aggregate condition. Moreover, the temperature of the material and that of the applied drops can be influenced such that an optimum connection is made between the drop and the substrate.

Taking this prior art as a starting point, the object of the present invention is to provide a method as a result of which products that are prefabricated in relatively large numbers can be further processed, individualised or personalised to meet individual demands. Further, a prefabricated product that makes this method possible is to be provided.

This object is achieved by a method having the features of Claim 1 and by a prefabricated product having the features of Claim 14.

According to the method, the starting point is a prefabricated product that has an individualising surface as the surface for an additive multi-dimensional application of material. Information for the additive multi-dimensional application of material is provided for the multi-dimensional, that is to say three-dimensional, individualisation of the product, with the result that this multi-dimensional individualisation can be prepared such that additive application on the individualising surface is possible. The prefabricated product is then placed into a corresponding device for additive application of the individualisation, and the multi-dimensional individualisation, which has been digitally deconstructed into the various elements, such as layers, is assembled again on the individualising surface such that the prefabricated product is individualised appropriately after this further processing procedure. This can be performed singly for each product, depending on the machine cycle. It is thus possible for a prefabricated product such as an injection moulded part as a consumer product to be individually further processed, identified and individualised from a plurality of similar products.

For example, a customer may specify that the prefabricated product is individualised for example with the customer's logo, signature or an image that the customer writes, copies or deposits in another suitable manner in a field in an order. This order is read in and a product that is prefabricated in relatively large numbers, for example by injection moulding, is provided that has the appropriate individualising surface. This product is then provided with the multi-dimensional individualisation in a device for additive manufacturing, that is to say the individualisation is applied such that an individual product is created from a product that is prefabricated in relatively large numbers and in anonymous manner.

Preferably, the additive application is performed by discharging drops that are joined together. Where necessary, the prefabricated product may also itself be manufactured by an additive manufacturing method, but it may equally be a product that is manufactured for example by an injection moulding procedure in which insert parts are inserted at the same time. Likewise, a holder that is used in the device for additive manufacture to hold the prefabricated product there may also itself be manufactured by this device, that is to say the information that makes it possible to manufacture a product is likewise used to create the holder. Preferably, the product itself may include this information in the form of order and processing data, for example in that there is a QR code on the prefabricated product or

indeed on the individualising surface, or an RFID component accompanies the product during the further processing procedure.

For further processing of this kind for the purpose of individualisation, the product is equipped with an information carrier, or an information carrier accompanies it in a holding element or region that is separable from the product. Using the information on the information carrier, the individualisation is then carried out in the form of mutually connected drops.

Where necessary, material in which the multi-dimensional individualisation is embedded, or indeed which covers it, may be applied to the prefabricated product in further method steps. Moreover, further materials may be applied by suitable method steps such as, once again, additive manufacture, and these further individualise the prefabricated product by creating for example a particular feel that is adapted to the user.

Further advantages are apparent from the subclaims and the description given below of preferred exemplary embodiments.

In the following the invention is explained in more detail below with reference to exemplary embodiments that are illustrated in the Figures, wherein:

Fig. 1 shows a view, partly in section, of a device for additive manufacturing,
Fig. 2 shows a three-dimensional illustration of an object carrier having mounted thereon a holder, in which the prefabricated product is inserted,
Fig. 3a shows a view of a prefabricated product with an individualising surface,
Fig. 3b shows a view of the product according to Fig. 3a with a multi-dimensional individualisation applied thereto,
Fig. 3c shows a section along line IIIc-IIIc in Fig. 3b,
Fig. 4a shows an illustration according to Fig. 3b,
Fig. 4b shows a section along line IVb-IVb in Fig. 4a, and
Figs. 5a, 5b show a prefabricated product with a covered individualisation, in plan view and in section along line Vb-Vb in Fig. 5a.

Description of preferred exemplary embodiments

The invention is now explained in more detail by way of example, with reference to the attached drawings. However, the exemplary embodiments are only examples, which are not intended to restrict the inventive concept to a particular arrangement. Before the invention is described in detail it should be pointed out that it is not restricted to the respective constituent parts of the device and the respective method steps, since these constituent parts and method may vary. The terms used here are merely intended to describe particular embodiments and are not used restrictively. Moreover, where the singular or the indefinite article is used in the description or the claims, this also refers to the plural of these elements unless the overall context unambiguously indicates otherwise.

Before discussing the method sequence for further processing of prefabricated products 30 according to Figures 2 to 5b, the structure and mode of operation of a device I for manufacturing a three-dimensional article by additive manufacturing from at least one solidifiable material is first explained with reference to Fig. 1. The material 34 which is used in the exemplary embodiment for producing an additive multi-dimensional material application as a multi-dimensional individualisation 32 is plasticised or liquefied for processing by means of a plasticising unit. Here, a plasticising unit that is known per se in the technique of injection moulding is used, and this prepares, mixes and homogenises the material. At the same time, the plasticising unit generates a high pressure that is required for discharge, preferably in the form of drops, in a range of more than 10 to 100 MPa. Using the plasticising unit that is illustrated in Fig. 1 by the pressure-generating unit 10 and the preparation unit 11, materials and additives that are conventional in the injection moulding technique may be used, which are usually in a free-flowing starting condition and are transformed in the liquid aggregate condition by the plasticising unit. This material preferably cures after discharge from a discharge unit 12 and hence forms the article to be manufactured, i.e. the multi-dimensional individualisation 32. In principle, curing using further agents is not required. In particular, a layer need not cure before the next layer can be applied. As a result, the materials can also be manufactured “wet on wet” with overlappying layers, that is to say drops 70 of the preceding layer may but need not yet be plasticised or undergo heat treatment such that a better connection between the layers is produced than if a layer is already fully cured before drops 70 of the next layer are applied thereto.

Preferably, for this purpose drops 70 are discharged from a pressurised material reservoir 12c, by way of the outlet opening 12b and in the direction of the object carrier 13 and the

prefabricated product 30 there, inside a structural space 20. As a result of the sequential discharge of drops 70 or indeed strands or threads, the multi-dimensional individualisation 32 is thus produced in the structural space 20, layer by layer, on the object carrier 13 that is movable in relation to the outlet opening 12b by a drive unit 16. The material reservoir 12c is filled by the conveying means 26 and pressurised. The entire device is located on a machine bed 15. It is controlled by way of a control device 60, which, on the basis of predetermined or input information, controls the drive part 12a of the discharge unit 12, the drive unit 16 for the object carrier 13, and the pressure-generating unit 10.

Since the type of material and processing thereof are crucial to the result of the method that is to say to the quality of the article manufactured, it is discussed in detail. The solidifiable material is a plasticised material such as silicone, or a plasticisable material such as thermoplastics or indeed materials in powder form. The material may also be a material that is reversibly meltable under heat and hence recyclable. Thus, possible materials are also conventional materials that are used in the injection moulding of plastics, that is to say that there is no need to resort to expensive specialist materials. Standard materials of this kind that are known from the injection moulding technique are inexpensive and at the same time available throughout the world. However, these materials are highly viscous, unlike other materials used in normal thermal printing or inkjet methods. The dynamic viscosity of the solidifiable material is between 100 and 10 000 Pa.s, with the result that corresponding pressures of more than 10 to 100 MPa are required, in particular for obtaining small drop volumes.

In practice, however, it has been found that it is precisely this procedure and the pressure that contribute to giving good results during manufacture. The material is prepared, mixed and homogenised and is discharged, preferably in drops, directly out of the material reservoir, which is at the said pressure. These discharged drops at the same time create the final geometry, that is to say they cure without further agents or cooling. As a result of pressure, processing such as that in injection moulding, and discharge in drops, the drops are joined together or melted into one another, which results in an extremely firm connection between the materials.

Figures 2 to 5b show the procedure with a method for further processing of an at least partly prefabricated product 30, which in Figures 2 to 4b is a pair of scissors and in Figures 5a, 5b a lens. Products of this kind may be mass-produced parts which are created for example by an injection moulding procedure or another manufacturing procedure. Figure 2 shows a

holder 40 that is arranged on an object carrier 13 formed by an X/Y carriage. Visible in the Figure is a receiving region 41 in the holder 40, wherein the left-hand region, which is not provided with a prefabricated product 30, is a mirror image of the right-hand region in which a pair of scissors is inserted. The background to this procedure is that a prefabricated product such as an injection moulded part as a consumer product is to be singly further processed, identified and individualised. Continuing with the example of the pair of scissors, the procedure is as follows:

A customer or end user specifies in an order whether a left-handed or right-handed pair of scissors is desired. Depending on this choice, the prefabricated product must in fact later be placed with the handles 30a in the left-hand or right-hand region of the holder 40 in Fig. 2. Further, the customer gives permission for the scissors to be individualised, for example with the customer's logo, signature or an image, wherein the customer writes or copies this information on three-dimensional individualisation in an order or deposits it in a file or similar. This order is input, that is to say copied and digitised, such that in a preceding manufacturing procedure such as an injection moulding procedure, with the metal blade parts automatically inserted individually as the insert parts 33, a pair of scissors for left-handed or right-handed users is produced in an injection mould with appropriate shaping of the handles 30a. As a result of this step, the handles 30a are connected to the insert parts. The connection of the handle 30a and the insert part 33 may be performed in a separate manufacturing step or indeed in the same manufacturing step as that in which the multi-dimensional individualisation 32 is also produced. In this case, the handles 30a would be shaped by additive manufacture.

After the injection moulding procedure, a QR code corresponding to the order data and the actual injection moulding data that have been used for the part during the automated injection moulding is printed directly onto the activatable plastics material on the part. The pair of scissors that is produced in this way may be introduced, as a prefabricated product 30, into a device I for additive manufacturing of the multi-dimensional individualisation, wherein the term "multi-dimensional manufacture" should be understood to mean three-dimensional manufacture or manufacture in which a flat element is made three-dimensional. Preferably, the customer order is retrieved there from a QR code and the associated desired individual logo is deconstructed from the order into elements by means of an algorithm, that is to say is deconstructed into layers. The pair of scissors is then laid in the holder 40 in a manner dependent on whether it has been constructed as a right-handed or left-handed pair of scissors, and in the device I is provided with the multi-dimensional individualisation 32.

This multi-dimensional individualisation 32, which has previously been digitised and deconstructed into elements that are suitable for additive application of the individualisation on a surface 31 as a multi-dimensional application of material, is re-constructed according to the information provided to give the multi-dimensional individualisation again, that is to say the individualisation 32 is created. The surface 31 is thus an individualising surface and is designated an individualising surface 31 below. Where necessary, the individualisation produced in this way may additionally be coated in a further material 35 which is for example transparent, in that material is injected around the product for example in a further injection moulding procedure. Likewise, it is possible to apply further material 37 in order to improve the pair of scissors with a transparent soft component for enhancing the ergonomics and feel. As a result of the information, at least one of the prefabricated products 30 is identified and individually provided with the multi-dimensional individualisation 32.

According to Fig. 1, the additive application of the individualisation may be performed by drops 70 that are joined to one another. The prefabricated product 30 itself may also be manufactured by an additive manufacturing method or another method such as injection moulding. Figures 3a to 3c make it clear that in the exemplary embodiment the pair of scissors, as the prefabricated product 30, has the individualising surface 31, in which an information carrier 45 may also be arranged. The information carrier 45 may also be arranged at another location on the product, or, in a manner which is not illustrated, may also accompany the product during the manufacturing procedure, that is to say be provided separately from the product and/or be separable from the product.

Figs. 3a and 3b differ in that the multi-dimensional individualisation 32 has already been applied in Fig. 3b. It can be seen from Fig. 3c, the sectional illustration of 3b along the line IIIc-IIIc, that the multi-dimensional individualisation 32 is in fact applied on top. The handles 30a are connected to the insert parts of the scissor blades and are moulded onto the latter.

The multi-dimensional individualisation 32 may for example be a preferably one-off pattern desired by the user and the client. This pattern is a three-dimensional object. The individualisation 32 is digitised and deconstructed into elements for additive manufacturing, that is to say is deconstructed into layers which are then constructed drop by drop or strand by strand by the device I for additive manufacturing of the individualisation.

Possible multi-dimensional individualisations 32 are in particular elements that have a predetermined geometry, and may be a serial number or a signature or an image. The multi-

dimensional individualisation 32 may also be a protection against copying, however, which is no longer visible on the finished product but makes it possible for the manufacturer to identify it again. For this, but not only for this purpose, the material 34 that is used for the additive application may be coded and/or electrically detectable. If a protection against copying of this kind is included in tamper-proof manner in the finished product, the result is a reliable protection against counterfeiting.

According to Fig. 5b, a further application of material 35 may be performed on a prefabricated product 30 such as the lens illustrated in Fig. 5a such that the individualisation 32 is covered by the application of material 35 in a further manufacturing step. The material applied in Fig. 5a is opaque, but it may equally be transparent or semi-transparent. The further application of material 35 may be performed by injecting material around the prefabricated product 30 which is provided with the multi-dimensional individualisation 32, for example in the mould cavity of an injection mould on an injection moulding machine.

In order to improve the adhesive properties of the individualising surface 31, before the additive application of the individualisation the individualising surface may be pre-treated. This may be done by means of a laser, but a laser may also be used for annotation, in that for example a QR code that contains further information for the processing is applied. This annotation may be covered by the later multi-dimensional individualisation 32. A plasma pre-treatment of the individualising surface is likewise possible for the purpose of improving the adhesive properties.

It is also possible, for application of the multi-dimensional individualisation 32, for the holder 40 for the prefabricated product 30 to be manufactured on the device I for additive application in a step before the individualisation, wherein the holder 40 is then adapted to the prevailing kinematics of the device I.

Preferably, the prefabricated product 30 itself includes the information for individualisation in the form of order and processing data, in that either a corresponding QR code is mounted thereon or an RFID component is provided on the product or accompanies the product. The device I for additive application of the multi-dimensional individualisation 32 identifies the prefabricated product 30 on the basis of this included information and processes it further accordingly.

According to Fig. 3a, the prefabricated product 30 has the individualising surface 31 and, in the exemplary embodiment, is provided with an information carrier 45 that is associated with the prefabricated product 30, for receiving information for individualisation of the prefabricated product. The information carrier 45 and the prefabricated product are conveyable together, at least during the manufacturing procedure. In Fig. 3a, this information carrier 45 is located on the individualising surface 31 and is later covered by the multi-dimensional individualisation 32. However, it may also be at any other location on or in the vicinity of the prefabricated product 30 and pass through the manufacturing sequence together with the prefabricated product. Based on the included information, the multi-dimensional individualisation 32 is produced on the individualising surface 31 in the form of mutually connected drops 70, as is also visible from the finished product.

The prefabricated product is preferably an injection moulded part, in particular having insert parts 33 as visible in Figures 2a to 4b. The multi-dimensional individualisation is a for example one-off pattern or a three-dimensional object and includes at least one of the elements in the group comprising a predetermined geometry, a serial number, a signature, an image or a protection against copying. Preferably, the material 34 used for the multi-dimensional individualisation 32 is coded and/or electrically detectable. The multi-dimensional individualisation 32 may be coated with a further application of material 35 which is preferably transparent, semi-transparent or opaque. The prefabricated product may have further materials 37 for individual adaptation to the user. This material 37 is suitable for producing for example elastic surfaces or surfaces with a pleasant surface feel.

In principle, it is also possible to apply different materials, in order for example to produce prints of different colours or different degrees of hardness in a multi-dimensional individualisation 32 using two components or a plurality of components. Individualisation may be performed on a labelling field that has already been annotated by the laser.

It goes without saying that this description may be subject to the broadest possible variety of modifications, changes and adjustments which are within the range of equivalents to the attached claims.

List of reference numerals

10	Pressure-generating unit
11	Preparation unit
12	Discharge unit
12a	Drive part
12b	Outlet opening
12c	Material reservoir
13	Object carrier
15	Machine bed
16	Drive unit for 13
20	Structural space
26	Conveying means
30	Prefabricated product
30a	Handles
31	Individualising surface
32	Multi-dimensional individualisation
33	Insert part
34	Material for 32
35	Further application of material
37	Further material
40	Holder
41	Receptacle for 30
45	Information carrier
60	Control device
70	Drop
I	Device for individualisation

PATENTKRAV

1. Fremgangsmåde til videreforarbejdning af mindst ét, i det mindste delvist, præfabrikeret produkt (30), som omfatter en flade (31) med henblik på en additiv, flerdimensional materialepåføring, hvorved information vedrørende den flerdimensionale materialepåføring indgives i et apparat (I), i hvilket den flerdimensionale påføring af materiale på basis af denne information bliver digitaliseret og adskilt til elementer, som er egnet til additiv påføring ved den flerdimensionale materialepåføring på fladen (31),
hvorved det præfabrikerede produkt (30) indbringes i apparatet (I) med henblik på additiv påføring af den flerdimensionale påføring, således at elementerne til den flerdimensionale materialepåføring på fladen (31) i henhold til informationen sammenføjes ved en additiv fremstillingsmetode,
hvorved fladen er en individualiseringsflade (31) i det præfabrikerede produkt, og den flerdimensionale materialepåføring er en flerdimensional individualisering (32), som omfatter materialet, hvilken individualisering er et individuelt formet, tredimensionalt objekt og er bestemt til og egnet til individualisering af produktet, og mindst et af de præfabrikerede produkter identificeres ved hjælp af informationen og individuelt udstyres med den flerdimensionale individualisering (32).

2. Fremgangsmåde ifølge krav 1, hvorved den additive påføring sker ved hjælp af dråber (70), der fortrinsvis i endnu plastisk tilstand sammenføjes til hinanden.

3. Fremgangsmåde ifølge krav 1 eller 2, hvorved selve det præfabrikerede produkt (30) er fremstillet ved en additiv fabrikationsmetode.

4. Fremgangsmåde ifølge et af de foregående krav, hvorved den flerdimensionale individualisering (32) er et fortrinsvis unikt mønster, som digitaliseres og adskilles til elementerne med henblik på additiv pålægning.

5. Fremgangsmåde ifølge et af de foregående krav, hvorved den flerdimensionale individualisering (32), omfattende mindst et af elementerne, omfatter en forudbestemt geometri, et serienummer, en underskrift eller et billede og/eller er udformet og anvendt som kopieringsbeskyttelse.

6. Fremgangsmåde ifølge et af de foregående krav, hvorved materialet (34), som anvendes ved den additive påføring af den flerdimensionale individualisering (32), er kodet og/eller elektrisk detekterbart.

7. Fremgangsmåde ifølge et af de foregående krav, hvorved individualiseringsfladen (31), der er udstyret med den flerdimensionale individualisering (32), i et yderligere fremgangsmådetrin udstyres med en yderligere materialepåføring (35), som fortrinsvis er transparent, halv-transparent eller uigennemsigtig.

8. Fremgangsmåde ifølge krav 7, hvorved den yderligere påføring af materiale (35) sker ved indsprøjtning af materiale rundt om det præfabrikerede produkt (30), som er udstyret med den flerdimensionale individualisering (32), i støbekaviteten i en sprøjtestøbeform på en sprøjtestøbemaskine.

9. Fremgangsmåde ifølge et af de foregående krav, hvorved individualiseringsfladen (31) med henblik på forbedring af hæfteegenskaberne før den additive påføring af individualiseringen bliver forbehandlet og/eller ved hjælp af en laser bliver forbehandlet eller forsynet med påskrift.

10. Fremgangsmåde ifølge et af de foregående krav, hvorved en holder (40) for det præfabrikerede produkt (30) med henblik på påføring af den flerdimensionale individualisering (32) ligeledes på apparatet (I) til additiv påføring additivt fremstilles i et trin før individualiseringen, hvorved holderen (40) tilpasses til den givne kinematik for apparatet (I) med henblik på additiv påføring.

11. Fremgangsmåde ifølge et af de foregående krav, hvorved der additivt på det præfabrikerede produkt (30) i det mindste anbringes et yderligere materiale (37) med henblik på individuel tilpasning til brugeren og/eller flerdimensional, yderligere individualisering af produktet.

12. Fremgangsmåde ifølge krav 11, hvorved der på basis af de yderligere materialer (37) dannes elastiske overflader, navnlig med en bestemt følefornemmelse.

13. Fremgangsmåde ifølge et af de foregående krav, hvorved det præfabrikerede produkt (30) bærer information vedrørende individualiseringen i form af påførings- og procesdata med sig, og hvorved apparatet (I) med henblik på additiv påføring af den flerdimensionale individualisering (32) identificerer og videreforarbejder det præfabrikerede produkt (30) ved hjælp af denne medbragte information.

14. Præfabrikeret produkt (30) med en flade (31) for additiv, flerdimensional påføring af materiale, såvel som med en til det præfabrikerede produkt (30) knyttet informationsbærer (45), der optager information vedrørende den additive, flerdimensionale materialepåføring,
hvorved informationsbæreren kan transporteres sammen med det præfabrikerede produkt, hvorved fladen er en individualiseringsflade (31) på det præfabrikerede produkt, og som er bestemt og egnet til individualisering af det præfabrikerede produkt,
hvorved den additive materialepåføring, baseret på informationen, er en flerdimensional individualisering (32), som er dannet med henblik på dannelse af et individuelt formet, tredimensionalt objekt ved hjælp af successivt til hinanden smeltede og derved indbyrdes fast forbundne dråber (70).

15. Præfabrikeret produkt ifølge krav 14, hvorved den flerdimensionale individualisering (32) fortrinsvis er et unikt mønster.

16. Præfabrikeret produkt ifølge krav 14 eller 15, hvorved den flerdimensionale individualisering (32), i det mindste omfattende et af elementerne, omfatter en forudbestemt geometri, et serienummer, en underskrift, et billede eller en kopieringsbeskyttelse, og/eller det til den flerdimensionale individualisering (32) anvendte materiale (34) er kodet og/eller elektrisk detekterbart.

17. Præfabrikeret produkt ifølge et af kravene 14 til 16, hvorved den flerdimensionale individualisering (32) er overtrukket med en yderligere materialepåføring (35), som fortrinsvis er transparent, halv-transparent eller uigennemsigtig.

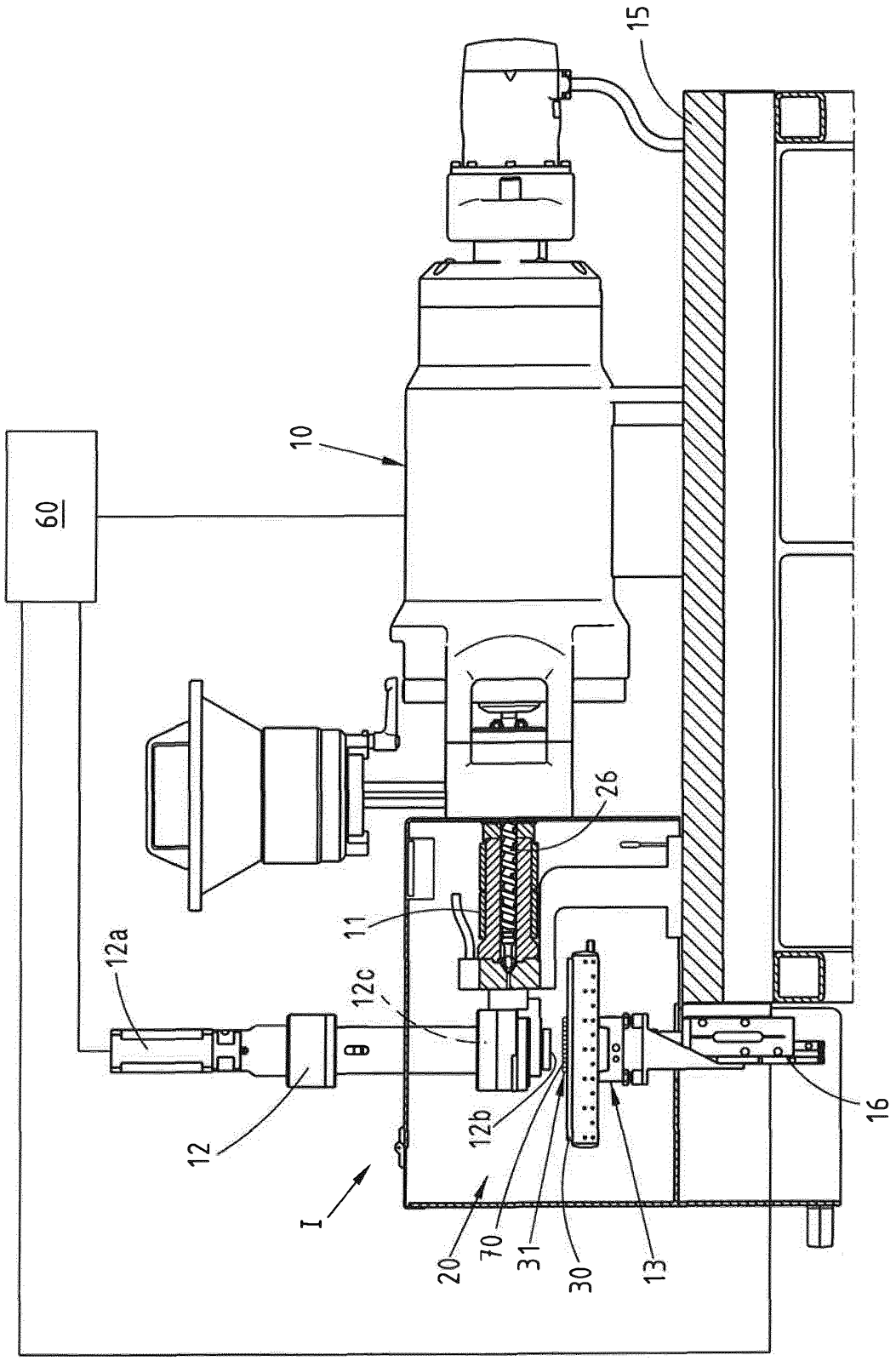


Fig.1

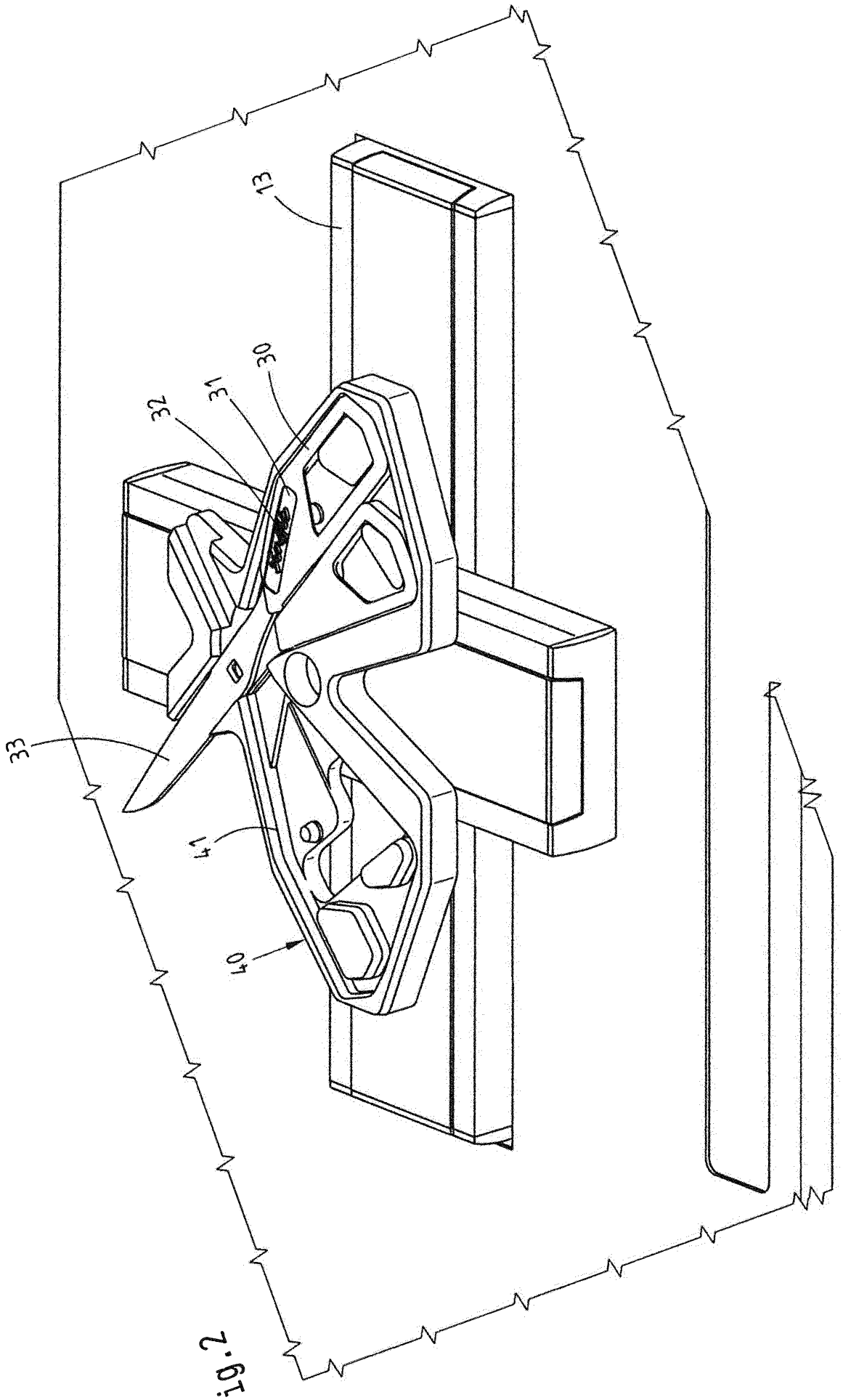


Fig. 2

Fig.3c

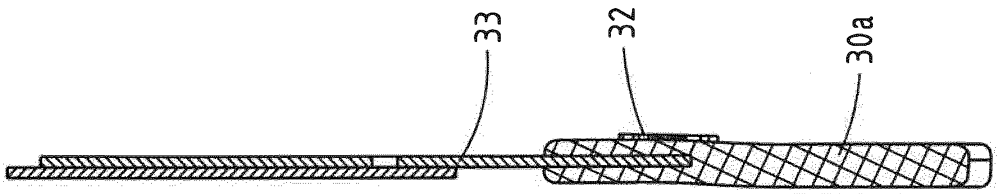


Fig.3b

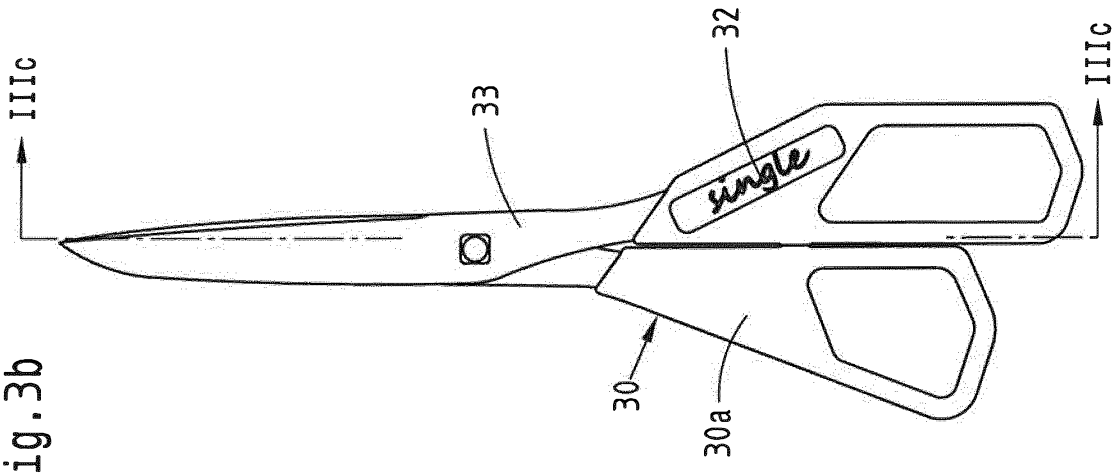


Fig.3a

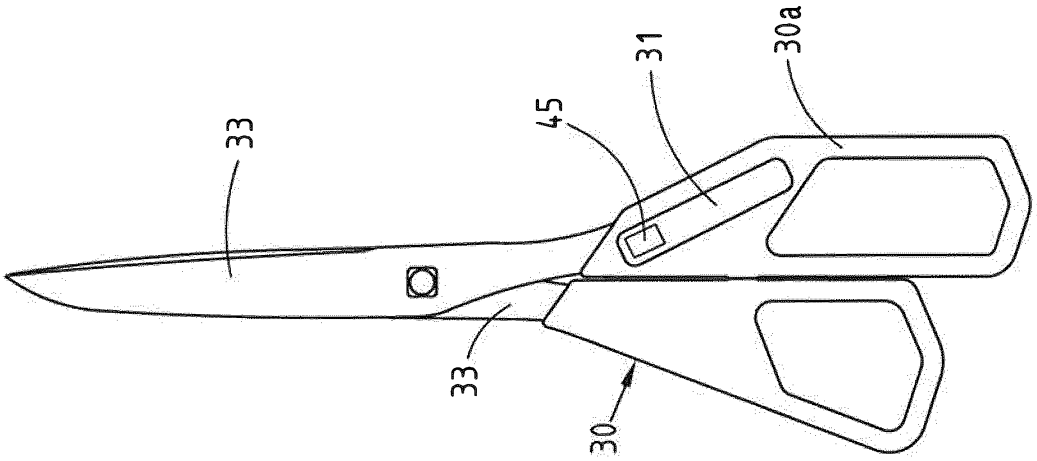


Fig.4b

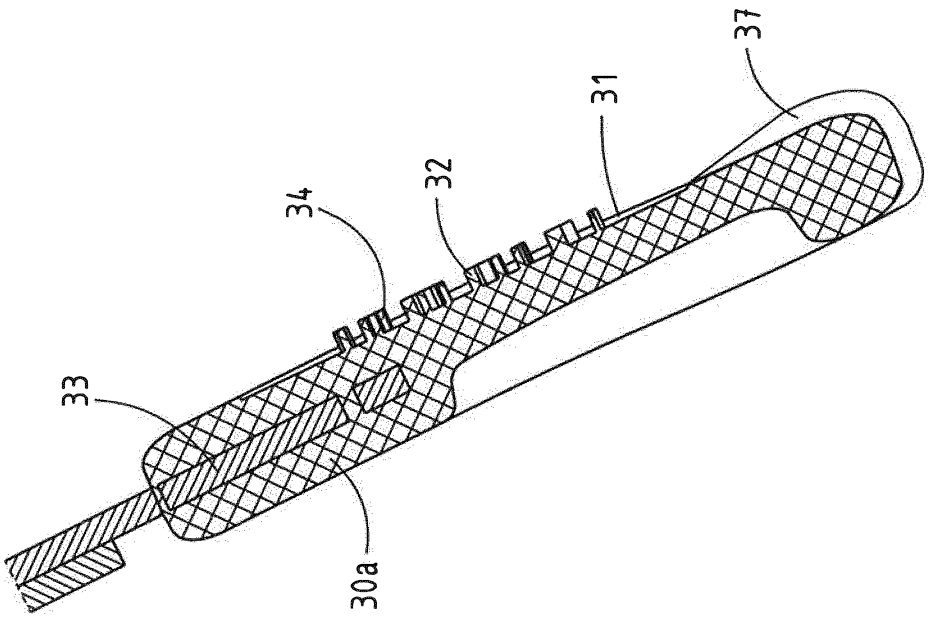
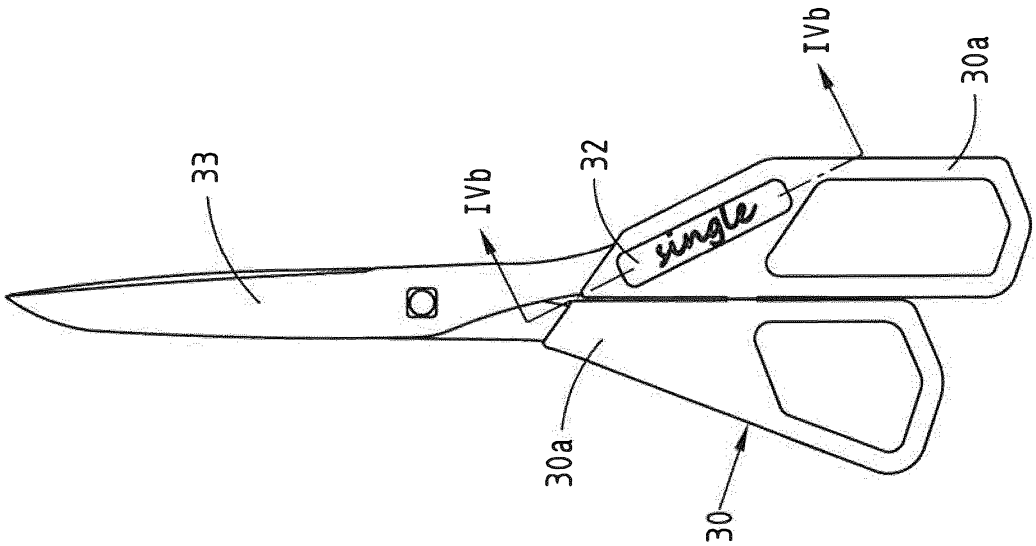


Fig.4a



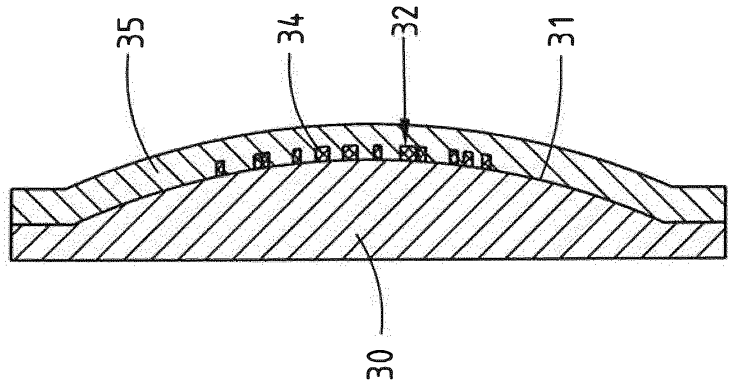


Fig.5b

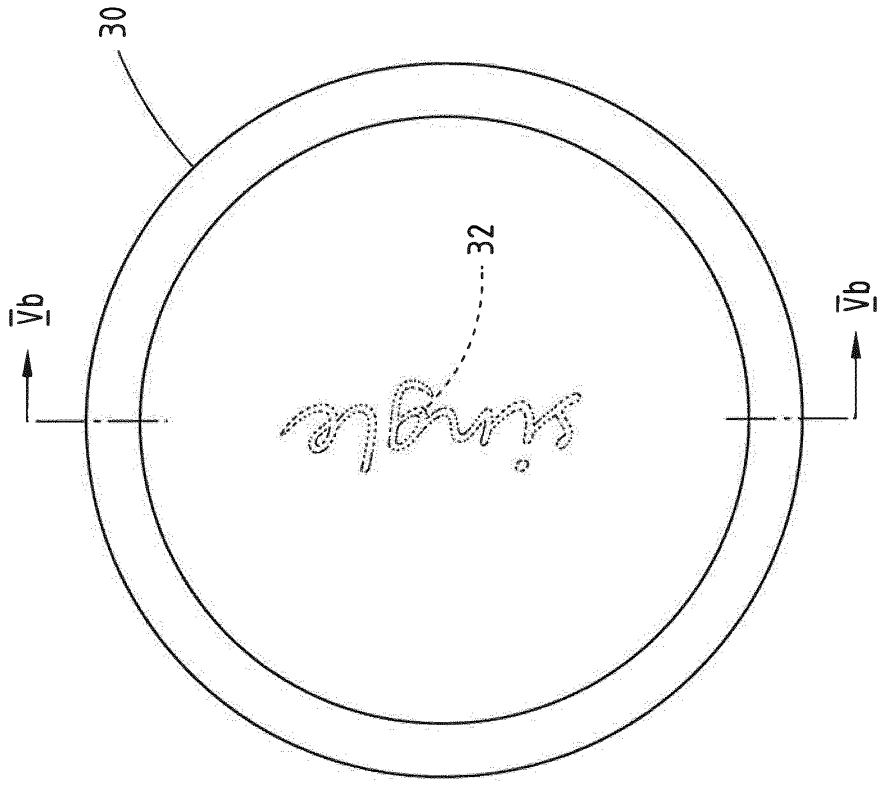


Fig.5a