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(54) **CONTAINER CUTTING DEVICE**

(57) The invention relates to a container cutting device; comprising a die plate (1) and a punch holder plate (2) carrying punches (3) and movable between an inoperative position die plate (1) and an operative position in which the punches penetrate housings of the die plate (1) making cuts in the containers. The punches (3) are interchangeable and comprise an active tip (31) in the form of a small plate, with an integrated centring body

(32), with a non-circular cross section; housed in a tight manner, and fixed by means of a removable clamping element in a cavity (21) of the punch holder plate (2). The active tip (31) is supported with its rear surface against the punch holder plate (2) and projects from said punch holder plate by a measurement less than 10 millimetres, to prevent the bending or lateral deviation thereof during cutting.

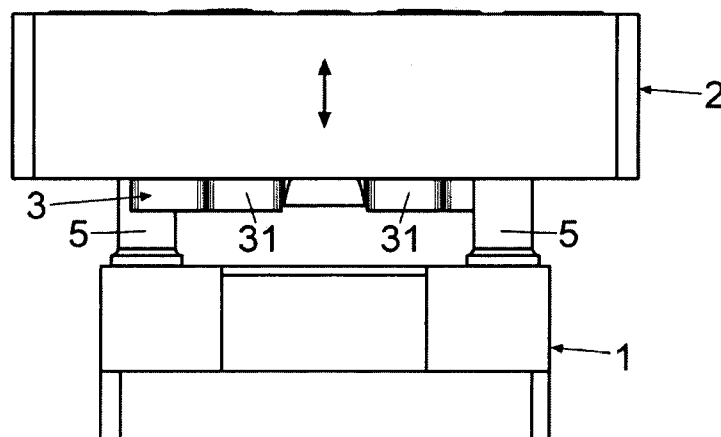


Fig. 1

Description

Object of the invention

[0001] The object of the present invention is a container cutting device, comprising interchangeable star-type die plate and punch holder plate, having features suitable for making a cut in plastic materials for example PLA, PET, PP-type materials, and other complex films of different structures and thicknesses, particularly applicable in the manufacture of containers for food use.

Field of application of the invention

[0002] This invention is applicable in machines for cutting containers and preferably, though not in a limiting manner, for containers intended for the food industry.

State of the art

[0003] In the manufacture of containers and in particular of containers for the food industry, packs are commonly formed with a variable number of packages which, once filled with the product in question, are closed by a continuous film, where it is then necessary to make the cut in perimetral areas of the mouths of the containers together with the lid applied on same.

[0004] In this operation, the use of devices made up of a die plate and a punch holder plate, suitably in opposition to one another, the punch holder plate having a series of punches which project from the surface of the punch holder plate in opposition to the die plate and are responsible for making the cut in peripheral areas of the mouth of the containers and of the corresponding lids.

[0005] The cutting devices used today have a series of drawbacks both in relation to the difficulty of replacing the cutting punches with other suitable ones to make cuts with a different geometry or cutting materials having different hardnesses, and very abrasive plastics such as highly reinforced PLA and PP.

[0006] Even though all cutting punches today have an acceptable commitment to enable the cutting of almost all materials, none of them assures optimal duration of the cutting edges and the quality of the cut containers.

[0007] This means that in the case of cutting very abrasive plastic, the service life of the cutting edges is very short, sometimes 3 or 4 weeks, which represents between 500,000 and 800,000 cycles, which is very little knowing that the sharpening and replacement of cutting punches is very substantial.

[0008] Another drawback of devices of this type existing on the market is that the punches have a forward positioning of 20 or 25 mm, which represents a high clearance height, certain operating restrictions and also bends during shearing stress, particularly in the case of devices today which have punches of an increasingly larger cross section due to the current design of containers by marketing services.

[0009] In cutting devices existing today, the punches virtually form a part with the punch and blade holder plate, which makes the cooling of the punches considerably difficult if needed, which negatively affects the duration of the cutting edge of the punches.

[0010] Therefore, the technical problem that is considered is the development of a cutting device with a series of features aimed at reducing the cost of spare parts, the interchangeability and comfort of the punches in order to use in each case the one that is most suited to the type of materials to be cut; to improve the cooling of the punches if needed; to allow the use of materials having high hardness for the manufacture of the tips of the punches considerably increasing the service life thereof and eliminating the unwanted bending of the punches during shearing stress.

Description of the invention

[0011] The container cutting device object of this invention; comprising interchangeable star-type die plate and punch holder plate, enabled for relative movement between an inoperative or open position, in which the punches are spaced from the die plate; and an operative position in which the punches penetrate housings of the die plate, making cuts in the containers; it has constructive particularities aimed at solving the problems set forth above in a satisfactory manner.

[0012] To that end and according to the invention, this cutting device comprises interchangeable punches which have an active tip in the form of a small plate, with an integrated centring body with a non-circular cross section; which centring body is housed in a tight manner, and fixed by means of a removable clamping element, in the interior of a cavity of the punch and blade holder plate which has a cross section coinciding in shape and dimensions with the cross section of the centring body of the punch; such that in the assembly position the active tip of the punch is supported with its rear surface against the punch and blade holder plate, projecting from same.

[0013] One of the features of the invention is that the active tip in the form of a small plate has a lower height, less than 10 millimetres, which allows the elimination of operating restrictions and bending due to the large drop in clearance heights of the punches in relation to punches used today, which have a height of 20 to 25 mm and therefore more bending during shearing stress.

[0014] The centring body of the punch in the punch holder plate, as a result of its design, machining range, in addition to its interchangeability provides extremely precise shape and position tolerances, less than 0.003 millimetres.

[0015] The features of the aforementioned device allow a very low cost of the punches and spare parts to be achieved, as well as improved market penetration taking into account that these wear parts are extremely expensive for industrial uses.

[0016] The interchangeability and convenience in

changing the punches for cutting materials with different features constitutes another important advantage of the invention since a series of containers can be produced, for example in PLA, and then another series can be produced in PS, simply by changing the tips of the punches to achieve perfect usage configurations depending on the plastic to be cut and the thickness thereof.

[0017] Another advantage of the invention is the improved cooling system for the punches should it be required to perform a thermal adjustment and prevent expansion, since the cooling will go up to the tip of the punch, passing through the centring body thereof, thereby preventing destruction of the cutting edges and increasing the service life of the punch.

[0018] This device allows the use of materials having high hardness for the manufacture of the cutting tips of the punches, for example the use of carbide with a hardness greater than 70 HRC (Rockwell hardness) and with very high stability, which allows the service life of the cutting tips to reach 4 million cycles.

[0019] The features of the invention will be more readily understood in view of the embodiment shown in the attached figures.

Description of the figures

[0020] As a complement to the description provided herein, and for the purpose of helping to make the characteristics of the invention more readily understandable, the present specification is accompanied by a set of drawings which, by way of illustration and not limitation, represent the following:

- Figures 1 and 2 show respective elevation views of an embodiment of the cutting device according to the invention, in the open position and in the closed position, respectively.
- Figure 3 shows a bottom perspective view of the die plate and the punch holder plate vertically spaced from one another.
- Figure 4 shows a top perspective view of the die plate and the punch holder plate vertically spaced from one another.
- Figure 5 shows an elevational view of the punch plate, partially sectioned through the area of assembly of one of the punches, the corresponding punch being depicted in an exploded view with respect to said punch holder plate.
- Figure 6 shows a view similar to the preceding figure, in which a punch assembled in the corresponding cavity of the punch holder plate can be observed.

Preferred embodiment of the invention

[0021] As can be observed in Figures 1 and 2, this cutting device for containers comprises a die plate (1) and a punch holder plate (2) enabled for relative movement between an inoperative position, depicted in Figure

1, in which the punches (3) are spaced from the die plate (1), and an operative position, depicted in Figure 2, in which the punches penetrate housings (11) of the die plate (1) referenced in Figures 3 and 4, making cuts in a non-depicted container previously arranged on the die plate (1).

[0022] As can be observed in Figures 5 and 6, the interchangeable punches (3) have an active tip (31) in the form of a small plate with an integrated centring body (32) which is prolonged at the rear surface of the active tip (31).

[0023] In this embodiment and as can be observed in greater detail in Figure 3, the tip (31) has a star-shaped contour with concave curved sides intended for forming the curved corners of the mouth and lid of a yogurt container.

[0024] Nevertheless, the tips or small plates (31) of the punches may have different configurations depending on the stamping or cutting to be made in the containers.

[0025] In this specific example, the centring body (32) of the punch has a quadrangular cross section which is housed in a tight manner in the cavity (21) of the punch holder plate (2) which has a cross section coinciding in shape and dimensions with the cross section of the mentioned centring body, assuring a positioning of the punch (3) with respect to the punch plate (2) with very high precision.

[0026] As can be observed in Figures 3 and 4, the punch (3) is fixed with respect to the punch holder plate by a removable clamping element (4) depicted by a screw which is assembled in the punch holder plate (2) with the interposition of a sleeve (41) and is screwed into a hole made for that purpose at the rear end of the centring body (32) of the punch (3).

[0027] In Figures 1 and 3, this device comprises columns (5) for guiding the punch holder plate (2) with respect to the die plate (1) in the opening and closing movements of the cutting device.

[0028] Having sufficiently described the nature of the invention, in addition to a preferred exemplary embodiment, it is hereby stated for the relevant purposes that the materials, shape, size and layout of the described elements may be modified, provided that it does not imply altering the essential characteristics of the invention claimed below.

Claims

1. A container cutting device; comprising a die plate (1) and a punch holder plate (2) enabled for relative movement between an inoperative or open position in which the punches (3) of the punch holder plate (2) are spaced from the die plate (1), and an operative position in which the punches (3) penetrate housings of the die plate (1) making cuts in the containers; **characterised in that** the punches are interchangeable and comprise an active tip (31) in the

form of a small plate, with an integrated centring body (32), with a non-circular cross section; which centring body (32) is housed in a tight manner, and fixed by means of a removable clamping element, in the interior of a cavity (21) of the punch holder plate (2); said cavity (21) having a cross section coinciding in shape and dimensions with the cross section of the centring body (32) of the punch (3); such that in the assembly position the active tip (31) is supported with its rear surface against the punch plate (2) and projects from said punch plate.

2. The device according to claim 1, **characterised in that** the active tip or small plate has a height less than 10 millimetres.
3. The device according to claim 1, **characterised in that** the active tip (31) and the centring body (32) of the punches (3) form a one-piece body manufactured with a material having a hardness greater than 70 HRC (Rockwell hardness).

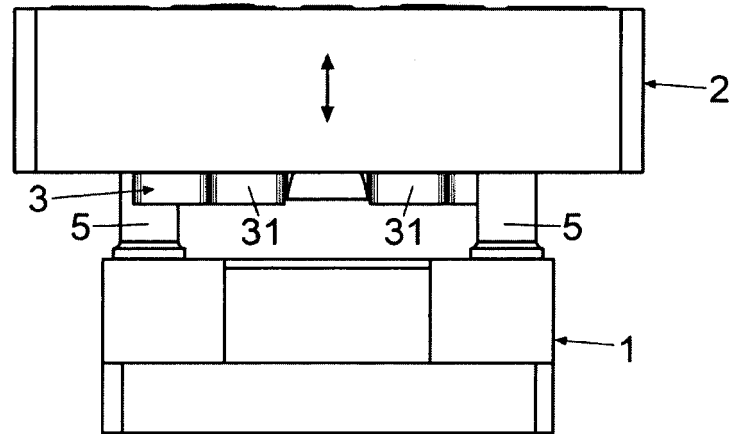


Fig. 1

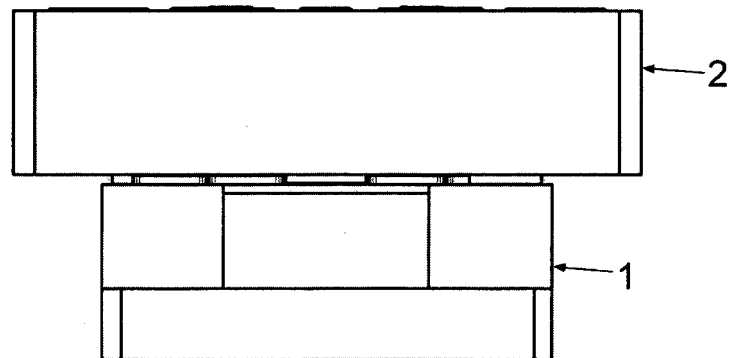


Fig. 2

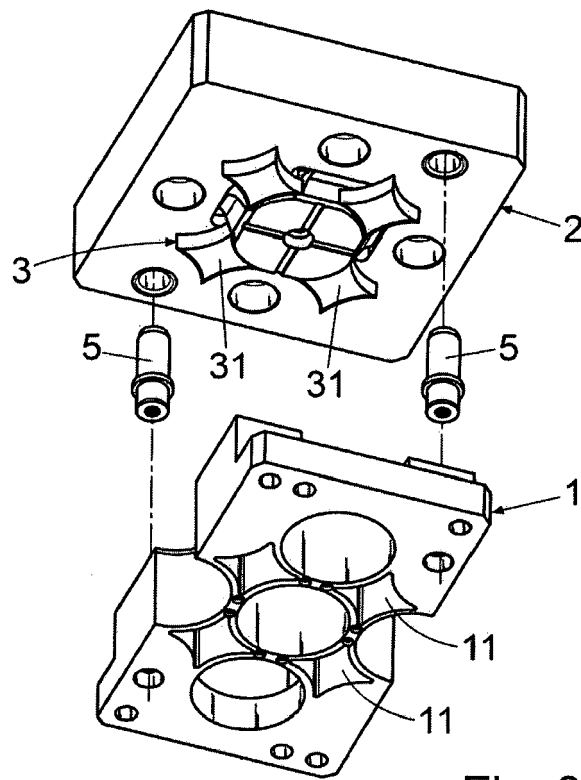


Fig. 3

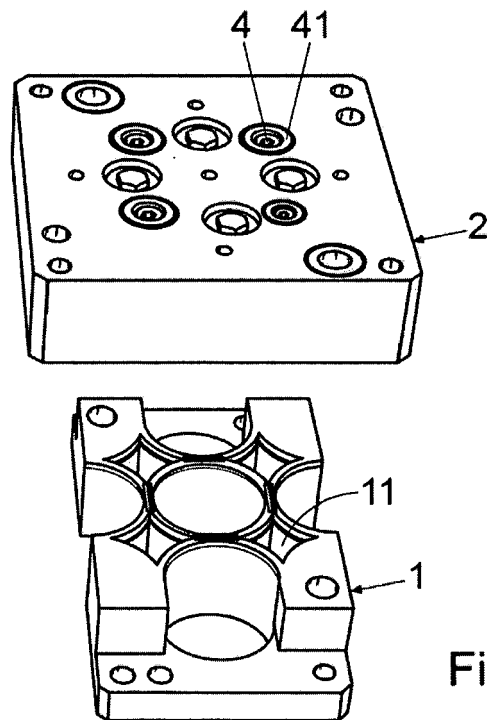


Fig. 4

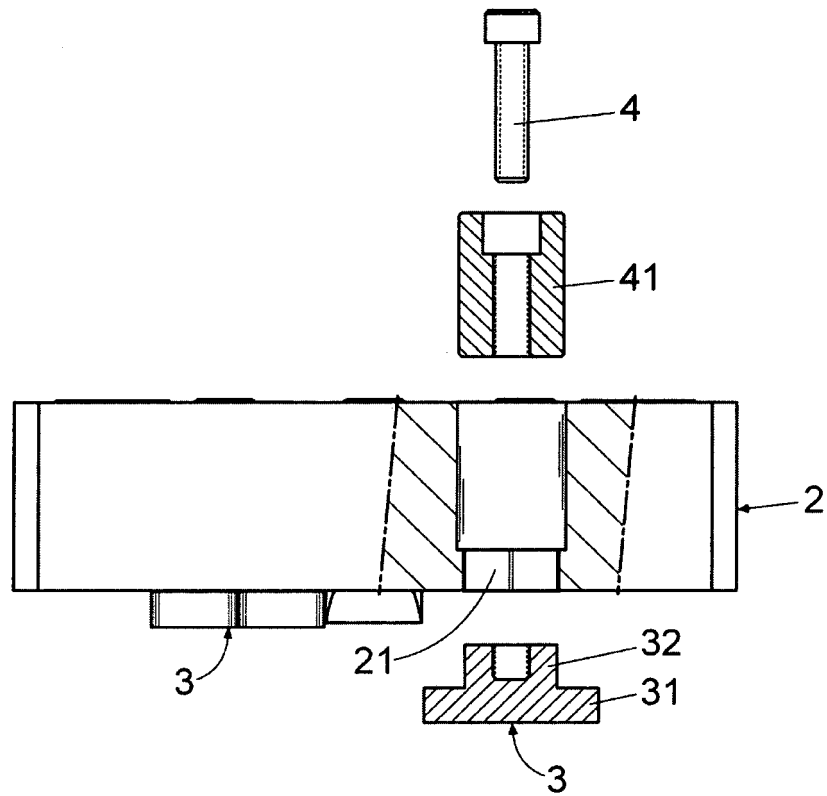


Fig. 5

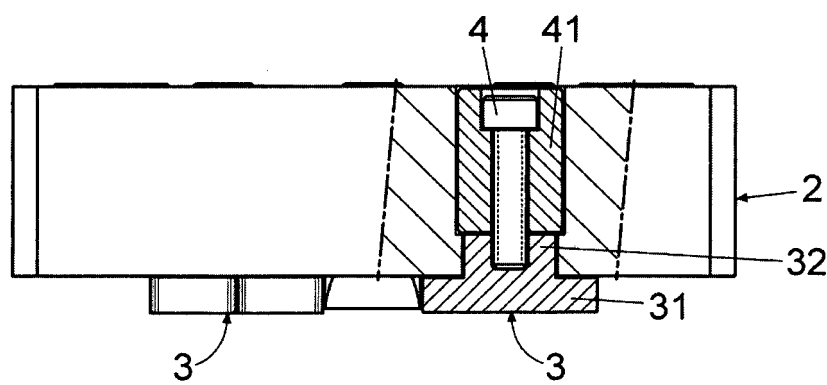


Fig. 6



EUROPEAN SEARCH REPORT

Application Number
EP 19 00 0207

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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)
A	DE 43 04 951 A1 (WACHSMUTH & CO WERKZEUGBAU [DE]) 25 August 1994 (1994-08-25) * figures 2,4 *	1-3	INV. B26F1/44
A	US 1 070 887 A (HARTOG STEPHEN D [US]) 19 August 1913 (1913-08-19) * figures 5,6 *	1-3	
A	FR 2 661 341 A2 (PIGNON GUY) 31 October 1991 (1991-10-31) * figures 1-9 *	1-3	
A	FR 2 443 386 A1 (APPLIC PLASTIQUE MEC ELEC [FR]) 4 July 1980 (1980-07-04) * the whole document *	1-3	
			TECHNICAL FIELDS SEARCHED (IPC)
			B26F B26D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 September 2019	Examiner Wimmer, Martin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 00 0207

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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18-09-2019

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