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(54) **Two-corner dinking machine**

(57) A machine for the double notching of a stack of paper sheets to coat boxes, in which the main notchings are performed by means of two descending main cutting assemblies (1, 2), each comprising a front blade (11, 21) and a side blade (12, 22), both movable and cooperating with a front lower counter-blade (13, 23) and a side lower

counter-blade (14, 24) respectively, the position of said blades and counter-blades being adjustable on the working surface, the machine comprising at least one secondary cutting assembly (8) connected above to translational means that press it above said stack of sheets to perform a secondary notching.

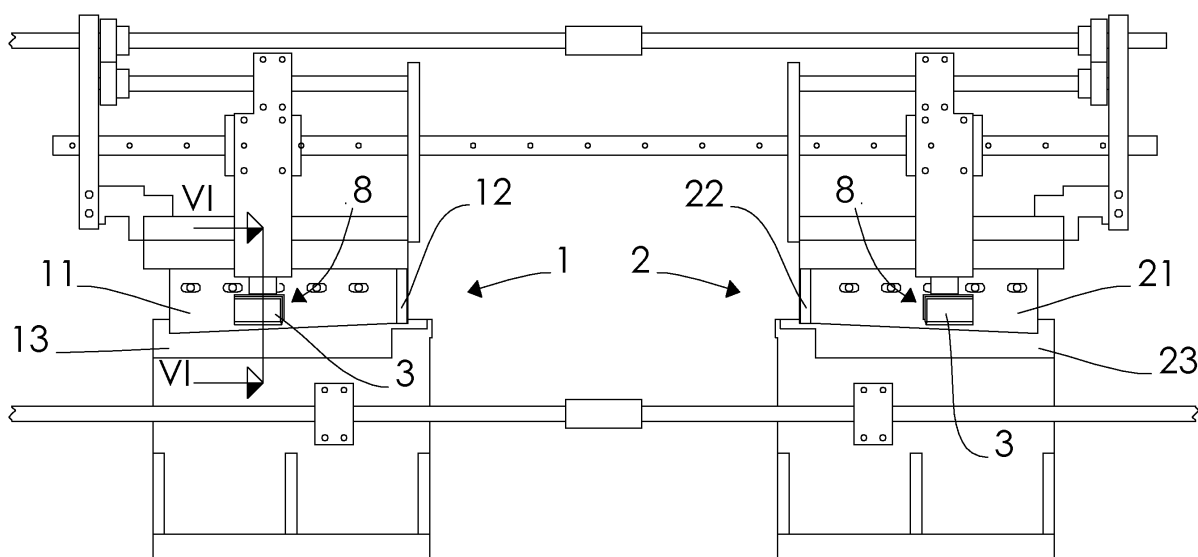


FIG. 5

Description

Technical field

[0001] Two-corner dinking machine

Technical field

[0002] The present invention belongs to the sector of the paper working machines and specifically to the sector of the machines specialized in cutting the paper used to coat boxes for valuable packings.

Prior art

[0003] The boxes used to contain valuable products, for instance leather goods, luxury shoes, perfumes or the like, are often made of cardboard coated by fine paper. Whereas cardboard provides the necessary sturdiness, paper coating is used to enrich the appearance of the box and of its respective cover. The paper coating is put on an already formed cardboard box hence, in order for paper to well adhere to the substrate, it is necessary that it is properly shaped, account being taken of the dimensions of the box to be coated as well as of the required flap. In the case of a box having the form of a regular parallelepiped, the shaped paper substantially get the form of a cross in which the opposed arms are identical two by two; all arms protrude by a length equal to the summation of the height of the box to be coated plus the inner flap.

[0004] Typically two arms have a width equal to the length of two sides of the box, whereas the remaining two arms are wider, because they incorporate the flaps used to coat the edges of the box.

[0005] More specifically, the cross shape is completed by a number of cuts having the shape of a semi-"V" in each point where the arms cross each other. The purpose of this cut is to make it possible to fold the side flaps without causing wrinkles.

[0006] Two main technical solutions are known for long time in this sector to shape paper.

[0007] The former solution is based on the use of a dedicated flat dinking die, in which a plurality of metal blades held by a planar support, typically made of wood, duplicates the exact perimeter of the paper to be obtained. The second solution is based on the use of a special machine tool, a so called notching machine, the latter being usually equipped with two adjustable notching devices, mounted on a movable cross-member capable of moving down and up. In correspondence with every downward movement of the movable cross-member, the notching devices simultaneously shape two of the four corners of the stack of paper sheets.

[0008] In notching machines, every corner of the sheet is removed thanks to the action of a notching device; the latter supports a combined action of two blades, called front blade and side blade, cooperating with a front coun-

ter-blade and a side counter-blade respectively. The front blade and the side blade form a substantially right angle in the plane.

[0009] The positions of the blades and of the counter-blades in the cutting plane are adjustable, so that one machine is capable of preparing paper coatings suitable for different boxes.

[0010] In order to completely notch a stack of sheets two cutting operations are necessary, as a matter of fact, after the first cutting operation, in order to complete the notching of all sheets, it is necessary to take the partially notched stack off, to turn it by 180 degrees, and then to insert it again into the machine for a subsequent downwards movement of the movable cross-member which performs the last two notchings. Both notching devices move simultaneously and each device comprises one front blade and one side blade; both these blades exert their cutting action by cooperating with their respective fixed, front and side counter-blades.

[0011] It is worth to note that both solutions mentioned above feature some drawbacks.

[0012] The use of a flat dinking die is very expensive in the case that sheets are to be cut for boxes of different dimensions, because every cutting geometry requires the construction of a specific dinking die. On the other hand the use of a dinking die makes it possible to obtain very accurate cutting perimeters, featuring so called two-corner notchings, i.e. notchings featuring a small angular cut in correspondence with each of the corners of the box to be coated, so as to prevent the flap from overlapping internally to every edge. In the present description this cut will be called secondary cut or secondary notch and the cutting assembly that performs it will be called secondary cutting assembly or pressure cutting assembly, whereas the assembly used to perform one of the two main, or primary, notchings will be referred to as main, or primary, cutting assembly.

[0013] Another advantage of a cut obtained by means of a flat dinking die consists of the possibility of shaping the cutting perimeter in such a way as to take account of the thickness of the cardboard used to manufacture the box to be coated.

[0014] This effect is accomplished by modifying the semi-"V"-shaped cut into an asymmetric "V"-shaped cut.

[0015] In notching machines, to take the thickness of the cardboard into consideration, the asymmetric "V"-shaped cut effect is obtained thanks to a slight tilt of the side blades with respect to the front blades, so as to form an angle between each other slightly greater than a right angle. However this solution prevents the edge of the coating paper from being perfectly parallel to the edge of the box, which results in an unpleasant final appearance.

Objects and brief description of the invention

[0016] As it will be evident from the following description, the machine according to the present patent appli-

cation allows to overcome both drawbacks affecting the two solutions presently offered by the state of the art known so far.

[0017] All that is accomplished by installing on a traditional notching machine two innovative secondary pressure cutting assemblies, each comprising an original angular blade and at the same time by conveniently modifying the ends of the profiles of the two side blade and counter-blade pairs by chamfering them.

[0018] Installing two secondary pressure cutting assemblies makes it possible to add to a traditional notching machine the possibility of performing two notchings simultaneously, each of which being a double-corner one, in other words the machine according to the present invention is capable of performing two primary notchings and two secondary notchings.

[0019] Each one of the secondary pressure cutting assemblies comprises an upper fixing block (5) and an innovative angular blade (3), its cutting edge being located below; the angular blade (3) is mounted on a blade-holder (6) which is slidably coupled with the body of said upper block (5), the secondary cutting action is accomplished by pressing the angular blade (3) against the stack of paper put on the working surface.

[0020] The pressure cutting assemblies (8) are mounted on devices of a known type which allow to adjust their position with respect to the working surface of the machine, so as to be able to determine the position where to perform the secondary notching accurately.

[0021] According to an embodiment of this invention the secondary cutting assembly is arranged in such a way that the blade-holder (6) is capable of going back a little bit inside the block, by winning the contrasting action exerted by appropriate compression elastic means (4).

[0022] The upper fixing block is mounted on the movable cross-member of the notching machine, which drives the alternating vertical movement of the main cutting assemblies.

[0023] The cutting action performed by the second notching takes place owing to the downwards movement of the cutting assembly (8) until the angular blade (3) starts cutting the stack of sheets to be notched, then the downwards movement proceeds until the blade (3) reaches the base of the stack of sheets, thus compressing the elastic means (4); this way the pressure cutting assembly is capable of also notching those sheets which are located at the very bottom of the stack.

[0024] It is necessary to point out that the pressure cutting assembly is just one of the possible embodiments of the present invention, as a matter of fact a similar effect might be obtained by using cutting assemblies not provided with compression elastic elements and where the downwards movement of the angular cutting tool is operated by an oil pressure or pneumatic system or by another known device.

[0025] There are two possible alternatives: according to a former technical solution the secondary cutting assembly is mounted on the movable cross-member and

is provided with independent means for making the blade and blade-holder go down with respect to the upper support connected to said movable cross-member; according to a second solution the secondary cutting assembly might be independent of the movable cross-member, but in any case be provided with independent means for making the blade go down and performing the secondary notching.

10 **Brief description of the drawings**

[0026]

- Fig. 1 shows the two primary cutting assemblies of a notching machine of a traditional type; the secondary notching is asymmetric-"V"-shaped and the two side blades are not parallel, but form a small acute angle.
- Fig. 2 shows the two primary cutting assemblies of the notching machine according to the present patent application, where the movable front blades (11, 21) and side blades (12, 22) as well as the fixed front counter-blades (13, 23) and side counter-blades (14, 24) are highlighted. The position of the angular blade (3) is also shown.
- Fig. 3 shows the two primary cutting assemblies illustrated in figure 2 along with the outline of a paper sheet with two double notchings only.
- Fig. 4 shows the two primary cutting assemblies illustrated in figure 3 along with the outline of a paper sheet with four double notchings.
- Figure 5 shows a front view of the movable main cross-member of the machine which highlights the main cutting assemblies (1, 2), the front and side blades and counter-blades, as well as the two secondary pressure cutting assemblies (8); the cross-section line "VI-VI" referred to in the next figure is also shown.
- Figure 6 shows the cross-section "VI-VI" of the secondary pressure cutting assembly (8) which highlights the upper block (5), the blade-holder (6), the angular blade (3) and the compression elastic means (4).
- Figure 7 shows a magnified detail of the ends of the side blades (12, 22) and of the counter-blades (14, 24) to highlight the chamferings (19, 29) present on said side blades and on their respective counter-blades.

Detailed description of an embodiment of the invention

[0027] The machine according to the present patent application comprises two main cutting assemblies (1, 2) adjustably mounted on a vertically movable cross-member; whenever the movable cross-member goes down said main cutting assemblies (1, 2) simultaneously go

down to simultaneously perform the two main notchings of the stack of sheets put by the operator on the working surface and make it move forward up to an abutting line.

[0028] Each one of the two main cutting assemblies (1, 2) comprises a front blade (11, 21) and a side blade (12, 22), fixed to each other and both integrally movable together with the main cross-member, said blades cooperate with their corresponding lower front counter-blades (13, 23) and side counter-blades (14, 24); the lower counter-blades are not constrained to the cross-member, but they are integral with the working surface. Cutting takes place whenever the upper blades are lowered down to engaging their corresponding fixed counter-blades.

[0029] The position in the working surface of the blades and of the counter-blades making-up the two main cutting assemblies is adjustable by using known methods, to adjust the position of the notchings both with respect to the centre line of the machine and with respect to the abutting line of the stack of paper sheets.

[0030] This adjustment can be made manually, by making the assemblies slide on graduated cursors and then blocking them thereto, alternatively it is possible to use lead nuts and worms, or even other systems.

[0031] One of the advantageous effects the machine according to the present patent application is surprisingly capable of achieving originates from the presence of two innovative compression secondary cutting assemblies; each of these assemblies comprises an upper support block (5) inside which a blade-holder (6) is slidably coupled with; an angular blade (3) is associated with said blade-holder, its cutting edge facing downwards.

[0032] The blade-holder (6) can be made slide with respect to the block (5) by means of a variety of devices of known types, for instance an oil-pressure system.

[0033] According to a practical and inexpensive embodiment of this invention, the sliding movement of the blade-holder (6) is contrasted by the action of specific compression elastic means (4) housed inside the upper block (5); the latter is in turn connected to translational means which make it go down toward the stack of sheets, in a direction parallel to the direction according to which the blade-holder (6) slides in the supporting block (5); said translational means make the cutting assembly (1) go down to cause the angular blade (3) to press in turn the stack of sheets in order to completely perform the second notching. A perfect secondary cutting of all sheets of the stack is obtained thanks to the combined effect of the downwards action exerted onto the angular blade (3) by the translational means and by the contrasting elastic means (4).

[0034] To adjust the position of the secondary notching with respect to the main notching, the position of both pressure cutting assemblies (8) is adjustable with respect to the centre line of the machine, in this case too the means for adjusting the position of the compression cutting assemblies (8) are of a known type.

[0035] According to a preferred and economically advantageous embodiment of this invention said elastic

means (4) consist of one or several helical springs.

[0036] According to a particularly complete and improved embodiment the rectilinear cutting edge of said side blades (12, 22) presents a chamfering (19, 29) in correspondence with the front end, so that the cut made features an asymmetric-"V"-shaped profile, not a semi-"V" shaped one, this way the perimeter of the shaped paper takes account of the thickness of the cardboard that the box is made of; consequently both lower side counter-blades are shaped in such a way as to fit the chamfering present in the upper side blades (12, 22).

Claims

1. A machine for the double notching of a stack of paper sheets to coat boxes, in which the main notchings are performed by means of two descending main cutting assemblies (1, 2), each comprising a front blade (11, 21) and a side blade (12, 22), both movable and cooperating with a front lower counter-blade (13, 23) and a side lower counter-blade (14, 24) respectively, the position of said blades and counter-blades being adjustable on the working surface, **characterized in that** it comprises at least one secondary pressure cutting assembly (8) connected above to translational means that press it above said stack of sheets to perform a secondary notching.
2. A machine according to the previous claim, **characterized in that** said translational means consist of the main movable cross-member of the notching machine.
3. A machine according to one or several of the previous claims, **characterized in that** said at least one secondary pressure cutting assembly comprises an upper fixing block (5) and a lower angular blade (3), the latter mounted on a blade-holder (6) slidably coupled with said upper fixing block according to an axis parallel to the sliding axis of said translational means.
4. A machine according to one or several of the previous claims, **characterized in that** the descending cutting action of said angular blade (3) with respect to said upper fixing block (5) is caused by specific means.
5. A machine according to one or several of the previous claims, **characterized in that** the descending cutting action of said angular blade (3) with respect to said upper fixing block (5) is caused by specific elastic means (4).
6. A machine according to one or several of the previous claims, **characterized in that** said elastic means (4) are driven into compression whenever the down-

wards movement of said translational means pushes said angular blade (3) against the stack of sheets to be notched located on the working surface.

7. A machine according to one or several of the previous claims, **characterized in that** said elastic means (4) comprise a helical spring. 5
8. A machine according to one or several of the previous claims, **characterized in that** the position of said at least one secondary pressure cutting assembly (8) is adjustable with respect to the working surface of the machine. 10
9. A machine according to one or several of the previous claims, **characterized in that** the rectilinear cutting edge of said side blades (12, 22) presents a chamfering (19, 29) in correspondence with the front end. 15
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10. A machine according to one or several of the previous claims, **characterized in that** said lower side counter-blades are shaped in such a way as to fit said chamfering present in said upper side blades (12, 22). 25

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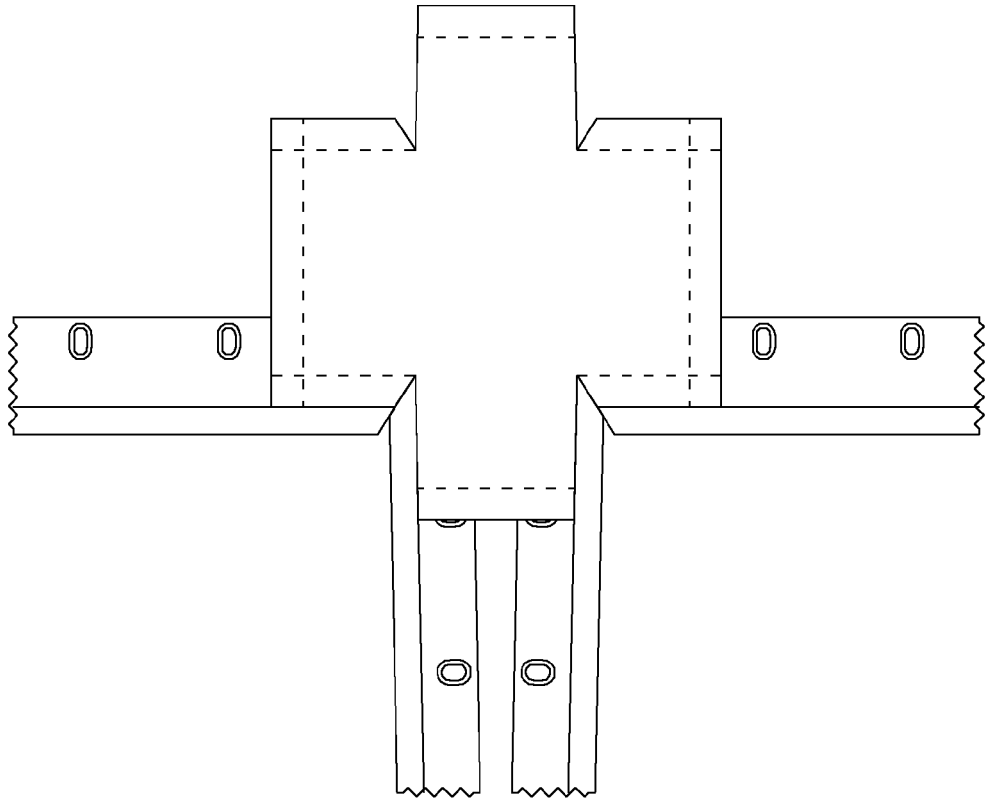


FIG. 1

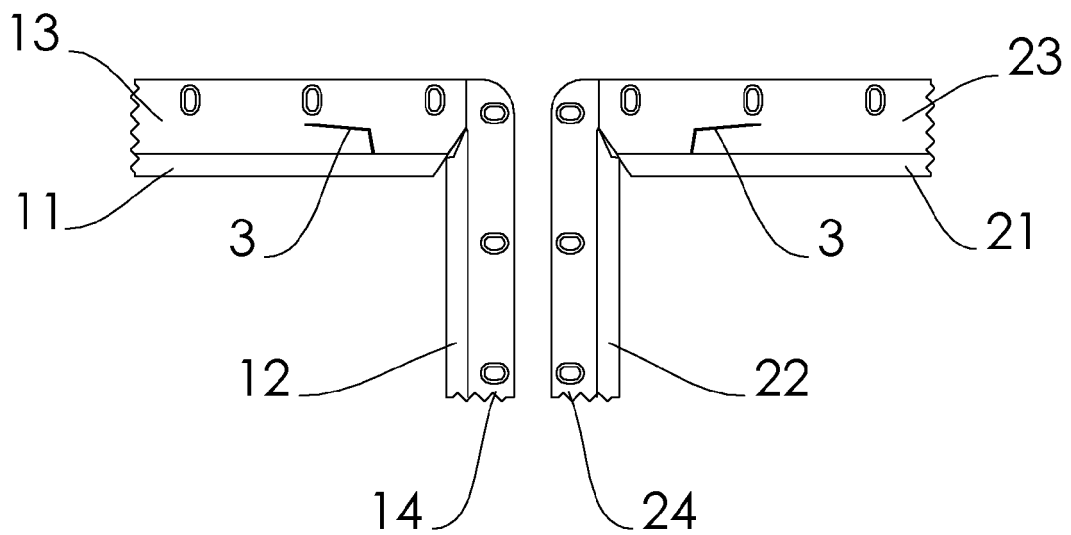


FIG. 2

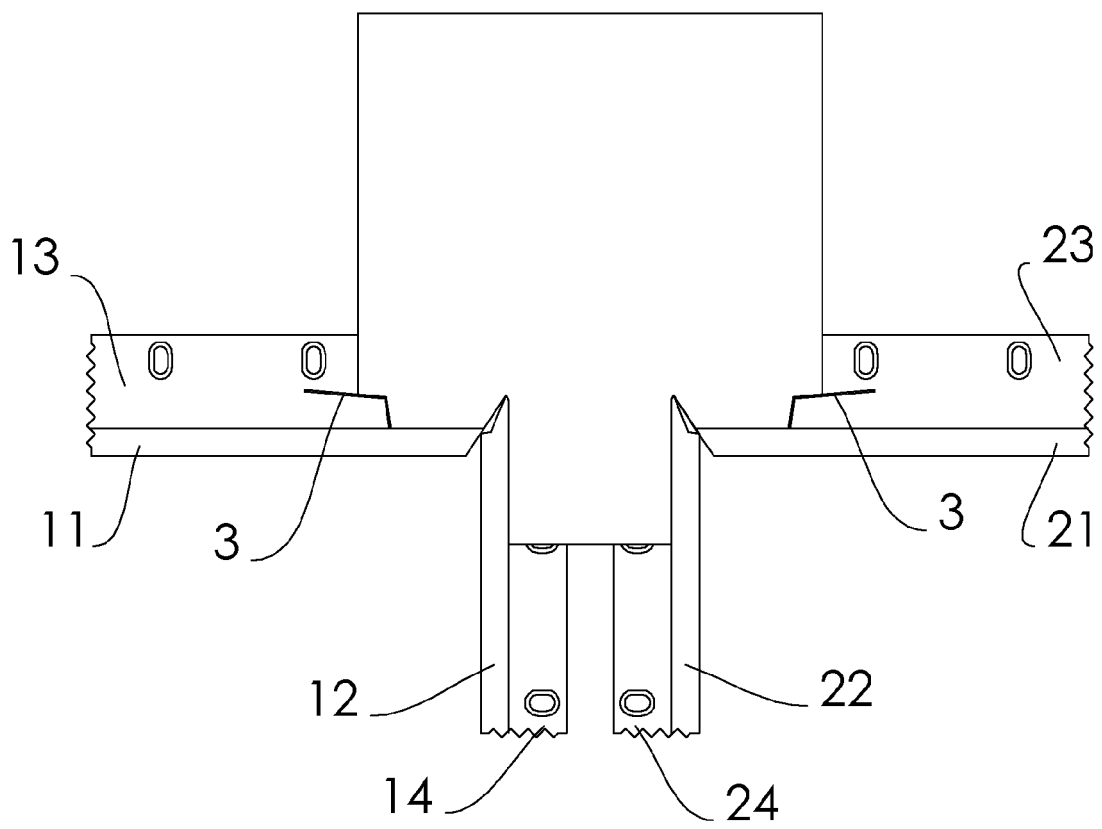


FIG. 3

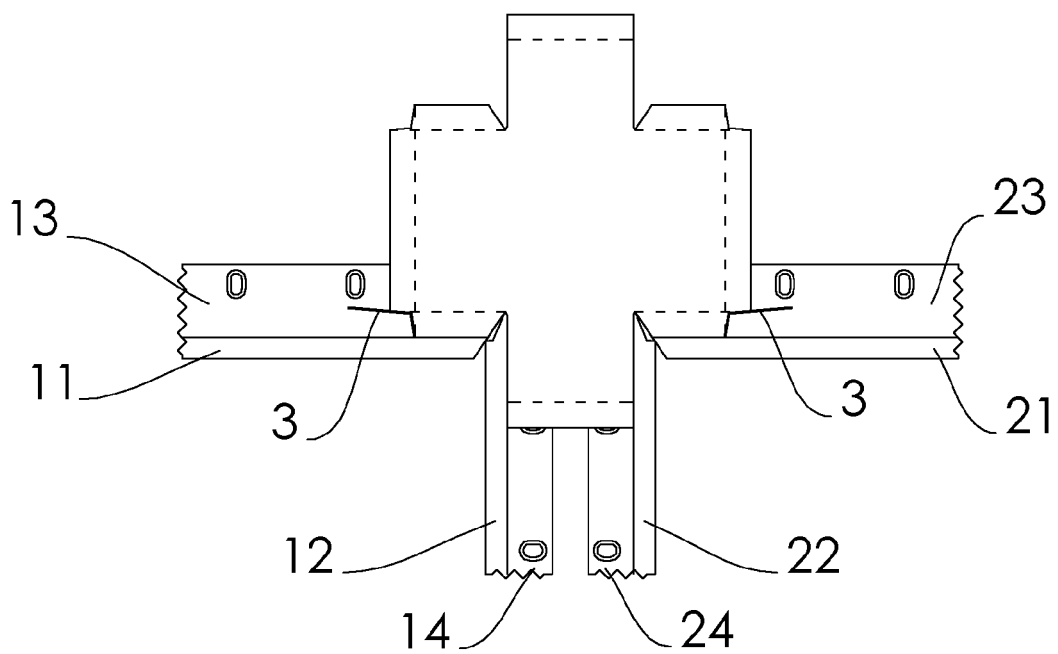


FIG. 4

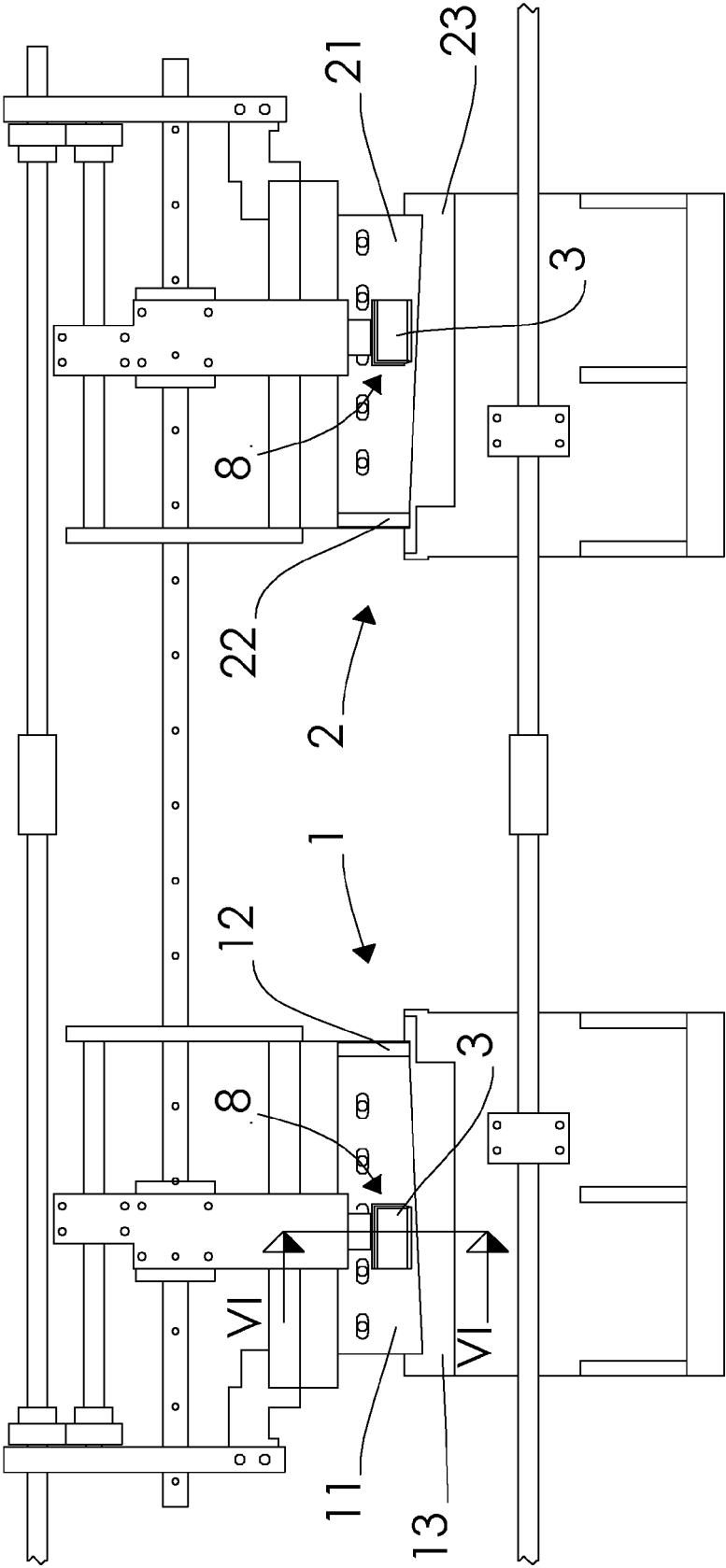


FIG. 5

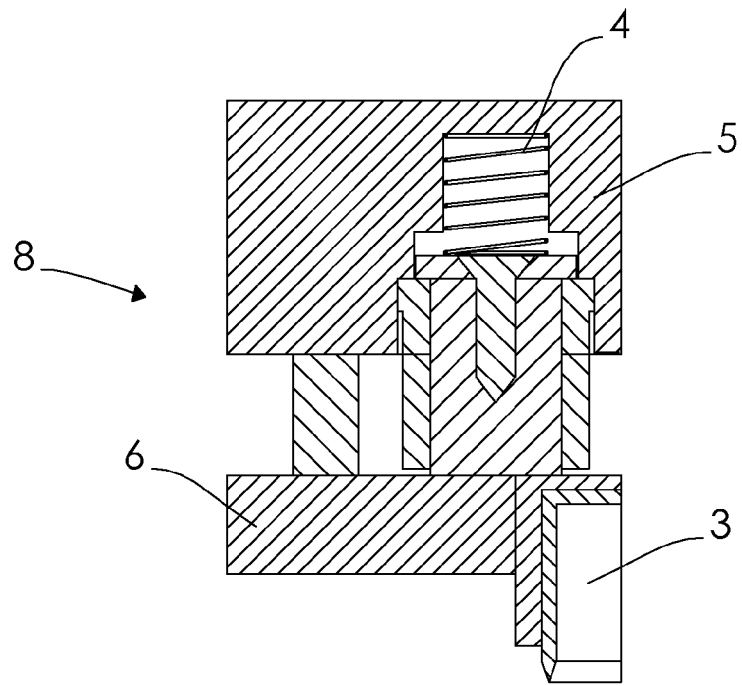


FIG. 6

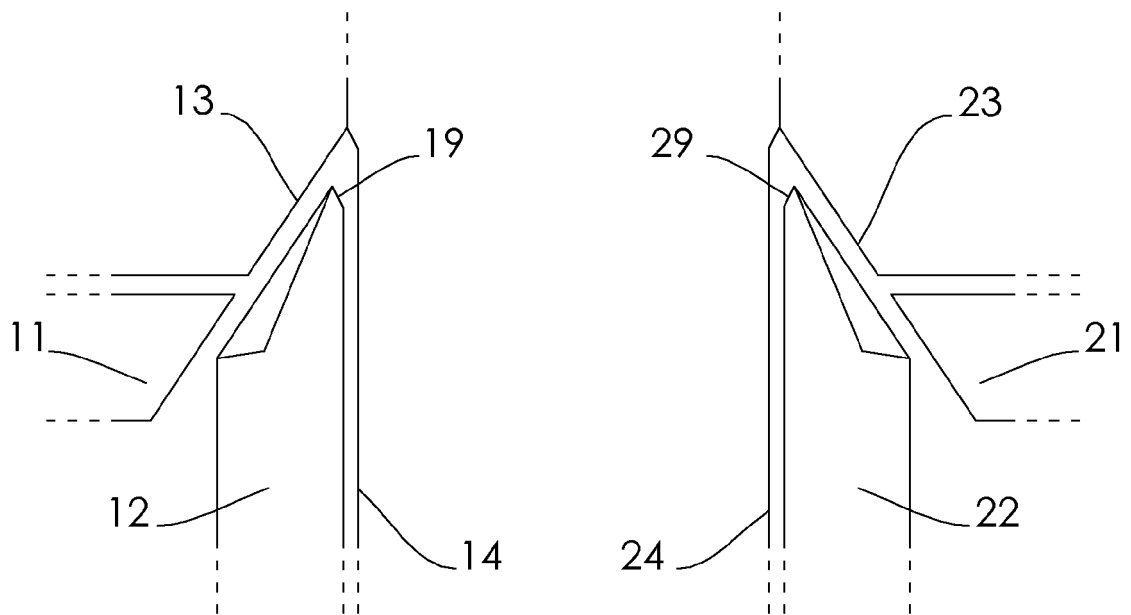


FIG. 7



EUROPEAN SEARCH REPORT

Application Number
EP 14 18 8435

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* the whole document * -----	3-10	B31B1/20 B31B1/22
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 February 2015	Examiner Schelle, Joseph
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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18-02-2015

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82