(19) DANMARK

(10) **DK/EP 2556949 T3**

(12) Oversættelse af europæisk patentskrift

Patent- og Varemærkestyrelsen

(51) Int.Cl.: ***B 31 B 1/25 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2016-07-25**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2016-04-27**

(86) Europæisk ansøgning nr.: **12180096.5**

(86) Europæisk indleveringsdag: **2012-08-10**

(87) Den europæiske ansøgnings publiceringsdag: **2013-02-13**

(30) Prioritet: **2011-08-12 DE 202011104299 U**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

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(54) Benævnelse: **Rille- og prægeværktøj til at præge foldelinjer i foldbare materialer**

(56) Fremdragne publikationer:
EP-A1- 0 017 179
DE-A1- 19 502 164
DE-C1- 3 928 916
JP-A- 2010 284 864

Description

The invention relates to a creasing and embossing tool for embossing folding creases into foldable materials according to the preamble of claim 1. Furthermore, the invention relates to a blank for producing a package as well as to a use of the creasing and embossing tool for producing a blank for a package.

Folding creases in foldable materials such as for example cardboard or paperboard ensure a defined shape of this package in erecting a blank consisting of this material during the production of a package. The contours of the blank are usually produced with the aid of a punching tool, while the folding creases are introduced into the material by a creasing tool. Therein, the creasing and punching tools are often combined such that the punching step and the embossing of the folding creases are effected at the same time or within the same process step. A creasing tool is for example already known from DE 196 10 574 C1 and includes a support plate, on which one or more creasing plates are disposed. The creasing plates each include one or more creasing contours, which emboss corresponding folding creases into the foldable material in cooperation with a counter plate of the creasing tool. Therein, each creasing plate is resiliently flexibly supported on the support plate via an elastomer plate with a preset spring constant. The elastomer plate is compressed due to force application to the creasing plate during the embossing operation, whereby the distance between the creasing plate and the support plate decreases. After creasing, the elastomer plate again relaxes to its original shape, whereby the creasing plate moves back into its initial position. From DE 39 28 916 C1, a creasing and embossing tool having the features of the preamble of claim 1 is known.

In the known creasing tool, the circumstance is to be regarded as disadvantageous that the elastomer plate has to be exchanged after a certain number of embossing strokes, whereby increased replacement part and assembly

costs arise. Since the elasticity and spring effect of the elastomer plate also change with the time, in addition, the dimensional stability of the creasing tool cannot be guaranteed over a longer period of time. Therein, the aging of the elastomer plate results in comparatively irregular embossing results due to the variable tolerances, which requires frequent readjustments of the creasing tool. In addition, more pressure overall has to be exerted on the creasing plate to overcome the spring effect of the elastomer plate. In idle strokes, this results in a very severe stress of the edges of punching knifes, which can also be present in known creasing tools.

It is the object of the present invention to provide a creasing and embossing tool of the initially mentioned kind, which has increased durability and causes lower adjustment and maintenance costs during its operation.

According to the invention, these objects are solved by a creasing and embossing tool for embossing folding creases into foldable material having the features of claim 1 as well as by the use of the creasing and embossing tool according to the invention specified in claim 12 for producing a blank. Advantageous configurations of the invention are specified in the dependent claims.

According to the invention, a creasing and embossing tool, which has increased durability and causes lower adjustment and maintenance costs during its operation, is provided in that the creasing plate is rigidly supported on the support plate such that a distance between the creasing plate and the support plate remains unchanged or at least substantially unchanged upon force application to the creasing plate during an embossing step with respect to a distance between the creasing plate and the support plate in the rest state. In other words, according to the invention, it is provided that the creasing plate is not resiliently flexibly retained on the support plate. Thus, the creasing and embossing tool is formed free of elastic or flexible damping elements, resilient intermediate layers or the like between the creasing plate and the support plate. By the rigid connection of the creasing plate to the support plate, a long-term, tolerance-free use of the creasing and embossing tool without the requirement of readjustments is allowed.

Furthermore, the regular exchange of elastomer plates or the like required up to now is omitted, whereby considerable time and cost advantages are achieved and the unit costs of the blanks creased with the aid of the creasing and embossing tool according to the invention are correspondingly severely decreased. Furthermore, the system according to the invention can advantageously be run with a lower overall pressure. Furthermore, it is provided according to the invention that a punching tool for separating the foldable material, in particular for cutting a material sheet, is associated with the creasing and embossing tool. Hereby, the foldable material can be particularly fast and simply creased and cut in one process cycle. The cutting of the foldable material is additionally simplified by at least one web including an opening and/or forming an opening together with the creasing plate, into which a punching knife of the associated punching tool can penetrate.

Further advantages arise by disposing at least one base element between the support plate and the creasing plate, by means of which a relative position of the creasing plate with respect to the support plate is adjusted, wherein the base element is composed of a stiff material. Simple adjustment of the distance between the creasing plate and the support plate is allowed with the aid of the base element(s). Since the base element is stiffly formed and thus does not yield upon force application to the creasing plate, the distance between the creasing plate and the support plate remains reliably constant also during the use of the creasing and embossing tool. Accordingly, the base element functions as a kind of fundament for the creasing plate.

In a further advantageous configuration of the invention, it is provided that the base element is composed of a metal or a metal alloy, in particular of aluminum or an aluminum alloy, and/or of a rigid plastic material and/or of a ceramic. Hereby, it is ensured that the base element(s) can be produced in a large shape variation and in inexpensive manner and at the same time have high durability and stiffness.

In a further advantageous configuration of the invention, it is provided that the base element is an aluminum plate preferably produced by eroding. Therein, a base element formed as an aluminum plate offers the advantage of high stiffness with at the same time low own weight. Accordingly, the mass of the creasing and embossing tool moved in creasing is comparatively low without losses in the mechanical stiffness having to be accepted. By producing the aluminum plate by an eroding method, complex contours can also be fast and inexpensively produced. Alternatively or additionally, however, it can for example also be provided that the aluminum plate is produced by a primary forming method, in particular a casting or die casting method, and/or by a separating method, in particular by chipping.

In a further advantageous configuration of the invention, it is provided that a contour of the base element is adapted to a contour of the creasing plate. In other words, it is provided that the base element and the creasing plate have an at least substantially similar or identical contour such that the creasing plate is preferably supported on the base element over its entire resting surface. Hereby, a mechanically particularly stiff connection between the creasing plate and the base element is given. Furthermore, modular configuration of the creasing and embossing tool with a simply variable number of optionally differently configured creasing plates, which are each supported on the support plate via an associated base element, is allowed hereby.

In a further advantageous configuration of the invention, it is provided that the creasing and embossing tool includes means for dimensionally accurately disposing the base element and the creasing plate to each other and/or means for setting the base element and/or the creasing plate on the support plate. Hereby, the creasing and embossing tool can be loaded with one or more creasing plates and with a corresponding number of base elements, respectively, in fast, reliable manner and without expensive adjustment measures.

In a further advantageous configuration of the invention, it is provided that the support plate includes at least one receptacle, in which the creasing plate and

optionally the at least one base element are disposed. This allows positioning the creasing plate and an optionally present base element on the support plate by simply disposing in the receptacle without expensive adjustment measures.

In a further advantageous configuration of the invention, it is provided that a contour of the receptacle, a contour of the creasing plate and optionally a contour of the at least one base element are adapted to each other. Hereby, the creasing plate and – if present – the base element(s) can be particularly simply and dimensionally stably disposed in the receptacle on the support plate. Moreover, it is ensured by the contours adapted to each other that the creasing plate and optionally the base element(s) are laterally and circumferentially supported, respectively, and cannot move relatively to the support plate even in case of force application during creasing.

In a further advantageous configuration of the invention, it is provided that the at least one receptacle is formed by a recess in the support plate.

In a further advantageous configuration of the invention, it is provided that at least one compensating element is disposed between the support plate and the creasing plate. Hereby, a simple adjustment of the distance between the support plate and the creasing plate and thus a simple tolerance compensation is allowed. Preferably, the compensating element is a plastic or metal foil with a thickness between 0.05 mm and 20.0 mm. However, it is also possible that the compensating element is composed of paper or ceramic. Other materials are also conceivable. In addition, the compensating element is in particular formed in calibrated manner. In order to be able to ensure this rigid coupling between the support plate and the creasing plate, the compensating element should of course also basically be formed not in resiliently flexible manner. A compensating element formed as a non-elastic plastic or metal foil is particularly suited for height correction or for simply adjusting the distance between the creasing plate and the support plate. For example, multiple compensating elements with a respective thickness difference of 0.05 mm or another suitable thickness difference can be provided and exchanged with each other according to need to adjust the distance

between the creasing plate and the support plate to a desired value. Furthermore, the compensating element allows simple adaptation of the distance between the support plate and the creasing plate for different configurations of an optionally present base element. Therein, it can be provided that the compensating element is disposed between the support plate and the base element and/or between the base element and the creasing plate. Alternatively or additionally, it can be provided that multiple identically or differently thick compensating elements are used for tolerance compensation. Furthermore, it can be provided that a contour of the compensating element is adapted to a contour of the creasing plate and/or the base element and/or a receptacle of the support plate.

A further aspect of the invention relates to the use of a creasing and embossing tool according to any one of the preceding embodiments for producing a blank, in particular for a cigarette box. The features arising herefrom and the advantages thereof can be taken from the preceding descriptions. Therein, advantageous configurations of the creasing and embossing tool are to be considered as advantageous configurations of the use according to the invention.

Further features of the invention are apparent from the protective claims, the embodiments as well as based on the drawings, in which identical or functionally identical elements are provided with identical reference characters. There shows:

Fig. 1 a perspective top view of a base element for a creasing and embossing tool according to the invention;

Fig. 2 a perspective bottom view of the base element shown in Fig. 1;

Fig. 3 a support plate provided with multiple base elements of the creasing and embossing tool according to the invention;

Fig. 4 the support plate shown in Fig. 3, wherein a creasing plate is additionally disposed on each base element; and

Fig. 5 an enlarged perspective view of the support plate shown in Fig. 4.

Fig. 1 shows a perspective top view of a base element 10 for a creasing and embossing tool (not depicted) according to the invention for creasing a blank for a cigarette box and will be explained below in synopsis with Fig. 2, in which a perspective bottom view of the base element 10 shown in Fig. 1 is shown. Therein, the base element 10 is presently formed as a stiff, not elastically flexible aluminum plate and produced with the aid of an eroding method. One recognizes that the base element 10 includes multiple bores 12 formed as blind holes, which serve as a means for dimensionally accurately disposing the base element 10 and its associated creasing plate 14 to each other in cooperation with centering pins (not shown) disposed in the bores 12 as well as in corresponding bores of an associated creasing plate 14 (see Fig. 4). Furthermore, the base element 10 includes multiple mounting openings 16 provided with female threads, which serve as means for dimensionally accurately disposing and detachably setting the base element 10 on a support plate 18 (see Fig. 3) of the creasing and embossing tool as well as means for connecting an associated creasing plate 14 of the creasing and embossing tool in cooperation with corresponding screws (not shown). As becomes clear in particular from Fig. 2, the base element 10 includes multiple groove-shaped recesses 20 on its bottom side to be faced to the support plate 18. Therein, the recesses 20 are formed such that the base element 10 has a weight as low as possible without impairing its mechanical stability and stiffness. Alternatively or additionally, it can be provided that the recesses 20 are used for fast and simply positioning the base element 10 by fitting the base element 10 onto corresponding webs 22 (see Fig. 3) of the support plate 18.

Fig. 3 shows the support plate 18 provided with multiple base elements 10 of the creasing and embossing tool according to the invention. One recognizes that multiple base elements 10 are disposed in contour-shaped receptacles 24 on the support plate 18 in two rows. Therein, for reasons of clarity, the reference characters are only completely represented in association with one base element 10 and correspondingly apply to all of the represented base elements 10. Therein, the receptacles 24 are formed by corresponding recesses in the support plate 18.

In addition, webs 22 disposed on the support plate 18 form a stabilizing grid, wherein the shown webs 22 are composed of a plastic. The contours of the receptacles 24 formed by the recesses correspond to the contours of the base elements 10 such that the base elements 10 can be disposed on and screwed to the support plate 18 in the desired position without setting and adjusting measures.

Furthermore, it can be provided that one or more compensating elements (not shown) for height correction are additionally disposed in the receptacles 24. The compensating element(s) can for example be formed of plastic foils. For tolerance compensation, that compensating element with the required thickness can be selected from a series of differently thick compensating elements and be disposed on and/or below the base element 10 in the receptacle 24. For example, multiple compensating elements with thicknesses increasing by respectively 0.05 mm can be provided. Preferably, a contour of the compensating element corresponds to a contour of the receptacle 24 or of the base element 10 to ensure a rigid and mechanically stable support.

Fig. 4 shows the support plate 18, wherein a creasing plate 14 is additionally disposed on each base element 10 in the corresponding recess 24 and is screwed to the support plate 18 together with the base element 10. Here too, for reasons of clarity, the reference characters are only represented in association with one creasing plate 14 and correspondingly apply to all of the represented creasing plates 14. The base elements 10 serve as fundaments for the creasing plates 14. Therefore, each creasing plate 14 is rigidly connected to the support plate 18 such that the distance between creasing plate 14 and support plate 18 defined by the stiff base element 10 does not or at least substantially not change even during use of the creasing and embossing tool, that is in introducing folding creases into a foldable material. Therein, it can basically also be provided that the base element 10 is set on the support plate 18 and the creasing plate 14 is set on the base element 10 and thus is only indirectly set on the support plate 18. Each creasing plate 14 has multiple creasing contours, which emboss corresponding folding creases into foldable material in cooperation with a counter plate (not shown) of

the creasing and embossing tool in a manner known per se. Therein, the shown creasing plates 14 are formed for creasing a blank for a cigarette box. Therein, the contours of the creasing plates 14, the base elements 10, optionally present compensating elements and the receptacles 24 substantially correspond to the contour of the blank and include additional contour areas for positioning and setting the individual plates and elements.

Fig. 5 shows an enlarged perspective view of the support plate 18 shown in Fig. 4. Therein, it is apparent that the creasing plates 14 also include mounting openings 16, which align with associated mounting openings 16 of the base elements 10 in the mounted state. Furthermore, it is apparent that the webs 22 have slit-shaped openings 26 for receiving a corresponding punching knife of a punching tool (not shown) associated with the creasing and embossing tool and additionally are disposed such that slit-shaped openings 26 arise between the webs 22 and the creasing plates 14. Hereby, foldable material disposed on the support plate 18 can be creased by the creasing and embossing tool and cut by the punching tool in a single process step. Since the creasing and embossing tool does not have resilient intermediate layers between the support plate 18 and the creasing plates 14 in contrast to creasing and embossing tools known from the prior art, therein, a long-term secured, very uniform and tolerance-free production of the creasing bead in the foldable material or in the blank is ensured. Due to the lower adjustment and repair demand of the creasing and embossing tool according to the invention, considerable cost decreases arise, which result in correspondingly lower unit costs of the creased blanks.

PATENTKRAV

1. Rille- og prægeværktøj til prægning af folderiller i foldbare materialer, især til fremstilling af i det mindste én rillevulst i et emneark til en emballage, omfattende en bæreplade (18), på hvilken der er anbragt i det mindste én rilleplade (14), som omfatter i det mindste én rillekontur til prægning af en folderille, hvor rillepladen (14) er stift understøttet på bærepladen (18), således at en afstand imellem rillepladen (14) og bærepladen (18), ved en kraftpåvirkning af rillepladen (14) under et prægetrin, i forhold til afstanden imellem rillepladen (14) og bærepladen (18) i hviletilstanden forbliver uforandret eller i det mindste i det væsentlige uforandret, og rille- og prægeværktøjet er tilknyttet et stanseværktøj til at adskille det foldbare materiale, især til at tilskære et materialeark, **kendetegnet ved, at**
i det mindste ét på bærepladen (18) anbragt tværstykke (22) omfatter en åbning (26) og/eller sammen med rillepladen (14) danner en åbning (26), i hvilken en stansekniv på det tilknyttede stanseværktøj kan trænge ind.

2. Rille- og prægeværktøj ifølge krav 1,
kendetegnet ved, at
der imellem bærepladen (18) og rillepladen (14) er anbragt i det mindste ét grundelement (10), ved hjælp af hvilket en relativ position af rillepladen (14) i forhold til bærepladen (18) indstilles, idet grundelementet (10) består af et stift materiale.

3. Rille- og prægeværktøj ifølge krav 2,
kendetegnet ved, at
grundelementet (10) består af et metal eller en metallegering, især af aluminium eller en aluminiumlegering, og/eller af et formfast plastmateriale og/eller af en keramik.

4. Rille- og prægeværktøj ifølge krav 3,
kendetegnet ved, at
grundelementet (10) er en fortrinsvis ved erodering fremstillet aluminiumplade.

5. Rille- og prægeværktøj ifølge ethvert af kravene 2 til 4,
kendetegnet ved, at
en kontur for grundelementet (10) er tilpasset til en kontur for rillepladen (14).

6. Rille- og prægeværktøj ifølge ethvert af kravene 2 til 5,

kendetegnet ved, at

dette omfatter organer til målnøjagtig anbringelse af grundelementet (10) og rillepladen (14) i forhold til hinanden og/eller organer til at fastlægge grundelementet (10) og/eller rillepladen (14) på bærepladen (18).

7. Rille- og prægeværktøj ifølge ethvert af kravene 1 til 6,

kendetegnet ved, at

bærepladen (18) omfatter i det mindste én holder (24), i hvilken rillepladen (14) og i givet fald det i det mindste ene grundelement (10) er anbragt.

8. Rille- og prægeværktøj ifølge krav 7,

kendetegnet ved, at

en kontur for holderen (24), en kontur for rillepladen (14) og i givet fald en kontur for det i det mindste ene grundelement (10) er indbyrdes tilpassede.

9. Rille- og prægeværktøj ifølge krav 7 eller 8,

kendetegnet ved, at

den i det mindste ene holder (24) er dannet af en udsparing i bærepladen (18).

10. Rille- og prægeværktøj ifølge ethvert af kravene 1 til 9,

kendetegnet ved, at

der imellem bærepladen (18) og rillepladen (14) er anbragt i det mindst ét udligningselement, især en plast- eller metalfolie med en tykkelse imellem 0,05 mm og 20,0 mm.

11. Rille- og prægeværktøj ifølge ethvert af kravene 1 til 9,

kendetegnet ved, at

der imellem grundelementet (10) og rillepladen (14) er anbragt i det mindste ét udligningselement, især en plast- eller metalfolie med en tykkelse imellem 0,05 mm og 20,0 mm.

12. Anvendelse af et rille- og prægeværktøj ifølge ethvert af kravene 1 til 11 til fremstilling et emneark til en emballage, især til en cigaretpakke.

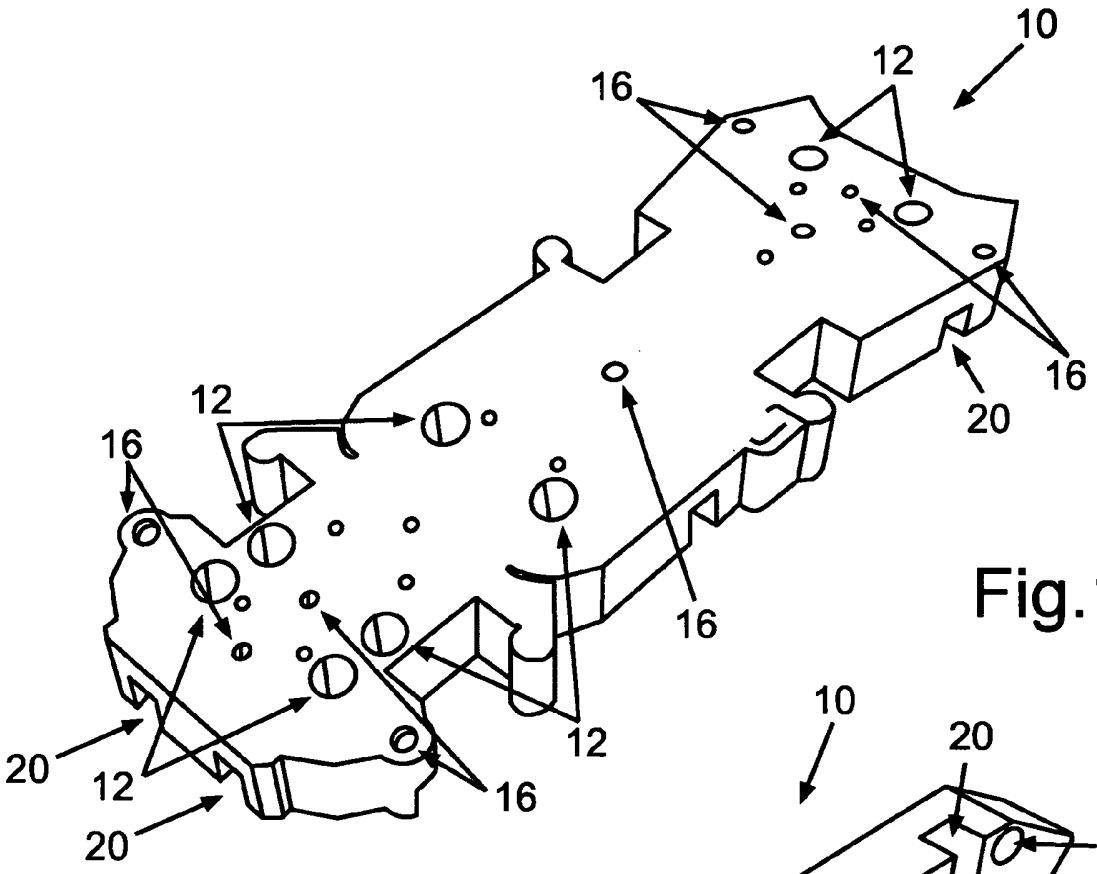
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Fig.1

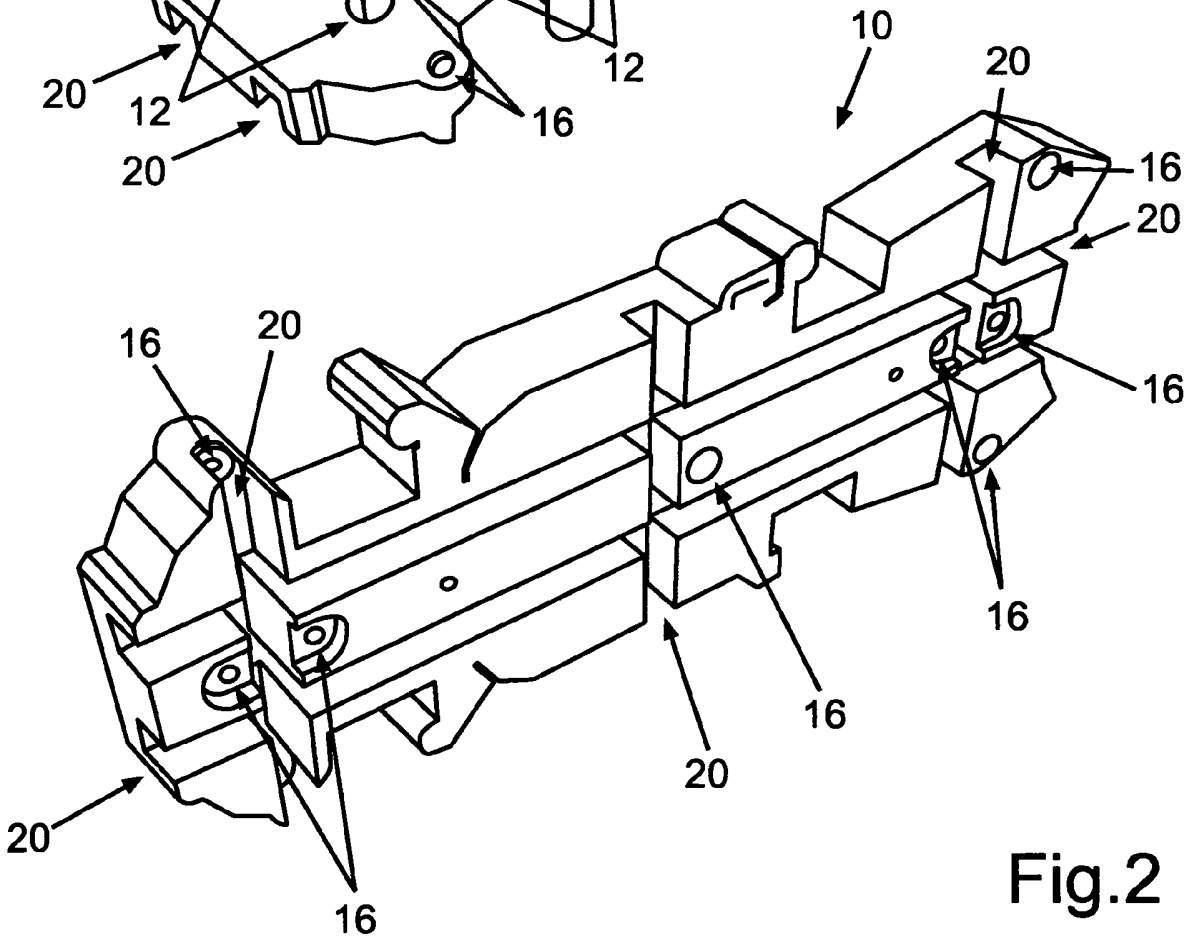
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Fig.2

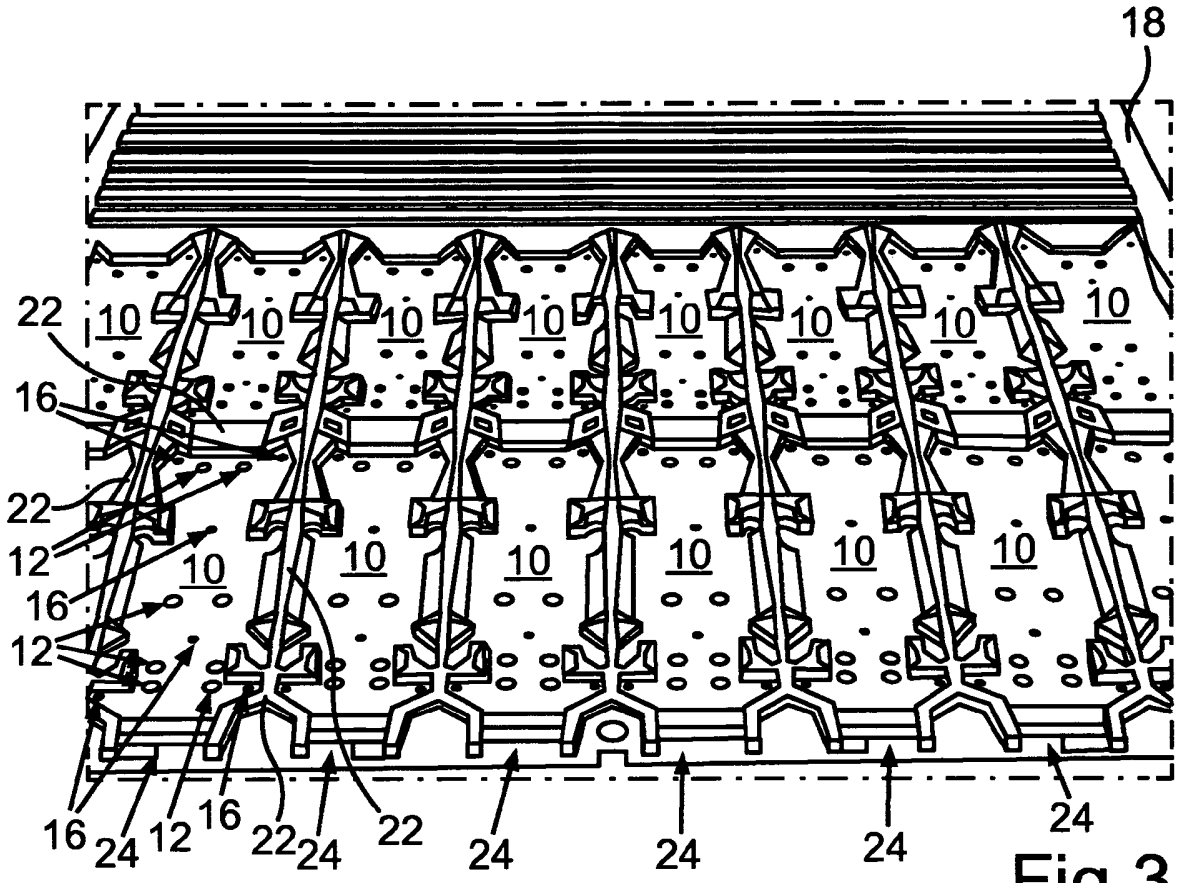

Fig.3

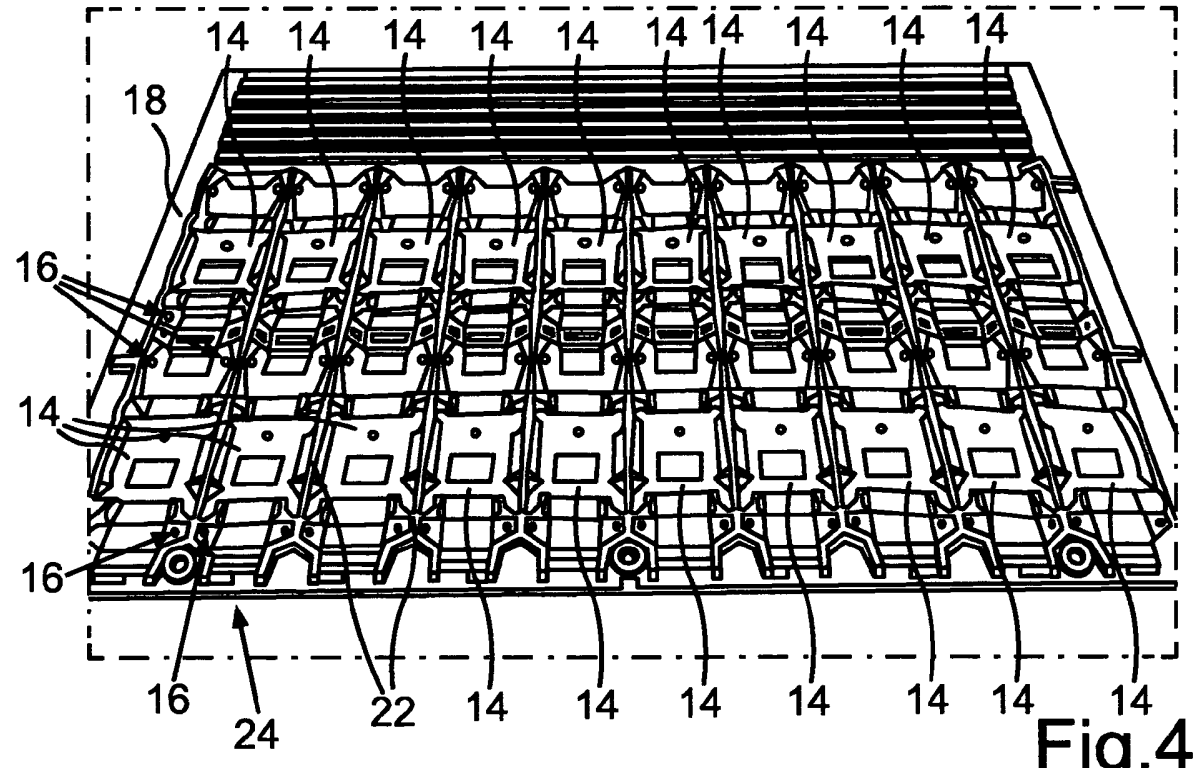

Fig.4

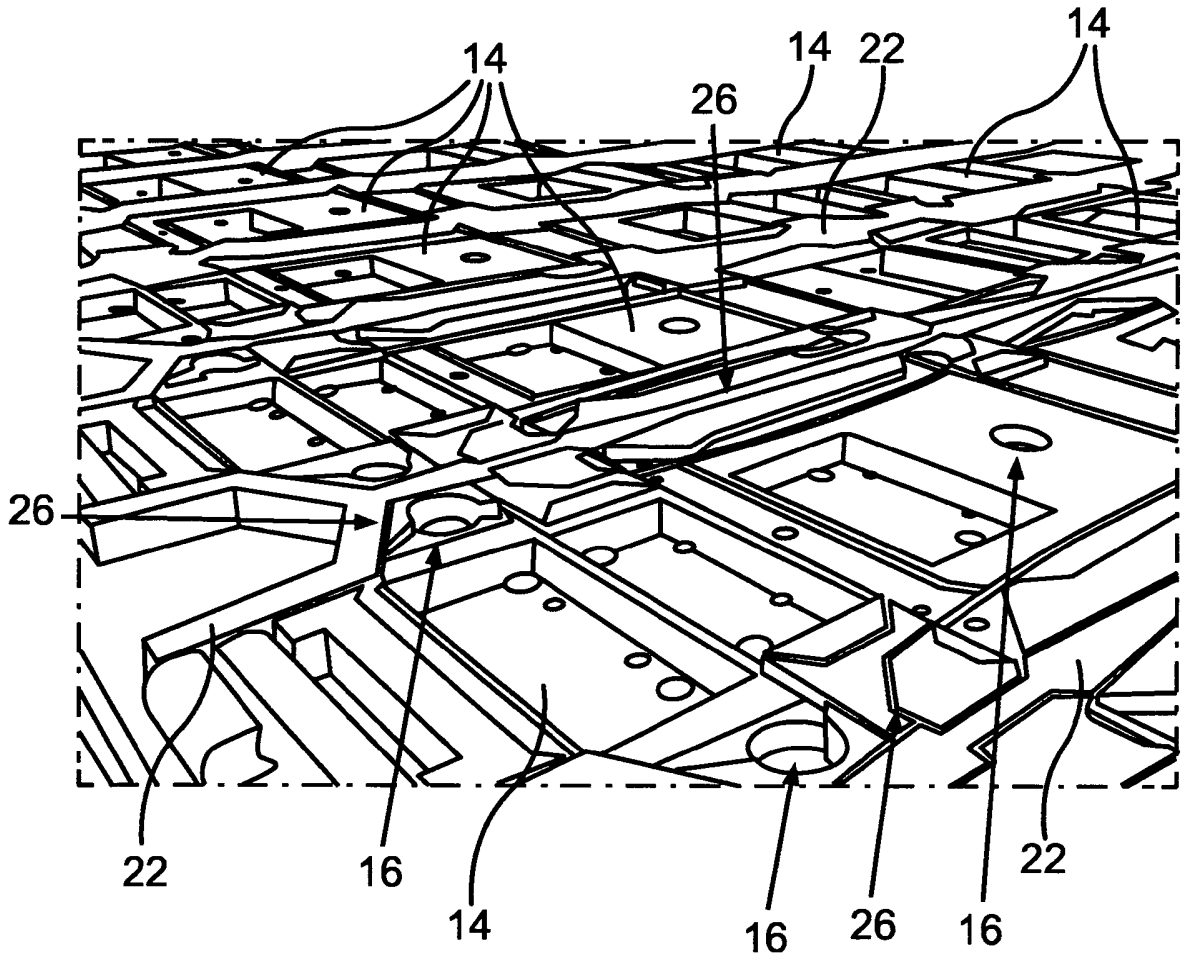

Fig.5