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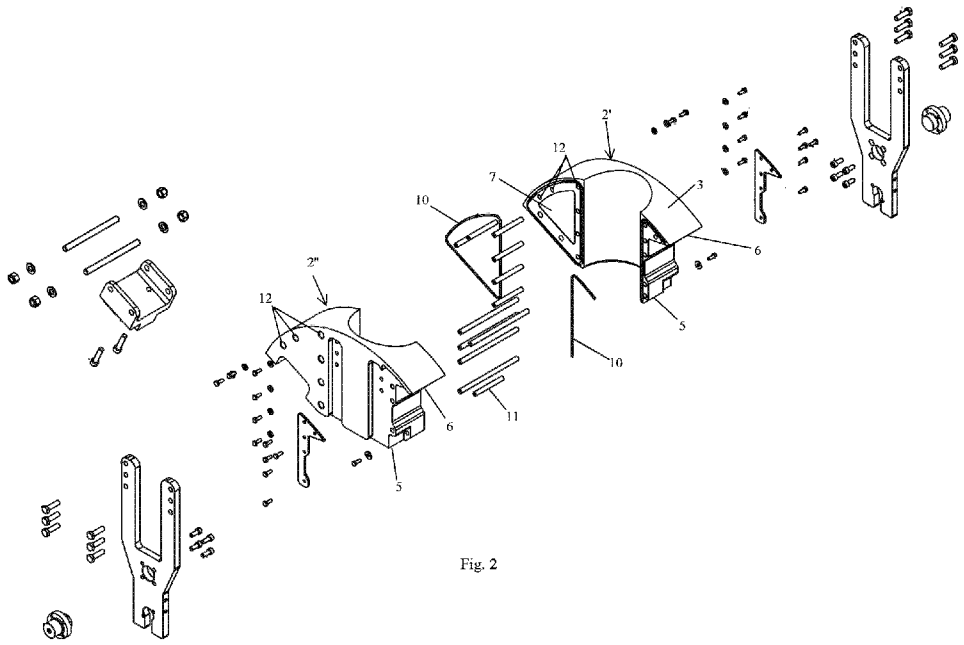

Fig. 2

(57) Abstract: Dividing drum (1) for volumetric dividers, comprising a curved head surface (3) and a through hole (4) that passes through the entire body of the drum (1) starting from said head surface (3) up to a base surface (5); said head surface (3) ending at one of its end sides in a cutting tip (6), protruding from the body of the drum (1). Said drum being composed of two half-drums (2', 2") made of polyethylene terephthalate; each half-drum (2', 2") constituting half of the drum (1) obtained by dividing it geometrically along its longitudinal plane of symmetry; each half-drum (2', 2") comprising an interface surface (7); said interface surfaces (7) being in mutual contact to constitute the complete dividing drum (1); each interface surface (7) including fixing means for integrally fixing the two half-drums (2', 2").

WO 2024/256078 A1

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— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
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DESCRIPTION

of the invention entitled "Dividing drum for volumetric dividers" in the name of Artezen s.r.l.

The present invention concerns a dividing drum for volumetric dividers, according to the general part of claim 1.

Dividing drums are fundamental components of volumetric dividers used in the food industry. These drums play a crucial role in the process of dividing a usually large mass of dough typically for bread-making and pastry-making, already kneaded by means of equipment complementary to the dividers, whose basic ingredients are food flours, water, yeast, salt, with possible addition of aids to the leavening and maturation process, as well as any edible fats, sugar and possibly secondary ingredients such as, for example, walnuts, raisins, in order to obtain portioning into dough shapes of uniform weight, ready to be processed subsequently to obtain the desired shape and then left to rise and cooked for consumption.

Dividing drums are usually made of metallic materials, such as stainless steel, bronze, aluminium or aluminium alloys. These materials are chosen for their strength, durability and ability to withstand mechanical loads and stress during operation.

Dividing drums can have a variety of geometric shapes, but typically feature a cylindrical or semi-cylindrical configuration. Their shape is designed to determine the breaking into uniform portions of dough contained inside a containment hopper through an action of suction, cutting, possible compression and final calibration.

Dividing drums are designed to rotate around a central axis with continuous or intermittent/reciprocating motion within volumetric dividers. The rotation speed can

be adjusted based on the specific needs of the dividing process and the type of dough to be processed.

In dividing drums there is often a piston suction system that allows the dough or the ingredients to be taken from the feeding hopper by suction. This system helps to ensure a constant and controlled flow of dough inside the drum.

The dividing drums can cause the dough to be broken by the action of suction alone and by a subsequent cutting, or by suction of a large quantity of dough followed by cutting, then by a compression inside a weighing chamber and by a final cutting to calibrate with greater precision the dough portions. This system may consist of pistons, rollers or other mechanical devices.

Some dividing drums can be integrated with automated control systems that monitor and regulate various parameters, such as temperature, rotational speed and compression pressure. These systems allow for greater precision and repeatability in the dividing process.

In general, the dividing drums in volumetric dividers are designed to provide effective dividing of the dough contained in the hopper, ensuring maximum weight uniformity in the treated portions while minimizing the mechanical stresses to the dough which determine a change in the molecular structure of the mixture which can lead to a reduction in the quality of the final product, and at the same time guarantee operational reliability over time and long life. Specific characteristics may vary depending on the needs of the dividing process and the desired end products.

For the dividing drums known in the art, and with particular reference to the technology used in the past but not limited to that, it was preferred the use of dividing drums made of metallic materials with or without surface protection treatments against corrosion,

the movement of which was assisted with a lubrication system to reduce the wear of the parts in relative movement and to avoid possible seizures, but this technology caused the organoleptic contamination of the mixture with the lubrication oil and big economic expenses due to the consumption of oil, but it allowed the equipment to operate even with high work rates. More modern solutions involve the construction of the dividing drum using plastic materials, whose polymers make it possible to reduce or even eliminate the need to lubricate the parts in relative movement but with limits of use as the mechanical action of the dividing drum determines its heating with consequent thermal expansion and in the long run, overheating and possibly melting of the surface of the plastic component, which can be reached at much lower temperatures than the same component made of metal. Alternatively, or in conjunction with the melting and deterioration of the surface of the plastic dividing drum, thermal expansion can also cause its movement to stop due to increased friction.

It is important to consider that to function correctly the drum must be extremely close to the curved surface of the hopper with respect to which it rotates since otherwise the suction action of the piston to extract the dough to be processed from the hopper would be compromised. Usually, the distance between the curved head surface of the drum and the curved surface of the hopper is 0.05 mm in the rest situation.

It is clear that a minimum expansion is sufficient to cause the reduction of this gap and consequently the sliding of the drum on the rubbing surfaces. Repeated sliding will generate more and more heat, leading to the machine stopping when this becomes excessive.

In the food sector, excessive use of lubricating oils cannot be made, as these would end up in the dough to be processed, compromising the food safety of the final product and

would also mix with the flour inside the machine, creating dirt that is very difficult to remove, with subsequent risks of bacterial nature.

Another aspect of fundamental importance for a dividing drum is the material in which it is made. In fact, although the material with the best performance is steel, a drum made entirely of steel is extremely expensive to build and this affects the final price of the volumetric divider and consequently its competitiveness in the market.

In the art it is known the creation of a dividing drum made with a steel body obtained from various welded and machined elements and a head surface in plastic material, to reduce at least a small part of the steel used and the plastic part ensures lubrication-free operation. However, this solution is complex to implement, since plastic sheets of the correct dimensions for a perfect creation of the head surface are not available and therefore it is necessary to work plastic pieces until obtaining the desired shape, wasting a lot of material. Furthermore, the problems of the cost of steel and the particularly long and expensive work cycle necessary to create the metal body remain.

The most important state-of-the-art document is DE 11 64 948 B which describes (the cited references concern this document) a dividing drum (2-4) suitable for volumetric dividers (column 2, row 29 - column 4, row 15; fig. 3), consisting of an arched head surface and a through hole (3) which passes through the entire body of the drum starting from said head surface (upper surface in fig. 3) up to a base surface (lower surface in fig. 3);

- said surface of the head terminating at its end with a sharp tip (8), protruding from the body of the drum (2-4);

- said surface of the arcuate head (upper surface in fig. 3) being adapted to slide, due to the rotation of the drum (2-4), along an arcuate surface in the same way as a volumetric

divider on which said drum (2-4) is adapted to be installed to suck a dough from a hopper (1), and then compresses it inside a weight chamber (5), thanks to the repeated forward and backward linear movement of a piston (4) of the volumetric divider adapted to slide inside said through hole (3).

Other state of the art documents to cite are: US 10736 330 B2, DE 460 745 C, DE 27 48 988 C2.

The production of a head drum entirely in plastic material is difficult due to the thermal expansion characteristics to be respected and also due to the difficulty of finding semi-finished products in plastic material from which to obtain the drum without excessive waste which leads to environmental and economic damage.

The aim of the present invention is to provide a dividing drum capable of solving the aforementioned problems and which has the correct thermal expansion characteristics, whilst guaranteeing a reduced production cost. In addition, the plastic material must be suitable for use in processing food products intended for human consumption and therefore must have the appropriate certifications according to stringent specific regulations of the countries where the device is marketed.

A dividing drum according to the invention is made of polyethylene terephthalate (PET) and composed of two half-drums joined together. Polyethylene terephthalate is a particular type of plastic material which has a linear expansion coefficient between $30 * 10^{-6} K^{-1}$ and $60 * 10^{-6} K^{-1}$ which is suitable for the purposes of the present invention.

Due to the characteristics of the material, the semi-finished products that can be obtained may have limited dimensions and it is therefore not possible to obtain a semi-

finished product of customized dimensions to obtain a monobloc dividing drum efficiently.

For this purpose, two half-drums are used to obtain the complete drum efficiently and economically.

Further advantages and characteristics of the invention will be more evident from the description of one of its possible embodiments, provided by way of non-limiting example only, with the help of the attached figures, where:

- fig. 1 represents a side view of a dividing drum according to the invention;

- fig. 2 represents a schematic exploded view of a dividing drum according to the invention;

- fig. 3 represents a side view of a dividing drum according to the invention equipped with means for fixing to the volumetric divider on which it is suitable for being installed;

- figs. 4 and 5 represent two perspective views of the half-drums which constitute a dividing drum according to the invention;

- fig. 6 represents a bottom view of a dividing drum according to the invention;

- fig. 7 represents the geometric development of a half-drum with respect to a PET sheet;

- fig. 8 represents the geometric development of a complete drum compared to a cylinder of non-PET plastic material, available on the market as a raw semi-finished product for a circular dimension with a diameter of at least 320 mm.

Fig. 1 shows a dividing drum 1 according to the invention. As also illustrated in fig. 2, it includes a curved head surface 3 and a through hole 4 which passes through the entire body of the drum starting from said head surface 3 up to a base surface 5. The head

surface 3 ends at one of its own end sides in a cutting tip 6, protruding from the body of the drum, which facilitates the detachment of the dough to be extracted from the hopper of the volumetric divider on which the dividing drum 1 is suitable to be installed.

The curved head surface 3 is able to slide, due to the rotation of the drum 1, along a corresponding curved surface of a volumetric divider on which said drum is suitable to be installed, in order to suck the dough from the hopper, to then compress it inside a weight chamber thanks to the repeated linear forward and backward movement of a piston of the volumetric divider capable of sliding inside said through hole 4.

A dividing drum according to the invention is composed of two half-drums 2', 2" made of polyethylene terephthalate (PET). Each half-drum 2', 2" constitutes half of the drum 1 obtained by dividing it geometrically along its longitudinal plane of symmetry and includes an interface surface 7. Both are in mutual contact to constitute the complete dividing drum.

As visible from the figs. 4 and 5, for each half-drum 2', 2" the interface surface 7 is divided into two sub-surfaces due to the presence of the through hole 4. Advantageously the sub-surface opposite the cutting tip 6 has a substantially triangular shape and has a greater extension than the other sub-surface, so as to facilitate the integral fixing between the two half-drums 2', 2".

The presence of the two half-drums 2', 2" made of PET makes it possible to obtain a dividing drum 1 which has a correct linear expansion coefficient and without excessive waste of material.

PET is commercially available in the form of a cylindrical or sheet semi-finished product. Due to the characteristics of PET it is not easily possible to obtain sheets with

a thickness greater than 100mm due to the difficulties that would arise in preparing such a thick and heavy sheet. There are no sheets on the market with a thickness greater than 100mm.

As visible in fig. 8, there would be a big waste of material for the production of a dividing drum obtained from a large cylindrical monobloc semi-finished product. The whole region shown in fig. 8 is between the circumference of the cylinder and the dividing drum and represents material wasted in processing.

Fig. 8 represents the geometric development of a complete drum already known in the art, obtained from a monobloc semi-finished product with a cylindrical shape and of large diameter available on the market, but not in PET material, to obtain which a long processing cycle is necessary to eliminate the areas to be discarded, with consequent problems in disposing of the resulting plastic material, high production costs, and limited technical characteristics compared to an equivalent product in PET. A cylinder with such dimensions cannot be obtained in PET due to manufacturing problems due to the characteristics of the material.

Conversely, in fig. 7 we can clearly see that by using a PET sheet it is possible to obtain the desired half-drum with very little waste of material.

Fig. 7 represents the geometric development of the invention, obtained from the coupling of two half-drums produced by working two single sheets of semi-finished sheet, of such dimensions as to be made with the PET material for which the best characteristics have been recognized (compared to other plastic materials) with regard to thermal expansion coefficient, hardness, workability with machine tools, admissibility to contact with food products, wear resistance.

To keep the two half-drums integral with each other, each interface surface includes fixing means.

These can advantageously include interlocking fastening means in which on one of the interface surfaces 7 there is at least a concavity 8 and on the other interface surface 7, in the equivalent position, there is a convexity 9 suitable to be inserted into the concavity 8 once the half-drums 2', 2" are assembled together.

Advantageously, in correspondence with the sub-surfaces of substantially triangular shape it can be provided that the concavity is constituted by a concave strip that runs along the perimeter of said sub-surface and obviously the respective convexity will be constituted by a convex strip of equivalent shape. This allows for a large interlocking surface, giving solidity to the structure.

Advantageously, at the sub-surface close to the cutting tip 6, the concavity is constituted by a strip that runs along the wall close to the through hole 4 and extends along the cutting tip 6. The respective convexity will have an equivalent shape. This allows to make the most of the reduced contact surface present in this area of the dividing drum to guarantee a solid fixing.

For the optimal functioning of the volumetric divider, an airtight seal of the two half-drums 2', 2" should be guaranteed, so that the suction and thrust action of the piston of the volumetric divider has maximum effectiveness. In the event that there was an entry of air between the interface surfaces 7, especially in the phase of suction of the dough by the piston, it is evident that this suction action would lose effectiveness.

To this end, it is advantageous for at least one gasket 10 to be present between the interface surfaces 7.

Advantageously, the gasket 10 located in correspondence of the triangular sub-surface can also have a triangular shape and run along the external perimeter of the concavity 8 and the convexity 9.

As illustrated in fig. 4, the gasket 10 placed in correspondence with the other sub-surface, can run along the side of the concavity 8 and the convexity 9 close to the through hole 4 and end with a protrusion in correspondence with the cutting tip 6.

This configuration of seals 10 maximizes the hermetic effect and provides optimal performance to the dividing drum.

Advantageously, to further increase the solidity of the drum 1 and the airtight effect, tie rods 11 are provided which can be inserted into through holes 12 present on the body of the drum 1.

The tie rods 11 can consist of rods threaded at their ends, which thus allow them to be inserted into the through holes 12 and be fixed using nuts to tighten the two half-drums 2', 2" together.

In conclusion, the basis of the inventive concept of the present invention is the fact that among the possible plastic materials as an alternative to PET that can be evaluated for the construction of a drum that can work without lubrication there are:

• Polyethylene (PE ld, PE hd, PE uhmw); semi-finished products can also be made in large sizes and are permitted for food use. They are not very rigid, have a very low softening and melting point, and excessive thermal expansion for use in this field;

• POM C (acetal resins); semi-finished products can also be made in large sizes and are permitted for food use. They are much more rigid than semi-finished products made of PE, the melting point is slightly higher than PE, and the thermal expansions are 50%

lower than PE; the melting point is still too low for it to be a suitable material for the present purpose;

• Cast nylon: this material can be casted into molds of any shape; even if it has mechanical characteristics similar to PET, it is not a material permitted for food use due to its toxicity;

• Mix of PE and POM C with the addition of glass fibres, Kevlar, carbon fibre: the adjuvants for rigidity and dimensional stability and expansion are not allowed for food use due to their toxicity.

Unlike these materials mentioned above, PET can be obtained in the form of semi-finished products with dimensions much smaller than the previous ones. It is permitted for food use. It has high rigidity and is workable by machine tools with surface qualities similar to metals. Its melting point is much higher than that of the materials mentioned above. Simply to give an indication of the best thermal expansion characteristics, it is mentioned that the thermal expansion of PET is 60% lower than that of POM C.

Basically, PET guarantees high performance thanks to its intrinsic characteristics, but it cannot be produced in large formats. The invention allows the creation of a dividing drum with high mechanical and technological characteristics, large dimensions, and without wasting material.

While the inventive concept has been described with reference to exemplary embodiments, it will be apparent to those skilled in the art that various changes and modifications can be made without departing from the scope of the inventive concept. Therefore, it should be understood that the above embodiments are not limiting, but illustrative. The invention is defined by the following claims.

CLAIMS

1. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, comprising a curved head surface (3) and a through hole (4) that passes through the entire body of the drum (1) starting from said head surface (3) up to a base surface (5); said head surface (3) ending at one of its end sides in a cutting tip (6), protruding from the body of the drum (1);

said drum **being characterized by the fact of**

being composed of two half-drums (2', 2") made of polyethylene terephthalate;

each half-drum (2', 2") constituting half of the drum (1) obtained by dividing it geometrically along its longitudinal plane of symmetry; each half-drum (2', 2") comprising an interface surface (7); said interface surfaces (7) being in mutual contact to constitute the complete dividing drum (1); each interface surface (7) including fixing means for integrally fixing the two half-drums (2', 2").

2. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to claim 1, **characterized by the fact that** said fixing means include interlocking fixing means in which on one of the interface surfaces (7) there is at least one concavity (8) and on the other interface surface (7), in the equivalent position, there is a convexity (9) adapted to be inserted into the concavity (8), once the half-drums (2', 2") are assembled together.

3. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to any of the previous claims, **characterized by the fact that** at least one gasket (10) is provided between the interface surfaces (7).

4. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to any of the previous claims, **characterized by the fact that** for each half-drum (2', 2") the

interface surface (7) is divided into two sub-surfaces due to the presence of the through hole (4).

5. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to claim 4, **characterized by the fact that** the sub-surface opposite to the cutting tip (6) has a substantially triangular shape and has a greater extension than the other sub-surface; at the sub-surface of substantially triangular shape, it being provided that the concavity (8) consists of a concave strip that runs along the perimeter of said sub-surface and that the respective convexity (9) consists of a convex strip of equivalent shape .

6. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to claim 5, **characterized by the fact that**, at the sub-surface near the cutting tip (6), it is provided that the concavity (8) is made up of a strip that runs along the wall next to the through hole (4) and extends along the cutting tip (6) and that the respective convexity (9) has an equivalent shape.

7. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to claim 6, **characterized by the fact that** the gasket (10) placed at the triangular sub-surface has a triangular shape and runs along the outer perimeter of the concavity (8) and of the convexity (9); and **by the fact that** the gasket (10) placed in correspondence with the other sub-surface runs along the side of the concavity (8) and of the convexity (9) close to the through hole (4) and ends with a protrusion in correspondence with the cutting tip (6).

8. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to any of the previous claims, **characterized by the fact that** the body of the drum (1) has through holes (12) in which tie rods (11) are inserted.

9. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to claim 8, **characterized by the fact that** the tie rods (11) include threaded ends; nuts being screwed onto said ends, so as to tighten the two half-drums (2', 2") together.

10. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to claim 9, **characterized by the fact that** PET has a linear expansion coefficient between 30 * 10^{-6} K^{-1} and 60 * 10^{-6} K^{-1}.

AMENDED CLAIMS

received by the International Bureau on 29 July 2024 (29.07.2024)

1. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, comprising a curved head surface (3) and a through hole (4) that passes through the entire body of the drum (1) starting from said head surface (3) up to a base surface (5); said head surface (3) ending at one of its end sides in a cutting tip (6), protruding from the body of the drum (1);

said drum **being characterized by the fact of**

being composed of two half-drums (2', 2") made of polyethylene terephthalate;

each half-drum (2', 2") constituting half of the drum (1) obtained by dividing it geometrically along its longitudinal plane of symmetry; each half-drum (2', 2") comprising an interface surface (7); said interface surfaces (7) being in mutual contact to constitute the complete dividing drum (1); each interface surface (7) including fixing means for integrally fixing the two half-drums (2', 2").

2. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to claim 1, **characterized by the fact that** said fixing means include interlocking fixing means in which on one of the interface surfaces (7) there is at least one concavity (8) and on the other interface surface (7), in the equivalent position, there is a convexity (9) adapted to be inserted into the concavity (8), once the half-drums (2', 2") are assembled together.

3. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to any of the previous claims, **characterized by the fact that** at least one gasket (10) is provided between the interface surfaces (7).

4. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to any of the previous claims, **characterized by the fact that** for each half-drum (2', 2") the

interface surface (7) is divided into two sub-surfaces due to the presence of the through hole (4).

5. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to claim 4, **characterized by the fact that** the sub-surface opposite to the cutting tip (6) has a substantially triangular shape and has a greater extension than the other sub-surface, it been provided that the concavity placed at the sub-surface of substantially triangular shape consists of a concave strip that runs along the perimeter of said sub-surface and that the respective convexity (9) consists of a convex strip of equivalent shape .

6. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to claim 5, **characterized by the fact that**, at the sub-surface near the cutting tip (6), it is provided that the concavity (8) is made up of a strip that runs along the wall next to the through hole (4) and extends along the cutting tip (6) and that the respective convexity (9) has an equivalent shape.

7. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to claim 6, **characterized by the fact that** the gasket (10) placed at the triangular sub-surface has a triangular shape and runs along the outer perimeter of the concavity (8) and of the convexity (9); and **by the fact that** the gasket (10) placed in correspondence with the other sub-surface runs along the side of the concavity (8) and of the convexity (9) close to the through hole (4) and ends with a protrusion in correspondence with the cutting tip (6).

8. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to any of the previous claims, **characterized by the fact that** the body of the drum (1) has through holes (12) in which tie rods (11) are inserted.

9. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to claim 8, **characterized by the fact that** the tie rods (11) include threaded ends; nuts being screwed onto said ends, so as to tighten the two half-drums (2', 2") together.

10. DIVIDING DRUM (1) FOR VOLUMETRIC DIVIDERS, according to claim 9, **characterized by the fact that** PET has a linear expansion coefficient between 30 * 10^{-6} K^{-1} and 60 * 10^{-6} K^{-1}.

STATEMENT UNDER ARTICLE 19 (1)

The claims have been modified as follows:

- the new claim 5 has been modified in order to take account of the considerations of the ISA Examiner regarding clarity reasons contained in his Written Opinion.

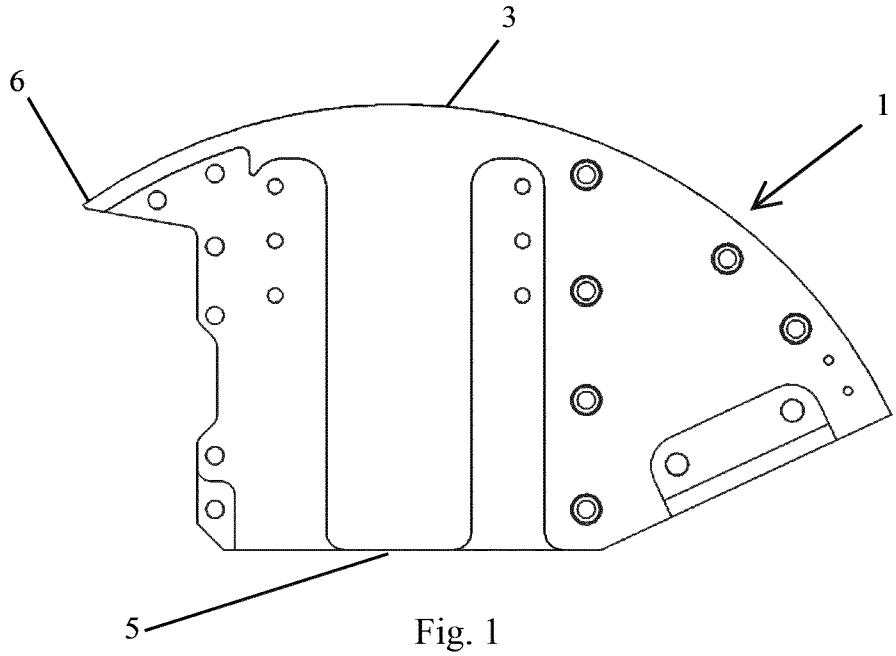

Fig. 1

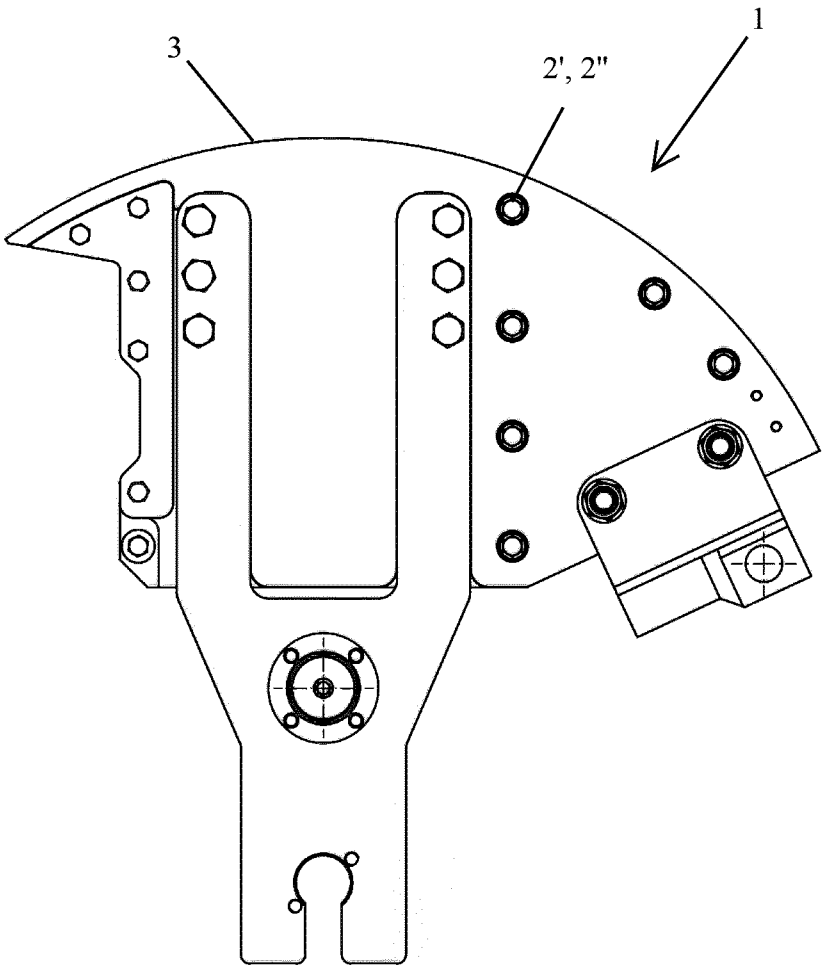

Fig. 3

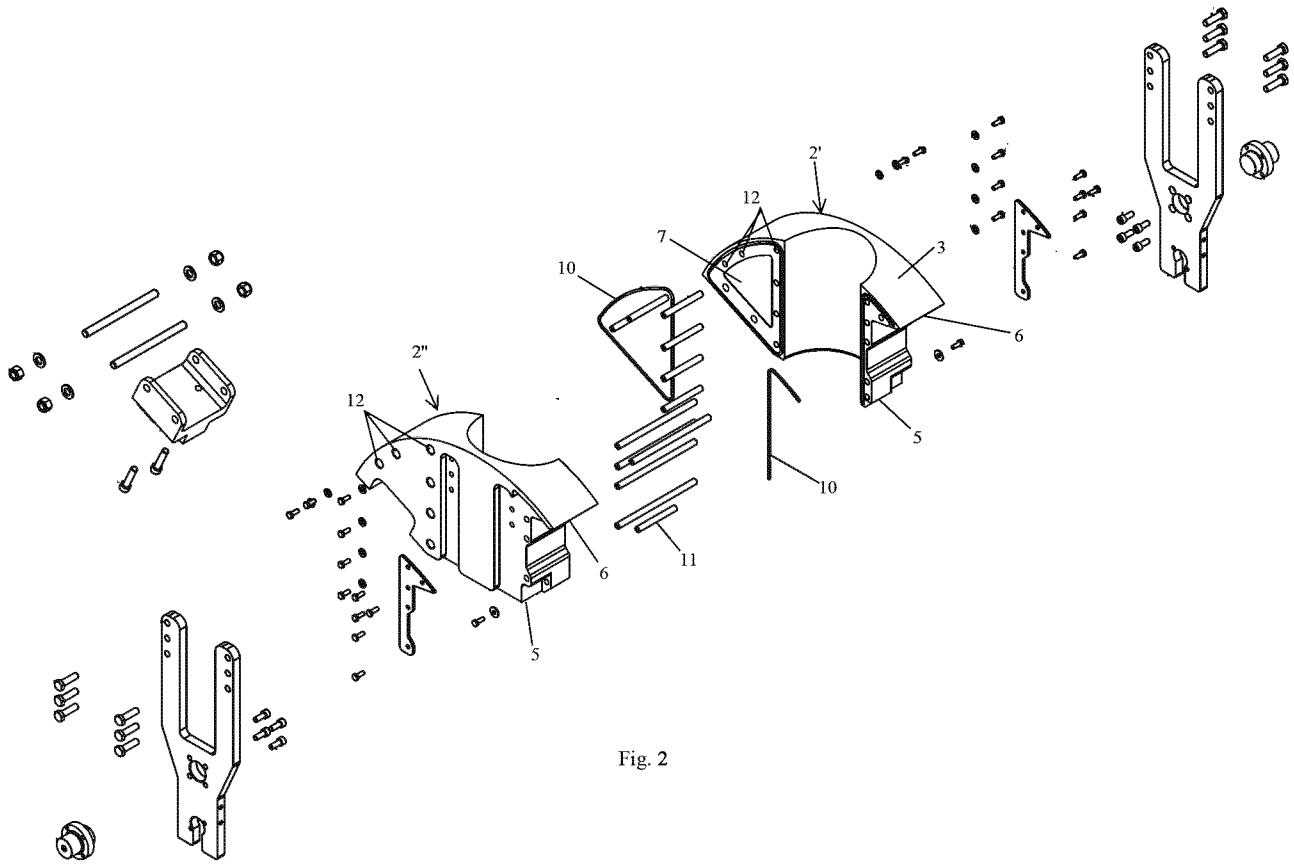

Fig. 2

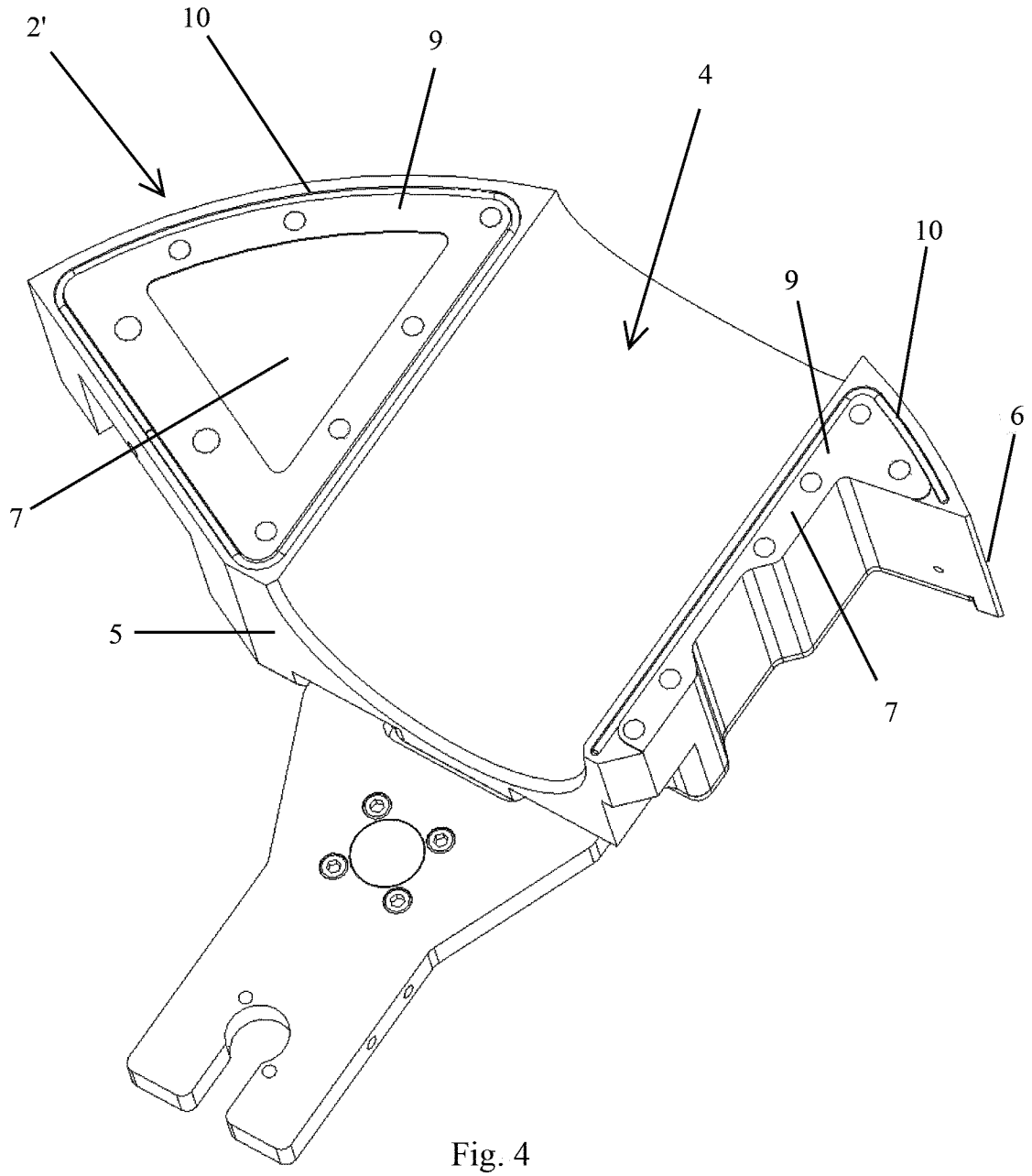

Fig. 4

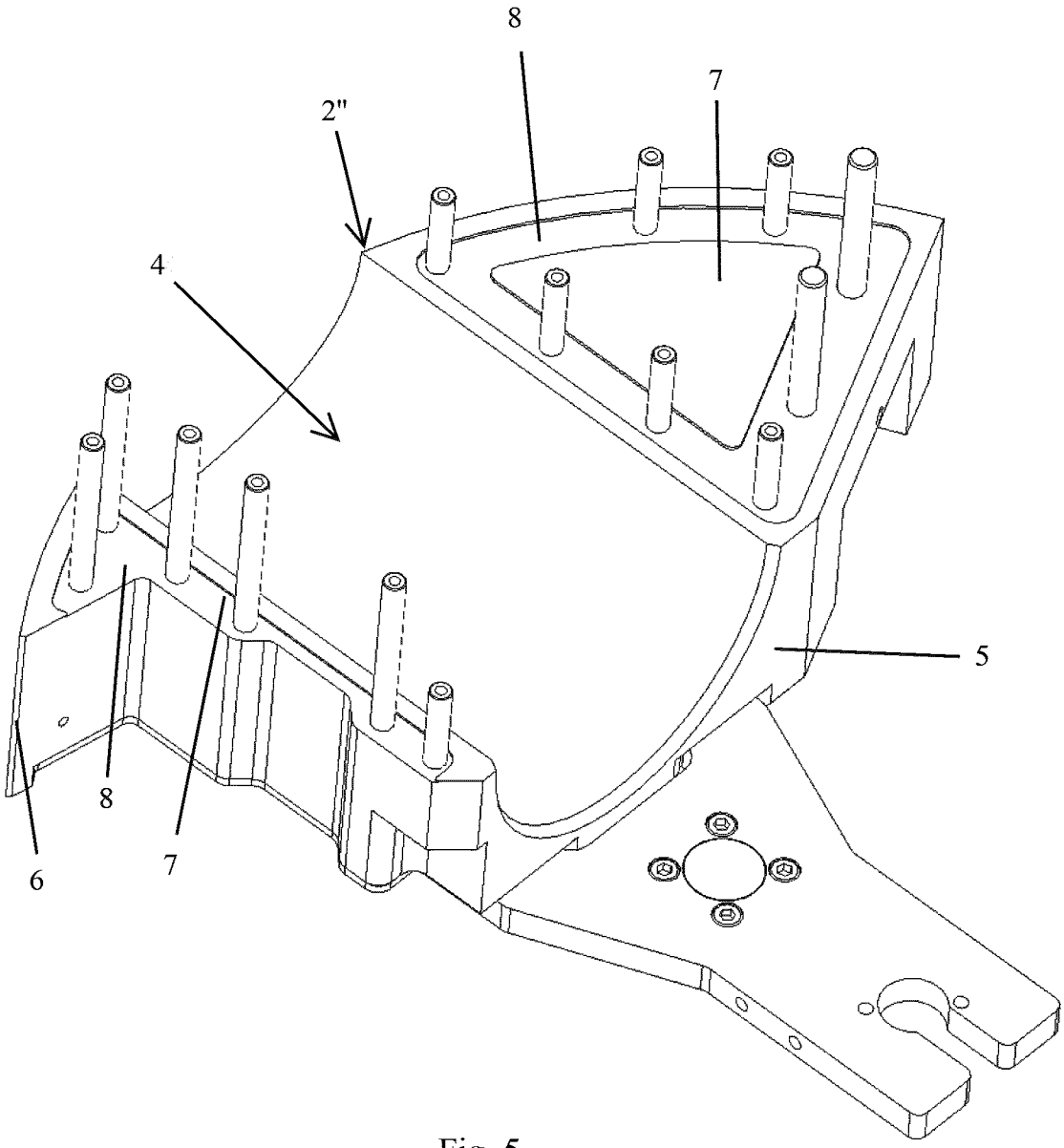

Fig. 5

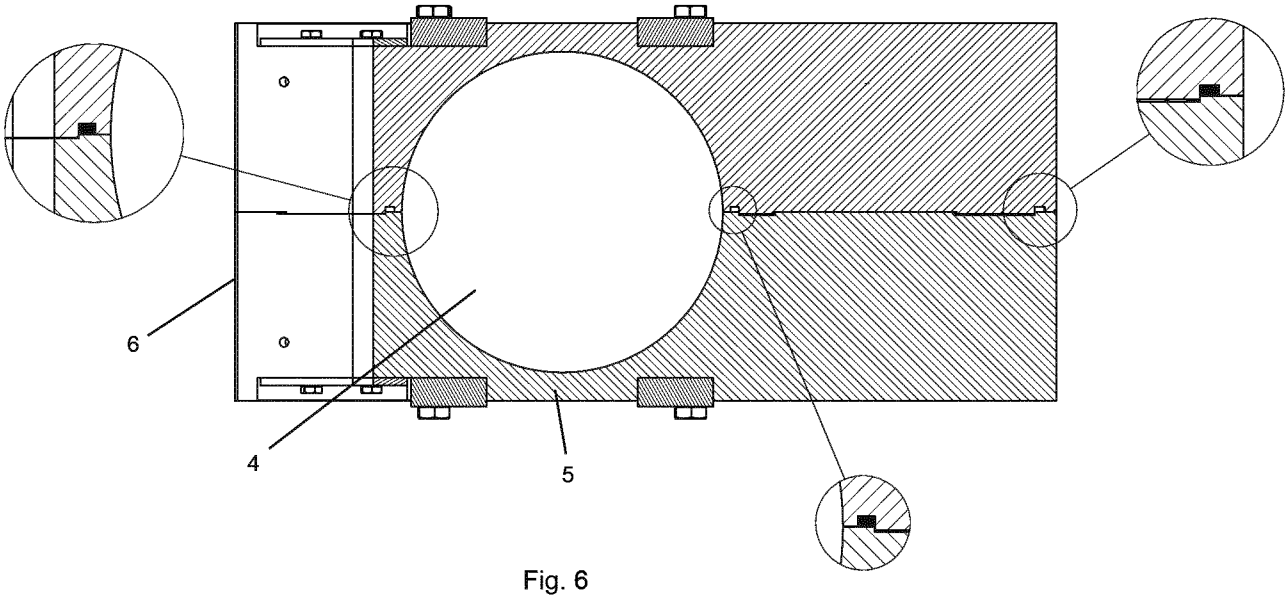

Fig. 6

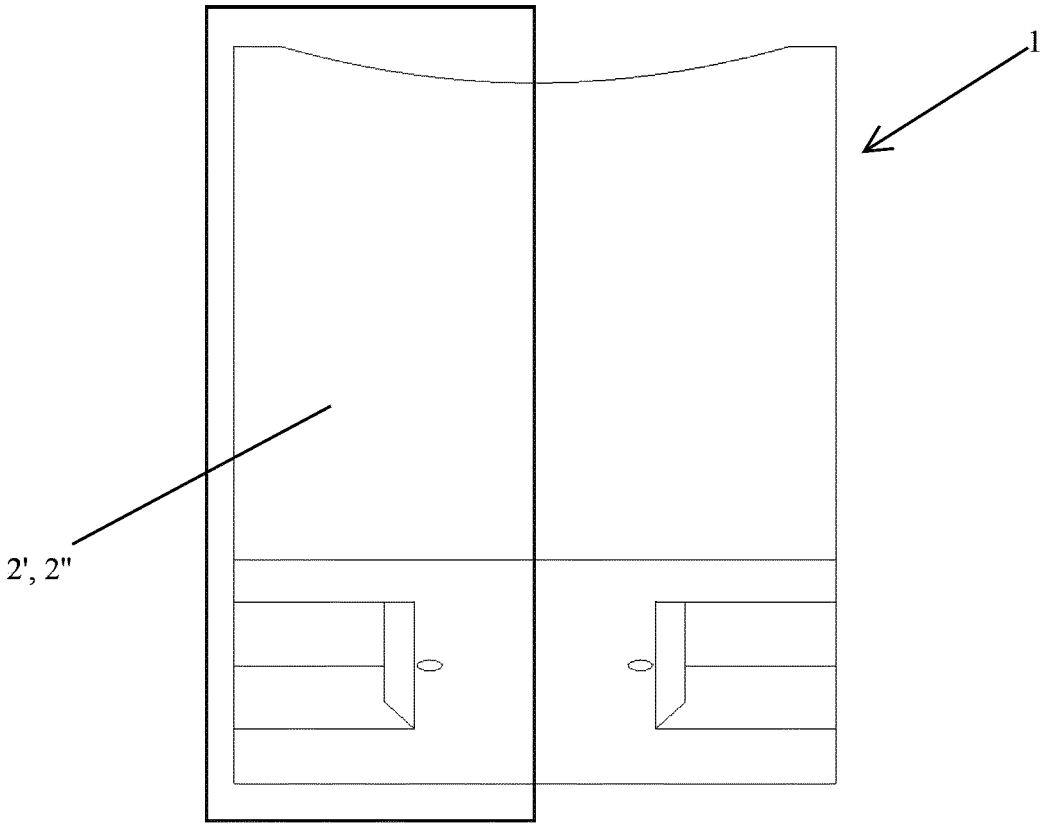

Fig. 7

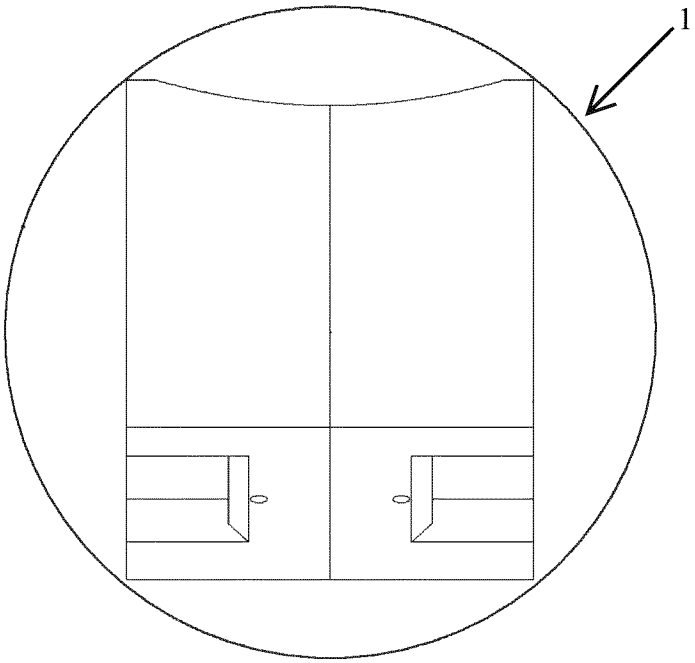

Fig. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2024/061984

A. CLASSIFICATION OF SUBJECT MATTER
INV. A21C5/02 A21C5/04
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A21C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 11 64 948 B (CORNELIS JAN GIJSBERT VAN T WO) 12 March 1964 (1964-03-12) cited in the application column 2, line 29 - column 4, line 15; figure 3	1-10
A	US 10 736 330 B2 (WERNER & PFLEIDERER LEBENSMITTELTECHNIK GMBH [DE]) 11 August 2020 (2020-08-11) column 3, line 3 - column 4, line 55; figure 1	1-10
A	DE 460 745 C (FRIDOLIN WINKLER) 4 June 1928 (1928-06-04) figures 1,2	1-10

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[x] Further documents are listed in the continuation of Box C.

[x] See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
25 June 2024	04/07/2024

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Mendão, João

1

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2024/061984

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 27 48 988 C2 (WINKLER KG F) 11 October 1984 (1984-10-11) column 3, line 31 - column 5, line 47; figures 1-4	1-10
A	NL 104 922 C (CORNELIS JAN GIJSBERT VAN'T WOUT [NL]) 15 May 1963 (1963-05-15) figure 3	1-10
A	DE 474 276 C (FRIEDRICH KUEHTZ; WILHELM METZGER) 18 June 1929 (1929-06-18) column 2, line 29 - column 4, line 15; figure 3	1-10

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2024/061984

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		EP 3449726 A1	06-03-2019
		HU E049680 T2	28-10-2020
		PL 3449726 T3	10-08-2020
		US 2019069559 A1	07-03-2019
DE 460745 C	04-06-1928	NONE	
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DE 474276 C	18-06-1929	NONE	