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Remarks:

Amended claims in accordance with Rule 137(2) EPC.

(54) **ROTARY DEVICE FOR OIL EXTRACTION FROM OILSEED**

(57) The invention refers to a rotary device for extracting oil from oilseed. The device is made up of half-cups (6) assembled onto two discs (12) of inclined rotational axes, which are joined and together with the plate (2), perforated as a sieve, form a pressing cavity into which a punch (1) enters. Oil from the pressing area is allowed to flow into the collecting trough (3) towards the oil tank (4). The punches (1), assembled on a rotating punch-carrying disc (11), have a complex constructive form that ensures the uniform pressing of the oilseed loaded from the seed tank (9) and engage the two discs (12) in a rotation motion in order to bring another cavity filled with seeds in front of the next punch (1). The heating elements (8), (10) and (13), on a seed loading tank (9) and on the discs (11, 12) respectively, maintain the optimum extraction temperature.

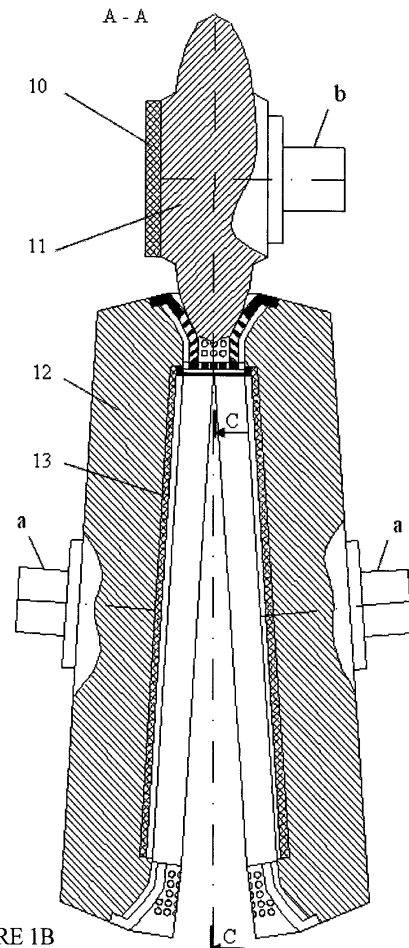


FIGURE 1B

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Description

[0001] The invention refers to a rotary device for extracting oil from oilseeds. Various oil extraction devices from oilseeds which are based on extraction using screws are known (US 2009/0126583 A1). Their disadvantage consists of exerting a pressure that does not have the same value in the whole mass of seeds subjected to pressure. The lack of a uniform pressure causes a low yield extraction. Another disadvantage is given by the interruption of the extraction cycle in order to evacuate the meal.

[0002] The technical problem solved by the invention consists in the use of a certain type of punch and two half-cups assembled on two disks of inclined rotational axes to extract the seed oil by mechanical pressing. The complex constructive form of the punch is obtained by two shapes: a shape generated by the rotation on a circle of an involute curve around the axis of symmetry which ensures seed pressing and engages the surfaces of the two half-cups and, at the peak, a shape generated by the rotation on a circle around the axis of symmetry of a parabolic curve. These forms ensure constant pressure over the entire mass of seeds subject to pressure and amplify the mechanical work that is exerted to the seeds. The half-cups have two forms inside, one generated by the rotation on a circle around the axis of symmetry of an involute curve and one generated by the rotation on a circle around the axis of symmetry of a line.

[0003] The oil extraction device eliminates the disadvantages of the known solutions and solves the proposed technical problem by using the half-cups, assembled on the two discs with inclined axes, which, joined together with a plate, form a pressing cavity into which a punch is inserted, ensuring a uniform pressing, and engage the disks into a rotation motion that brings another cavity filled with seeds in front of the next punch. By continuing to rotate the disks, due to the inclination of the axes of rotation, the half-cups open and allow easy evacuation of the shed on a sloped trough to a tank.

[0004] The oil extraction device, according to the invention, has the following advantages:

- provides the necessary pressure to break the seeds in order to extract the oil they contain;
- it ensures a continuous working regime;
- uniform extraction pressures are provided on the entire mass of seeds using the two-sided punch;
- the two half-cups can be easily cleaned or replaced in case of clogging;
- the sieve-shaped part ensures the passage of the oil to the collection tank and can be easily replaced or cleaned if clogging occurs;
- better separation of the shed from oil is ensured;
- reduction of the extraction time and increase of the extraction efficiency/reduced extraction time and increased extraction efficiency;
- provides granular pellets that can be used for differ-

ent purposes (adding fiber to food, fertilizer, burning briquettes, etc.).

[0005] The following is an example of an execution of the invention, in relation to Figures 1A, 1B and 2, which show:

- Figure 1A, C-C cross-sections through the device;
- Figure 1B, A-A cross-sections through the device;
- Figure 2, detail D from the press area.

[0006] The device, according to the invention, consists of two cone-trunk disks **12** which have inclined rotational axes and bearings on the surfaces **a**. The operation of the two cone-trunk disks **12** is done simultaneously by engaging the punch **1** and the half-cups **6** assembled at the front of the cone-trunk disks, Figure 1B, section A-A. The operating in the sequential rotation motion of the port-punches disk **11** is performed by coupling surface **b** to a kinematics chain provided with a gear-motor system. The heating elements **13** that provide the optimum extraction temperature are placed inside the two-cone trunk.

[0007] On the cone-trunk disks **12** there are reaming in which the channels **c** are made radially, in order to allow the oil to be evacuated during the pressing phase. In the reaming, the half-cups **6**, fitted with radial outlet holes for the oil evacuation obtained by pressing, are assembled, Figure 2. The channels are equidistant and executed in front of the radial holes from the half-cups **6**.

[0008] The loading with the oilseeds that will be pressed is done from the seeds tank **9**, by free fall, Figure 1A. The seeds will fill the cavity formed by the two half-cups and plate **2**. Under the seeds tank **9** there is the heating element **8** which has the role of preheating the seeds.

[0009] The pressing area comprises the cavity formed by the two half-cups **6**, the plate **2** and the punch **1**, located on the port-punches disk **11**, Figure 1B. The punch **1** has a complex constructive form that includes a base volume **d** generated by the rotation of an involutes profile in the vertical plane to ensure the gearing with the half-cups **6** and a peak volume **e** generated by the rotation of a parabola in vertical plane to ensure a constant pressure in the whole mass of seeds subject to pressing. A heating element **10** is assembled on the port-punches disk **11** which performs the heating of the punches necessary to ensure the optimum extraction temperature.

[0010] The plate **2** of semi-cylindrical shape has holes near the pressing area which allow the oil obtained from the pressing of the seeds to drain, followed by an area that supports the shredded pellets formed as a result of the pressing until the release of the two half-cups **6** occurs which allow the pellets to discharge. After removal, the pellets will slide on the inclined trough **5** in the pellet store **7**, Figure 1, section C-C.

[0011] At the bottom of the plate **2** there is the oil trough **3**. It has a longitudinal section in a semi-cylindrical shape

and is U-shaped in cross-section. The trough for oil **3** has a length equal to the plate **2** and continues to the oil tank **4**, Figure 1A, section C-C.

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[0012]

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Claims

1. The device for extraction of oil from oilseeds **characterized in that** it consists of two cone-trunk disks (**12**) of inclined axes which, by rotation, allow the upper area to form a seed-pressing cavity, formed by the two perforated half-cups (**6**) and the sieve type plate (**2**), through which the oil is drained during pressing and then, by continuing to rotate the two cone-trunk disks (**12**), the half-cups (**6**) is released and the scrap pellets are discharged.
2. The device according to claim 1, **characterized in that** the constructive form of the punches (**1**) and the half-cups (**6**) can realize a rotational motion and a pressing of the seeds to obtain the oil.
3. The device, according to claims 1 and 2, **characterized in that** the sieve-type half-cups (**6**) are assembled into the cone-trunk disks, in a semi-cavity that has internal drainage channels for oil flow during pressing, in order to collect it and to allow an easy replacement in case of clogging.
4. The device according to claim 1, **characterized in that** it includes the heating element (**8**) at the base of the loading seed tank (**9**), the heating element (**13**) on the cone-trunk disks (**12**) and the heating element (**10**) on the front side of the port-punches disk (**11**) which maintain the extraction temperature to an optimum value.

Amended claims in accordance with Rule 137(2) EPC.

1. A device for oil extraction from oilseeds, which comprises two cone-trunk disks (**12**) that have inclined rotation axes with respect to the horizontal direction; on each front face of the discs are mounted perforated half-cups (**6**) equidistant positioned; in the contact area of the discs there are brought face to face

the half-cups (**6**) that form a seed-pressing cavity together with the sieve type (perforated) plate (**2**) which is located at the base of the perforated half-cups; in the achieved cavity, the punches (**1**) that are equidistant positioned on the port-punches disk (**11**) enter and press the seeds from which the oil is extracted; the oil is drained through the perforated half-cups and through the sieve during pressing and collected by the trough (**3**) in the oil tank (**4**); by continuing to rotate the two cone-trunk disks (**12**), the half-cups (**6**) are splitting up, the scrap pellets are released and discharged to the pallet tank (**7**).

2. The device according to claim 1, wherein the constructive form of the punches (**1**) and the perforated half-cups (**6**) can realize a rotational motion and a pressing of the seeds to obtain the oil.
3. The device, according to claims 1 and 2, comprises the perforated half-cups (**6**) that are equidistant assembled into the cone-trunk disks, in equidistant semi-cavities that has internal drainage channels for oil flow during pressing, in order to collect it and to allow an easy replacement in case of clogging.
4. The device according to claim 1, includes the heating element (**8**) at the base of the loading seed tank (**9**), the heating element (**13**) on the cone-trunk disks (**12**) and the heating element (**10**) on the front side of the port-punches disk (**11**) which maintain the extraction, temperature to an optimum value.

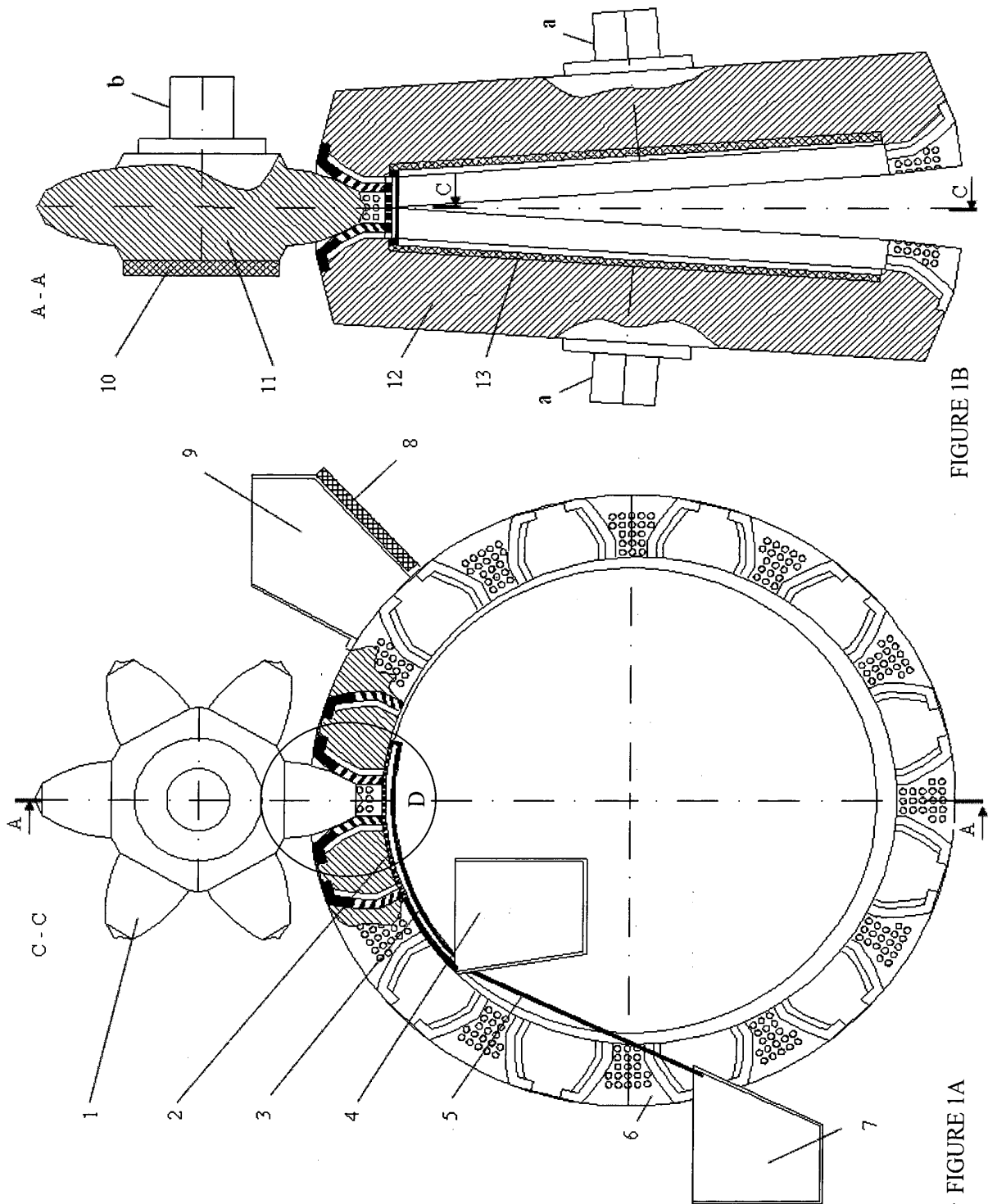


FIGURE 1B

FIGURE 1A



EUROPEAN SEARCH REPORT

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 15 July 2020	Examiner Papakostas, Ioannis
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p> <p>& : member of the same patent family, corresponding document</p>			

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