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Description

The present invention relates to a packaging machine according to the preamble of Patent Claim 1.

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A generic packaging machine is described, for example, in DE 31 189 46 A1.

10 Packaging machines of this type are well known from the prior art and are referred to, for example, as so-called form-fill-seal (FFS) packaging machines. By way of example, in the case of these packaging machines a packaging tray is molded in a lower film web, for example by vacuum forming, then filled with a packaging content and then closed with a cover film.

15 The item of packaging thus completed is finally singularized in that it is cut out from at least one film web. Preferably, here this is a so-called profile cut, in which the entire profile of the packaging is removed from the film web by way of one cutting means. These packaging machines preferably

20 operate in a cyclical manner, that is to say that the film web/webs is/are conveyed onward in a cyclical manner by in each case one so-called indexing length. Typically, a multiplicity of items of packaging which are arranged in a format which consists of a plurality of columns and/or a

25 plurality of rows are simultaneously produced here. The items of packaging of a format of this type are always simultaneously processed.

Nowadays, it is a must for packaging machines to be employable

30 in a highly flexible manner, that is to say that a multiplicity of different items of packaging in different formats have to be able to be produced by said packaging machines. Since different tools are required for the item of packaging in each case and/or for the format in each case,

35 said tools have to be changed for producing different items of packaging. In order to keep the down time of the packaging machines according to the invention as low as possible, this tool change has to take place as fast as possible.

It has, therefore, been the object of the present invention to provide a packaging machine having a cutting station in which the tool change can take place faster than in machines
5 according to the prior art.

The object is achieved with a packaging machine which has the features of Patent Claim 1.

10 The present invention relates to a packaging machine having a cutting station. A packaging machine of this type is, for example, a so-called form-fill-seal (FFS) packaging machine in which a packaging tray is molded in a lower film, which is filled with a packaging content and subsequently closed with a
15 cover film. The item of packaging completed in this manner finally has to be singularized, that is to say cut out, from the lower film and/or the cover film, using the cutting station.

20 Packaging machines of this type operate in a cyclical manner, that is to say that the film web in each case is intermittently conveyed by a so-called indexing length along the packaging machine. Typically, a multiplicity of items of packaging, a so-called format which consists of a multiplicity
25 of rows and/or columns, are simultaneously produced. Each of these items of packaging has to be singularized.

The cutting station has a cutting means, which is typically provided with a cutting blade, and a counter means, which
30 preferably interacts in a scissor-like manner with the cutting means and which typically has a means for clamping the film web prior to and/or during cutting, or a cutting means, which is typically provided with a serrated cutting blade and which acts in a self-cutting manner, and a counter means, which
35 preferably clamps the film web. Clamping the film web prior to and/or during cutting usually serves to at least enable and/or improve the cutting effect of the cutting means. Here, the cutting means and the counter means preferably have the

profile of the item of packaging which is to be cut out from the film web and/or the cutting means moves along a predetermined profile which corresponds to the profile of the desired item of packaging. In order to cut out the item of packaging from the respective film web, according to the invention the cutting means and the counter means are moved toward one another by at least one drive, preferably a plurality of drives, until the respective item of packaging has been cut out. According to the invention, it is now provided that the drive is preferably provided beside the film web. On account thereof, the region in which the film web moves along the packaging machine is freely accessible and can be used for a tool change, enabling the latter to be carried out substantially faster than has been possible to date. A person skilled in the art will appreciate that, alternatively or additionally, the drive may also be located above the film web and/or upstream or downstream of the format to be cut out, for example, as long as the region in which the film web moves along the packaging machine is freely accessible to an adequate extent and can be used for a tool change which is substantially faster than has been possible to date.

According to a preferred subject matter of the present invention, the cutting means and/or the counter means are/is in each case fastened on a movable frame. This frame-type fastening likewise permits a very fast and simple tool change. The tool in each case preferably bears at least in part on a horizontal face of the respective frame. For cutting, the frames are moved in relation to one another.

Preferably, at least one frame has a free cross section which substantially corresponds to at least the format to be processed. The free cross section of the frame is preferably provided to be so large that the free cross section of said frame corresponds to the circumference of the largest format which is to be processed on the packaging machine according to the invention. Each frame may be exchangeably located on the cutting station. Each frame, at least in part, is preferably

manufactured from profiles, in particular closed profiles, for example rectangular profiles.

Furthermore preferably, the cutting means and/or the counter means are displaceably located on a machine frame which has a free cross section which substantially corresponds to at least the format to be processed. The free cross section of this frame is preferably provided to be so large that it corresponds to the circumference of the largest format which is to be processed on the packaging machine according to the invention. The frame may be exchangeably located on the packaging machine. Each frame, at least in part, is preferably manufactured from profiles, in particular closed profiles, for example rectangular profiles.

Furthermore, the cutting station has an ejection means which ejects the in each case singularized items of packaging from the respective film web and/or deposits the items of packing cut out in each case onto a conveying means, for example a conveyor belt. One ejection means is preferably provided per item of packaging to be cut out. This ejection means is particularly preferably arranged on the upper frame. Furthermore preferably, each ejection means has a compressed-air connector and/or vacuum connector. This compressed-air connector and/or vacuum connector is in each case particularly preferably supplied via a distributor plate which is connected to at least one compressed-air source and/or vacuum source. On account thereof, connecting hoses between the source and the respective ejection means can be dispensed with. This distributor plate disposes of a multiplicity of clearances, for example bores, which connect the respective source to the respective ejection means. Valves are preferably provided in these clearances in order to control or regulate the amount of compressed air and/or negative pressure in each case.

The ejection means preferably has a venturi nozzle with which a negative pressure can be generated. With this negative pressure, the ejection means can be reversibly connected to

the item of packaging to be singularized in each case, in order to deposit the latter, after having been cut out, onto a conveying means, for example.

5 Preferably, an elastic seal which interacts in a sealing manner with the product to be suctioned and/or to be ejected is provided on the ejection means. This seal is particularly preferably a PUR foam material, very particularly preferably having closed pores.

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The seal is preferably configured as a closed annular face, wherein the ring may optionally be a circular ring.

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The seal is preferably configured so that its shape, at least in sections, follows the faces to be suctioned.

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A further preferred subject matter of the present invention is a packaging machine in which a film web, at least at times, is clamped between two clamping faces. This clamping may be required, for example, in the region of the molding station in which a packaging tray is molded in the lower film web, in the sealing station in which a cover film is sealed onto the lower film web and/or in the cutting station in which the items of packaging are in each case singularized, in order to prevent the respective film web from slipping in an undesirable manner and/or in order to clamp the film web and to enable and/or improve the cutting effect of the cutting station. Here, one clamping face is located above and one clamping face is located below the respective film web, said clamping faces being moved toward one another for clamping. Preferably, at least one of these clamping faces, at least in portions, is structured; particularly preferably, however, both these clamping faces, at least in portions, are structured; these clamping faces are, in particular, provided with a pyramid-like structure. On account thereof, a particularly good clamping effect is achieved between the clamping faces. Preferably, the structure of the two clamping faces that interact in a clamping manner is a mutually offset one, in

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particular offset so that the tip of a pyramid of one clamping face engages in the intermediate space between at least two pyramids of the other clamping face.

5 A further subject matter of the present invention is a method for changing a cutting tool of a cutting station, in which the cutting means and/or the counter means and/or the ejection means are in each case pulled or pushed from a frame of a cutting station in or counter to the running direction of the
10 film web.

The explanations made in respect of the packaging machine according to the invention apply in equal measure to the method according to the invention, and vice versa.

15 On account of the cutting means, the counter means and/or the ejection means in each case being pulled from the frame of a cutting station in or counter to the running direction of the film web, a particularly simple, space-saving tool change is
20 possible.

An optionally present ejection means is preferably placed from above onto the upper frame and secured there. The tool change preferably takes place with very simple means, preferably in a
25 tool-free manner.

The inventions will be explained in the following by means of figs. 1 - 5c. These explanations are merely exemplary and do not limit the general concept of the invention. The
30 explanations apply in equal measure to all subject matter of the present invention.

Fig. 1 shows the cutting station according to the invention.

35 **Fig. 2** shows the tool change in the cutting station according to the invention.

Figs. 3a - 3c show the singularization of items of packaging from the packaging film.

Fig. 4 shows details of the clamping faces.

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Fig. 5 shows an embodiment of the ejection means.

Fig. 1 shows the cutting station 11 of the packaging machine according to the invention. This packaging machine preferably
10 has a molding station in which a packaging tray is molded in a so-called lower film web, a filling station in which the at least one packaging content is filled into the packaging tray produced in the lower film web, and a sealing station in which a cover film is sealed onto the filled packaging tray. A
15 cutting station which singularizes the completed item of packaging from the lower film web and/or the upper film web is situated downstream of the sealing station. The packaging machine according to the invention preferably operates in a cyclical manner, that is to say that in each cycle the
20 respective film web is conveyed onward along the packaging machine by a specific indexing length. For processing the respective film web, the latter is preferably stopped. At each operating step, preferably a multiplicity of items of packaging, preferably in a so-called format which consists of
25 a plurality of columns and/or a plurality of rows, are simultaneously produced, in that the respective processing step for producing the respective item of packaging in each case takes place simultaneously. During the respective processing of the respective film web, the latter preferably
30 is stopped. The cutting station 11 has a static machine frame which is statically mounted preferably on the right and on the left on the machine frame of the packaging machine. On this machine frame, a first, in this case an upper, frame 3 and/or a second, in this case lower, frame 8 are provided, in
35 particular in a vertically displaceable manner. For cutting, at least one of the two frames 3, 8 is moved in relation to the other frame 3, 8 from a position which is spaced apart from the film web into a cutting position. Preferably, at

least one frame 3 has a means, for example a spring means, which pretensions said frame 3 in its position which is spaced apart from the film. The other frame 8 is held in its spaced apart position preferably by gravity. For moving the two
5 frames toward one another and/or away from one another, the cutting station has at least one, in this case two, drive means, preferably a cylinder, in particular a heavy duty cylinder. As can be seen in particular from fig. 3a, this drive means is preferably located to the right and to the left
10 of the film web and, therefore, does not block the region below or above the film web, such that said region is available for a tool change, for example. On the first, in this case the upper, frame 3 a cutting means 4, which has a multiplicity of cutting edges which singularizes the
15 respective item of packaging from the respective film web, is located. The cutting edge may be a closed, static blade. This blade typically has a cutting tip which preferably lies in one plane but which may also be serrated. The cutting edge, however, may also be a so-called profile cutter which, for
20 cutting, moves along a predetermined profile. On the second, in this case the lower, frame a counter means, for example a counter knife or a cutting screen with which the cutting operation is enabled and/or improved is located. The counter means interacts with the cutting means during cutting. The
25 counter means typically also has a means for clamping the film web, with which the cutting operation is enabled and/or improved.

Fig. 2 shows further details of the cutting station according
30 to fig. 1 and a tool change. It can be seen from fig. 2, in particular, that at least one frame 3, 5, 8, in this case all frames 3, 5, 8 have a free cross section 3.1, 5.1, 8.1 which corresponds to at least the format to be produced in each case, preferably to the maximum format that can be produced.
35 The cutting means 4 is fastened on the upper frame in that it is in particular horizontally inserted by a movement in or counter to the running direction of the film web into the first, in this case the upper, machine frame and bears on the

latter and is then secured there, preferably in a tool-free manner. The same applies to the counter means which is likewise, in particular horizontally, pushed onto the second, in this case the lower, machine frame in or counter to the running direction of the film web and is then secured there, preferably in a tool-free manner. It can be seen from the illustration according to fig. 2 that both the cutting means 4 as well as the counter means 7 preferably have a multiplicity of cutting edges or counter knives, respectively. The number and arrangement of the cutting edges/counter knives corresponds here to the format to be processed in each case and which in the present case consists of two rows and four columns. If present, the ejection means 2 typically has to be likewise exchanged in the case of a format change. As is indicated by the double arrow, in the case of a tool change, said ejection means 2 is preferably lifted or lowered, in the present case in a vertical manner. A person skilled in the art will identify that the tool change in the cutting station of the packaging machine according to the invention can take place with very simple means, preferably in a tool-free manner, and in a very short time. Where applicable, the film web does not have to be severed for a tool change.

Figs. 3a - 3c show the cutting-out of the respective item of packaging from the film web 9, wherein in the illustration the film web is moved through the cutting station from right to left. As can be seen from fig. 3a, initially both the first frame 3 as well as the second frame 5 are situated in a position which is spaced apart from the film web 9. In particular the first, in this case the upper, frame 5 is held in this position by a spring means. Thereafter, a drive means, in this case a cylinder, moves the second frame 8 as indicated by the arrows, in this case upward, into its cutting position (cf. fig. 3b). The first frame 3 here remains in its position spaced apart from the film web. Subsequently, the drive 1 continues its movement, in particular the cylinder is retracted and thereby pulls the first frame 3 as indicated by the arrow, in this case downward, counter to the spring force.

Here, the cutting means 4 which is provided on the frame 3 is likewise moved downward and interacts in a cutting manner in each case with counter means which are located on the first frame 8, such that the respective items of packaging are singularized. The cut-out items of packaging are then discharged downward through the second frame 8. This may take place by ejection, for example by pneumatic ejection by means of compressed air which flows out from the ejection means 2. However, the items of packaging may also initially be reversibly connected to the ejection means, for example by negative pressure, and then deposited in a defined manner, for example onto a conveying means and/or into a further packaging means. Subsequently or simultaneously, the drive means moves in the opposite direction, that is to say for example that a cylinder is extended again and the first and/or the second frame 3, 8 move into the position spaced apart from the packaging film. Said packaging film can then be conveyed onward by one further indexing length before the next cutting cycle commences.

Fig. 4 shows the clamping means according to the invention, in this case using the example of the counter means. This counter means has a clamping face 7.1 which, at least in portions, is structured, in this case is structured in a pyramid-like manner. A structured face 7.1 of this type is situated to the right and to the left of a clearance 7.2, in this case a groove encircling the entire item of packaging, into which a cutting edge of the cutting means plunges for singularizing the respective item of packaging. A person skilled in the art will identify that likewise at least one clamping face which interacts in a clamping manner with the clamping face 7.1 is present on the cutting means. Preferably, this clamping face, at least in portions, is likewise implemented in a structured manner, in particular in a pyramid-like manner, wherein the pyramids of the respective clamping faces preferably are provided so as to be mutually offset, such that the tip of one pyramid of the one clamping face engages in the intermediate space between at least two pyramids of the other clamping

face.

A potential embodiment of the ejection means 2 is illustrated in fig. 5. Said ejection means 2 has a housing 14, in this case a plate, in particular a steel plate, which is provided with a pressure connector and/or a suction-means connector. Moreover, a seal 12, which interacts in a sealing manner with the product to be suctioned and/or ejected, is located on the housing. Preferably, the seal is adapted to the product to be suctioned, in this case a sausage. Preferably, the seal, at least in portions, is designed to be annular, such that one or more suction chambers and/or pressure chambers 13 are configured. Preferably, the seal is made from foamed PUR material which is so elastic that the shape of the seal, in the contact regions, adapts to the shape of the product.

List of reference signs

- 1 Drive means, heavy-duty cylinder
- 2 Ejection means
- 5 3 First, upper frame
 - 3.1 Open cross section of the upper frame
- 4 Cutting means
- 5 Machine frame, static frame
 - 5.1 Open cross section of the static frame
- 10 6 Stop
- 7 Counter means, counter knife, cutting screen
 - 7.1 Clamping face, structured face
 - 7.2 Clearance, groove
- 8 Second, lower frame
- 15 8.1 Open cross section of the lower frame
- 9 Film web
- 10 Item of packaging
- 11 Cutting station
- 12 Seal
- 20 13 Vacuum chamber and/or pressure chamber
- 14 Housing
- 15 Suction connector and/or pressure-means connector

Patentkrav

1. Emballeringsmaskine, der arbejder taktvist, med en skærestation (11), med hvilken der udskæres færdiggjorte
5 emballager af i det mindste en foliebane (9), idet et skæremiddel (4) og et modmiddel (7) og i givet fald et udstødningsmiddel (2) bevæges mod hinanden med i det mindste en drivanordning (1), kendetegnet ved, at drivanordningen (1) ud over det format, der skal udskæres, og som består af et
10 stort antal rækker og et stort antal spalter, er indrettet sådan, at et skift af skæremidlet og/eller udstødningsmidlet (2) og/eller modmidlet er muligt.

2. Emballeringsmaskine ifølge krav 1, kendetegnet ved, at
15 skæremidlet (4) og/eller modmidlet (7) hver især er fastgjort på en bevægelig ramme (3, 8).

3. Emballeringsmaskine ifølge krav 2, kendetegnet ved, at i det mindste en ramme (3, 5, 8) har et frit tværsnit (3.1, 5.1, 8.1), som i det væsentlige i det mindste svarer til det
20 format, der skal udskæres.

4. Emballeringsmaskine ifølge et af de foregående krav, kendetegnet ved, at skæremidlet (4) og/eller modmidlet (7) er
25 anbragt forskydeligt på en maskinramme, der har et frit tværsnit, som i det væsentlige i det mindste svarer til det format, der skal udskæres.

5. Emballeringsmaskine ifølge et af de foregående krav, kendetegnet ved, at skærestationen har et udstødningsmiddel
30 (2), som fortrinsvist er anbragt på den øverste ramme, hvor der fortrinsvist pr. emballage, der skal udskæres samtidigt, hver gang er indrettet et udstødningsmiddel (2).

35 6. Emballeringsmaskine ifølge krav 5, kendetegnet ved, at hvert udstødningsmiddel (2) har en trykluft- og/eller vakuumtilslutning, og at den hver gang via en fordelerplade er forbundet med i det mindste en henholdsvis trykluft- eller

vakuumkilde.

7. Emballeringsmaskine ifølge et af kravene 5 eller 6,
kendetegnet ved, at udstødningsmidlet har en venturidyse som
5 sugemiddel.

8. Emballeringsmaskine ifølge et af kravene 5 eller 6 eller
7, kendetegnet ved, at der på udstødningsmidlet (2) er
indrettet en elastisk tætning, der samvirker tætnende med det
10 produkt, der skal tilsuges og/eller udstødes.

9. Emballeringsmaskine, ifølge et af de foregående krav, ved
hvilken en foliebane i det mindste lejlighedsvist fastklemmes
mellem to klemflader, kendetegnet ved, at i det mindste en
15 klemflade hver gang i det mindste afsnitsvist er struktureret,
især har en pyramideagtig struktur.

10. Emballeringsmaskine ifølge krav 9, kendetegnet ved, at
strukturen af to klemmende samvirkende klemflader er forskudt
20 i forhold til hinanden.

11. Fremgangsmåde til skiftning af et skæreværktøj i en
skærestation, ifølge et af de foregående krav, kendetegnet
ved, at skæremidlet (4) og/eller modmidlet (7) og/eller
25 udstødningsmidlet (2) i eller mod foliebanens (9) løberetning
hver gang trækkes eller skubbes ud af en ramme (3, 8).

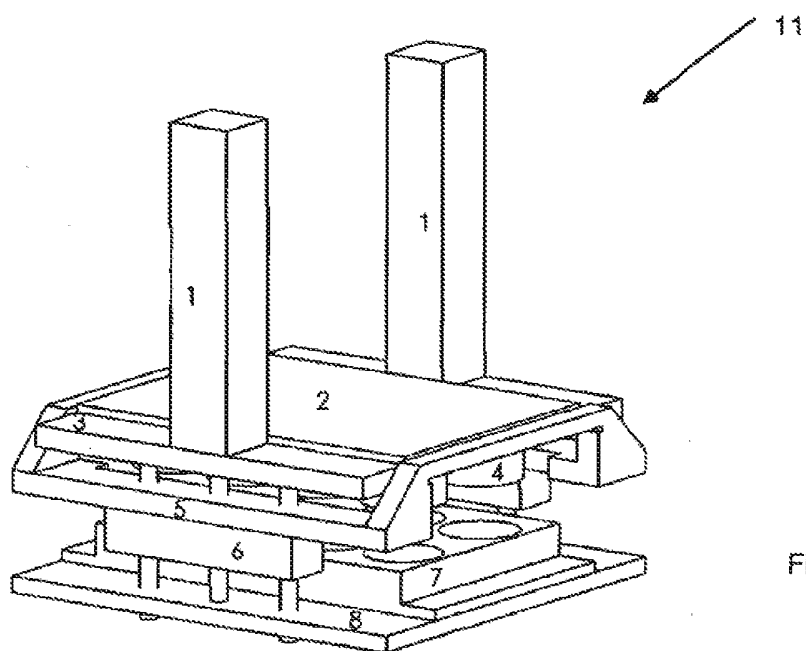


Fig. 1

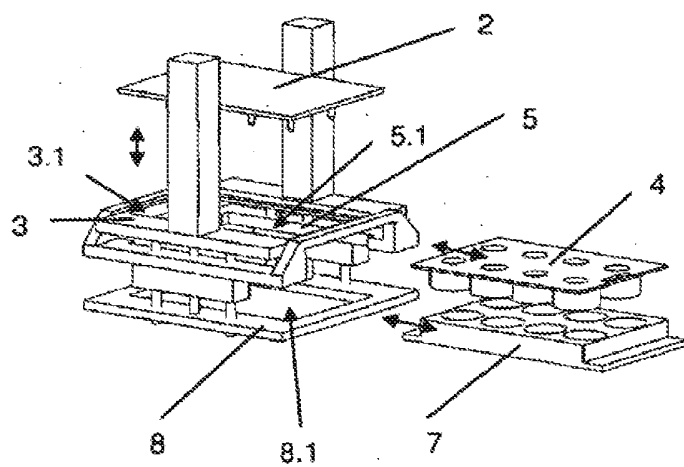


Fig. 2

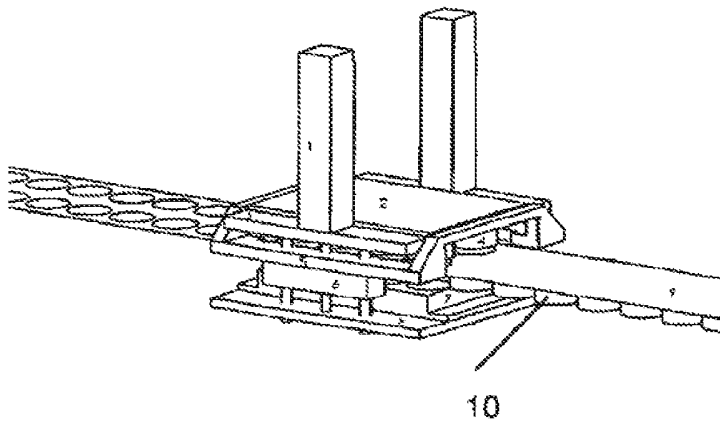


Fig. 3a

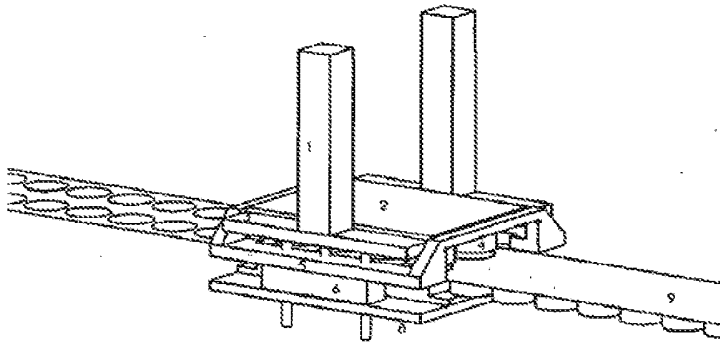


Fig. 3b

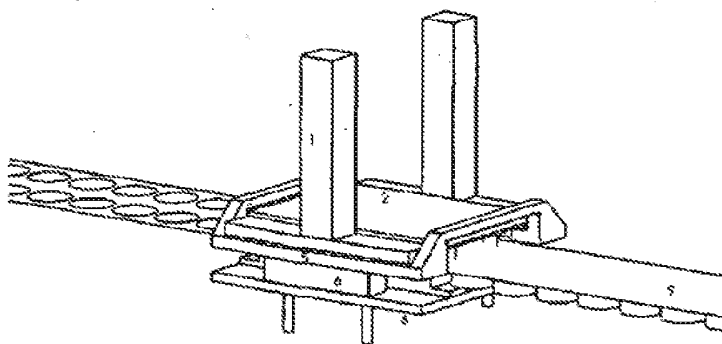


Fig. 3c

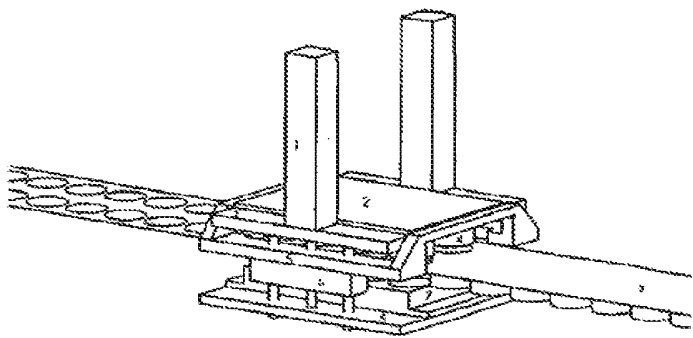


Fig. 3d

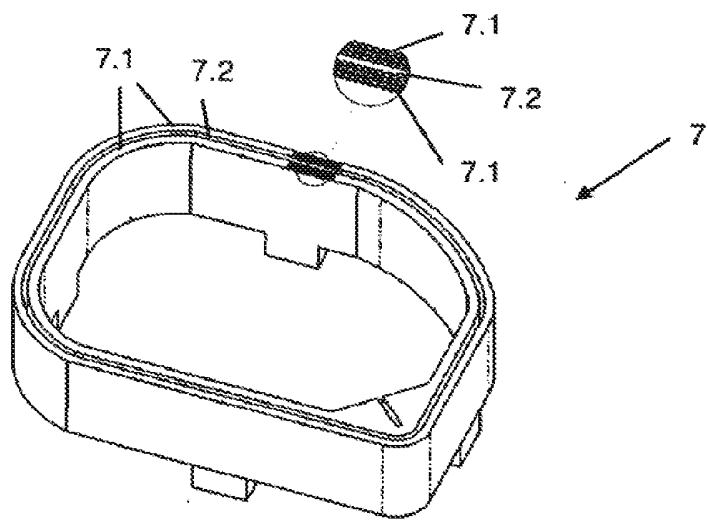


Fig. 4

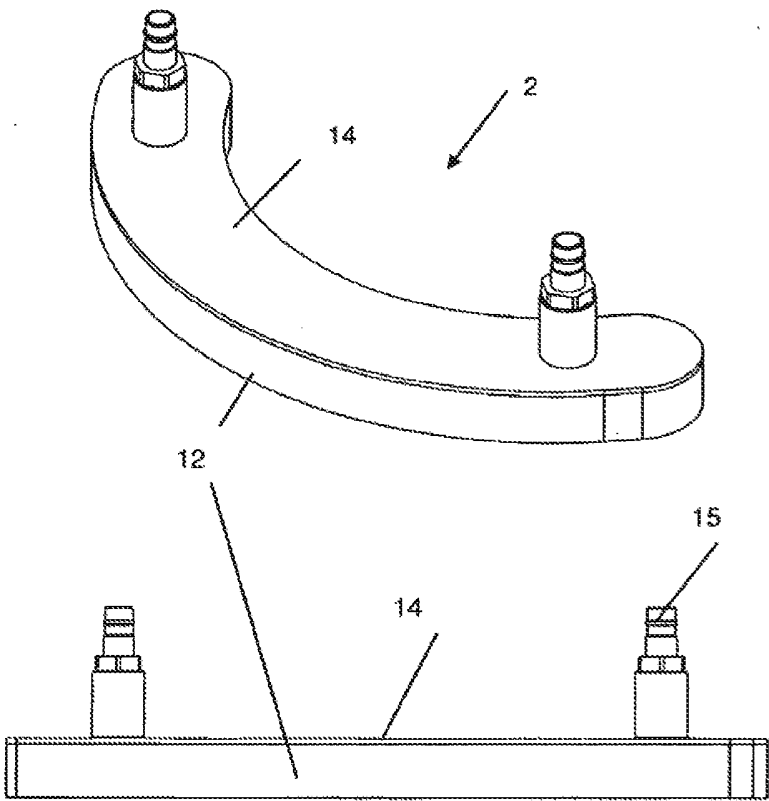


Fig. 5a

Fig. 5b

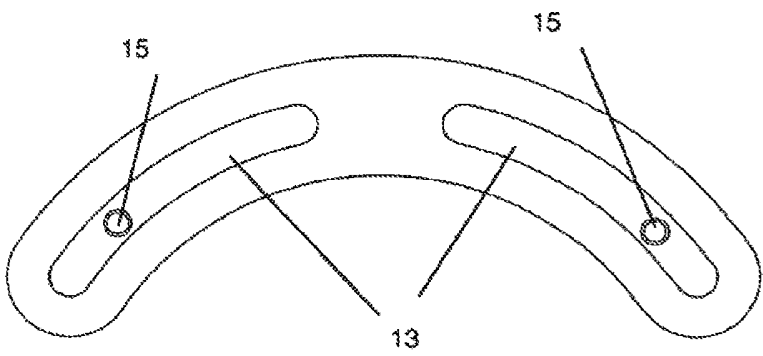


Fig. 5c